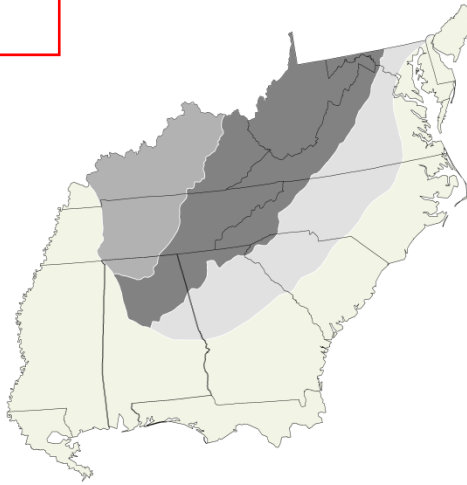


This version of the flora has maps reduced to a few pixels to reduce file size. For a full version, see <http://herbarium.unc.edu/flora.htm>

This version is also divided into parts to see if this will work better on mobile devices. This is part 4 of 4: Eudicotyledonae (Eudicots), pages 770-1197

Flora of the Southern and Mid-Atlantic States

Working Draft of 28 September 2012



by
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INTRODUCTION

The Flora

Floras serve as the basic reference of the plant biota of an area; they are critical tools that serve botanists, conservationists, ecologists, foresters, gardeners, agronomists, researchers, and the general public. In the nineteenth and early twentieth centuries, the botanical exploration of an area and writing a flora to summarize that information was seen as a basic societal need leading to the discovery of economically valuable information. Financial support for the research and writing of floras has waned in recent decades, though, as they have been increasingly regarded as “old science” and resources have shifted to areas of plant science seen as more “cutting edge.” Even in taxonomic research, the advent of molecular techniques has largely supplanted detailed taxonomic research (at generic levels and below) and the writing of floras, and the great majority of papers in plant systematics now address phylogenetic relationships within a particular group of plants, and mostly at higher taxonomic levels. Traditional monographic taxonomy, with descriptions of taxa, keys to facilitate their identification, distribution maps, and assessments of habitat and relative abundance or rarity, has become increasingly rare.

Yet, paradoxically, the societal uses and needs for the translation of taxonomic information to a useable form, such as floras, have never been greater. Globalization of human societies and economies has meant that plants are regularly introduced far away from their regions of nativity, and many become established and can be either benign or cause economic and conservation damages. Increasing human utilization of land resources has fueled a biodiversity crisis, with many species now considered imperiled. In the United States and elsewhere, this has resulted in considerable governmental and nongovernmental activity focused on biodiversity inventory and conservation, “recovery” of endangered and threatened species, ecological studies and ecological restoration, and assessment and suppression of invasive exotics. All these activities require an accurate and sophisticated understanding of the flora of an area. These activities also generate new information about the taxonomy, distribution, and conservation status of components of a region’s flora which then needs to be incorporated into new iterations

In the southeastern United States, the publication thirty-seven years ago of the Manual of the Vascular Flora of the Carolinas, by A.E. Radford, H.E. Ahles, and C.R. Bell (Radford, Ahles, & Bell 1968), was a landmark. In the decades since its publication, it has served as the primary reference for the identification of plants in the Carolinas, and throughout the southeastern United States (since most other states were not covered by comparable, recent references). The effort to research and write the Manual of the Vascular Flora of the Carolinas took about 11 years, and resulted in a series of publications, the Guide to Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1964), the Atlas of the Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1965), and finally the Manual itself (1968). Once published, the existence of “the Manual” helped generate an interest in and further studies of the flora of the region; since then, many additional species have been documented as part of the region’s flora, additional alien species have become naturalized, new species have been described, monographs have given new taxonomic insights into groups, nomenclature accepted in 1968 has been found to be invalid, new and more reliable keys have been developed, and systematic treatments have changed and advanced. Increasingly, identification of the flora of our area (and other states of the Southeast and Mid-Atlantic) by academic researchers, agency personnel, and the interested public is hampered by the lack of an up-to-date flora. Without such a flora, identification must involve reference to herbaria and thousands of monographs, papers, and other floras – resources not readily available to many people who need them. The absence in the region of a single-source modern standard for the systematic treatment, nomenclature, and identification of the flora compromises scientific studies, ecological research, and agency inventory, management, and monitoring of ecosystem and species biodiversity.

Chapter 1 consists of a new treatment of the flora of the Carolinas, Virginia, and Georgia, to fill the need for a new standard reference to aid in the consistent identification of the flora of the region. While building on the tradition of the Manual, the Flora is not a revision or second edition; it takes some different approaches, has features the Manual lacks, lacks features the Manual has, and has an expanded geographic scope. At the present time, the Flora includes treatment of all species in the flora area of Delaware, Virginia, West Virginia, North Carolina, South Carolina, Georgia, northern Florida (the Panhandle and northeastern Florida, south to and including Dixie, Gilchrist, Columbia, Union, Bradford, Clay, and Duval counties), Alabama, Mississippi, Tennessee, Kentucky, the District of Columbia, and Maryland, and portions of the additional states of New Jersey (southern New Jersey, south of and including Monmouth and Burlington counties), and Louisiana (the Florida Parishes, east of and including West Feliciana, East Baton Rouge, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, and Plaquemines parishes) (see Figure 1.A.). Approximately 6800 taxa are keyed and treated, making the Flora a comprehensive resource for understanding the flora of all of the Southeastern United States east of the Mississippi River and south of the Ohio River and Mason-Dixon Line, excluding peninsular Florida.

Sources of information.

This new flora is based on all resources available: herbarium specimens, published literature, grey literature, Natural Heritage databases and rare species lists, and personal communication with a regional network of botanists and taxonomic experts. Herbarium specimens have been consulted at major institutions in the region.

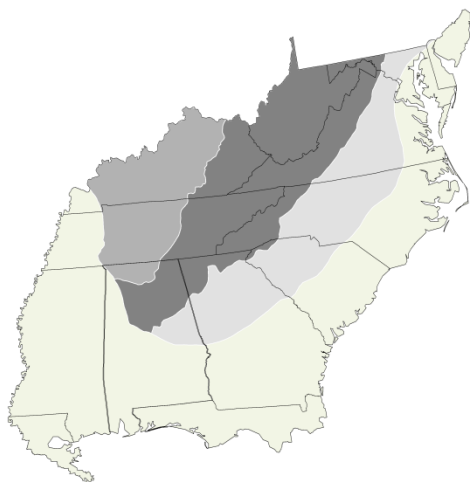


Figure 1.A. Map of the area covered by the Flora.

Criteria for inclusion of taxa.

One of the first challenges that the author of a flora encounters is to decide the criteria for the inclusion of taxa. The general rule in most floras can be simply summarized as “all native taxa and naturalized alien taxa,” but within this simplistic phrase hide many complicated issues, and floras often differ widely in the actual criteria and judgments that they apply (Pyšek et al. 2004; Palmer, Wade, & Neal 1995). In particular, coverage of alien species is very uneven in floras, and the frequent exclusion of many alien species from floras hampers ecological studies, conservation efforts, and efforts to minimize the ecological and economic impacts of invasive aliens.

The following categories of taxa are included and treated fully as “primary” species:

1. Native taxa documented from the Flora (Georgia, South Carolina, North Carolina, Virginia, West Virginia, Delaware, and northern Florida, Alabama, Mississippi, Tennessee, Kentucky, Maryland, District of Columbia, Maryland, eastern Louisiana, and southern New Jersey), whether extant or presumed extinct. Some authors, such as Isely (1990), have “excluded” taxa from a flora if they believed them to be extinct or extirpated. This philosophy seems poorly considered: these taxa may prove not to be extinct or extirpated and their inclusion in the Flora will facilitate possible rediscovery, even if never found again specimens of them in the herbarium need to be identified or confirmed, and their former existence in the region should be documented.
2. Alien taxa introduced by whatever means and demonstrably established and reproducing (sexually or vegetatively) as a component of the flora. Parallel to #1 above, established alien taxa which have been presumably eradicated (such as *Striga asiatica* in the Carolinas) are included, as their eradication may not have been effective, they may be reintroduced, specimens need to be identifiable using the Flora, and their former existence should be documented.
3. Alien taxa substantially cultivated in the Flora area as crops, such as *Triticum aestivale*, *Zea mays*, *Vitis vinifera*, and *Pinus clausa*. Such species are variably represented in herbaria, and are often included in floras only if one or more herbarium specimens indicate that the species is persisting, or has been collected around a dump or in the edge of a field “out of cultivation.” This seems an arbitrary criterion to apply to species which are among the most commonly seen and economically most important in a region, and may cover many thousands of acres or square miles in the region covered by the flora.

Additional categories of taxa are included and treated as “secondary” species:

1. Native taxa with uncertain documentation, this varying from literature reports not definitely verifiable with specimens (some of these old and some new), to sight reports regarded as probably correct. Taxa in this category are included as secondarily-treated taxa, and their imperfect documentation is described.

Species which have been reported from the Flora area but which are excluded for one reason or another are also listed and the reason for their exclusion mentioned or discussed.

Taxonomic philosophy. Taxonomic treatments generally follow recent monographic and revisionary work, but an effort has been made to provide a certain rough consistency of “splitting” vs. “lumping” across different taxonomic groups. As is generally true in recent treatments, generic and family concepts are often narrower than those used in the Radford, Ahles, and Bell (1968) Manual, based on new evidence, including (but not limited to) cladistic methods applied to morphologic and molecular data.

Ironically, these results have often resulted in a validation of earlier, narrower generic (and familial) concepts espoused by J.K. Small, P.A. Rydberg, and others (see Weakley 2005 for extensive discussion). Varieties are less frequently recognized than by Fernald (1950), though a considerable number of species and infraspecific taxa “lumped” by Radford, Ahles, and Bell (1968) are recognized (generally following more recent monographic or revisionary work). Some taxa not formally recognized are discussed and characters for their recognition provided in the text, to draw attention to putative taxa that may warrant recognition after further evaluation.

Format and features.

Detailed keys. Keys have been subjected to rigorous testing in the field and herbarium by hundreds of users. To the degree feasible, keys are structured to emphasize characters that are readily observable and available for long parts of the year, such as vegetative characters; this is not feasible for all groups, of course. Multiple characters are provided. Terminology strives to avoid abstruse technical terms which do not significantly add meaning (for some genera, an introduction to morphological characters and terms used is provided as “Identification notes” preceding the key). Geographic distributions and habitats are sometimes included in the keys as pragmatic, useful, secondary “characters,” but are placed in brackets to indicate that they are not “true” characters. The keys include all species from the primary and secondary flora areas (North Carolina, South Carolina, Virginia, Georgia, Alabama, Mississippi, Tennessee, Kentucky, West Virginia, Maryland, Delaware, the District of Columbia, and parts of Florida, Louisiana, and New Jersey). In some cases, several alternate keys are provided. The primary emphasis of the keys is pragmatism – effective and efficient identification. For this reason, a key to a genus sometimes includes closely similar taxa not in the genus that may be mistaken for it. Another example is that the “family key” to ferns and fern allies is actually a key to genera, allowing an emphasis in the key on readily observable characteristics, rather than the technical characters often needed to distinguish fern families. Keys are based on herbarium specimens, though reference is made when characters based on live or fresh plants may differ from those of pressed and dried specimens. Some keys have been adapted from literature cited; where the adaptation is particularly close, credit is given to the source by specific citation.

Habitat. Information is provided about the habitat of the taxon. This information is largely from the field experience of the author, supplemented by information from other botanists, from herbarium labels, and from the literature. For species with wide ecological amplitudes, the habitat may be described simply and broadly (“a wide variety of upland forests”), while the habitat of more localized, specialized, or rare taxa may be described in considerable detail (“moist outcrops of calcareous to semi-calcareous metamorphic rocks, such as mylonite or marble, near waterfalls in humid escarpment gorges with high rainfall, at low elevations”).

Native status. The native or alien status is stated. Also, an asterisk prior to the species’ name indicates that it is considered alien throughout the primary flora area. Some past floras, including Radford, Ahles, and Bell (1968), were haphazard in their inclusion of this information, which is a very important attribute of each recognized taxon. If there is a question, it is mentioned or discussed. For aliens, an opinion is given as to whether the taxon is naturalized, persistent, waif, etc. in the primary flora area.

Flowering/fruitlet dates. Flowering and fruiting dates are provided for the primary flora area. These are derived from herbarium specimens viewed by the author (collected from within the Flora area), from field observations by the author (within the Flora area), and from literature cited.

Distribution of species. A statement of the rangewide distribution of each taxon treated is provided. This is based on published distribution maps and distribution statements in other floras, amended and improved by additional herbarium specimens and published records (such as the “Noteworthy Collections” section in the journal *Castanea*). The distribution within the primary area is provided by state and physiographic province.

These distribution statements are being replaced by a map.

The map shows distribution within the Flora area symbolically, with each state × physiographic province area, except that on the maps, the very small areas of the DC Piedmont, the DC Coastal Plain, and the DE Piedmont are not shown separately from the MD Piedmont, the MD Coastal Plain, and the MD Piedmont, respectively. The native/alien status of the taxon is shown by squares for native occurrence and triangles for alien occurrence. Note that some species have distributions including both alien and native distributions, so *Dionaea muscipula* for instance is native in the Coastal Plain of NC and SC, but alien in the Coastal Plain of FL. The abundance in that state × physiographic province area is shown by the symbol, an open symbol is rare, a symbol with a dot is uncommon, and a filled symbol is common.

In the lower right corner is a space designated for distributional information. If the species is endemic to the Flora Area, you will see "EN." If the species is alien, you will see the region of the world to which it is native. If the species is native but not endemic, you will see a compass rose. Eight arrows depict the native distribution of the taxon outside of the Flora area. Arrows can be long (common at least somewhere in that region), or short (only uncommon or rare in that region).

The regions to which the eight arrows point are:

N arrow -- ne. North America (PA and n. NJ north to the Canadian maritime provinces, west through QC to se. ON and e. and s. OH);
 NW arrow -- nw. North America (w. OH, MI, w. ON, and NU west to AK, BC, and OR, north of and including n. MO, NE, WY, ID, and OR);
 W arrow -- w. United States (the western “Southeast” of trans-Mississippi LA, AR, s. MO, OK, and e. TX), west to sw. United States;
 SW arrow -- Mexico, Central America, and South America;
 S arrow -- peninsular FL;
 SE arrow (dashed to indicate oversea) -- West Indies (including Bahamas) and Bermuda;
 E arrow (dashed to indicate oversea) -- Asia and/or Africa;
 NE arrow (dashed to indicate oversea) -- Europe.

Literature. Nearly all genera have citations to recent, pertinent systematic literature, as well as more limited citations to literature on ecology and population biology. The intent is to provide the user with access into more detailed literature, and to document the literature basis of the treatment followed in the Flora. About 2100 references have been consulted and are cited.

Synonymy. Cited synonymy is provided to regional floras, monographs, revisions, and other significant floristic treatments. This allows comparison of the treatment in the Flora to other treatments, and convenient access to the other treatments. Synonymy is provided comprehensively for the following floras: Radford, Ahles, and Bell (1968), as RAB; Small (1933, 1938), as S; Fernald (1950), as F; Gleason (1952), as G; Godfrey and Wooten (1979, 1981) as GW; Vascular Flora of the Southeastern States (Cronquist 1980, Isely 1990) as SE; Wofford (1989) as W; Gleason and Cronquist (1991) as C; Kartesz (1999) as K or K1; Kartesz (2010) as K2; and Flora of North America (1993b, 1997, 2000, 2002a, 2002b, 2003a, 2004b, 2005, 2006a, 2006b, 2006c, 2007a, 2009, 2010) as FNA; Brown & Brown (1984) as Md; Wunderlin & Hansen (2003) as WH; Strausbaugh & Core (1978) as WV. Synonymy used in recent monographs and revisions is also cited. All names known to me to be attributed to the *Flora* area in other floras, monographs, and revisions are accounted for.

Comments and discussion. Miscellaneous comments and discussion are provided for many species and genera, including discussion of biogeography, more details on distribution of rare species, additional notes on identification not included in the keys, information of particular interest on species biology and ecology, habitat, uses, discovery in the flora area or a state, etc. These “idiosyncratic comments” add to the general usefulness and interest of what is intended to be a rigorous, practical, and interesting flora.

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Leaf duration. The longevity of leaves is used in the keys for woody plants. **Evergreen** plants are those that retain full leaf cover through the winter, while **deciduous** plants lose their leaves at the end of the growing season (for some species, sometimes well before autumn). Some plants are also described as **tardily deciduous** or **semi-evergreen**, meaning that they drop leaves gradually into the winter, so that they are sparsely bedecked with leaves or even bare by the time of initiation of new growth in the spring. Unless you are in a position to observe the plant repeatedly through the seasons, leaf duration must be interpreted, and this can be difficult, especially on herbarium specimens. In general, evergreen leaves tend to be darker green (at least on the upper surface), often shinier, and usually thicker in texture and stiffer than deciduous leaves, but there are exceptions to all these tendencies. It can be helpful to see if the specimen or living plant has two obviously different ages of leaves present: older, tougher, more ragged and insect-eaten leaves of last year as well as younger leaves of the year. On many woody plants, it is easy to determine what is new (this year's) growth from older growth, and the younger vs. older leaves may be spatially separated on shoots of the season vs. on older wood. Note, though, that some "evergreen" shrubs or trees essentially replace all their leaves at leaf-out in the spring, all of last year's leaves being sloughed as the current year's leaves are emerging.

Growth form or habit. The basic growth form or habit of the plant is used extensively in the keys. **Woody** plants have substantial secondary or diameter growth of wood, which makes their stems (in general) thicker, stronger, stiffer, and tougher; they also have "perennating structures" (normally buds) borne above ground on their woody stems. **Woody plants** are further subdivided into **trees, shrubs, rosette shrubs, subshrubs, rosette subshrubs, and lianas**. **Trees** are generally more than 5 meters tall at maturity and usually have single stems which are not interconnected by subterranean rhizomes (forming clonal patches). However, some tree species are characteristically multi-trunked or tend to produce a multi-trunked growth form as a result of stump-sprouting following logging, and stressful ecological conditions (such as shallow soil over rock or maritime exposure) can produce trees shorter than 5 meters. **Shrubs** are generally less than 5 meters tall and are often multi-stemmed from the base or near it (though some shrubs are characteristically single stemmed); quite a few are also clonal and produce many above-ground stems from a series of interconnected underground rhizomes). Some species grow as both trees and shrubs or have an ambiguous form; these are generally keyed as both trees and shrubs. Note that trees have seedlings or saplings that are shorter than 5 meters tall and may be multi-stemmed in growth form, especially in burned habitats; these are **not** keyed as shrubs and can generally be recognized as tree seedlings or saplings by the presence in the habitat of adult trees of the same species and by their lack of sexual reproduction (flowers, fruits, cones, etc.) because of their juvenile condition. **Subshrubs** are somewhat to strongly woody, but short in stature (often < 2 dm tall); while they have woody growth, they are often mistaken for herbs. **Rosette shrubs and rosette subshrubs** have basal leaves (see **Leaf location**, below) from an above-ground but short woody stock. **Lianas** are woody vines: in essence shrubs with specialized structures for climbing, including a) adventitious roots, b) twining growth of main stems, or c) simple or branched tendrils that either twine themselves or have adhesive "holdfast" tips. Some plants are keyed both as lianas and as shrubs. **Herbaceous plants** lack substantial secondary growth of wood and are either annual or have perennating organs (such as buds) on subterranean rhizomes, crowns, caudices, or corms. Herbaceous plants are further subdivided into **herbs and herbaceous vines**. **Herbs** are erect, sprawling, or trailing, but lack specialized adaptations for climbing (twining, tendrils, etc.); whereas **herbaceous vines** have these specialized adaptations. The interpretation of "woodiness", between shrub and herb (and liana and herbaceous vine), can be difficult, especially with herbarium specimens. Some herbaceous plants can become suffrutescent: tough, fibrous, or thick in ways that mimic or approach woodiness. The presence of vegetative buds (not flower buds) in the axils of leaves on the aerial stems clearly indicates a woody plant. Some plants which are ambiguously woody and likely to be mistaken one way or the other are keyed both ways.

Leaf disposition. The disposition of the leaves, whether basal or cauline, is used as a distinction to separate some of the major subkeys (in the woody plants separating Keys A7, B1, and E from the others, and in the herbaceous plants separating Key N from Keys O, P, Q, R, and S), as well as in a few other places. **Basal leaves** arise from underground buds (on rhizomes, crowns, caudices, or corms) or from the very base (ground level) of an aerial stem. **Stem leaves** (cauline leaves) are those which arise from above-ground (aerial) stems of the plant. Many plants, however, have **basally disposed** leaves, where the largest leaves are basal (and usually persistent through the growing season as a "basal rosette"), but smaller stem leaves extend up the above-ground stem. This can be ambiguous, though, and the persistence of basal leaves can be affected by season and conditions. While many taxa are keyed both in Key N and in one or more of Keys O, P, Q, R, and S), if this choice seems at all ambiguous and keying one way does not work well, the other choice should be tried.

Leaf type. Leaves are described as either **simple** or **compound**. Simple leaves are not divided into separate leaflets; the leaf tissue is continuous with all other leaf tissue of the leaf. By contrast, compound leaves are separated into 2 or more separate leaflets, connected only by various stalks (petiolules, rachises, rachillas) that lack leaf tissue. Simple leaves may be **unlobed, pinnately lobed, or palmately lobed**, and the lobes may be variously shallow or cut nearly to the midvein or base of the leaf. Perhaps the easiest way to determine whether leaf lobing is pinnate or palmate is to look at the major veins in the leaf. Pinnately lobed leaves have lobes arrayed in a line along either side of the midvein, and the lobes are associated with the major secondary veins of the (pinnately veined) leaf. The lobes of palmately lobed leaves are associated with the 3 or more palmate veins that arise together from the base of the leaf blade (note that the lobes of palmately lobed leaves are sometimes themselves sublobed, and that these sublobes are often pinnately arrayed: the leaf is still considered palmately lobed). **Compound leaves** are further classified by the number of leaflets, whether the leaflets are arrayed in a pinnate or palmate manner, and whether there is a single order of division or 2 or more orders of division. **Palmately compound** leaves have all leaflets attached at a single point, at the end of the petiole. Palmately compound leaves in our flora have from 3 to ca. 21 leaflets and are never further compound beyond the single order of division (in other words, the leaflets are not themselves compound). **Pinnately compound** leaves have leaflets attached to one or more axes (rachises, rachillas) that extend beyond the end of the petiole, and many taxa have 2 or more orders of division. Bifoliolate (**2-foliolate**) leaves are very rare in our flora. Trifoliolate leaves (**3-foliolate**, and sometimes called "ternate") are very common in our flora and can be either **palmately 3-foliolate** or (especially in the Fabaceae) **pinnately 3-foliolate**. Pinnately compound leaves have a short rachis extending past the end of the petiole (and the point of attachment of the 2 lateral leaflets via their petiolules), with the terminal leaflet attached at the end of this rachis via its petiolule; the joint between the rachis and the terminal petiolule is usually obvious because of a change in diameter, color, vestiture, and/or texture. The distinction between palmately 3-foliolate and pinnately 3-foliolate leaves is not used in the [Key to Genera and Families](#) but is important in the some other keys, especially the key to genera of the Fabaceae. Pinnately compound leaves with 4 or more leaflets are very common in our flora, especially in some families. **Even-pinnately compound** leaves (the less common situation) have an even number of leaflets, often paired along the rachis or rachillas, and lack a terminal leaflet at the tip of the rachis or rachilla and extending along its axis; these taxa are concentrated in the Fabaceae and a few other smaller families. **Odd-pinnately compound** leaves have a terminal leaflet and therefore usually an odd number of leaflets. Odd-pinnately compound leaves with 2 or more orders of division are typically described in the keys as **complexly compound**. Other floras variously describe leaves of this sort as 2-pinnate, 3-pinnate, decomposed, biternate, or other terms, but these have largely been avoided in the keys in this work because the "compoundness" is often complex, mixed between pinnate and ternate, and therefore difficult to describe accurately with such terminology. For instance, many members of the Apiaceae have complexly compound leaves, which are initially 3-forked (ternate), each of these forks may then be 3-forked again (though with the lateral forks supporting fewer or smaller leaflets than the terminal one), and these 3-order divisions are then often pinnately compound. Note that **deeply lobed leaves** can sometimes be easily mistaken for **compound leaves**. Compound leaves have no leaf tissue connecting the individual leaflets, whereas lobed leaves have at

least a narrow flange of leaf tissue along the rachis or rachilla that connects the leaf tissue of one lobe with the leaf tissue of the next. In some taxa, this is difficult to interpret, and these have generally been keyed both ways.

Lobes and teeth. The presence, absence, number, and shape of **lobes** or **teeth** along the margin of the leaf are very useful vegetative characters. The term “tooth” or “teeth” is here used in a broad sense to include any of the small marginal projections covered under the terms dentate, denticulate, serrate, serrulate, crenate, crenulate, spinose, spinulose, doubly serrate (biserrate), or erose. In other words, teeth can be rounded, pointed, or spine-tipped, and of various shapes and sizes. The term “tooth” or “teeth” does not include undulations out of the main plane of the leaf, hairs, or epidermal projections in the plane of the leaf margin, described by terms such as ciliate, ciliolate, or scabrous-margined. Teeth are often regular in size and position but in some species are irregular in form, shape, and even presence (these species are keyed in several places). The term “lobe” or “lobes” is also used in a broad sense to mean a larger feature of the leaf margin. Relative to teeth, lobes are typically both actually larger and relatively larger in relation to the size of the leaf, and also more widely spaced, often with a sinus (the depression between 2 lobes) extending $1/10^{\text{th}}$ to $9/10^{\text{th}}$ of the way from the outer leaf outline to the midrib. Lobes are typically spaced 1 cm or more apart, though the term is also applied to more closely spaced features with relatively deep sinuses (at least $3/10^{\text{th}}$ of the way to the midrib), especially in pteridophytes and in flowering plants with small leaves. Teeth are truly marginal, typically meeting 2 or 3 of the following 3 conditions: spaced < 1 cm apart, the sinuses between them usually extending $< 1/10^{\text{th}}$ of the way to the midrib, and the tooth itself (measured on its shorter side if it not equilateral) < 4 mm long. Occasionally we have also used the number of “**points**” as a character in the keys. This is the total number of lobe points and tooth points along one side of the leaf (base to apex on one side of the midvein). Note that some leaves are unlobed except for the presence of 2 basal lobes (one on either side, often described as cordate, sagittate, auriculate, or hastate depending on the shape, size, and orientation of the lobes); this situation is not keyed in the “lobed” sections of the key (as noted in the pertinent couplets).

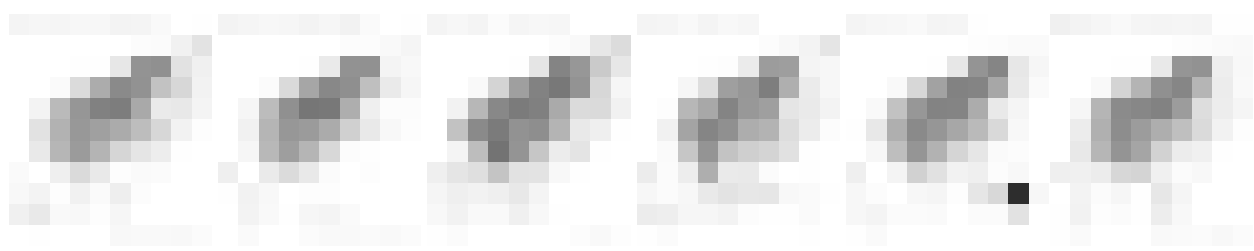
Learning families. Learning plant families, especially those that are particularly important in Virginia’s flora or that are especially distinctive, is an extremely useful aid in identifying plants. While “learning” a family often starts with understanding its distinctive characteristics, often including some rather technical characteristics, with experience it becomes a more “gestalt” sense that, for instance, “that plant just looks like Asteraceae”, even if the features that would allow it to be keyed are not present. Knowing plant families often allows one to bypass the Key to Genera and Families entirely or facilitates decisions at particular couplets in it. A few of the families that are particularly useful to learn are Apiaceae, Asteraceae, Brassicaceae, Cyperaceae, Euphorbiaceae, Fabaceae, Juncaceae, Lamiaceae, Poaceae, Ranunculaceae, Rosaceae, and Rubiaceae.

Sluething characters. Some characters used in the key may seem initially impossible to find on your plant or specimen, but may actually be findable or deducible. Old fruits can sometimes be found on woody species, or on the ground under the tree or shrub. Old flower stalks (from the previous year) are sometimes present in perennial herbs, allowing the size of the plant and the type of inflorescence to be assessed. The calyx is often persistent after the petals have fallen, and calyx merosity (number in the whorl) and symmetry is usually the same as the merosity and symmetry of the corolla (though not always). Various fruit characters can sometimes be deduced from the flowers, and various flower characters can be deduced from the fruits. When capsules are immature (sometimes even in the stage of an ovary while in flower), dehiscence can often be deduced by the presence of visible lines on the fruit (sutures, visible at $10\times$). The number of carpels and locules can usually be determined from either the ovary or the immature or mature fruit, by making a careful \times -section. Stamens are sometimes present as shriveled remnants on fruits, allowing the number of stamens to be determined. Hair types (e.g., simple vs. stellate) may seem impossible if the leaf appears superficially glabrous, but hairs often remain to the end of the season on even apparently glabrous leaves in protected places, especially on the lower surface in the main vein axils. The bulbous or papillose bases of some hairs remain after the rest of the hair has worn off. Hairs with bulbous or papillate bases. Deducing the presence of stipules is often possible by looking for scars (usually linear) that extend beyond the leaf scar proper.

Winter identification. Note that no attempt has been made to make the key work consistently for plants in winter condition. Woody plants with evergreen foliage will generally be “keyable” in Keys B, D, E, F, G, H, I, and J, but deciduous species will not; there are various winter twig and bud keys available in print and online for the winter identification of trees and shrubs. Herbaceous plants with winter rosettes or otherwise green winter foliage will generally be found in Key N, but an impractical number of ambiguous or “dead end” leads will be encountered.

Botanical terminology. While the use of specialized terminology and jargon has been reduced, some of these terms are useful and unavoidable, and provide a precise meaning without a lengthy explanation. Terms can be found in the glossary, and there are print and online resources that provide definitions and often illustrations as well. Particularly recommended at the time of writing is Harris and Harris (2001), Plant Identification Terminology: an Illustrated Glossary.

Characteristics of major groups of vascular plants. At various points in the key, a kind of shorthand is used in key leads to indicate the main evolutionary group involved: Lycophytes, Pteridophytes, Gymnosperms, Basal Angiosperms, Eudicots, and Monocots. This shorthand is not placed in every couplet in which it could be, but is used where it is likely to be helpful to the user. While the readily visible characteristics of these groups have many exceptions, the following table} will aid in their recognition (note that this table is pragmatically based only on the characteristics of those taxa in our flora).



316. CACTACEAE A.L. de Jussieu 1789 (Cactus Family) [in CARYOPHYLLALES]

A family of about 100 genera and 1500 species, herbs, shrubs, vines, and trees, of tropical, subtropical, and temperate America (a single species occurring as well in Africa, Madagascar, and Ceylon), with centers of diversity in sw. United States-Mexico, s. South America, and the West Indies. References: Parfitt & Gibson in FNA (2003b); Barthlott & Hunt in Kubitzki, Rohwer, & Bittrich (1993); Anderson (2001); Nyffeler & Egli (2010).

Opuntia P. Miller 1754 (Prickly-pear Cactus)

A genus of about 200 species, widespread in America, from s. Canada to Patagonia. References: Pinkava in FNA (2003b); Ward (2009e)=X; Doyle (1990)=Z; Benson (1982)=Y; Barthlott & Hunt in Kubitzki, Rohwer, & Bittrich (1993). Key based on Y and Z.

Identification notes: New joints sometimes bear reduced leaves and have not yet developed spines; look for spines 1 or 2 joints back from the growing tip.

- 1 Spines absent.
 - 2 Joints narrowly obovate, narrowly elliptic, or oblong, mostly 12-25 (-35) cm long, 7.5-10 (-20) cm broad; [of the Coastal Plain]..... *O. stricta* var. *stricta*
 - 2 Joints orbiculate to obovate, 5-7.5 (12.5) cm long, 4-6 (-7.5) cm broad; [widespread in our area].
 - 3 Joints mostly 7.5-10 (-15) cm long, 5-9 (-12.5) cm broad; hypanthium with 7 or more areoles; style diameter < 3.5 mm; petals > 3 cm long; [of the Coastal Plain] *O. humifusa* var. *austrina*
 - 3 Joints mostly 5-7.5 (-12.5) cm long, 4-6.2 (-7.5) cm broad; hypanthium with 6 or fewer areoles; style diameter > 3.5 mm; petals < 3 cm long; [widespread in our area]..... *O. humifusa* var. *humifusa*
- 1 Spines present.
 - 4 Spines strongly and retrorsely barbed; joints slender, (2-) 3-6 (-13) cm long, 2-5 (-7) cm broad, easily detached from the plant; spines to 3.7 cm long, 0-2 per areole (usually some areoles on a plant with 2 well-developed spines); [of coastal dunes] *O. pusilla*
 - 4 Spines not strongly and retrorsely barbed; joints broad, 10-30 cm long, 7.5-12.5 cm broad, not easily detached from the plant; spines to 7.5 cm long, 0-2 (-12) per areole; [of various habitats, including coastal dunes].
 - 5 Spines (at least the larger) flattened throughout or basally, narrowly elliptic in cross-section, 0-11 per areole.
 - 6 Spines white, tan or pale-brown at maturity; pads (22.5-) 30-60 cm long, 20-40 cm broad; [rare introduction]..... *O. ficus-indica*
 - 6 Spines yellow at maturity; pads 10-30 cm long, 5-15 (-25) cm broad; [common native in the southern part of our area].
 - 7 Spines 1-11 per areole, 1.2-4 (-6) cm long; pads 20-30 cm long, 5-12 cm broad *O. stricta* var. *dillenii*
 - 7 Spines 0 (-1 per areole only in marginal areoles), usually < 2 cm long; pads 10-30 cm long, 7-15 (-25) cm broad *O. stricta* var. *stricta*
 - 5 Spines needle-like, not flattened, elliptic to circular in cross-section, 1-6 (-12) per areole.
 - 8 Plants not mat-forming or prostrate, rising the height of several joints, commonly 3-20 dm tall; largest joints (7.5-) 10-30 cm long, (5-) 7.5-12.5 cm broad; spines gray, reddish-brown, or yellowish-brown; fruit 5-7.5 cm long, 4-5 cm in diameter; [introduced, rarely spread or persistent from cultivation] *O. monacantha*
 - 8 Plants low and mat-forming, usually prostrate and < 3 dm tall, the joints usually in series of 3-5; largest joints 3.8-10 cm long, 4-6 cm broad; spines white, gray, or brown; fruit 2.5-4 cm long, 2-3 cm in diameter; [native].
 - 9 Joints mostly 7.5-10 (-15) cm long, 5-9 (-12.5) cm broad; spines to 8 cm long; hypanthium with 7 or more areoles; style diameter < 3.5 mm; petals > 3 cm long; [of the Coastal Plain] *O. humifusa* var. *austrina*
 - 9 Joints mostly 5-7.5 (-12.5) cm long, 4-6.2 (-7.5) cm broad; spines to 3 cm long; hypanthium with 6 or fewer areoles; style diameter > 3.5 mm; petals < 3 cm long; [widespread in our area]..... *O. humifusa* var. *humifusa*

* *Opuntia engelmannii* Salm-Dyck ex Engelm var. *lindheimeri* (Engelmann) Parfitt & Pinkava. Disturbed areas; native of sc. United States south into Mexico. Reported for MS (Majure et al. 2011). Small (1933) reports *O. cantabrigiensis* Lynch from dunes near Beaufort, NC, based on a fragmentary 1930 collection accompanied by a photograph. Similar plants were apparently seen near Beaufort by Engelm, prior to 1856. Benson (1982) refers the collection tentatively to *O. lindheimeri* Engelm var. *cuija* (Griffiths & Hare) L. Benson, treated in K as *O. engelmannii* Salm-Dyck var. *cuija* Griffiths & Hare, a native of Mexico. Benson (1982) also states, however, that it could also be var. *lindheimeri* (primarily of TX and Mexico), or, indeed, *O. tuna* (Linnaeus) P. Miller (native to the West Indies). Benson (1982) failed to relocate the plant in the field in 1956, but stated there was "insufficient time for a thorough search." Unless relocated, the identity of the plant will probably remain a mystery, as well as whether it represents a native species, an established population from aboriginal use, or a more recent introduction or adventive. [= FNA; > *O. lindheimeri* Engelm – S; > *O. cantabrigiensis* Lynch – S] {not yet keyed}

* *Opuntia ficus-indica* (Linnaeus) P. Miller, Indian-fig, Mission Prickly-pear, Tuna Cactus. Disturbed areas; native of tropical America. [= FNA, K1, K2, WH, X, Y]

Opuntia humifusa (Rafinesque) Rafinesque var. *ammophila* (Small) L. Benson, Florida Prickly-pear. Dry sandy soils. A third variety, var. *ammophila* (Small) L. Benson, is apparently endemic to FL, occurring in most of the state; It has more elongate joints than the other two varieties, the joints with a length-to-width ratio of 2-4 (vs. 1-2) and is a more erect plant, often 3-4 joints high. [= FNA, K1, Y, Z; = *O. ammophila* Small – S] {not yet keyed; add to synonymy}

Opuntia humifusa (Rafinesque) Rafinesque var. *austrina* (Small) Dress, Southern Prickly-pear. Cp (FL, GA, SC): dunes, shell middens, and other dry sandy soils, mostly but not entirely on barrier islands; rare. Var. *austrina* (Small) Linnaeus Benson occurs throughout FL, and at scattered locations north to se. SC and west to se. TX; Ward (2009e) considers this (as *O. austrina*) to be endemic to FL. [= K1, Y, Z; < *O. humifusa* var. *humifusa* – FNA; > *O. austrina* – S; > *O. cumulicola* Small – S; = *O. austrina* Small – K2, X; = *O. compressa* (Salisbury) J.F. Macbride var. *austrina* (Small) L. Benson]

Opuntia humifusa (Rafinesque) Rafinesque var. *humifusa*, Eastern Prickly-pear. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dry open places, such as in thin soil around rock outcrops, sandhill forests and woodlands, dry barrens and woodlands, barrier island dunes, dry pastures; common (uncommon in Piedmont and Mountains). May-June; August-October. The only cactus widespread in e. North America, var. *humifusa* ranges from MA, MI, and e. IA, south to s. FL and c. TX, with some outlying stations farther west. Various authors, including Small (1933) and Ward (2009e), separate the Coastal Plain *O. pollardii* from the inland *O. humifusa* (s.s.); this may have merit. Ward (2009e) separates *O. pollardii* as always having spines, these 2-3 cm long, leaves prior to shedding 6-8 mm long, fruits 2-2.5 cm long (vs. often lacking spines, when present these fewer and < 1 cm long, leaves 2-3 mm long, fruits 1-1.5 cm long in *O. humifusa*). Where growing in proximity to *O. pusilla*, the two species hybridize rather freely, sometimes producing hybrid swarms. See Doyle (1990) for discussion of the correct nomenclature for this taxon (*O. compressa* vs. *O. humifusa*). [= K1, Y, Z; < *O. humifusa* var. *humifusa* – FNA; > *O. compressa* (Salisbury) J.F. Macbride var. *compressa* – G; < *O. compressa* – RAB; < *O. humifusa* (Rafinesque) Rafinesque – C, F, Pa, W; > *O. pollardii* Britton & Rose – G, S, X; = *O. humifusa* – K2; > *O. humifusa* – X; > *O. impedita* Small – S; > *O. macrarthra* Gibbes – S; > *O. opuntia* (Linnaeus) Kartén – S; > *O. compressa* – WV; > *O. calcicola* Wherry – WV]

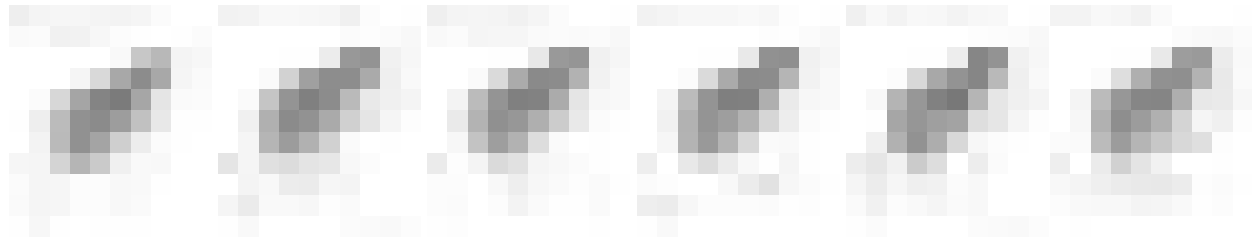
Opuntia macrorhiza Engelman, Twisted-spine Prickly-pear. Alleged to barely enter our area (from a primary distribution west of the Mississippi River from WI, IL, MO, AR, and LA westward) in West Feliciana Parish, LA (Kartesz 2010). [= FNA, K2] {not yet keyed; add to synonymy}

* *Opuntia monacantha* (Willdenow) Haworth, Common Prickly-pear. Frequently cultivated, rarely escaped or persistent; native of n. South America. May-June; August-October. [= FNA, K1, K2; ? *O. vulgaris* P. Miller – RAB, X, Y; = *O. monacanthos* – WH]

Opuntia pusilla (Haworth) Nuttall, Dune Prickly-pear, Sand-bur Prickly-pear, Little Prickly-pear, Creeping Cactus. Dunes on barrier islands. May-June; August-October. A Southeastern Coastal Plain endemic: NC (Dare County) south to c. peninsular FL and west to se. TX, nearly always within a few hundred meters of the sea. As mentioned by Small (1933) and RAB, this little coastal cactus is inconspicuous and often becomes attached by its retrorsely barbed-spines to the pants or shoes of people walking through the dunes. It can inflict painful wounds, the spines not easily removed from flesh or clothing because of the retrorse barbs. *O. pusilla* sometimes forms hybrid swarms with *O. humifusa* on coastal dunes (see Y for additional discussion). [= FNA, K1, WH, X, Z; = *O. drummondii* Graham – RAB, S]

Opuntia stricta (Haworth) Haworth var. *dillenii* (Ker-Gawler) L. Benson. Cp (FL, GA, NC?, SC): dunes on barrier islands; rare. Se. SC south to s. peninsular FL. This taxon was reported from NC by Small (1933), as *O. tunoidea* Gibbes. Benson (1982) and Doyle (1990) do not verify this distribution, showing var. *dillenii* reaching its northern limit along the coast in se. SC. [= K1, X, Y, Z; < *O. stricta* – FNA, K2, WH; > *O. tunoidea* Gibbes – S]

Opuntia stricta (Haworth) Haworth var. *stricta*. Cp (FL, GA, NC, SC, VA?): dunes, shell middens, sandhills, dry woodlands; rare. Sc. NC (Robeson County) and c. SC south to s. peninsular FL, with a single collection from Isle of Wight County, VA (Benson 1982), mostly near the coast. Small (1933) describes the habitat of *O. stricta* as "shell mounds, kitchenmiddens, and aboriginal village sites" and identifies it as the "the prickly-pears the early Spanish records tell us the aborigines feasted on for three months of each year and also cured, like figs, for food when out of season." [= K1, X, Y, Z; < *O. stricta* – FNA, K2, WH; > *O. stricta* – S]



320a. *CORNACEAE* (Berchtold & J. Presl) Dumortier 1829 (Dogwood Family) [in CORNALES]

A family of 2 genera and about 85 species, trees, shrubs, lianas, and subshrubs, semicosmopolitan (mainly northern hemisphere). The Cornaceae is best circumscribed to exclude *Nyssa* (Xiang et al. 2002). References: Xiang et al. (2002); Kubitzki in Kubitzki (2004).

Cornus Linnaeus 1753 (Dogwood, Cornel)
(contributed by Z.E. Murrell & A.S. Weakley)

A genus of about 65 species, trees, shrubs, and subshrubs, mainly north temperate. The generic limits are controversial. Phylogenetic analyses show that *Cornus* is monophyletic, but various clades within it are also monophyletic and have levels of genetic and morphologic divergence often regarded as warranting generic distinction. Zhang et al. (2008) estimate the time of divergences of the various subgenera as having been from the Paleocene to the Oligocene; at very least, the subgenera are well-marked. References: Haines (2011)=X; Godfrey (1988)=Z; Wilson (1965); Murrell (1993); Zhang et al. (2008); Xiang et al. (2006); Fan & Xiang (2001); Eyde (1987); Xiang, Soltis, & Soltis (1998); Ferguson (1966c, 1966d)=Y; Kubitzki in Kubitzki (2004).

- 1 Leaves alternate (the internodes typically short and therefore the leaves looking nearly whorled); [subgenus *Mesomora*].....*C. alternifolia*
- 1 Leaves opposite.
 - 2 Herb or dwarf shrub from a woody rhizome, to 2 dm tall; leaves in 2-4 pairs below the inflorescence; [of NJ and montane VA and WV northward]; [subgenus *Arctocrania*].....*C. canadensis*
 - 2 Shrub or tree, much taller than 2 dm when mature; leaves many; [collectively widespread].
 - 3 Inflorescence subtended by 4 showy (white, creamy, or pink) bracts.
 - 4 Showy bracts subtending the inflorescence rounded and notched; fruits separate in a compact cluster; [common native small tree]; [subgenus *Cynoxylon*]*C. florida*
 - 4 Showy bracts subtending the inflorescence acute; fruits fused together; [exotic uncommonly planted, rarely escaped or persistent]; [subgenus *Syncarpea*].....[*C. kousa*]
 - 3 Inflorescence lacking bracts; [subgenus *Kraniopsis*].
 - 5 Veins usually 5 or more per leaf side.
 - 6 Bark of older branches and stems splitting longitudinally, appearing braided; leaves without tufts of trichomes in axils of secondary veins on abaxial surface.
 - 7 Abaxial leaf surface not coronulate, trichomes appressed and rigid, and erect and curling, on the same leaf, leaf base usually rounded or truncate..... *C. amomum*
 - 7 Abaxial leaf surface coronulate, trichomes all appressed and rigid, leaf base usually cuneate..... *C. obliqua*
 - 6 Bark of older branches and stems smooth, with scattered protruding lenticels; leaves with tufts of trichomes in axils of secondary veins on the abaxial surface.
 - 8 Area surrounding lenticels suffused with purple; leaves suborbicular or broadly ovate; 7-9 veins per leaf side; tertiary veins usually prominent.....*C. rugosa*
 - 8 Area surrounding lenticels not differentiated; leaves lanceolate, elliptic, or ovate; 5-7 veins per leaf side; tertiary veins not prominent*C. stolonifera*
 - 5 Veins usually 3-4 per leaf side.
 - 9 Trichomes erect on abaxial surface.
 - 10 Petioles 3-7 mm long; leaf veins evenly spaced.....*C. asperifolia* [or *C. asperifolia* × *stricta*]
 - 10 Petioles 8-25 mm long; leaf veins emanate from the basal half of the leaf*C. drummondii*
 - 9 Trichomes appressed or slightly raised on abaxial leaf surface.
 - 11 Rhizomatous, forming large colonies; lenticels protrude slightly, older stems appear verrucose; fruit white *C. racemosa*
 - 11 Multiple stems from a single rootstock (occasionally appearing rhizomatous from decumbent stems); lenticels not protruding, bark swelling between lenticels; fruit blue.....*C. stricta*

Cornus alternifolia Linnaeus f., Alternate-leaf Dogwood, Pagoda Cornel, Pagoda Dogwood. Moist forests. May-June; August-September. NL (Newfoundland) west to MN, south to Panhandle FL, AL, s. MS, and AR. [= RAB, C, F, G, K, Pa, W, WH, WV, Y, Z; = *Svida alternifolia* - S; = *Swida alternifolia* (Linnaeus f.) Small - X]

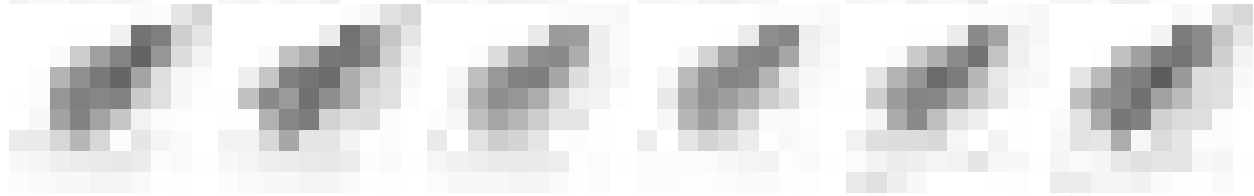
Cornus amomum P. Miller, Silky Dogwood. Shores, streams, bottomlands. May-July; August-September. NY and MA west to IN, south to GA, Panhandle FL, and MS. [= RAB, F, G, K, W, WV; = *Cornus amomum* var. *amomum* - C; = *Cornus amomum* P. Miller ssp. *amomum* - GW, Pa, Y, Z; = *Svida amomum* - S; = *Swida amomum* (P. Miller) Small var. *amomum* - X]

Cornus asperifolia Michaux, Eastern Roughleaf Dogwood. Mesic calcareous forests and thickets, shell middens, calcareous hammocks. May-June; August-September. Se. NC south to n. peninsular FL, west to s. AL. Nash (1896) collected *C. asperifolia* Michaux at River Junction, Florida; based upon conflicting reports of fruit colors given by Chapman (1860) and Coulter and Evans (1890) for the two rough-leaved dogwoods (*C. asperifolia* and *C. drummondii*), Nash decided to name the rough-leaved dogwood with blue fruit as *C. microcarpa*. However, Michaux's (1803) description, even without reference to fruit color, is clearly attributable to this species, since its locality was given as "Carolinae inferioris." The populations of this rough-leaved dogwood in NC and SC have morphology intermediate between *C. stricta* and *C. asperifolia* and these should possibly be attributed to a hybrid origin. More analysis needs to be done on this complex. [= RAB, K, Y, Z; = *Cornus foemina* P. Miller ssp. *microcarpa* (Nash) J.S. Wilson - GW; = *Svida microcarpa* (Nash) Small - S; = *Swida asperifolia* (Michaux) Small]

Cornus canadensis Linnaeus, Bunchberry, Dwarf Cornel, Dwarf Dogwood. High elevation forests, in humus or on talus, under *Betula cordifolia*, *Picea rubens*, or *Pinus rigida*. Greenland west to AK, south to NJ, VA, WV, and CA. [= C, F, G, K, Pa, W, WV, Y; = *Chamaepericlymenum canadense* (Linnaeus) Ascherson & Graebner - X]

Cornus drummondii C.A. Meyer, Midwestern Roughleaf Dogwood. Open woodlands and glades over calcareous rocks (limestone, calcareous shale). NY, ON, and SD south to e. TN, nw. GA, LA, and TX. [= C, G, GW, K, Pa, Y; > *Cornus drummondii* - F; > *Cornus priceae* Small - F; > *Svida priceae* (Small) Small - S; > *Svida asperifolia* - S, misapplied; = *Swida drummondii* (C.A. Meyer) Soják]

Cornus florida Linnaeus, Flowering Dogwood. Dry to moist forests and woodlands. March-May; September-October. ME west to MI, south to c. peninsular FL; disjunct in montane ne. Mexico (Veracruz and Nuevo León). The Mexican plants may warrant recognition as *C. urbaniana*. *C. florida* has been impacted since the 1980s by widespread infection by the dogwood anthracnose fungus (*Discula destructiva*). [= RAB, C, F, G, K, Pa, W, WH, WV, Y, Z; = *Cynoxylon floridum* (Linnaeus) Rafinesque ex B.D. Jackson - S; *Benthamidia florida* (Linnaeus) Spach - X]



* *Cornus kousa* Hance, Kousa Dogwood. Suburban areas, sometimes planted as an ornamental and may persist or seed down in the immediate vicinity of the parent tree. [= K; *Benthamidia japonica* (Siebold & Zuccarini) Hara – X; = *Cynoxylon kousa* (Hance) Nakai] {not mapped; rejected as a component of our flora}

Cornus obliqua Rafinesque, Silky Dogwood. Swamps, moist thickets, (in VA) rocky rivershores where periodically scoured. May-July. ME and QC west to MN, south to VA, KY, c. TN, AR, and OK. Some material intermediate between *C. amomum* and *C. obliqua* has been found in the Mountains of nw. NC and w. VA. These plants are recognizable by leaves intermediate between the putative parents, ovate with an attenuate base, abaxial surface papillose; abaxial and adaxial surfaces with mostly appressed ornamented trichomes, but with scattered unornamented trichomes with erect arms on both blade surfaces and midvein and secondary veins. [= F, K, WV; = *Cornus amomum* P. Miller var. *schuetzeana* (C.A. Meyer) Rickett – C; = *Cornus purpusii* Koehne – G; = *Cornus amomum* P. Miller ssp. *obliqua* (Rafinesque) J.S. Wilson – GW, Pa, Y; = *Swida amomum* var. *schuetzeana* (C.A. Meyer) A. Haines – X; = *Swida obliqua* (Rafinesque) Moldenke]

Cornus racemosa Lamarck, Northern Swamp Dogwood. Wet to moist forests and thickets. May-July; August-September. ME and s. QC west to s. MB, south to VA, nc. NC, s. IL, and MO. [= RAB, C, F, G, K, Pa, WV; = *Svida femina* (P. Miller) Small – S, misapplied; = *Cornus foemina* P. Miller ssp. *racemosa* (Lamarck) J.S. Wilson – W, Y; = *Swida racemosa* (Lamarck) Moldenke – X]

Cornus rugosa Lamarck, Roundleaf Dogwood. At high elevations, usually on talus (greenstone, quartzite, sandstone). QC to MB, south to NJ, PA, w. VA, OH, IN, and IL. [= C, F, G, K, Pa, W, WV; = *Swida rugosa* (Lamarck) Rydberg – X]

Cornus stolonifera Michaux, Red Osier Dogwood. Shrub swamps, bottomlands, suburban areas. May; July. At least some of the occurrences in VA represent horticultural introductions. NL (Labrador) and AK south to VA, WV, KY (Clark et al. 2005), IL, NM, AZ, and CA. Attempts to link the name *C. sericea* Linnaeus to the red-osier dogwood have focused on the Linnaean description of "foliis subtus sericeis" and "ramis rubicundis." The reference to the red branches has been emphasized to rule out any other species, yet *C. amomum* and *C. obliqua* also have reddish-maroon branches. The description of "fructo nigro-caeruleo" cannot be dismissed as a reference to individuals of the red-osier dogwood which have pale blue fruit, often considered to be due to hybridization with *C. amomum* or *C. obliqua*. It seems clear that the description fits *C. obliqua* better than it does the red-osier dogwood. Although there is a specimen in the Linnaean herbarium which has been identified as the red-osier dogwood, it is neither dated nor is the label of *C. sericea* in Linnaeus' hand. Also, considering the similarity of the red-osier dogwood and *C. alba* Linnaeus, it is doubtful Linnaeus would have described the red-osier dogwood without reference to *C. alba*. Therefore, we agree with Rickett's rejection of *C. sericea* as a *nomen dubium*. This species is also sometimes considered to be indistinguishable from the Eurasian *C. alba*. [= G, W, WV; = *C. sericea* Linnaeus – C, Pa, nomen dubium; = *Cornus stolonifera* Michaux – G, W; > *Cornus stolonifera* var. *stolonifera* – F; > *Cornus stolonifera* var. *baileyi* (Coulter & Evans) Drescher – F; > *C. sericea* ssp. *sericea* – K, nomen dubium; = *Swida sericea* (Linnaeus) Holub – X, nomen dubium; = *Swida stolonifera* (Michaux) Rydberg; < *C. alba* Linnaeus]

Cornus stricta Lamarck, Southern Swamp Dogwood. Swamps, streambanks, marshes, alluvial forests. April-May; July-August. DE south to s. FL, west to TX, and north in the interior to TN, s. IN, s. IL, AR, and se. OK. Although the name *C. foemina* P. Miller predates *C. stricta* Lamarck, it is very unclear what plant was intended by that name (the description is very obscure and no type is available), so *C. foemina* is best rejected as a *nomen dubium*. [= RAB, C, G; = *Cornus foemina* P. Miller – F, K, WH, Z; = *Cornus stricta* Lamarck – RAB, C, G; = *Svida stricta* (Lamarck) Small – S; = *Cornus foemina* P. Miller ssp. *foemina* – GW, W, Y; = *Swida foemina* (P. Miller) Rydberg; = *Swida stricta* (Lamarck) Small]



320b. NYSSACEAE A.L. de Jussieu ex Dumortier 1829 (Tupelo Family) [in CORNALES]

A family of 5 genera and 22 species, trees and shrubs, of e. Asia, se. Asia, e. North America, and Central America. The circumscription and recognition of this family has been controversial; Nyssaceae has sometimes been included in a broadly circumscribed Cornaceae, but this appears to be phylogenetically incorrect (Xiang et al. 2002). References: Xiang et al. (2002).

Nyssa Linnaeus 1753 (Tupelo, Sour Gum, Black Gum)

A genus of about 8-10 species, trees and shrubs, of e. North America, e. Asia, se. Asia, and Central America. The only other members of the genus are 2-4 e. and se. Asian species and a single species of Costa Rica (Hammel & Zamora 1990, Wen & Stuessy 1993). References: Burckhalter (1992)=Z; Wen & Stuessy (1993)=Y; Eyde (1966)=X; Ward (2008b)=V.

Identification notes: *Nyssa sylvatica* is often mistaken (especially as seedlings, saplings, or fire-sprouts) for *Diospyros virginiana*, because of their similar, alternate, glossy-green, acuminate leaves. *Nyssa* can be distinguished by its three vascular bundle scars per leaf scar (vs. one *Diospyros*), leaves often with a few irregular teeth (vs. never toothed), leaves pale to medium green beneath (vs whitish-green beneath), leaves lacking reddish to dark glands on the midrib above and the petiole (vs. present), and leaves glabrous or nearly so below (vs. glabrate to tomentose with curly hairs) (McKenney 1967).

- 1 Petioles of mature leaves 3-6 cm long; leaves to 30 cm long and 15 cm wide, at least the larger on a tree normally > 8 cm wide, often with a few irregular teeth, these typically located near the widest part of the blade *N. aquatica*
- 1 Petioles of mature leaves 0.5-2.0 (-2.5 cm) long; leaves to 18 cm long and 10 cm wide, the largest leaves on a tree rarely > 7 cm wide, generally entire, rarely with a few irregular teeth, these typically located toward the leaf apex.
- 2 Fruits 20-40 mm long, yellow, orange, or red when mature, the stone winged; pistillate flowers and fruits 1 per peduncle; trees often multiple-trunked, the trunks crooked; mature leaves densely pubescent beneath *N. ogeche*
- 2 Fruits 6-15 mm long, blue-black when mature, the stone slightly ridged to nearly smooth; pistillate flowers (1-) 2-5 per peduncle; trees typically single-trunked, the trunk fairly straight; mature leaves glabrous to pubescent beneath.
- 3 Pistillate flowers and fruits (2-) 3-5 (-8) per peduncle; leaves with thin texture, pliable, typically widest near the middle, the apex typically acuminate, the margins often with a few irregular teeth near the apex (though sometimes an entire tree with no toothed leaves); trunk not swollen or buttressed at base (even when growing in moist or wet habitats); bark of large trees rough, divided by deep vertical and horizontal furrows into a pattern of squarish checks; [trees of dry to mesic upland forests, less commonly in bottomlands or other wetlands, where flooding occurs at most occasionally and is of short duration; throughout our area] *N. sylvatica*
- 3 Pistillate flowers and fruits (1-) 2 (-3) per peduncle; leaves with thick texture, rather stiff, typically widest beyond the middle, the apex typically obtuse, the margins entire (rarely with a few teeth on vigorous sprouts); trunk swollen or buttressed at base; bark of large trees rough, a vertical ridge-furrow pattern most prominent; [trees of swamps with periodic or seasonal flooding; mostly on the Coastal Plain].
- 4 Small to large tree; leaves 5-14 cm long, 1.5-4 cm wide; fruit ovoid, 7-14 mm long; [widespread in our area] *N. biflora*
- 4 Shrub to small tree, 1-3 (-5) m tall; leaves 3-6 cm long, 1-2 cm wide; fruit globose, 6-11 mm long; [restricted to c. FL Panhandle (Apalachicola lowlands region, Bay, Calhoun, Franklin, Gulf, Liberty, and Wakulla counties)] *N. ursina*

Nyssa aquatica Linnaeus, Water Tupelo, Tupelo Gum, Cotton Gum. River swamps, where inundated for substantial periods of time. April-May; September-October. Se. VA south to Panhandle FL, west to se. TX, north in the Mississippi Embayment to se. MO, s. IL, and e. KY, primarily on the Coastal Plain, but with scattered locations in other physiographic provinces, such as in sc. TN. [= RAB, C, F, GW, K, S, V, WH, X, Y, Z; = *N. uniflora* Wengenheim – G]

Nyssa biflora Walter, Swamp Tupelo, Water Gum, Swamp Black Gum. Blackwater river swamps, depressions in pinelands, pocosins, either where inundated for substantial periods of time or in more-or-less permanently saturated organic peaty soils. April-June; August-October. NJ south to s. FL, west to e. TX, primarily on the Coastal Plain, but scattered inland to c. NC, w. SC, c. TN, w. KY (Clark et al. 2005), se. MO, and c. AR. [= G, K, S, Z; = *N. sylvatica* Marshall var. *biflora* (Walter) Sargent – RAB, C, F, X, Y; < *N. sylvatica* Marshall var. *biflora* (Walter) Sargent – GW, WH; = *N. biflora* var. *biflora* – V]

Nyssa ogeche Bartram ex Marshall, Ogeechee Lime, Ogeechee Tupelo, Ogeechee Plum. River swamps and wet forests with peaty soils, also in upland depression ponds. April; August-October. A Southeastern Coastal Plain endemic: se. SC south to c. peninsular FL, west to s. AL. [= RAB, GW, K, V, WH, X, Y, Z; > *N. acuminata* Small – S; > *N. ogeche* – S]

Nyssa sylvatica Marshall, Sour Gum, Black Gum, Pepperidge. Dry or mesic upland forests, less commonly in bottomlands, pine savannas, or upland depressions, where occasionally inundated briefly. April-June; August-October. S. ME west to MI and se. WI, south to c. peninsular FL, west to e. TX and e. OK. The status of varieties recognized by previous authors (such as Fernald 1950) needs reassessment; *N. sylvatica* is quite variable in morphology and ecology, at least some of the morphologic variation correlated with geography and ecology, but not so far readily tractable taxonomically. In the Mountains of our area, *N. sylvatica* is typically found in dry woodlands, such as pine-oak/heath, with xerophytic species such as *Pinus virginiana* and *Quercus montana*. In the outer Coastal Plain of the Carolinas, a swamp variant of *N. sylvatica* often occurs in wet savannas with *Pinus serotina*, where often mistaken (because of the wetland habitat and some superficial similarities) for *N. biflora*. The leaves turn a brilliant orange-red in fall (often a few on any tree coloring prematurely in July or August). [= G, K, Pa, S, V, WV, Z; = *N. sylvatica* var. *sylvatica* – RAB, C, GW, WH, X, Y; > *N. sylvatica* var. *sylvatica* – F; > *N. sylvatica* var. *dilatata* Fernald – F; > *N. sylvatica* var. *caroliniana* (Poiret) Fernald – F]

Nyssa ursina Small, Bear Tupelo, Apalachicola Tupelo. Stringers, flatwoods depressions. Endemic to Panhandle FL (Apalachicola lowlands region; Bay, Calhoun, Franklin, Gulf, Liberty, and Wakulla counties). A 2-5 m tall shrub or small tree, intricately branched, related to *N. biflora*. Because of the co-occurrence of this and *N. biflora* in the FL Panhandle, it seems best to recognize this taxon at the species level. [= K, S, Z; < *N. sylvatica* Marshall var. *biflora* (Walter) Sargent – GW, WH, X; = *N. biflora* Walter var. *ursina* (Small) D.B. Ward – V; = *N. sylvatica* Marshall var. *ursina* (Small) Wen & Stuessy – Y]



321. HYDRANGEACEAE Dumortier 1829 (Hydrangea Family) [in CORNALES]

A family of about 17 genera and 190-220 species, trees, shrubs, vines, and herbs, primarily north temperate. As here interpreted, the family Hydrangeaceae includes two well-marked groups, the Hydrangeae (including *Decumaria* and *Hydrangea*) and the Philadelphae (including *Deutzia* and *Philadelphus*). This group has been shown by molecular research to be unrelated to the Saxifragaceae, and to have its closest affinities to the Loasaceae, Cornaceae, and Nyssaceae (Xiang et al. 2002; Soltis, Xiang, & Hufford 1995; Morgan & Soltis 1993). References: Spongberg (1972); Soltis, Xiang, & Hufford (1995); Morgan & Soltis (1994); Xiang et al. (2002); Hufford in Kubitzki (2004).

- 1 Woody vine, climbing by aerial rootlets; petals 7-10; [tribe *Hydrangeae*] *Decumaria*
- 1 Shrub; petals 4-5 (rarely 10 or many in the cultivars of *Deutzia* and *Philadelphus*).
- 2 Pubescence of leaves and twigs stellate; stamens 10; [a cultivated alien, rarely escaped]; [tribe *Philadelphae*]..... *Deutzia*
- 2 Pubescence of leaves and twigs simple; stamens 8-10 (*Hydrangea*) or 25-90 (*Philadelphus*); [natives and aliens].
- 3 Leaf blades 10-30 cm long; inflorescences of 25-many flowers; stamens 8-10; [tribe *Hydrangeae*] *Hydrangea*
- 3 Leaf blades 3-8 cm long; inflorescences of 1-7 flowers; stamens 25-90; [tribe *Philadelphae*]..... *Philadelphus*

Decumaria Linnaeus (Climbing Hydrangea, Woodvamp)

A genus of 2 species, vines, of e. North America and e. Asia (China). A molecular analysis by Samain, Wanke, & Goetghebeur (2010) suggests that *Hydrangea* should be treated more broadly and include several genera in tribe Hydrangeae that are phylogenetically embedded (including in our area *Decumaria*). References: Hufford in Kubitzki (2004).

Identification notes: *Decumaria* is readily distinguished from the other opposite-leaved, woody vines in our flora (*Gelsemium*, *Trachelospermum*, *Lonicera*, *Bignonia*, *Campsis*, and *Clematis*) by its leaves (simple, ovate, and usually serrate) and climbing structures (adventitious roots).

Decumaria barbara Linnaeus, Climbing Hydrangea, Woodvamp. Swamp forests and bottomlands, moist forests in the mountains. May-June; July-October. Se. VA south to FL and west to LA and e. TX (Singhurst, Keith, & Holmes 2005), inland to nw. SC, se. TN, and w. TN. This handsome vine climbs to the tops of trees via adventitious roots. The opposite leaves are somewhat fleshy in texture. [= RAB, C, F, G, GW, K, S, W; = *Hydrangea species 1*]

Deutzia Thunberg (*Deutzia*)

A genus of about 60 species, shrubs, mainly Asian. References: Hufford in Kubitzki (2004).

* ***Deutzia scabra*** Thunberg, *Deutzia*, Pride-of-Rochester. Fairly commonly cultivated, persistent around old homesites and escaping to adjacent woodlands; native of Japan and China. June. First reported for NC (Jackson Co., NC) by Pittillo & Brown (1988); now known from scattered sites. *D. crenata* Siebold & Zuccarini, Chinese *Deutzia*, is reported as introduced in GA by Kartesz (1999); this may not be taxonomically distinct from *D. scabra*. [= C, F, Pa; > *D. scabra* – K; > *D. crenata* Siebold & Zuccarini – K; > *D. scabra* var. *candisissima* (Froebel) Rehder]

Hydrangea Linnaeus (*Hydrangea*, Sevenbark)

A genus of about 25 species, shrubs, of e. North America and e. Asia. Molecular analyses suggest that *Hydrangea* as usually interpreted is polyphyletic (Soltis, Xiang, & Hufford 1995); future taxonomic changes are to be expected. A molecular analysis by Samain, Wanke, & Goetghebeur (2010) suggests that *Hydrangea* should be treated more broadly and include several genera in tribe Hydrangeae that are phylogenetically embedded (including in our area *Decumaria*). See Dirr (2004) and van Gelderen & van Gelderen (2004) for information on cultivated hydrangeas. References: Pilatowski (1982)=Z; McClintock (1957)=Y; Hufford in Kubitzki (2004).

- 1 Leaves pinnately lobed, the lobes toothed; inflorescence a panicle; large sterile flowers many (> 20 per inflorescence), borne throughout the inflorescence..... *H. quercifolia*
- 1 Leaves unlobed, merely toothed; inflorescence a corymb (except *H. paniculata*); large sterile flowers absent to relatively few (0-15 per inflorescence), borne around the periphery of the corymb (except *H. paniculata*).

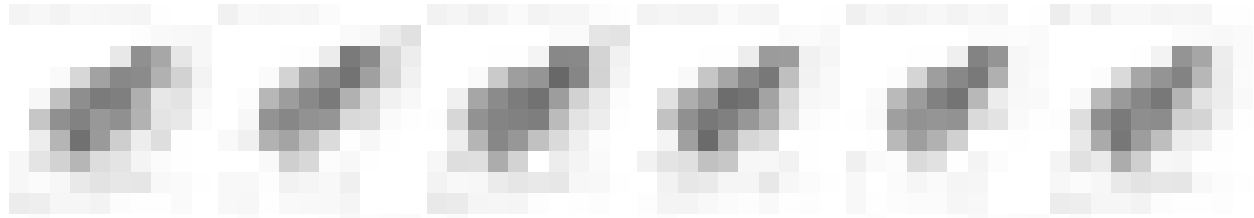
- 2 Inflorescence a panicle; large sterile flowers many (> 20 per inflorescence), borne throughout the inflorescence; [large shrub to small tree, to 8 m tall and 10 cm trunk diameter]; [alien, cultivated and sometimes persistent]*H. paniculata*
- 2 Inflorescence a corymb; large sterile flowers absent to relatively few (0-15 per inflorescence), borne around the periphery of the corymb; [small to medium shrub, to 3 m tall and 2 cm trunk diameter]; [native].
- 3 Lower leaf surface glabrous or inconspicuously puberulent, appearing green; trichomes of the lower leaf surface restricted to the midrib and major veins; sterile flowers absent, or, if present, usually < 1 cm in diameter*H. arborescens*
- 3 Lower leaf surface variously pubescent, appearing white or gray; trichomes of the lower leaf surface on veins and interveinal areas; sterile flowers usually present, large and showy, usually greater than 1 cm in diameter.
- 4 Lower leaf surface velutinous, pilose, or tomentose, appearing gray; trichomes usually not dense enough to entirely mask the green leaf surface; trichomes with prominent tubercles (as seen at 40× magnification); sterile flowers generally very few (0-3 per inflorescence)*H. cinerea*
- 4 Lower leaf surface densely floccose-velutinous, felt-like, appearing bright white or silver; trichomes dense enough to entirely mask the green leaf surface; trichomes without tubercles, or with small and inconspicuous tubercles (as seen at 40× magnification); sterile flowers generally fairly many (2-15 per inflorescence)*H. radiata*

Hydrangea arborescens Linnaeus, Smooth Hydrangea, Sevenbark. Forests, especially around rock outcrops and along streambanks. May-July. NJ, s. NY, OH, IN, IL, MO, and se. KS south to e. NC, c. SC, c. GA, Panhandle FL, s. AL, LA, and OK. [= K, Pa, S, W, WH, Z; = *H. arborescens* ssp. *arborescens* – RAB, Y; = *H. arborescens* var. *arborescens* – C, G, WV; > *H. arborescens* var. *arborescens* – F; > *H. arborescens* var. *oblonga* Torrey & A. Gray – F]

Hydrangea cinerea Small, Ashy Hydrangea. Rocky forests and rock outcrops, roadbanks, perhaps strictly or mostly associated with mafic or calcareous rocks. May-July. Sw. NC, c. IN, c. IL, and c. MO south to n. SC, sc. AL, and c. AR. [= K, S, W, Z; = *H. arborescens* ssp. *discolor* (Seringe) McClintock – RAB, Y; = *H. arborescens* var. *discolor* Seringe – C, G; = *H. arborescens* var. *deamii* E. St. John – F]

* *Hydrangea paniculata* Siebold, Panicle Hydrangea. Persistent after cultivation at old home-sites, sometimes appearing naturalized; native of e. Asia. July-August. [= C, F, G, K, Pa]

Hydrangea quercifolia Bartram, Oakleaf Hydrangea. Native in hammocks, moist forests, also in disturbed areas, thickets, or forests adjacent to urban or suburban areas. May-July. C. and sw. TN, south through w. GA, AL, and MS to Panhandle FL and e. LA; scattered elsewhere as a remnant or escape from cultivation. Boufford & Wood (1977) describe a purportedly native occurrence in nw. SC, but it seems more likely to be an escape from cultivation (R. Clark, pers. comm.). This southeastern native is a spectacular garden plant, frequently planted, rarely escaping or persisting. [= C, F, G, K, S, WH]



Hydrangea radiata Walter, Snowy Hydrangea, Silverleaf. Rocky forests and rock outcrops, often common and conspicuous on roadbanks. May-July. A Southern Appalachian endemic: sw. NC (in the valley of the French Broad River and to its southwest), nw. SC, ne. GA, and se. TN, with outliers (perhaps escaped from cultivation?) in Stokes County, NC and Calhoun County, SC. This attractive species is especially typical of the escarpment gorge region near the tricorner of NC, SC, and GA, in the vicinity of the towns of Highlands, Cashiers, and Rosman, NC, where it is conspicuous along roadbanks. [= K, S, W, Z; = *H. arborescens* ssp. *radiata* (Walter) McClintock – RAB, Y]

***Philadelphus* Linnaeus (Mock-orange)**

A genus of 65 (or fewer) species, shrubs, of north temperate areas. The most recent monographer of the genus, Hu (1954-1955) recognizes many species and varieties on the basis of minor differences in pubescence. Many of the recognized taxa are based only on cultivated material. The native distributions of the varieties have little phytogeographic coherence, and several varieties are often reported from the same site, suggesting that they reflect merely variation within a population (if genetically based at all). For instance, Hu recognizes three varieties in *P. hirsutus* and five in *P. inodorus*, but these seem to be no more than forms. As Hu writes, "the formerly recognized species, *P. grandiflorus* Willd., and *P. laxis* Schrad., are merely different forms of a species with heterogeneous leaf shape, size, and margins. Fostered by growers, propagated and distributed through cuttings, these forms have maintained their distinction in gardens since their discoveries. But when they are projected on the spectrum of variations exhibited by a large number of specimens collected from the homeland of *P. inodorus* Linn. they appear to be nothing but a few transitional forms. In this paper, these forms are treated as varieties." Hu's "varieties" should be treated as forms or cultivars, if recognized at all. I have taken a conservative approach, though variation in several of our native species could use additional study. References: Weakley & Henrickson in FNA (in press); Hu (1954-1956)=Z; A.E. Weakley (2002); Hufford in Kubitzki (2004).

- 1 Axillary buds exposed above the petiole base (best observed in mature long-shoot leaves, not always visible in axils of young leaves or on short-shoot leaves); twigs of the current year villous-hirsute; seeds not caudate; [subgenus *Deutzioides*, section *Deutzioides*].....*P. hirsutus*

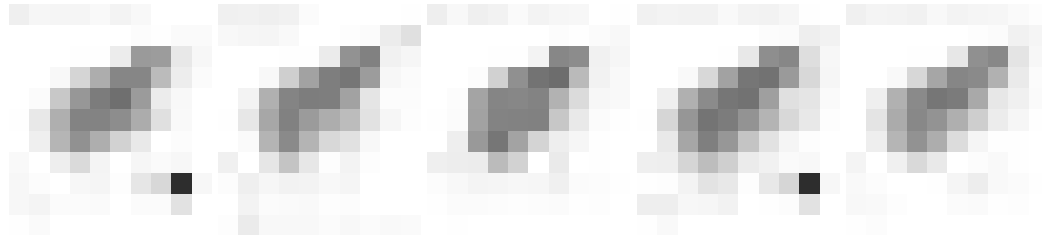
- 1 Axillary buds contained within a distinct pouch directly below the petiole (best observed in mature, long-shoot leaves); twigs of the current year glabrous; seeds with caudate tails about as long as the embryo; [subgenus *Philadelphus*].
- 2 Flowers 1-3 (-9) in a cymule; stamens 60-90; [subgenus *Philadelphus*, section *Pauciflorus*]..... *P. inodorus*
- 2 Flowers 5-9 in a determinate raceme; stamens 20-50; [subgenus *Philadelphus*, section *Philadelphus*].
- 3 Bark of the current year brown, exfoliating in its second year; flowers fragrant..... *P. coronarius*
- 3 Bark of the current year gray, not exfoliating later; flowers not fragrant or only slightly so..... *P. pubescens*

* *Philadelphus coronarius* Linnaeus, European Mock-orange. Cultivated (though moreso in the past than now), and sometimes escaped or persisting around old homesites; native of Europe. May-July. *P. coronarius* is the most commonly cultivated *Philadelphus* in our area, though it is currently considered rather old-fashioned. [= C, FNA, Pa]

Philadelphus hirsutus Nuttall, Hairy Mock-orange, Cumberland Mock-orange. Bluffs, rock outcrops, rocky woodlands, often with seepage, over mafic or calcareous rocks. April-May; June-August. A Southern Appalachian species: sw. VA and KY south and west to w. NC, TN, n. GA, and n. AL. *P. sharpianus* Hu, known from e. TN and nc. AR, is similar to *P. hirsutus*, allegedly differing in the hypanthium glabrous (vs. more or less pubescent), the leaves strigose-pilose above, glabrous or sparsely strigose or with the nerves only villous beneath (vs. scabrous-hirsute above, uniformly villous beneath); it is probably best considered only a form of *P. hirsutus*. *P. hirsutus* is cultivated and it may escape outside of the range stated. [= RAB, C, F, FNA, G, S, W; > *P. hirsutus* - K, Z; > *P. sharpianus* Hu - K, Z; > *P. hirsutus* var. *intermedius* Hu - Z; > *P. hirsutus* var. *nanus* Hu - Z; > *P. sharpianus* Hu var. *parviflorus* Hu - Z]

Philadelphus inodorus Linnaeus, Appalachian Mock-orange. Rich forests and woodlands, rocky bluffs over mafic or calcareous rocks, and also cultivated and persistent. April-May; June-August. VA and TN south to Panhandle FL (Gadsden, Liberty, and Jackson counties), GA, and s. AL (and according to C, also in e. PA). *P. floridus* Beadle, known from nw. GA, is similar to *P. inodorus*, allegedly differing in the pedicels and hypanthium pubescent (vs. glabrous); it is probably only a form of *P. inodorus*. [= RAB, C, FNA, G, Pa, W, WH; > *P. inodorus* var. *inodorus* - F, S, Z; > *P. inodorus* var. *carolinus* Hu - Z; > *P. inodorus* var. *grandiflorus* (Willdenow) A. Gray - F, Z; > *P. inodorus* var. *laxus* (Schrader) Hu - Z; > *P. inodorus* var. *strigosus* Beadle - S, Z; > *P. grandiflorus* Willdenow - S; > *P. gloriosus* Beadle - S; > *P. inodorus* - K; > *P. floridus* Beadle - K, S, Z]

Philadelphus pubescens Loiseleur, Ozark Mock-orange, Hairy Mock-orange. Limestone bluffs. E. TN, KY, nw. GA (Jones & Coile 1988), AL, MO, OK, and AR, west of the Blue Ridge. It has been documented from TN counties adjacent to both VA and NC, and is likely to be found in VA, at least. [= FNA, Pa; > *P. intectus* Beadle - S; > *P. latifolius* Schrader ex A.P. de Candolle - S; > *P. intectus* var. *intectus* - Z; > *P. intectus* var. *pubigerus* Hu - Z; > *P. pubescens* var. *verrucosus* (Schrader) Hu - Z; > *P. pubescens* var. *pubescens* - K, Z; > *P. pubescens* var. *intectus* (Beadle) A.H. Moore - K]



322. **LOASACEAE** A.L. de Jussieu 1804 (Loasa Family) [in CORNALES]

A family of 20 genera and 260-330 species, mainly herbs, primarily of America. References: Weigend in Kubitzki (2004).

Mentzelia Linnaeus (Blazingstar)

A genus of about 80 species, herbs, shrubs, and trees, of America, especially in sw. United States and Mexico. References: Weigend in Kubitzki (2004).

Mentzelia floridana Nuttall ex Torrey & A. Gray, Stickleaf. Hammocks, shell middens, dunes, other dry sands. Ne. FL (Duval County) south to s. FL. [= K, S, WH]

323. **BALSAMINACEAE** A. Richard 1822 (Touch-me-not Family) [in ERICALEs]

A family of 2 genera and 850-1000 species, primarily of the Old World tropics. References: Fischer in Kubitzki (2004).

Impatiens Linnaeus (Jewelweed, Touch-me-not, Snapweed, Balsam)

A genus of 850-1000 species, herbs and subshrubs, primarily tropical and north temperate Old World. References: Fischer in Kubitzki (2004).

- 1 Corolla purple, pink, or white; plants 3-6 (-8) dm tall; stems puberulent or glabrous; [cultivated alien, rarely escaped].
- 2 Sepal spur strongly recurved; stems puberulent *I. balsamina*

- 2 Sepal spur slightly curved; stems glabrous or with widely scattered hairs*I. walleriana*
- 1 Corolla yellow or orange (rarely cream or white); plant mostly 5-25 dm tall; stems glabrous; [native].
- 3 Flowers orange (rarely orange-yellow or white); calyx spur (colored) 7-10 mm long, curved forward parallel to the calyx sac*I. capensis*
- 3 Flowers yellow (rarely cream or white); calyx spur (colored) 4-6 mm long, at a right angle to the calyx sac*I. pallida*

* *Impatiens balsamina* Linnaeus, Garden Balsam. Frequently cultivated, sometimes escaped as a waif or "throw-out"; native of s. Asia. June-November. [= RAB, C, F, G, K, Pa, S, WH, WV]

Impatiens capensis Meerburgh, Orange Jewelweed, Orange Touch-me-not, Spotted Touch-me-not. Moist forests, bottomlands, cove forests, streambanks, bogs. May-November. NL (Newfoundland) west to SK, NT, and BC, south to SC, Panhandle FL, AL, TX, CO, ID, and OR. Within the portion of our area where *I. capensis* and *I. pallida* overlap, the two species often occur in mixed populations. *I. capensis* tends to have the leaf apices and crenulations more rounded than *I. pallida*, but the character is overlapping and variable. [= RAB, C, F, GW, K, Pa, W, WV; = *I. biflora* Walter – G, S]

Impatiens pallida Nuttall, Yellow Jewelweed, Yellow Touch-me-not, Pale Touch-me-not. Cove forests, streambanks, seepages, moist forests, bogs, roadsides. July-September. NS and QC west to SK, south to e. VA, wc. NC, TN, WV, MO, and OK. [= RAB, C, F, G, GW, K, Pa, S, W, WV]

* *Impatiens walleriana* Hooker f., Garden Impatiens. Suburban woodlands, weakly spreading from horticultural plantings; native of Africa. [= K, WH]



327. **POLEMONIACEAE** A.L. de Jussieu 1789 (Jacob's-ladder Family) [in ERICALES]

A family of 18 genera and 350-380 species, herbs, vines, and shrubs (rarely trees), mainly of temperate North America, but extending into tropical America and also in Eurasia. References: Wilson (1960a); Grant (1997); Grant (1998); Prather, Ferguson, & Jansen (2000); Wilken in Kubitzki (2004).

- 1 Leaves simple; [tribe *Polemoniae*]**5. Phlox**
- 1 Leaves compound.
- 2 Leaf segments ovate or elliptic, 5-16 mm wide; corolla blue; [tribe *Polemoniae*].....**4. Polemonium**
- 2 Leaf segments linear, most ca. 1 mm wide; corolla red, yellow, blue, or white; [tribe *Gilieae*]
- 3 Inflorescences elongate; flowers red or yellow**3. Ipomopsis**
- 3 Inflorescences spherical; flowers blue or white.
- 4 Inflorescence bracts not spinose; inflorescence on a long peduncle; flowers blue; plant 1-9 dm tall.....**1. Gilia**
- 4 Inflorescence bracts spine-tipped; inflorescence not long-pedunculata, subtended by bracts; flowers white; plant < 1 dm tall.....**2. Navarretia**

1. Gilia Ruiz & Pavón 1794 (Gilia)

A genus of about 40 species, herbs, of w. North America.

Gilia capitata Sims *ssp. capitata*, Bluehead Gilia. Disturbed areas, uncommonly cultivated; native of nw. North America. Reported for Hampshire County, WV (Harmon, Ford-Werntz, & Grafton 2006). [= K]

2. Navarretia Ruiz & Pavón 1794 (Navarretia)

A genus of ca. 30 species, herbs, of w. North America and South America. References: Wilken in Kubitzki (2004).

* *Navarretia intertexta* (Bentham) Hooker *ssp. propinqua* (Suksdorf) Day, Needle-leaf Pincushion-plant. Disturbed areas; native of w. North America. [= K]

3. Ipomopsis Michaux 1803 (Standing-cypress)

A genus of about 30 species, herbs, mainly of w. North America (1 species in se. North America, 1 in w. South America); an example of the affinities of the Sandhill flora to that of the dry sw. United States. References: Grant (1956)=Z; Wilken in Kubitzki (2004).

Ipomopsis rubra (Linnaeus) Wherry, Standing-cypress. Sandhills, sand rims of Carolina bays, dolomitic glades and woodlands, dunes, roadbanks, disturbed areas. June-August; August-September. Sc. NC south to c. peninsular FL, west to TX and OK, spread from cultivation in other areas to the north (including sites in the Piedmont and Mountains of GA and NC). [= RAB, K, W, WH, Z; = *Gilia rubra* (Linnaeus) A.A. Heller – C, F, G, S]

4. *Polemonium* Linnaeus 1753 (Jacob's-ladder)

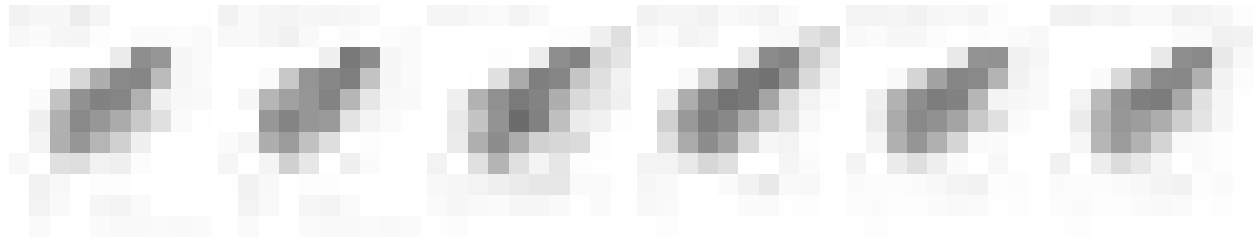
A genus of about 25 species, of temperate regions of North America and Eurasia. References: Worley, Ghazvini, & Schemske (2009); Davidson (1950); Wilken in Kubitzki (2004).

- 1 Stamens exerted 5-7 mm from the corolla; flowers in a compact panicle, the pedicels usually shorter than the calyx; flowering in July.....
.....*P. vanbruntiae*
- 1 Stamens included in the corolla; flowers in a diffuse, corymbiform panicle, the pedicels usually longer than the calyx; flowering in April-May.
 - 2 Inflorescence minutely puberulent; corolla 12-16 mm long*P. reptans* var. *reptans*
 - 2 Inflorescence densely glandular-villous; corolla 8-12 (-13) mm long*P. reptans* var. *villosum*

Polemonium reptans Linnaeus var. *reptans*, Spreading Jacob's-ladder. Moist, nutrient-rich forests, such as bottomlands and rich slopes. April-May; June. NY west to MN, south to VA, nc. NC, nw. GA, AL, and e. OK. [= C, K; < *P. reptans* – RAB, F, G, Pa, S, W, WV]

Polemonium reptans Linnaeus var. *villosum* E.L. Braun. Moist forests. Appalachian Plateau and vicinity, in s. OH and e. KY. [= C, K; < *P. reptans* – F, G]

Polemonium vanbruntiae Britton. Calcareous fens, swamps, and streambanks. May-July. ME, VT, and n. NY south to se. PA, sw. PA, and e. WV. [= K; = *P. van-bruntiae* – C, F, G, Pa, WV, orthographic variant]



5. *Phlox* Linnaeus 1753 (Phlox)

A genus of about 70 species, herbs (and creeping subshrubs), of temperate North America (with 1 species in ne. Asia). References: Wherry (1955)=Z; Ferguson, Krämer, & Jansen (1999); Wilken in Kubitzki (2004). Key based on C and Z.

- 1 Stems woody or suffrutescent, trailing or decumbent; leaves to 25 mm long (-60 mm long in *P. bifida*), to 3 (-5) mm wide, generally with short-shoots or fascicles of leaves in the axils of leaves of the sterile shoots.
 - 2 United portion of the style 5-12 mm long, the cleft portion ca. 1 mm long.
 - 3 Larger leaves > 3 cm long; nodes 4-5, spaced; petals deeply notched, the notch 1.5-5 mm deep.....*P. bifida*
 - 3 Larger leaves < 2.5 cm long; nodes >6, crowded; petals shallowly notched, the notch 0.5-3 mm deep.....*P. subulata*
 - 2 United portion of the style 1.5-4 mm long, the cleft portion 0.5-2 mm long.
 - 4 Fertile shoots (10-) 15-30 cm tall; upper leaves oblong-lanceolate, up to 12-25 mm long, 1.5-3 mm wide on sterile shoots, 2.5-5 mm wide on fertile shoots; pubescence of the inflorescence mostly with conspicuously glandular tips*P. nivalis* var. *hantzii*
 - 4 Fertile shoots (3-) 8-12 (-15) cm tall; upper leaves linear-lanceolate, up to 8-12 mm long, 0.5-1.5 mm wide on sterile shoots, 1.5-3 mm wide on fertile shoots; pubescence of the inflorescence mostly with finely glandular tips.....*P. nivalis* var. *nivalis*
- 1 Stems herbaceous, erect or decumbent; leaves (at least the larger) > 25 mm long and/or > 5 mm wide, generally lacking axillary fascicles of leaves.
 - 5 Style short, 1-4 mm long, the united portion 1-1.5 (-2)× as long as the cleft portion; stamens shorter than the corolla tube (thus included).
 - 6 Upper leaves alternate; annual; corolla red, white, or variegated; [alien, mostly naturalized in dry sandy soils of roadsides, fields, and disturbed areas].....*P. drummondii*
 - 6 Upper leaves opposite or subopposite; perennial; corolla blue, lavender, or pink; [native, mostly of forests, woodlands, or roadbanks].
 - 7 Sterile shoots rooting at the nodes; leaves broad-elliptic, ca. 2-3× as long as wide; sepals acuminate to very slightly awned, the awn 0-0.5 mm long; corolla tube glabrous.....*P. divaricata*
 - 7 Sterile shoots not rooting at the nodes; leaves lanceolate to linear, ca. 4-10× as long as wide; sepals awned, the awn 0.5-3.0 mm long; corolla glabrous, pilose, or glandular-pubescent.
 - 8 Cymes open, the lowest branches elongate, > 1 cm long; corolla usually glandular-pubescent or pilose (rarely glabrous); pedicels 1-8 (-12) mm long
 - 9 Leaves largest below the middle of the stem*P. floridana*
 - 9 Leaves largest above the midpoint of the stem*P. pilosa*
 - 8 Cymes compact, the lowest branches short, < 0.5 cm long; corolla glabrous; pedicels 1-6 mm long.
 - 10 Leaves and bracts oblong-elliptic to lanceolate, acute to obtuse (rarely acuminate), the larger 20-40 (-50) mm long, 4-8 (-12) mm wide, ca. 5× as long as wide; bracts below the inflorescence hiding the calyces*P. amoena*

- 10 Leaves and bracts linear to lanceolate, acuminate, the larger 35-45 mm long, 3-5 mm wide, ca. 10× as long as wide; bracts below the inflorescence not hiding the calyces *P. lighthipei*
- 5 Style long, (12-) 14-26 mm long, the united portion 3-30× as long as the cleft portion; stamens equaling or exceeding the corolla tube (thus in part exerted).
- 11 Plants forming colonies by rhizomes, stolons, and/or prostrate sterile shoots with evergreen to semi-evergreen leaves; flowering shoots 1-4 (-5) dm tall.
- 12 Plants with rhizomes and stolons tipped with clustered, evergreen, linear to lanceolate leaves 3-12 cm long, 5-10 (-12) mm wide *P. buckleyi*
- 12 Plants with prostrate sterile shoots with scattered, semi-evergreen, spatulate to obovate leaves 1.5-4.5 cm long, 5-16 mm wide *P. stolonifera*
- 11 Plants not colony-forming by rhizomes or stolons; flowering shoots (3-) 5-20 dm tall.
- 13 Leaf margin ciliate-serrulate; lateral veins of the leaves readily apparent, these joining to form a connecting vein parallel to the leaf margin.
- 14 Bracts of the inflorescence pubescent with glandular hairs; corolla tube glabrous; leaves opposite; nodes usually 8-15; leaves usually 2-3× as long as wide *P. amplifolia*
- 14 Bracts of the inflorescence pubescent with non-glandular hairs; corolla tube pubescent (rarely glabrous); leaves subopposite (at least near the inflorescence); nodes usually 15-40; leaves usually 3-4× as long as wide *P. paniculata*
- 13 Leaf margin smooth or slightly rough; lateral veins of the leaves not readily apparent, not forming a connecting vein parallel to the leaf margin.
- 15 Flowering shoots arising from decumbent stems; nodes below the inflorescence 3-7
- 16 Sterile, decumbent stems short; nodes (3-) 4 (-5) *P. ovata*
- 16 Sterile, decumbent stems elongate; nodes (5-) 6 (-7) *P. pulchra*
- 15 Flowering shoots arising from rhizomes; nodes below the inflorescence 7 or more.
- 17 Cymes several, the lower on rather short and uniform peduncles, thus the inflorescence as a whole subcylindric in outline.
- 18 Nodes 7-15, well-spaced; upper leaves oblong to ovate, cordate at the base; flowering early summer *P. maculata* var. *maculata*
- 18 Nodes 16-35, crowded; upper leaves lanceolate to ovate-oblong; truncate to subcordate at the base; flowering late summer ... *P. maculata* var. *pyramidalis*
- 17 Cymes solitary or several, if several then the lower on long peduncles, thus the inflorescence as a whole broadly rounded or even flat-topped.
- 19 Calyx subcylindric, the sepals fairly broad, with a rather weak midrib, the junction-membranes thin, narrow, becoming markedly plicate-keeled *P. carolina*
- 19 Calyx subcampanulate, the sepals narrow with a well-developed midrib, the junction-membranes firm, broad and flat (to slightly plicate-keeled) *P. glaberrima*

Phlox amoena Sims, Hairy Phlox, Chalice Phlox. Dry woodlands and forests, roadbanks, sandhills. April-June; June-July. W. NC west to s. KY, south to n. FL and MS. [= C, F, G, S, W; = *P. amoena* ssp. *amoena* – K, Z; < *P. amoena* – RAB, WH (also see *P. lighthipei*)]

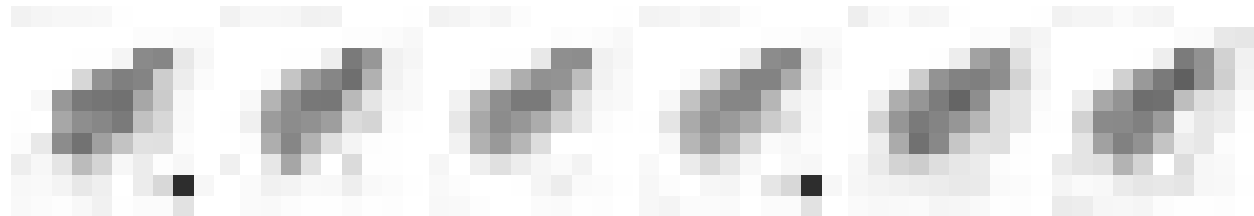
Phlox amplifolia Britton, Broadleaf Phlox. Moist forests, particularly over mafic rocks. July-August. W. VA west to s. IN and se. MO, south to w. NC, AL, and n. AR. [= RAB, C, F, G, K, S, W, WV, Z]

Phlox bifida Beck, Ten-point Phlox. Cliffs, rock outcrops, dry rocky or sandy sites. MI west to MN, south to c. TN (Chester, Wofford, & Kral 1997) and nw. AR. [= *Phlox bifida* Beck ssp. *bifida* – K, Z; > *Phlox bifida* Beck ssp. *stellaria* (A. Gray) Wherry – K, Z; > *Phlox bifida* Beck var. *bifida* – C, F, G; > *P. bifida* var. *cedraria* (Brand) Fernald – C, F, G; > *Phlox bifida* Beck var. *stellaria* (A. Gray) Wherry – G, K, Z]

Phlox buckleyi Wherry, Swordleaf Phlox, Shale-barren Phlox. Shale woodlands and woodland edges, shaley roadbanks. May-June. Endemic to w. VA and e. WV. [= C, F, G, K, W, WV, Z]

Phlox carolina Linnaeus, Carolina Phlox, Thick-leaf Phlox, Giant Phlox. Forests, woodlands, woodland borders, barrens. May-July. VA, WV, IL and MO south to s. GA, s. AL, s. MS, se. LA and e. TX. [= RAB, G, S, W; < *P. glaberrima* – C; > *P. carolina* ssp. *alta* Wherry – K, Z; > *P. carolina* ssp. *angusta* Wherry – K, Z; > *P. carolina* ssp. *carolina* – K, Z; > *P. carolina* ssp. *turritella* Wherry – K, Z]

Phlox divaricata Linnaeus, Eastern Blue Phlox, Timber Phlox. Moist deciduous forests in circumneutral soils. April-May. VT and QC west to MN, south to e. NC, GA, Panhandle FL, and TX. [= RAB, S, W, WH, WV; > *P. divaricata* var. *divaricata* – C, F, G; > *P. divaricata* var. *laphamii* A.W. Wood – C, F, G; > *P. divaricata* ssp. *divaricata* – K, Pa, Z; > *P. divaricata* ssp. *laphamii* (A.W. Wood) Wherry – K, Pa, Z]



* ***Phlox drummondii*** Hooker, Annual Phlox, Drummond Phlox. Dry sandy soils of roadsides, fields, disturbed areas; native of TX. April-July. Wherry recognized 3 subspecies in *P. drummondii*, all endemic to TX; it does not seem meaningful to try to distinguish infraspecific taxa in our area, since our plants are the progeny of various cultivars derived from hybrids and selections of the wild taxa. [= RAB, F, G, S, WH; > *P. drummondii* ssp. *drummondii* – K, Z]

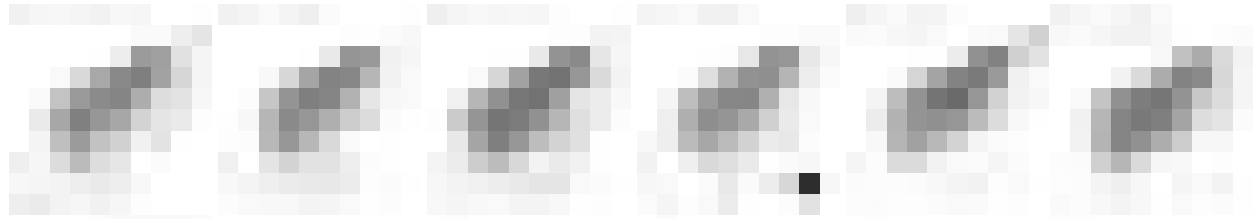
Phlox floridana Benth. Sandhills. Sw. GA and se. AL south to FL Panhandle and nw. peninsular FL. [= K, S, WH, Z]

Phlox glaberrima Linnaeus, Smooth Phlox. Wet forests and woodlands, especially bottomlands. April-June; June-July. MD, OH, IN, IL, WI, and MO south to Panhandle FL, LA, and OK. [= F, G, S, W; > *P. glaberrima* ssp. *glaberrima* – RAB, K, Z; > *P. glaberrima* ssp. *triflora* (Michaux) Wherry – RAB, K, Z; > *Phlox glaberrima* Linnaeus ssp. *interior* (Wherry) Wherry – K, Z; > *Phlox glaberrima* Linnaeus var. *interior* Wherry – F; > *P. carolina* Linnaeus var. *triflora* (Michaux) Wherry – F; > *Phlox glaberrima* Linnaeus var. *interior* Wherry; < *P. glaberrima* – C, WH]

Phlox lighthipei Small, Lighthipe's Phlox. Dry to moist sandy soils. April-May; June-July. S. SC south to n. FL. [= S; = *P. amoena* ssp. *lighthipei* (Small) Wherry – K, Z; < *P. amoena* – RAB, WH]

Phlox maculata Linnaeus var. *maculata*, Northern Meadow Phlox. Moist forests and openings. June-July. S. QC west to MN, south to c. NC, KY, and IA. [= F, G, WV; = *P. maculata* ssp. *maculata* – K, Z; < *P. maculata* – C, Pa, S]

Phlox maculata Linnaeus var. *pyramidalis* (J.E. Smith) Wherry, Leafy Meadow Phlox. Moist forests and openings. July-September. PA, OH, s. IN, and se. MO, south to NC, n. GA, and TN. [= *P. maculata* ssp. *pyramidalis* (J.E. Smith) Wherry – RAB, K, Z; = *P. maculata* var. *purpurea* Fernald – F, G, WV; < *P. maculata* – C, Pa, S]



Phlox nivalis Loddiges ex Sweet var. *hantzii* (Nuttall) Wherry, Trailing Phlox. Rock outcrops, thin soils of rocky woodlands, roadbanks. March-May. Sc. VA west to n. AL, south to c. peninsular FL and s. AL. [= RAB; < *P. nivalis* – C, F, S, W, WH; < *P. hantzii* – G; = *P. nivalis* ssp. *hantzii* (Nuttall) Wherry – K, Z]

Phlox nivalis Loddiges ex Sweet var. *nivalis*, Pineland Phlox. Sandhills, other dry woodlands, roadbanks. March-May. Nc. NC south to Panhandle FL. A third taxon, *P. nivalis* ssp. *texensis* Lundell is endemic in e. TX. [= RAB; < *P. nivalis* – C, F, S, W, WH; < *P. hantzii* – G; = *P. nivalis* ssp. *nivalis* – K, Z]

Phlox ovata Linnaeus, Mountain Phlox, Appalachian Phlox, Allegheny Phlox. Moist forests, woodlands, woodland borders, and barrens. May-June; July. PA to NC and ne. TN in the Appalachians; disjunct in OH and IN. See Locklear (2011) for a discussion of the nomenclatural issue involving *P. ovata* and *P. latifolia*. [= RAB, C, F, G, Pa, S, W, WV, Z; = *Phlox latifolia* Michaux – K1]

Phlox paniculata Linnaeus, Garden Phlox. Streambanks, moist forests, woodlands, and woodland borders. July-August; September. S. NY west to IL and MO, south to e. NC, w. SC, n. GA, n. MS, and AR. [= RAB, C, F, G, K, Pa, S, W, WV, Z]

Phlox pilosa Linnaeus, Downy Phlox. Dry to mesic woodlands and forests, roadbanks. April-May; May-June. PA west to se. ND, south to c. peninsular FL and TX. [= Pa, RAB, S, W, WH; > *P. pilosa* ssp. *pilosa* – K, Z; > *P. pilosa* Linnaeus ssp. *detonsa* (A. Gray) Wherry – K, Z; > *P. pilosa* Linnaeus ssp. *deamii* Levin – K; > *P. pilosa* Linnaeus ssp. *ozarkana* (Wherry) Wherry – K, Z; > *P. pilosa* var. *pilosa* – C, F, G; < *P. pilosa* – RAB, S, W, WH]



Phlox pulchra Wherry, Alabama Phlox. {habitat} Endemic to c. AL. [= K] {add to synonymy}

Phlox stolonifera Sims, Creeping Phlox. Moist forests. April-May; May-June. PA and s. OH south to w. NC, n. GA, and e. TN, essentially a Southern and Central Appalachian endemic. This species is sometimes locally abundant, as in parts of Great Smoky Mountains National Park. [= RAB, C, F, G, K, Pa, S, W, WV, Z]

Phlox subulata Linnaeus, Moss Phlox, Mountain-pink. Dry and exposed rock outcrops, rocky flood-scoured riversides, dry woodlands over a wide variety of rocks, shale barrens. April-May. NY and OH south to w. NC and TN; escaped or naturalized more widely from horticultural use. Intraspecific taxa that are sometimes recognized seem poorly correlated with morphology and geography. [= Pa, RAB, S, W; > *P. subulata* var. *australis* – G; > *P. subulata* var. *setacea* (Linnaeus) Brand – C; > *P. subulata* var. *brittonii* – F, WV; > *P. subulata* ssp. *australis* (Wherry) Wherry – K, Z; > *P. subulata* ssp. *brittonii* (Small) Wherry – K, Z; > *P. brittonii* Small – S; > *P. subulata* var. *subulata* – C, F, WV; < *P. subulata* var. *subulata* – C (also see var. *brittonii*); > *P. subulata* var. *ciliata* Wherry – G; > *P. subulata* ssp. *subulata* – K, Z]

330. PENTAPHYLACACEAE Engler 1897 (Pentaphylax or Sakaki Family) [in ERICALEs]

A family of 12 genera and ca. 340 species, of the tropics and subtropics (a few of warm temperate areas), mainly of Asia and America. There is nomenclatural dispute over whether to use the name Pentaphylacaceae (which is conserved) or the older Ternstroemiaceae. References: Weitzman, Dressler, & Stevens in Kubitzki (2004).

Ternstroemia Mutis ex Lianneus f. 1782 (Saintedwood)

A genus of about 90 species, shrubs and trees, native of tropical and subtropical Asia, Africa, and America. References: Ming & Bartholomew 2007)=Z.

* *Ternstroemia gymnanthera* (Wight & Arnott) Beddome, Ternstroemia. Moist forests and bluffs; native of e. and se. Asia (China south into se. Asia). Locally and aggressively naturalizing at Kalmia Gardens, Coker College, Hartsville, Darlington County, SC, where perhaps planted as long ago as the 1930s. Material cultivated and naturalizing in the se. United States does not key perfectly to *T. gymnanthera*, and may represent other species (such as *T. luteoflora* L.T. Ling), hybrids, or horticultural selections out of the normal morphological range of wild *T. gymnanthera*, as described in the Flora of China (Ming & Bartholomew 2007). [= K1, K2, Z]



331. SAPOTACEAE A.L. de Jussieu 1789 (Sapodilla Family) [in ERICALEs]

A family of about 53-54 genera and 1100-1250 species, trees and shrubs, primarily tropical (rarely temperate), of Old World and New World. References: Elisens, Whetstone, & Wunderlin in FNA 2009); Pennington in Kubitzki (2004); Govaerts, Frodin, & Pennington (2001).

Sideroxylon Linnaeus 1754 (Bumelia, Buckthorn, Bully)

As defined broadly by Pennington (1991), *Sideroxylon* includes about 75 species, widely distributed in the New World and Old World Tropics (our species are the northern tip of a "tropical iceberg"). Pennington found that no consistent set of characters could be used to separate *Bumelia* from other New World genera (such as *Mastichodendron* and *Dipholis*), and that the New World segregate genera were also not separable from several Old World genera. The Linnaean *Sideroxylon* has nomenclatural priority. References: Elisens & Jones in FNA (2009); Clark (1945)=V; Cronquist (1945)=Q; Pennington (1991)=Z; Godfrey (1988)=Y; Govaerts, Frodin & Pennington (2001)=X; Allison (2006)=U. Key adapted from Y.

- 1 First-year twigs persistently pubescent; leaves pubescent beneath with appressed to tomentose hairs, ranging in color (depending partly on age) from silvery through coppery to dark brown;
 - 2 Mature leaves densely pubescent beneath, the hairs sericeous, matted and shiny; leaves 2-5 (-7) cm long, 0.5-2 (-3) cm wide..... *S. tenax*
 - 2 Mature leaves pubescent beneath, the hairs woolly-tomentose, neither matted nor shiny; leaves 1-10 cm long, 0.5-4 cm wide.
 - 3 Low shrub, 0.1-0.3 (-1) m tall, clonal from subterranean stems; berries (8-) 10-13 mm long *S. rufohirtum*
 - 3 Shrub or small tree, to 12 m tall, sometimes multistemmed but not extensively clonal; berries 6-8 mm long.
 - 4 Leaf pubescence persistently tawny or red *S. lanuginosum* ssp. *lanuginosum*
 - 4 Leaf pubescence slightly tawny when leaves are first emerging, later becoming gray or white *S. lanuginosum* ssp. *oblongifolium*
- 1 First-year twigs pubescent when young, soon becoming glabrous or nearly so; leaves glabrous, glabrate, or sparsely pubescent beneath with appressed blond hairs or cottony white hairs (or densely appressed metallic-silvery pubescent in *S. alachuense*).
 - 5 Low shrub, 0.1-0.5 (-1) m tall, clonal from subterranean stems; leaves 1-4 (-5.2) cm long; [endemic to xeric sands in GA] *S. macrocarpum*
 - 5 Shrub or small tree, to 20 m tall, sometimes multistemmed but not extensively clonal; leaves 1-12 (-15) cm long; [collectively widespread].
 - 6 Lower leaf surface with dense, metallic-silvery, appressed pubescence; stems of shoots of the season pale gray or silvery *S. alachuense*
 - 6 Lower leaf surface glabrous or glabrescent, green; {stems...}.
 - 7 Leaf blade not conspicuously reticulate..... *S. celastrinum*
 - 7 Leaf blade conspicuously reticulate (see below).
 - 8 Upper surfaces of the mature leaf blades faintly and coarsely reticulate-veined (at 20× or greater magnification), the veins of the reticulum not at all raised, usually somewhat impressed, and, although pale, not bony-cartilaginous..... *S. thornei*
 - 8 Upper surfaces of the mature leaf blades notably finely reticulate-veined (at 20× or greater magnification), the veins of the reticulum usually raised above the enclosed islets, and bony-cartilaginous in contrast to the green islets.
 - 9 Larger leaf blades 8-12 (-15) cm long; large shrub or small tree, the stem usually solitary; berries 10-15 mm long, 10-12 mm in diameter; [of NC, SC, and VA and southward] *S. lycioides*

- 9 Larger leaf blades 2-5 (-7) cm long; small to large shrub, usually multi-stemmed; berries 5-8 mm long, ca. 5 mm in diameter; [of SC and southward].....*S. reclinatum* ssp. *reclinatum*

Sideroxylon alachuense L.C. Anderson, Alachua Bully, Silver Buckthorn. Sandy hammocks, shell middens. S. GA south to c. peninsular FL. [= FNA, K; = *Bumelia anomala* (Sargent) R.B. Clark – V, Y; = *S. alachense* – X, misspelled; = *B. lanuginosa* (Michaux) Persoon var. *anomala* Sargent]

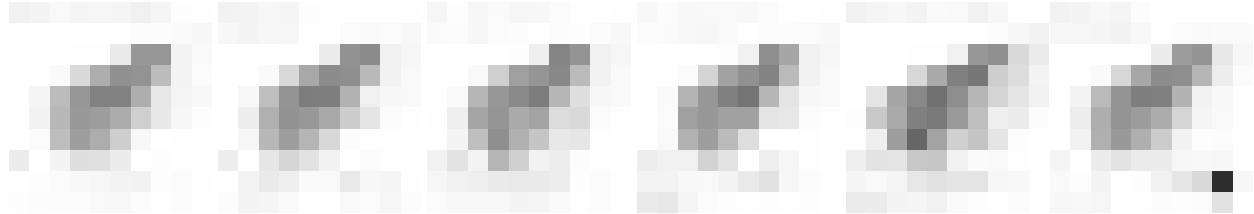
Sideroxylon celastrinum (Kunth) T.D. Pennington, Saffron-plum. Sandy hammocks. Peninsular FL (immediately south of our area), s. AL, s. TX, south through Mexico and Central America to n. South America; West Indies. [= FNA, K2, WH, X; = *Bumelia celastrina* Kunth]

Sideroxylon lanuginosum Michaux ssp. *lanuginosum*, Eastern Gum Bumelia, Eastern Gum Bully. Mesic to floodplain forests. E. GA south to nc. FL, west to LA. Other subspecies are more western. Reported for SC by Kartesz (1999) {investigate}. [= FNA, X; > *S. lanuginosum* ssp. *lanuginosum* – K; > *S. lanuginosum* ssp. *albicans* (Sargent) Kartesz & Gandhi – K; = *Bumelia lanuginosa* ssp. *typica* Q; < *Bumelia lanuginosa* (Michaux) Persoon – S; > *B. lanuginosa* var. *lanuginosa* – V; > *B. rufa* Rafinesque – V; = *B. lanuginosa* ssp. *lanuginosa* – Y; < *S. lanuginosum* – Z]

Sideroxylon lanuginosum Michaux ssp. *oblongifolium* (Nuttall) T.D. Pennington, Western Gum Bumelia, Western Gum Bully. Hammocks and mesic to dry forests. AL and KY west to KS, OK, and TX. [= FNA, K, X; = *Bumelia lanuginosa* (Michaux) Persoon var. *oblongifolia* (Nuttall) R.B. Clark – C, F, G, V; = *Bumelia lanuginosa* ssp. *oblongifolia* (Nuttall) Cronquist var. *oblongifolia* (Nuttall) R.B. Clark – Q; < *S. lanuginosum* – Z]

Sideroxylon lycioides Linnaeus, Buckthorn Bumelia, Buckthorn Bully. Maritime forests, maritime scrub, river bluffs, swamp margins, usually in circumneutral soil (over shell hash, coquina limestone, marl, or limestone), in the Piedmont and Mountains in rich, mesic forests over mafic or calcareous rocks. June-July; September-October. Se. VA south to Panhandle FL, west to se. TX, north in the interior to s. IN, s. IL, and se. MO, mostly on the Coastal Plain, but extending (in our area in NC and SC) to the upper Piedmont and north in the interior (primarily on limestone) to KY and TN. This species is extremely variable in leaf shape; though described in most works as up to 10-12 cm long and up to 4 cm wide, the leaves can be to 15 cm long and 8 cm wide. The leaf apex can be acuminate, acute, rounded, or notched. [= FNA, K, X, Z; = *Bumelia lycioides* (Linnaeus) Persoon – RAB, C, G, GW, S, Y; > *B. lycioides* var. *lycioides* – F, V; > *B. lycioides* var. *virginiana* Fernald – F, V; > *B. lycioides* var. *ellipsoidalis* R.B. Clark – V; > *B. smallii* R.B. Clark – F]

Sideroxylon macrocarpum (Nuttall) J.R. Allison, Big-fruited Buckthorn, Ochoopee Bumelia, Ochoopee Bully. Longleaf pine sandhills. Endemic to sc. GA (Appling, Candler, Emanuel, Evans, Jeff Davis, Laurens, Long, Montgomery, Pierce, Tattnall, Toombs, Treutlen, and Wheeler counties). [= FNA, U; < *B. reclinata* (Michaux) Ventenat var. *reclinata* – Q, Y; < *B. reclinata* – V; = *Bumelia macrocarpa* Nuttall]



Sideroxylon reclinatum Michaux ssp. *reclinatum*, Smooth Bumelia, Florida Bully. Floodplain forests and river margins. Ssp. *reclinatum* ranges from s. SC and se. GA south to s. peninsular FL. Ssp. *austrofloridense* (Whetstone) Kartesz & Gandhi [= K; *Bumelia reclinata* (Michaux) Ventenat var. *austrofloridensis* Whetstone] occurs in peninsular FL. [= FNA, K, X; > *Bumelia reclinata* – S; > *B. microcarpa* Small – S; < *B. reclinata* (Michaux) Ventenat var. *reclinata* – Q, Y; < *B. reclinata* – V; < *S. reclinatum* – Z]

Sideroxylon rufohirtum Herring & Judd, Red-haired Bully. Hammocks. Endemic to FL: ne. FL south to c. peninsular FL. [= FNA; = *S. reclinatum* Michaux ssp. *rufotomentosum* (Small) Kartesz & Gandhi – K, X; = *Bumelia rufotomentosa* Small – V, S, Y; = *B. reclinata* (Michaux) Ventenat var. *rufotomentosa* (Small) Cronquist – Q]

Sideroxylon tenax Linnaeus, Tough Buckthorn, Tough Bumelia, Tough Bully. Maritime scrub, maritime forests, also inland in hammocks. May-June; September-October. Se. NC south to s. peninsular FL. [= FNA, K, X, Z; = *Bumelia tenax* (Linnaeus) Willdenow – RAB, Q, V, Y; > *B. tenax* – S; > *B. lacuum* Small – S]

Sideroxylon thornei (Cronquist) Pennington, Thorne's Bumelia, Swamp Bumelia. Bottomlands and limesink depressions, particularly over calcareous substrates. May-June; August-early October. Ne. GA south to Panhandle FL, and west to AL. The validity of this species has been supported by Anderson (1996). [= FNA, K, X, Z; = *Bumelia thornei* Cronquist – Y]

332. EBENACEAE Gürcke 1891 (Ebony Family) [in ERICALEs]

A family of 2-6 genera and 500-600 species, trees and shrubs, distributed in tropical and subtropical (rarely warm temperate) regions. References: Eckenwalder in FNA (2009); Wallnöfer in Kubitzki (2004).

Diospyros Linnaeus 1753 (Persimmon)

A genus of 500-600 species, trees and shrubs, of tropical and subtropical regions (with very few exceptions). The genus includes a variety of tropical trees called ebony in the wood trade. References: Eckenwalder in FNA (2009); Spongberg (1977)=Z; Wallnöfer in Kubitzki (2004).

Identification notes: Seedlings and fire sprouts are superficially very similar to *Nyssa sylvatica*, but can be separated in the following ways: bundle scar 1 per bud scar, narrowly crescent-shaped (vs. *Nyssa* with 3 distinct, circular, bundle scars arranged in a broad V pattern), leaves never with teeth (vs. *Nyssa* leaves sometimes with a few irregular teeth), leaves glabrate to tomentose with curly hairs (vs. glabrous or with a few straight, forward-pointing hairs), leaves with sessile to short-stipitate glands on upper surface of midrib and outer petiole, later becoming necrotic spots (vs. leaves without glands).

- 1 Twigs stout, reddish-pubescent; fruits to 10 cm in diameter; [cultivated alien]**[D. kaki]**
- 1 Twigs slender, glabrous or with gray pubescence; fruits to 4 cm in diameter; [native].....**D. virginiana**

* **Diospyros kaki** Linnaeus f., Kaki, Kaki-plum, Japanese Persimmon. Rarely grown in our area for its fruits, which are much larger than *D. virginiana* (to 9 cm in diameter). [= FNA, Z] {not mapped; rejected as a component of our flora}

Diospyros virginiana Linnaeus, American Persimmon, Possumwood. Dry woods, sandhills, disturbed places, floodplain and mesic forests, fencerows. May-June; September-December (and persisting). CT, PA, OH, IN, IL, MO, and e. KS south to s. FL and TX. East of the Mississippi River, *D. virginiana* var. *virginiana* has leaves cuneate to rounded at the base, and glabrous or glabrescent; mostly west of the Mississippi River and perhaps eastward along the Coastal Plain, *D. virginiana* var. *pubescens* (Pursh) Dippel has leaves subcordate, and persistently pubescent. Though these differences seem relatively trivial, they are consistent, geographically correlated, and may be worthy of varietal recognition. Persimmons are famous for their sweet and edible fruits, and infamously for the bitter-astringency of the not fully ripe fruit. The species is dioecious, the male trees appear to reach a greater size than the females. The wood is one of the heaviest and hardest in e. North America. [= RAB, FNA, GW, K, Pa, W, WH, WV; > *D. virginiana* var. *virginiana* – C, F, G, Z; > *D. virginiana* var. *pubescens* (Pursh) Dippel; > *D. virginiana* – S; > *D. mosieri* Small – S]



333. PRIMULACEAE Ventenat 1799 (Primrose Family) [in ERICALES]

As broadly circumscribed to include Myrsinaceae and Samolaceae, cosmopolitan in distribution. Following the discovery that various herbaceous and largely temperate genera (*Lysimachia*, *Trientalis*, *Anagallis*, *Samolus*, etc.) traditionally placed in Primulaceae actually were more closely related to the largely tropical and woody Myrsinaceae, various authors, including Källersjö, Bergqvist, & Anderberg (2000) and Martins, Oberprieler, & Hellwig (2003) proposed the transfer of *Lysimachia*, *Anagallis*, and *Trientalis* to Myrsinaceae and of *Samolus* to Theophrastaceae. APG III (2009) alternatively merges Samolaceae and Myrsinaceae into Primulaceae, and recognizes variation at the subfamilial and tribal ranks; this approach is followed here. References: Cholewa in FNA (2009); Cholewa & Kelso in FNA (2009); Cholewa, Pipoly, and Ricketson in FNA (2009); Channell & Wood (1959); APG III (2009); Källersjö, Bergqvist, & Anderberg (2000); Martins, Oberprieler & Hellwig (2003); Anderberg in Kubitzki (2004); Ståhl in Kubitzki (2004), Ståhl & Anderberg in Kubitzki (2004). [including *MYRSINACEAE* and *SAMOLACEAE*]

- 1 Aquatic; leaves pectinate (deeply pinnatifid into linear segments); [subfamily *Primuloideae*].....**2. Hottonia**
- 1 Terrestrial (though sometimes in wetlands or submersed for short periods of time); leaves entire or shallowly toothed.
 - 2 Shrub or tree; [of FL, LA, and southward]; [subfamily *Myrsinoideae*].
 - 3 Flowers in axillary cymes of many flowers; leaf margins crenulate.....**4. Ardisia**
 - 3 Flowers in fascicles of 5-9, on short stalks directly on the stem; leaf margins entire**5. Myrsine**
 - 2 Herb; [collectively widespread].
 - 4 Leaves all or chiefly cauline; [subfamily *Myrsinoideae*]**6. Lysimachia**
 - 4 Leaves strictly in a basal rosette or basally disposed (with a basal rosette and smaller stem leaves).
 - 5 Inflorescence an umbel; leaves strictly basal; [subfamily *Primuloideae*]**3. Primula**
 - 5 Inflorescence a raceme or a panicle of racemes; larger leaves basal and smaller leaves on the stem; [subfamily *Theophrastidoideae*, tribe *Samoleae*].....**1. Samolus**

1. Samolus Linnaeus 1753 (Water-pimpernel)

A genus of about 10-15 species, herbs and subshrubs, nearly cosmopolitan. References: Cholewa in FNA (2009); Ståhl in Kubitzki (2004).

- 1 Pedicels ebracteate; corolla 3-7.5 mm long, the flowers 5-7 mm across; leaves all below the inflorescence; calyx lobes equaling or longer than tube; staminodes absent**S. ebracteatus**

- 1 Pedicels with a minute bract near the middle; corolla 1.2-3 mm long, the flowers 2-3 mm across; leaves extending into the inflorescence; calyx lobes equaling or shorter than tube; staminodes present..... *S. parviflorus*

Samolus ebracteatus Kunth, Limewater Brookweed. Brackish marshes, swamps over calcareous substrate. Peninsular FL, coastal Panhandle FL, sw. LA, and TX, south into Mexico; West Indies. [= FNA, GW, WH; > *S. ebracteatus* ssp. *ebracteatus* – K; > *S. ebracteatus* ssp. *alyssoides* – K]

Samolus parviflorus Rafinesque, Water-pimpernel, Brookweed. Stream banks, brackish marshes, pools in floodplains, interdune ponds. April-October. NB west to BC, south to Central America; also in c. and s. South America. Sometimes treated as a subspecies or other component of the European *S. valerandi*; the American plant is sufficiently distinct to warrant specific status. A different opinion is expressed by Jones et al. (2012), who prefer to treat *S. parviflorus* within a broadly circumscribed *S. valerandi*. *S. parviflorus* has nomenclatural priority over *S. floribundus* by a month. [= RAB, F, FNA, GW, Pa, W, WV; = *Samolus floribundus* Kunth – C, G, S; = *S. valerandi* Linnaeus ssp. *parviflorus* (Rafinesque) Hultén – K, WH]

2. *Hottonia* Linnaeus 1753 (Water-violet)

A genus of 2 species, aquatic herbs, of North America and Eurasia. References: Cholewa in FNA (2009); Anderberg in Kubitzki (2004).

Hottonia inflata Elliott, Featherfoil, Water-violet. Slow-moving or stagnant waters of swamps, millponds, beaverponds, sag ponds, oxbows, rivers, probably dispersed by waterfowl, primarily in the Coastal Plain, very rarely in the Piedmont and Mountains. April-July; May-August. ME south to GA, west to TX, inland up the Mississippi Embayment to IL, and at other scattered locations inland (as w. WV, and especially around the Great Lakes). The species shows large population fluctuations, and may be essentially ephemeral at many locations. Townsend (1995) documents its first SC record. [= RAB, C, F, FNA, G, GW, K, Pa, S, WV]

3. *Primula* Linnaeus 1753 (Shooting star)

A genus of about 450 species, primarily of the temperate Northern Hemisphere. Mast et al. (2004) show that *Dodecatheon* is nested within *Primula*, and is closely related to (and derived from) *Primula* subgenus *Auriculastrum*, apparently via a relatively simple alteration of the corolla for buzz-pollination. References: Reveal in FNA (2009); Mast & Reveal (2007)=Y; Fassett (1944)=Z; Mast et al. (2004).

- 1 Leaves cordate, subcordate, or abruptly narrowed to the petiole..... *P. frenchii*
 1 Leaves long-cuneate at the base, gradually narrowed to the petiole..... *P. meadia*

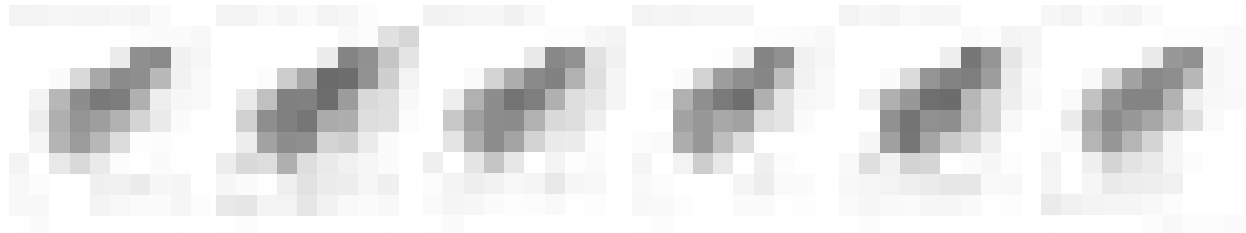
Primula frenchii (Vasey) A.R. Mast & Reveal, French's Shooting-star. Ledges, cliffs. April-May. IN, IL, and MO south through KY to AL and AR. [= Y; = *Dodecatheon meadia* Linnaeus var. *frenchii* Vasey – C, F, G, Z; = *D. frenchii* (Vasey) Rydberg – FNA, K]

Primula meadia (Linnaeus) A.R. Mast & Reveal, Eastern Shooting Star. Rich forests, woodlands, and rock outcrops (primarily calcareous or mafic), especially with nutrient-rich seepage. Late March-early June; late May-June. MD and PA west to s. WI, se. MN, IA, and OK, south to sc. SC, n. GA, n. FL (Gadsden County), AL, and TX. [= Y; = *Dodecatheon meadia* – RAB, FNA, Pa, W, WH, WV; > *D. meadia* Linnaeus var. *meadia* – C, F, G, Z; > *Dodecatheon meadia* Linnaeus var. *brachycarpum* (Small) Fassett – C, F, G, Z; > *D. meadia* ssp. *meadia* – K; > *D. meadia* ssp. *brachycarpum* (Small) R. Knuth – K; > *D. brachycarpa* Small – S; > *D. meadia* – S; > *D. hugeri* Small – S; > *D. meadia* var. *genuinum* – Z; > *D. meadia* var. *obesum* Fassett – Z]

4. *Ardisia* Swartz 1788 (Marlberry)

A genus of 400-500, trees and shrubs, of tropical America, Asia, and Australia. References: Pipoly & Ricketson in FNA (2009); Ståhl & Anderberg in Kubitzki (2004).

* *Ardisia crenata* Sims, Coral Ardisia, Coralberry, Spiceberry, Hen’s Eyes, Marlberry. Moist suburban forests, floodplains, mesic flatwoods; native of Asia. Naturalized from horticultural use in s. GA (Lowndes and Thomas counties [Carter, Baker, & Morris 2009]), FL Panhandle, and FL peninsula. [= FNA, K, WH]



5. *Myrsine* Linnaeus 1753 (Colicwood)

A genus of about 300 species (if circumscribed to include *Rapanea*), shrubs and trees, pantropical. References: Pipoly & Ricketson in FNA (2009); Ståhl & Anderberg in Kubitzki (2004).

Myrsine cubana A. de Candolle, *Myrsine*, Colicwood. Cp (FL): hammocks; rare. Dixie, Levy, and Volusia counties FL, south to s. FL; West Indies and Central America. [= FNA; ? *M. guianensis* (Aublet) Kuntze – GW, misapplied; > *M. floridana* A. de Candolle – K (superfluous name); ? *Rapanea guayanensis* Aublet – S, misapplied, orthographic variant; ? *Rapanea punctata* (Lamarck) Lundell – WH]

6. *Lysimachia* Linnaeus 1753 (Loosestrife)

A genus of about 180 species, herbs (rarely shrubs), cosmopolitan. Hao et al. (2004) showed that the traditional subgeneric classification of *Lysimachia* is highly artificial, and that *Glaux* is embedded within *Lysimachia*. References: Cholewa in FNA (2009); Manns & Anderberg (2009)=Y; Coffey & Jones (1980)=Z; Hao et al. (2004); Ståhl & Anderberg in Kubitzki (2004). Key partly adapted from Z. [including *Anagallis*, *Centunculus*, *Glaux*, and *Trientalis*]

- 1 Leaves alternate (or with some opposite or subopposite); flowers white.
 - 2 Flowers axillary, nearly sessile; leaves 3-10 mm long..... *L. minima*
 - 2 Flowers in a terminal raceme, pedicellate, the flowers closely spaced, touching, the inflorescence thus appearing cylindrical, and generally drooping at the tip (reminiscent of *Saururus cernuus*); leaves longer; [introduced, rarely naturalized in upland situations]
 - 3 Leaf blades linear-elliptic, lanceolate or narrowly ovate..... *L. barystachys*
 - 3 Leaf blades broadly elliptic, broadly lanceolate, or broadly ovate..... *L. clethroides*
- 1 Leaves opposite or whorled; flowers yellow, white, pink, red, or blue.
 - 4 Leaves in a single terminal whorl; petals 7; flowers white..... *L. borealis*
 - 4 Leaves opposite or whorled (if whorled, with several to many whorls); petals 0 or 5; flowers yellow, red, blue, white, or pink.
 - 5 Leaves < 2 cm long (and distinctly longer than wide); flowers red, blue, white, or pink.
 - 6 Flowers nearly sessile; corolla absent..... *L. maritima*
 - 6 Flowers on long pedicels; corolla present.
 - 7 Petals blue, ca. 2× as long as the sepals..... *L. monelli*
 - 7 Petals red or blue (rarely white), ca. 1× as long as the sepals.
 - 8 Flowers red (rarely white); pedicels usually longer than the leaves..... *L. arvensis*
 - 8 Flowers blue; pedicels usually shorter than the leaves..... *L. foemina*
 - 5 Leaves > 2 cm long (sometimes less in *L. nummularia*, and then orbicular, about as wide as long); flowers yellow
 - 9 Leaves nearly round; plant trailing, rooting at nodes
 - 10 Flowers 5-7 mm across; sepals about 1× as long as the petals..... *L. japonica*
 - 10 Flowers 16-24 mm across; sepals about ½× as long as the petals..... *L. nummularia*
 - 9 Leaves linear, lanceolate, elliptic, or ovate; plant erect (or trailing and rooting at the nodes in *L. radicans*, which has lanceolate leaves).
 - 11 Flowers in a terminal raceme or panicle, subtended by bracts much smaller than the stem leaves.
 - 12 Inflorescence a terminal panicle..... *L. fraseri*
 - 12 Inflorescence a terminal raceme.
 - 13 Leaves narrowly ovate, broadest near the base, with 3 prominent veins..... *L. asperulifolia*
 - 13 Leaves linear to lanceolate, broadest near the middle, with 1 prominent vein.
 - 14 Leaves linear to narrowly lanceolate, (1-) 2-4 (-8) mm wide; sepals stipitate-glandular..... *L. loomisii*
 - 14 Leaves lanceolate to elliptic, 7-20 mm wide; sepals glabrous.
 - 15 Flowers in part (the lower) in the axils of well-developed leaves..... *L. ×producta*
 - 15 Flowers all in the axils of much reduced linear bracts..... *L. terrestris*
 - 11 Flowers axillary, all or most of them subtended by leaves similar in shape to (though often somewhat smaller than) stem leaves not subtending flowers (or with flowers in axillary, peduncled, densely-flowered racemes in *L. thysiflora*).
 - 16 Flowers in peduncled axillary racemes in the axils of midstem leaves; petals linear to lanceolate, ca. 5 mm long and ca. 1 mm wide, much surpassed by the stamens..... *L. thysiflora*
 - 16 Flowers solitary, all or most of them subtended by leaves similar in shape to (though often somewhat smaller than) normal stem leaves; petals lanceolate to ovate, as long or longer than the stamens.
 - 17 Stem leaves whorled (in adult plants – juvenile plants with opposite leaves or a mixture of opposite and whorled); leaves “punctate” with sinuous, elongate markings (visible with the naked eye, but more readily observed with 10× magnification).
 - 18 Petals yellow, marked with black lines; sepals 2.5-5 mm long; stem glabrous or sparsely pubescent; [native]..... *L. quadrifolia*
 - 18 Petals plain yellow, not marked with black lines; sepals 2.5-4.5 mm (*L. vulgaris*) or 5.5-9 mm long (*L. punctata*); stem hairy; [alien].
 - 19 Calyx lobes 5-8 mm long, green throughout; corolla lobes 12-16 mm long, glandular-ciliate..... *L. punctata*
 - 19 Calyx lobes 3-5 mm long, with red margins; corolla lobes 8-12 mm long, entire..... *L. vulgaris*
 - 17 Stem leaves opposite; leaves not “punctate” (as described above).
 - 20 Mid-cauline leaves with petioles ciliate their entire length.
 - 21 Mid-cauline leaves 1-2 mm wide; flowers 7-14 mm across; [of ne. AL]..... *L. graminea*
 - 21 Mid-cauline leaves 4-60 mm wide; flowers 11-26 mm across; [collectively widespread].
 - 22 Mid-cauline leaves ovate to lanceolate, 17-60 mm wide; sepals with 3 (or 6) usually reddish-brown veins..... *L. ciliata*
 - 22 Mid-cauline leaves lanceolate to linear, 4-23 mm wide; sepals without reddish-brown veins.

- 23 Cilia of the petiole not extending onto the leaf blade; leaf blade lanceolate to ovate, typically 2-4× as long as wide, rounded to cuneate at the base; sepal venation conspicuous; capsules 4-6.5 mm in diameter *L. hybrida*
- 23 Cilia of the petiole extending onto the base of the leaf blade; leaf blade lanceolate to linear, typically about 8-12× as long as wide, cuneate at the base; sepal venation inconspicuous or apparently absent; capsules 2-4.5 mm in diameter..... *L. lanceolata*
- 20 Mid-cauline leaves with petioles pubescent only along basal portion.
- 24 Rhizomes absent, new shoots arising from crown of rootstock *L. tonsa*
- 24 Rhizomes present, new shoots arising from the rhizome.
- 25 Plant reclining or trailing, rooting at the nodes *L. radicans*
- 25 Plant erect, not rooting at the nodes.
- 26 Leaf blades ovate to lanceolate, typically 2-4× as long as wide, rounded to cuneate at the base, with the midrib not prominent; sepals conspicuously veined, 0.5-4 mm wide..... *L. hybrida*
- 26 Leaf blades linear to narrowly lanceolate, typically 8-14× as long as wide, cuneate to tapering at the base, with a prominent midrib; sepals not conspicuously veined, 1-2 mm wide..... *L. quadriflora*

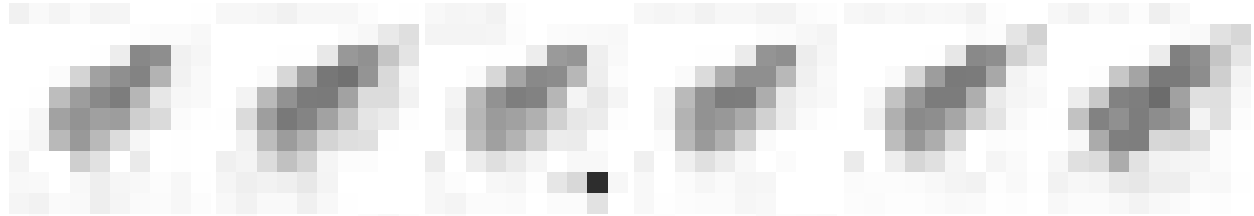
* *Lysimachia arvensis* (Linnaeus) U. Manns & A. Anderberg, Scarlet Pimpernel, Common Pimpernel. Lawns, fields, disturbed areas; native of Europe. April-November. [= Y; = *Anagallis arvensis* Linnaeus ssp. *arvensis* – K1, S; = *A. arvensis* var. *arvensis* – C, G; < *A. arvensis* – RAB, F, FNA, GW, Pa, W, WH; < *Lysimachia arvensis* (Linnaeus) U. Manns & A. Anderberg – K2]

Lysimachia asperulifolia Poiret, Pocosin Loosestrife, "Roughleaf Loosestrife". Low pocosins, high pocosins, streamhead pocosins, savanna-pocosin ecotones, sandhill-pocosin ecotones. May-June; August-October. Endemic to the Coastal Plain of NC and SC. *L. asperulifolia* is a very distinctive species, easily recognized vegetatively by its whorls (or opposite on smaller plants) of sessile, rounded-based, acuminate, bluish-green (to yellowish-green when shaded or otherwise stressed) leaves on an unbranched stem 0.5-1 m in height. Young or depauperate plants may produce only opposite leaves and no flowers. When stems are injured or subjected to herbivory, they produce branches below the damaged site. The leaves of *L. asperulifolia* are not rough; the common name "roughleaf loosestrife" is a misnomer, based on a mistranslation of the specific epithet, the translator assuming that "*asperulifolia*" meant "rough-leaved." The epithet actually refers to the perceived similarity of the leaves to those of the European *Asperula odorata* (treated in this work as *Galium odoratum*), Sweet Woodruff, a plant with which Poiret would have been very familiar. The leaves of *G. odoratum* are similar to those of *L. asperulifolia* in their whorled disposition. Franklin (2001) studied the biology of this rare species. [= FNA, K; = *L. asperulaefolia* – RAB, GW, S (orthographic variant)]

* *Lysimachia barystachys* Bunge, Manchurian Loosestrife. Disturbed areas; native of Manchuria. Reported from a single county in nc. GA (Jones & Coile 1988) {further investigate}. [= FNA, K]

Lysimachia borealis (Rafinesque) U. Manns & A. Anderberg, Northern Starflower, Maystar. Northern hardwood forests, rich slope forests, often in second-growth areas. May-June. This northern species, widespread in the mountains of VA, and known from a few locations in n. GA and ne. TN (Chester, Wofford, & Kral 1997), was first located in NC only in 1988 (Dellinger 1989). "The attractive white corollas, usually with 7 petals united only at the very base, are open in the late spring and they drop intact – like fallen stars" (Voss 1996). This species can be recognized by its terminal whorl of leaves (4-10 cm long), the one to several white flowers borne on terminal, slender pedicels, each flower typically with 7 petals (inconspicuously united at the bases), each petal acuminate. The plant is a white-flowered *Lysimachia* with only one whorl of leaves. [= Y; = *Trientalis borealis* Rafinesque – FNA; = *T. borealis* Rafinesque ssp. *borealis* – K; < *T. borealis* – C, F, G, Pa, W, WV]

Lysimachia ciliata Linnaeus, Fringed Loosestrife. Mesic forests, especially bottomlands and coves dominated by hardwoods. June-August; August-October. NL (Newfoundland) west to AK, south to GA, Panhandle FL, AL, MS, AR, KS, NE, CO, NM, UT, ID, and OR. [= RAB, C, F, FNA, GW, K, Pa, W, WH, WV, Z; = *Steironema ciliatum* (Linnaeus) Baudo – G, S]



* *Lysimachia clethroides* Duby, Gooseneck Loosestrife. Roadsides (cultivated and rarely persistent or escaped); native of Japan. July-August. Collected in the Mountains of NC (Macon County), escaped from cultivation; it is also reported as naturalized in Grundy County, TN (Chester, Wofford, & Kral 1997, Kral 1981). It and *L. barystachys* differ from our other species in their white flowers in a dense terminal spike (with secund tip) and alternate leaves. [= C, FNA, G, K, Pa]

* *Lysimachia foemina* (P. Millert) U. Manns & A. Anderberg, Blue Pimpernel. Disturbed areas; native of Europe. Also reported as introduced in PA, KY, OH, and other scattered states north and west of our area (Kartesz 1999). [= Y; = *Anagallis arvensis* Linnaeus ssp. *foemina* (P. Miller) Schinz & Thellung – K1; = *Anagallis arvensis* Linnaeus var. *caerulea* (Schreber) Grenier & Godron – C, G; < *A. arvensis* – RAB, F, FNA, GW, W; = *A. arvensis* ssp. *coerulea* Hartman – S; < *Lysimachia arvensis* (Linnaeus) U. Manns & A. Anderberg – K2; = *Anagallis foemina* P. Miller]

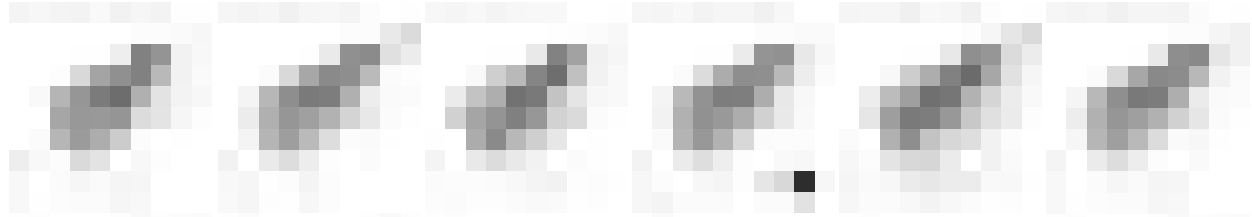
Lysimachia fraseri Duby, Fraser's Loosestrife. Hardwood forests, forest edges and roadbanks, thin soils around rock outcrops, usually flowering only when exposed to extra sunlight by a tree-fall light gap or other canopy opening. June-August; September-October. W. NC and e. TN south to n. SC, n. GA, and AL; disjunct in s. IL and nw. TN (Stewart County) (Chester, Wofford, & Kral 1997). This rare species is limited in NC to the mountains south of the Asheville Basin, especially in the escarpment gorges of Macon and Jackson counties. Potentially the largest and coarsest of our *Lysimachia* (up to 2 meters tall), *L.*

fraseri usually occurs as much smaller seedlings and non-flowering individuals. When a tree-fall light gap occurs, individuals flower and fruit. Even seedlings can be separated from the more common and widespread *L. quadrifolia* by the following characteristics (all best observed at 10×): leaves with a narrow, translucent red border, upper internodes of the stem glandular-puberulent, and backlighted leaf without sinuous, translucent lineations (*L. quadrifolia*: leaves without red border, upper internodes sparsely pubescent with longer, nonglandular hairs, or rarely a few of the hairs with slightly bulbous tips, and backlighted leaf with numerous sinuous, translucent lineations). [= RAB, FNA, GW, K, S, W]

Lysimachia graminea (Greene) Handel-Mazzetti, Grassleaf Yellow-loosestrife. Endemic to ne. AL (Little River Canyon area). [= FNA, K, Z; = *Steironema gramineum* Greene – S]

Lysimachia hybrida Michaux, Lowland Loosestrife. Mesic hardwood forests, wet areas. June-August; September-October. ME and s. QC west to AB and WA, south irregularly to ne. FL, Panhandle FL, AR, NE, and AZ. [= C, F, FNA, K, Pa, W, WV, Z; = *L. lanceolata* var. *hybrida* (Michaux) A. Gray – RAB, GW, WH; = *Steironema hybridum* (Michaux) Rafinesque ex B.D. Jackson – G, S]

* ***Lysimachia japonica*** Thunberg, Japanese Loosestrife, Ko-Nasubi. Grassy places, roadsides, disturbed areas; native of Japan and China. May-October. Reported for WV (FNA 2009, Harmon, Ford-Wertz, & Grafton 2006) and LA (FNA 2009). [= FNA, K, WV]



Lysimachia lanceolata Walter, Lanceleaf Loosestrife. Mesic to relatively dry forests, forest edges, roadbanks, primarily on circumneutral soils. June-August; September-October. NJ, PA, OH, MI, and WI south to GA, Panhandle FL, AL, MS, LA, and ne. TX. [= C, F, FNA, K, Pa, W, WV, Z; = *L. lanceolata* var. *lanceolata* – RAB, GW, WH; = *Steironema lanceolatum* (Walter) Gray – G, S; = *Steironema heterophyllum* (Michaux) Baudo – S]

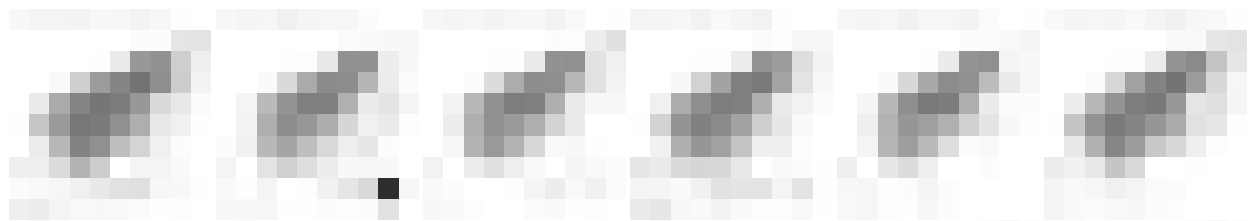
Lysimachia loomisii Torrey, Carolina Loosestrife. Moist to wet savannas, pocosin ecotones. May-June; August-October. Endemic to the outer and middle Coastal Plain of NC, SC, and e. GA. *L. ×radfordii* H.E. Ahles, a hybrid of *L. loomisii* × *quadrifolia*, is intermediate between its parents. [= RAB, FNA, GW, K, S]

Lysimachia maritima (Linnaeus) Galasso, Banfi, & Soldano, Sea-milkwort. Saline coastal habitats. June-July. The species is interruptedly circumboreal, in North America from QC south to VA on the east coast, and from BC south to OR on the west coast, also inland in w. North America, from SK south to NM. G suggests that *L. maritima* is introduced near its southern limit in the east. [= FNA; = *Glaux maritima* Linnaeus – C, K; > *G. maritima* var. *maritima* – F, G]

Lysimachia minima (Linnaeus) U. Manns & A. Anderberg, Chaffweed, False-pimpernel. Ditches, wet disturbed areas, savannas, pond margins. March-June. This species occurs in widely scattered areas, nearly cosmopolitan. [= Y; = *Anagallis minima* (Linnaeus) E.H. Krause – FNA, GW, K1, WH; = *Centunculus minimus* Linnaeus – RAB, C, F, G, S, W]

* ***Lysimachia monelli*** (Linnaeus) U. Manns & A. Anderberg, Blue Pimpernel. Along intermittent stream in suburban woodlands, probably only a waif; native of sw. Europe. Reported for Fairfax County, VA by Harvill et al. (1992) and Shetler & Orli (2000). [= *Anagallis monelli* (Linnaeus) – FNA, K1; < *Lysimachia arvensis* (Linnaeus) U. Manns & A. Anderberg – K2; = *Lysimachia monelli* (Linnaeus) U. Manns & A. Anderberg – Y, orthographic variant]

* ***Lysimachia nummularia*** Linnaeus, Creeping Charlie, Creeping Jenny, Moneywort. Lawns, pastures, seepages, other moist, disturbed places; native of Europe. May-July; August-September. The leaves have many minute, maroon dots. [= RAB, C, F, FNA, G, GW, K, Pa, S, W]



Lysimachia ×producta (A. Gray) Fernald (pro sp.). Moist areas. May-July; August-October. This is a fertile hybrid of *L. quadrifolia* and *L. terrestris*, sometimes occurring in the apparent absence of one or both parents. [= RAB, C, FNA, K, Pa; = *L. producta* (A. Gray) Fernald – G, S]

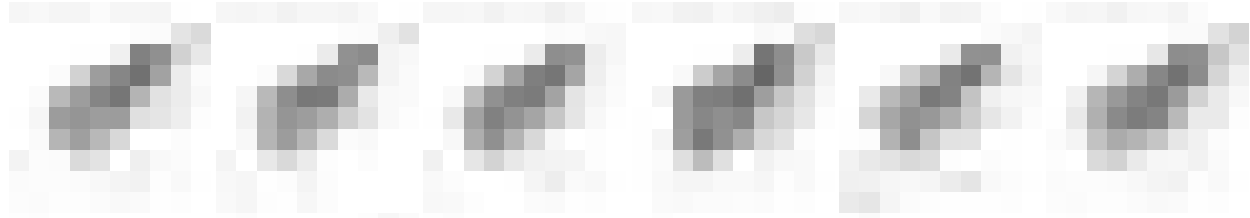
* ***Lysimachia punctata*** Linnaeus, Large Loosestrife, Spotted Loosestrife. Disturbed areas; native of Eurasia. June-July; August? First found in NC in 1985 (Weakley *in prep.*). [= C, F, FNA, G, K, Pa]

Lysimachia quadriflora Sims, Smooth Loosestrife, Four-flowered Loosestrife. Wet meadows and calcareous fens, stream banks. July-September. MA, s. ON, MI, and ND south to w. VA, WV, nw. GA, AL, and AR; mainly north and west of the Ohio River, very rare and scattered in or east of the Appalachians. Reported for c. NC by Coffey & Jones (1980), based on 2 specimens; the records seem unlikely but are tentatively accepted. [= C, F, FNA, K, Pa, W, WV, Z; = *Steironema quadriflora* (Sims) Hitchcock – G]

Lysimachia quadrifolia Linnaeus, Whorled Loosestrife. A wide variety of forests and openings, including pine savannas of the outer Coastal Plain, ranging from moist to very dry. May-August; August-October. ME west to WI and MN, south to SC, c. GA, AL, and TN. Although the species normally has whorled leaves, immature and small plants often have opposite leaves only. See *L. fraseri* for discussion of vegetative features useful in distinguishing the two species. *L. ×radfordii* H.E. Ahles, a hybrid of *L. loomisii* × *quadrifolia*, is intermediate between its parents. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WV]

Lysimachia radicans Hooker, Trailing Loosestrife. moist forests, swamps. June-August. The main distribution of this species is in the Mississippi Embayment, from MO and w. TN south to s. AL, MS, AR, LA, and e. TX; disjunct occurrences in VA and (allegedly) e. NC are curious. The report for NC is from a species list for Nags Head Woods, Dare County; it is unpublished, apparently not documented by an herbarium specimen, and rejected unless documentation is found. [= C, F, FNA, K, W, Z; = *Steironema radicans* (Hooker) A. Gray – G, S]

Lysimachia terrestris (Linnaeus) Britton, Sterns, & Poggenburg, Bog Loosestrife, Bog-candles, Swamp-candles. bogs, wet meadows, and swamp forests. May-July; August-October. NL (Newfoundland) west to MN and SK, south to SC, GA, e. TN, and sc. TN. [= RAB, C, FNA, G, GW, K, Pa, S, W, WV; > *L. terrestris* var. *terrestris* – F]



Lysimachia thyrsiflora Linnaeus, Tufted Loosestrife. Bogs, swamps, marshes. May-July. Circumboreal, south in North America to NJ, PA, OH, and MO (Kartesz 1999), WV (FNA), and MD (from Big Marsh, Kent County) (Steury, Tyndall, & Cooley (1996), NE, CO, UT, and CA. [= C, F, K, Pa; = *Naumburgia thyrsiflora* (Linnaeus) Duby – G]

Lysimachia tonsa (Wood) Wood ex Pax & R. Knuth, Southern Loosestrife, Appalachian Loosestrife. Upland forests, especially over calcareous or mafic rocks. May-July; August-October. Sc. VA, sw. VA, and KY south to SC, wc. GA, and e. TN. The range is centered on the Southern Appalachians, but the species is essentially absent from the higher mountains – a "doughnut range." [= RAB, C, F, FNA, K, W, WV, Z; =? *Steironema intermedium* Kearney – G; = *Steironema tonsum* (Wood) Bicknell ex Britton – S]

* ***Lysimachia vulgaris*** Linnaeus, Garden Loosestrife. Disturbed bottomlands, marshes, disturbed areas; native of Europe. Introduced and naturalized south at least to se. and sc. PA (Rhoads & Klein 1993), WV, KY, MD, and NJ (Kartesz 1999) and now reported for n. VA (Steury, Fleming, & Strong 2008). [= C, F, FNA, G, K, Pa]



334. THEACEAE D. Don 1825 (Tea Family) [in ERICALEs]

With a more circumscribed definition (excluding Pentaphylacaceae), a family of about 9 genera and 450 species, trees and shrubs, of primarily tropical and subtropical regions of the Old and New Worlds. References: Prince in FNA (2009); Prince & Parks (2001); Stevens, Dressler, & Weitzman in Kubitzki (2004).

- 1 Leaves deciduous, medium green above, herbaceous in texture.
 - 2 Leaves broader toward the tip, 2-2.5× as long as wide; [tribe *Gordonieae*]***Franklinia***
 - 2 Leaves broadest near or below the middle, 1-1.8× as long as wide; [tribe *Stewartieae*].....***Stewartia***
- 1 Leaves evergreen, dark green above, coriaceous in texture.
 - 3 Leaves ovate to elliptic (broadest at or below the middle), 1-3× as long as wide, slightly to strongly acuminate, 5-10 (-15) cm long; [introduced shrub, planted in upland soils]; [tribe *Theaeae*].....***Camellia***
 - 3 Leaves oblanceolate to narrowly elliptic (broadest at or above the middle), 2.5-4× as long as wide, acute to obtuse (rarely slightly acuminate), 8-30 cm long; [small to large tree, native in acidic Coastal Plain wetlands]; [tribe *Gordonieae*].....***Gordonia***

Camellia Linnaeus 1753 (Camellia, Tea)

A genus of about 100-300 species, shrubs and trees, of se. Asia. References: Stevens, Dressler, & Weitzman in Kubitzki (2004).

- 1 Sepals deciduous; flowers sessile; leaves mostly ovate, acuminate, > 4 cm wide.....***C. japonica***

- 1 Sepals persistent; flowers on pedicels; leaves mostly elliptic, only slightly acuminate, < 4 cm wide *C. sinensis*
- * *Camellia japonica* Linnaeus, Camellia. Frequently cultivated, sometimes persistent around old home sites; native of China and Japan. [= K]
- * *Camellia sasanqua* Thunberg, Sasanqua Camellia, is reported as introduced in NC, SC, GA, and FL (Kartesz 1999). [= K] {not yet keyed}
- * *Camellia sinensis* (Linnaeus) Kuntze, Tea. Cultivated in plantations and as a horticultural novelty, rarely escaped; native to China. [= K; = *Thea sinensis* Linnaeus]

***Franklinia* Bartram ex Marshall 1785 (Franklinia)**

A monotypic genus, apparently endemic to e. GA (now presumably extinct in the wild). *Franklinia* is actually most closely related to the Asian genus *Schima* (Prince & Parks 2001); its closest relative in North America is *Gordonia*, from which it differs in its deciduous leaves (vs. evergreen) and globose fruits (vs. pointed). References: Prince in FNA (2009); Bozeman & Rogers (1986); Stevens, Dressler, & Weitzman in Kubitzki (2004).

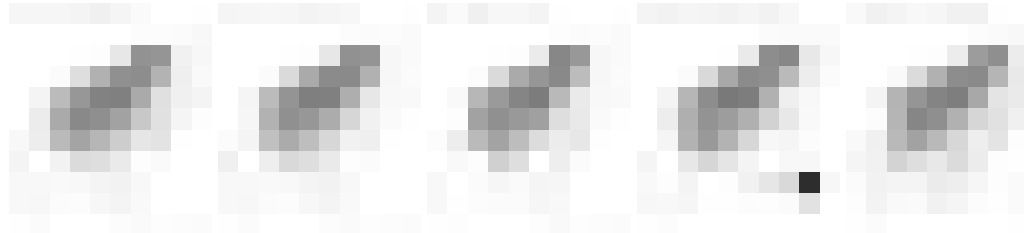
***Franklinia alata* Bartram ex Marshall, Franklinia.** Habitat speculative, probably dry sandy ridges, near the mouth of the Altamaha River; believed to be extinct in the wild. It was native to the Coastal Plain of GA, where it was found by William Bartram near the mouth of the Altamaha River. It has not been seen in the wild since 1803 and is now considered to be extinct in the wild. It is sometimes cultivated in our area. Bozeman & Rogers (1986) discuss the history of this tree. [= FNA, K, S; = *Gordonia alata* (Bartram ex Marshall) Sargent]

***Gordonia* Ellis 1771 (Loblolly Bay, Gordonia)**

As recircumscribed, a genus of 2 species, trees, of se. North America and Central America (*Gordonia brandegeei* H. Keng). The other 20-70 species of se. Asian trees and shrubs previously assigned to *Gordonia* are actually in a different tribe and should be reassigned to *Polyspora* (Yang et al. 2004). References: Prince in FNA (2009); Yang et al. (2004); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Identification notes: *Gordonia* is one of the "bay trees" so typical of acid Coastal Plain wetlands of our area – the other two being Sweet Bay (*Magnolia virginiana* of the Magnoliaceae) and Swamp Red Bay (*Persea palustris* of the Lauraceae). *Gordonia* can be distinguished from the other two species by its smooth leaves, serrate toward the tip, odorless when crushed (vs. pubescent leaves, entire-margined, aromatic when crushed). *Gordonia* is also distinctive in its narrow, conical crown, resembling *Liriodendron* or *Chamaecyparis*, and its medium-gray, deeply furrowed bark. Most individuals of *Gordonia* have at least a few orange-red leaves visible, at any season.

***Gordonia lasianthus* (Linnaeus) Ellis, Loblolly Bay, Gordonia.** Pocosins, bayheads, acidic, organic-rich swamp forests, wet pine savannas, bay forests. July-September; September-October. Ne. NC south to s. peninsular FL, west to s. MS (Sorrie & Leonard 1999), a Southeastern Coastal Plain endemic. Peat-filled Carolina bays and large peat dome pocosins typically have *Gordonia* as an important tree, surpassed in abundance and importance only by *Pinus serotina*. On deep peats, *Gordonia* individuals are stunted and rarely reach sizes larger than pocosin shrubs. [= RAB, FNA, GW, K, S, WH]



***Stewartia* Linnaeus 1753 (Stewartia, Wild Camellia)**

A genus of about 20 species, trees and shrubs, of temperate e. Asia and e. North America. Both our species of *Stewartia* are very attractive shrubs. The other species of the genus are Asian. Li et al. (2002) demonstrate that our 2 species form a clade together, separate from and basal to the Asian species; Prince (2002) shows a different tree topology. References: Prince in FNA (2009); Spongberg (1974)=Z; Li et al. (2002); Prince (2002); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Identification notes: The leaves are borne in horizontal planes, reminiscent of *Cornus florida* and *Cornus alternifolia*. The leaves of both species are obscurely serrate or crenate, and also conspicuously and copiously ciliate-margined.

- 1 Style 1, with a 5-lobed stigma; seeds 5-7 mm long, shiny, plump, angled; fruit lobes rounded; leaves mostly 4-10 cm long, with 7-8 pairs of lateral veins; petioles narrowly winged (0.1-1 mm wide), not enclosing and concealing the terminal and lateral buds; calyx subtended by 2 persistent bracts, each 2-4 mm long; seeds shiny *S. malacodendron*

- 1 Styles 5, separate; seeds 8-10 mm long, dull, flat, thin (to slightly winged); fruit lobes angled; leaves mostly 7-15 cm long, with 5-7 pairs of lateral veins; petioles widely winged (1-2 mm wide), enclosing and concealing the terminal and lateral buds; calyx subtended by 1 persistent bract, 11-14 mm long; seeds dull..... *S. ovata*

Stewartia malacodendron Linnaeus, Silky Camellia, Virginia Stewartia. Mesic forests, especially on beech-dominated bluffs or "islands" in Coastal Plain swamps. May-June; September-October. Primarily Coastal Plain, se. VA south to FL, west to se. TX, but extending inland to the Piedmont of GA, NC, and SC and the Mountains of NC. [= RAB, FNA, K, W, WH, Z; = *Stewartia malachodendron* – C, F, G (orthographic variant); = *Stuartia malachodendron* – S (orthographic variant)]

Stewartia ovata (Cavanilles) Weatherby, Mountain Camellia, Mountain Stewartia. Mesic forests, especially acidic bluffs, often in openings in rhododendron thickets ("hells"), in the Coastal Plain of VA restricted to ravines. Late June-July; August-September. Primarily Appalachian: e. KY, sc. VA, e. VA south to c. NC, w. SC, e. and c. TN to n. GA and n. AL, avoiding, however, the higher mountains, and extending into the Coastal Plain in e. VA. The species is most abundant in the Cumberland Plateau of KY and TN. [= RAB, C, F, FNA, G, K, W, Z; = *Malachodendron pentagynum* (L'Héritier) Small – S]

335. SYMPLOCACEAE Desfontaines 1820 (Sweetleaf Family) [in ERICALES]

A family of 1 genus and about 250-300 species, trees and shrubs, of tropical and warm temperate America and Asia. References: Nootboom in Kubitzki (2004).

Symplocos Jacquin 1760 (Sweetleaf)

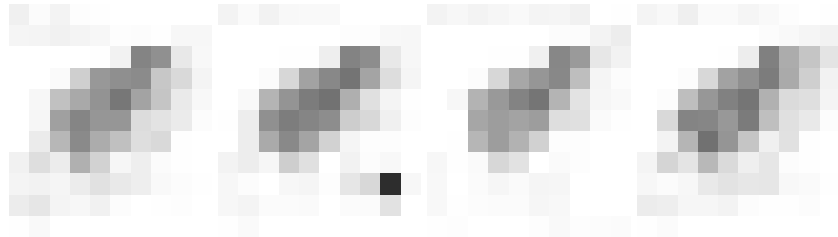
A genus of about 300 species, trees and shrubs, of tropical and warm temperate America and Asia. Wang et al. (2004) found that the affinities of *S. tinctoria* are with South American species of subgenus *Epigenia*, rather than with east Asian species of subgenus *Hopea*, section *Palaeosymplocos*. References: Wang et al. (2004); Nootboom in Kubitzki (2004).

Identification notes: The foliage of *S. tinctoria* has a sweet taste, and an odor and taste similar to green apples. Sometimes the leaves are glossy and appear subcoriaceous, somewhat resembling *Kalmia latifolia*.

- 1 Leaf margins sharply and finely glandular-dentate; inflorescence a terminal panicle; drupes blue (white); [alien, rarely cultivated and escaped]; [subgenus *Palura*].....*S. paniculata*
- 1 Leaf margins entire to coarsely serrate-crenate; inflorescence an axillary fascicle; drupes green; [native, common in parts of our area]; [subgenus *Symplocos*; section *Barberina*]..... *S. tinctoria*

* *Symplocos paniculata* (Thunberg) Miquel, Sapphire-berry, Asiatic Sweetleaf. Suburban woodlands; native of e. Asia. May. Spreading from plantings at scattered locations in the ne. United States, such as DE and District of Columbia (Whittemore 2003). [=Pa]

Symplocos tinctoria (Linnaeus) L'Heritier, Sweetleaf, Horsesugar. Moist bottomland forests, pocosin edges, mesic forests, ridgetop forests. March-May; August-September. DE south to n. FL and west to e. TX and se. OK. The range in our area is discontinuous and interesting, the species rather abundant in the Coastal Plain throughout our area, and in the Mountains of NC and SC (absent from the VA mountains!), but present in the Piedmont only near its borders with the other provinces and in scattered sites in the central Piedmont. The leaves have a subcoriaceous and rather evergreen appearance, but are (in our area) only semi-evergreen. As the name implies, the leaves are somewhat sweet, but the sweetness seems variable from plant to plant, season to season, and taster to taster. Whether sweet or not, the taste is distinctive and is helpful (once learned) in distinguishing this rather nondescript shrub or small tree. Where protected from fire, *S. tinctoria* can reach considerable size, up to 20 cm in diameter and 10 m tall, with longitudinally striped bark. [= RAB, C, GW, K, S, W, WH; > *S. tinctoria* var. *tinctoria* – F, G; > *S. tinctoria* var. *pygmaea* Fernald – F, G (probably based on fire sprouts); > *S. tinctoria* var. *ashei* Harbison]



336. DIAPENSIACEAE (Link) Lindley 1836 (Diapensia Family) [in ERICALES]

A family of 5-6 genera and about 13-15 species, subshrubs and perennial herbs, largely arctic and north temperate. References: Nesom in FNA (2009); Scott & Day (1983)=X; Scott in Kubitzki (2004).

- 1 Leaves cauline, generally < 10 mm long and < 2.5 mm wide; [of Coastal Plain pinelands] *Pyxidanthera*
- 1 Leaves basal (or on a short caudex), generally > 50 mm long and > 30 mm wide; [throughout our area, more common in the Piedmont and Mountains].

- 2 Leaves orbicular, rounded or with a slight point at the apex, finely serrate (4-8 teeth per cm), the teeth not prominently mucronate; flowers in racemes; [widespread]..... *Galax*
- 2 Leaves broadly elliptic, generally emarginate (slightly notched) at the apex, coarsely serrate (1-4 teeth per cm), the teeth prominently mucronate; flowers solitary; [native to humid gorges along the escarpment between the Mountains and Piedmont, sometimes cultivated and becoming established elsewhere]..... *Shortia*

Galax Sims 1804 (Galax)

A monotypic genus, a perennial herb, endemic to eastern North America. References: Nesom in FNA (2009); Nesom (1983); Soltis, Bohm, & Nesom (1983); Scott in Kubitzki (2004).

Galax urceolata (Poiret) Brummitt, Galax. Mountain forests, rock outcrops, nearly ubiquitous in the Mountains, more restricted in habitat elsewhere, moist to dry slopes in the Piedmont and Coastal Plain, often associated with *Kalmia latifolia* or *Rhododendron maximum*. May-July; August-October. The genus consists of this single species, with a range centered in the Southern Appalachians, occurring in NC, SC, GA, AL, e. TN, KY, VA, WV, and MD. Diploid and tetraploid races exist, and both are present in our area (Nesom 1983). In NC, diploids are the predominant race in the Mountains, the s. Piedmont, and the s. and c. Coastal Plain; tetraploids predominate along the Blue Ridge Escarpment, the n. Piedmont, and the n. Coastal Plain. In SC, diploids occur in the Coastal Plain and Piedmont, tetraploids in the mountains and escarpment. In GA, the pattern is similar, with diploids extending farther into the Piedmont and tetraploids restricted to the Mountains and upper Piedmont. In AL, only diploids are known. In VA, however, tetraploids occupy the Coastal Plain and e. Piedmont, diploids in the upper Piedmont and Mountains. A study of the flavonoids supported the idea that the tetraploid is an autopolyploid derivative of the diploid. Because of the close morphologic similarity, substantially sympatric distributions, and apparent general absence of demonstrable ecologic differentiation between the two races, it seems best not to attempt to taxonomically distinguish them (Nesom 1983; Soltis, Bohm, & Nesom 1983). "Galax-pulling" (the gathering of the often bronze-colored evergreen leaves for the florist trade) is an important folk industry in the mountains. [= FNA, K, W, X; = *G. aphylla* Linnaeus – RAB, C, F, G, S, WV, misapplied]

Pyxidantha Michaux 1803 (Pyxie-moss, Pyxie)

A genus of 2 species, creeping subshrubs, endemic to se. North America. Superficially, *Pyxidantha* is reminiscent of the circumboreal, arctic-alpine *Diapensia*. References: Sorrie, Weakley, & Nesom in FNA (2009); Primack & Wyatt (1975)=Z; Godt & Hamrick (1995); Scott in Kubitzki (2004).

- 1 Leaves (3.3) 4-10 mm long; leaves lanceolate, averaging > 1.0 mm wide (oblanceolate and up to 2.5 mm wide if etiolated under leaf litter); leaves (in fresh material) herbaceous in texture, < 0.1 mm thick; leaves of sterile shoots ciliate along the margins at the base, usually also pubescent on the upper surface near the base, but the pubescence rarely extending > 1/3 of the way from the base to the tip; internodes usually > 1 mm long; [of moist sites in the outer and inner Coastal Plain, including the Sandhills] *P. barbulate*
- 1 Leaves 1-5 mm long (rarely to 7 mm long if etiolated under leaf litter); leaves ovate, averaging < 1.2 mm wide (lanceolate and up to 1.5 mm wide if etiolated under leaf litter); leaves (in fresh material) succulent in texture, up to 0.5 mm thick; leaves of sterile shoots lanose to densely pubescent on the upper surface at the base, the pubescence becoming sparser toward the tip of the leaf, but extending past the midpoint of the leaf and often its full length; internodes usually < 1 mm long; [in extremely xeric sites over coarse deep sand or clay in the Sandhills region of sc. NC and nc. SC] *P. brevifolia*

Pyxidantha barbulate Michaux, Common Pyxie-moss, Big Pyxie. Pine savannas, pine flatwoods, pocosin margins, edges of sandhill seepage bogs, primarily in mesic to hydric sites, in wet sands and peaty sands, occasionally extending to submesic sands, but generally with a permanently or seasonally high water table, often with *Sphagnum*. March-April; May-June. NY (Long Island) south to NJ, and from se. VA south to n. SC. In the Sandhills, where its range overlaps *P. brevifolia*, *P. barbulate* is limited to seepage areas or pocosin ecotones, while *P. brevifolia* occurs in xeric situations far upslope. [= F, FNA, G, GW, K, S; = *P. barbulate* var. *barbulate* – RAB; < *P. barbulate* – X, Z]

Pyxidantha brevifolia B.W. Wells, Sandhills Pyxie-moss, Wells's Pyxie-moss, Little Pyxie. On xeric sandhills, generally over deep sand or sand-clay mixtures near the summits or on the upper slopes of sandhills, restricted to the Sandhills region. December-March; February-May. This species is endemic to a six-county area of the Sandhills of NC and SC. In NC, it is nearly limited to Fort Bragg, and is puzzlingly absent from seemingly suitable habitat on the Sandhills Game Land to the west. The taxonomic status of this entity has been controversial, with different authors considering it a species, a variety, or an ecotype not worthy of taxonomic status. A combination of morphologic, embryologic, phytogeographic, ecological, and phenologic evidence favors the recognition of two taxa in *Pyxidantha*. Recent surveys of *Pyxidantha* in the Sandhills of NC have shown that it is ecologically distributed in a strongly bimodal manner. While ecologically intermediate situations predominate in the Sandhills, this habitat is rarely occupied by *Pyxidantha*. Instead, *Pyxidantha* is usually found either in very dry (hill-top) or moist (pocosin ecotones) situations. A few morphologically intermediate populations are occasionally found, in ecologically intermediate situations, but the vast majority of populations are readily assigned to one taxon or the other. Godt & Hamrick (1995) showed low levels of allozyme differentiation between the two taxa and supported varietal status. [= FNA, K, S; = *P. barbulate* Michaux var. *brevifolia* (B.W. Wells) H.E. Ahles – RAB; < *P. barbulate* – X, Z]

Shortia Torrey & Gray 1842 (Shortia, Oconee Bells)

A genus of 5-6 species, perennial herbs, of e. Asia and the Southern Appalachians. The Asian species are: *S. uniflora* (Maximowicz) Maximowicz of montane Japan (with 3 varieties), *S. rotundifolia* (Maximowicz) Makino of Japan, *S. exappendiculata* Hayata, of montane Taiwan, *S. soldanelloides* (Siebold & Zuccarini) Makino, of montane Japan (with as many as 5 varieties recognized), and *S. sinensis* Hemsley of montane Yunnan Province, China. References: Nesom in FNA (2009); Davies (1952)=Z; Hatley (1977)=Y; Barnes (1990); Scott in Kubitzki (2004).

- 1 Style 6-10 (-12) mm long; filaments generally 5-7 mm long; corolla lobes 14-17 mm long; [native of McDowell County, NC] *Sh. galacifolia* var. *brevistyla*
- 1 Style (10-) 12-18 mm long; filaments generally 6-9 mm long; corolla lobes 16-25 mm long; [native to Transylvania and Jackson counties, NC, Oconee and Pickens counties, SC, and Rabun County, GA; introduced elsewhere]..... *Sh. galacifolia* var. *galacifolia*

Shortia galacifolia Torrey & A. Gray var. *brevistyla* Davies, Northern Shortia. On moist slopes, creekbanks, and rock outcrops in humid escarpment gorges with high rainfall, generally in deep shade under *Rhododendron maximum*, at elevations of 350-550m. March-April; July-August. This variety is known only from McDowell County, NC, where it occurs on several tributaries of the Catawba River and North Fork Catawba River. It has also been reported from the gorge of the Linville River, Burke County, but this locality is questionable and has not been relocated. This area is disjunct about 100 kilometers to the northeast along the Blue Ridge Escarpment from the range of the typical variety. In addition to the characters used in the key, var. *brevistyla* differs in a variety of characters of the flowers and leaves, as discussed in Davies (1952) and Hatley (1977). Whether the recognition of infraspecific taxa is warranted is not clear; Davies argued for and Hatley against. Though the morphological characters are relatively minor and partially overlapping, their correlation with disjunct ranges and their likely influence on pollination and reproduction influence me to provisionally accept varietal status, pending further research. [= FNA, K, Z; < *Shortia galacifolia* – RAB, C, G, W, X, Y; < *Sherwoodia galacifolia* (Torrey & A. Gray) House – S]

Shortia galacifolia Torrey & A. Gray var. *galacifolia*, Southern Shortia, Oconee Bells. On moist slopes, creekbanks, and rock outcrops in humid escarpment gorges with high rainfall, generally in deep shade under *Rhododendron maximum* and *R. minus*, at elevations (in NC) of 350-650m. March-April; July-August. This variety occurs in Transylvania and Jackson counties, NC, Oconee and Pickens counties, SC, and Rabun County, GA, where it occurs in the remarkable escarpment gorges region, at elevations from 200-650m (formerly at lower elevations, now submerged under Lake Jocassee). Most of the population of this species, including the type locality, was destroyed in the early 1960's by the construction of Lake Jocassee (Zahner & Jones 1983). In the gorge tributaries of the Eastatoe, Toxaway, Horsepasture, and Thompson rivers, *Shortia* can sometimes form a dense groundcover covering acres. Various outlying locations, such as in NC (Swain and Macon counties), VA (Amherst County), and TN (Blount, Monroe, and McMinn counties) are not considered native, and are adventive or the result of persistence after cultivation. The species is prized by gardeners, and survives well outside its natural range. [= FNA, K, Z; < *Shortia galacifolia* – RAB, C, G, W, X, Y; < *Sherwoodia galacifolia* (Torrey & A. Gray) House – S]



337. *STYRACACEAE* Dumortier 1829 (Storax Family) [in ERICALEs]

A family of about 11 genera and 160 species, trees and shrubs, of warm temperate and tropical regions of America, Mediterranean Europe, se. Asia, Malesia. References: Fritsch in FNA (2009); Fritsch in Kubitzki (2004).

- 1 Corolla lobes 4; fruit elongate, winged, 2.5-5 cm long; petioles 15-25 mm long.....*Halesia*
- 1 Corolla lobes 5; fruit globose, not winged, 0.5-0.9 cm in diameter; petioles 2-10 mm long.....*Styrax*

Halesia J. Ellis ex Linnaeus 1759 (Silverbell, Snowdrop Tree)

A genus of about 4 species, trees and shrubs, of e. North America and e. Asia. The genus was named to honor Stephen Hales; it therefore seems more appropriate to pronounce the genus with three syllables (the accent on the first) than the commonly heard four, which thoroughly distorts the honoree's name. The number of taxa in our area and their appropriate taxonomic level are in dispute; recent analyses vary from from 2-5, with specific or varietal status. References: Fritsch in FNA (2009); Fritsch & Lucas (2000)=X; Reveal & Seldin (1976)=Y; Sargent (1921); Godfrey (1988)=Z.

- 1 Petals united only basally, the lobes longer than the tube; fruits broadly 2-winged; leaves broadly obovate to suborbicular, 1-2× as long as wide.
 - 2 Corolla 10-15 mm long *H. diptera* var. *diptera*
 - 2 Corolla 20-30 mm long *H. diptera* var. *magniflora*

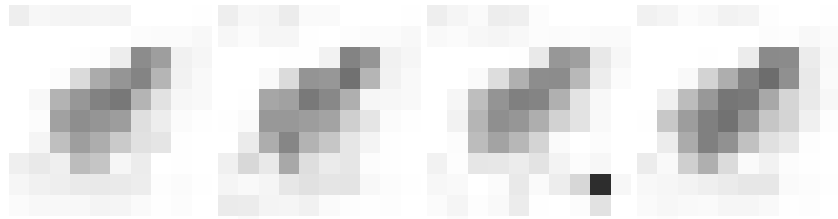
- 1 Petals united for most of their length, the tube longer than the lobes; fruits narrowly or broadly 4-winged; leaves elliptic-oblong, ca. 2× as long as wide.
- 3 Corolla 7-10 (-12) mm long, the style strongly exerted (1/3 to 1/2 the length of the corolla tube beyond its mouth), the anthers at the mouth of the corolla tube or slightly exerted; fruit obovate in outline, broadest toward the tip, strongly narrowed to the base, narrowly winged.....*H. carolina*
- 3 Corolla (12-) 15-30 mm long, the style included or slightly exerted, the anthers within the mouth of the corolla tube; fruit ellipsoid to slightly obovate in outline, broadest near the middle, broadly winged.....*H. tetraptera*

Halesia carolina Linnaeus, Little Silverbell. Sandy alluvial forests. March-April; September-October. S. SC south to Panhandle FL, west to s. MS. [= K, WH, Y, Z; = *H. parviflora* Michaux – RAB, GW, S; < *H. carolina* – FNA, X]

Halesia diptera Ellis var. *diptera*, Common Two-wing Silverbell. Bottomland forests, forested edges of brackish marshes. April-May; August-September. Var. *diptera* ranges from s. SC south to Panhandle FL, west to n. AL, sw. AR, and e. TX. [= Y, Z; < *H. diptera* – RAB, FNA, GW, K, S, WH]

Halesia diptera Ellis var. *magniflora* Godfrey. Dry to moist hammocks. Endemic to sw. GA and Panhandle FL. Fritsch in FNA (2009) considers the variation clinal, the larger-flowered plants in the eastern part of the range of *H. diptera* s.l., and not worthy of taxonomic status. [= Y, Z; < *H. diptera* – FNA, GW, K, S, WH]

Halesia tetraptera Ellis, Common Silverbell, Mountain Silverbell. Moist slopes, coves, creek-banks, bottomlands. March-May; August-September. W. VA, s. WV, s. OH and s. IL, south to FL and e. TX (and cultivated elsewhere). Two varieties or species have sometimes been recognized (see synonymy): “*monticola*,” a large tree, restricted to the Southern Appalachians (and especially the Great Smoky Mountains), the corolla (18-) 20-30 mm long, the style included, the anthers well inside the mouth of the corolla tube, and “*tetraptera*,” a smaller tree more widely distributed, the corolla (12-) 15-20 mm long, the style slightly exerted, the anthers just within the mouth of the corolla tube. Most studies have judged them too intergradient to be practically delimited. [= C; = *H. carolina* – RAB, F, G, W, WV; < *H. carolina* – FNA, Pa, X; > *Halesia tetraptera* Ellis var. *tetraptera* – K, Y; > *Halesia tetraptera* Ellis var. *monticola* (Rehder) Reveal & Seldin – K, Y; > *H. carolina* Linnaeus – S; > *H. monticola* (Rehder) Sargent – S]



Styrax Linnaeus 1753 (Snowbell, Storax)

A genus of about 120-130 species, trees and shrubs, of s. Europe, Malesia, se. Asia, se. North America, and tropical America. Nicolson & Steyskal (1976) discuss at length the grammatical gender of the genus, and conclude that it should be treated as masculine. References: Gonsoulin (1974)=Z.

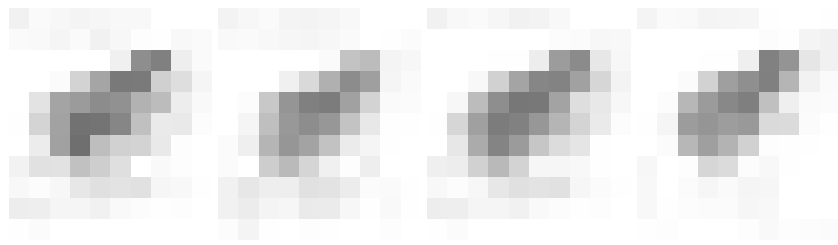
- 1 Pedicels 15-50 mm long *S. japonicus*
- 1 Pedicels 4-10 (-14) mm long
- 2 Leaves generally broadly obovate, sometimes broadly ovate, 5-14 cm long, 4-10 cm wide, the apices acute to short-acuminate, densely and finely pubescent beneath, giving the underside of the leaf a pale color; inflorescence usually of 5-20 flowers..... *S. grandifolius*
- 2 Leaves narrowly elliptic to ovate or obovate, usually 2-8 cm long, 1-4 cm wide, the apices short- to long-acuminate, glabrous or sparsely pubescent beneath (to densely pubescent and then giving the underside of the leaf a rusty color in var. *pulverulentus*); inflorescence usually of 1-7 flowers.
- 3 Leaves oblong-elliptic, glabrous or sparsely pubescent on the undersurfaces and petioles, the margins usually distantly toothed toward the apices; pedicels 10-14 mm long; calyces essentially glabrous; new growth glabrous to sparsely pubescent.....*S. americanus* var. *americanus*
- 3 Leaves elliptic to ovate to oblanceolate or obovate, sparsely to densely scurfy-hairy on the undersurfaces and petioles, margins entire to serrate; pedicels 4-6 mm long; calyces and pedicels densely scurfy-hairy; new growth densely matted pubescent.....*S. americanus* var. *pulverulentus*

Styrax americanus Lamarck var. *americanus*, American Snowbell, American Storax. Swamp forests, pocosin edges, other moist to wet habitats. April-June; July-September. Var. *americanus* ranges from ne. WV, OH, s. IN, s. IL, s. MO, south to s. FL and e. TX. See discussion below on var. *pulverulentus* and the presence in our area of transitional plants. [= C; < *S. americana* – RAB, G, GW, W; < *S. americanus* – FNA, K, WH; = *S. americana* var. *americana* – F, Z; = *S. americana* – S]

Styrax americanus Lamarck var. *pulverulentus* (Michaux) Perkins ex Rehder, Downy American Snowbell. Wet pine flatwoods. April-May; July-September. "Good" var. *pulverulentus* ranges from SC south to s. FL and west to e. TX and se. MO; some plants in NC and SC are transitional between the two varieties and will not be easily assigned. [= C, Z; < *S. americana* – RAB, G, GW, W; < *S. americanus* – FNA, K, WH; = *S. pulverulenta* Michaux – S; = *S. americana* var. *americana* – Z]

Styrax grandifolius Aiton, Bigleaf Snowbell, Bigleaf Storax. Upland forests, bluffs. April-May; August-September. Se. VA south to ne. FL and. Panhandle FL, west to e. TX, north to se. MO. [= C, FNA, K, WH; = *S. grandifolia* – RAB, F, G, S, W, Z]

Styrax japonicus Siebold & Zuccarini, Japanese Snowbell. Suburban woodlands; native of e. Asia. May. [= FNA, K, Pa]



338. *SARRACENIACEAE* Dumortier 1829 (Pitcherplant Family) [in ERICALES]

A family of 3 genera and about 22 species, perennial insectivorous herbs, of e. North America (*Sarracenia*), w. North America (*Darlingtonia*), and ne. South America (*Heliamphora*). References: Mellichamp in FNA (2009); Neyland & Merchant (2006); Kubitzki in Kubitzki (2004).

Sarracenia Linnaeus 1753 (Pitcherplant)

A genus of about 11 species, perennial insectivorous herbs, of e. North America. References: Mellichamp & Case in FNA (2009); McDaniel (1971)=U; Wood (1960)=Z; Schnell & Determann (1997)=Y; Schnell (2002b)=X; Bell (1949)=Q; Case & Case (1976)=V; McPherson (2007); Neyland & Merchant (2006); Schnell (1979, 1981, 1993, 1998, 2002a); Bell (1952); Bell & Case (1956); Reveal (1993); Cheek (1994, 2001); Godt & Hamrick (1999); Naczi et al. (1999); Romanowski (2002); Catalani (2004); Mellichamp (2008).

Identification notes: Hybrids between the various species of pitcher-plants are relatively frequent; see Bell (1952), Bell & Case (1956), Mellichamp (2008), and Mellichamp in FNA (2009) for further discussion. They are usually rather easy to determine, since they show intermediacy in characters, and usually are found in close proximity to both parents.

- 1 Pitchers mostly decumbent; lateral wing of the pitcher very prominent; petals maroon to pink; [section *Sarracenia*].
 - 2 Pitchers prominently marked with white on the hood; hood of the pitcher globose; orifice formed by the fusion of the hood margins..... *S. psittacina*
 - 2 Pitchers not marked with white on the hood; hood of the pitcher expanded and erect; orifice not involving the hood margins.
 - 3 Petals pale pink; lip of pitcher 2.6-7.5 mm thick at thickest point; scape 16.3-35.1 cm high; style arm 2.6-4.1 cm long; [of the Gulf Coastal Plain, from sw. GA westward] *S. rosea*
 - 3 Petals red to deep maroon; lip of pitcher 0.7-3.1 mm thick at thickest point; scape 22-79 cm high; style arm 1.7-2.9 (-3.8) cm long; [of e. GA northward]
 - 4 Pitchers > 3× as long as broad; pitchers glabrous on the outer surface; petals dark maroon (occasionally red); rhizomes generally vertical, and with relatively many pitchers per crown (often 6-10); [of e. VA northward] *S. purpurea* var. *purpurea*
 - 4 Pitchers < 3× as long as broad; pitchers bristly-pubescent on the outer surface; petals bright red; rhizomes generally horizontal, and with relatively few pitchers per crown (often 4-5); [of the Coastal Plain of se. VA southward, and in the Mountains and Piedmont of NC and SC].
 - 5 Hood lobes closely incurved, touching each other or nearly so, obscuring the hood opening; hairs lining the hood averaging 0.8-1.0 mm long; [of the Mountains of sw. NC, nw. SC, and ne. GA] *S. purpurea* var. *montana*
 - 5 Hood lobes not closely incurved and touching; hairs lining the inner surface of the hood (1.0-) 1.5-3.0 mm long; [of the Atlantic Coastal Plain and rarely also the adjacent Piedmont of VA, NC, and SC south to e. GA] *S. purpurea* var. *venosa*
- 1 Pitchers erect; lateral wing of the pitcher generally not prominent; petals maroon, red, or yellow; [section *Erectae*].
 - 6 Pitchers with white (or whitish and translucent) patches toward the summit of the pitcher and behind the orifice and/or on the hood.
 - 7 Areas of white tissue all around the summit of the pitcher and throughout the hood, the areas of bright white tissue surrounded by a conspicuous network of reddish venation; hood erect or ascending; petals maroon..... *S. leucophylla*
 - 7 Areas of whitish, translucent tissue toward the summit of the pitcher and on the lower portion of the hood, behind the orifice, the areas of translucent white tissue not enclosed within a conspicuous network of reddish venation; hood arching horizontally over the orifice; petals pale lemon yellow
 - 8 Pitchers and scapes < 35 cm tall; unwinged petiolar base of pitchers (3-) avg. 6 (-11) cm long, abruptly widened into the pitcher; [of pine savannas]; [widespread from se. NC southward] *S. minor* var. *minor*
 - 8 Pitchers and scapes 40-120 cm tall; unwinged petiolar base of pitchers (12-) avg. 17 (-21) cm long, gradually widened into the pitcher; [of floating peat mats and other very wet sites]; [endemic to the Okefenokee Swamp and vicinity, se. GA]..... *S. minor* var. *okefenokeensis*
 - 6 Pitchers without white or translucent patches toward the summit of the pitcher.
 - 9 Petals yellow; pitcher hood 4-10 (-14) cm wide.
 - 10 Phyllodia (nonpitcher leaves) many per plant and forming a rosette, 5-18 cm long, strongly curved, usually curving 45-90 degrees; scapes taller than the pitchers; [inland, from sw. NC and e. TN south and west to n. and wc. GA and c. AL] *S. oreophylla*
 - 10 Phyllodia (nonpitcher leaves) rare, only a few per plant (if present at all), 12-30 cm long, straight to slightly curved; scapes shorter than the pitchers; [of the Coastal Plain and rarely Piedmont, from se. VA southward to n. FL and west to e. TX].
 - 11 Narrowed base of the hood not purple-spotted, its sides revolute but not rolled backward and nearly touching; blade of the hood ovate, slightly cordate basally; [of the Coastal Plain, from s. AL west to e. TX] *S. alata*
 - 11 Narrowed base of the hood usually purple-spotted, its sides strongly rolled backward (away from the orifice) such that they nearly touch; blade of the hood broadly reniform to orbicular-reniform, broadly cordate basally; [of the Coastal Plain and rarely Piedmont, from se. VA southward to n. FL and west to se. MS]..... *S. flava*
 - 9 Petals maroon; pitcher hood < 4 cm wide (except *S. alabamensis* ssp. *alabamensis*, which can be up to 8.8 cm wide).

- 12 Orifice wing loosely rolled, with a pronounced "spout" over the wing; summer pitchers ca. 10× as long as the width of the pitcher mouth; orifice yellow-green; [of the Coastal Plain of c. and s. AL and s. MS]
- 13 Pitcher background color yellow, the upper pitcher weakly or not veined on the outer surface; [of c. AL (Autauga, Chilton, and Elmore counties)] *S. alabamensis* ssp. *alabamensis*
- 13 Pitchers background color tan, the upper pitcher strongly reticulately veined on the outer surface; [of s. AL, s. MS, and w. FL]..... *S. alabamensis* ssp. *wherryi*
- 12 Orifice rim tightly rolled, with a very slight "spout" over the wing; summer pitchers narrow and elongate, ca. 20× as long as the width of the pitcher mouth; [of the Coastal Plain of NC, SC, GA, and Panhandle FL, and the Mountains of sw. NC and nw. SC].
- 14 Pitchers (25-) avg. 40-50 (-75) cm tall; scapes about the same height as the pitchers; hood ascending, leaving the orifice exposed, 1.5-6.5 cm long, 2.0-5.4 cm wide; orifice 2.8-4.2 cm wide; [of the Mountains of NC and SC] *S. jonesii*
- 14 Pitchers (7-) avg. 15-60 cm tall (-55) cm tall; scapes 1.5-2× the height of the leaves (pitchers); hood horizontal, held closely over the orifice, 0.7-4.5 cm long, 0.7-3.9 cm wide; orifice 1.5-3.5 cm wide; [of the Coastal Plain of NC, SC, and GA].
- 15 Pitchers (7-) 15-43 cm tall; orifice 1.5-2.3 cm wide; [se. and sc. NC south through SC to sc. GA] *S. rubra* ssp. *rubra*
- 15 Pitchers 47-61 cm tall; orifice 2.4-3.5 cm wide; [sw. GA west to FL Panhandle] *S. rubra* ssp. *gulfensis*

Sarracenia alabamensis F.W. and R.B. Case ssp. *alabamensis*, Alabama Pitcherplant, Alabama Canebrake Pitcherplant. Seepage bogs. Endemic to c. AL (Autauga, Chilton, and Elmore counties). See Case (2005). [= FNA, V; = *S. rubra* Walter ssp. *alabamensis* (F.W. & R.B. Case) Schnell – K, X; < *S. rubra* – GW, S, U, Z]

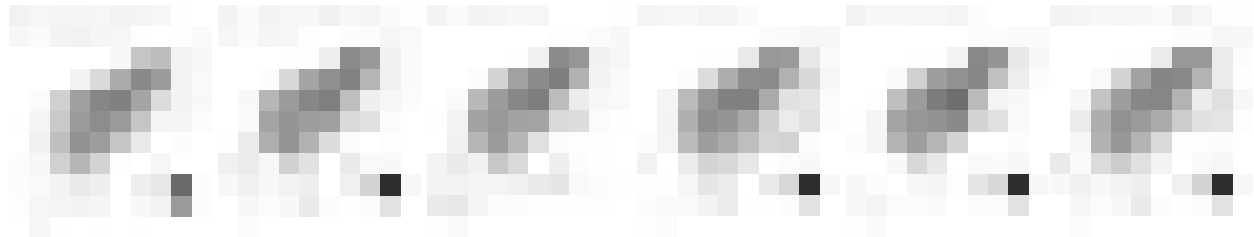
Sarracenia alabamensis F.W. & R.B. Case ssp. *wherryi* F.W. & R.B. Case, Wherry's Pitcherplant. Seepage bogs and savannas. FL Panhandle, s. AL, s. MS. April-May. See Case (2005). [= FNA, V; = *S. rubra* Walter ssp. *wherryi* (F.W. & R.B. Case) Schnell – K, WH, X; < *S. rubra* – GW, S, U, Z]

Sarracenia alata Wood, Pale Pitcherplant. Savannas, seepage bogs. S. AL west to e. TX. [= FNA, GW, K, U, X, Z; = *S. sledgei* Macfarlane – Q, S]

Sarracenia flava Linnaeus, Yellow Pitcherplant, Trumpets. Savannas, seepage bogs, pocosins. March-April; May-June. Se. VA south to n. FL and west to s. AL and se. MS. In the centers of peat domes and large peat-filled Carolina bays, *S. flava* is sometimes very abundant, occasionally the dominant plant over areas exceeding several square kilometers. [= RAB, C, F, FNA, G, GW, K, Q, U, W, Z; < *S. flava* – S (also see *S. oreophila*); > *S. flava* var. *flava* – X; > *S. flava* var. *atropurpurea* (Bull) C.R. Bell – X; > *S. flava* var. *maxima* Bull ex Masters – X; > *S. flava* var. *ornata* Bull ex Masters – X; > *S. flava* var. *cuprea* Schnell – X; > *S. flava* var. *rugelii* (Shuttleworth ex de Candolle) Masters – X; > *S. flava* var. *rubricorpora* Schnell – X]

Sarracenia jonesii Wherry, Mountain Sweet Pitcherplant. Bogs, cataract seeps. May; July. Endemic to a small area in sw. NC and nw. SC. There has been a great deal of disagreement over the taxonomic treatment of this taxon, a montane sibling of *S. rubra*. See Wherry (1929), Bell (1949), McDaniel (1971), Wherry (1972), Case and Case (1976), Schnell (1977), Massey et al. (1983), and McDaniel (1986) for further discussion. [= FNA, V, W; < *S. rubra* – RAB, GW, Q, U, Z; = *S. rubra* ssp. *jonesii* (Wherry) Wherry – K, X]

Sarracenia leucophylla Rafinesque, Whitetop Pitcherplant, Crimson Pitcherplant. Wet pine savannas. Sw. GA, w. FL, s. AL, and se. MS, a Gulf Coastal Plain endemic; introduced in eastern NC. The NC population (on Croatan National Forest, Carteret Co.) was apparently introduced in the 1980s; it is not known whether this species will spread in NC, but it is persisting and has been independently "discovered" several times. [= FNA, GW, K, U, X, Z; = *S. drummondii* Croom – Q, S]

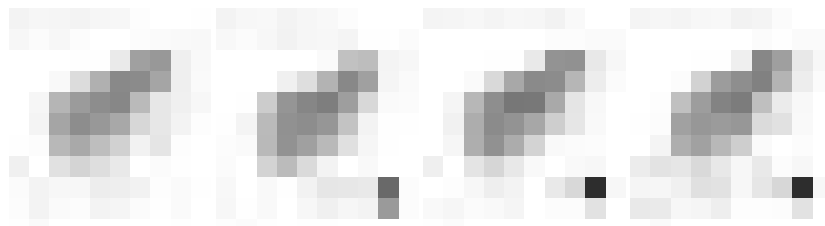


Sarracenia minor Walter var. *minor*, Hooded Pitcherplant. Wet savannas. April-May; June-July. Se. NC south through SC and GA to c. peninsular and e. Panhandle FL. [< *S. minor* – FNA, GW, K, Q, RAB, S, U, X, Z]

Sarracenia minor Walter var. *okefenokeensis* Schnell, Okefenokee Hooded Pitcherplant. On floating vegetation mats, ditches, and other very wet sites. Endemic to Okefenokee Swamp, se. GA. See Schnell (2002a) for additional information. [< *S. minor* – FNA, GW, K, Q, S, U, X, Z]

Sarracenia oreophila (Kearney) Wherry, Green Pitcherplant. Seepage bogs. April-May; June-July. A montane-piedmontane sibling of *S. flava*, known from sw. NC, se. TN (where presumed extirpated from the state), n. GA, and c. and ne. AL (Govus 1987, Wherry 1933, Schnell 1980b, Dennis 1980, Catalani 2004). [= FNA, GW, K, Q, U, W, X, Z; < *S. flava* – S]

Sarracenia psittacina Michaux, Parrot Pitcherplant. Savannas. This distinctive species is distributed primarily in the East Gulf Coastal Plain, but ranges east to the Atlantic Coastal Plain of e. GA (Bullock County), in close proximity to the SC border. [= FNA, GW, K, Q, S, U, X, Z]



***Sarracenia purpurea* Linnaeus var. *montana* Schnell & Determann**, Southern Appalachian Purple Pitcherplant. Mountain bogs, seepage bogs. May; July. Var. *montana* is restricted to a few dozen populations in sw. NC (south of Asheville), nw. SC, and ne. GA (Rabun County). These montane populations (in sw. NC, nw. SC, and ne. GA) show some consistent differences and appear to warrant taxonomic distinction (Schnell & Determann 1997); further study is warranted. For those tolerant of quadrinomial taxonomy, plants in our area can be called *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *montana* Schnell & Determann. Allozyme studies by Godt and Hamrick (1999) show striking genetic differences between var. *montana*, var. *purpurea*, var. *venosa* and the Gulf Coast var. *burkii*, supporting their taxonomic recognition. In fact, the genetic differentiation is greater than that between taxa in the *S. rubra* complex. [= *S. purpurea* – RAB, GW, Q, S, W, Z; < *S. purpurea* var. *purpurea* – Reveal (1993); < *S. purpurea* ssp. *purpurea* – FNA; = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *montana* Schnell & Determann – K, Y]

Sarracenia purpurea* Linnaeus var. *purpurea, Northern Purple Pitcherplant. Bogs. April-May; June-July. The species as a whole is widespread in e. North America, the only *Sarracenia* to extend north of se. VA. Var. *purpurea* ranges from NL (Labrador) to NT and BC, south to NJ, DE, e. MD, w. MD (where not native), ne. VA, e. WV (where not native), OH, IN, IL, MN, and WA. A nomenclatural battle about the application of the typic variety has been resolved, with var. *purpurea* applying to the northern variety (Reveal 1993, Cheek 1994, Kartesz & Gandhi 1995, Cheek 2001). [= C, F, G, Z; < *S. purpurea* – RAB, GW, Pa, Q, S, U, W, WV; = *S. purpurea* ssp. *gibbosa* (Rafinesque) Wherry – K; = *S. purpurea* var. *terrae-novae* de la Pylaie – Reveal (1993); < *S. purpurea* ssp. *purpurea* – FNA; = *S. purpurea* ssp. *purpurea* – X]

***Sarracenia purpurea* Linnaeus var. *venosa* (Rafinesque) Fernald**, Southern Purple Pitcherplant. Wet savannas, sandhill seepage bogs, hillside seepage bogs. April-May; June-July. Var. *venosa* is restricted to the Atlantic Coastal Plain of the se. United States, ranging from se. VA south to se. SC and e. GA; perhaps disjunct in e. LA. See MacRoberts & MacRoberts (2004) for a detailed discussion about old LA collections of *S. purpurea* or *S. rosea*. For those tolerant of quadrinomial taxonomy, plants in our area may be considered *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *venosa*. It is notable, though, that the findings of Godt & Hamrick (1999) and Ellison et al. (2004) do not support the greater relationship of the southern taxa to one another and their divergence from the northern taxon, and thus do not support the quadrinomial taxonomy. [= C, F, G, Z; < *S. purpurea* – RAB, GW, Q, S, U, W; = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald – FNA; = *S. purpurea* Linnaeus ssp. *purpurea* var. *purpurea* – K; = *S. purpurea* var. *purpurea* – Reveal (1993); = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *venosa* – X, Y]

***Sarracenia rosea* Naczi, F.W. Case, & R.B. Case**, Rose Pitcherplant. Wet pine savannas and seepage bogs. Sw. GA and Panhandle FL west to s. MS and (?) e. LA. Schnell (1993) distinguished the distinctive East Gulf Coastal Plain population (with short peduncles, white stigmas, and pale pink petals) as *S. purpurea* ssp. *venosa* var. *burkii* Schnell; Naczi et al. (1999) elevated this to species rank, as *S. rosea*. See Naczi et al. (1999) and Schnell (1993) for more detailed information and color photographs. Naczi et al.'s (1999) treatment of this taxon at specific rank is supported by the greater genetic distance found by Godt and Hamrick (1999) and morphologic and genetic analyses (Ellison et al. 2004). See MacRoberts & MacRoberts (2004) for a detailed discussion about old LA collections of *S. purpurea* or *S. rosea*. [= FNA, WH; < *S. purpurea* – GW, Q, S, U, Z; = *S. purpurea* Linnaeus ssp. *purpurea* var. *burkii* Schnell – K; < *S. purpurea* var. *purpurea* – Reveal (1993); = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *burkii* Schnell – X, Y]

***Sarracenia rubra* Walter ssp. *gulfensis* Schnell**, Gulf Pitcherplant. Seepage bogs and savannas. April-May. Sw. GA to Panhandle FL. Schnell (2002b) considers the populations of the "*rubra* complex" in Taylor County, GA (the western Coastal Plain of GA, near the AL line) to be best assigned to "*gulfensis*." [= FNA, K, WH, X; < *S. rubra* – GW, S, U, V, Z]

Sarracenia rubra* Walter ssp. *rubra, Sweet Pitcherplant, Redflower Pitcherplant. Sandhill seepage bogs, pocosins, wet savannas. April-May; June-July. Se. and sc. NC south to sc. GA. The *S. rubra* complex consists of five geographically isolated entities, variously treated as species, subspecies, or geographic races (see *S. jonesii* for some of the pertinent references). [= FNA, K, X; < *S. rubra* – RAB, GW, Q, S, U, V, Z]



340. ACTINIDIACEAE Hutchinson 1926 (Kiwi-fruit Family) [in ERICALEs]

A family of 3 genera and 340-360 species, trees, shrubs, and lianas, of tropical and warm temperate Asia. References: Dressler & Bayer in Kubitzki (2004).

Actinidia Lindley (Kiwi-fruit)

A genus of 40-60 species, lianas, of e. and se. Asia. In addition to *A. chinensis*, various other species in the genus *Actinidia* are in limited or novelty cultivation in our area; some show potential to escape and naturalize. References: Dressler & Bayer in Kubitzki (2004).

* *Actinidia chinensis* Planchon, Kiwi-fruit, Chinese Gooseberry. Pd (NC, VA), Mt (VA): suburban woodlands; rare, native of e. Asia. Also naturalized in nc. TN.

341. CLETHRACEAE Klotzsch 1851 (Clethra Family) [in ERICALES]

A monogeneric family of 65-95 species, shrubs and trees, primarily of tropical America and Asia. Sometimes combined into the Cyrillaceae. References: Tucker & Jones in FNA (2009); Sleumer (1967b); Anderberg & Zhang (2002); Schneider & Bayer in Kubitzki (2004).

Clethra Linnaeus (Sweet Pepperbush, White-alder, Clethra)

A genus of 65-95 species, shrubs and trees, primarily of tropical America and Asia. References: Tucker & Jones in FNA (2009); Sleumer (1967b)=Z; Schneider & Bayer in Kubitzki (2004). Key based on FNA.

- 1 Leaves oblong or elliptic, averaging 11-13 cm long and 5-7 cm wide; distance up leaf margin from the leaf base to the first tooth avg. 2.4 cm; leaf apex acuminate; inflorescence bracts exceeding the flowers; [of the Mountains] *C. acuminata*
- 1 Leaves obovate or oblong, averaging 5-9 cm long and 2-4 cm wide cm wide; distance up leaf margin from the leaf base to the first tooth avg. 3.4 cm; leaf apex obtuse to acute; inflorescence bracts shorter than the flowers; [of the Coastal Plain and rarely lower Piedmont].
 - 2 Lower leaf surface sparsely hairy; petioles 2.5-3.5 (-6) cm long; styles 6-7 mm long, hairy at the base with straight hairs; filaments 0.2-0.3 (-0.4) mm in diameter.....*C. alnifolia*
 - 2 Lower leaf surface woolly-tomentose; petioles 0.5-1 (-1.5) cm long; styles 3.5-5 mm long, downy throughout; filaments 0.4-0.5 (-0.7) mm in diameter *C. tomentosa*

Clethra acuminata Michaux, Mountain Sweet-pepperbush, Mountain White-alder. Moist forests, heath balds, margins of rock outcrops at high elevations. July-August; September-October. Endemic to the Southern and Central Appalachians. *C. acuminata* ranges from sw. PA south through e. WV, w. VA, e. TN, w. NC to nw. SC, n. GA, and ne. AL. [= RAB, C, F, FNA, G, K, Pa, S, W, Z]

Clethra alnifolia Linnaeus, Coastal Sweet-pepperbush, Coastal White-alder. Pocosins, blackwater swamp forests, nonriverine swamp forests. June-August; September-October. Primarily a southeastern Coastal Plain species, *C. alnifolia* ranges from NS and ME south to FL, west to TX; disjunct in sc. TN (Coffee County) (Chester, Wofford, & Kral 1997). [= FNA, S; < *C. alnifolia* – C, F, G, GW, K, Pa, WH; = *C. alnifolia* var. *alnifolia* – RAB, Z; = *C. alnifolia* var. *pubescens* Aiton – Z]

Clethra tomentosa Lamarck, Downy Sweet-pepperbush, Downy White-alder. Pocosins, swamps, streambanks. E. SC south to FL, and west to e. LA (east of the Mississippi River). If recognized at varietal rank, the correct name is var. *pubescens* Aiton, which predates var. *tomentosa* (Lamarck) Michaux (Sleumer 1967b, Wilbur 1970b). [= FNA, S; < *C. alnifolia* – GW, K, WH; = *C. alnifolia* var. *tomentosa* (Lamarck) Michaux – RAB; = *C. alnifolia* var. *pubescens* Aiton – Z]

342. CYRILLACEAE Endlicher 1841 (Ti-ti Family) [in ERICALES]

A family of 2 genera and 3 or more species, ranging from se. North America to the West Indies and n. South America (following the removal of *Purdiaea* to the Clethraceae (Anderberg & Zhang 2002). References: Lemke in FNA (2009); Godfrey (1988); Anderberg & Zhang (2002); Thomas (1960)=Y; Kubitzki in Kubitzki (2004). Key adapted from Godfrey (1988).

- 1 Lateral veins of the leaf blades scarcely or not at all apparent on either surface; flowers in terminal and axillary racemes, the racemes solitary or several at a node, not markedly radiating; fruit 5-7 mm long, 2-5 winged.....*Cliftonia*
- 1 Lateral veins of the leaf blades readily apparent on both surfaces, the main laterals neatly pinnate, the smaller veins forming a fine reticulum; flowers in lateral racemes, the racemes clustered together at the summit of the previous year's growth and radiating outward or reflexed; fruit 2-2.5 mm long, not winged.....*Cyrilla*

Cliftonia Banks ex C.F. Gaertner 1807 (Black Ti-ti, Buckwheat-tree)

A monotypic genus, shrub or small tree, of se. North America. References: Lemke in FNA (2009); Thomas (1960)=Y; Kubitzki in Kubitzki (2004).

Cliftonia monophylla (Lamarck) Britton ex Sargent, Black Ti-ti, Buckwheat-tree. Acid bogs, bayheads, swamps, and streambanks. Se. SC south to n. FL, west to se. LA. [= FNA, GW, K, S, WH, Y]

Cyrilla Garden ex Linnaeus 1767 (Ti-ti)

A genus of 3-10 (or more) species, trees and shrubs, of warm temperate to tropical North America, the West Indies, and n. South America. The most recent monographer (Thomas 1960) treated *Cyrilla* as monotypic, clearly the diversity of habit (from subshrubs to large forest trees) and floral structure warrant the recognition of multiple taxa at specific rank; the genus is badly in need of modern study. References: Lemke in FNA (2009); Kurz & Godfrey (1962)=Z; Thomas (1960)=Y; Kubitzki in Kubitzki (2004).

- 1 Leaves mostly 1-4 cm long, mostly 0.5-1 cm wide; inflorescences mostly 4-9 cm long; petals < 3 mm long; [mostly of flatwoods ponds, in s. GA southward] *C. parvifolia*
- 1 Leaves mostly 5-10 cm long, mostly 1-2 cm wide; inflorescences mostly 10-18 cm long; petals > 3 mm long; [of various wetland habitats, throughout our area and widely distributed beyond] *C. racemiflora*

Cyrilla parvifolia Rafinesque, Littleleaf Ti-ti. Flatwood pond margins and along drains through savannas. S. GA south into Panhandle FL. Its taxonomy is problematic; while very distinctive in some places (such as Apalachicola National Forest, FL), apparent intermediates are seen elsewhere. [= K, S, Z; < *C. racemiflora* – FNA, GW, WH3, Y]

Cyrilla racemiflora Linnaeus, Ti-ti. Pocosins, swamps, lake and flatwood pond margins, streambanks, pine flatwoods. May-July; September-October. E. VA (Accomack County) south to FL, west to TX, and south into the West Indies, Belize, Mexico, and n. South America (Thomas 1960). The leaves are quite variable in shape and size; the venation and glossy smoothness, however, are distinctive once learned. Under various ecological conditions, titi can be anything from a small shrub to a medium tree (or large tree in the West Indies). [= RAB, C, G, K, S, Z; < *C. racemiflora* – FNA, GW, WH3, Y; > *C. racemiflora* var. *racemiflora* – F; > *C. racemiflora* var. *subglobosa* Fernald – F]



344. ERICACEAE A.L. de Jussieu 1789 (Heath Family) [in ERICALES]

A family of about 107-124 genera and 3400-4100 species, primarily shrubs, small trees, and subshrubs, nearly cosmopolitan. The Ericaceae is very important in our area, which is one of the north temperate centers of diversity for the Ericaceae, with a great diversity of genera and species, many of them rather narrowly endemic. Along with *Quercus* and *Pinus*, various members of this family are dominant in much of our landscape. References: Tucker in FNA (2009); Gillespie & Kron (2010); Kron et al. (2002); Wood (1961); Judd & Kron (1993); Kron & Chase (1993); Luteyn et al. (1996)=L; Dorr & Barrie (1993); Cullings & Hileman (1997); Stevens et al. in Kubitzki (2004).

Main Key, for use with flowering or fruiting material

- 1 Plant an herb, subshrub, or sprawling shrub, not clonal by underground rhizomes (except *Gaultheria procumbens* and *Epigaea repens*), rarely > 3 dm tall; plants mycotrophic or hemi-mycotrophic (except *Epigaea*, *Gaultheria*, and *Arctostaphylos*).
 - 2 Plants without chlorophyll (fully mycotrophic); stems fleshy; leaves represented by bract-like scales, white or variously colored, but not green; pollen grains single; [subfamily *Monotropoideae*; tribe *Monotropeae*].
 - 3 Petals united; fruit nodding, a berry; flower and fruit several per stem **6. *Monotropis***
 - 3 Petals separate; fruit erect, a capsule; flower and fruit 1-several per stem.
 - 4 Flowers few to many, racemose; stem pubescent, at least in the inflorescence; plant yellow, orange, or red when fresh, aging or drying dark brown **5. *Hypopitys***
 - 4 Flower solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black **4. *Monotropa***
 - 2 Plants with chlorophyll (hemi-mycotrophic or autotrophic); stems woody; leaves present and well-developed, green; pollen grains in tetrads (single in *Orthilia*).
 - 5 Herb with a rosette of ascending basal leaves; flowers scapose; [subfamily *Monotropoideae*; tribe *Pyroleae*].
 - 6 Style and filaments straight; filaments straight, the anthers closely surrounding the style; inflorescence distinctly secund (1-sided) **3. *Orthilia***

- 6 Style and filaments strongly declined; filaments curved, the anthers not closely surrounding the style; inflorescence slightly or not at all secund (1-sided) **1. Pyrola**
- 5 Subshrub or sprawling shrub with cauline leaves; flowers axillary (except scapose in *Chimaphila*).
- 7 Plant erect, the leaves clustered near the apex of the single stem.
- 8 Leaves lanceolate or oblanceolate, normally 2-4× as long as wide (sometimes proportionately less narrow in stunted individuals; fruit a capsule, borne 1-several on an erect scape above the leaves [subfamily *Monotropeae*; tribe *Pyroleae*]..... **2. Chimaphila**
- 8 Leaves obovate, 1-2× as long as wide; fruit a red berry, borne on nodding axillary pedicels beneath the leaves; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] **26. Gaultheria**
- 7 Plant creeping or sprawling, leaves scattered along the stems.
- 9 Flowers solitary and axillary; fruit a white berry; [subfamily *Vaccinioideae*; tribe *Gaultherieae*]..... **26. Gaultheria**
- 9 Flowers in axillary or terminal spikes or racemes; fruit a fleshy loculicidal capsule or red drupe.
- 10 Leaves glabrous, 1-3 cm long, tapered to the base; corolla urceolate; calyx not subtended by large bracts; [subfamily *Arbutoideae*]..... **7. Arctostaphylos**
- 10 Leaves pilose (glabrate in age), 2-10 cm long, rounded or subcordate at the base; corolla salverform, the lobes spreading; calyx subtended by 2 large bracts; [subfamily *Ericoideae*; tribe *Phyllodoceae*] **11. Epigaea**
- 1 Plant a shrub, > 3 dm tall, or 1-3 dm tall and definitely and obviously clonal by underground rhizomes; plants not mycotrophic or hemi-mycotrophic.
- 11 Leaves ca. 1 mm wide, 3-12 mm long, appearing opposite, alternate, or whorled (the internodes very short, thus the leaves generally appearing whorled); petals absent; fruit a subglobose, 2-stoned drupe, 1-3 mm in diameter; branches often appearing in whorls of 3-7; [subfamily *Ericoideae*; tribe *Empetreae*]
- 12 Leaves 5-15 mm long; shrubs 5-25 dm tall; drupes red, 1.5-3 mm in diameter; [of SC southward]..... **14. Ceratiola**
- 12 Leaves 3-6 mm long; shrubs 1.5-6 dm tall; drupes gray, 1-1.5 mm in diameter; [of NJ northward] **13. Corema**
- 11 Leaves **either** > 2 mm wide **or** < 5 mm long, mostly alternate or whorled; petals present; fruit not as above, mostly either a capsule or 10- or many-seeded berry; branches appearing alternate or whorled; [subfamily *Vaccinioideae*; tribe *Vaccinieae*].
- 13 Ovary inferior; fruit indehiscent, a fleshy berry.
- 14 Ovary 10 locular; seeds 10; leaves glandular-punctate, at least on the lower surface (except *G. brachycera*)..... **28. Gaylussacia**
- 14 Ovary 4-5 locular; seeds numerous; leaves not glandular-punctate **27. Vaccinium**
- 13 Ovary superior; fruit dehiscent, a dry capsule.
- 15 Petals separate; fruit 2-7-locular; **either** a shrub to 1 m tall with ovate to oblong, evergreen leaves, 0.6-1.2 cm long, **or** a shrub to small tree 2-6 (-9) m tall with elliptic, deciduous leaves, 4-12 cm long, **or** a shrub 1-2.5 m tall, with elliptic to ovate, evergreen leaves 2-4 cm long; [subfamily *Ericoideae*; tribe *Phyllodoceae*].
- 16 Fruit 2-3 (5)-locular; shrub to 1 m tall; leaves, 0.4-1.2 cm long; petals 2-4 mm long **12. Kalmia buxifolia**
- 16 Fruit 4-7-locular; shrub to small tree 1-6 (-9) m tall; leaves 2-12 cm long; petals 12-30 mm long.
- 17 Fruit 7-locular; leaves evergreen 2-4 cm long; petals 20-30 mm long; shrub 1-2.5 m tall **8. Bejaria**
- 17 Fruit 4-5-locular; leaves deciduous, 4-12 cm long; petals 12-14 mm long; shrub to small tree 2-6 (-9) m tall **10. Elliottia**
- 15 Petals fused for part or all their lengths; fruit (4-) 5-locular; shrub or tree with leaves of various shape, evergreen or deciduous, these **either** < 6 mm long, linear and whorled, **or** > 12 mm long.
- 18 Leaves opposite or whorled, < 5 mm long, linear; [subfamily *Ericoideae*, tribe *Ericae*]
- 19 Leaves opposite, sessile, clasping at the base **15. Calluna**
- 19 Leaves whorled (in 4s), petiolate **16. Erica**
- 18 Leaves alternate or whorled, > 20 mm long.
- 20 Flowers 4-merous; fruits 4-locular; leaves with a series of fascicles of trichomes on the midrib below; [subfamily *Ericoideae*; tribe *Rhodoreae*]..... **9. Rhododendron**
- 20 Flowers 5-merous; fruits 5-locular; leaves not as above.
- 21 Leaves coriaceous, evergreen, shiny and dark green above.
- 22 Leaves sharply and distinctly serrate.
- 23 Pedicels slender, 7-10 mm long; filaments strongly curved just below the anthers; pith transversely diaphragmed; [subfamily *Vaccinioideae*; tribe *Lyonieae*]..... **19. Agarista**
- 23 Pedicels stout, 2-6 mm long; filaments straight; pith solid; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] **24. Leucothoe**
- 22 Leaves entire, or obscurely and finely crenulate-serrulate.
- 24 Capsules elongate, > 2× as long as broad, 8-18 mm long; [subfamily *Ericoideae*; tribe *Rhodoreae*] **9. Rhododendron**
- 24 Capsules ovoid to globose or subglobose, about as long as broad, 5-8 mm long.
- 25 Leaves with a prominent vein running parallel to (and about 1 mm in from) the margin; [subfamily *Vaccinioideae*; tribe *Lyonieae*] **20. Lyonia**
- 25 Leaves without a prominent marginal vein.
- 26 Corolla saucer-shaped, 10-30 mm across; leaves entire; [subfamily *Ericoideae*; tribe *Phyllodoceae*]..... **12. Kalmia**
- 26 Corolla narrowly urceolate, 4-6 mm across; leaves finely crenulate-serrulate; [subfamily *Vaccinioideae*; tribe *Lyonieae*]..... **18. Pieris**
- 21 Leaves membranaceous or subcoriaceous, deciduous or evergreen, if subcoriaceous and evergreen, then not shiny and dark green above.
- 27 Capsules elongate, > 2× as long as broad, 7-23 mm long; [subfamily *Ericoideae*; tribe *Rhodoreae*] **9. Rhododendron**
- 27 Capsules ovoid to globose or subglobose, about as long as broad, or broader than long, 2-7 mm long.
- 28 Leaves (at least the larger) > 2.5 cm wide.
- 29 Pedicels with 2 bracteoles.
- 30 Capsule broader than long; shrub; bracteoles just below the calyx; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] **25. Eubotrys**
- 30 Capsule longer than broad; tree; bracteoles generally near the middle of the pedicel; [subfamily *Vaccinioideae*; tribe *Oxydendreae*]..... **17. Oxydendrum**
- 29 Pedicels without bracteoles.

- 31 Leaves entire to minutely serrulate; capsule sutures pale and thickened; [subfamily *Vaccinioideae*; tribe *Lyonioideae*].....**20. Lyonia**
- 31 Leaves crenate; capsule sutures not thickened and pale; [subfamily *Vaccinioideae*; tribe *Andromedeae*].....**22. Zenobia**
- 28 Leaves < 2.5 cm wide.
- 32 Leaves linear to narrowly lanceolate, 8× or more as long as wide, strongly revolute, strongly whitened beneath; [subfamily *Vaccinioideae*; tribe *Andromedeae*].....**21. Andromeda**
- 32 Leaves broader, not revolute or slightly so, not strongly whitened below.
- 33 Leaves whorled or alternate; corolla saucer-shaped, 10-20 mm across; [subfamily *Ericoideae*; tribe *Phyllodoceae*].....**12. Kalmia**
- 33 Leaves alternate; corolla narrowly urceolate, 2-8 mm across.
- 34 Pedicels with 2 bracteoles near the summit; [subfamily *Vaccinioideae*; tribe *Gaultherieae*].....**23. Chamaedaphne**
- 34 Pedicels with 2 bracteoles near the base; [subfamily *Vaccinioideae*; tribe *Lyonioideae*].....**20. Lyonia**

Alternate Key to Ericaceae (including some relatives), emphasizing vegetative characters

[This key includes some related shrubs, of the Diapensiaceae, Clethraceae, and Cyrillaceae]

- 1 Leaves and stems lacking chlorophyll (either white or variously tinted with colors such as pink, tan, red, or violet).....**Key A**
- 1 Leaves and stems with chlorophyll (green, though some parts may have the green pigment obscured with purple or other colors).
- 2 Leaves membranaceous or subcoriaceous, deciduous or tardily deciduous, usually not particularly glossy (except in new foliage of some species).....**Key B**
- 2 Leaves coriaceous, more or less stiff, evergreen, usually glossy and often dark green.
- 3 Subshrub or sprawling shrub, 0-1 (-2) dm tall, not clonal by underground rhizomes (except *Gaultheria procumbens*), though often clonal by creeping stems, or sprawling and patch-forming (many of these species are only ambiguously shrublike and are considered herbs by the casual observer).....**Key C**
- 3 Shrub, > 3 dm tall, or 1-3 dm tall and definitely and obviously clonal by underground rhizomes.....**Key D**

Key A – Achlorophyllose plants

- 1 Flower solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black.....**Monotropa uniflora**
- 1 Flowers few to many, racemose; stem glabrous (*Monotropis*) or pubescent, at least in the inflorescence (*Hypopitys*); plant yellow, orange, or red when fresh, aging or drying dark brown.
- 2 Plant yellow, orange, or red when fresh, aging or drying dark brown; stem pubescent, at least in the inflorescence; petals separate to base ..
.....**Hypopitys monotropa**
- 2 Plant lavender when fresh; stem glabrous; petals fused into an urceolate corolla.....**Monotropis**

Key B – Deciduous ericaceous shrubs and trees

Gaylussacia spp., *Vaccinium* spp., *Elliottia racemosa*, *Rhododendron* spp., *Kalmia cuneata*, *Chamaedaphne calyculata*, *Lyonia mariana*, *Lyonia ligustrina* var. *ligustrina*, *Lyonia ligustrina* var. *foliosiflora*, *Eubotrys racemosa*, *Eubotrys recurva*, *Oxydendrum arboreum*, *Zenobia pulverulenta*, *Clethra acuminata*, *Clethra alnifolia*, *Cyrilla racemiflora*

Key C – Evergreen subshrubs and sprawling shrubs

- 1 Plant erect, the leaves few (< 10), clustered near the apex of the single stem.
- 2 Leaves obovate, 1-2× as long as wide; fruit a red berry, borne on nodding axillary pedicels beneath the leaves.....**Gaultheria procumbens**
- 2 Leaves lanceolate or oblanceolate, normally 2-4× as long as wide (sometimes proportionately less narrow in stunted individuals; fruit a capsule, borne 1-several on an erect scape above the leaves.
- 3 Leaves lanceolate (broadest below the middle), base rounded, striped with white or paler green along the major veins.....
.....**Chimaphila maculata**
- 3 Leaves oblanceolate (broadest above the middle), base cuneate, solid dark green throughout.....
.....**Chimaphila umbellata** ssp. *cisatlantica*
- 1 Plant creeping or sprawling, leaves scattered along the stems, or tufted at the base.
- 4 Leaves 2-15 cm wide; leaves (2-) 3.5-15 cm long, rounded or subcordate at the base.
- 5 Leaves dull green, with a pebbled texture, pilose (glabrate in age).....**Epigaea repens**
- 5 Leaves bright shiny green (or purple), with a smooth texture, glabrous.
- 6 Leaves orbicular, rounded or with a slight point at the apex, finely serrate (4-8 teeth per cm), the teeth not prominently mucronate; flowers in racemes; [widespread in distribution].....**Galax urceolata** [DIAPENSIACEAE]
- 6 Leaves broadly elliptic, generally emarginate (slightly notched) at the apex, coarsely serrate (1-4 teeth per cm), the teeth prominently mucronate; flowers solitary; [native to humid gorges along the escarpment between the Mountains and Piedmont, sometimes cultivated and becoming established elsewhere].....**Shortia galacifolia** [DIAPENSIACEAE]
- 4 Leaves 0-1.5 cm wide; leaves 0.5-3 cm long, cuneate at the base (at least widely so), glabrous (or bristly beneath in *Gaultheria hispida*).
- 7 Leaves linear, < 2 mm wide.
- 8 Leaves (3.3) 4-10 mm long; leaves lanceolate, averaging > 1.0 mm wide (oblanceolate and up to 2.5 mm wide if etiolated under leaf litter); leaves (in fresh material) herbaceous in texture, < 0.1 mm thick; leaves of sterile shoots ciliate along the margins at the base,

- usually also pubescent on the upper surface near the base, but the pubescence rarely extending > 1/3 of the way from the base to the tip; internodes usually > 1 mm long *Pyxidantha barbata* [DIAPENSIACEAE]
- 8 Leaves 1-5 mm long (rarely to 7 mm long if etiolated under leaf litter); leaves ovate, averaging < 1.2 mm wide (lanceolate and up to 1.5 mm wide if etiolated under leaf litter); leaves (in fresh material) succulent in texture, up to 0.5 mm thick; leaves of sterile shoots lanose to densely pubescent on the upper surface at the base, the pubescence becoming sparser toward the tip of the leaf, but extending past the midpoint of the leaf and often its full length; internodes usually < 1 mm long *Pyxidantha brevifolia* [DIAPENSIACEAE]
- 7 Leaves broader, > 2 mm wide.
- 9 Leaves serrate or serrulate (sometimes inconspicuously so); [of pinelands of the Coastal Plain and (very rarely) lower Piedmont of se. VA southward].
- 10 Leaves (2-) 3-18 (-25) mm long, generally elliptic (less commonly ovate or obovate); angle of leaf base typically > 90 degrees; margins finely glandular mucronulate-crenulate, the teeth tightly appressed and therefore often obscure, the margin superficially entire; stems mostly prostrate (ascending in areas that have been long fire-suppressed); [widespread in NC and SC, rare in se. VA and e. GA]..... *Vaccinium crassifolium*
- 10 Leaves (4-) 7-35 (-63) mm long, elliptic to obovate (less commonly elliptic-ovate); angle of leaf base typically < 90 degrees; margins glandular mucronulate-serrulate to serrulate-crenulate, the teeth apparent, especially toward the apex; stems often ascending to upright; [of Lexington County, SC]..... *Vaccinium sempervirens*
- 9 Leaves entire; [of the Mountains of VA northward, except *Vaccinium macrocarpon* of bogs, as far south as se. sc. and sw. NC].
- 11 Leaves 10-30 mm long; leaves oblanceolate to obovate, the widest point past the middle; primary stems 1-3 mm in diameter; [of relatively dry, rocky habitats]..... *Arctostaphylos uva-ursi*
- 11 Leaves (3-) 5-10 (-18) mm long; leaves ovate or elliptic, the widest point below at the middle; primary stems delicate; [of moist to distinctly boggy habitats].
- 12 Leaf undersurface green, sparsely bristly; [of moist habitats]..... *Gaultheria hispidula*
- 12 Leaf undersurface whitened, glabrous; [of saturated wetlands].
- 13 Leaves elliptic, broadest near middle, (5-) 7-10 (-18) mm long, (2-) 3-4 (-5) mm wide; leaves blunt-rounded and non-involute; pedicels with 2 green, leaf-like bracts 1-2 mm wide; berry 8-15 mm in diameter *Vaccinium macrocarpon*
- 13 Leaves ovate, broadest toward base, (3-) 5-6 (-9) mm long, (1-) 2-3 (-5) mm wide; leaves involute at least along the margins, thus making the leaf tip acute; pedicels with (0-) 2 (-5) reddish, scale-like bracts < 1 mm wide; berry 6-12 mm in diameter ... *Vaccinium oxycoccos*

Key D – Evergreen ericaceous shrubs (either tall or obviously clonal) and trees

- 1 Leaves linear, needle-like, **either** appearing whorled (at least in part, sometimes also with nodes appearing opposite or alternate) **or** opposite (*Calluna*).
- 2 Leaves opposite, sessile and clasping; [exotic, rarely naturalized] *Calluna vulgaris*
- 2 Leaves whorled (at least in part), petiolate; [**either** native **or** exotic and rarely naturalized].
- 3 Leaves densely puberulent and ciliate with gland-tipped hairs; leaves 1.5-5 mm long; [exotic, rarely naturalized]..... *Erica tetralix*
- 3 Leaves glabrous; leaves 3-15 mm long; [native].
- 4 Leaves 5-15 mm long; shrubs 5-25 dm tall; drupes red, 1.5-2 mm in diameter; [of SC southward] *Ceratiola ericoides*
- 4 Leaves 3-6 mm long; shrubs 1.5-6 dm tall; drupes gray, 1-1.5 mm in diameter; [of NJ northward]..... *Corema conradii*
- 1 Leaves broader, alternate (or whorled or opposite in *Kalmia*).
- 5 Leaves (all of them) < 2 cm long.
- 6 [**Either** of the Mountains, the Piedmont, **or** the Coastal Plain of ne. SC and se. NC].
- 7 Leaves alternate, glabrous, finely serrulate..... *Gaylussacia brachycera*
- 7 Leaves alternate or opposite, stipitate-glandular or glabrous, entire, or with a few obscure teeth..... *Kalmia buxifolia*
- 6 [Of the Coastal Plain, from se. SC southward].
- 8 Twigs densely hispid; leaves hispid on both surfaces *Kalmia hirsuta*
- 8 Twigs glabrous to puberulent; leaves glabrous or with scattered inconspicuous hairs.
- 9 Plant glaucous and bluish-green throughout; leaf undersurface lacking scattered glandular hairs; [of s. GA south to s. peninsular FL, west to e. TX] *Vaccinium darrowii*
- 9 Plant dark green throughout, generally exceeding 20 mm in length; leaf undersurface with scattered glandular hairs, these sometimes very few by late in the season (best seen in the field by folding a leaf, holding the fold up to the light, and using a 10× lens); [of se. SC southward to n. FL, west to s. AL]..... *Vaccinium myrsinites*
- 5 Leaves (at least the larger) > 3 cm long.
- 10 Leaves toothed, at least toward the tip of the leaf (note that fine serrations or crenations can be obscured by revolute margins).
- 11 Leaves elliptic to oblanceolate, widest near or above the middle, obtuse, acute, or short-acuminate, 1.5-7 cm long, 0.5-2.5 cm wide; leaf serrations fine and obscure; leaf surfaces with small stipitate glands (*Pieris*) or lepidote with scales (*Chamaedaphne*).
- 12 Leaves lepidote with scales; leaves oblanceolate, widest above the middle *Chamaedaphne calyculata*
- 12 Leaves with small stipitate glands, otherwise appearing glabrous; leaves elliptic, widest near the middle.
- 13 Inflorescence a many-flowered panicle of racemes, borne terminally; seeds 2.5-3 mm long; [of slopes and ridges of the Mountains and upper Piedmont] *Pieris floribunda*
- 13 Inflorescence a 3-9 flowered raceme, borne in the axils of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with *Taxodium ascendens*] *Pieris phillyreifolia*
- 11 Leaves lanceolate or ovate, widest below the middle, short-acuminate to acuminate, 4-15 cm long, 1-5 cm wide; leaf serrations generally obvious (at least toward the acuminate leaf tip); leaf surfaces glabrous, or with non-stipitate hairs on the lower surface.
- 14 Pith transversely diaphragmed; [pedicels slender, 7-10 mm long]; [filaments strongly curved just below the anthers] *Agarista populifolia*
- 14 Pith solid; [pedicels stout, 2-6 mm long]; [filaments straight].
- 15 Leaves with an acute or short-acuminate apex; racemes 2-4 (5) cm long; sepals ovate, with an obtuse or rounded apex; longest petioles 3-8 mm long *Leucothoe axillaris*

- 15 Leaves with a long-acuminate apex; racemes 4-10 cm long; sepals lanceolate-ovate, with an acute (or subacute) apex; longest petioles 8-15 mm long *Leucothoe fontanesiana*
- 10 Leaves entire.
- 16 Leaves whitened beneath by a dense mat of white hairs; leaves linear and strongly revolute..... *Andromeda*
- 16 Leaves green or brown beneath, glabrous, glabrescent, or lepidote with scales.
- 17 Leaves densely lepidote on the under surface with brown scales.
- 18 Leaves planar, not revolute; petioles 7-20 mm long; twigs more-or-less terete in cross-section; [of the Mountains, Piedmont, and upper Coastal Plain].
- 19 Corolla mostly 15-20 mm long, the corolla tube (9-13 mm long) shorter than to as long as the corolla lobes (12-18 mm long); plant flowering early relative to *R. minus*, despite occurring at higher elevations and more northern latitudes; seeds ovoid, < 1.0 mm long, < 2.5× as long as wide (reminiscent of tiny watermelon seeds), coarsely textured, unornamented at the ends; calyx lobes deltoid; [of mountain ridges, heath balds, and rocky summits, mostly either away from the Blue Ridge Escarpment or north of the Asheville Basin] *Rhododendron carolinianum*
- 19 Corolla mostly 25-37 mm long, the corolla tube (13-22 mm long) longer than the corolla lobes (8-12 mm long); plant flowering late relative to *R. carolinianum*; seeds usually > 1.0 mm long, usually > 3× as long as wide, ornamented at one or both ends; calyx lobes ovate; [of the Coastal Plain, Piedmont, and Mountains, in the Mountains mostly of the Blue Ridge Escarpment of sw. NC and nw. SC, ranging in elevation up to the higher granitic domes in Macon and Jackson counties, NC].
- 20 Leaf apices mostly obtuse to rounded; petioles 2-6 (-7) mm long; branches erect and rigid; seeds moderately to elaborately ornamented with flared protrusions at both ends; [of n. FL]..... *Rhododendron chapmanii*
- 20 Leaf apices mostly acute to acuminate; petioles (5-) 6-20 mm long; branches spreading, not notably erect and rigid; seeds somewhat ornamented at one end; [of c. GA northward]..... *Rhododendron minus*
- 18 Leaves slightly to strongly revolute (or nearly planar in *Lyonia fruticosa*); petioles 1-7 mm long; twigs angled in cross-section; [of the lower Coastal Plain, from se. SC southward].
- 21 Ultimate branches not rigidly ascending, flowers nearly always restricted to branches of the previous year, the leaves not conspicuously reduced toward the branch tips; leaves with distal margin usually revolute, sometimes strongly so; major veins usually depressed; lower leaf surface with some scales often large and with irregular margins, others smaller and more nearly entire, at least the smaller scales more-or-less persistent; [shrub or small tree to 6 (-10) m tall] *Lyonia ferruginea*
- 21 Ultimate branches rigidly ascending, flowers frequent on branches of the current year (though also on older growth), the leaves conspicuously reduced toward the branch tips; leaves with distal margin at most slightly revolute; major veins not depressed; lower leaf surface with scales usually all large and with irregular margins, the scales often deciduous; [shrub to 1.5 (-3) m tall] *Lyonia fruticosa*
- 17 Leaves not lepidote beneath (*Lyonia lucida* with scattered minute scales on young leaves).
- 22 Leaves whorled or rarely opposite.
- 23 Calyx lobes glandular-canescens and with marginal stipitate glands; leaves glabrous beneath; bracts and bracteoles densely glandular; stomates 18 μ long and 13 μ wide, 15-24 per 0.2 square millimeter; shrub to 1 (-1.2) m tall; [of ne. NC northward] *Kalmia angustifolia*
- 23 Calyx lobes canescens but lacking glands; leaves short puberulent beneath; bracts and bracteoles nearly glandless; stomates 13 μ long and 9 μ wide, 35-51 per 0.2 square millimeter; shrub to 2 m tall (though often much shorter); [of se. and sw. VA southward] *Kalmia carolina*
- 22 Leaves alternate.
- 24 Leaf blades (8-) 10-30 cm long, 3-9 cm wide, rounded to obtuse at the tip.
- 25 Leaves rounded at base (rarely broadly cuneate or slightly cordate), obtuse at apex; leaf generally 1.5-2.5× as long as wide; [corolla usually deep pink to purple]; [sepals 0.5-1 mm long] *Rhododendron catawbiense*
- 25 Leaves cuneate at base, acute at apex; leaf generally 3-5× as long as wide; [corolla usually white to pale pink]; [sepals 4-6 mm long] *Rhododendron maximum*
- 24 Leaf blades 2-10 (-12) cm long, 1-5 cm wide, acute, short-acuminate (or obtuse or rounded in *Cyrilla*) at the tip.
- 26 Leaf with a prominent vein running the length of the margin, about 1 mm in; [shrub to 4 m tall] *Lyonia lucida*
- 26 Leaf venation not as above; [shrub to small tree]..... *Kalmia latifolia*, *Cyrilla racemiflora*, *Cliftonia racemosa*, *Bejaria racemosa*

1. *Pyrola* Linnaeus 1753 (Shinleaf, Pyrola)

A genus of 30-35 species, subshrubs, circumboreal and also in Sumatra and Guatemala. The inclusion of this group of species in the Ericaceae or its recognition as a separate family has been controversial. Recent studies (Judd & Kron 1993, Kron & Chase 1993) suggest that it is best resubmerged in the Ericaceae. References: Freeman in FNA (2009); Liu et al. (2010); Stevens et al. in Kubitzki (2004).

- 1 Calyx lobes distinctly longer than broad, 3-4 mm long; leaves coriaceous, more or less glossy; [section *Pyrola*; series *Pyrola*]..... *P. americana*
- 1 Calyx lobes about as broad as long, 1.5-2 mm long; leaves not coriaceous, dull.
- 2 Leaves mostly 1-3 cm long, the blade mostly < 2.5 cm wide; calyx lobes broadly ovate, the apex subacute to obtuse; [section *Ampliosepala*; series *Chloranthae*] *P. chlorantha*
- 2 Leaves mostly 3-9 cm long, the blade mostly > 2.5 cm wide; calyx lobes triangular, the apex acute to acuminate; [section *Pyrola*; series *Ellipticae*]..... *P. elliptica*

Pyrola americana Sweet, Rounded Shinleaf. Xeric to mesic woodlands and forests. May-August; July-October. NL (Newfoundland) west to MB, south to NC, ne. TN, KY, IN, MN, and SD. [= FNA, K, Pa, S, W; = *P. rotundifolia* Linnaeus var. *americana* (Sweet) Fernald – RAB, C, F, G, L, WV]

Pyrola chlorantha Swartz. Dry forests. June-August; August-October. Circumboreal, in North America south to VA, WV, IN, NE, NM, AZ, and CA. [= C, FNA, K, L, Pa, W; > *P. virens* var. *virens* – F, G; > *P. virens* var. *convoluta* (Bart.) Fernald – F, G, WV]

Pyrola elliptica Nuttall, Elliptic Shinleaf. Moist to dry forests, including rich northern hardwood forests. June-August; July-October. NS, NL (Newfoundland), and QC west to BC, south to DE, nw. NC, WV, OH, IN, IL, IA, NE, NM, and AZ. Known in NC only from Ashe County, in Long Hope Valley (McDowell 1984) and on Phoenix Mountain. [= C, F, FNA, G, K, L, Pa, S, W, WV]

2. *Chimaphila* Pursh 1814 (Pipsissewa)

A genus of 4-5 species, subshrubs, of temperate and tropical America, and Eurasia. References: Freeman in FNA (2009); Stevens et al. in Kubitzki (2004).

- 1 Leaves lanceolate (broadest below the middle), base rounded, striped with white or paler green along the major veins.....*C. maculata*
 1 Leaves oblanceolate (broadest above the middle), base cuneate, solid dark green throughout.....*C. umbellata* var. *cisatlantica*

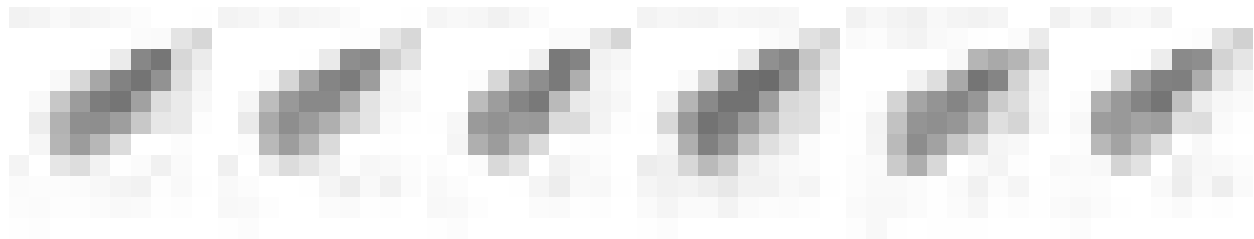
Chimaphila maculata (Linnaeus) Pursh, Pipsissewa, Striped Wintergreen. Forests and woodlands, mostly rather xeric and acid. May-June; July-October. ME west to MI, south to GA, FL Panhandle, and AL; disjunct in mountains of AZ, Mexico, and Central America south to Panama. [= RAB, C, F, G, K, L, Pa, S, W, WH]

Chimaphila umbellata (Linnaeus) W. Barton var. *cisatlantica* Blake, Prince's-pine. Forests and woodlands, mostly rather xeric and acid. May-June; July-October. Circumboreal, extending (in the interpretation of some) south into Central America. Var. *cisatlantica* is widespread in ne. North America, from NS and QC west to MN, south to NC and IN. [= C, F, G, L; < C. *umbellata* ssp. *umbellata* – FNA; < C. *umbellata* – Pa, RAB, W; = C. *umbellata* ssp. *cisatlantica* (Blake) Hultén – K; ? C. *corymbosa* Pursh – S]

3. *Orthilia* Rafinesque 1840 (Sidebells, One-sided Shinleaf, One-sided Wintergreen)

A monotypic genus, a subshrub, circumboreal in distribution. The recognition of *Orthilia* as separate from *Pyrola* is supported by molecular data (Freudenstein 1999a). References: Freeman in FNA (2009); Stevens et al. in Kubitzki (2004).

Orthilia secunda (Linnaeus) House, Sidebells, One-sided Shinleaf, One-sided Pyrola. Forests under *Pinus virginiana*, other forests? June-July; July-September. Circumboreal, in North America south to VA, IN, IA, NE, NM, AZ, and CA; disjunct in Mexico and Guatemala. [= FNA, K, L, Pa; = *Pyrola secunda* Linnaeus – C, G, W; > *P. secunda* var. *secunda* – F]



4. *Monotropa* Linnaeus 1753 (Indian Pipes, Pinesap)

A monotypic genus, an herb, of North America, Central America, South America, and e. Asia. The segregation of *Monotropa*, *Hypopitys*, and *Monotropopsis* into the Monotropaceae or their inclusion in the Ericaceae has been controversial. Recent studies suggest that their inclusion in the Ericaceae is warranted (Kron & Chase 1993, Judd & Kron 1993). References: Wallace in FNA (2009); Wallace (1975)=Z; Stevens et al. in Kubitzki (2004). [also see *Hypopitys*]

- 1 Flowers few to many, racemose; stem pubescent, at least in the inflorescence; plant yellow, orange, or red when fresh, aging or drying dark brown.....[*Hypopitys monotropa*]
 1 Flower solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black.....*Monotropa uniflora*

Monotropa uniflora Linnaeus, Indian Pipes. In a wide variety of forests. June-October; August-November. NL (Labrador) and AK south to s. FL, TX, CA; disjunct in s. Mexico, Central America, South America (Colombia), and e. Asia. A preliminary molecular study suggests that splitting of worldwide *Monotropa uniflora* into several geographic species or varieties may be warranted (Neyland & Hennigan 2004). [= RAB, C, F, FNA, G, K, L, Pa, W, WH, WV, Z; > *M. uniflora* – S; > *M. brittonii* Small – S]

5. *Hypopitys* Crantz 1766 (Pinesap)

A genus of 1-several species, herbs, of circumboreal distribution. Recent molecular evidence supports its separation as a genus distinct from *Monotropa* (as has often been done in the past) (Neyland & Hennigan 2004). References: Wallace in FNA (2009); Wallace (1975)=Z; Stevens et al. in Kubitzki (2004).

Hypopitys monotropa Crantz, Pinesap. Forests. May-October; July-November. Circumboreal, south nearly throughout North America, to c. peninsular and Panhandle FL, TX, NM, AZ, CA, and Mexico; disjunct in Guatemala; Europe; c. and e. Asia. Recent studies suggest that several cryptic to semi-cryptic species or infraspecific taxa should be recognized (M. Klooster, pers. comm. 2009). [= *Monotropa hypopithys* Linnaeus – RAB, C, F, FNA, G, K, L, Pa, W, WH, WV, Z; > *Hypopitys americana* (A.P. de Candolle) Small – S; > *Hypopitys lanuginosa* (Michaux) Nuttall – S; > *H. insignata* Bicknell; > *Monotropa lanuginosa* Michaux]

6. *Monotropis* Schweinitz in Elliott 1817 (Pigmy Pipes, Sweet Pinesap)

A genus of probably 2 species, mycotrophic herbs, of se. North America. Often treated as monotypic, but there appears to be more to at least one of the “lumped” taxa than has usually been credited; the genus warrants additional study. *Monotropis* is mycotrophic, receiving its nutrition by association with a mycorrhizal fungus, the intertwined root mass and fungal mantle about 1-2 cm in diameter. References: Wallace in FNA (2009); Wallace (1975)=Z; Chafin (2000)=Y; Wolf (1922); Stevens et al. in Kubitzki (2004).

- 1 Sepals about 0.75-1.25× as long as the corolla, ovate; corolla pink, lavender, purple, or purplish-red, the corolla lobes in the plane of the corolla tube or curved inward from that plane; **either** flowering prematurely in September-November and the flowers not fragrant, **or** flowering February-April and the flowers strongly and spicily fragrant; [of AL and GA northward]..... *M. odorata*
- 1 Sepals about 0.5× as long as the corolla, lanceolate; corolla white or pale lavender, the corolla lobes spreading or reflexed; flowering January-February, the flowers slightly fragrant; [of FL]..... *M. reynoldsiae*

Monotropis odorata Schweinitz ex Elliott, Appalachian Pigmy Pipes. Dry to mesic upland woods under oaks and/or pines (*Pinus virginiana* or *P. echinata*), especially slopes or bluffs with abundant heaths, often including *Kalmia latifolia* and/or *Rhododendron maximum*. February-April (and sometimes September-November); May-June (and sometimes October-November). Centered in the Appalachians: DE, MD, and WV south to GA and AL. The flowers are very fragrant, the odor variously compared to cloves, nutmeg, cinnamon, and violets. Since the diminutive plants (3-10 cm tall) are often covered by leaf litter, fragrance is often the key to finding this species. The fall flowering form, entity “*lehmaniae*” (see synonymy), appears to represent the early development of *M. odorata* which will typically then overwinter in “suspended animation” and flower in the early spring. [< *M. odorata* – C, F, FNA, G, K, L, W, WV, Z; > *M. odorata* var. *odorata* – RAB; > *M. odorata* var. *lehmaniae* (Burnham) H.E. Ahles – RAB; > *M. odorata* – S; > *M. lehmaniae* Burnham – S]

Monotropis reynoldsiae (A. Gray) A. Heller, Florida Pigmy Pipes. Upland mixed hardwood forests, mesic hammocks, xeric hammocks, scrub. January-February. Endemic to nc. peninsular FL, in St. Johns, Marion, Citrus, Hernando, Pasco, and Volusia counties. See Chafin (2000) for additional information; there seems little question that this is specifically distinct from *M. odorata*. [= S, Y; < *M. odorata* – FNA, K, L, W, WH, Z]

7. *Arctostaphylos* Adanson 1760 (Bearberry)

A genus of 60-70 species, shrubs, woody vines, or small trees, mostly in w. North America, but with 2 circumboreal species. References: Parker, Vasey, & Keeley in FNA (2009); Rosatti (1987b)=Z; Stevens et al. in Kubitzki (2004).

Arctostaphylos uva-ursi (Linnaeus) Sprengel, Bearberry, Kinnikinnick. High elevation granitic outcrop (VA); Coastal Plain pitch pine woodlands and sandy barrens (DE and NJ); ridgeline shale outcrop (MD). Late April-June; early August-October (and persisting). Circumboreal, ranging in North America from NL (Labrador) west to AK, south to DE, n. VA, n. IN, IL, IA, SD, NM, AZ, and CA; disjunct in Guatemala. Following Rosatti (1987), *A. uva-ursi* is here treated inclusively, as a complex species not readily divisible into infraspecific taxa. The MD occurrence (Allegany County) is reported by Knapp et al. (2011). [= C, FNA, K, L, Pa, W, Z; > *A. uva-ursi* var. *coactilis* Fernald & J.F. Macbride – F, G; > *A. uva-ursi* ssp. *coactilis* (Fernald & J.F. Macbride) A. & D. Löve & Kapoor]

8. *Bejaria* Mutis in Linnaeus 1771 (Tarflower)

A genus of 15 species, shrubs and trees, of se. United States to Cuba, and from Mexico south into Bolivia. The spelling of the generic name has been controversial; it was originally published as '*Befaria*,' because of Linnaeus's misreading of Mutis's handwriting, but was intended to commemorate José Béjar. The spelling has now been conserved as '*Bejaria*' (Greuter et al. 2000). References: Clemants in FNA (2009); Stevens et al. in Kubitzki (2004).

Bejaria racemosa Ventenat, Tarflower, Flycatcher. Pine flatwoods. E. GA (adjacent to se. SC) south to s. peninsular FL, west to AL. [= FNA, L, WH; = *Befaria racemosa* – GW, K, S, orthographic variant]



9. *Rhododendron* Linnaeus 1753 (*Rhododendron*, Azalea)

A genus of about 860 species, shrubs and trees, mostly north temperate (centered in Himalayan Asia). Molecular evidence makes clear that *Menziesia* should be included in *Rhododendron*, and is actually closely related within *Rhododendron* to *R. vaseyi* (Goetsch, Eckert, & Hall 2005; Kurashige et al. 2001); while the urceolate corolla is rather anomalous in *Rhododendron*, many other characters ally *Menziesia* with basal clades in *Rhododendron* s.l. References: Judd & Kron in FNA (2009); Fabijan in FNA (2009); Kron (1993)=Z; Judd & Kron (1995)=Y; Chamberlain (1982)=X; Cullen (1980)=Q; Davidian (1982)=D; Craven (2011)=U; Duncan & Pullen (1962)=V; Goetsch, Eckert, & Hall (2005); Towe (2004); Kron & Creel (1999); Stevens et al. in Kubitzki (2004).

- 1 Leaves evergreen, coriaceous, entire; stamens 10; [**rhododendrons**].
 - 2 Lower surface of leaves not punctate with brown scales; larger leaves 10-30 cm long; [subgenus *Hymenanthes*, section *Ponticum*, subsection *Pontica*].
 - 3 Leaves rounded at base (rarely broadly cuneate or slightly cordate), obtuse at apex; leaf generally 1.5-2.5× as long as wide; corolla usually deep pink to purple; sepals 0.5-1 mm long ***R. catawbiense***
 - 3 Leaves cuneate at base, acute at apex; leaf generally 3-5× as long as wide; corolla usually white to pale pink; sepals 4-6 mm long ***R. maximum***
 - 2 Lower surface of leaves punctate with brown scales; larger leaves 6-12 cm long; [subgenus *Rhododendron*, section *Rhododendron*, subsection *Caroliniana*].
 - 4 Corolla mostly 15-20 mm long, the corolla tube (9-13 mm long) shorter than to as long as the corolla lobes (12-18 mm long); plant flowering early relative to *R. minus*, despite occurring at higher elevations and more northern latitudes; seeds ovoid, < 1.0 mm long, < 2.5× as long as wide (reminiscent of tiny watermelon seeds), coarsely textured, unornamented at the ends; calyx lobes deltoid; [of mountain ridges, heath balds, and rocky summits, mostly either away from the Blue Ridge Escarpment or north of the Asheville Basin]. ***R. carolinianum***
 - 4 Corolla mostly 25-37 mm long, the corolla tube (13-22 mm long) longer than the corolla lobes (8-12 mm long); plant flowering late relative to *R. carolinianum*; seeds usually > 1.0 mm long, usually > 3× as long as wide, ornamented at one or both ends; calyx lobes ovate; [of the Coastal Plain, Piedmont, and Mountains, in the Mountains mostly of the Blue Ridge Escarpment of sw. NC and nw. SC, ranging up to the higher granitic domes in Macon and Jackson counties, NC].
 - 5 Leaf apices mostly obtuse to rounded; petioles 2-6 (-7) mm long; branches erect and rigid; seeds moderately to elaborately ornamented with flared protrusions at both ends; [of n. FL] ***R. chapmanii***
 - 5 Leaf apices mostly acute to acuminate; petioles (5-) 6-20 mm long; branches spreading, not notably erect and rigid; seeds somewhat ornamented at one end; [of c. GA northward] ***R. minus***
- 1 Leaves deciduous, membranaceous, ciliate or serrulate; stamens 5-7; [**azaleas**]; {also see the Alternate Key to azaleas, emphasizing vegetative characters}.
 - 6 Corolla urceolate, the corolla lobes ca. 1 mm long; stamens 8; capsule 4-7 mm long, 4 (-5) locular; leaf mucro extremely prominent; midrib on lower leaf surface with a series of fascicles of glandular trichomes; [subgenus *Azaleastrum*, section *Sciadorhodium*] ***R. pilosum***
 - 6 Corolla tubular at the base, with well-developed flaring corolla lobes > 10 mm long; stamens 5-7; capsule 10-25 mm long, 5-locular; leaf mucro not prominent; midrib on lower leaf surface variously pubescent, but not with a series of fascicles of glandular trichomes.
 - 7 Corolla tube 2-5 mm long, much shorter than the corolla lobes; stamens (5-) 7; leaves elliptic, often broadly so (commonly 3-6 cm wide), acuminate; capsule ellipsoid-ovoid, 10-14 mm long; [subgenus *Azaleastrum*, section *Sciadorhodium*] ***R. vaseyi***
 - 7 Corolla tube 13-25 mm long, equal to or longer than the corolla lobes; stamens 5; leaves generally oblanceolate to narrowly elliptic, generally < 3 cm wide, acute to obtuse, mucronate; capsule cylindroid-ellipsoid, 10-25 mm long; [subgenus *Hymenanthes*, section *Pentanthera*].
 - 8 Corolla yellow, orange, or red.
 - 9 Flowers appearing after the leaves have expanded.
 - 10 Twigs pubescent with multicellular hairs; [e. KY and w. VA south to ec. TN, n. GA, and ne. AL; apparently disjunct in the Piedmont of SC] ***R. cumberlandense***
 - 10 Twigs glabrous; [south of ec. AL and wc. GA] ***R. prunifolium***
 - 9 Flowers appearing before or with the leaves.
 - 11 Corolla limb shorter than the length of the corolla tube, the tube gradually expanding into the limb ***R. austrinum***
 - 11 Corolla limb nearly as broad as the tube is long, the tube abruptly expanding into the limb.
 - 12 Floral bud-scales with glandular margins, the outer surface glabrous; corolla tube glandular-pubescent on its outer surface; sepals 2.0-3.0 mm long ***R. calendulaceum***
 - 12 Floral bud-scales with ciliate margins, the outer surface glabrous to sparsely pubescent; corolla tube pubescent (not glandular or rarely very weakly so) on the outer surface; sepals 0.5-3.0 mm long ***R. flammeeum***
 - 8 Corolla white or pink (white marked with yellow in *R. eastmanii* and *R. alabamense*).
 - 13 Sepals 1.5-5 mm long.
 - 14 Young stems glabrous (rarely very sparsely pubescent); nonclonal shrub or small tree, to 7 m tall ***R. arborescens***
 - 14 Young stems densely pubescent, generally with a mixture of glandular and nonglandular hairs; clonal shrub, the upright stems up to 1.5 m tall ***R. atlanticum***

- 13 Sepals 0.1-1 mm long.
- 15 Leaves glabrous beneath, except for strigose bristles along the midrib and major veins.
- 16 Pedicels strigose to puberulent, not stipitate-glandular; flowers appearing with or before the leaves.....*R. periclymenoides*
- 16 Pedicels densely stipitate-glandular; flowers appearing after the leaves.
- 17 Shrubs to 7 m tall; floral winter bud scales 15-20, at least the inner acute and aristate; corolla tube glabrous within, > 2× as long as the lobes*R. viscosum* var. *serrulatum*
- 17 Shrubs 1-2 (-5) m tall; floral winter bud scales 8-12 (-15), rounded (-mucronate) apically; corolla tube pubescent within, < 2× as long as the lobes*R. viscosum* var. *viscosum*
- 15 Leaves densely and softly pubescent beneath.
- 18 Corolla lobes about as long as the corolla tube; capsule densely glandular-pubescent; [of northern distribution, of montane areas of w. NC, w. VA, and northward]*R. prinophyllum*
- 18 Corolla lobes much shorter than the corolla tube; capsule sparsely pubescent, the pubescence not glandular (or with some of the hairs glandular in *R. eastmanii* and *R. alabamense*); [of southern distribution, from c. SC and se. TN southward].
- 19 Corolla pale to deep pink, without yellow markings; scales of the winter buds pubescent on the outer surface*R. canescens*
- 19 Corolla white, with a blotch of yellow on the upper lobe; scales of the winter buds glabrous on the outer surface.
- 20 Flowers opening before the leaves have expanded; flower buds with non-glandular margins *R. alabamense*
- 20 Flowers opening after the leaves have expanded; flower buds with margins glandular along their lower 2/3s.....*R. eastmanii*

Alternate Key to Azaleas

Identification notes: This key makes as much use as possible of vegetative characters, geography, and capsule characters; capsules are generally available for longer during the year than flowers, and even when plants are in flower, last year's capsules can often be found.

- 1 Corolla urceolate, the corolla lobes ca. 1 mm long; stamens 8; capsule 4-7 mm long, 4 (-5) locular; leaf mucro extremely prominent; midrib on lower leaf surface with a series of fascicles of glandular trichomes; [subgenus *Azaleastrum*, section *Sciadorhodion*].....*R. pilosum*
- 1 Corolla tubular at the base, with well-developed flaring corolla lobes > 10 mm long; stamens 5-7; capsule 10-25 mm long, 5-locular; leaf mucro not prominent; midrib on lower leaf surface variously pubescent, but not with a series of fascicles of glandular trichomes.
- 2 Corolla tube 2-5 mm long, much shorter than the corolla lobes; stamens (5-) 7; leaves elliptic, often broadly so (commonly 3-6 cm wide), acuminate; capsule ellipsoid-ovoid, 10-14 mm long; [subgenus *Azaleastrum*, section *Sciadorhodion*]*R. vaseyi*
- 2 Corolla tube 13-25 mm long, equal to or longer than the corolla lobes; stamens 5; leaves generally oblanceolate to narrowly elliptic, generally < 3 cm wide, acute to obtuse and usually also noticeably mucronate; capsule cylindroid-ellipsoid or ovoid, 10-29 mm long; [subgenus *Hymenanthes*, section *Pentanthera*].
- 3 Outer (abaxial) surface of the vegetative bud scales densely pubescent; flowers appearing before or with the leaves (at least some of the leaves still folded or the vegetative bud scales still present) (except *R. viscosum*).
- 4 Capsule cylindroid, (3-) 4-5× as long as broad.
- 5 Corolla yellow-orange to orange-red; upper corolla lobe with a contrasting blotch; [of s. GA west to se. MS].....*R. austrinum*
- 5 Corolla white to pink; upper corolla lobe uniform in color (lacking a contrasting blotch); [collectively widespread in our area].
- 6 Corolla tube narrow and somewhat abruptly expanding into the lobes, the lobes distinctly shorter than the tube; pedicels usually eglandular (occasionally glandular), (4-) 5-10 (-13) mm long; leaves inconspicuously ciliate, the cilia appressed to the leaf margin; capsule densely covered with nonglandular hairs; flowering March-May; [widely distributed from s. NC and n. TN southward]*R. canescens*
- 6 Corolla tube broader, gradually expanding into the lobes, the lobes about as long as or longer than the tube; pedicels usually glandular, (7-) 10-16 (-26) mm long; leaves conspicuously ciliate, the cilia diverging from the leaf margin; capsule glabrous or sparsely pubescent, the hairs at least partly gland-tipped; flowering May-June; [of the Mountains and upper Piedmont from n. NC (and rarely ne. AL) northward]*R. prinophyllum*
- 4 Capsule ovoid, 2-3 (-4)× as long as broad (if capsules absent, try both leads).
- 7 Corolla yellow-orange to orange-red; upper corolla lobe with a contrasting blotch; hairs of the capsule not gland-tipped; [of the Piedmont and Coastal Plain of GA and w. SC]*R. flammeum*
- 7 Corolla white to pink; upper corolla lobe uniform in color (lacking a contrasting blotch); hairs of the capsule gland-tipped (at least in part; nonglandular hairs also present); [collectively widespread in our area].
- 8 Flowers appearing after the leaves have expanded (essentially all of the leaves unfolded, and the vegetative bud scales absent), typically May (Coastal Plain, low elevation, or south) to August (mountains, high elevation, or north)*R. viscosum*
- 8 Flowers appearing before or with the leaves (at least some of the leaves still folded or the vegetative bud scales still present), typically April-May (unless stimulated by fire or weather).
- 9 Leaf blade (3.2-) 3.4-4.7 (-5.2) cm long, (0.8-) 1.1-1.9 (-2.0) cm wide; plant typically strongly rhizomatous; [of the Coastal Plain from s. NJ south to sc. GA]*R. atlanticum*
- 9 Leaf blade (3.9-) 5.0-7.3 (-8.7) cm long, (1.2-) 1.8-3.0 (-3.7) cm wide; plant typically nonrhizomatous; [of the Mountains and upper Piedmont]*R. prinophyllum*
- 3 Outer (abaxial) surface of the vegetative bud scales glabrous or sparsely pubescent.
- 10 Capsule cylindric, (3-) 4-5 × as long as broad; flowers appearing before or with the leaves (at least some of the leaves still folded or the vegetative bud scales still present).
- 11 Corolla white, with a contrasting yellowish blotch on the upper lobe; [of se. TN and w. GA westward]..... *R. alabamense*
- 11 Corolla deep pink (rarely white or nearly so), lacking a contrasting blotch on the upper lobe; [widespread in our primary and secondary area]*R. periclymenoides*
- 10 Capsule ovate, 2-3.5× as long as broad; flowers appearing before, with, or after the leaves.
- 12 Corolla white to pink (sometimes with yellow blotches)*R. arborescens*, *R. eastmanii*, *R. viscosum*
- 12 Corolla predominantly yellow, orange, or orange-red.....*R. calendulaceum*, *R. flammeum*, *R. cumberlandense*, *R. prunifolium*

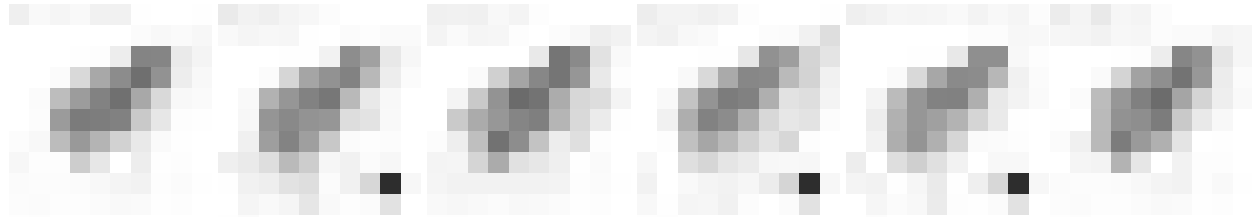
Rhododendron alabamense Rehder, Alabama Azalea. Moist slopes, bluffs, streambanks. March-April. W. GA and Panhandle FL west through AL to e. MS. *R. alabamense* is reported for Calhoun County, SC (RAB), but this record actually represents the more recently described *R. eastmanii*. [= FNA, K, L, WH, Z; = *Azalea alabamensis* (Rehder) Small – S]

Rhododendron arborescens (Pursh) Torrey, Sweet Azalea, Smooth Azalea. Rocky riversides, wooded stream banks, swamps, high elevation forests, shrub balds. Late May-July; July-October. Primarily Appalachian: ne. PA and se. KY south to sc. NC, w. SC, c. GA, and c. AL. [= RAB, C, F, FNA, G, K, L, Pa, W, WV, Z; = *Azalea arborescens* Pursh – S]

Rhododendron atlanticum (Ashe) Rehder, Dwarf Azalea. Pocosins, savannas, pine flatwoods, sandhill-pocosin ecotones. April-May (sporadically later, particularly in response to fire); August-October. An Atlantic Coastal Plain endemic: s. NJ and se. PA south to sc. GA. [= RAB, C, F, FNA, G, GW, K, L, Pa, Z; = *Azalea atlantica* Ashe – S]

Rhododendron austrinum (Small) Rehder, Florida Flame Azalea. Hammocks, bluffs, floodplain forests. Sc. GA and ne. FL west to s. AL and se. MS (Kron 1993); also reported for e. GA (Jones & Coile 1988). [= FNA, K, L, WH, Z; = *Azalea austrina* Small – S]

Rhododendron calendulaceum (Michaux) Torrey, Flame Azalea. Deciduous forests, particularly on mountain slopes, grassy balds. May-June; June-September. Largely Appalachian: s. PA and s. OH to c. GA and e. TN. This is a tetraploid species; various theories have been advanced about the origin of this polyploid chromosome complement. Kron (1993) argues that the evidence best fits an allopolyploid derivation of *R. calendulaceum*, involving hybridization between ancestors of *R. cumberlandense* and *R. prinophyllum*. [= RAB, C, F, FNA, G, K, L, Pa, W, WV, Z; = *Azalea calendulacea* Michaux – S]



Rhododendron canescens (Michaux) Sweet, Piedmont Azalea, Southern Pinxterbloom Azalea, Wild Azalea. Swamps, pocosins, and savannas. March-early May; September-October. Se. and sc. NC, n. TN, se. KY, s. IL, and e. OK, south to n. peninsular FL and se. TX. [= RAB, C, F, FNA, G, GW, L, W, WH, Z; > *R. canescens* var. *canescens* – K; > *R. canescens* var. *candidum* (Small) Rehder – K; > *R. canescens* var. *subglabrum* Rehder – K; > *Azalea candida* Small – S; > *Azalea canescens* Michaux – S]

Rhododendron carolinianum Rehder, Carolina Rhododendron, Punctatum. Rocky summits, heath balds, high elevation forests, moist slopes. Late April-May; September-October. A Southern Appalachian endemic: w. NC, e. TN, ne. GA, and nw. SC, from the Linville Gorge area south and west to the Great Smoky Mountains; its precise southern limit uncertain. *R. carolinianum* is phenologically separated from *R. minus*, flowering earlier than *R. minus*, despite its occurrence at higher elevations and with a more northerly distribution. Morphological distinctions between the two taxa are subtle and inconsistent, as discussed by Duncan & Pullen (1962). From a horticultural perspective, Davidian (1982) supports recognition of *R. carolinianum* and *R. minus* as distinct. Gensel (1988, and pers. comm.) did detailed studies of the complex and supported the recognition of 3 taxa (*R. carolinianum*, *R. minus*, and *R. chapmanii*). [= D, K, S; < *R. minus* – RAB, W; < *R. minus* var. *minus* – FNA, L, Q, V]

Rhododendron catawbiense Michaux, Pink Laurel, Catawba Rhododendron, Mountain Rosebay. Rocky summits, shrub balds, acid ridges and slopes (mostly at high elevations), north-facing bluffs in the Piedmont. April (in the Piedmont and Coastal Plain)-June; July-October. A Southern Appalachian endemic: VA and KY south to GA and AL, with scattered disjunct populations in the Piedmont and extreme upper Coastal Plain. The disjunct populations in central NC are discussed by Coker (1919), who named them forma *insularis* on the basis of "the larger and broader leaves and ... the longer flowers." *R. catawbiense* is apparently most closely related to *R. macrophyllum* D. Don ex G. Don of nw. North America (Milne 2004). [= RAB, C, F, FNA, G, K, L, S, W, WV, X]

Rhododendron chapmanii (Alph. Wood) A. Gray, Chapman's Rhododendron. Flatwoods. Endemic to Panhandle FL, with an isolated disjunction in ne. FL (Clay County). [= D, K, S; = *R. minus* Michaux var. *chapmanii* (Alph. Wood) Gandhi & Zarucchi = FNA, L, V, WH; = *R. minus* var. *champanii* – Q, orthographic error]

Rhododendron colemanii R. Miller, Red Hills Azalea. Moist hammocks, moist bluffs, along streams. Early-mid May. Described in 2008 (Zhou et al. 2008). Tetraploid. {not yet keyed}

Rhododendron cumberlandense E.L. Braun, Cumberland Azalea. Balds and exposed or moist slopes. June-July; July-October. A Southern Appalachian endemic, primarily west of the Blue Ridge: e. KY and w. VA south to ec. TN, n. GA, and ne. AL; apparently disjunct in the Piedmont of SC (Kron 1993). Diploid. [= F, FNA, G, K, L, W, Z; = *R. bakeri* (Lemmon & McKay) Hume – C, misapplied]



Rhododendron eastmanii Kron & Creel, May White Azalea, Eastman's Azalea. Rich slopes. Early-mid May. This species is endemic to the Piedmont of South Carolina, and locally fairly common in the Broad River drainage (Horn 2005). It should be sought in NC and GA, approaching within 4 miles of the NC border in Cherokee County, SC (M. Creel, pers. comm., 2007). Previous reports of *R. alabamense* in SC (RAB) are based on this species. [= FNA; = *Rhododendron alabamense* Rehder – RAB, misapplied]

Rhododendron flammeum (Michaux) Sargent, Oconee Azalea. Sandhills, upland forests on slopes, ridges, stream bluffs. April. W. SC west to w. GA. [= FNA, K, L, Z; = *Azalea speciosa* Willdenow – S; = *Rhododendron speciosum* (Willdenow) Sweet]

Rhododendron maximum Linnaeus, Great Laurel, White Rosebay, Great Rhododendron. Moist slopes, wet flats, bogs, swamps, north-facing bluffs in the Piedmont. Apparently most closely related to *R. ponticum* Linnaeus of Turkey and vicinity (Milne 2004). June-August; September-October. Largely Appalachian: ME, NY, and OH south to GA and AL, primarily in the mountains. [= RAB, C, F, G, K, L, Pa, S, W, WV, X]

Rhododendron minus Michaux, Gorge Rhododendron, Punctatum. Rocky slopes, escarpment gorges, rocky areas in the Piedmont, sandhill bluffs in the Coastal Plain. Late April (in the Piedmont and Coastal Plain)-June (at the higher elevations along the Blue Ridge escarpment); September-October. GA and AL north to the Blue Ridge escarpment of n. GA, nw. SC, and sw. NC, and the Piedmont and inner Coastal Plain (fall-line sandhills) of sc. NC. This species ranges up to granite domes along the Blue Ridge Escarpment (such as Whiteside Mountain, Macon and Jackson counties, NC). [= D, K, S; < *R. minus* – RAB, W (also see *R. carolinianum*); < *R. minus* var. *minus* – FNA, L, Q, V]

Rhododendron periclymenoides (Michaux) Shinnery, Wild Azalea, Pinxterflower, Pinxterbloom Azalea, Election Pink. Moist to dry slopes and streambanks. Late March-May; September-October. Fairly widespread in e. United States, ranging from MA, NY, and s. OH, south to GA and AL. See Shinnery (1962) for explanation of the change from the name *R. nudiflorum*. [= C, FNA, K, L, Pa, W, Z; = *R. nudiflorum* (Linnaeus) Torrey – RAB, F, G, GW, WV; = *Azalea nudiflora* Linnaeus – S]

Rhododendron pilosum (Michaux) Craven, Minniebush. Heath balds, bogs, rocky summits, and rocky woodlands, mostly at high elevations. May-July; August-October. A Southern and Central Appalachian endemic: sc. PA, sw. PA, e. WV, w. VA, e. TN, w. NC, and ne. GA. The very prominent mucro on the leaves and the series of fascicles of glandular trichomes along the leaf midrib below readily distinguish the species in sterile condition from similar deciduous *Rhododendron*. [= U; = *Menziesia pilosa* (Michaux) Antoine Laurent de Jussieu – RAB, C, F, FNA, G, K, L, Pa, S, W, WV; = *Azalea pilosa* Michaux]

Rhododendron prinophyllum (Small) Millais, Election Pink, Early Azalea, Roseshell Azalea. Upland forests (especially under *Quercus montana* and *Quercus rubra*), xeric pine and oak woodlands. May-June; August-October. NH, NY, and ne. OH, south to w. NC, nc. KY, and s. OH; disjunct in ne. AL and c. TN; also disjunct from s. IL and s. MO south to AR and e. OK. The only known location in NC is on Bluff Mountain, Ashe County (on a rocky plateau over amphibolite at about 1300m elevation); Kron (1993) also cites a collection from Transylvania County. See Shinnery (1962) for explanation of the change from the name *R. roseum*. [= C, FNA, K, L, Pa, W, Z; = *R. roseum* (Loiseleur) Rehder – RAB, F, G, WV; = *Azalea prinophylla* Small – S]



Rhododendron prunifolium (Small) Millais, Plumleaf Azalea. Mesic ravine forests and streambanks. Endemic to a small area along the AL-GA border, in se. AL (Kron 1993) and sw. and wc. GA (Jones & Coile 1988). [= FNA, K, L, Z; = *Azalea prunifolia* Small – S]

Rhododendron vaseyi A. Gray, Pinkshell Azalea. Moist slopes, bogs, high elevation rocky summits, cliffs, high elevation heath balds. May-June; August-October. Endemic to the mountains of NC, though approaching very close to SC and GA in the vicinity of Cashiers and Highlands, NC and reported for Rabun Bald (Rabun Co. GA) without definite documentation; *R. vaseyi* occurs primarily southwest of the Asheville Basin, but is found at scattered locations farther north and is locally abundant on Grandfather Mountain (at the junction of Avery, Watauga, and Caldwell counties, NC), its northernmost outpost. When not in flower, *R. vaseyi* is readily distinguished from our other azaleas by its distinctive foliage (see key). [= RAB, F, FNA, K, L, W, Y; = *Biltia vaseyi* (A. Gray) Small – S]

Rhododendron viscosum (Linnaeus) Torrey var. ***serrulatum*** (Small) H.E. Ahles, Swamp Azalea, Clammy Azalea. Bogs, pocosins, wet pine savannas. Late May-June; July-October. Se. VA south to c. peninsular FL, west to LA. [= RAB; = *R. serrulatum* (Small) Millais – C, F, G; < *R. viscosum* – FNA, GW, K, L, W, WH, WV, Z; = *Azalea serrulata* Small – S]

Rhododendron viscosum (Linnaeus) Torrey var. ***viscosum***, Swamp Azalea, Clammy Azalea. Moist streambanks, shrub balds, and other moist habitats. June-July; July-October. ME and OH south to FL, west to LA and TX. [= RAB; < *R. viscosum* – FNA, GW, K, L, Pa, W, WH, WV; = *R. viscosum* – C, F, G; = *Azalea viscosa* Linnaeus – S]

10. *Elliottia* Muhlenberg ex Elliott 1817 (Elliottia, Southern-plume)

A genus of 4 species (as here circumscribed), shrubs to small trees, of se. North America, nw. North America, and Japan. As discussed by Wood (1961), the generic limits of *Elliottia* have been controversial. The closest relatives of *E. racemosa* are *E. paniculata* (Siebold & Zuccarini) Benth & Hooker and *E. bracteata* (Maximowicz) Benth & Hooker, both of Japan, and *E. pyroliflorus* (Bong.) S.W. Brim & P.F. Stevens [*Cladothamnus pyroliflorus* Bong.], of AK, British Columbia, WA, and OR; these have sometimes been placed in other genera. References: Tucker in FNA (2009); Stevens et al. in Kubitzki (2004).

Elliottia racemosa Muhlenberg ex Elliott, Elliottia, Southern-plume, Georgia-plume. Xeric sandy ridges, sandhills, river bluffs; serpentine woodlands. June-August. Endemic to e. GA and s. SC (Aiken County, where considered to have been extirpated). *Elliottia* extends barely into the Piedmont in Georgia, occurring on Burks Mountain on serpentine in a *Pinus palustris* woodland. [= FNA, K, L, S]

11. *Epigaea* Linnaeus 1753 (Trailing Arbutus)

A genus of 3 species, subshrubs, in e. North America and Eurasia; the other 2 species of the genus occur in the Caucasus and Asia Minor, and in Japan. References: Judd & Kron in FNA (2009); Stevens et al. in Kubitzki (2004).

Epigaea repens Linnaeus, Trailing Arbutus, Mayflower, Ground Laurel. In a wide variety of acidic forests, xeric to mesic, sandy, rocky, and loamy. Late February-early May; April-June. NL (Newfoundland) and QC west to MB, south to FL Panhandle, MS, and IA. At maturity, the fruits split along the sutures, exposing tiny brown seeds embedded in "sticky, white, placental tissue" which is "distinctly sweet to the taste;" ants are strongly attracted to the placental tissue, and in carrying it away disperse the seeds (Clay 1983). [= RAB, C, FNA, G, K, L, Pa, S, W, WH, WV; > *E. repens* var. *glabrifolia* Fernald – F; > *E. repens* var. *repens* – F]



12. *Kalmia* Linnaeus 1753 (Wicky, Sheepkill, Mountain Laurel, Ivy, Sand-myrtle)

A genus of 9-11 species, shrubs, of North America and Cuba, except the circumboreal *K. procumbens* (formerly *Loiseleuria*). *Leiophyllum*, traditionally treated as a monotypic or small genus of se. United States, is better treated as a part of *Kalmia* along with the northern *Loiseleuria*, based on molecular and morphological studies (Kron & King 1996, Kron et al. 2002). While this idea may initially seem outlandish (particularly to those whose concept of *Kalmia* is based only on *Kalmia latifolia*), the morphological and habitual similarities of *Leiophyllum* to *Kalmia* are striking. The foliage and wood of all species (and the smoke from burning them) are poisonous. References: Liu, Denford, Ebinger, Packer, & Tucker in FNA (2009); Southall & Hardin (1974)=Z; Ebinger (1974)=Y; Strand & Wyatt (1991)=Q; Wilbur & Racine (1971)=T; Camp (1938)=P; Kron & King (1996); Kron et al. (2002)=V; Haines (2010)=U; Stevens et al. in Kubitzki (2004).

- 1 Petals separate; fruit 2-3 (-7)-locular *K. buxifolia*
- 1 Petals fused; fruit 5-locular.
- 2 Leaves whorled or opposite; inflorescence **either** an axillary raceme **or** a terminal corymbiform raceme.
- 3 Leaves opposite, 1-4 cm long, subsessile; inflorescence a terminal corymbiform raceme *K. polifolia*

- 3 Leaves whorled in 3s (rarely opposite), 2-5 cm long, the petioles 4-12 mm long; inflorescence an axillary raceme.
- 4 Calyx lobes glandular-canescens and with marginal stipitate glands; leaves glabrous beneath; bracts and bracteoles densely glandular; stomates 18 μ long and 13 μ wide, 15-24 per 0.2 square millimeter; shrub to 1 (-1.2) m tall; [of ne. NC northward] *K. angustifolia*
- 4 Calyx lobes canescens but lacking glands; leaves short puberulent beneath; bracts and bracteoles nearly glandless; stomates 13 μ long and 9 μ wide, 35-51 per 0.2 square millimeter; shrub to 2 m tall (though often much shorter when growing in burned situations); [of se. and sw. VA southward] *K. carolina*
- 2 Leaves alternate; inflorescence an axillary fascicle or a terminal panicle.
 - 5 Leaves 0.5-1.5 cm long, 2-8 mm wide; twigs densely persistently hispid; [of the Coastal Plain of s. SC southward] *K. hirsuta*
 - 5 Leaves 2.5-12 cm long, 7-50 mm wide; twigs glabrous or puberulent (glabrescent in age); [collectively widespread in our area].
 - 6 Leaves deciduous, dull, and subcoriaceous, 1.5-3 cm wide; inflorescence a fascicle of 1-3 flowers, axillary to leaf scars near the tips of the previous year's growth; petiole 1-4 mm long; [of the Coastal Plain of NC and SC] *K. cuneata*
 - 6 Leaves evergreen, glossy, and coriaceous, (1) 3-5 cm wide; inflorescence a terminal panicle; petiole 7-45 mm long; [widespread]..... *K. latifolia*

Kalmia angustifolia Linnaeus, Northern Sheepkill. Sandy, xeric to mesic hillsides and moist areas, rocky areas. April-June; September-October. NL (Labrador) west to MN, south to se. VA and extreme ne. NC, WV, s. ON, and MI, reaching its southern limit in the Coastal Plain of extreme ne. NC (Sorrie & LeBlond 2008). See *Kalmia carolina* for discussion of the taxonomy of these two taxa. [= K, S, Pa, Z; = *K. angustifolia* var. *angustifolia* - C, F, FNA, G, L, Y; = *K. angustifolia* ssp. *angustifolia* - U]

Kalmia buxifolia (P.J. Bergius) Gift, Kron, & Stevens, Sand-myrtle. Locally abundant but very restricted in wet (spodosol) pinelands of the outer Coastal Plain (in Brunswick and Carteret counties, NC), locally common in relatively dry sandhills in a few locations in the Sandhills, disjunct in the Piedmont on a few quartzite monadnocks, fairly common in the mountains on rock outcrops at high to moderate elevations (on a wide variety of rock types). Late March-June (sporadically to October); September-October. The species is curiously distributed, both in its overall range and within NC. *Kalmia buxifolia* is found in the Pine Barrens of NJ, the outer Coastal Plain of se. NC, the inner Coastal Plain (fall-line sandhills) of sc. NC and nc. SC, monadnocks of the upper Piedmont of NC, mountain peaks of NC and immediately adjacent nw. SC, ne. GA, and e. TN, and isolated in extreme e. PA (Monroe County) and in se. KY (on sandstone in Whitley County, in the Cumberland Plateau). Populations in the high mountains consist of very old, prostrate krummholz, the stems to 6 cm in diameter at the base, the branches spreading to cover at least a square meter. The disjunct distribution, various habitats, and subtle morphological variation between populations has led to periodic attempts to divide the species into two or more varieties or species, but the variability apparently cannot be successfully described taxonomically; it is here treated as a single species. See X, Y, and Q for detailed discussion of the various taxa recognized by various authors (within the genus *Leiophyllum*). Strand & Wyatt (1991) found a population from Hanging Rock, Stokes County, NC to be the most distinctive, but did not choose to give it formal taxonomic status. [= FNA, Pa, V; = *Leiophyllum buxifolium* (P.J. Bergius) Elliott - C, K, L, Q, T, W; > *Leiophyllum buxifolium* var. *buxifolium* - RAB; > *Leiophyllum buxifolium* var. *prostratum* (Loudon) Gray - RAB; > *Leiophyllum buxifolium* var. *hugeri* (Small) Schneider - F, G, P; > *Leiophyllum lyonii* Sweet - S, P; > *Leiophyllum hugeri* (Small) K. Schumann - S; = *Dendrium buxifolium* (Bergius) Desvaux]

Kalmia carolina Small, Southern Sheepkill, Carolina Wicky, Carolina Bog Myrtle. Moist to wet pinelands of the Coastal Plain, pocosin margins (or seemingly in pocosins or swamps because of fire suppression), mountain bogs and fens (and less commonly in rocky areas at high elevations) in the Mountains. April-May (sporadically to September, especially in response to fire); September-October. This species, a close relative of the more widespread and northern *K. angustifolia*, occurs in two disjunct areas: the Coastal Plain, from se. VA south through NC to wc. GA (Taylor County), and the Southern Appalachians from sw. VA south through w. NC and ne. TN to ne. GA. Southall & Hardin (1974) favored species status for *K. carolina* because of its essentially allopatric distribution relative to *K. angustifolia* (the 2 meet in Southampton County, VA), the near absence of intermediates or hybrids in nature, and because "significant morphological and anatomical differences have developed and remain constant between these two species when grown together." [= GW, K, S, W, Z; = *K. angustifolia* Linnaeus var. *caroliniana* (Small) Fernald - RAB (an orthographic error); = *K. angustifolia* var. *carolina* (Small) Fernald - C, F, FNA, G, L, Y; = *K. angustifolia* ssp. *carolina* (Small) A. Haines - U]

Kalmia cuneata Michaux, White Wicky. Pocosins and pocosin-savanna or pocosin-sandhill ecotones. Late May-June; September-October. This species is a narrow endemic of the Coastal Plain of se. NC and e. SC. It is not closely related to other species in the genus. It is most easily distinguished from other pocosin shrubs by the combination of the following characters: leaves deciduous, alternate, oblanceolate (cuneate-attenuate at base, obtuse at apex), revolute, dark green above, paler and prominently stipitate-glandular beneath, woody capsule rounded, stipitate-glandular, persistent through the winter, borne on delicate, recurved pedicels usually 2-3 cm long. [= RAB, FNA, GW, K, L, S, Y, Z]

Kalmia hirsuta Walter, Hairy Wicky. Pine savannas and pine flatwoods. June-July; September-October. Se. SC (Beaufort, Jasper, Hampton, and Colleton counties) south to nc. peninsular FL, west to s. AL. The closest relatives of *K. hirsuta* are 3 Cuban species: *K. aggregata* (Small) Copeland, *K. ericoides* Wright ex Grisebach, and *K. simulata* (Britton & Wilson) Southall. [= RAB, FNA, GW, K, L, WH, Y, Z; = *Kalmiella hirsuta* (Walter) Small - S]



Kalmia latifolia Linnaeus, Mountain Laurel, Ivy, Calico-bush. Acidic forests, bluffs, bogs, along sandhill steams, and in a wide range of other habitats, nearly ubiquitous in the mountains, up to at least 1600m, more restricted in habitat in the lower Piedmont and Coastal Plain. April-July; September-October. ME, OH, and IN south to Panhandle FL and extreme e. LA. Unlike our other species, which are strictly shrubs, *K. latifolia* reaches the stature and diameter of a small tree. [= RAB, C, FNA, K, L, Pa, S, W, WH, WV, Y, Z; > *K. latifolia* var. *laevipes* Fernald – F, G; > *K. latifolia* var. *latifolia* – F, G]

Kalmia polifolia Wengenheim, Swamp Laurel, Bog Laurel. Bogs. NL (Labrador) and NT south to n. NJ, ne. PA, MI, WI, MN, and MT; disjunct in Tucker County, WV (where discovered by T.F. Wieboldt in 2007). [= C, F, FNA, G, K, Pa, Y, Z]

13. *Corema* D. Don 1826

A genus of 2 species, shrubs, one of ne. North America and one of Spain and the Azores. References: Elisens in FNA (2009); Stevens et al. in Kubitzki (2004).

Corema conradii (Torrey) Torrey ex Loudon, Broom-crowberry. Dunes. April-May. NS, QC, NB, and PE south to ME, MA, NY, and s. NJ. [= C, F, FNA, G, K]

14. *Ceratiola* Michaux 1803 (Florida Rosemary)

A monotypic genus, a shrub, of se. North America. *Ceratiola* has been traditionally placed in the Empetraceae. Many workers have expressed doubt about the naturalness of the Empetraceae and its distinction from the Ericaceae. Molecular data have corroborated that concern, and shown *Ceratiola* and the rest of the Empetraceae to be better included in a broader Ericaceae (Kron & Chase 1993); the affinities of *Ceratiola* may actually be with other southeastern United States genera, *Kalmia*, *Elliottia*, and *Bejaria* (Kron & Chase 1993). References: Kron & Chase (1993); Judd & Kron (1993); Johnson (1982); Stevens et al. in Kubitzki (2004).

Ceratiola ericoides Michaux, Rosemary, Florida Rosemary, Sandhill Rosemary, Sand Heath. Xeric sandhills, usually in white "sugar sand.". October-November. Ne. SC south to s. FL and west to s. MS. Its content of aromatic compounds makes it very flammable. [= RAB, K, L, S, WH]

15. *Calluna* R.A. Salisbury 1802 (Heather)

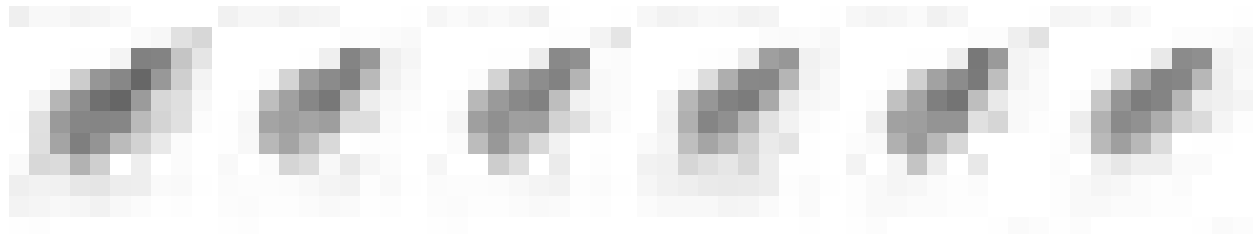
A monotypic genus, a shrub, of Europe. References: Tucker in FNA (2009); Stevens et al. in Kubitzki (2004).

* ***Calluna vulgaris*** (Linnaeus) Hull, Heather, Ling, Scotch Heather. Roadbanks, railroad grades; native of Europe. July-August. Also known to be naturalized in Tucker County, WV (Luteyn et al. 1996). [= C, F, FNA, G, K, L, WV]

16. *Erica* Linnaeus 1753 (Heath)

A genus of 735-860 species, shrubs and trees, of Africa and Eurasia (mostly s. Africa). References: Tucker in FNA (2009); Stevens et al. in Kubitzki (2004).

* ***Erica tetralix*** Linnaeus, Cross-leaved Heath. Sandy thickets; native of Europe. July-August; September-October. [= RAB, C, F, FNA, G, K, L, WV]



17. *Oxydendrum* A.P. de Candolle 1839 (Sourwood)

A monotypic genus, a tree, of se. North America. The genus *Oxydendrum* is "isolated ... among the Ericaceae, apparently with no close relatives" (Wood 1961): the only member of tribe Oxydendreae (Judd in FNA 2009). References: Judd in FNA (2009); Stevens et al. in Kubitzki (2004).

Oxydendrum arboreum (Linnaeus) A.P. de Candolle, Sourwood, Sorrel-tree. Mesic to xeric deciduous forests, especially dry-mesic to xeric oak-hickory and oak-pine forests, and also often in sandhill/pocosin ecotones. June-July; September-October. Se. and sw. PA west to IL, south to n. FL and se. and c. LA. It is an especially characteristic understory tree of upland forests of

the Piedmont and lower Mountains. The bark is dark grayish-brown and fairly deeply furrowed; the tree often has a characteristic lean (toward a former canopy light-gap). The finely serrate, elliptic leaves are distinctive, with the sour taste of garden sorrel (*Rumex acetosa*), sheep sorrel (*Rumex acetosella*), or wood sorrel (*Oxalis*). [= RAB, C, F, FNA, G, K, L, Pa, S, W, WH, WV]

18. *Pieris* D. Don 1834 (Evergreen Fetterbush)

A genus of 7 species, shrubs, of e. Asia, e. North America, and Cuba. Judd (1982a) treats *Pieris* as a genus of 7 species, 4 in e. Asia, 1 in the Southern Appalachian Mountains, 1 in the se. United States Coastal Plain, and 1 in w. Cuba. References: Judd (1982a)=Z; Judd in FNA (2009); Judd (1979); Stevens et al. in Kubitzki (2004).

- 1 Inflorescence a many-flowered panicle of racemes, borne terminally; seeds 2.5-3 mm long; [of slopes and ridges of the Mountains and upper Piedmont]; [subgenus *Pieris*, section *Pieris*] *P. floribunda*
 1 Inflorescence a 3-9 flowered raceme, borne in the axils of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with *Taxodium ascendens*]; [subgenus *Pieris*, section *Phillyreoides*] *P. phillyreifolia*

Pieris floribunda (Pursh) Bentham & Hooker f., Mountain Andromeda, Evergreen Mountain Fetterbush. Acid wooded slopes, heath balds at high elevations, summits of Piedmont monadnocks, sometimes escaped from cultivation. May-June; August-October. A Southern Appalachian endemic: e. WV, w. VA, w. NC, e. TN, and n. GA. The type locality is supposedly in n. GA. The range in NC is peculiar, the species occurring at high elevations southwest of Asheville, absent from apparently suitable habitats to the northeast (such as the Craggies, Blacks, Roan Mountain, and Grandfather Mountain), yet reappearing in a few disjunct populations at low elevations in the upper Piedmont. In w. VA (and adjacent e. WV), *P. floribunda* occurs on rather dry sandstone ridges and upper slopes, often under an oak canopy, especially in the front ranges of the Cumberland Mountains. *P. floribunda* is placed in subgenus *Pieris*, section *Pieris*, along with *P. japonica* (see below) and another Asian species. [= RAB, C, F, FNA, G, K, L, S, W, WV, Z]

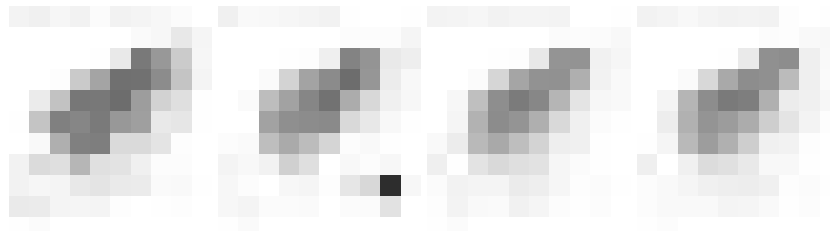
* *Pieris japonica* (Thunberg) D. Don ex G. Don, Japanese Andromeda or Lily-of-the-valley Bush, rather closely related to our *P. floribunda*, is frequently grown as an ornamental. [= FNA, Z] {not keyed}

Pieris phillyreifolia (Hooker) A.P. de Candolle, Vine-wicky, Climbing Fetterbush. Swamp forests. E. SC south to c. peninsular FL west to s. AL. This southeastern species has the remarkable habit of often growing as a creeping vine under the bark of *Taxodium ascendens*, the branches exerted through the cypress bark, sometimes ascending into the upper canopy with the main stem never visible except at the very base of the tree; it also sometimes grows as a low shrub. Godfrey (1969) documents the occurrence of this species in our area. See GW and Godfrey (1989) for excellent descriptions and illustrations of this curious "shrub-vine." It is apparently most closely related to the other two members of subgenus *Pieris*, section *Phillyreoides*, *P. cubensis* (Grisebach) Small, endemic to w. Cuba, and *P. swinhoei* Hemsley, of se. China, neither of which shares its unusual habit. [= FNA, GW, K, L, WH, Z; = *Ampelothamnus phillyreifolius* (Hooker) Small – S]

19. *Agarista* D. Don ex G. Don 1834 (Agarista)

A genus of about 30 species, shrubs, primarily of tropical America, but also in Africa, Madagascar, and se. North America. Judd (1979, 1984) discusses the reasons for separating *Agarista* from *Leucothoe*; *Agarista* is more closely related to *Pieris* than *Leucothoe* (Judd & Kron 1996). References: Judd (1984, 1979)=Z; Judd in FNA (2009); Stevens et al. in Kubitzki (2004).

Agarista populifolia (Lamarck) Judd, Agarista, Pipe-plant. Blackwater swamps, hydric hammocks, marly spring runs. April-May; September-October. E. SC (or se. NC?) south to ne. and c. peninsular FL. Reported for several locations in s. AL, likely escaped (Diamond & Woods 2009). A specimen at the University of North Carolina at Chapel Hill is labeled as coming from a nursery, originally taken from plants in a swamp in Columbus County, NC. The record is plausible and would add the species to the state's flora. [= FNA, K, L, WH, Z; = *Leucothoe populifolia* (Lamarck) Dippel – RAB, GW; = *Leucothoe acuminata* (Aiton) G. Don – S; = *Andromeda populifolia* Lamarck]



20. *Lyonia* Nuttall 1818 (Staggerbush, Maleberry, Fetterbush)

A genus of about 35 species, shrubs and small trees, of e. and se. Asia, e. North America, Mexico, and the West Indies. References: Judd (1981)=Z; Judd in FNA (2009); Stevens et al. in Kubitzki (2004).

- 1 Lower leaf surfaces stipitate-peltate with rusty scales; [of s. SC southward].
 - 2 Ultimate branches not rigidly ascending, flowers nearly always restricted to branches of the previous year, the leaves not conspicuously reduced toward the branch tips; leaves with distal margin usually revolute, sometimes strongly so; major veins usually depressed; lower leaf surface with some scales often large and with irregular margins, others smaller and more nearly entire, at least the smaller scales more-or-less persistent; [shrub or small tree to 6 (-12) m tall].....*L. ferruginea*
 - 2 Ultimate branches rigidly ascending, flowers frequent on branches of the current year (though also on older growth), the leaves conspicuously reduced toward the branch tips; leaves with distal margin at most slightly revolute; major veins not depressed; lower leaf surface with scales usually all large and with irregular margins, the scales often deciduous; [shrub to 1.5 (-3) m tall]..... *L. fruticosa*
- 1 Lower leaf surfaces glabrous or pubescent; [collectively widespread].
 - 3 Leaves evergreen (some leaves present on wood of the previous year), coriaceous, and shining*L. lucida*
 - 3 Leaves deciduous (no leaves present on wood of the previous year), subcoriaceous, and dull.
 - 4 Young twigs angled; leaf margin entire; corolla 7-14 mm long; inflorescence umbellate-racemose, in fascicles along previous year's (leafless) growth; capsule 4-6 mm long; leaf surfaces with tiny, red, short-stalked capitate glands (also often with spreading, translucent hairs on the main veins)*L. mariana*
 - 4 Young twigs terete; leaf margin minutely serrulate; corolla 3-5 mm long; inflorescence a terminal panicle; capsule 2.5-3 mm long; leaf surfaces with appressed, strigillose hairs, pale with a red base.
 - 5 Inflorescences (at least the lower) with conspicuous bracts; [of the Coastal Plain and lower Piedmont].....*L. ligustrina* var. *foliosiflora*
 - 5 Inflorescences naked, or with only a few leafy bracts; [of the Mountains, Piedmont, and (less commonly) Coastal Plain]*L. ligustrina* var. *ligustrina*

Lyonia ferruginea (Walter) Nuttall, Crookedwood, Dragonwood, Staggerbush. Dry oak and pine woodlands, scrub, rarely pocosins, spodosolic flatwoods. February-May; April-October. Se. SC south to sc. peninsular FL, west to Panhandle FL. See discussion under *L. fruticosa*. [= FNA, GW, K, L, WH, Z; < *Lyonia ferruginea* – RAB (also see *L. fruticosa*); = *Xolisma ferruginea* (Walter) Heller – S]

Lyonia fruticosa (Michaux) G.S. Torrey, Staggerbush, Poor-grub. Pocosins. March-July; May-October. Se. SC (at least formerly) south to s. peninsular FL, west to e. Panhandle FL. Though not included in RAB for our area, Judd (1981) cites several old specimens from SC. The species is definitely known from immediately adjacent GA, and there seems no reason to doubt its (at least historical) occurrence in SC. This species is difficult to distinguish from *L. ferruginea*, with which it often co-occurs. [= FNA, GW, K, L, WH, Z; < *L. ferruginea* – RAB; = *Xolisma fruticosa* (Michaux) Nash – S]

Lyonia ligustrina (Linnaeus) A.P. de Candolle var. *foliosiflora* (Michaux) Fernald, Southern Maleberry, He-huckleberry. Pocosins, seepage bogs, and other wet habitats. Late April-June; September-October. Se. VA south to c. FL, west to e. TX and e. OK, and (west of the mountains) north to TN and AR. Rather nondescript when sterile, the gray-green hue of the leaves is a useful character. Var. *foliosiflora* is the usual variety on the Coastal Plain (including the fall-line sandhills). [= FNA, GW, K, L, W, Z; < *L. ligustrina* – RAB, C, G; > *L. ligustrina* var. *capreaefolia* (Watson) A.P. de Candolle – F; > *L. ligustrina* var. *foliosiflora* – F; > *L. ligustrina* var. *salicifolia* (Watson) A.P. de Candolle – F; = *Arsenococcus frondosus* (Pursh) Small – S; = *Xolisma foliosiflora* (Michaux) Small]

Lyonia ligustrina (Linnaeus) A.P. de Candolle var. *ligustrina*, Northern Maleberry, He-huckleberry. Mountain bogs, shrub balds, bottomlands, other moist to wet habitats, "dry" ridges at high elevations. May-July; September-October. S. ME, s. NH, s. VT, s. and e. NY, s. OH, WV, and KY south to w. and c. SC, n. GA, and ne. AL, primarily in the mountains and adjacent provinces. Var. *ligustrina* is the usual variety in the Mountains and Piedmont, but extends as well into the Coastal Plain in NC and SC. This variety is very variable in leaf shape and size, some populations having leaves about 3 cm long and 1.3 cm wide, others with leaves to as large as 8 cm long and 5 cm wide. The plants with smaller leaves occur in bogs and other distinctly wet habitats, while plants with large leaves occur in thin soils in high elevation heath balds and thin soils around rock outcrops (as, for instance, on Grandfather Mountain, NC). [= F, FNA, GW, K, L, W, Z; < *L. ligustrina* – RAB, C, G, Pa, WV; = *Arsenococcus ligustrinus* (Linnaeus) Small – S; = *Xolisma ligustrina* (Linnaeus) Britton]

Lyonia lucida (Lamarck) K. Koch, Shining Fetterbush. Pocosins, wet woodlands, blackwater swamp forests, other acidic wetlands, especially if peaty. April-early June; September-October. Se. VA south to s. FL and west to e. and c. LA; also in w. Cuba. Readily distinguished by the glossy, coriaceous leaves with a prominent vein running along the margins. When in flower in large numbers, the odor is cloyingly sweet. [= RAB, C, F, FNA, G, GW, K, L, WH, Z; = *Desmothamnus lucidus* (Lamarck) Small – S; = *Neopieris nitida* (Bartram ex Marshall) Britton]

Lyonia mariana (Linnaeus) D. Don, Staggerbush. Pine flatwoods, savannas, pocosin-sandhill ecotones, dry rocky woodlands in the lower Piedmont (especially with chestnut oak). April-May; September-October. RI (formerly) and NY (Long Island) south to c. peninsular and e. Panhandle FL; disjunct west of the Mississippi River in sc. MO, c. AR, nw. LA, se. OK, and e. TX. Readily distinguished by the broadly elliptic leaves borne at an ascending 45 degree angle, with bright pink axillary buds. [= RAB, C, F, FNA, G, GW, K, L, Pa, WH, Z; = *Neopieris mariana* (Linnaeus) Britton – S]

21. *Andromeda* Linnaeus 1753 (Bog-rosemary, Andromeda)

A genus of 1-2 species, shrubs, north temperate. References: Fabijan in FNA (2009); Stevens et al. in Kubitzki (2004).

Andromeda polifolia Linnaeus var. *latifolia* Aiton, Bog-rosemary. Bogs. May-July; June-September. Circumboreal, in North America from NL (Newfoundland) and NL (Labrador) west to SK, south to NJ, ne. PA (Rhoads & Klein 1993), e. WV (at Cranberry Glades, Pocahontas County), IN, IL, and MN. Var. *polifolia* is also circumboreal, overall more northern. [= FNA; = *A. glaucophylla* Link – C, F, G, L; = *A. polifolia* var. *glaucophylla* (Link) A.P. de Candolle – K, Pa; = *A. polifolia* ssp. *glaucophylla* (Link) Hultén]

22. *Zenobia* D. Don 1834 (Zenobia, Honey-cups)

A monotypic genus, a shrub, of se. North America (endemic to the flora area). References: Dorr in FNA (2009); Stevens et al. in Kubitzki (2004).

Zenobia pulverulenta (Bartram ex Willdenow) Pollard, Zenobia, Honey-cups. Pocosins, margins of pineland ponds. April-June; September-October. This monotypic genus is a narrow endemic of the Coastal Plain of se. VA, NC, SC, and e. GA (Bryan Co.). It was considered by Wood (1961) to have "no close relatives," but molecular phylogeny suggests that it is sister to *Andromeda*. The crenate leaves help distinguish *Zenobia* from other pocosin shrubs. The flowers are extremely fragrant. The species is remarkably variable in leaf glaucescence. Many plants in the fall-line sandhills and upper Coastal Plain have the lower leaf surface, pedicels, and capsules covered in wax to the point that they are bright white; outer Coastal Plain plants generally lack any glaucescence. The division into two species listed below in synonymy was based largely on this character; further study appears warranted. In the centers of major peat domes in the Outer Coastal Plain and in large Carolina bays in the Bladen Lakes region, where peat depths reach 3-5 meters, occur areas of up to 25 square kilometers dominated by *Zenobia* (sometimes codominant with *Chamaedaphne* or *Sarracenia flava*). This community has been referred to as "deciduous low pocosin," to distinguish it from the dominance of evergreen shrubs found in most pocosins. [= RAB, C, F, FNA, G, GW, K, L; > *Z. pulverulenta* – S; > *Z. cassinefolia* (Ventenat) Pollard – S]

23. *Chamaedaphne* Moench 1794 (Leatherleaf, Cassandra)

A monotypic genus, a shrub, circumboreal in distribution. References: Fabijan in FNA (2009); Stevens et al. in Kubitzki (2004).

Chamaedaphne calyculata (Linnaeus) Moench, Leatherleaf, Cassandra. Pocosins in the Coastal Plain, bogs in the Mountains, *Chamaecyparis* bogs. (February-) March-April; June-October. Circumboreal; in North America from NL (Newfoundland) to AB, south to WV (Tucker County) (T.F. Wieboldt, pers.comm., 2007), MD, OH, n. IL, WI, n. IA, AB, and BC; disjunct to the mountains of NC (where now nearly extirpated, known only from a single bog of less than 1 hectare) and to the Coastal Plain of NC and ne. SC. The Coastal Plain occurrences in our area are mainly in the centers of large peat dome or Carolina Bay pocosins, the insufficiently famous southern blanket bogs or "southern muskeg." In these areas, *Chamaedaphne* is sometimes dominant (or codominant with *Zenobia pulverulenta* or *Sarracenia flava*) over expanses of 25 square kilometers. The southern occurrences of *Chamaedaphne* are certainly the result of Pleistocene distributions. A number of varieties have been named (the Eurasian var. *calyculata*, var. *latifolia* in Maritime Canada, south to n. New England, and var. *angustifolia*, to which our material would presumably be referred). The validity of the varieties is doubtful. [= C, FNA, G, K, L, S, W; = *Cassandra calyculata* (Linnaeus) D. Don – RAB, GW; > *Chamaedaphne calyculata* var. *angustifolia* (Aiton) Rehder – F, Pa]

24. *Leucothoe* D. Don 1834 (Fetterbush, Leucothoe)

A genus of 5-6 species, shrubs, of Japan, Himalayan Asia, and e. North America. References: Tucker in FNA (2009); Stevens et al. in Kubitzki (2004). [also see *Agarista* and *Eubotrys*]

- 1 Leaves deciduous, dull, membranaceous[see *Eubotrys*]
- 1 Leaves evergreen, glossy, coriaceous.
 - 2 Leaves with an acute or short-acuminate apex; racemes 2-4 (5) cm long; sepals ovate, with an obtuse or rounded apex; longest petioles 3-8 mm long *L. axillaris*
 - 2 Leaves with a long-acuminate apex; racemes 4-10 cm long; sepals lanceolate-ovate, with an acute (or subacute) apex; longest petioles 8-15 mm long *L. fontanesiana*

Leucothoe axillaris (Lamarck) D. Don, Coastal Doghobble. Pocosins, blackwater swamp forests, and moist and acid slopes. Late March-May; September-October. A Southeastern Coastal Plain endemic: se. VA south to FL and west to extreme e. LA. [= C, FNA, G, GW, K, L, S, WH; = *L. axillaris* var. *axillaris* – RAB; > *L. axillaris* var. *axillaris* – F; > *L. axillaris* var. *ambigena* Fernald – F]

Leucothoe fontanesiana (Steudel) Sleumer, Mountain Doghobble, Switch-ivy. Moist slopes, streambanks, ravines, often associated with *Rhododendron maximum* thickets. April-May; September-October. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. GA. [= FNA, GW, K, L, W; = *L. axillaris* var. *editorum* (Fernald & Schubert) H.E. Ahles – RAB; = *L. walteri* (Willdenow) Melvin – C, Pa; = *L. editorum* Fernald & Schubert – F, G; = *L. catesbaei* (Walter) Gray – S]



25. *Eubotrys* Nuttall 1842 (Deciduous Fetterbush)

A genus of 2 species, shrubs to small trees, of e. North America. Recent molecular evidence supports the recognition of *Eubotrys* as a genus separate from *Leucothoe*, and more closely related to *Chamaedaphne*, supporting the views, based on morphological grounds, of many earlier authors (Kron et al. 2002). References: Tucker in FNA (2009); Kron et al. (2002); Stevens et al. in Kubitzki (2004).

- 1 Anthers with 4 awns; capsule rounded on the sutures; sepals broadly lanceolate; racemes 3-5 cm long; seeds not winged, shaped like a section of an orange *E. racemosa*
 1 Anthers with 2 awns; capsule angled on the sutures; sepals ovate; racemes 5-12 cm long; seeds winged, oblanceolate, flat *E. recurva*

Eubotrys racemosa (Linnaeus) Nuttall, Coastal Fetterbush. Swamps, pocosins, streambanks, and other wet places. Late March-early June; September-October. E. MA south to c. peninsular FL and west to LA, primarily on the Coastal Plain; disjunct inland, as in c. TN (Chester, Wofford, & Kral 1997). [= C, FNA, G; = *Leucothoe racemosa* (Linnaeus) A. Gray – RAB, GW, K, L, Pa, W, WH; > *L. racemosa* var. *projecta* Fernald – F; > *L. racemosa* var. *racemosa* – F; > *Eubotrys racemosa* – S; > *Eubotrys elongata* Small – S]

Eubotrys recurva (Buckley) Britton, Mountain Fetterbush. Heath balds, high elevation ridges and granitic domes, bogs. April-early June (rarely sporadically in the fall); August-October. A Southern Appalachian endemic: sw. VA, s. WV, and se. KY south through w. NC and ne. TN to ne. GA (Rabun County) and nw. SC. [= C, FNA, G, S; = *Leucothoe recurva* (Buckley) A. Gray – RAB, F, K, L, W, WV]

26. *Gaultheria* Kalm ex Linnaeus 1754 (Wintergreen, Teaberry)

A genus of 115-135 species, shrubs and subshrubs, of Asia, Australia and New Zealand, South America, West Indies, Central America, and North America (primarily Asian). References: Trock in FNA (2009); Stevens et al. in Kubitzki (2004).

- 1 Stems creeping, the leaves 3-10 mm long, well-distributed along the stem; berries white; flowers 4-merous *G. hispidula*
 1 Stems erect, the leaves 15-50 mm long, clustered at the tip of the stem; berries red; flowers 5-merous *G. procumbens*

Gaultheria hispidula (Linnaeus) Muhlenberg ex Bigelow, Creeping Snowberry, Moxie. Spruce-fir forests, northern hardwoods forests, bogs at high elevations. May-June; September. NL (Newfoundland) and NL (Labrador) west to BC, south to NJ, MD, WV, OH, MN, ID, and WA; there is no known documentation for the attribution (by C, F, G, and S) of this species as occurring in NC. [= C, F, FNA, G, K, Pa, WV; = *Chiogenes hispidula* (Linnaeus) Torrey & A. Gray – S]

Gaultheria procumbens Linnaeus, Wintergreen, Teaberry, Checkerberry. Heath balds, woodlands, and openings, usually acidic and xeric. June-August; September-November. NL (Newfoundland) west to MB, south to e. NC, ne. GA, AL, c. TN, KY, n. IN, and MN. [= RAB, C, F, FNA, G, K, L, Pa, S, W, WV]

27. *Vaccinium* Linnaeus 1753 (Blueberry)

A genus of 140 species, shrubs, lianes, and small trees, semicosmopolitan. *Vaccinium* in our area is divided into 6 strongly differentiated sections, sometimes, as by Small, treated as separate genera. The taxonomy of *Vaccinium* remains unclear – past divergence of opinion is obvious in the synonymy. For instance, Small (1933) recognizes 6 genera and 25 species for our area, Ahles in RAB (1968) recognizes 1 genus and 14 species (one with 2 varieties) (not including VA), and Vander Kloet (1988) recognizes 1 genus and 9 species. The highbush blueberries of section *Cyanococcus* are particularly difficult. Vander Kloet's extremely broad concept of the highbush blueberries as consisting of a single species, *V. corymbosum*, including *V. fuscatum* (*V. atrococcum* – RAB), *V. simulatum* ("*V. constablaei*" – RAB), *V. virgatum* (*V. amoenum* – RAB), *V. elliotii*, *V. formosum* (*V. australe*), and *V. caesariense* (and many other named taxa not recognized here) has been adopted by some recent authors, at least partly for its ease of application. I agree with Godfrey (1988), though, that *V. elliotii* has "such distinctiveness as to be recognizable in the field at a glance." The other taxa are less easily recognizable, but seem to have substantial morphological and phylogeographic integrity. The fairly frequent presence of hybrid individuals and populations can make identification frustrating, but I agree with Ward (1974) that "the genus *Vaccinium* ... is difficult but not in any way an irresolvable tangle of intergrading populations. The vast bulk of individuals encountered in the field may be assigned, as with any non-apomict genus, to a relatively few, discrete, and wholly recognizable species". Many of the taxa included in *V. corymbosum* by Vander Kloet (1988) and Luteyn et al. (1996) occur together in combinations of two to four, are immediately recognizable in the field, bloom at

different times, and have different flower, fruit, and leaf morphology. Failure to recognize multiple entities within the highbush blueberries results in the taxonomic homogenization of the diversity of the group and obscures important phylogeographic patterns. Our area, with 20 species (24 taxa) in 6 sections, has a greater diversity of *Vaccinium* than any other comparably sized area in North America. References: Vander Kloet (1988)=Z; Uttal (1987)=Y; Camp (1945)=X; Ashe (1931)=V; Ward (1974)=Q; Luteyn et al. (1996)=L; Vander Kloet in FNA (2009); Vander Kloet & Hall (1981); Vander Kloet (1977, 1978a, 1978b, 1980, 1982, 1983a, 1983b); Uttal (1986a, 1986b); Stevens et al. in Kubitzki (2004). Key based in part on Uttal (1987).

- 1 Trailing vines, erect shoots (if present) borne on horizontal stems; leaves evergreen, glossy and dark green above, rarely exceeding 20 mm in length.
 - 2 Leaves narrowly elliptic, glabrous above, glaucous-white below; leaf margin entire and eglandular; berry red when ripe, 8-15 mm long; [**cranberries**, section *Oxycoccus*] **Key A**
 - 2 Leaves elliptic, puberulent above, pale green below; leaf margin obscurely to fairly strongly serrate and glandular; berry black when ripe, 6-8 mm long; [**creeping blueberries**, section *Herpothamnus*] **Key B**
- 1 Erect shrubs, the growth form various (single-stemmed, multi-stemmed and clump-like, or clonal with numerous erect shoots from a network of subterranean rhizomes); leaves deciduous to semi-evergreen (evergreen in *V. myrsinites*), dull to somewhat glossy and medium green above (dark green and glossy in *V. myrsinites*), generally exceeding 20 mm in length (5-30 mm long in *V. myrsinites*).
 - 3 Twigs of the season verrucose (the surface abundantly covered with small bumps, readily visible without magnification); [**blueberries**, section *Cyanococcus*] **Key C**
 - 3 Twigs of the season not verrucose.
 - 4 Corolla lobes 4, strongly recurved, 7-10 mm long; calyx lobes 4 (also visible on the berry); leaves lanceolate to ovate, the apex acuminate, the margin regularly and finely serrate with glandular teeth; [of high elevations in the Mountains]; [**mountain cranberry**, section *Oxycoccoides*] **Key D**
 - 4 Corolla lobes 5, not or only slightly recurved, 1-8 mm long; calyx lobes 5 (also visible on the berry); leaves elliptic, obovate, oblanceolate, or nearly round, the apex generally obtuse to rounded, the margin entire to obscurely and irregularly serrate; [collectively widespread in our area, but not at high elevations].
 - 5 Mature leaves green (or glaucous), glandular beneath, mostly elliptic to round, generally 1.5-4.5 cm long; corolla broad-urceolate to narrow-campanulate, the stamens included; berry black, lustrous, 5-9 mm long; [**farkleberry**, section *Batodendron*] **Key E**
 - 5 Mature leaves pale and glaucous, eglandular beneath, mostly elliptic, 3-10 cm long; corolla campanulate, the stamens long-exserted; berry green, yellow, pink, or purple, usually glaucous, 7-18 mm long; [**deerberries**, section *Polycodium*] **Key F**

Key A – cranberries, section *Oxycoccus*

- 1 Leaves elliptic, broadest near middle, (5-) 7-10 (-18) mm long, (2-) 3-4 (-5) mm wide; leaves blunt-rounded and non-involute; pedicels with 2 green, leaf-like bracts 1-2 mm wide; berry 8-15 mm in diameter *V. macrocarpon*
- 1 Leaves ovate, broadest toward base, (3-) 5-6 (-9) mm long, (1-) 2-3 (-5) mm wide; leaves involute at least along the margins, thus making the leaf tip acute; pedicels with (0-) 2 (-5) reddish, scale-like bracts < 1 mm wide; berry 6-12 mm in diameter *V. oxycoccus*

Key B – creeping blueberries, section *Herpothamnus*

- 1 Leaves (2-) 3-18 (-25) mm long, generally elliptic (less commonly ovate or obovate); angle of leaf base typically >90 degrees; margins finely glandular mucronulate-crenulate, the teeth tightly appressed and therefore often obscure, the margin superficially entire; stems mostly prostrate (ascending in areas that have been long fire-suppressed); [widespread in NC and SC, rare in se. VA and e. GA] *V. crassifolium*
- 1 Leaves (4-) 7-35 (-63) mm long, elliptic to obovate (less commonly elliptic-ovate); angle of leaf base typically <90 degrees; margins glandular mucronulate-serrulate to serrulate-crenulate, the teeth apparent, especially toward the apex; stems often ascending to upright; [of Lexington County, SC] *V. sempervirens*

Key C – blueberries, section *Cyanococcus*

Note: Hybrids and apparent local races in this section are frequent, and will key poorly. Hybrids are particularly frequent among the taxa of the highbush blueberries, somewhat less so among lowbush blueberries and between lowbush and highbush. In the Coastal Plain, *V. ×marianum* (*formosum* × *fuscatum*) is the most common, and will be responsible for most difficulties encountered in the key from lead 10 on. Uttal (1987) presents a complicated key with *V. ×marianum* (but not other hybrids) included.

- 1 Shrubs rhizomatous, forming clonal colonies, the upright stems < 1 m tall (and often < 0.5 m tall); ["lowbush blueberries"].
 - 2 Leaves evergreen, 5-15 mm long (rarely to 30 mm long on fire sprouts), subcoriaceous, glossy dark-green or dull blue-green; [restricted in our area to the Coastal Plain of se. SC southward].
 - 3 Plant glaucous and bluish-green throughout; leaf undersurface lacking scattered glandular hairs; [of s. GA south to s. peninsular FL, west to e. TX] *V. darrowii*
 - 3 Plant dark green throughout; leaf undersurface with scattered glandular hairs, these sometimes very few by late in the season (best seen in the field by folding a leaf, holding the fold up to the light, and using a 10× lens); [of se. SC southward to n. FL, west to s. AL] *V. myrsinites*
 - 2 Leaves deciduous to semi-evergreen, herbaceous, generally > 20 mm in length, dull to somewhat glossy and medium green; [collectively widespread in our area].
 - 3 Lower surfaces of the leaves with red stipitate glands (sometimes pubescent as well when young); berry usually black and lustrous; [of the Coastal Plain and lower Piedmont] *V. tenellum*
 - 3 Lower surfaces of the leaves eglandular, pubescent or glabrous; berry either blue and glaucous, or black and glandular-hirsute; [collectively widespread in our area].
 - 4 Leaves sharply serrulate (each tooth with a small glandular tip), 20-32 mm long, 6-16 mm wide, green and shiny below (rarely glaucous), glabrous or nearly so *V. angustifolium*

- 4 Leaves entire or obscurely serrulate (if obscurely serrulate then 30-50 mm long and 13-25 mm wide), either glaucous and glabrous (or nearly so) beneath, or green and densely pubescent beneath.
- 5 Leaves pale and glaucous, glabrous on both sides or pubescent on the underside only; berry blue and glaucous; [plants collectively widespread].
- 6 Plants mostly 0.5-1.0 (-1.4) m tall, stems brown for much of their length; leaves entire; fruit 7-12 mm in diameter; [of moderate to high elevations of the Mountains]..... *V. altontanum*
- 6 Plants mostly 0.2-0.6 (-1.0) m tall, stems green to the base (or brown at the very base); leaves serrulate (rarely entire); fruit 4-7 (-8) mm in diameter; [widespread, at low to moderate elevations]..... *V. pallidum*
- 5 Leaves green, pilose on both sides; berry either blue and glaucous, or black and glandular-hirsute; [of the Mountains].
- 7 Berry black and glandular-hirsute; calyx and corolla hirsute and stipitate-glandular; leaves mostly > 3 cm long; [of the mountains of sw. NC and adjacent TN and GA]..... *V. hirsutum*
- 7 Berry blue and glaucous; calyx and corolla glabrous; leaves mostly < 3.5 cm long; [of the mountains of n. NC and north]..... *V. myrtilloides*
- 1 Shrubs crown-forming, single-stemmed or several-stemmed from the base, the upright stems generally > 1 m tall (often 2-3 m tall, and rarely to 7 m); ["highbush blueberries"].
- 8 Leaves with stipitate glands on the lower surface; [of the Coastal Plain of SC and s. NC]..... *V. virgatum*
- 8 Leaves lacking stipitate glands on the lower surface (variously glabrous to pubescent with eglandular hairs); [collectively widespread].
- 9 Leaves 0.7-3.5 cm long, 0.3-1.5 cm wide, with serrulate margins; twigs slender, numerous..... *V. elliotii*
- 9 Leaves 3-10 cm long, 1.5-4.5 cm wide, with entire, ciliate, or serrulate margins; twigs stouter, fewer.
- 10 Young twigs glabrous; leaf surfaces glabrous; leaf margins eciliate or ciliate.
- 11 Leaves 4-10 cm long, 2.5-4.5 cm wide, most of them widest below the middle, eciliate; leaf bud scales reddish, 2-4 mm long, including the elongated (1.5-3 mm long), slender awnlike tips; corollas 8-12 mm long, cylindrical; berry 7-12 mm in diameter, dark blue with a glaucous bloom; [primarily of the Coastal Plain, very rarely disjunct in Coastal Plain like habitats in the Mountains or Piedmont]..... *V. formosum*
- 11 Leaves 3-8 cm long, 1.5-3 cm wide, most of them widest at or above the middle, ciliate or not; leaf bud scales flesh-colored or pink to reddish, 1-3 mm long, including the short (to 1.5 mm long) awnlike tips; corollas 4-10 mm long, cylindrical, subglobose, subcampanulate, or urceolate; berry 5-10 mm in diameter, blue with a glaucous bloom; [collectively widely distributed in our area].
- 12 Leaves 3-6 cm long, 1.5-2 cm wide, eciliate; corolla 4-6 mm long; [primarily of the Coastal Plain, very rarely disjunct in Coastal Plain like habitats in the Piedmont]..... *V. caesariense*
- 12 Leaves 3-8 cm long, 2-3 cm wide, usually ciliate-margined, at least basally; corolla 5-10 mm long; [of the Mountains and montane sites in the upper Piedmont]..... *V. corymbosum*
- 10 Young twigs puberulent, at least in lines; leaf surfaces more-or-less pubescent; leaf margins ciliate (rarely eciliate).
- 13 Puberulence of the young twigs merely in 2 lines; [of the Mountains and montane sites in the upper Piedmont].
- 14 Leaves elliptic to elliptic-obovate, broadest at or beyond the middle, the apex acute to short-acuminate; leaf margins entire to obscurely serrulate; corolla 5-10 mm long; berry blue, glaucous..... *V. corymbosum*
- 14 Leaves narrowly ovate, broadest below the middle, the apex acuminate; leaf margins distinctly serrulate; corolla 5-7 mm long; berry purple-black, not glaucous (sometimes drying so as to appear somewhat glaucous blue)..... *V. simulatum*
- 13 Puberulence of the young twigs extending around their circumference (not merely in 2 lines); [collectively widely distributed in our area].
- 15 Hairs of the twigs and leaf surfaces whitish; leaves medium to pale green, not darkening on drying; berry blue, glaucous; twigs and bud scales flesh-colored to reddish; corolla 5-10 mm long, usually not narrowed to the tip; blooming May; [of the Mountains and montane sites in the upper Piedmont]..... *V. corymbosum*
- 15 Hairs of the twigs and leaf surfaces dingy, brownish, or dark; leaves dark green, darkening on drying; berry black; twigs and bud scales brownish-green to black; corolla 5-8 mm long, often narrowed to the tip; blooming February-April; [widely distributed in our area, though most common in the Coastal Plain]..... *V. fuscatum*

Key D – mountain cranberry, section *Oxycoccoides*

One species in our area..... *V. erythrocarpum*

Key E – farkleberry, section *Batodendron*

One species in our area..... *V. arboreum*

Key F – deerberries, section *Polycodium*

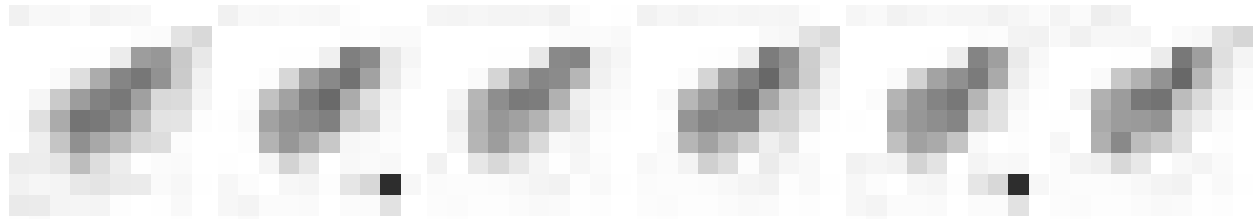
[This key and treatment provisional]

- 1 Leaves strongly white-glaucous beneath; stamens 4-6 mm long.
- 2 Bracts of the inflorescence nearly as large as normal foliage leaves; [of the Coastal Plain from se. NC southward]..... *V. stamineum* var. *caesium*
- 2 Bracts of the inflorescence much smaller than normal foliage leaves; [of the Mountains and Piedmont]..... *V. stamineum* var. *2*
- 1 Leaves green beneath (often slightly paler but not at all glaucous); stamens 5-8 mm long.
- 3 Bracts of the inflorescence nearly as large as normal foliage leaves; plants short, 0.2-0.5 (-1.0) m tall, distinctly clonal; [primarily of Coastal Plain pinelands]..... *V. stamineum* var. *1*
- 3 Bracts of the inflorescence much smaller than normal foliage leaves; plants short to taller, 0.3-5 m tall, either clonal or crown-forming; [primarily of rocky or submesic habitats of the Piedmont and Mountains].

- 4 Hypanthium and fruit pubescent *V. stamineum* var. *sericeum*
 4 Hypanthium and fruit glabrous *V. stamineum* var. *stamineum*

Vaccinium altomontanum W.W. Ashe, Blue Ridge Blueberry. Mt (GA, NC, SC, VA): grassy balds, heath balds, high elevation forests and woodlands; uncommon. May-June; July-September. The tetraploid *V. altomontanum* occurs primarily in the Mountains at moderate to high elevations (the type collection is from the Fodderstacks, Macon County, NC); it differs from the diploid *V. pallidum* in forming tighter (often circular) clones, with taller plants (to 1 m tall), the leaves thick in texture, often revolute, strictly glaucous and glabrous, and with excellent berries. [*< V. corymbosum* – RAB; = *V. alto-montanum* – G, X, orthographic variant; *< V. pallidum* – FNA, K; *> Cyanococcus subcordatus* Small – S; *> Cyanococcus liparis* Small – S, as to type]

Vaccinium angustifolium Aiton, Northern Lowbush Blueberry, Sugarberry, Low Sweet Blueberry. Mt (NC, VA, WV), Pd (DE): acidic forests and woodlands, cliffs and talus (especially sandstone and quartzite), usually at high elevations; common (uncommon in WV, rare in DE and NC). NL (Labrador) and NL (Newfoundland) west to MB, south to NJ, PA, sw. VA, IL, and MN. Recently reported for the Great Smoky Mountains National Park (J. Rock, pers. comm. 2009) and from Cheoah Bald, Graham County (E. Schwartzman, pers. comm. 2010 and NCU specimen). [= C, FNA, K, Pa, W, Y, Z; *> V. angustifolium* var. *angustifolium* – F, WV; *> V. angustifolium* var. *laevifolium* House – F, WV; *> V. angustifolium* var. *hypolasium* Fernald – F; *> V. angustifolium* var. *nigrum* (Wood) Dole – F, WV; *> V. angustifolium* – G, X; *> V. lamarkii* Camp – G, X; *> V. brittonii* Porter ex Bicknell – X]



Vaccinium arboreum Marshall, Farkleberry, Sparkleberry. Rocky or sandy woodlands, bluffs, and cliffs, usually xeric and often fire-maintained, and unlike most other *Vaccinium*, often on mafic, ultramafic, or calcareous rocks. Late April-June; September-October. This species is widely distributed in se. North America, from TX and FL north to MO, IN, KY, and VA. It can be a small tree, to 35 cm DBH and 10 m tall. The leaves are coriaceous and semi-evergreen, often being retained for much or all of the winter. Var. *glaucescens* (Greene) Sargent may be worthy of recognition; it differs from var. *arborescens* in its subglaucous to conspicuously blue-green leaves (vs. dark green leaves) and the bracts at the base of the pedicels nearly equal in size and shape to the leaves (vs. bracts distinctly smaller and often also different in shape than the leaves). [= RAB, C, FNA, G, K, L, W, WH, Y, Z; *> V. arboreum* var. *arborescens* – F; *> V. arboreum* var. *glaucescens* (Greene) Sargent – F; = *Batodendron arboreum* (Marshall) Nuttall – S]

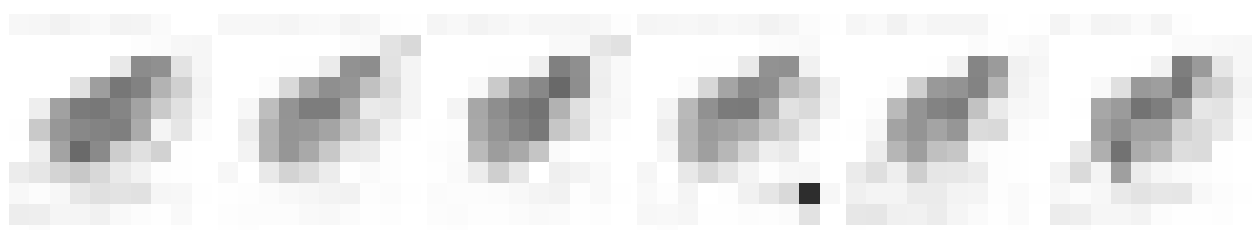
Vaccinium caesariense Mackenzie, New Jersey Highbush Blueberry. Swamps, bogs, moist ground. Late February-May; June-August. S. ME south to n. FL. This species is diploid. [= C, F, G, K, X, Y; *< V. corymbosum* – RAB, FNA, L, Pa, WH, Z]

Vaccinium corymbosum Linnaeus, Smooth Highbush Blueberry. Bogs, wet swamp forests, moist high elevation bogs, balds, and forests. May; August. NS west to MI, south to WV, OH, and IN, south in the Appalachians (and rarely on Piedmont monadnocks) to w. NC, nw. SC, n. GA, and e. TN. In our area, *V. corymbosum* (sensu stricto) appears to be limited to the Mountains, except for occurrences on Piedmont monadnocks and outlier ridges, such as Hanging Rock, Stokes County, NC, and the Brushy Mountains, NC. See the end of the genus treatment for discussion of taxonomic controversy involving this species and its allies. Note that this treatment recognizes 2 species (*V. formosum* and *V. caesariense*) included within *V. corymbosum* by RAB. *V. formosum* is the common "corymbosum" type blueberry of the Coastal Plain. *V. corymbosum* is primarily tetraploid; *V. constablaei* A. Gray (misapplied to *V. simulatum* by RAB) is correctly applied to hexaploid plants of the high elevation Blue Ridge of NC and TN, especially on heath balds and grassy balds. Camp (1945) considered *V. constablaei* to be an allopolyploid derivative of *V. simulatum* and *V. altomontanum* (itself a tetraploid apparently related to diploid *V. pallidum*, and of uncertain derivation). The appropriate taxonomic treatment of these plants is unclear; they are apparently not reliably identifiable based on morphology. [= K, X, Y; *< V. corymbosum* – RAB, FNA, G, L, Pa, W, Z; *> V. corymbosum* var. *corymbosum* – F, WV; *> V. corymbosum* var. *albiflorum* (Hooker) Fernald – F; *> V. corymbosum* var. *glabrum* Gray – F, WV; *< V. corymbosum* – C (also see *V. fuscatum* and *V. simulatum*); *< V. constablaei* A. Gray – G, X; = *Cyanococcus corymbosus* (Linnaeus) Rydberg – S]

Vaccinium crassifolium Andrews, Creeping Blueberry. Savannas, pine flatwoods, pocosin-sandhill ecotones, upland sandhills over clay pans. April-May; June-July. This species is nearly endemic to the Carolinas, barely extending into immediately adjacent VA and GA. See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for discussion of the systematics and ecology of this species and the closely related *V. sempervirens*. [= RAB, C, F, G, GW, Y; = *V. crassifolium* ssp. *crassifolium* – K; *< Herpothamnus crassifolius* (Andrews) Small – S; *< V. crassifolium* – FNA, L, Z]

Vaccinium darrowii Camp, Darrow's Blueberry. Pine flatwoods. S. GA south to s. peninsular FL and west to e. LA. [= FNA, K, L, WH, X, Z; = *V. darrowii* – GW, orthographic variant; = *Cyanococcus myrsinites* (Lamarck) Small var. *glaucum* A. Gray – S]

Vaccinium elliotii Chapman, Mayberry. Bottomlands, slopes, sandy river terraces, natural levees. March-April; May-June. Primarily a Coastal Plain species, *V. elliotii* ranges from se. VA south to FL, west to se. TX and AR; disjunct in Coffee County, TN (Chester, Wofford, & Kral 1997). [= RAB, C, F, G, GW, K, X, Y; = *Cyanococcus elliotii* (Chapman) Small – S; *< V. corymbosum* – FNA, L, WH, Z]



Vaccinium erythrocarpum Michaux, Bearberry, Highbush Cranberry, Mountain Cranberry. Rocky ridges, shrub or grassy balds, bogs, spruce-fir forests, usually at high elevations. Late May-July; August-September. A Southern and Central Appalachian endemic, *V. erythrocarpum* ranges from WV through VA to w. NC, e. and ec. TN, and ne. GA. The only other member of Section *Oxycoccoides* is *V. japonicum* Miguel of montane Japan, so similar as to be sometimes regarded as only a subspecies or variety of our species. [= RAB, C, F, G, K, L, W, WV, Y, Z; = *V. erythrocarpum* ssp. *erythrocarpum* – FNA; = *Hugeria erythrocarpa* (Michaux) Small – S]

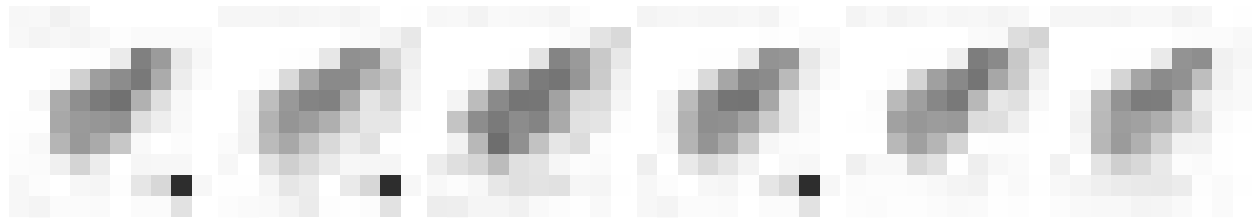
Vaccinium formosum H.C. Andrews, Southern Highbush Blueberry, Swamp Highbush Blueberry. Bogs, swamps (especially blackwater, or at least where away from strong alluvial influence), seepages, depression ponds (dolines), other moist ground. Late February-May; June-August. Apparently ranging from NJ south to n. FL and s. AL, primarily on the Coastal Plain. This species is the primary source of the cultivated highbush blueberries. It has the largest and arguably the highest quality fruit of the native highbush blueberries. [= K, Y; < *V. corymbosum* – RAB, C, FNA, L, Pa, WH, Z; = *V. australe* Small – G, GW, X; = *Cyanococcus virgatus* (Aiton) Small – S, misapplied]

Vaccinium fuscatum Aiton, Hairy Highbush Blueberry, Black Highbush Blueberry. Bogs, pocosins, swamps, also in uplands. Late February-May; June-August. The species is apparently widespread in e. United States. [= GW, K, W, X, Y; = *V. atrococcus* (Gray) Heller – RAB, F, G, X; < *V. corymbosum* – C, FNA, L, Pa, WH, Z; ? *V. marianum* S. Watson – G; > *Cyanococcus fuscatus* (Aiton) Small – S; > *Cyanococcus atrococcus* (A. Gray) Small – S]

Vaccinium hirsutum Buckley, Woollyberry, Hairy Blueberry. Mountain slopes and ridges, primarily in pine-oak and oak forests. April-May; June-July. *V. hirsutum* is a narrow Southern Appalachian endemic, occurring only in a few counties of sw. NC, se. TN, and n. GA. It is the only species in our area with pubescent fruit. [= RAB, FNA, K, L, W, X, Z; = *Cyanococcus hirsutus* (Buckley) Small – S]

Vaccinium macrocarpon Aiton, Cranberry, Large Cranberry. Mountain bogs, low pocosins with deep peat, interdunal swales. May-July; August-November. Unlike the circumboreal *V. oxycoccus* Linnaeus, *V. macrocarpon* is limited to North America. This is the familiar edible cranberry, raised commercially in artificial bogs, primarily in MA, WI, and NJ. It ranges as a native plant from NL (Newfoundland) west and south to s. ON, MN, ne. IL, n. IN, n. and c. OH, PA, and NJ, extending south along the Appalachians as a disjunct rarity through WV, w. VA, and ne. and se. TN to w. NC, and south along the outer Coastal Plain as a disjunct rarity in e. MD, se. VA, and ne. and se. NC. The occurrence in the inner Coastal Plain (fall-line sandhills) along the Little River in Cumberland County, NC is questionably native. [= RAB, C, F, FNA, G, GW, K, L, Pa, W, WV, Y, Z; = *Oxycoccus macrocarpus* (Aiton) Persoon – S]

Vaccinium myrsinites Lamarck, Southern Evergreen Blueberry. Pine flatwoods. March-April; May-June. Se. SC south to s. peninsular FL, west to s. AL. *V. myrsinites* is readily distinguished from all our species by the following combination of characteristics: clonal shrub with upright stems usually < 50 cm tall, the young twigs verrucose, leaves evergreen, mostly 5-15 mm long and 2-10 mm wide, lower surface of young leaves with stout glandular hairs. Farther south, it can be difficult to distinguish from the closely related *V. darrowii* Camp (see key), with which it often co-occurs in their area of overlap. [= RAB, FNA, GW, K, L, WH, X, Z; = *Cyanococcus myrsinites* (Lamarck) Small var. *myrsinites* – S]



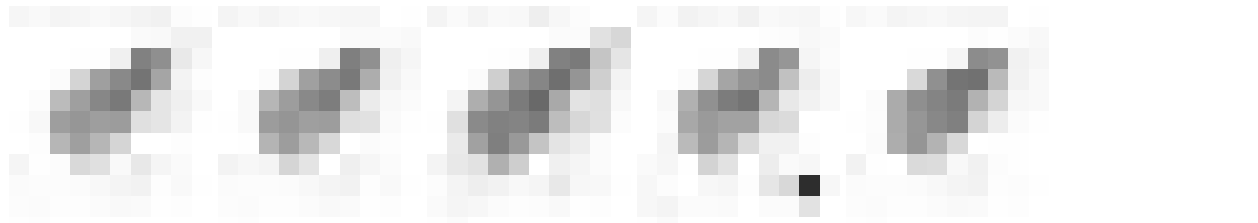
Vaccinium myrtilloides Michaux, Velvetleaf Blueberry, Sourtop, Canada Blueberry. Acidic, high elevation slopes and cliffs. May-July. NL (Labrador) west to BC, south to PA, VA, w. NC, WV, IN, and MN. Reported for the NC side of Great Smoky Mountains National Park (Haywood County) (K. Langdon, pers. comm. 2009). The possible occurrence of this species on Grandfather Mountain is based on somewhat ambiguous specimens and needs additional confirmation. See Vander Kloet & Hall (1981) for a summary of information on this diploid species. [= C, F, FNA, G, K, Pa, W, WV, X, Y, Z]

Vaccinium oxycoccus Linnaeus, Small Cranberry. Bogs. June; September-October. Circumboreal, south in North America to NJ, PA, WV (Grant, Mineral, Pendleton, Pocahontas, Preston, Randolph, and Tucker counties), IN, and MN. This species has been reported for NC, by Fernald (1950) as *V. oxycoccus* var. *ovalifolium* Michaux, by Scoggan (1979) as *Oxycoccus ovalifolius* (Michaux) Porsild, and by Kartesz (1999). Most likely, ambiguous collections of *V. macrocarpon* are the basis for these reports. [= C, FNA, G, K, Pa; > *V. oxycoccus* Linnaeus var. *ovalifolium* – F; = *Oxycoccus palustris* Persoon; > *Oxycoccus palustris* Persoon var. *ovalifolius* (Michaux) Seymour; > *Oxycoccus ovalifolius* (Michaux) Porsild]

Vaccinium pallidum Aiton, Hillside Blueberry, Dryland Blueberry. Forested slopes, usually rather xeric. March-April; June-July. Widespread in e. United States, *V. pallidum* is centered in the Appalachians and Ozarks. Vander Kloet (1978, 1988) and Uttal (1987) do not favor Camp's (1945) separation of *V. pallidum* and *V. vacillans*. If the two taxa are combined (as here), *V. pallidum* has nomenclatural priority. *V. pallidum* is primarily diploid. See *V. altomontanum* for discussion of its relationship to *V. pallidum*. [= C, K, L, Pa, W, WV, Y, Z; = *V. vacillans* Kalm ex Torrey – RAB; > *V. vacillans* Torrey var. *vacillans* – F; > *V. vacillans* var. *crinitum* Fernald – F; > *V. pallidum* – F, G, X; > *V. vacillans* – G, X; < *V. pallidum* – FNA; ; > *Cyanococcus pallidus* (Aiton) Small – S; > *Cyanococcus vacillans* (Kalm ex Torrey) Rydberg – S]

Vaccinium sempervirens Rayner & Henderson, Rayner's Blueberry. Seepage bogs in the fall-line Sandhills, longleaf pine woodlands over sandstone and gravel outcrops. Endemic to Lexington County, SC, known from only a few sites. This species is clearly closely allied to *V. crassifolium*. Kirkman & Ballington (1990) reduce it to a subspecies. Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species. See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*. [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – FNA, L, Z]

Vaccinium simulatum Small, Mountain Highbush Blueberry. Forested slopes (northern hardwoods, spruce-fir forests), ridges, and shrub balds, at moderate and high elevations. Late April-early June; July-August. A Southern and Central Appalachian endemic, *V. simulatum* ranges from e. KY and sw. VA south through w. NC and e. TN to n. GA and n. AL. The name *V. constablaei* has been misapplied to this species, as by RAB; see *V. corymbosum* for a discussion of the correct application of *V. constablaei*. [= G, K, X, Y; = *V. constablaei* Gray – RAB, G, misapplied; < *V. corymbosum* – C, FNA, L, W, Z; = *Cyanococcus simulatus* (Small) Small – S]



Vaccinium stamineum Linnaeus var. **1**, Dwarf Deerberry. Pinelands. April-June; August-October. This dwarf taxon is characteristic of Coastal Plain pinelands; its stature is not the result of fire; it never achieves greater height, even following decades of fire suppression. Se. NC south to GA. [< *V. stamineum* var. *stamineum* – RAB; < *Vaccinium stamineum* – C, FNA, K, L, W, Y, Z; = *Polycodium arenicola* W.W. Ashe – V]

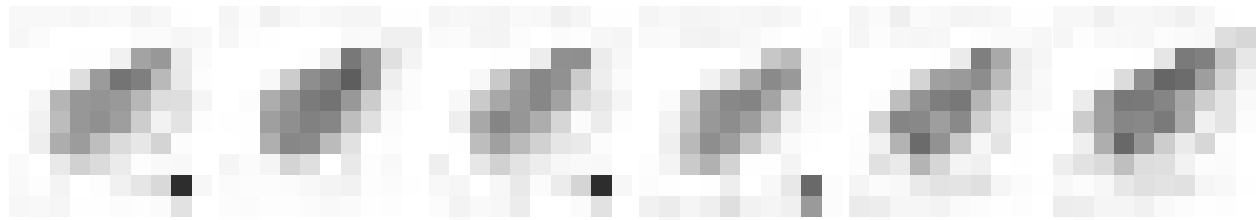
Vaccinium stamineum Linnaeus var. **2**, Appalachian Deerberry. Xeric to submesic woodlands and forests, including pine-oak/heath and shrub balds. April-June; August-October. PA south to GA, in the Appalachians and adjacent provinces. [< *V. stamineum* var. *stamineum* – RAB, F, WV; < *V. stamineum* – C, FNA, K, L, Pa, W, Y, Z; = *Polycodium candicans* Small – S, V; = *V. candicans* (C. Mohr) Sleumer]

Vaccinium stamineum Linnaeus var. **caesium** (Greene) D.B. Ward, Florida Deerberry, Whiteleaf Deerberry. Xeric woodlands. April-May; August-October. Se. NC south to c. peninsular FL, and west to s. AL. [= Q; < *V. stamineum* var. *stamineum* – RAB; < *V. stamineum* – C, FNA, K, L, W, WH, Y, Z; ? *V. caesium* Greene – F (probably misapplied); > *Polycodium floridanum* (Nuttall) Greene – S; > *Polycodium ashei* Harbison – S; > *Polycodium floridanum* var. *floridanum* – V; > *Polycodium floridanum* var. *caesium* – V]

Vaccinium stamineum Linnaeus var. **glandulosum** (Ashe) D.B. Ward. Pine flatwoods. Supposedly endemic to the FL Panhandle, probably in GA. [= *Polycodium glandulosum* Ashe; < *Vaccinium stamineum* – FNA, L, WH] {not yet keyed; synonymy incomplete}

Vaccinium stamineum Linnaeus var. **sericeum** (C. Mohr) D.B. Ward, Southern Deerberry. Xeric woodlands. April-June; August-October. S. SC, w. NC, TN, and AR south to Panhandle FL and TX; disjunct in Mexico. [= Q; ? *V. stamineum* var. *melanocarpum* C. Mohr – RAB, F, misapplied; < *V. stamineum* – C, FNA, K, L, W, WH, Y, Z; ? *V. melanocarpum* (C. Mohr) C. Mohr ex Kearney – G, misapplied; ? *Polycodium melanocarpum* (C. Mohr) Small – S, misapplied; = *Polycodium sericeum* (C. Mohr) C.B. Robinson – V]

Vaccinium stamineum Linnaeus var. **stamineum**, Common Deerberry. Xeric to submesic woodlands, forests, and rock outcrops (unlike most *Vaccinium*, often on mafic, ultramafic, or calcareous rocks). April-June; August-October. MA, NY, s. ON, and MO south to Panhandle FL and TX. [= Q; < *V. stamineum* var. *stamineum* – RAB; < *Vaccinium stamineum* – C, FNA, K, L, Pa, W, Y, Z; > *V. stamineum* var. *stamineum* – F, WV; > *V. stamineum* var. *interius* (Ashe) Palmer & Steyermark – F, WV; > *V. stamineum* var. *neglectum* (Small) Deam – F, WV; > *Vaccinium neglectum* (Small) Fernald – G; > *Polycodium stamineum* (Linnaeus) Greene – S, V; >< *Polycodium candicans* Small – S; > *Polycodium neglectum* Small – S, V]



Vaccinium tenellum Aiton, Southern Blueberry, Small Cluster Blueberry. Sandhills, pine flatwoods, other xeric woodlands. Late March-early May; June-July. Though abundant in the Carolinas, *V. tenellum* is rather restricted, occurring as a common

species from se. VA to c. GA, with a range extension (where it is scattered and rare) south and west to n. FL, s. AL, and se. MS. [= RAB, C, F, FNA, G, K, L, X, Y, Z; = *Cyanococcus tenellus* (Aiton) Small – S]

Vaccinium virgatum Aiton, Swamp Blueberry, Rabbiteye Blueberry. Pocosins and *Chamaecyparis* swamps, also in various drier habitats, including turkey oak sandhills. March-April; May-June. A Southeastern Coastal Plain species, *V. virgatum* occurs from se. NC south to FL and west to e. TX. [= GW, K; = *V. amoenum* Aiton – RAB; = *Cyanococcus amoenus* (Aiton) Small – S; < *V. corymbosum* – L, WH, Z; > *V. virgatum* – X; > *V. amoenum* – X; > *V. ashei* Reade – X]

28. *Gaylussacia* Kunth 1819 (Huckleberry)

A genus of ca. 50 species, shrubs, of North and South America (centered in South America). The sections and subsections follow Sleumer (1967a). A study of the phylogeny of the genus *Gaylussacia* provided some evidence for the treatment of *Gaylussacia brachycera* as a monotypic genus or within *Vaccinium*; additional study is needed. References: Sorrie, Weakley, & Tucker in FNA (2009); Sleumer (1967a)=Z; Camp (1935)=Y; Godfrey (1988)=X; Duncan & Brittain (1966)=V; Sorrie & Weakley (2007a)=U; Gajdeczka et al. (2010)=Q; Fernald (1911); Stevens et al. in Kubitzki (2004).

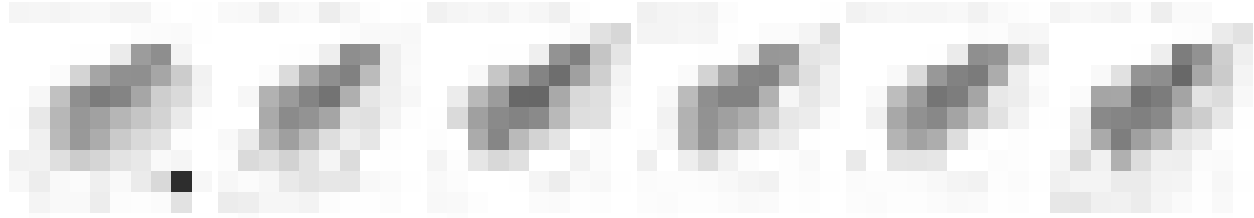
- 1 Leaves 0.7-2.2 cm long, serrulate, leathery, evergreen, lacking punctate glands; [section *Vitis-idaea*] *G. brachycera*
- 1 Leaves 1.5-10 cm long, entire (or minutely glandular-crenate), membranaceous to subcoriaceous, deciduous, with punctate glands.
 - 2 Leaves subcoriaceous, upper surface shining, dark green, 1.5-4 cm long; bracts of the inflorescence equal to or longer than the pedicels (5-12 mm long), persistent; sepals, pedicels, bracts, and leaves stipitate-glandular and pubescent; [section *Gaylussacia*].
 - 3 Plant < 3 dm high.
 - 4 Corollas averaging 7.0 mm long; anthers averaging 3.7 mm long; glandular hairs on hypanthium dense, 0.3-0.5 mm long; plants usually 4-10 dm high, rarely less than 3 dm; plants of wet boggy habitats; [northeastern, south to DE, disjunct to NC and SC] *G. bigeloviana*
 - 4 Corollas averaging 5.8 mm long; anthers averaging 3.0 mm long; glandular hairs on hypanthium moderately dense to relatively sparse, 0.2-0.3 mm long; plants occasionally up to 4 dm high; [plants of xeric to moist habitats; southeastern range, north to VA and scattered inland to n. AL, n. GA, c. TN, w. SC, w. NC, and s. WV] *G. dumosa*
 - 3 Plant 4-10 (-15 dm) tall.
 - 5 Sessile glands on upper leaf surface absent; glandular hairs on hypanthium 1.0-1.5 mm long; [East Gulf Coastal Plain endemic, sw. GA, n. FL, s. AL, s. MS, and se. LA] *G. mosieri*
 - 5 Sessile glands on upper leaf surface numerous; glandular hairs on hypanthium 0.3-0.5 mm long; ranging from SC northward.
 - 6 Corollas averaging 7.0 mm long; anthers averaging 3.7 mm long; plants of peat bogs, raised bogs, peat-based pocosins, and Atlantic white cedar-red maple swamps; [from NL (Newfoundland) to DE, and as a rare disjunct in the Coastal Plain of NC and SC] *G. bigeloviana*
 - 6 Corollas averaging 6.0 mm long; anthers averaging 2.9 mm long; plants of montane bogs, seepage over rock, and possibly drier forests; [rare endemic of southern Appalachians of w. NC] *G. orocola*
 - 2 Leaves membranaceous to subcoriaceous, upper surface dull, yellow-green to medium-green, 2-10 cm long; bracts of the inflorescence shorter than the pedicels, early deciduous; sepals, pedicels, bracts, and leaves with sessile glands, pubescent or not pubescent; [section *Decamerium*].
 - 7 Leaves glandular on both surfaces; racemes 0.5-1.5 cm long; [section *Decamerium*, subsection *Baccatae*] *G. baccata*
 - 7 Leaves glandular on the lower surface only; racemes 1-5 cm long.
 - 8 Leaves membranaceous, medium-green, with acuminate apices; [section *Decamerium*, subsection *Ursinae*] *G. ursina*
 - 8 Leaves subcoriaceous, yellow-green to glaucous, with obtuse to emarginate apices; [section *Decamerium*, subsection *Frondosae*].
 - 9 Young twigs glabrous; leaves glabrous or pubescent beneath, often glaucous; shrub to 20 dm tall; [widespread in our area] *G. frondosa*
 - 9 Young twigs densely pubescent with short, curled hairs; leaves sparsely to densely pubescent beneath, glaucous or not; shrub to 10 dm tall; [of se. NC and southward in the Coastal Plain].
 - 10 Larger leaves mostly 2-4 cm long and 1-2 cm wide; lower leaf surface usually strongly glaucous, sparsely pubescent, with the longest nonglandular hairs < 0.27 mm long; floral tube and calyx glaucous; shrub 2-6 (-10) dm tall *G. nana*
 - 10 Larger leaves mostly 3-6 cm long and 2-3.5 cm wide; lower leaf surface not glaucous, sparsely to densely pubescent, with the longest nonglandular hairs 0.46-0.64 mm long; floral tube and calyx not glaucous; shrub to 10 dm tall *G. tomentosa*

Gaylussacia baccata (Wangenheim) K. Koch, Black Huckleberry, Crackberry. Xeric, acidic forests and woodlands, rock outcrops, to 1600m elevation. April-June; July-August. NL (Newfoundland) and QC west to ON and MB, south to ne. NC, nw. SC, n. GA, AL, and MO; in GA, NC, and SC it is primarily montane in distribution, but in VA it occurs throughout the state. [= C, F, FNA, G, K, L, Pa, Q, RAB, V, W, WV, Y, Z; = *Decachaena baccata* (Wangenheim) Small – S]

Gaylussacia bigeloviana (Fernald) Sorrie & Weakley, Northern Dwarf Huckleberry. Peat dome pocosins (in NC and VA), sandhill seepage bogs (SC), *Chamaecyparis* bogs (DE), generally growing in peat, forms transitional to var. *dumosa* in wet pinelands and disturbed pocosins. April-June; June-October. Var. *bigeloviana* ranges from NL (Newfoundland) south to NJ, with forms transitional to var. *dumosa* as far south as se. VA, and disjunct in Carteret, Dare, and Pender counties, NC (in low pocosins of large peat domes with *Chamaedaphne* and *Zenobia*), in a Sandhill seepage bog in Lexington County, SC. [= FNA, Q, U; = *G. dumosa* (Andrews) Torrey var. *bigeloviana* Fernald – C, F, G, Y; < *G. dumosa* – GW, K, L, RAB, W, X, Z]

Gaylussacia brachycera (Michaux) A. Gray, Box Huckleberry. Dry, acidic ridgetops and upper slopes, locally forming large clones. May-June. Sc. PA and DE south to e. KY and ec. TN, primarily on the Cumberland and Allegheny Plateaus; also disjunct on a steep, xeric, west-facing bluff in Durham Co. NC, where evidently native. Treatment of this species in a monotypic genus may be warranted, but the genus name *Buxella* (as used by Small) is unavailable, as it had already been used prior to Small in a different application (Wilbur & Bloodworth 2004). [= C, F, FNA, G, K, L, Pa, Q, W, WV, Y, Z; = *Buxella brachycera* (Michaux) Small – S (but *Buxella* is preoccupied); = *Vaccinium brachycerum* Michaux; note that the report in RAB is based on a misidentification]

Gaylussacia dumosa (Andrews) Torrey & A. Gray, Southern Dwarf Huckleberry. Xeric to mesic, acidic forests and woodlands. March-June; June-October. This variety is one of the most common shrubs of the Southeastern Coastal Plain, with an overall range from NJ south to FL and west to e. LA, primarily in the Coastal Plain, less commonly inland (as in sc. TN and se. WV). [= FNA, Q, U; = *G. dumosa* (Andrews) Torrey var. *dumosa* –C, F, G, Y; < *G. dumosa* –GW, K, L, Pa, RAB, V, W, WH, WV, X, Z; = *Lasiococcus dumosus* (Andrews) Small –S]



Gaylussacia frondosa (Linnaeus) Torrey & A. Gray ex Torrey, Dangleberry. Mesic, acidic woodlands, especially in sandhill-pocosin and savanna-pocosin ecotones, also in xeric chestnut oak forests in the lower Piedmont. Late March-May; June-August. Primarily a Southeastern Coastal Plain species: s. NH south to s. SC, less commonly inland to w. NY, c. and w. PA, w. VA, and w. SC. [= C, F, FNA, G, K, L, Pa, Q, W, V; = *G. frondosa* var. *frondosa* –GW, RAB, X, Y, Z; = *Decachaena frondosa* (Linnaeus) Torrey & Gray –S]

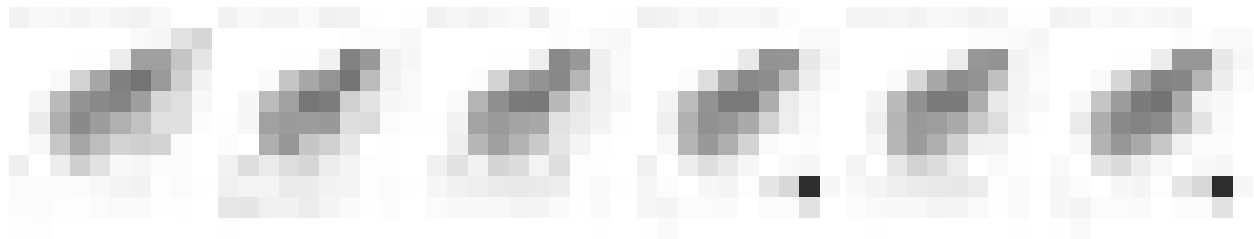
Gaylussacia mosieri Small, Mosier's Huckleberry, Hirsute Huckleberry. Savannas and seepages. S. GA and Panhandle FL and west to e. LA. Material from Lexington County, SC originally identified as this taxon has been reassigned to *G. bigeloviana*. [= FNA, GW, K, L, Q, U, V, X, Y, Z; = *Lasiococcus mosieri* (Small) Small –S]

Gaylussacia nana (A. Gray) Small, Dwarf Dangleberry. Xeric sandhills. Se. SC (Beaufort County) south to n. and c. FL peninsula, FL Panhandle, and west to e. LA (Florida prishes); disjunct in se. NC (New Hanover County) (Sorrie & LeBlond 2008). This species is disjunct at several sites in xeric sandhills of se. NC (on the Carolina Beach peninsula and the 421 Sandhills nw. of Wilmington). *G. nana* has a diploid chromosome complement (n=12), compared to tetraploid for *G. tomentosa* (n=12) (Luteyn et al. 1996). [= FNA, K, L, Q, V, Y; = *G. frondosa* (Linnaeus) Torrey & A. Gray ex Torrey var. *nana* A. Gray –GW, X, Y; = *Decachaena nana* (A. Gray) Small –S; < *G. frondosa* (Linnaeus) Torrey & A. Gray ex Torrey var. *tomentosa* A. Gray –WH]

Gaylussacia orocola (Small) Camp, Blue Ridge Bog Huckleberry. Bogs, seepages over granite. Endemic to the sw. NC mountains. The montane plants named *Lasiococcus orocola* by Small are probably most closely allied to northern *G. bigeloviana*, and occur with other notable northern disjuncts, such as *Myrica gale* and *Chamaedaphne calyculata* (often associated with var. *G. bigeloviana* in northern peat bogs); they differ in several respects, however, and are here given taxonomic standing (Sorrie & Weakley 2007a). [= FNA, Q, U, Y, Z; < *G. dumosa* –RAB, GW, K, L, W, X; = *Lasiococcus orocola* (Small) Small –S]

Gaylussacia tomentosa (A. Gray) Pursh ex Small, Hairy Dangleberry. Pine flatwoods, sandhills, xeric coastal fringe sandhills. March-May; June-August. Se. SC (spodosolic flatwoods in Beaufort County) south to c. peninsular FL, west to s. GA and sw. AL. As discussed by Godfrey (1988) and Duncan & Brittain (1966), probably better treated as a species than as a variety of *G. frondosa*. *G. tomentosa* has a tetraploid chromosome complement (n=24), compared to diploid for *G. nana* and *G. frondosa* (n=12) (Luteyn et al. 1996). [= FNA, K, L, Q, V, Y; = *G. frondosa* (Linnaeus) Torrey & A. Gray ex Torrey var. *tomentosa* A. Gray –GW, RAB, X, Z; = *Decachaena tomentosa* (Pursh ex Small) Small –S; < *G. frondosa* (Linnaeus) Torrey & A. Gray ex Torrey var. *tomentosa* A. Gray –WH]

Gaylussacia ursina (M.A. Curtis) Torrey & A. Gray ex A. Gray, Bear Huckleberry, Mountain Huckleberry. Mesic to xeric forests, frequently dominant; common. May-June; July-September. A narrow Southern Appalachian endemic: sw. NC (southwest of the Asheville Basin), nw. SC, ne. GA, and se. TN; disjunct at Cumberland Gap National Historic Park, Bell County, KY. On mountain slopes and summits in that area it is often the dominant shrub, forming large clonal patches. [= FNA, K, L, Q, RAB, V, W, Y, Z; = *Decachaena ursina* (M.A. Curtis) Small –S]

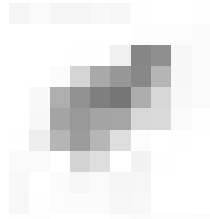


349. GARRYACEAE Lindley 1834 (Garrya Family) [in GARRYALES]

Garryaceae is here circumscribed to include *Aucuba* (Bremer et al. 2002). References: Bremer et al. (2002)

Aucuba Thunberg (*Aucuba*, Japanese-laurel)

* *Aucuba japonica* Thunberg, Aucuba, Japanese-laurel, Spotted-laurel. Commonly planted throughout our area, rarely escaping and naturalizing in suburban woodlands; native of Japan and se. Asia. The most frequently planted cultivars have the dark green leaves prominently speckled with yellow. [= K]



350. RUBIACEAE A.L. de Jussieu 1789 (Madder Family) [in GENTIANALES]

A family of about 630-650 genera and 10,200-13,000 species, trees, shrubs, vines, and rarely herbs, cosmopolitan, but especially diverse in tropical and subtropical areas. References: Rogers (1987, 2005).

- 1 Trees, shrubs, or woody vines.
 - 2 Prostrate or climbing woody vine (liana), rooting at nodes; corolla lilac; [alien]; [subfamily *Rubioideae*; tribe *Paederieae*] *Paederia*
 - 2 Shrub or tree (sometimes somewhat scrambling, but not rooting at nodes); corolla white, green, maroon, or orange-red; [native or alien].
 - 3 Inflorescence spherical; [widespread in our area]; [subfamily *Cinchonoideae*; tribe *Naucleaeae*] *Cephalanthus*
 - 3 Inflorescence cymose or thyrsoid; [in the Coastal Plain, from s. SC southward].
 - 4 Flowers orange-red; leaves usually whorled; [subfamily *Cinchonoideae*]..... *Hamelia*
 - 4 Flowers white, green, or maroon; leaves opposite.
 - 5 Inflorescence cymose; some calyx lobes expanded into pink or reddish “flags”; leaves deciduous; domatia not present; [of s. SC southward] *Pinckneya*
 - 5 Inflorescences thyrsoid; calyx lobes inconspicuous; leaves evergreen; domatia present in secondary vein axils; [of ne. FL southward]
 - 6 Lateral veins 3-6 on either side of the midvein; fruit white; flowers yellowish, > 6 mm long; [subfamily *Cinchonoideae*; tribe *Chiococceae*] *Chiococca*
 - 6 Lateral veins 8-14 on either side of the midvein; fruit red; flowers white, <5 mm long; [subfamily *Rubioideae*; tribe *Psychotrieae*]..... *Psychotria*
 - 1 Herbs (or creeping subshrubs in *Mitchella*).
 - 6 Leaves whorled; [subfamily *Rubioideae*; tribe *Rubieae*] *Galium*
 - 6 Leaves opposite
 - 10 Flowers paired, the ovaries connate and developing into a single fleshy red fruit; leaves roundish; creeping subshrub; [subfamily *Rubioideae*; tribe *Mitchelleae*]..... *Mitchella*
 - 10 Flowers single or in inflorescences with multiple flowers, the fruits **either** dry **or** fleshy and yellowish or black; leaves various; herb; [subfamily *Rubioideae*; tribe *Spermacoceae*].
 - 11 Carpels with few to many seeds.
 - 12 Corolla 5-lobed *Pentodon*
 - 12 Corolla 4-lobed.
 - 13 Capsule longer than the calyx tube flowers blue, pink, or white *Houstonia*
 - 13 Capsule not longer than the calyx tube; flowers white..... *Oldenlandia*
 - 11 Carpels 1-seeded.
 - 14 Flowers in dense, terminal, involucrate heads; flowers 4- or 6-lobed; styles 3 *Richardia*
 - 14 Flowers in axillary or terminal clusters, or single in axils, not involucrate; flowers 4-lobed; styles 2.
 - 15 Flowers usually solitary in leaf axils; fruit separating into 2 parts *Diodia*
 - 15 Flowers in terminal and axillary clusters; fruits not separating into 2 parts.
 - 16 Carpels opening transversely..... *Mitracarpus*
 - 16 Carpels opening longitudinally..... *Spermacoce*

Cephalanthus Linnaeus (Buttonbush)

A genus of about 6 species, of tropical and temperate America. References: Rogers (1987)=Z; Ridsdale (1976)=Y.

Cephalanthus occidentalis Linnaeus, Buttonbush. Streambanks, riverbanks, depressional wetlands, lakes, often in standing water. June-July. Widespread in North America, and south into Mexico, Guatemala, and Honduras. [= RAB, K, Pa, W, S, Y, Z; > *C. occidentalis* var. *occidentalis* – C, F, G; > *C. occidentalis* var. *pubescens* – C, F, G; = *C. occidentalis* var. *occidentalis* – GW (including var. *pubescens*)]

Chiococca P. Browne 1759

A genus of about 30 species, of FL and the West Indies south to s. South America. References: Rogers (2005).

Chiococca alba (Linnaeus) A.S. Hitchcock, Snowberry, Milkberry. Coastal hammocks, shell middens. N. FL (St. Johns and Dixie counties) south to s. FL; s. TX south through Mexico to Central America; West Indies (incl. Bahamas and Bermuda). [= K, S, WH]

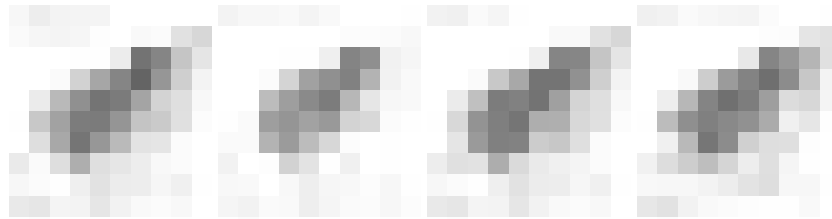
Diodia Linnaeus

A genus of about 30 species, of tropical and warm temperate America and Africa. Bacigalupo & Cabral (1999) suggest that *Diodella* Small should be recognized as distinct from *Diodia*. References: Bacigalupo & Cabral (1999)=Z; Rogers (2005).

- 1 Sepals 4 and similar in size; style entire; [of dry habitats]*D. teres*
- 1 Sepals 2 (or 4, and then markedly dimorphic); style cleft; [of moist to wet habitats]*D. virginiana*

Diodia teres Walter, Poorjoe. Dunes, sandy roadsides, glades, other dry habitats. June-December. MA, NY and WI, south to FL, TX, and CA, south through Mexico and Central America. [= RAB, C, GW, Pa, W, WV; > *Diodia teres* var. *hirsutior* Fernald & Griscom – F, K; > *Diodia teres* var. *hystricina* Fernald & Griscom – F, G, K; > *Diodia teres* var. *oblongifolia* Fernald – F, K; > *Diodia teres* var. *teres* – F, G, K; = *Diodella teres* (Walter) Small – Z]

Diodia virginiana Linnaeus. Pondshores, ditches, other moist to wet habitats. June-December. CT, PA, IL, and KS south to FL and TX. [= RAB, C, G, GW, W, WV; > *D. virginiana* var. *attenuata* Fernald – F, K; > *D. virginiana* var. *latifolia* Torrey & A. Gray – K; > *D. virginiana* var. *virginiana* – F, K; > *D. virginiana* – S; > *D. tetragona* Walter – S; > *D. hirsuta* Pursh – S; > *D. harperi* Small – S]



Galium Linnaeus 1753 (Bedstraw, Cleavers, Woodruff)

A genus of ca. 500 species, herbs, cosmopolitan. Here circumscribed to include *Asperula*, *Cruciata*, and *Sherardia*, following an analysis by Soza & Olmstead (2010) that shows the genera *Galium*, *Cruciata*, and *Sherardia* each to be paraphyletic relative to one another, if circumscribed as traditionally. Other solutions are possible, including the dispersal of *Galium* into two or more genera. Interestingly, the number of leaves per whorl appears to be a more fundamental character than those (such as tubular corollas) used to separate genera in the past. References: Soza & Olmstead (2010); Puff (1976, 1977)=Z; Lipscomb & Nesom (2007)=Y; Rogers (2005); Dempster (1978, 1981).

- 1 Leaves mostly in whorls of 4 (rarely a few in whorls of 5-6) at the primary nodes**Key A**
- 1 Leaves mostly in whorls of 5-8 or more at the primary nodes.
 - 2 Leaves mostly 6 per node (ranging from 5-8) at the primary nodes**Key B**
 - 2 Leaves mostly 8 or more per node at the primary nodes**Key C**

Key A – Bedstraws with leaves mostly in whorls of 4 (rarely a few in whorls of 5-6)

- 1 Flowers yellow; plant an annual, 0.5-3 dm tall *G. pedemontanum*
- 1 Flowers white, creamy, greenish-purple, maroon, or purple; plant a perennial, 1-8 dm tall.
 - 2 Flowers solitary, sessile or subsessile in the leaf axils; leaves 4-10 mm long *G. virgatum*
 - 2 Flowers on pedicels, usually in complex inflorescences; leaves >10 mm long.
 - 3 Larger leaves 6-25 mm wide, mostly 1.5-4× as long as wide; fruits uncinat-hispid (except smooth in *G. latifolium*); flowers greenish or purplish.
 - 4 Larger leaves 4-8 cm long, 1-2 cm wide, widest below the middle, tapering to a long-acuminate apex, averaging about 3-4× as long as wide.
 - 5 Fruits uncinat-hispid; flowers yellowish, turning maroon *G. lanceolatum*
 - 5 Fruits smooth; flowers purple *G. latifolium*
 - 4 Larger leaves 1-5 cm long, 0.6-2.5 cm wide, widest at about the middle, tapering to an obtuse (or broadly acute) apex, averaging about 2× as long as wide.
 - 6 Flowers (some of them) sessile or subsessile along the inflorescence branches; leaves 1.5-5 cm long, the larger usually > 2.5 cm long, not punctate.
 - 7 Lower leaf surface glabrous or sparsely short-hispid on the veins; larger leaves 1.5-2.5 (-4.0) cm long and 0.7-1.4 (-1.8) cm wide; [more southern] *G. circaezans* var. *circaezans*
 - 7 Lower leaf surface appressed-pilose, long-hirsute on the veins; larger leaves 2-5 cm long, 1-2.5 cm wide; [more northern] *G. circaezans* var. *hypomalacum*
 - 6 Flowers all distinctly pedicelled; leaves 1-2.5 cm long, glandular-punctate beneath.
 - 8 Stem glabrous *G. orizabense* ssp. *laevicaule*
 - 8 Stem pubescent.

- 9 Stem and leaves pubescent with spreading, straight hairs; [more northern] *G. pilosum* var. *pilosum*
- 9 Stem and leaves pubescent with short, upwardly incurved hairs; [more southern] *G. pilosum* var. *puncticulosum*
- 3 Larger leaves 1-6 mm wide, mostly 4-20× as long as wide; fruits smooth or pubescent (if pubescent, the hairs not hooked at the end, though they may curve through their length), either fleshy or dry; flowers white or creamy.
- 10 Fruits fleshy, blue-black; leaves firm, more-or-less evergreen, glandular-punctate beneath.
 - 11 Leaves elliptic, 7-18 mm long, 3-6 mm wide, 2-3.5× as long as wide..... *G. hispidulum*
 - 11 Leaves linear, 15-25 mm long, 2-4 mm wide, 5-10× as long as wide..... *G. uniflorum*
- 10 Fruits dry, black; leaves herbaceous, deciduous, not glandular-punctate beneath.
 - 12 Stems erect or nearly so; leaves 15-45 mm long, 2-6 mm wide *G. boreale*
 - 12 Stems sprawling, matted; leaves 6-30 mm long, 0.5-5 (-6) mm wide.
 - 13 Corollas 4-lobed, the lobes longer than wide.
 - 14 Leaves (8-) 10-20 (-25) mm long, (0.5-) 0.8-2 mm wide, margin usually smooth, with strongly down-rolled margins; corolla (1.8-) 2-2.5 (-3) mm across; pedicels filiform; stems 15-50 (-60) cm long, delicate..... *G. obtusum* var. *filifolium*
 - 14 Leaves (10-) 15-25 (-30) mm long, (2-) 3-5 (-6) mm wide, margin scabrous, not down-rolled; corolla (2-) 2.5-3.5 (-4) mm across; pedicels thicker; stems (15-) 25-60 (-80) cm long, firm *G. obtusum* var. *obtusum*
 - 13 Corollas 3-(4)-lobed, the lobes about as wide as long, or wider than long.
 - 15 Flowers and fruits borne on arcuate pedicels, (5-) 7-15 (-20) mm long and densely retrorsely scabrous *G. trifidum* var. *trifidum*
 - 15 Flowers and fruits borne on straight pedicels, these (2-) 2.5-8 (-12) mm long and smooth.
 - 16 Fruiting pedicels (4-) 5-8 (-12) mm long; pairs of fruits (3-) 3.5-5 mm across at maturity; leaves 2-3 (-4) mm wide..... *G. tinctorium* var. *floridanum*
 - 16 Fruiting pedicels (2-) 2.5-5 (-6) mm long; pairs of fruits 2-3 mm across at maturity; leaves (1.5-) 2-2.5 (-2.8) mm wide..... *G. tinctorium* var. *tinctorium*

Key B – Bedstraws with leaves mostly 6 per node (ranging from 4-8)

- 1 Flowers in terminal heads, subtended by an involucre of leaves fused at the base; stem rough-hairy, but not retrorse-scabrid; [clade IV] *G. sherardia*
- 1 Flowers in axillary or terminal diffuse inflorescences, not subtended by an involucre; stems either smooth, retrorse-scabrid, or pubescent.
 - 2 Largest leaves < 10 mm long; fruits 0.7-1 mm across; annual; [alien]; [clade III].
 - 3 Inflorescence relatively diffuse, branches divaricate; ultimate fruits (2-) 3-6 (-7) nodes beyond primary stem axis (with largest leaves); first inflorescence internode (beyond primary stem axis) 15-50 mm long; fruit surface glabrous (without hairs)..... *G. divaricatum*
 - 3 Inflorescence relatively strict, branches ascending; ultimate fruits 2-3 (-4) nodes beyond primary stem axis (with largest leaves); first inflorescence internode (beyond primary stem axis) 3-12 (-20) mm long; fruit surface glabrous or bristly-hispid.
 - 4 Fruit surface without hairs, smooth to shallowly papillate..... *G. anglicum*
 - 4 Fruit surface bristly-hispid with uncinat-tipped hairs, distinctly papillate..... *G. parisiense*
 - 2 Largest leaves > 10 mm long; fruits 1-2.5 mm across; perennial; [native].
 - 5 Fruits and ovaries uncinat-hispid; leaves 15-50 mm long, 7-10 mm wide; [clade III]..... *G. triflorum*
 - 5 Fruits and ovaries glabrous or papillose; leaves 5-25 mm long, 1-6 mm wide.
 - 6 Corolla 1.5-2.5 mm across, 3-lobed; [collectively widespread in our area]; [clade V].
 - 7 Fruiting pedicels (4-) 5-8 (-12) mm long; pairs of fruits (3-) 3.5-5 mm across at maturity; leaves 2-3 (-4) mm wide *G. tinctorium* var. *floridanum*
 - 7 Fruiting pedicels (2-) 2.5-5 (-6) mm long; pairs of fruits (2-) 2.5-3 mm across at maturity; leaves (1.5-) 2-2.5 (-2.8) mm wide *G. tinctorium* var. *tinctorium*
 - 6 Corolla 2.5-4.5 mm across, 4-lobed; [mostly of the Mountains in our area, extending into the Piedmont or even Coastal Plain in n. VA and northward].
 - 8 Leaf margins retrorsely ciliate-scabrid; leaves 3-5× as long as wide; [plants of bogs and moist thickets] *G. asprellum*
 - 8 Leaf margins antorsely ciliate-scabrid; leaves 4-8× as long as wide; [plants of dry forests and woodlands].
 - 9 Leaves sharply acute or cuspidate; corolla 2.5-3 mm across..... *G. concinnum*
 - 9 Leaves rounded, obtuse, or barely acute; corolla ca. 4 mm across *G. palustre*

Key C – Bedstraws with leaves mostly 8 or more per node (ranging from 5-12)

- 1 Leaves 8-12 per whorl (many whorls with > 8 leaves); flowers bright yellow, in a large showy terminal compound inflorescence; fruits glabrous; perennial.
 - 2 Flowers golden-yellow, fragrant; inflorescence dense, usually not interrupted *G. verum*
 - 2 Flowers lemon-yellow, odorless; inflorescence interrupted..... [*G. wirtgenii*]
- 1 Leaves (5-) 8 (-10) per whorl (few if any whorls with > 8 leaves); flowers white or greenish, in a terminal compound inflorescence or in small axillary inflorescences; fruits glabrous, papillose, or uncinat-hispid; annual or perennial.
 - 3 Stems retrorsely scabrous; annual.
 - 4 Fruits and ovaries uncinat-hispid; flowers and fruits mainly in clusters of 2-5 *G. aparine*
 - 4 Fruits and ovaries sharply papillose; flowers and fruits mainly in clusters of 3 *G. tricornutum*
 - 3 Stems glabrous or pubescent, but not scabrous; perennial.
 - 5 Fruits and ovaries uncinat-hispid; nodes bearded, the stem otherwise glabrous *G. odoratum*
 - 5 Fruits and ovaries glabrous; nodes not bearded, the stem either glabrous or pubescent toward the base of the plant.
 - 6 Corolla 3-5 mm across, the pedicels usually shorter than the width of the corolla; inflorescence branches ascending, mostly at < 45 degrees [*G. album*]
 - 6 Corolla 2-3 mm across, the pedicels usually longer than the width of the corolla; inflorescence branches spreading, mostly at > 45 degrees *G. mollugo*

* *Galium album* P. Miller. Mt?, Pd?, Cp? (DE?, NC?, VA?) {WV?}: moist roadsides, disturbed areas; {abundance}, native of Europe. May-June. A component of the European *G. mollugo* complex; variously treated by European authors (see Stace 2010; Sell & Murrell 2006). Reported from ne. United States, and very possibly in our area, but hidden under a broad interpretation of *G. mollugo*. [= K2; = *G. mollugo* Linnaeus var. *erectum* (Hudson) Domin – C, G; < *G. mollugo* – RAB, K1; = *G. erectum* Hudson – F] {not yet mapped}

* *Galium anglicum* Hudson. Pastures, disturbed areas; native of w. Europe. June-July. [= Y; < *G. parisiense* Linnaeus – RAB, F, G, S, W, WV; < *G. parisiense* var. *leiocarpum* Tausch – C; < *G. divaricatum* – K; = *G. parisiense* ssp. *anglicum* (Hudson) Arcangeli]

Galium aparine Linnaeus, Cleavers. Meadows, thickets, disturbed areas, forests. April-June. Nearly cosmopolitan, from n. North America south through Central and South America. Apparently represented in North America (including our area) by both native and introduced genotypes. [= RAB, F, G, GW, K, Pa, S, W, WV; > *G. aparine* var. *aparine* – C; > *G. aparine* var. *echinospermum* (Wallroth) Farwell – C]

* *Galium arvense* (Linnaeus) F. Hermann, Blue Woodruff. Disturbed areas, native of Europe. Naturalized south to WV, MD, DE (USDA NRCS 2007), and se. PA (Rhoads & Klein 1993). [= *Asperula arvensis* Linnaeus C, G, K, WV] {not yet keyed}

Galium asprellum Michaux, Rough Bedstraw. Bogs, streambanks, wet meadows. June-October. NL (Newfoundland) west to MN, south to n. VA, w. NC, ne. TN (Chester, Wofford, & Kral 1997), and MO. The report for sc. TN is an error (D. Estes, pers. comm. 2005). [= RAB, C, F, G, GW, K, Pa, S, W, WV]

Galium boreale Linnaeus, Northern Bedstraw. Rocky areas, woodlands, and fields. May-September. Circumboreal, south in North America to DE, sw. VA, KY, MO, and CA. [= C, K, Pa, W; > *G. boreale* var. *intermedium* A.P. de Candolle – F, G]

Galium circaezans Michaux var. *circaezans*, Southern Forest Bedstraw. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): moist forests; common. April-July. NY, KY, and MI, south to FL and TX. The varieties need additional study. [= C, F, G, K, Pa, WV; < *G. circaezans* – RAB, S, W]

Galium circaezans Michaux var. *hypomalacum* Fernald, Northern Forest Bedstraw. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE), {GA?, SC?}: moist forests; common. April-July. QC west to MN and NE, south to VA, w. NC, KY, MO, and TX (?). The varieties need additional study. [= C, F, G, K, Pa, WV; < *G. circaezans* – RAB, S, W]

Galium concinnum Torrey & A. Gray, Shining Bedstraw. Dry woodlands. June-August. NJ west to MN and NE, south to sw. VA, e. TN, nc. TN, and AR. [= C, F, G, K, Pa, W, WV]

* *Galium divaricatum* Pourret ex Lamarck. Disturbed areas; native of s. Europe. June-July. [= Y; < *G. parisiense* var. *leiocarpum* Tausch – C; < *G. parisiense* Linnaeus – F, G, S; < *G. divaricatum* – K; = *G. parisiense* var. *divaricatum* (Pourret ex Lamarck) Koch; = *G. anglicum* var. *divaricatum* (Pourret ex Lamarck) Reichenbach; = *G. parisiense* ssp. *divaricatum* (Pourret ex Lamarck) Rouy] {add to synonymy}

Galium hispidulum Michaux. Maritime forests, sandhills, dry sandy forests. June-August; August-September. S. NJ south to FL, west to LA, primarily on the Coastal Plain; Bahamas. [= RAB, C, F, G, K, W; = *G. bermudense* Linnaeus – S, misapplied]

Galium lanceolatum Torrey, Wild-licorice. Moist hardwood forests. June-July. QC west to MN, south to w. NC and e. TN. [= RAB, C, F, G, K, Pa, S, W, WV]

Galium latifolium Michaux, Wideleaf Bedstraw. Moist hardwood forests. May-August. C. PA and KY south to n. GA and n. AL, a Southern and Central Appalachian endemic. The closely related *G. arkansanum* A. Gray is the Ozarkian sibling of the Appalachian *G. latifolium*. Var. *hispidum*, named from VA, needs additional inquiry. [= RAB, C, K, Pa, S, W; > *G. latifolium* var. *latifolium* – F, G; > *G. latifolium* var. *hispidum* Small – F, G]

* *Galium mollugo* Linnaeus. Moist roadsides, disturbed areas; native of Europe. May-June. The varieties need additional study. [= F, RAB; = *G. mollugo* var. *mollugo* – C, G; = *G. mollugo* – F, K1, Pa, RAB, W, WV]

Galium obtusum Bigelow var. *filifolium* (Wiegand) Fernald, Carolina Bedstraw. Marshes, swamps, creekbanks, alluvial forests. April-May. S. NJ south to c. GA, primarily on the Coastal Plain. [= RAB, C, F, W; < *G. obtusum* – GW; = *G. obtusum* ssp. *filifolium* (Wiegand) Puff – K, Z; = *G. filifolium* (Wiegand) Small – S]

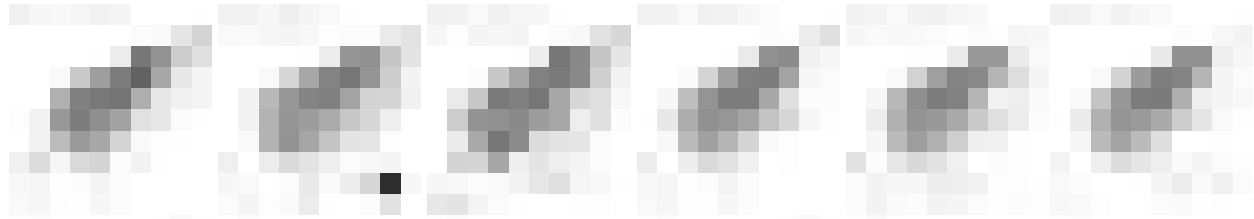
Galium obtusum Bigelow var. *obtusum*, Bluntleaf Bedstraw. Marshes, swamps. April-May. NS west to SD, south to FL and TX. "Ssp. *australe* Puff", cited in Kartesz (1999) and allegedly endemic to GA, was never published and is no longer considered a useful entity by its potential author (Puff, pers. comm. 2004). [= RAB, C, F, W; < *G. obtusum* – GW, Pa, WV; > *G.*

obtusum var. *obtusum* – G; > *G. obtusum* var. *ramosum* Gleason – G; > *G. obtusum* ssp. *obtusum* – K, Z; > *G. obtusum* "ssp. *australe*" – K, Z, not validly published; = *G. tinctorium* – S, misapplied]

* ***Galium odoratum*** (Linnaeus) Scopoli, Sweet Woodruff, Waldmeister. Commonly cultivated, rarely escaped or persistent; native of Europe. May-June. Used fresh as a flavoring for May-wine. [= C, K, Pa; = *Asperula odorata* Linnaeus – F, G]

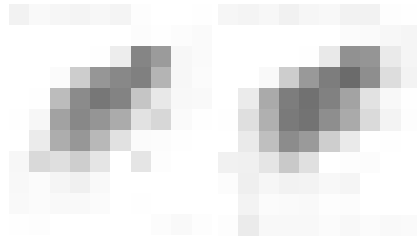
Galium orizabense Hemsley ssp. *laevicaule* (Weatherby & Blake) Dempster, Smoothstem Bedstraw. Forests May-August. Se. VA south to FL, west to se. TX; West Indies. The typic subspecies, ssp. *orizabense*, is distributed from Tamaulipas south through Mexico, Central America, to n. South America (Dempster 1981). [= K; < *G. pilosum* – RAB, S; = *G. pilosum* Aiton var. *laevicaule* Weatherby & Blake – F]

Galium palustre Linnaeus, Marsh Bedstraw, Ditch Bedstraw. Marshes, wet soil. June-August. NL (Labrador) and ON south to MD, s. PA (Rhoads & Klein 1993), MD, WV, OH, IN, and IL; also in Europe and nw. North America. [= C, F, G, K, Pa]



* ***Galium parisiense*** Linnaeus. Disturbed areas; native of s., w., and c. Europe. June-July. [= K, Y; = *G. parisiense* ssp. *parisiense*] {add to synonymy}

* ***Galium pedemontanum*** (Bellardi) Allioni, Piedmont Crosswort. Lawns, grassy roadsides, pastures; native of s. Europe. April-June. The Piedmont referred to in the name is the "original" Piedmont of southern Europe. In GA Mountains and Piedmont (T. Govus, pers. comm. 2005). [= RAB, C, F, Pa, W, WV; = *Cruciata pedemontana* (Bellardi) Ehrend – K, Z]



Galium pilosum Aiton var. *pilosum*. Mt (NC, SC?, VA, WV), Pd (DE, NC, SC?, VA), Cp (DE, NC, SC?, VA), {GA}: forests, woodland borders, clearings; common. May-August. S. NH west to MI, south to NC, TN, MO, and TX. The varieties need additional study. [= C, F, G, K; < *G. pilosum* – Pa, RAB, S, W, WV]

Galium pilosum Aiton var. *puncticulosum* (Michaux) Torrey & A. Gray. Cp (DE, GA, NC, SC, VA), Pd (DE), Mt (WV): forests, woodland borders, clearings; common (rare in WV). May-August. S. NJ south to FL, west to MS. The varieties need additional study. [= C, F, G, K; < *G. pilosum* – RAB, S, W, WV]

* ***Galium sherardia*** E.H.L. Krause, Field-madder. Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA), Mt (NC, SC, VA, WV): lawns, disturbed areas; uncommon (rare in FL), native of Europe. February-August. Differing in its involucre inflorescence and the more tubular, pink to purple flowers, and usually treated as a monotypic genus, *Sherardia*. Soza & Olmstead (2010) show *Sherardia* to be deeply embedded within a paraphyletic *Galium*. [= *Sherardia arvensis* Linnaeus – RAB, C, F, G, K, Pa, S, W, WH, WV]

Galium tinctorium (Linnaeus) Scopoli var. *floridanum* Wiegand, Florida Three-lobed Bedstraw. Cp (GA, NC, SC, VA), Mt (NC, SC, VA), Pd (NC, SC): swamps, marshes, and ditches; common (VA Watch List). April-June. MA south to FL, west to e. TX, mostly on the Coastal Plain, but extending inland to w. VA, w. NC, se. KY, s. IL, and se. MO. See Puff (1976) for additional information. [= F; < *G. tinctorium* – RAB, C, K, Pa, W; = *G. obtusum* var. *floridanum* (Wiegand) Fernald – G; < *G. claytonii* Michaux – S; = *G. tinctorium* ssp. *floridanum* (Wiegand) Puff – Z]

Galium tinctorium (Linnaeus) Scopoli var. *tinctorium*, Southern Three-lobed Bedstraw. Mt (GA, NC, SC, VA), , WVPd (DE, NC, SC, VA), Cp (DE, NC?, SC?, VA?): swamps, marshes, and ditches; common. April-June. NL (Newfoundland) west to MN and NE, south to SC, n. GA, KY, and ne. MO. See Puff (1976) for additional information. [= F, G, GW; < *G. tinctorium* – RAB, C, K, Pa, W, WV; < *G. claytonii* Michaux – S; = *G. tinctorium* ssp. *tinctorium* – Z]

* ***Galium tricornutum*** Dandy, Small Bedstraw. Pd (GA, SC): disturbed areas; rare, introduced. This species has been reported from Cherokee and Greenwood counties, SC, nearby GA, and se. PA (Rhoads & Klein 1993). [= K; < *G. tricorne* Stokes – F]

Galium trifidum Linnaeus var. *trifidum*, Northern Three-lobed Bedstraw. Moist places, bogs, and swamps. June. Circumboreal, south in North America to MD, DE, PA, and NJ. [= C, F, G; = *G. trifidum* ssp. *trifidum* – K, Z; < *G. trifidum* – Pa]

Galium triflorum Michaux, Sweet-scented Bedstraw. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): woodlands, roadsides, disturbed areas; common (rare in DE Coastal Plain). July-August. Circumboreal, south in North America to FL and Mexico (Veracruz). [= RAB, K, Pa, S, W; > *G. triflorum* var. *triflorum* – C, F, G, WV; > *G. triflorum* var. *asprelliforme* Fernald – C, F, G, WV]

Galium uniflorum Michaux. Cp, Pd (GA, NC, SC, VA): moist slope forests and alluvial forests; uncommon. April-September. Se. VA south to FL, west to TX. [= RAB, C, F, G, K, S]

* *Galium verum* Linnaeus, Yellow Bedstraw, Our Lady's Bedstraw. Mt (NC, VA, WV), Pd (DE, VA): meadows, pastures, roadsides; uncommon (rare in DE and NC), native of Europe. May-September. [= C, F, G, K1; = *G. verum* var. *verum* – K2, Pa; < *G. verum* – RAB, W, WH (also see *G. wirtgenii*)]

Galium virgatum Nuttall, Ozark Bedstraw. Cp (GA, SC*): (in GA) open blackland prairies, (in SC) waif around wool-combing mill; rare. Native from TN, c. GA (Houston County), and AL west to KS, OK, and TX. [= C, F, G, K; > *G. virgatum* var. *leiocarpum* Torrey & A. Gray – S; > *G. virgatum* var. *virgatum* – S]

* *Galium wirtgenii* F.W. Schultz, Yellow Bedstraw. Not definitely known from our area, but likely to be present. [= C, F, G, K1; = *G. verum* var. *wirtgenii* (F.W. Schultz) Oborny – K2, Pa; < *G. verum* – W]

Hamelia Jacquin (Firebush)

A genus of ca. 40 species, shrubs, of the tropical America. References: Rogers (1987, 2005).

* *Hamelia patens* Jacquin, Firebush. Disturbed areas. Reported as escaped in Leon County, FL (Wunderlin & Hansen 2011). [= S, WH3]

Houstonia Linnaeus 1753 (Bluet)

The generic limits of *Houstonia*, *Hedyotis*, *Oldenlandia*, and *Stenaria* remain unclear. References: Terrell (1959)=Z; Terrell (1991)=Y; Terrell (1996)=X; Rogers (1987)=Q; Ward (2004c)=V; Church & Taylor (2005); Church (2003); Turner (1995b)=U; Terrell (2001)=M; Rogers (2005); Terrell (2007). Key adapted in part from the references.

Identification notes: In the key below, all leaf measurements and length/width ratios are based on median cauline leaves.

- 1 Flowers solitary on terminal (rarely axillary) pedicels (2-) 6-50 (-70) mm long; corolla salverform; leaves 2-15 mm long; [subgenus *Houstonia*].
 - 2 Stems prostrate and creeping.
 - 3 Corolla white (rarely pale lavender); capsule (2.3-) 3.0-6.3 mm across; leaves 2-13 mm wide; pedicels usually single, 2-25 mm long; flowers chasmogamous and cleistogamous (the cleistogamous borne underground); [of the outer Coastal Plain]; [section *Mullera*] *H. procumbens*
 - 3 Corolla blue (rarely white); capsule 2.5-5.0 mm across; leaves 0.5-7 mm wide; pedicels single or paired, to 60 mm long; flowers all chasmogamous and aerial; [of the Mountains]; [section *Houstonia*] *H. serpyllifolia*
 - 2 Stems erect or spreading.
 - 4 Stems 1-4 (-7) cm tall; leaves mostly oblanceolate, 0.3-3.0 mm wide; corolla 5-12 mm long, white to pale pink; seeds with a hilar ridge in an elliptical depression; [section *Mullera*] *H. rosea*
 - 4 Stems 1-26 cm tall; leaves elliptic, ovate or spatulate, 0.3-9.0 mm wide (at least some on a plant generally > 3 mm wide); corolla 2-21 mm long, purple, pale blue, pink, or white; seeds subglobose with a ventral cavity; [section *Houstonia*].
 - 5 Plants perennial, with a well-developed, persistent basal rosette; corolla 5.8-16 (-21) mm long, the tube (2-) 4-11 (-12) mm long *H. caerulea*
 - 5 Plants annual, with at most a few short-lived basal leaves; corolla 2-10 (-12) mm long, the tube 0.8-5.5 mm long.
 - 6 Calyx lobes slightly shorter than to slightly longer than the corolla tube; corollas white, 2.0-5.5 mm long, the tube 0.8-2.5 mm long *H. micrantha*
 - 6 Calyx lobes 1/5 as long as to slightly longer than the corolla tube; corollas purple or violet (rarely white), 3.5-10 (-12.5) mm long, the tube 2.0-5.5 mm long *H. pusilla*
 - 1 Flowers several to many, in terminal cymes; corolla funnelliform; leaves (8-) 10-60 mm long; [subgenus *Chamisme*, section *Amphiotis*].
 - 7 Capsule obovoid-cylindric, longer than wide, the free calyx lobes distinctly shorter than the capsule; stipules of mid-cauline leaves ciliate or fringed, and also often bristle-tipped; leaves 1-3 mm wide; [of calcareous glades and barrens] *H. nigricans* var. *nigricans*
 - 7 Capsule as long as wide or wider, depressed globose, the free calyx lobes about as long as the capsule; stipules of mid-cauline leaves not ciliate, fringed, or bristle-tipped; leaves 0.5-34 mm wide; [of various habitats, including calcareous glades and barrens]
 - 8 Basal leaves persistent in a rosette until and past flowering; leaves distinctly ciliate *H. canadensis*
 - 8 Basal leaves absent at the onset of flowering; leaves smooth-margined or ciliate.
 - 9 Leaves ovate or lanceolate, 1-6× as long as wide, 4-34 mm wide, widest toward the base or at the middle; calyx lobes 1-7 mm long.
 - 10 Calyx lobes 4-7 mm long; leaves mostly lanceolate (varying from narrowly lanceolate to broadly ovate), 17-33 mm long, 4-10 mm wide, 3.3-6× as long as wide *H. purpurea* var. *calycosa*
 - 10 Calyx lobes 1-4 mm long; leaves mostly ovate (varying from broadly ovate to ovate-lanceolate), 8-63 mm long, 6-34 mm wide, 1-3.2× as long as wide.
 - 11 Corollas light purple to white, (4-) 5-8 (-10) mm long; leaves (10-) 25-50 (-60) mm long, (6-) 12-30 (-34) mm wide; stems sparsely to densely pubescent; median internodes 2-9 cm long; leaves with pubescence ciliate on the leaf margin, on the midrib, and scattered on the surface; [of various habitats, widely distributed] *H. purpurea* var. *purpurea*
 - 11 Corollas deep purple, 8-12 mm long; leaves 8-20 (-30) mm long, 3-8 (-13) mm wide; stems glabrous (or slightly short-pubescent on the lower nodes only); median internodes 0.5-4 cm long; leaves entirely glabrous or with pubescence ciliate on the leaf margin, on the midrib, but lacking from the leaf surface; [of high elevation rocky summits and adjacent grassy balds in w. NC and e. TN] *H. montana*
 - 9 Leaves linear to narrowly elliptic, 4-20× as long as wide, 0.5-6 mm wide, widest at the middle or near the apex or nearly equally wide for most of their lengths; calyx lobes 0.5-3 mm long.

- 12 Leaves 1.3-4.7 cm long, 0.5-4.0 mm wide (mostly < 2.5 mm wide), 7-20× as long as wide; inflorescence very diffuse and open, to 20 cm long, the branches ascending, spreading, or deflexed, slender and often ultimately filiform, with 1-4 remote nodes bearing reduced leaves, the pedicels to 14 mm long; internodes mostly 4-9; mature capsules mostly 1.5-2.5 mm long and wide; stem densely cinereous-puberulent, especially at the nodes *H. tenuifolia*
- 12 Leaves 1.6-4.0 cm long, 1.5-6.0 mm wide (mostly > 2.5 mm wide), 4-11× as long as wide; inflorescence rather open to rather compact, < 12 cm long, the branches ascending or spreading, slender, pedicels to 8 mm long; internodes mostly 7-11; mature capsules mostly 1.8-3.0 mm long and wide; stem densely cinereous-puberulent, glabrate, or glabrous.
- 13 Stems glabrous or glabrate (sometimes puberulent on the nodes only); internodes 7-10, the median internodes (1.1-) 2.0-4.5 (-6.0) cm long; [of seasonally wet soil mats on moderate to high elevation granitic domes in sw. NC, nw. SC, and ne. GA] *H. longifolia* var. *glabra*
- 13 Stems densely cinereous-puberulent; internodes (6-) 7-11 (-13), the median internodes (1.0-) 1.5-3.5 (-4.4) cm long; [of dry sandy, shaley, gravelly, or rocky soil, widely distributed] *H. longifolia* var. *compacta*

Houstonia caerulea Linnaeus, Quaker Ladies, Innocence, Common Bluet. Forests, woodlands, openings, lawns, a wide variety of disturbed sites. April-July; May-August. ME, ON, and WI south to s. GA, s. AL, w. LA, and OK. The flowers of this species and *H. serpyllifolia* are very similar; *H. caerulea* is a somewhat duller blue. [= RAB, G, K, Pa, S, W, WV, X, Y; = *Houstonia caerulea* var. *caerulea* - F; = *Hedyotis caerulea* (Linnaeus) Hooker - C, GW; < *Hedyotis caerulea* - Q]

Houstonia canadensis Willdenow ex Roemer & J.A. Schultes, Canada Bluet. Dry limestone barrens, locally abundant in shallow soils over limestone. April-August. ME and s. ON west to MI and n. IL, south to sw. VA, se. and c. TN, nw. GA, and w. TN. Terrell (1959) determined that *Houstonia setiscaphia* (allegedly a narrow endemic of sw. VA) fell within the range of variation of southern populations of *H. canadensis*. Further study is perhaps warranted. [= G, K, Pa, W, WV, X, Y, Z; = *Hedyotis canadensis* (Willdenow ex Roemer & J.A. Schultes) Fosberg - C, Q; > *Houstonia canadensis* - F; > *Houstonia setiscaphia* L.G. Carr - F; > *Houstonia canadensis* var. *setiscaphia* (L.G. Carr) C.F. Reed]

Houstonia longifolia Gaertner var. *compacta* Terrell, Eastern Longleaf Bluet. Mt (GA, NC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry rock outcrops and adjacent open woodlands, dry sandy woodlands, dry roadbanks, glades and barrens; uncommon. Early June-August; September-October. Var. *compacta* is centered in the central Appalachians of VA, WV, e. KY, and se. OH, with extensions north to VT, west into n. IL, and south in the Piedmont and adjacent Coastal Plain to SC, GA, and Panhandle FL). The typic variety is more northern, apparently reaching its southern limit in IN, not reaching our area. [= WV, Z; < *Houstonia longifolia* - RAB, C, F, G, Pa, S, W, WH3; < *Hedyotis longifolia* (Gaertner) Hooker - C, Q; < *Houstonia longifolia* var. *longifolia* - Y; = *Houstonia longifolia*, "Appalachian Group" - X; < *Houstonia longifolia* - K (also see *H. tenuifolia*)]

Houstonia longifolia Gaertner var. *glabra* Terrell, Granite Dome Bluet. Mt (GA, NC, SC): seasonally and periodically wet soils of shallow soil mats and crevices of granitic domes; rare. June-August; September-October. Var. *glabra* is endemic to the granitic dome district centered around Highlands, NC, occurring in sw. NC, nw. SC, and ne. GA. Terrell (1959) says "the lower internodes [are often] so smooth they appear to have been polished," and gives an altitudinal range of 850-1750 m. Although the morphological differences between var. *glabra* and var. *compacta* are not great, the combination of distinctive morphology correlated with a distinctive habitat and a disjunct range seem to warrant recognition at the varietal level. [= Z; < *Houstonia longifolia* - RAB, S, W; < *Hedyotis longifolia* (Gaertner) Hooker - C, Q; < *Houstonia longifolia* var. *longifolia* - Y; = *Houstonia longifolia*, "Glabra Group" - X; < *Houstonia longifolia* - K (also see *H. tenuifolia*)]

Houstonia micrantha (Shinners) Terrell. Dunes, sandy soils, granitic flatrocks, disturbed areas. February-April. E. and c. GA west to sw. TN, nw. AR, south to w. FL Panhandle, s. MS, s. LA, and e. TX. [= K, WH3, X; = *Hedyotis australis* W.H. Lewis & D.M. Moore - Q; = *Houstonia pusilla* - S, misapplied]



Houstonia montana Small, Roan Mountain Bluet. In crevices of rock outcrops at the summits of high elevation peaks of the Southern Blue Ridge, also in thin, frost-heaved, gravelly soils of grassy balds near summit outcrops, from 1250-1950 m in elevation. June-July; July-August. This species is endemic to the high Blue Ridge of nw. NC and ne. TN, most notably occurring on Roan Mountain, Grandfather Mountain, Bluff Mountain, and Three Top Mountain. It was first noted by Asa Gray in 1841, who described it as "a remarkable dwarfish form." There has been debate over whether it is not indeed merely a weather-induced form, but recent studies show that it is distinct. In addition to the characters given above in the key, *H. montana* also differs from *H. purpurea* in having larger calyx lobes, corolla, capsules, and seeds. See Terrell (1959), Yelton (1974), and Terrell (1978) for further discussion. [= S, W; < *Houstonia purpurea* - RAB; = *Houstonia purpurea* Linnaeus var. *montana* (Small) Terrell - K, X, Y, Z; < *Hedyotis purpurea* - Q; = *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray var. *montana* (Small) Fosberg]

Houstonia nigricans (Lamarck) Fernald var. *nigricans*, Diamond-flower. Limestone barrens dominated by *Andropogon gerardii*, blackland prairies. Sw. VA (Ludwig 1999), s. MI, IA, NE, and e. CO, south to s. FL, TX, e. NM, and along the Sierra Madre Oriental to Hidalgo, Mexico. This species has been variously placed in *Houstonia*, *Hedyotis*, and *Stenaria*. Based primarily on seed characters and chromosome numbers, Terrell (2001) has concluded that this taxon is not congeneric with the Sri Lankan type of the genus *Hedyotis*, and is also not a *Houstonia*, so has published the new genus *Stenaria* for *Hedyotis*

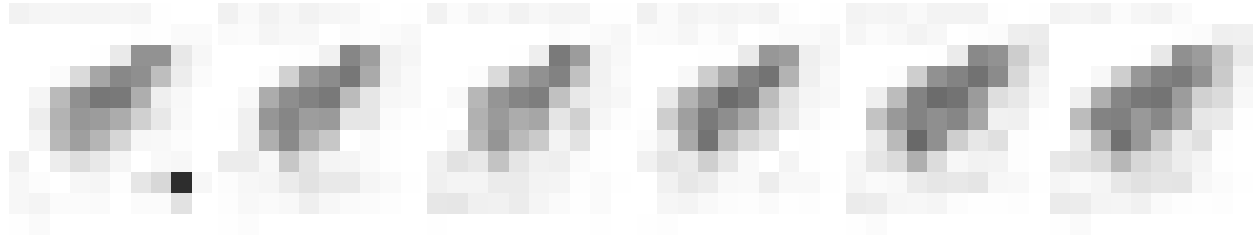
nigricans and its close relatives. Church (2003) considers *Stenaria* congeneric with *Houstonia*, based on molecular phylogeny. The resolution of generic limits in this group is still unresolved. As interpreted by Terrell (1991, 2001) and Turner (1995b), *Houstonia nigricans* is a polymorphic species, with *Houstonia nigricans* var. *nigricans* as a widespread "matrix variety," and other, much more local varieties warranting recognition. Turner (1995b) reports *Houstonia nigricans* var. *nigricans* (as *Hedyotis nigricans* var. *nigricans*) from Pickens County, SC; the documentation is not known to me, and suitable habitats there are unlikely. [= *Hedyotis nigricans* (Lamarck) Fosberg var. *nigricans* – K, U, Y; = *Stenaria nigricans* (Lamarck) Terrell var. *nigricans* – M; < *Hedyotis nigricans* – C, Q; < *Houstonia nigricans* (Lamarck) Fernald – F, G; > *Houstonia angustifolia* Michaux – S; > *Houstonia filifolia* (Chapman) Small – S; < *Stenaria nigricans* (Lamarck) Terrell var. *nigricans* – WH3]

Houstonia procumbens (Walter ex J.F. Gmelin) Standley, Creeping Bluet, Fairy-footprints, Roundleaf Bluet. Beach dunes, moist to wet sandy pinelands. October-April. Se. SC south to s. FL, west to se. LA. Gaddy & Rayner (1980) note that this plant is fairly common on SC barrier islands, but flowers in the winter and is easily overlooked in other seasons (when botanists are more likely to be afield). See Wilbur (1968) and Ward (2004c) for differing opinions about the merits of the taxonomic recognition of the glabrous and pubescent plants. [= RAB, K, S, WH3, X, Y; = *Hedyotis procumbens* (Walter ex J.F. Gmelin) Fosberg – Q; = *Houstonia rotundifolia* Michaux; > *Houstonia procumbens* var. *procumbens* – V; > *Houstonia procumbens* var. *hirsuta* (W.H. Lewis) D. B. Ward – V]

Houstonia purpurea Linnaeus var. *calycosa* Shuttleworth ex A. Gray, Midwestern Summer Bluet. Dry woodlands, banks, rock outcrops, shallow soils around mafic and calcareous rock outcrops. May-July; July-August. The distribution and ecology of var. *calycosa* in our area are poorly known; it apparently occupies drier and typically more circumneutral sites than var. *purpurea*. Var. *calycosa* ranges from s. ME and w. NY west to s. OH, and sw. MO, south to w. NC, n. GA, AL, MS, AR, and e. OK. [= G, K, WV, X, Y, Z; < *Houstonia purpurea* – Pa, RAB, W; < *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray – C, Q; = *Houstonia lanceolata* (Poirlet) Britton – F, S; = *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray var. *calycosa* (Shuttleworth ex A. Gray) Fosberg]

Houstonia purpurea Linnaeus var. *purpurea*, Summer Bluet. Moist and dry woodlands and forests, roadbanks, thinner soils around rock outcrops, a variety of disturbed sites. May-July; July-August. Var. *purpurea* ranges from DE, MD, and s. PA west to s. OH, s. IL, and sw. MO south to SC, sw. GA, Panhandle FL, MS, s. LA, e. TX, and e. OK. Plants growing in high elevation and exposed sites are sometimes dwarfed, and in that respect only, superficially resemble *H. montana*. [= G, K, Pa, WV, X, Y, Z; < *Houstonia purpurea* – RAB, W, WH3; = *Houstonia purpurea* – F, S; < *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray – C, Q; = *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray var. *purpurea*]

Houstonia pusilla Schoepf, Tiny Bluet. Woodlands, lawns, cemeteries, and other disturbed sites. March-April. MD south to Panhandle FL, west to TX, and inland from IL west to NE, south to TN and TX. The natural habitats and original distribution of this species are obscure. [= RAB, G, K, S, W, WH3, X, Y; = *Houstonia patens* Elliott – F; = *Hedyotis crassifolia* Rafinesque – C, GW; < *Hedyotis caerulea* (Linnaeus) Hooker – Q; = *Houstonia minima* L.C. Beck – S]



Houstonia rosea (Rafinesque) Terrell, Rose Bluet. {habitats}. AL west to TX and OK. [= K; = *Hedyotis rosea* Rafinesque] (synonymy incomplete)

Houstonia serpyllifolia Michaux, Appalachian Bluet, Thyme-leaf Bluet. Streambanks, grassy balds, moist forests, seepy rock outcrops, spray cliffs, and moist disturbed areas; common (uncommon in GA, VA, and WV). (March-) May-July. A Southern and Central Appalachian endemic: PA south to nw. SC and ne. GA. The flowers are very similar to, but usually a brighter blue than, the more widespread *H. caerulea*. [= RAB, F, G, K, Pa, S, W, WV, X, Y; = *Hedyotis michauxii* Fosberg – C, GW, Q]

Houstonia tenuifolia Nuttall, Diffuse-branched Bluet. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (NC, SC, VA): usually in dry woodlands, often rocky (especially mafic rocks) or sandy; uncommon (rare in Coastal Plain). May-July; July-October. This species is centered in the Southern Appalachians and the Ozarks, extending into provinces adjacent to both areas of concentration, ranging overall from PA west to MO and OK, south to SC, GA, and TX. [= RAB, F, G, S, W, WV, Z; = *Hedyotis nuttalliana* Fosberg – C; < *Hedyotis longifolia* (Gaertner) Hooker – Q; = *Houstonia longifolia* var. *tenuifolia* (Nuttall) Wood; = *Houstonia longifolia*, "Tenuifolia Group" – X; < *Houstonia longifolia* – K]



Mitchella Linnaeus (Partridge-berry)

A genus of 2 species, perennials, ours and 1 in e. Asia. References: Rogers (2005)=Z.

Mitchella repens Linnaeus, Partridge-berry. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): deciduous and coniferous forests, stream-banks, heath balds, maritime forests, on rotten logs; common. May-June; June-July. NS west to MN, south to c. peninsular FL and TX; disjunct in Guatemala. Plants in maritime forests are more robust than others and often have an ascending habit, the stems sometimes 20-30 cm tall. [= RAB, C, F, G, GW, K, Pa, S, W, WH3, WV, Z]

Mitracarpus Zuccarini (Girdle-pod)

A genus of about 30-40 species, of tropical America. References: Rogers (2005)=Z.

* ***Mitracarpus hirtus*** (Linnaeus) A.P. de Candolle, Girdle-pod. Cp (FL, GA, LA): disturbed areas; uncommon (rare in GA and LA), native of tropical America. Reported for GA Coastal Plain (Charlton County) (Carter, Baker, & Morris 2009). [= K, WH3, Z; ? *M. villosus* (Swartz) Chamisso & Schlechtendal ex A.P. de Candolle]

Oldenlandia Linnaeus (Oldenlandia)

A genus of about 100 species, pantropical, but circumscription is controversial and uncertain. References: Terrell & Robinson (2006)=X; Terrell (1991)=Z; Rogers (1987)=Y; GW; Rogers (2005).

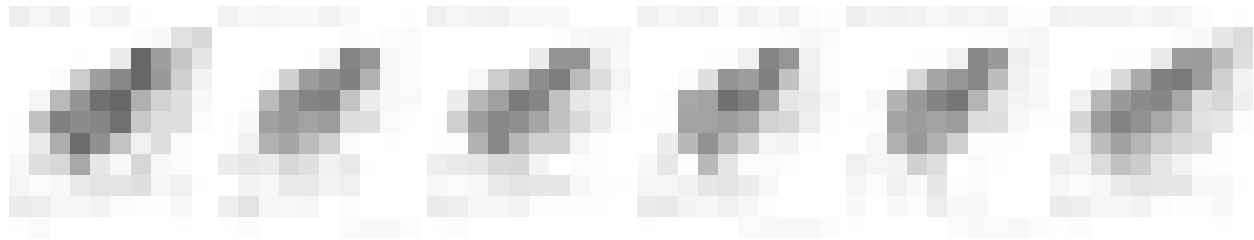
- 1 Creeping, mat-forming perennial, rooting at nodes; leaves 1.5-5.2 mm long; flowers solitary on slender axillary pedicels; seeds 4-14 per capsule.....***O. salzmannii***
- 1 Erect, spreading, decumbent, or prostrate annual or perennial, not rooting at nodes; leaves 3-40 mm long; flowers usually > 1, in axillary clusters or pedunculate umbels; seeds > 50 per capsule.
 - 2 Flowers (1) 2-5 in pedunculate axillary umbels, the filiform peduncle 5-10 mm long, the filiform pedicels 3-5 mm long***O. corymbosa***
 - 2 Flowers 1-10 in sessile or subsessile axillary clusters.
 - 3 Stem glabrous or nearly so; leaves mostly linear or linear-oblongate, 1-3 mm wide, generally 5-10× as long as wide; flowers solitary or (rarely) in 2-3-flowered clusters; plant a perennial***O. boscii***
 - 3 Stem pilose or villous (rarely glabrous); leaves mostly ovate or broadly lanceolate, 4-10 mm wide, generally 2-3× as long as wide; flowers in compact clusters of 3-10, rarely solitary; plant an annual***O. uniflora***

Oldenlandia boscii (A.P. de Candolle) Chapman, Bosc's Bluet. Clay-based Carolina bays, rivershore and millpond drawdown shores, sagponds, other seasonally saturated habitats. August-September. A Southeastern Coastal Plain endemic, ranging from se. VA south to FL and west to TX. Similar in vegetative condition to *Polypremum procumbens*. [= RAB, G, K, S, WH3, X, Z; = *Hedyotis boscii* A.P. de Candolle – C, F, GW, Y]

* ***Oldenlandia corymbosa*** Linnaeus, Diamond-flower. Moist lawns, gardens; native of South America. July-October. Reported for NC by Nesom (2000e). [= RAB, K, S, WH3, X, Z; = *Hedyotis corymbosa* (Linnaeus) Lamarck – GW, Y]

* ***Oldenlandia salzmannii*** (de Candolle) Benth & Hooker ex B.D. Jackson. Roadside ditches, marshes; native of South America. Introduced in s. AL and w. Panhandle FL. [= K, WH3, X]

Oldenlandia uniflora Linnaeus, Oldenlandia. Pondshores, muddy drawdown shores, moist to wet ecotones of Coastal Plain streamheads, other moist to wet places. August-October. Mostly a species of the Southeastern Coastal Plain: NY (Long Island) south to s. FL and west to TX, north in the interior to MO. [= RAB, G, K, S, WH3, X, Z; = *Hedyotis uniflora* (Linnaeus) Lamarck – C, F, GW, Y; = *Hedyotis glomerata* Elliott, a later name]



Paederia Linnaeus (Skunk-vine)

A genus of about 30 species, woody vines, of the Tropics. References: Rogers (2005)=Z; Diamond (1999).

* ***Paederia foetida*** Linnaeus, Skunk-vine. Disturbed areas, rarely spreading from plantings; native of se. Asia. Diamond (1999) reports its naturalization in Randolph County, NC; Carter, Baker, & Morris (2009) report its naturalization in several counties in the GA Coastal Plain. [= RAB, K, S, WH3, Z]

Pentodon Hochstetter in Krauss 1844

A genus of 2 species, herbs, of tropical and warm temperate America and Africa. References: Terrell (1991)=Z; Rogers (1987)=Y; Rogers (2005)=X.

* *Pentodon pentandrus* (K. Schumacher & Thonning) Vatke. Pond edges, wet meadows, moist ground; native of Africa. July-September. In North America, ranging from e. SC south to s. FL, west to se. TX. [= GW, K, WH3, X, Y, Z; ? *P. halei* (Torrey & A. Gray) A. Gray – S; ? *Oldenlandia halei* (Torrey & A. Gray) Chapman]

Pinckneya Michaux (Pinckneya, Fever-tree)

A monotypic genus, a small tree of the se. United States. References: Godfrey (1988); Rogers (1987)=Z.

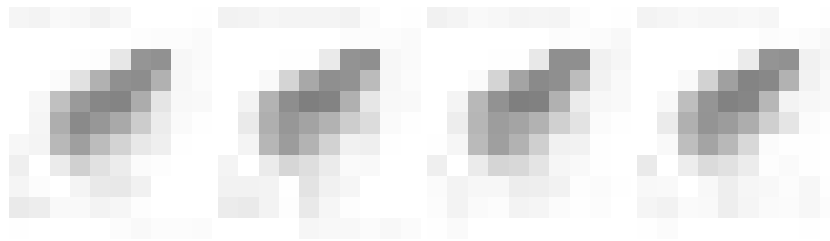
Identification notes: *Pinckneya* is showy when in flower because of the development of 1 of the 5 calyx lobes of some of the flowers of the inflorescence into a large (to 7 cm by 5 cm), petaloid (pink or cream) appendage.

Pinckneya bracteata (Bartram) Rafinesque, Pinckneya, Fever-tree. Margins of acidic, peaty (blackwater) swamps. May-June (-July); September. Se. SC south to ne. FL and Panhandle FL. [= GW, K, WH3, Z; = *P. pubens* Michaux – RAB, S]

Psychotria Linnaeus 1759 (Wild Coffee)

A genus of about 2000 species, mostly shrubs, tropical and subtropical. References: Rogers (2005)=Z.

Psychotria nervosa Swartz, Wild Coffee. Hammocks. Ne. FL (Duval County) south to s. FL, West Indies, Central America, and South America. [= K, S, WH3, Z]

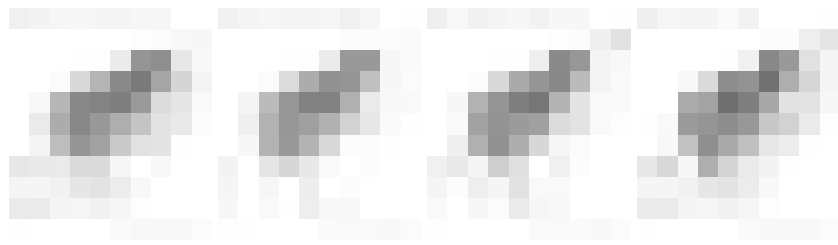


Richardia Linnaeus (Richardia)

A genus of about 15 species, of subtropical and tropical America, and introduced in the Old World. References: Lewis & Oliver (1974)=Z; Rogers (2005)=Y; Krings (2002). Key based in part on Krings (2002).

- 1 Mericarps smooth; corolla 4-lobed; [section *Asterophyton*].....*R. humistrata*
- 1 Mericarps **either** conspicuously and densely hispidulous to strigose **or** papillose to tuberculate; corolla 6-lobed; [section *Richardia*].
 - 2 Stems hirsute, generally densely and evenly so from tip to base; adaxial leaf surface evenly strigose; mericarps conspicuously and densely hispidulous to strigose, the adaxial face broad, with a pronounced median keel; perennial from a woody rhizome (or annual)*R. brasiliensis*
 - 2 Stems hirsute or villous near the tips, but progressively more sparsely so to glabrate toward the base; adaxial leaf surface glabrous to strigillose near the margins only, the median portion of the leaf blade glabrous; mericarps papillose to tuberculate, the adaxial surface closed to a narrow groove; annual.
 - 3 Corolla (8-) 12-20 (-25) mm long, pink to lilac; mericarp papillae blunt and rounded; [FL peninsula only][*R. grandiflora*]
 - 3 Corolla (2.5-) 5-7 (-10-5) mm long, white (sometimes with the lobes pale pink or lilac); mericarp papillae acute; [widespread]*R. scabra*

- * *Richardia brasiliensis* Gomes. Roadsides, fields, vacant lots, urban areas, disturbed areas; native of South America. May-November. [=RAB, C, F, K, S, WH3, Y, Z]
- * *Richardia grandiflora* (Chamisso & Schlechtendal) J.A. & J.H. Schultes, Largeflower Richardia. Cp (FL): disturbed areas; rare, native of South America (mainly Brazil). Reported for Alachua County, immediately south of our area (Kunzer et al. 2009), and “rapidly spreading.” [= K, WH3, Y, Z]
- * *Richardia humistrata* (Chamisso & Schlechtendal) J.A. & J.H. Schultes. Disturbed areas, savannas, pine flatwoods; native of South America. Also collected in 1886 as a ballast waif in Camden County, NJ; first noted on the Gulf Coast only in 1941, but perhaps early introduced there on ballast as well, such as at Pensacola. [= K, WH3, Y, Z]
- * *Richardia scabra* Linnaeus. Roadsides, fields, vacant lots, urban areas, disturbed areas; native of South America. June - December. Lewis & Oliver (1974) consider this species to be native from our area south through Central America into northern South America, based on the semi-contiguous distribution, but occurrences in our region seem to be in altered habitats. [= RAB, C, F, G, K, S, WH3, Y, Z]



Spermacoce Linnaeus (Buttonweed)

A genus of about 150-250 species, herbs, of tropical and warm-temperate Old and New World. Here circumscribed to include *Borreria* G.F.W. Meyer. References: Ward (2011b)=Y; Rogers (2005)=Z.

- 1 Calyx with 2 long lobes, the other 2 absent or vestigial (much shorter than the 2 long lobes).
 - 2 Terminal head 1-3 cm wide; leaves broadly elliptic, the blade 3-4 cm long, 1.2-1.5 cm wide, obtuse to rounded at the apex*S. densiflora*
 - 2 Terminal head 0.5-1 cm wide; leaves ovate to linear, acute at the apex.
 - 3 Leaves ovate-elliptic, with 3-5 pairs of lateral veins; calyx longer than the corolla *S. ocymoides*
 - 3 Leaves linear to linear-lanceolate, with 1-2 pairs of lateral veins; calyx shorter than the corolla..... [*S. verticillata*]
- 1 Calyx with 4 lobes of nearly equal length.
 - 4 Flowers in terminal glomerules; stamens exserted; corolla white with a pink throat.....*S. remota*
 - 4 Flowers in axillary glomerules; stamens included; corolla white.
 - 5 Corolla villous in the throat; sepals rotate in fruit, long-deltoid, < 2× as long as width at base.....*S. glabra*
 - 5 Corolla not villous in throat; sepals erect in fruit, narrowly triangular, > 5× as long as width at base [*S. tenuior*]

* *Spermacoce densiflora* (deCandolle) A.H. Liogier. Cp (FL): disturbed areas; rare, native of the Neotropics. [= K1, K2, WH3, Y, Z; = *Borreria densiflora* deCandolle] {add to synonymy}

Spermacoce glabra Michaux, Smooth Buttonweed. Moist shores, bottomlands, riverside drawdowns, rocky riversides in the mountains, disturbed areas in the Coastal Plain. C. MD, s. OH, c. IN, c. IL, MO, and e. KS south to s. SC, Panhandle FL, s. AL, s. MS, LA, and e. TX. Perhaps only introduced in some parts of our area; see Wieboldt et al. (1998) for discussion. [= C, F, G, GW, K1, K2, RAB, S, WH3, Y, Z]

Spermacoce ocymoides Burmann f. Wet pine flatwoods, floodplain forests. FL, AL, MS, south through the New World tropics. July-September. I follow Ward (2011a) in provisionally accepting *S. ocymoides* as the correct name for our plant, until a more definitive rationale for its rejection in favor of *S. prostrata* is made. [= Y; ? *S. prostrata* Aublet – K1, K2, WH3; = *Borreria ocymoides* (Burmann f.) deCandolle – S]

Spermacoce remota Lamarck. Wet hammocks, bottomland forests, marshes. July-September. Sw. GA, s. AL, and FL; Central America, South America, and the West Indies. [= K2, WH3; > *S. assurgens* Ruiz & Pavón – K1, Y; = *Borreria laevis* (Lamarck) Grisebach – GW, S, misapplied; ? *Borreria brachysepala*, misapplied] {add to synonymy}

* *Spermacoce tenella* Kunth. Reported for Pensacola, Escambia County, FL by Small (1933); presumably merely a ballast waif. [= Y; = *Borreria tenella* (Kunth) Chamisso & Schlechtendal – S] {not keyed; rejected as a component of our flora}

* *Spermacoce tenuior* Linnaeus. Reported from sw. GA and MS (Kartesz 1999, 2010). {IDs need checking; unlikely} [= K1, K2, S; ? *S. riparia* Chamisso & Schlechtendal]

* *Spermacoce verticillata* Linnaeus, Shrubby Buttonweed, Bóton Blanco. Disturbed areas; native of Neotropics. Reported for several counties in the n. FL peninsula just south of our area (Kartesz 2010). [= K2, WH3, Y, Z; = *Borreria verticillata* (Linnaeus) Meyer]



A family of about 87 genera and about 1650 species, herbs, shrubs, and trees, cosmopolitan (Struwe & Albert 2002). References: Ho & Liu (1999); Wood & Weaver (1982); Struwe & Albert (2002). [also see *MENYANTHACEAE*]

- 1 Leaves all scale-like, 1-3 (-5) mm long, appressed to the stem; [tribe *Gentianeae*, subtribe *Swertiinae*].....**5. *Bartonia***
- 1 Leaves larger, spreading or ascending.
 - 2 Stem leaves whorled; plants robust, 1-3 m tall; [tribe *Gentianeae*, subtribe *Swertiinae*]..... **7. *Frasera***
 - 2 Stem leaves opposite; plants generally < 1 m tall.
 - 3 Calyx lobes 2; stem leaves obovate, widest near the rounded tip, 0.5-1.5 cm long, crowded near the tip of the stem, basal rosette never present; [of nutrient-rich, mesic forests]; [tribe *Gentianeae*, subtribe *Swertiinae*] **6. *Obolaria***
 - 3 Calyx lobes 4-5; stem leaves lanceolate, ovate, elliptic or narrowly elliptic (widest near the middle or toward the base, the tip acute or acuminate), mostly > 1.5 cm long, distributed fairly evenly along the stem, basal rosettes sometimes present; [of various more-or-less open habitats (except some species of *Gentiana*, which can occur in nutrient-rich, mesic forests)].
 - 4 Corolla lobes 5-14, longer than the corolla tube, pink or white; [common natives]; [tribe *Chironieae*, subtribe *Chironiinae*].
 - 5 Stigmas shorter than the style.....**2. *Eustoma***
 - 5 Stigmas equaling or longer than the style.....**1. *Sabatia***
 - 4 Corolla lobes 4-5, shorter than the corolla tube, blue, lavender, pink or white.
 - 6 Corolla tube < 2 mm wide; [rare to uncommon aliens, naturalized in disturbed areas]; [tribe *Chironieae*, subtribe *Chironiinae*].
 - 7 Style not divided or subcapitate; stigma lobes rhombic to fan-shaped, not fleshy; capsule elliptic to ovoid.....**4. *Schenkia***
 - 7 Style slightly bifid; stigma lobes reniform to shoe-shaped, fleshy; capsule linear**3. *Centaureum***
 - 6 Corolla tube > 3 mm wide.
 - 8 Corolla lobes alternating with corolla appendages (appearing as plaits or lobes, these often toothed, notched, or lacerate, sometimes as long as or longer than the true corolla lobes); main stem leaves cuneate at the base; perennial; [tribe *Gentianeae*, subtribe *Gentianinae*]**10. *Gentiana***
 - 8 Corolla lobes not alternating with corolla appendages; main stem leaves rounded to cordate at the base; biennial or annual; [tribe *Gentianeae*, subtribe *Swertiinae*].
 - 9 Corolla lobes 4, finely fringed; main stem leaves rounded at base, with lateral veins obscure; biennial **8. *Gentianopsis***
 - 9 Corolla lobes 5, entire, not fringed; main stem leaves cordate (the cordate bases often overlapping the opposite leaf), with 2-3 well-developed lateral veins (prominently visible on the lower surface); annual **9. *Gentianella***

I. Sabatia Adanson 1763 (*Sabatia*, Rose-gentian, Rose-pink, Marsh-pink, Sea-pink)
(contributed by B.A. Sorrie and A.S. Weakley)

A genus of about 20 species, of North America and the West Indies. References: Wilbur (1955)=Z.

- 1 Flowers with (7-) 8-12 (-14) corolla lobes.
 - 2 Pedicels < 5 mm long; calyx subtended by linear bracts that usually exceed the corolla lobes; terminal flowers in capitate clusters (less commonly single).
 - 3 Basal leaves similar in shape and size to the stem leaves; cauline leaves (25-) 35-50 (-65) mm long, (7-) 10-20 (-25) mm wide, 2-4× as long as wide; corolla lobes pale rose or white; [of mountain slopes, restricted in our area to sw. NC and nw. GA] ***S. capitata***
 - 3 Basal leaves much broader and shorter than the stem leaves; cauline leaves (15-) 40-80 (-100) mm long, 1-3 mm wide, 20-60× as long as wide; corolla lobes medium rose to deep rose; [of bogs and savannas, of the Coastal Plain]***S. gentianoides***
 - 2 Pedicels > 10 mm long; calyx not subtended by long bracts; terminal flower single.
 - 4 Upper stem leaves about as wide as the diameter of the stem, or narrower; calyx lobes terete or semi-terete; stems 6-12 dm tall; [of *Taxodium ascendens*-*Nyssa biflora* depressions and wet pine flatwoods in se. SC].....***S. bartramii***
 - 4 Upper stem leaves much wider than the diameter of the stem; calyx lobes flat, linear to narrowly oblanceolate; stems 3-12 dm tall; [of various habitats, primarily along the shores of blackwater rivers or ponds, or in tidal marshes].
 - 5 Primary branches opposite; terminal flower short-stalked (much shorter than the first internode of the adjacent branch); stems 5-12 dm tall; [of drawdown blackwater riverbanks and similar situations]..... ***S. kennedyana***
 - 5 Primary branches usually alternate; terminal flower long-stalked (usually longer than the first internode of the adjacent branch); stems 3-7 dm tall; [of brackish marshes or openings along blackwater streams].
 - 6 Surficial stolons usually absent or poorly developed; internodes commonly much longer than leaves; [of tidal brackish or freshwater marshes] ***S. dodecandra***
 - 6 Surficial stolons usually present and well-developed, elongate; internodes shorter than to equaling the leaves; [of openings of blackwater streams]***S. foliosa***
 - 1 Flowers with 5-6 (-7) corolla lobes.
 - 7 Upper branches of main stem alternate.
 - 8 Calyx tube strongly winged; corolla lobes pink (rarely white); [w. KY, MS, and se. LA westward, and very rarely introduced farther east].
 - 9 Leaves thick, succulent; leaf base broadly cuneate, not at all clasping; [se. LA westward]***S. arenicola***
 - 9 Leaves thin; leaf base truncate to rounded, and clasping the stem; [w. KY, MS, and se. LA westward, and very rarely introduced farther east].....***S. campestris***
 - 8 Calyx tube not winged; corolla lobes pink or white; [more widespread, primarily Coastal Plain].
 - 10 Calyx lobes foliaceous, 5-8 mm wide, oblong to oblanceolate, mostly exceeding the corolla lobes.....***S. calycina***
 - 10 Calyx lobes linear-setaceous, 0.5-2 mm wide, if equaling the corolla lobes then very narrow and not foliaceous.
 - 11 Calyx lobes (3-) 4-7 (-8) mm long; corolla lobes white***S. brevifolia***
 - 11 Calyx lobes (4-) 6-17 (-23) mm long; corolla lobes pink (rarely white in individual plants).
 - 12 Plants perennial, often with several stems from a caudex; calyx lobes > 3/4× as long as the corolla lobes, and sometimes exceeding them; [of saturated soils from Coastal Plain savannas to Mountain bogs]***S. campanulata***
 - 12 Plants annual, solitary; calyx lobes up to 3/4× as long as the corolla lobes
 - 13 Corolla lobes (18-) 20-25 mm long; leaves succulent (usually drying rugose and green).....***S. grandiflora***

- 13 Corolla lobes 10-15 mm long; leaves thin (usually drying flat and darkening) *S. stellaris*
- 7 Upper branches of main stem opposite.
- 14 Corolla lobes pink (rarely white); pedicels at least in part > 5 mm long.
- 15 Lower half of stem winged; leaves ovate, clasping, < 2× as long as wide; [widespread in our area] *S. angularis*
- 15 Lower half of stem not winged; leaves elliptic to lanceolate, more or less tapered to the base, mostly > 3× as long as wide; [of the Coastal Plain or very rarely Piedmont] *S. brachiata*
- 14 Corolla lobes white or creamy white; pedicels (above the uppermost bracts or branches) ca. 1-2 (-5) mm long.
- 16 Lower portion of stem quadrangular, narrowly winged; plants annual or biennial, with 1 (-several) stems arising from a taproot *S. quadrangula*
- 16 Lower portion of stem terete, not winged (though the upper stem is quadrangular or angled in *S. difformis*); plants perennial, with several stems arising from a short rhizome; [section *Eusabatia*, subsection *Difformes*].
- 17 Leaves and upper stem not glaucous; stem terete below, becoming quadrangular or quadrangular-angled above; corolla lobes (5-) 7-15 (-21) mm long; [widespread in our area] *S. difformis*
- 17 Leaves and upper stem glaucous; stem terete throughout; corolla lobes (4-) 5-7 (-8) mm long; [of GA southward and westward].
- 18 Calyx-lobes erect, (0.1-) 0.2-1.5 (-2.0) mm long, as long as or shorter than the calyx-tube; [of sw. GA and n. FL westward to e. LA] *S. macrophylla* var. *macrophylla*
- 18 Calyx lobes strongly recurved, (1.0-) 1.5-3 mm long, longer than the calyx-tube; [of e. and sc. GA south to ne. FL] *S. macrophylla* var. *recurvans*

Sabatia angularis (Linnaeus) Pursh, Bitter-bloom, Common Marsh-pink. Forests, woodlands, marshes, fields, calcareous hammocks (in FL). July-August; September-October. NY west to s. MI, IL, and e. KS, south to Panhandle FL and e. TX. [= RAB, C, F, GW, K, Pa, W, WH, WV, Z; = *Sabbatia angularis* -S]

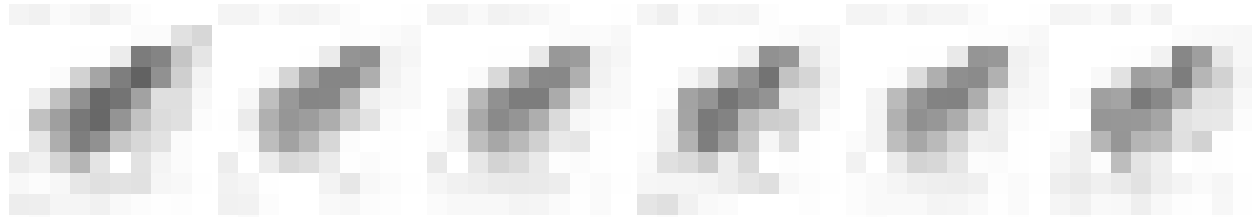
Sabatia arenicola Greenman, Sand Rose-gentian. Interdune depressions, wet savannas, saline flats. April-July. Se. LA west through TX to ne. MX. [= GW, K, Z]

Sabatia bartramii Wilbur, Bartram's Rose-gentian. Margins of *Taxodium ascendens*-*Nyssa* depressions, wet pine flatwoods. June-August; August-October. Ne. SC south to s. FL, west to s. AL and se. MS. [= GW, K, WH, Z; = *S. dodecandra* var. *coriacea* (Elliott) H.E. Ahles - RAB; = *Sabbatia decandra* (Walter) R.M. Harper - S]

Sabatia brachiata Elliott, Narrowleaf Rose-pink. Mesic pinelands, sandhills, pine savannas, pine flatwoods. Late May-July; August-September. Se. VA south to s. GA, west to LA, north in the interior to c. TN and se. MO. [= RAB, C, F, GW, K, W, Z; = *Sabbatia brachiata* - S]

Sabatia brevifolia Rafinesque. Pine savannas. September-October; October-November. E. SC south to peninsular FL, west to s. AL. [= RAB, GW, K, WH, Z; = *Sabbatia elliotii* Steudel - S]

Sabatia calycina (Lamarck) Heller, Coastal Rose-pink. Swamp forests, river banks. June-October; July-October. Se. VA south to s. FL, west to se. TX; e. Cuba and Hispaniola. [= RAB, C, F, GW, K, WH, Z; = *Sabbatia calycina* - S]



Sabatia campanulata (Linnaeus) Torrey, Slender Marsh-pink. Pine savannas, bogs. June-August; September-October. MA south to ne. FL, Panhandle FL, west to LA and AR; scattered inland as in w. VA, w. NC, c. TN, and KY. [= RAB, C, GW, K, Pa, W, WH, Z; > *S. campanulata* var. *campanulata* - F; > *S. campanulata* var. *gracilis* (Michaux) Fernald - F; < *Sabbatia campanulata* - S]

* *Sabatia campestris* Nuttall, Western Marsh-pink, Prairie Rose-gentian, Prairie Sabatia. Roadsides and woodland edges; native of c. United States. July-August; September-October. [= RAB, C, F, GW, K, Z]

Sabatia capitata (Rafinesque) Blake, Cumberland Rose-gentian. Sloping woodlands and meadows, over sandstone or shale. July-August; September-October. Sw. NC and se. TN south to nw. GA and c. AL. Apparently present in NC, at least formerly, based on a specimen collected "from Cherokee", probably Cherokee County, NC, a remarkably poorly botanized area. [= K, Z; = *Lapithea capitata* (Rafinesque) Small - S]

Sabatia difformis (Linnaeus) Druce, Lanceleaf Rose-gentian, White Sabatia. Pine savannas, bogs, pocosins. May-September; September-December. S. NJ south to c. peninsular FL, west to s. AL. [= RAB, C, F, GW, K, WH, Z; = *Sabbatia difformis* - S]

Sabatia dodecandra (Linnaeus) Britton, Sterns, & Poggenburg, Perennial Sea-pink, Large Marsh Rose-pink. Tidal brackish and freshwater marshes. June-August; August-October. CT south to e. SC and e. GA (Sorrie 1998b). [= F; < *S. dodecandra* var. *dodecandra* - RAB (also see *S. foliosa*); = *S. dodecandra* var. *dodecandra* - C, GW, K, Z; = *Sabbatia dodecandra* - S]

Sabatia foliosa Fernald. Openings along blackwater rivers, cypress ponds. June-August; August-October. E. SC south to ne. FL and Panhandle FL, west to se. TX. [< *S. dodecandra* var. *dodecandra* - RAB; = *S. dodecandra* (Linnaeus) Britton, Sterns, & Poggenburg var. *foliosa* (Fernald) Wilbur - GW, K, Z; > *Sabbatia foliosa* - S; > *Sabbatia harperi* Small - S; = *S. dodecandra* - WH]

Sabatia gentianoides Elliott. Pine savannas, bogs. July-August; September-October. NC south to ne. FL and Panhandle FL, west to se. TX. [= RAB, GW, K, WH, Z; = *Lapithea gentianoides* (Elliott) Grisebach – S]

Sabatia grandiflora (Gray) Small, Largeflower Rose-gentian. Cp (FL): wet flatwoods, marshes, cypress-gum depressions, limesink ponds, borrow pits; common. Ne. FL, Panhandle FL, s. AL, south to s. FL. [= GW, K, WH, Z; = *Sabbatia grandiflora* – S]

Sabatia kennedyana Fernald, Plymouth Gentian. Seasonally exposed drawdown banks of the Waccamaw River, in adjacent ditches and disturbed flats (in se. NC and ne. SC), and very rarely on shores of beaver ponds (in e. VA, by introduction). June-August; August-October. This species has a strange, disjunct range, likely related to Pleistocene refugia on the (now) Continental shelf, present in s. NS; e. MA and RI; se. NC and ne. SC. The record of the species in e. VA (Caroline County) reported by Fleming & Ludwig (1996) has now been determined to be a deliberate introduction. Studies underway suggest that the Carolina plants may differ varietally from those in New England (Sorrie, pers. comm.). [= C, F, GW, K, Z; = *S. dodecandra* var. *kennedyana* (Fernald) H.E. Ahles – RAB]

Sabatia macrophylla Hooker var. *macrophylla*, Large-leaf Rose-gentian. Wet savannas. Sw. GA west to e. LA. [= K, Z; < *S. macrophylla* – GW, WH; = *Sabbatia macrophylla* Hooker – S]

Sabatia macrophylla Hooker var. *recurvans* (Small) Wilbur, Small's Rose-gentian. Wet savannas. E. and c. GA south to ne. FL; it may occur in se. SC. [= K, Z; < *S. macrophylla* – GW, WH; = *Sabbatia recurvans* Small – S]

Sabatia quadrangula Wilbur, Four-angle Sabatia. Sandhills, moist forests, pocosin ecotones. June-September; August-November. E. VA south to n. peninsular FL, west to s. AL. [= RAB, C, GW, K, WH, Z; = *S. paniculata* Michaux – F, misapplied; = *Sabbatia paniculata* – S]

Sabatia stellaris Pursh, Annual Sea-pink. Brackish marshes. July-October; August-November. S. MA south to s. FL, west to LA; Bahama Islands, Cuba, c. Mexico. [= RAB, C, F, GW, K, WH, Z; < *Sabbatia campanulata* – S]

2. *Eustoma* Salisbury ex G. Don (Prairie-gentian)

A genus of 3 species, annual to perennial herbs, of se., c., and sw. North America south to Mexico and Belize and in the West Indies. References: Shoiners (1957)=Z; Wood & Weaver (1982)=Y.

Eustoma exaltatum (Linnaeus) Salisbury ex G. Don, Prairie-gentian. Cp (FL): alkaline prairies, saline coastal areas; rare. AL and peninsular FL west to TX, south to Mexico and Belize; West Indies. June-November. [= GW, S, WH, Y, Z; = *E. exaltatum* ssp. *exaltatum* – K]

3. *Centaurium* Hill 1756 (Centaury)

A genus of about 20 species, herbs, mainly north temperate. References: Mansion (2004)=Z.

- 1 Flowers pedicellate, the pedicels 3-5 mm long *C. pulchellum*
- 1 Flowers sessile or nearly so (sometimes appearing stalked but with bracteal leaves immediately below the calyx).
 - 2 Inflorescence a corymbiform cyme (about as broad as long, the central axis poorly developed)..... *C. erythraea*
 - 2 Inflorescence a spikelike cyme (distinctly elongate, the central axis straight).....[see *Schenkia*]

* *Centaurium erythraea* Rafn, Common Centaury, Forking Centaury. Lawns, disturbed areas; native of Europe and w. Asia. July-September. [= C, K, Pa, Z; = *C. minus* – RAB, later homonym; = *C. umbellatum* – F, G, later homonym]

* *Centaurium pulchellum* (Swartz) Druce, Lesser Centaury, Branching Centaury. Disturbed areas; native of Europe. June-September. [= C, F, G, K, Pa, S, Z]

4. *Schenkia* Grisebach 1853 (Centaury)

A genus of 5 species, herbs, widely distributed in the Old World. References: Mansion (2004)=Z.

* *Schenkia spicata* (Linnaeus) Mansion, Spiked Centaury. Disturbed areas; native of s. Europe. July-August. [= Z; = *Centaureum spicatum* (Linnaeus) Fritsch – C, F, G, K]



5. *Bartonia* Muhlenberg ex Willdenow (Bartonia)

A genus of 3 species, herbs, of e. North America. The genus has coraloid mycorrhizae and lacks root hairs, and is thus presumably partially mycotrophic. References: Mathews et al. (2009)=Y; Gillett (1959)=Z.

- 1 Corolla lobes white, 4-9 mm long, spreading, spatulate to obovate, rounded at the apex; flowering in early spring (rarely to early summer) *B. verna*
- 1 Corolla lobes green to creamy white, 2-3 (-5.2) mm long, ascending or erect, oblong to ovate or lance-ovate, acuminate or rounded-mucronate at the apex; flowering in summer or fall (July-October).
 - 2 Mid-cauline scale leaves alternate; corolla lobes acuminate at the apex, their margins entire; anthers 0.3-0.5 mm long *B. paniculata* ssp. *paniculata*
 - 2 Mid-cauline scale leaves opposite; corolla lobes rounded at the apex, abruptly narrowed to a mucro, their margins erose (uncommonly entire); anthers 0.5-1.1 mm long *B. virginica*

Bartonia paniculata (Michaux) Muhlenberg ssp. *paniculata*, Screwstem Bartonia. Swamps, bogs, pocosins, pocosin ecotones, sphagnum seepages, sinkhole ponds. August-October; September-October. Ssp. *paniculata* ranges from MA south to c. peninsular FL and west to e. TX, chiefly on the Coastal Plain, but with scattered occurrences inland (to c. VA, w. NC, KY, and AR). Ssp. *iodandra* (B.L. Robinson) J. Gillett is more northern, ranging from NL (Newfoundland) south to MA. Ssp. *texana* (Correll) K. Mathews, Dunne, E. York, & Struwe is endemic to the West Gulf Coastal Plain of w. LA and e. TX, where it is more-or-less sympatric with ssp. *paniculata* (Mathews et al. 2009). [= K, Y, Z; < *B. paniculata* – RAB, GW, Pa, WH; = *B. paniculata* – G; = *B. paniculata* var. *paniculata* – C, F; = *B. lanceolata* Small – S]

Bartonia verna (Michaux) Rafinesque ex Barton, Spring Bartonia, White Bartonia. Wet pine savannas, shores of Coastal Plain depression ponds, other moist sands. (November-) February-April (-June); April-June. VA (one site known from City of Virginia Beach) (Belden et al. 2004) and se. NC (Carteret County) south to s. FL, west to se. TX. Wood & Weaver's (1982) speculation that *B. verna* is an outlier relative to the other species appears not to be true, with the true division being between *B. verna/virginica* on one hand and the *B. paniculata* subspecies on the other (Mathews et al. 2009). [= RAB, GW, K, S, WH, Y, Z]

Bartonia virginica (Linnaeus) Britton, Sterns, & Poggenburg, Virginia Bartonia. Bogs, swamps, savannas, pocosin ecotones, pocosins. July-October; September-October. NS and QC west to WI, south to n. FL and LA. [= RAB, C, F, G, GW, K, Pa, S, WH, Y, Z]

6. *Obolaria* Linnaeus (Pennywort)

A monotypic genus, herb, of e. North America. References: Gillett (1959)=Z.

Obolaria virginica Linnaeus, Pennywort. Nutrient-rich, moist forests, mesic hammocks. March-June; May-July. NJ west to OH, s. IN, and s. IL, south to Panhandle FL and se. LA (reported from TX). The small purplish-green plants are inconspicuous, often nearly hidden under fallen leaves. *Obolaria* has well-developed mycorrhizae and may be substantially mycotrophic. [= RAB, C, F, G, K, Pa, S, W, WH, WV, Z]

7. *Frasera* Walter (Columbo)

A genus of 15 species, herbs, primarily of w. North America. References: Threadgill & Baskin (1978)=Z; Horn (1997).

Frasera caroliniensis Walter, American Columbo. Mt (GA, NC), Pd (GA, SC): rich forests over mafic or calcareous rocks, upper slopes of cove forests, floodplain forests; rare. Late May-June; September-October. W. NY, nw. PA, and s. ON west to IL, MI, MO, and e. OK, south to w. SC, n. GA, and LA, primarily west of the Blue Ridge. Horn (1997) studied the ecology of this species in the Piedmont of SC. [= C, K, S, W, Z; = *Swertia caroliniensis* (Walter) Kuntze – RAB, F, G, Pa]



8. *Gentianopsis* Ma 1951 (Fringed-gentian)

A genus of about 20 species, herbs, of north temperate Asia and North America. The reasons for the recognition of *Gentianopsis* are enumerated by Ma (1951), Iltis (1965), and Wood & Weaver (1982). References: Gillett (1957)=Z; Iltis (1965); Ma (1951).

Gentianopsis crinita (Frölich) Ma, Eastern Fringed-gentian. Sunny or semi-shaded seepage areas over calcareous, mafic, or ultramafic rocks (such as limestone, amphibolite, or serpentized olivine). September-October. ME, s. ON, and ND south to NJ, n. DE, IN, and IA (mostly north of the glacial maximum) and from PA south to nw. NC and ne. GA in the unglaciated Appalachians. Certainly one of the most beautiful of our native plants. [= C, K, Pa; = *Gentiana crinita* Frölich – RAB, F, G, GW, W, WV; = *Anthopogon crinitum* (Frölich) Rafinesque – S; = *Gentianella crinita* (Frölich) G. Don ssp. *crinita* – Z]

9. *Gentianella* Moench (Agueweed)

A genus of about 125-250 species, herbs, temperate. The separation of *Gentianella* from *Gentiana* appears to be well warranted; some characters suggest that *Gentianella* is more closely allied to *Swertia*, *Halenia*, and *Lomatogonium* than to *Gentiana* (Wood & Weaver 1982). A molecular analysis has confirmed this (Yuan & Küpfer 1995). References: Gillett (1957)=Z. Key based on Gillett (1957).

- 1 Calyx 8-10 mm long; calyx tube 3.0-3.5 mm long; calyx lobes 5-6 mm long, elliptic-lanceolate to oblanceolate with thickened margins, and with broadly flattened, frequently nerve-like keels; corolla ca. 20 mm long..... *G. quinquefolia* var. *occidentalis*
- 1 Calyx 4-5 mm long; calyx tube 1.5-2.0 mm long; calyx lobes 2.0-2.5 mm long, narrowly triangular with hyaline margins and very prominent keels; corolla 16-18 mm long *G. quinquefolia* var. *quinquefolia*

Gentianella quinquefolia (Linnaeus) Small var. *occidentalis* A. Gray, Western Agueweed. Calcareous barrens, dry and dry-mesic limestone woodlands. Late August-October. Var. *occidentalis* A. Gray is more western, from OH and s. ON west to MN, east and south to w. VA, sc. KY, AR, and se. KS. [= C, G; < *Gentiana quinquefolia* Linnaeus – RAB, GW, W; = *Gentiana quinquefolia* var. *occidentalis* (A. Gray) Hitchcock – F; = *Gentianella quinquefolia* ssp. *occidentalis* (A. Gray) J. Gillett – K, Z; = *Gentianella occidentalis* (A. Gray) Small – S]

Gentianella quinquefolia (Linnaeus) Small var. *quinquefolia*, Eastern Agueweed. Forests, grassy balds. Late August-October. Var. *quinquefolia* is primarily Appalachian, from ME west to w. NY and s. ON, south to n. GA and sc. TN. [= C, G; < *Gentiana quinquefolia* Linnaeus – RAB, GW, W, WV; = *Gentiana quinquefolia* var. *quinquefolia* – F; = *Gentianella quinquefolia* ssp. *quinquefolia* – K, Z; < *Gentianella quinquefolia* – Pa; = *Gentianella quinquefolia* – S]

10. *Gentiana* Linnaeus 1753 (Gentian)

A genus of about 350-400 species, herbs, primarily temperate and arctic. Even following the removal of *Gentianopsis* and *Gentianella* (to separate genera and a different subtribe), *Gentiana* is a large and apparently heterogeneous group, perhaps not monophyletic. No satisfactory comprehensive treatment is available, however. All of the species treated here as *Gentiana* are in the distinctive group often treated as section, subgenus, or genus *Pneumonanthe*. References: Pringle (1967)=Z; Halda (1996)=Y; Ho & Liu (2001)=X; Pringle & Weakley (2009)=Q; Ho & Liu (1990); Yuan, Küpfer, & Doyle (1996); Pringle (1977). Key adapted from Z.

Identification Notes: In some species it may be somewhat difficult to interpret the corolla lobes and the corolla appendages. The filaments are alternate to the corolla lobes, and are therefore attached to the lower portion of the corolla appendages.

- 1 Flower solitary (rarely 2 or 3); corolla spotted within; leaves twisted, oblanceolate to oblinear; [subgenus *Pneumonanthe*, series *Angustifoliae*].
 - 2 Calyx lobes widest at base, the sides then parallel upward for a distance; corolla exterior intensely indigo blue; [of s. NJ and adjacent DE, and from se. VA south through e. NC to nc. SC] *G. autumnalis*
 - 2 Calyx lobes widest above the base, narrowing upward and downward from that point; corolla exterior dull purplish-green; [of FL Panhandle]..... *G. pennelliana*
- 1 Flowers clustered; corolla not spotted within; leaves planar, mostly lanceolate, elliptic, or ovate (rarely linear); subgenus *Pneumonanthe*, series *Pneumonanthe*].
 - 3 Calyx lobes keeled, the keel decurrent on the calyx tube, the margins of the lobes entire (as seen at 10×); corolla greenish-white or yellowish-white; leaves ovate to lanceolate, acuminate..... *G. alba*

- 3 Calyx lobes not keeled, the margins of the lobes conspicuously ciliate (as seen at 10×, except entire to minutely denticulate in *G. linearis* and *G. villosa*); corolla white, greenish-white, or variously blue; leaves various.
- 4 Corolla greenish-white (sometimes somewhat purplish); seeds wingless; lower leaves spatulate to obovate *G. villosa*
- 4 Corolla blue, purplish, pale blue, or nearly white; seeds winged; lower leaves linear, lanceolate, elliptic, or ovate.
 - 5 Margins of leaves and calyx lobes entire to minutely denticulate; corolla appendages obliquely triangular, broader than high (sometimes with a minute deflexed segment)..... *G. linearis*
 - 5 Margins of leaves and calyx lobes conspicuously ciliate (as seen at 10×); corolla appendages with 2 teeth, as long as broad or longer (sometimes with a deflexed segment, if so, the deflexed segment about as long as the erect one).
 - 6 Anthers separate at anthesis; outer surfaces of petals suffused with green; calyx lobes linear-subulate, about as long as the tube; corolla lobes 6-14 mm long, about 2× as long as the free portions of the corolla appendages *G. puberulenta*
 - 6 Anthers connate at anthesis; outer surfaces of petals not suffused with green; calyx lobes various; corolla lobes usually shorter.
 - 7 Calyx lobes linear-subulate, broadest at the base, 4× or more as long as broad, shorter than the densely puberulent calyx tube; stems densely puberulent; corolla appendages very unevenly bifid, the narrower segment often deflexed into the corolla tube *G. decora*
 - 7 Calyx lobes lanceolate, oblanceolate, ovate, or orbicular, 1-5× as long as broad, longer or shorter than the glabrous or puberulent calyx tube; stems glabrous or puberulent; corolla appendages subequally bifid, both segments erect.
 - 8 Corollas open to loosely closed; involucrel and upper leaves obtuse to acute (rarely acuminate); calyx lobes lanceolate.
 - 9 Leaves ovate, widest near the base, bright green; calyx lobes longer than the calyx tube; corolla lobes spreading, usually 2-4 mm longer than the appendages..... *G. catesbaei*
 - 9 Leaves linear to elliptic, widest near the middle, dark green; calyx lobes shorter than or about equal to the calyx tube; corolla lobes usually incurved, rarely exceeding the appendages by > 2 mm *G. saponaria*
 - 8 Corollas tightly closed; involucrel and upper leaves acuminate; calyx lobes ovate-orbicular.
 - 10 Corolla lobes reduced to a minute mucro or triangular tooth, much exceeded by the corolla appendages *G. andrewsii* var. *andrewsii*
 - 10 Corolla lobes about as long as the corolla appendages.
 - 11 Calyx tubes densely puberulent; calyx lobes lanceolate, erect or ascending; stems puberulent; filaments 7-12 mm long; corolla lobes 1.5-3 mm, often triangular, about 0.5-0.6× as wide as the corolla appendages..... *G. austromontana*
 - 11 Calyx tubes glabrous; calyx lobes widely elliptic, ovate, obovate, orbicular, or rhombic, spreading widely; stems glabrous; filaments 10-15 mm long; corolla lobes **either** 0.7-2.0 mm long **or** 2.5-5.0 mm long, usually rounded, about as wide as the corolla appendages.
 - 12 Calyx lobes widely obovate to orbicular, 2-10 mm; corolla lobes 0.7-2.0 mm; [more widespread]..... *G. clausa*
 - 12 Calyx lobes obovate, elliptic, ovate, orbicular, or rhombic, (3-) 5-25 (-35) mm; corolla lobes 2.5-5.0 mm; [Mountains of NC, south of Asheville] *G. latidens*

Gentiana alba Muhlenberg ex Nuttall, Pale Gentian. Moist meadows. August-October. MI west to MN, south to n. AR; with scattered disjunctions eastward to PA, OH, WV, KY, and w. NC. *G. alba* has nomenclatural priority over *G. flavida* as the older name; there is controversy, however, over whether it was validly published and applies clearly to the species at hand (see Wilbur 1988c for discussion). [= RAB, K, Pa, W, WV, X, Y, Z; = *Gentiana flavida* A. Gray – C, F, G; = *Dasystephana flavida* (A. Gray) Britton – S; = *Pneumonanthe flavida* (A. Gray) Greene]

Gentiana andrewsii Grisebach var. *andrewsii*, Prairie Closed Gentian. Meadows, seeps, forest edges. Late July-early November. NH, s. QC, MN, and s. MB, south to s. MD, WV, MO and WY; earlier reports of it as far south as GA or NC (as by F and G) are apparently based on misidentifications. An additional variety, var. *dakotica* A. Nelson, occurs from MB and SK south in the Great Plains to MO and IL. [= C, K, X, Y, Z; < *G. andrewsii* – F, G, Pa, WV; < *Dasystephana andrewsii* (Grisebach) Small – S; = *Pneumonanthe andrewsii* (Grisebach) W.A. Weber var. *andrewsii*]



Gentiana austromontana J.S. Pringle & Sharp, Blue Ridge Gentian. Mountain forests and grassy balds, especially at medium to high elevations, but descending to ca. 600 m (2200 feet). August-October. A Southern Appalachian endemic: s. WV and sw. VA south to w. NC and ne. TN. The flowers of *G. austromontana* are usually a deeper and more intense blue-violet than the similar *G. clausa* and *G. decora*. See Pringle & Sharp (1964) for additional discussion. [= C, K, Q, W, WV, X, Y, Z; < *G. clausa* Rafinesque – RAB, F, G, GW; < *Dasystephana decora* (Pollard) Small – S]

Gentiana autumnalis Linnaeus, Pinebarren Gentian. Savannas, pine flatwoods, sandhills, in a variety of sites varying from moist to very xeric, nearly always associated with *Pinus palustris* and/or *Aristida stricta* (in se. VA, NC, and SC). Late September-mid January (rarely at other times of the year, such as spring, in response to fire). This species is a "bimodal endemic," occurring in s. NJ and adjacent DE (at least formerly), and from se. VA south through e. NC to nc. SC. The related *G. pennelliana* Fernald (sometimes reduced to a subspecies of *G. autumnalis*) is endemic to the FL Panhandle; other siblings, *G. bicuspadata* (G. Don) Briquet, *G. hooperi* Pringle, and *G. longicollis* G.L. Nesom, occur in Mexico. *G. autumnalis* is often overlooked, since it is very inconspicuous except when in flower, it usually flowers at a season when few botanists are about, and sterile plants greatly outnumber fertile ones. Vegetatively it is extremely distinctive once learned; the leaves are glossy, dark-

green, opposite, oblanceolate to "oblinear," and twisted and curved in a manner reminiscent of an airplane propeller. [= RAB, C, F, GW, K, X, Z; = *Gentiana porphyrio* J.F. Gmelin – G; = *Dasystephana porphyrio* (J.F. Gmelin) Small – S; = *Gentiana autumnalis* ssp. *autumnalis* – Y; = *Pneumonanthe porphyrio* (Linnaeus) Greene]

Gentiana catesbaei Walter, Coastal Plain Gentian. Pocosins, moist savanna edges, edges of moist hardwood forests, bluff seepages. Late September–November. S. NJ south to ne. FL and e. Panhandle FL, on the Coastal Plain. [= RAB, C, G, GW, K, Pa, WH, X, Y, Z; > *G. catesbaei* var. *catesbaei* – F; > *G. catesbaei* var. *nummulariifolia* Fernald – F; > *Dasystephana latifolia* (Chapman) Small – S; > *D. parvifolia* (Chapman) Small – S; = *Pneumonanthe catesbaei* (Walter) F.W. Schmidt]

Gentiana clausa Rafinesque, Meadow Closed Gentian, Meadow Bottle Gentian. Forests. September–October. Mostly Appalachian: ME south to w. NC and ne. TN, extending east and west to adjacent physiographic provinces. [= C, Pa, Q, WV; < *G. clausa* – C, K, W, X, Y, Z (also see *G. latidens*); < *G. clausa* – RAB, F, G, GW (also see *G. austromontana* and *G. latidens*); < *Dasystephana decora* (Pollard) Small – S; < *Pneumonanthe clausa* (Rafinesque) Greene]

Gentiana decora Pollard, Appalachian Gentian. Forests. September–October. A Southern Appalachian endemic: c. WV south through w. VA to w. NC, e. TN, nw. SC, ne. GA. [= RAB, C, F, G, K, W, WV, X, Y, Z; < *Dasystephana decora* (Pollard) Small – S; = *Pneumonanthe decora* (Pollard) Greene]

Gentiana latidens (House) J.S. Pringle & Weakley, Balsam Mountain Gentian. Moist, often seeping, more or less open sites on rocky slopes. September–October. Restricted to the higher mountains of NC south of Asheville, NC (Haywood, Jackson, Macon, and Transylvania counties). [= Q; < *G. clausa* – RAB, GW, K, W, X, Y, Z; < *Dasystephana decora* (Pollard) Small – S; < *Pneumonanthe clausa* (Rafinesque) Greene; = *G. saponaria* var. *latidens* House]



Gentiana linearis Frölich, Narrowleaf Gentian. Openings in spruce–fir forests, bogs, at high elevations. September–October. Mainly occurring in ne. United States and e. Canada, west to Lake Superior, and south (scattered) in the Appalachians to sw. VA (in openings in spruce–fir forest near summit of Whitetop Mountain) and e. TN (Chester, Wofford, & Kral 1997). On Mount LeConte (Sevier County, TN), *G. linearis* occurs in thin soils around high elevation outcrops of Anakeesta Slate. See Pringle (1977) for extensive discussion of actual and putative southern occurrences of this species. [= C, F, G, K, Pa, W, WV, X, Y, Z; = *Pneumonanthe linearis* (Frölich) Greene]

Gentiana pennelliana Fernald, Wiregrass Gentian. Pine flatwoods. December–March. Endemic to Panhandle FL. [= GW, WH; = *Dasystephana tenuifolia* (Rafinesque) Pennell – S] {add to synonymy X, Y, Z}

Gentiana puberulenta J.S. Pringle, Prairie Gentian. {habitats}. W. NY west to ND, south to KY, sc. TN (Coffee County) (Chester, Wofford, & Kral 1997), LA, n. AR, and KS. Reports for WV are unconfirmed (Harmon, Ford-Werntz, & Grafton 2006). [= C, K, X, Y, Z; = *G. puberula* – F, G, misapplied; = *Dasystephana puberula* (Michaux) Small – S, misapplied]

Gentiana saponaria Linnaeus, Soapwort Gentian. Bogs, marshes, wet hardwood forests, other moist to wet habitats. Late September–November. NY west to n. IL, south to Panhandle FL and e. TX. A peculiar form with very narrow leaves has been found at several localities in Ashe and Watauga counties, NC and in the South Mountains, NC; it may warrant taxonomic recognition after further study. [= RAB, C, GW, K, Pa, W, WH, X, Y, Z; > *G. saponaria* – F, G, WV; > *G. cherokeensis* (W.P. Lemmon) Fernald – F, G; = *G. saponaria* var. *saponaria* – K; = *Dasystephana saponaria* (Linnaeus) Small – S; = *Pneumonanthe saponaria* (Linnaeus) F.W. Schmidt]

Gentiana villosa Linnaeus, Striped Gentian. Upland forests, sandhill/pocosin ecotones. Late August–November. Se. PA west to n. KY and w. TN, south to Panhandle FL and e. LA. [= RAB, C, F, G, K, Pa, W, WH, X, Y, Z; = *Dasystephana villosa* (Linnaeus) Small – S; = *Pneumonanthe villosa* (Linnaeus) F.W. Schmidt]



352. LOGANIACEAE R. Brown ex Martius 1827 (Logania Family) [in GENTIANALES]

As here rather narrowly interpreted, Loganiaceae consists of 12 genera and about 420 species, herbs and subshrubs, of tropical, subtropical, and warm temperate areas of the Old and New Worlds. Other genera in our area which have traditionally been considered components of the Loganiaceae now are clearly better placed in the small families Tetrachondraceae (*Polypremum*),

Gelsemiaceae (*Gelsemium*), and Scrophulariaceae (*Buddleja*), more closely related to other families (such as Rubiaceae) than to Loganiaceae sensu stricto (Struwe, Albert, & Bremer 1994). The affinities of *Spigelia* appear to be with a small group of tropical and subtropical genera, the largest of which is *Strychnos*. Struwe, Albert, & Bremer (1994) treated this group as the family Strychnaceae, based on a cladistic analysis of data. A later, more thorough analysis suggested that Strychnaceae is best recombined with Loganiaceae (Backlund, Oxelman, & Bremer 2000). References: Rogers (1986). [also see *GELSEMIACEAE*, *SCROPHULARIACEAE*, and *TETRACHONDRAEAE*]

- 1 Woody vine *Gelsemium* [see *GELSEMIACEAE*]
- 1 Herb.
 - 2 Corolla funnellform, 0.1-0.2 cm long, white *Mitreola*
 - 2 Corolla tubular, 3-6 cm long, red and yellow *Spigelia*

***Mitreola* Linnaeus 1758 (Miterwort)**

A genus of about 6 species, herbs, tropical, subtropical, and warm temperate. References: Nelson (1980)=Y; Rogers (1986)=Z.

- 1 Leaves 2-8 cm long petiolate or sessile and tapering to a cuneate base *M. petiolata*
- 1 Leaves 1-4 cm long, sessile, the base rounded.
 - 2 Mature seed reticulate; mature capsule smooth to slightly and finely tuberculate; larger leaves ca. 4× as long as wide *M. angustifolia*
 - 2 Mature seed smooth; mature capsule markedly papillose-warty; larger leaves 1.5-2× as long as wide *M. sessilifolia*

Mitreola angustifolia (Torrey & A. Gray) J.B. Nelson, Narrow-leaved Miterwort. Clay-based Carolina bays, other Coastal Plain depressional wetlands. June-August. Se. SC south to n. FL, and west to s. AL and se. MS (Sorrie & Leonard 1999). [= GW, WH, Y; < *M. sessilifolia* – K, Z; = *Cynoctonum angustifolium* (Torrey & A. Gray) Small – S]

Mitreola petiolata (J.F. Gmelin) Torrey & A. Gray, Caribbean Miterwort. Swamps, marshes, ditches, other wet habitats. July-September; September-November. Se. VA south to FL and west to AR and c. TX, north in the interior to nw. GA and c. and se. TN; Mexico, the West Indies, and n. South America. [= GW, K, WH, Y; = *Cynoctonum mitreola* (Linnaeus) Britton – RAB, C, F, G, S]

Mitreola sessilifolia (J.F. Gmelin) G. Don, Small-leaved Miterwort. Wet savannas, pocosins, ditches, margins of limesink depressions (dolines). Late June-August; September-October. Se. VA south to FL, west to e. TX, and in the Bahama Islands. [= GW, WH, Y; = *Cynoctonum sessilifolium* J.F. Gmelin – RAB, C, F, G, S; < *M. sessilifolia* – K, Z (also see *M. angustifolia*)]

***Spigelia* Linnaeus 1753 (Pinkroot)**

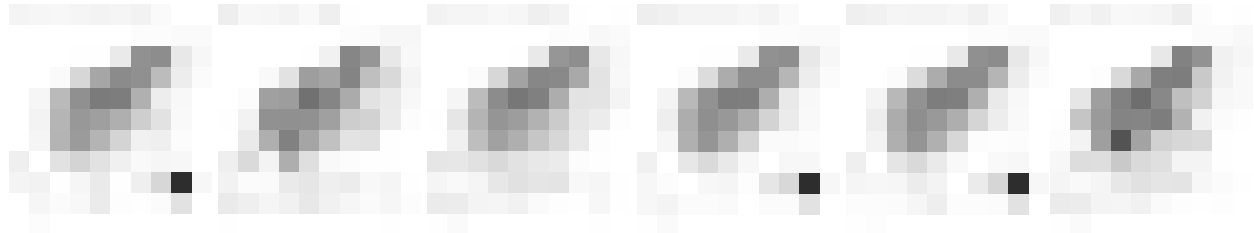
A genus of about 50 species, herbs, of tropical and warm temperate America. References: Gould (1996)=Z; Rogers (1986)=Y; Weakley et al. (2011)=X.

- 1 Corolla scarlet on the outer surface, yellow on the inner surface *S. marilandica*
- 1 Corolla light pink to white on the outer and inner surfaces.
 - 2 Corolla 36-50 mm long; pistil 24-27 mm long; sepals 8-11 mm long; inflorescence with 2-4 flowers; [of dolomitic glades of the southern Ridge and Valley of Bibb Co. AL] *S. alabamensis*
 - 2 Corolla 25-30 mm long; pistil 17-19 mm long; sepals 4-6 mm long; inflorescence with 3-8 flowers; [of pine savannas of Coastal Plain of Panhandle FL and adjacent AL] *S. gentianoides*

Spigelia alabamensis (K. Gould) K.G. Mathews & Weakley. Dolostone glades. Endemic to Bibb County, AL (Gould 1996, Allison & Stevens 2001). [= X; = *S. gentianoides* Chapman ex Alphonse de Candolle var. *alabamensis* K. Gould – K, Z]

Spigelia gentianoides Chapman ex Alphonse de Candolle. Pine savannas. Endemic to FL Panhandle (Calhoun, Jackson, and Washington counties) and adjacent AL (Geneva County). [= X; = *S. gentianoides* Chapman ex Alphonse de Candolle var. *gentianoides* – K, Z; = *S. gentianoides* – S, Y (var. *alabamensis* not discovered at the time); < *S. gentianoides* – WH]

Spigelia marilandica (Linnaeus) Linnaeus, Pinkroot, Wormgrass. Woodlands and forests, usually on circumneutral soils. May-June; late June-July. SC, sw. NC (Cherokee Co. and Macon Co.), and TN west to s. IN and OK, south to Panhandle FL and TX; some floras allege its occurrence north to VA, MD, NJ, and PA. *S. marilandica* will likely be found in sw. VA. [= RAB, C, F, G, K, S, W, WH]



A family of 2 genera and about 10 species, shrubs and vines, of tropical and warm temperate America, Africa, and Asia. There is persuasive evidence that *Gelsemium* and *Mostuea* Didr., traditionally treated as part of a heterogeneous Loganiaceae, should be accorded family status as Gelsemiaceae (Backlund, Oxelman, & Bremer 2000; Struwe, Albert, & Bremer 1994; Sennblad & Bremer 1996). The Gelsemiaceae form a clade most closely related to the Apocynaceae (Backlund, Oxelman, & Bremer 2000). References: Backlund, Oxelman, & Bremer (2000); Struwe, Albert, & Bremer (1994); Sennblad & Bremer (1996); Rogers (1986).

Gelsemium Antoine Laurent de Jussieu (Yellow Jessamine)

A genus of 3 species, vines, our 2 species in se. North America (and also Central America) and 1 species in e. Asia. References: Wyatt et al. (1993); Duncan & Dejong (1964); Godfrey (1988); Rogers (1986)=Z; GW.

- 1 Sepals acuminate apically, persistent on the fruit; capsule elliptical, 1.0-1.6 cm long, 6-8 mm broad, the tapering tip bearing a definite beak about 3 mm long; seeds wingless; flowers odorless (rarely fragrant), usually golden-yellow..... *G. rankinii*
- 1 Sepals obtuse to broadly acute, not persistent on the fruit; capsule oblong, 1.5-2.5 cm long, 8-12 mm broad, very abruptly narrowed to a beak 1.5-2 mm long; seeds with a prominent membranous wing sharply differentiated from the body of the seed; flowers fragrant, usually lemon-yellow..... *G. sempervirens*

Gelsemium rankinii Small, Swamp Jessamine. Swamps of blackwater rivers, restricted in NC to the se. corner of the state, most notably the swamps of the Waccamaw and Black rivers. March-April; September-October. Se. NC south through SC and GA to the FL Panhandle, and west to e. LA. See Wyatt et al. (1993) and Duncan & Dejong (1964) for extensive discussions of morphology, habitat, pollination, genetics, distribution, and evolutionary relationships of our 2 species of *Gelsemium*. [= RAB, GW, K, S, WH, Z]

Gelsemium sempervirens (Linnaeus) St. Hilaire, Carolina Jessamine. In a wide range of habitats, from swamp forests to dry uplands and thickets, also commonly planted as an ornamental. March-early May; September-November. VA, se. TN, and AR south to c. peninsular FL and e. TX; disjunct in Guatemala and Mexico (Chiapas, Oaxaca, Puebla, and Veracruz). Jessamine climbs to the tops of trees. [= RAB, F, G, GW, K, S, W, WH, Z]

354. APOCYNACEAE A.L. de Jussieu 1789 (Dogbane Family) [in GENTIANALES]

As here circumscribed including the Asclepiadaceae, a family of about 480 genera and about 4800 species, lianas, shrubs, herbs, and trees, widespread in tropical and temperate areas. There appears to be overwhelming evidence favoring the combination of the Asclepiadaceae into the Apocynaceae; see, for instance, Rosatti (1989), Sennblad & Bremer (1996), and many others. References: Rosatti (1989); Liede (1997a).

- 1 Plant erect or trailing (but not twining), herbaceous or woody.
 - 2 Plant a woody shrub or trailing woody vine.
 - 3 Plant rhizomatous, suffrutescent, < 4 dm tall; leaves narrowly to broadly ovate; flowers blue, lavender, or white..... *Vinca*
 - 3 Plant erect, > 4 dm tall; leaves either lanceolate or elliptic; flowers yellow, white, pink, or red.
 - 4 Flowers yellow; shrub 4-12 dm tall, with only a few wand-like branches; [very rare waif in our area]..... *Angadenia*
 - 4 Flowers white, pink, or red; shrub 10-40 dm tall, much branched from the base; [commonly cultivated in our area (and sometimes persistent), particularly near the coast] *Nerium*
 - 2 Plant an herb.
 - 5 Flowers with conspicuous corona; follicles not paired; seeds with coma present *Asclepias*
 - 5 Flowers lacking corona; follicles paired (occasionally single by abortion); seeds with coma absent (*Catharanthus*, *Amsonia*) or present (*Apocynum*).
 - 6 Leaves alternate (rarely a few on a plant subopposite) *Amsonia*
 - 6 Leaves opposite.
 - 7 Flower < 8 mm across; paired follicles pendent, 10-22 cm long; seeds with coma; mature plants normally > 7 dm tall.... *Apocynum*
 - 7 Flower > 20 mm across; paired follicles erect, 1.5-2.5 cm long; seeds lacking coma; mature plants 2-6 dm tall..... *Catharanthus*
 - 1 Plant twining, herbaceous or woody.
 - 8 Leaves cordate at base, ovate to broadly lanceolate, < 4× as long as wide.
 - 9 Plants in flower.
 - 10 Petals white; gynostegial corona > ¾ as long as the corolla lobes..... *Cynanchum*
 - 10 Petals purple-black, brown, yellow, yellow-green, cream, or maroon (white in *Matelea baldwyniana*); gynostegial corona < ½ as long as the corolla lobes.
 - 12 Corolla lobes glabrous on the outer surface; dorsal anther appendages laminar; carpels smooth and angled..... *Gonolobus*
 - 12 Corolla lobes glandular-puberulent or puberulent on the outer surface; dorsal anther appendages absent; carpels muricate (*Matelea*) or smooth (*Vincetoxicum*).
 - 13 Corolla lobes (5-) 6-18 mm long, purple-black, brown, maroon, yellow, yellow-green, cream, or white *Matelea*
 - 13 Corolla lobes, 1.5-4.5 mm long, purple-black, brown, or maroon *Vincetoxicum*
 - 9 Plants in fruit.
 - 13 Follicles muricate *Matelea*
 - 13 Follicles smooth and angled.
 - 14 Leaves cordate, broadly rounded, tapering abruptly to an acute, obtuse, or apiculate apex..... *Gonolobus*
 - 14 Leaves deeply cordate, tapering steadily to an acuminate apex.
 - 15 Corona a fleshy, lobed cup *Cynanchum*
 - 15 Corona nearly as long as to longer than the corolla lobes *Vincetoxicum*

- 8 Leaves not cordate at base (cuneate or rounded), ovate, lanceolate, or linear, > 1.5× as long as wide
 - 16 Leaves linear, the margins parallel
 - 17 Leaves petiolate; calyx lobes deltoid, obtuse, ca. 1 mm long; leaves petiolate, not reflexed, often caducous; follicle 1-3 mm in diameter; [of se. SC and south]..... *Orthosia*
 - 17 Leaves sessile; calyx lobes lanceolate, acute, (1.3-) 1.5-2.5 mm long; leaves sessile, reflexed, persistent; follicle 6-7 mm in diameter; [of ne. NC and south]..... *Seutera*
 - 16 Leaves ovate to lanceolate.
 - 18 Flowers brownish-purple, with a corona of narrow segments; fruit 10-15 cm long, > 5 mm in diameter; leaves obtuse to acute at the tip (rarely slightly acuminate)..... *Periploca*
 - 18 Flowers white to creamy yellow, lacking a corona; fruit 10-25 cm long, 1-2 mm in diameter; leaves acuminate at the tip
 - 19 Corolla lobes 3-4 mm long, acute, reflexed, pale yellow; leaves subcoriaceous; [native, common]..... *Thrysanthella*
 - 19 Corolla lobes 8-12 mm long, rounded, spreading, white; leaves coriaceous; [alien, commonly planted, rarely persistent or spreading]..... *Trachelospermum*

Amsonia Walter 1788 (Blue-stars)
[by Bruce A. Sorrie and Alan. S. Weakley]

A genus of about 20 species, herbs, of temperate North America and Japan. References: Woodson (1928)=Z.

- 1 Corolla glabrous on the outer surface; stem pubescent (*A. ciliata*) or glabrous (*A. rigida*); [of the Coastal Plain from se. and sc. NC southward].
 - 2 Leaves linear to lanceolate, the lower leaves 4-30× as long as wide, the upper leaves 1mm or less wide; [of dry, sandy habitats, such as sandhills]..... *A. ciliata*
 - 2 Leaves elliptic, the lower and upper mostly 3-5× as long as wide, all leaves > 5 mm wide; [of seasonally flooded depression wetlands and moist pinelands]..... *A. rigida*
- 1 Corolla pubescent on the outer surface; stem glabrous; [more widespread in our area].
 - 3 Follicles pubescent..... *A. ludoviciana*
 - 3 Follicles glabrous.
 - 4 Leaf blades ovate to oblong-lanceolate, 1-6 cm wide; inflorescence dense, many-flowered; leaves glabrous, glaucous beneath..... *A. tabernaemontana* var. *tabernaemontana*
 - 4 Leaf blades lanceolate to linear-lanceolate, 1-3 cm wide; inflorescence loose, few-flowered; leaves pubescent (glabrate in age)..... *A. tabernaemontana* var. *gatingeri*

Amsonia ciliata Walter, Sandhills Bluestar. Sandhills. April; September-October. Two varieties have been traditionally recognized since the monograph of Woodson (1928), var. *ciliata* (leaves strongly heteromorphic, the lower leaves lanceolate, 4-10 mm wide (mostly 4-15× as long as wide), the upper about 1 mm wide; inflorescence barely held above the foliage) and var. *tenuifolia* (leaves slightly or not at all heteromorphic, the lower leaves linear, 1-3 mm wide (mostly 15-30× as long as wide), the upper < 1 mm wide; inflorescence usually held well above the foliage). They do not seem to be clearly separable morphologically, and their distributions are very largely overlapping, suggesting that they are merely forms. Se. NC south to c. peninsular FL, west to c. and s. AL; disjunct in Ozark-Ouachita highlands of sc. MO, w. AR, and se. OK. [= RAB, WH; > *A. ciliata* Walter var. *ciliata* – K, S, Z; > *A. ciliata* Walter var. *tenuifolia* (Rafinesque) Woodson – K; > *A. ciliata* var. *filifolia* Wood – F, G, S; > *A. ciliata* var. *tenuifolium* – Z, misspelling]

Amsonia glaberrima Woodson. {habitat}. MS, LA. [= Z; < *A. tabernaemontana* var. *tabernaemontana* – K; < *A. amsonia* – S]

Amsonia ludoviciana Vail, Louisiana Bluestar. Open woodlands around outcrops of Lithonia granitic gneiss, {other habitats}. So far as is known, endemic to LA, MS and GA; not native or naturalized in SC, contrary to Kartesz (1999). [= GW, K, S, Z]

Amsonia rigida Shuttleworth ex Small, Stiff Bluestar, Pond Bluestar. Seasonally flooded depression wetlands and moist pinelands. S. GA to n. peninsular FL, west to s. MS. [= GW, K, S, Z; < *A. tabernaemontana* – WH]



Amsonia tabernaemontana Walter var. *gatingeri* Woodson. Mt (GA): rich forests, rocky forests, riverside scours; rare. IL, MO, and se. KS south to ne. TX, and apparently disjunct in the Interior Low Plateau of sc. KY, c. TN (Chester, Wofford, & Kral 1997), and in n. GA. [= F, K, Z; < *A. tabernaemontana* – C, GW, W; < *A. salicifolia* Pursh – S]

Amsonia tabernaemontana Walter var. *tabernaemontana*, Wideleaf Blue-stars. Mt (GA, NC, SC), Pd (DE*, GA, NC, SC, VA), Cp (GA, NC, SC, VA): floodplain forests, moist, rich slope forests; common (uncommon in DE and VA, uncommon in Mountains). April; August-September. Se. VA west to s. IL, MO, and KA, south to GA, LA, e. OK, and TX. The varieties *tabernaemontana* and *salicifolia*, while strikingly different in their extreme expressions, have nearly the same distribution and do intergrade; they are probably not worthy of recognition. [= C, G, W; > *A. tabernaemontana* var. *tabernaemontana* – RAB, G, K, Z; > *A.*

tabernaemontana var. *salicifolia* (Pursh) Woodson – RAB, G, K, Z; < *A. tabernaemontana* – C, GW, Pa, W; < *A. amsonia* (Linnaeus) Britton – S; < *A. salicifolia* Pursh – S (also see var. *gatingeri*)]

Angadenia Miers 1878 (Pineland Allamanda)

A genus of 2 species, woody vines, of Florida and the West Indies.

* **Angadenia berteroi** (Alphonse de Candolle) Miers, Pineland Golden-trumpet, Pineland Allamanda, Lice-root. Cp (NC): disturbed, acid, peaty soil; rare, native of s. FL, the Bahamas, Cuba, and Hispaniola. The only record in our area is from an agricultural experiment station near Wenona, Washington County, NC (Hayes 1946), where presumably introduced via cattle; the species has probably not persisted in our area. [= K; > *Rhabdadenia corallicola* Small – S]

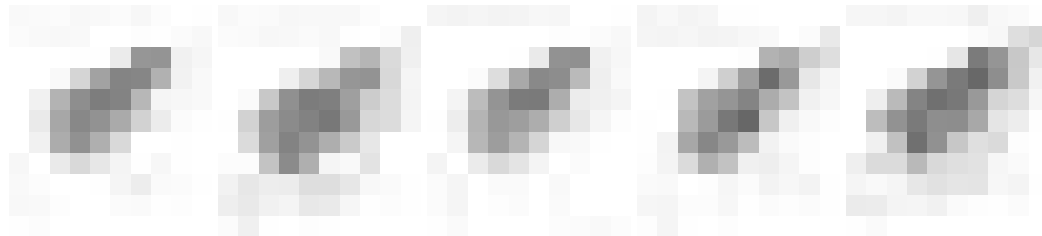
Apocynum Linnaeus 1753 (Dogbane, Indian-hemp)

A genus of about 12 species, herbs, of temperate e. and c. Asia and North America. References: Woodson (1930)=Z.

- 1 Corolla 5-10 mm long, pink or white with pink veins, the lobes spreading or recurved.
 - 2 Leaves drooping; corolla ca. 3× as long as the calyx lobes **A. androsaemifolium**
 - 2 Leaves spreading; corolla ca. 2× as long as the calyx lobes **A. ×floribundum**
- 1 Corolla 3-6 mm long, white, greenish, or yellowish, the lobes erect or slightly outcurved.
 - 3 Leaves of the main stem with petioles 5-10 mm long; leaf base cuneate to rounded; [widespread in our area]..... **A. cannabinum**
 - 3 Leaves of the main stem sessile or on petioles to 3 mm long; leaf base rounded or cordate; [of VA and WV northward]..... **A. sibiricum**

Apocynum androsaemifolium Linnaeus, Spreading Dogbane. Mt (GA, NC, VA, WV), Pd (DE, GA, VA), Cp (DE): forests, woodlands, roadsides, pastures; common (rare in DE). June-August; September-October. NL (Newfoundland) to BC south to w. NC, c. GA, TX, and AZ. [= RAB, C, F, K, Pa, S, W; > *A. androsaemifolium* var. *androsaemifolium* – G, Z; > *A. androsaemifolium* var. *glabrum* Macoun – G; > *A. androsaemifolium* var. *incanum* A. deCandolle – Z]

Apocynum cannabinum Linnaeus, Hemp Dogbane, Indian-hemp. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): forests, woodlands, roadsides, pastures; common. May-July; September-October. QC, MB, and WA south to FL, TX, CA. [= RAB, C, S, W; > *A. cannabinum* var. *cannabinum* – F, G; > *A. cannabinum* var. *pubescens* (Mitchell) Woodson – F, G, Z; > *A. cannabinum* var. *nemorale* (G.S. Miller) Fernald – F; > *A. cannabinum* var. *glaberrimum* A. de Candolle – G, Z; > *A. cannabinum* var. *greeneanum* (Béguinot & Belosersky) Woodson – Z; < *A. cannabinum* – K, Pa]



Apocynum ×floribundum Greene (pro sp.) [*A. androsaemifolium* × *cannabinum*]. Forests, woodlands, roadsides, pastures. June-July; September-October. Sometimes occurring in populations seemingly lacking one or both parents. [= C, K; = *A. medium* Greene – RAB, F, S, W; > *A. medium* var. *medium* – Z]

Apocynum sibiricum Jacquin. Forests, woodlands, riverside scour areas, roadsides, pastures. July-September; September-October. NL (Newfoundland) and BC south to e. VA, w. VA, WV, and MO. *A. sibiricum* var. *cordigerum* has been found in Kent County, MD (Steury, Tyndall, & Cooley 1996). [= C, W; > *A. sibiricum* var. *sibiricum* – F, G; > *A. sibiricum* var. *cordigerum* (Greene) Fernald – F, G; < *A. cannabinum* – K, Pa; > *A. hypericifolium* Aiton var. *hypericifolium* – Z; > *A. hypericifolium* Aiton var. *cordigerum* (Greene) Béguinot & Belosersky – Z]

Asclepias Linnaeus 1753 (Milkweed)

A genus of about 100 species, herbs, temperate and tropical, of North and Central America. References: Woodson (1954)=Z; Turner (2009b)=Y; Farmer & Bell (1985)=X.

- 1 Sap clear; leaves alternate; corolla orange to yellow **Key A**
- 1 Sap milky (the milkiness often difficult to show in *A. verticillata*, which has numerous, whorled, linear leaves); leaves opposite, subopposite, or whorled; flowers orange, red, white, cream, green, pink, or purple.
 - 2 Leaves linear, > 10× as long as wide **Key B**
 - 2 Leaves lanceolate, ovate, or elliptic, < 1-5 (-10)× as long as wide.
 - 3 Leaves sessile, subsessile, or with petioles to 3 mm long **Key C**
 - 3 Leaves with petioles (3-) 5-20 mm long.
 - 4 Plants in flower..... **Key D**
 - 4 Plants in fruit (or sterile)..... **Key E**

Key A – milkweeds with clear sap and alternate leaves

- 1 Leaves cuneate at the base; leaves usually obovate to oblanceolate (widest beyond the middle); [s. NH west to OH, south to Panhandle FL and e. TX widespread eastward].....*A. tuberosa* var. *tuberosa*
- 1 Leaves cordate to hastate at the base; leaves usually lanceolate, ovate, or elliptic (widest at or below the middle).
 - 2 Leaf margins flat; leaves widest toward the base; [PA, WV, KY, TN, MS westward]..... *A. tuberosa* var. *interior*
 - 2 Leaf margins usually crisped; leaves widest near the middle; [of se. Coastal Plain, se. VA south to s. FL, west to s. MS].....
.....*A. tuberosa* var. *rolfsii*

Key B – milkweeds with milky sap, with linear leaves opposite, subopposite, or whorled

- 1 Leaves **either** mostly in whorls of 3-6 (sometimes some nodes with merely opposite leaves), **or** subopposite (the leaves more-or-less paired but separated by 0.5-3 mm); corolla whitish or greenish, usually suffused with rose-purple (especially at the tips of the corolla lobes).
- 2 Leaves mostly in whorls of 3-6 (sometimes some nodes with merely opposite leaves); leaves 1.5-7 cm long, 1-2 mm wide; seeds ca. 5 mm long, the coma ca. 2.5 cm long; milky sap often difficult to show..... *A. verticillata*
- 2 Leaves subopposite (the leaves more-or-less paired but separated by 0.5-3 mm); leaves (3-) 5-18 cm long, (1-) 2-10 mm wide; seeds ca. 7-11 mm long, the coma 3-5 cm long; milky sap obvious and profuse.
 - 3 Umbel 1, terminal; corona 5-7 mm in diameter; horns present, about as long as the hood; hoods ca. 2-4 mm long, surpassing the anther heads; [dry pinelands of the Coastal Plain] *A. michauxii*
 - 3 Umbels 1-4, terminal and from upper nodes; corona 2-3 mm in diameter; horns absent; hoods ca. 2 mm long, surpassed by the anther heads; [**either** wet pinelands of the Coastal Plain **or** dry glades or woodlands].
 - 4 Pedicels with spreading hairs; umbels 2-10, each with up to 30-100 flowers; leaves minutely scabrous; [dry glades or woodlands, known from the Mountains of nw. GA, e. TN, w. WV westward]*A. hirtella*
 - 4 Pedicels with incurved hairs; umbels 1-6, each with 10-30 flowers; leaves glabrous or nearly so; [wet pinelands of the Coastal Plain]*A. longifolia*
- 1 Leaves opposite; corolla as above, or creamy yellow, purple, or orange-red.
 - 5 Leaves 2.5-4.5 cm long, puberulent beneath, sessile; corolla lobes erect, creamy yellow to dull or greenish white, 7-10 mm long; plant 1-4 dm tall; [dryish pinelands of the Coastal Plain].....*A. pedicellata*
 - 5 Leaves 5-20 cm long, glabrous or glabrate beneath (rarely puberulent), sessile to petiolate; corolla lobes reflexed, either orange-red or usually with at least some purple (rarely merely whitish or greenish), 3-7 mm long (except 8-11 mm long in the orange-red *A. lanceolata*); plant 1-15 dm tall; [collectively of various habitats].
 - 6 Leaves with petioles 1-10 mm long; leaves 5-15 mm wide; plants 5-15 dm tall.
 - 7 Petiole 4-10 mm long; corolla pink (rarely white), the lobes 3-5.5 mm long; hoods 1-2 mm long; horns longer than the hoods; [mostly of the Mountains and Piedmont].....*A. incarnata* var. *incarnata*
 - 7 Petiole 1-3 mm long; corolla orange-red, the lobes 8-11 mm long; hoods 5-6 mm long; horns slightly shorter than the hoods; [of the Coastal Plain]*A. lanceolata*
 - 6 Leaves with petioles 0-1 mm long; leaves 1-7 mm wide; plants 1-7 dm tall.
 - 8 Leaves 1-2 mm wide; each hood with 2 erect, acuminate, marginal teeth on the inner side (adjoining the anther heads)*A. cinerea*
 - 8 Leaves 3-7 mm wide; each hood truncate, lacking prominent marginal teeth.
 - 9 Umbel 1, terminal; corona 5-7 mm in diameter; horns present, about as long as the hood; hoods ca. 2-4 mm long, surpassing the anther heads; [dry pinelands] *A. michauxii*
 - 9 Umbels 1-4, terminal and from upper nodes; corona 2-3 mm in diameter; horns absent; hoods ca. 2 mm long, surpassed by the anther heads; [**either** of wet pinelands of the Coastal Plain **or** dry glades or woodlands].
 - 10 Pedicels with spreading hairs; umbels 2-10, each with up to 30-100 flowers; leaves minutely scabrous; [dry glades or woodlands, east to nw. GA, TN, and WV]*A. hirtella*
 - 10 Pedicels with incurved hairs; umbels 1-6, each with 10-30 flowers; leaves glabrous or nearly so; [wet pinelands of the Coastal Plain]*A. longifolia*

Key C – milkweeds with milky sap, with sessile, nonlinear leaves

- 1 Leaves 2-5 cm long, 0.3-1.0 cm wide; corolla lobes erect, creamy yellow to greenish white, 7-10 mm long; plant 1-4 dm tall; [of dryish pinelands of the Coastal Plain of NC and SC]*A. pedicellata*
- 1 Leaves 3-30 cm long, 0.5-11 cm wide (not simultaneously < 5 cm long and < 1 cm wide); corolla lobes reflexed, either orange-red, purple, pink, or green, 5-15 mm long; plant 2-10 dm tall; [collectively of various habitats, including dryish pinelands of the Coastal Plain].
 - 2 Leaves cordate-clasping at base, 3-10 cm wide, 1-2× as long as wide; stem and leaves glabrous and usually also glaucous.
 - 3 Plant erect, the stems 4-10 dm long, the leaves perpendicular to the stem thus in a plane parallel to the ground; corolla lobes 7-11 mm long; inflorescence solitary, terminal (rarely a second from an upper node); corona 5-8 mm across; [widespread]..... *A. amplexicaulis*
 - 3 Plant prostrate or decumbent, the stems 2-7 dm long, the leaves perpendicular to the stem and thus perpendicular to the ground as well; corolla lobes 5-6.5 mm long; inflorescences 2-6 from upper nodes; corona 3-5 mm across; [of dry pinelands of the Coastal Plain]
.....*A. humistrata*
 - 2 Leaves cuneate to rounded at base, 1-6 cm wide, (1-) 1.5-6× as long as wide; stem and leaves pubescent to glabrate.
 - 4 Corolla lobes 12-15 mm long, greenish-yellow; flowers 3-6 (-8) per umbel..... *A. connivens*
 - 4 Corolla lobes 6-9 mm long, reddish-purple or pale green; flowers > 7 per umbel.
 - 5 Leaves lanceolate, acuminate at the apex; corolla reddish purple, the lobes 7-9 mm long; [of Coastal Plain wetlands]*A. rubra*
 - 5 Leaves orbicular to oblong, rounded at the apex; corolla pale green, the lobes 6-7 mm long; [of dry habitats primarily in the Piedmont and Mountains (rarely in the Coastal Plain)]*A. viridiflora*

Key D – milkweeds with milky sap, with petiolate, nonlinear leaves, in flower

- 1 Corolla greenish, either pale green or yellowish green.
 - 2 Leaves subopposite; corolla lobes 13-15 mm long *A. viridis*
 - 2 Leaves opposite; corolla lobes 6-10 mm long.
 - 3 Corona 2-3 mm across; corolla lobes pale green, 6-7 mm long; [of various provinces, primarily of the Piedmont] *A. viridiflora*
 - 3 Corona 5-9 mm across; corolla lobes yellowish green, 9-10 mm long; [strictly of the Coastal Plain, of NC and SC, and southward].
 - 4 Hoods ca. 6 mm long, about 2× as long as the anther heads; stem and leaves densely tomentulose *A. obovata*
 - 4 Hoods ca. 4 mm long, scarcely exceeding the anther heads; stem and leaves softly puberulent *A. tomentosa*
- 1 Corolla pink, purple, or white.
 - 5 Hoods about as long as the anther heads; horns 1.5-2× as long as the hood, exerted well beyond the hood.
 - 6 Hood opening truncate, the hood therefore beaker-shaped; corolla lobes 8-12 mm long; [primarily of mesic forests of the Mountains] *A. exaltata*
 - 6 Hood opening very oblique, the hood therefore scoop-shaped; corolla lobes 2.5-6 mm long; [primarily of wetlands of various provinces].
 - 7 Plants 3-5 dm tall; corolla lobes usually white (rarely slightly pink); leaves glabrous beneath; [of the Coastal Plain of SC] *A. perennis*
 - 7 Plants 5-15 dm tall; corolla lobes rose to purple (rarely white); leaves pubescent to glabrate beneath; [collectively widespread].
 - 8 Stems and leaves sparsely pubescent to glabrescent; leaves narrow, the base obtuse to truncate, the apex long-acuminate; plants usually much branched *A. incarnata* var. *incarnata*
 - 8 Stems and leaves moderately to densely pubescent; leaves broader, the base rounded to subcordate, the apex acute to short-acuminate; plants usually relatively strict *A. incarnata* var. *pulchra*
 - 5 Hoods distinctly longer than the anther heads; horns 0.5-1× as long as the hood, not conspicuously exerted beyond the hood.
 - 9 Lower leaf surface pubescent over the surface.
 - 10 Hood margin irregular but not with a sharp tooth; corolla purplish-rose; plants 4-10 dm tall *A. purpurascens*
 - 10 Hood margin with a single, ascending, triangular tooth; corolla rose or greenish-white; plants (5-) 8-20 dm tall *A. syriaca*
 - 9 Lower leaf surface glabrous to sparsely pubescent along the midvein only.
 - 11 Hood opening very oblique, the hood therefore scoop-shaped, and also with 2 prominent lateral teeth; corolla pink to greenish (rarely white); plants 2-5 dm tall *A. quadrifolia*
 - 11 Hood opening truncate and constricted, and lacking prominent teeth; corolla white (often pink at the "waist"); plants 3-12 dm tall *A. variegata*

Key E – milkweeds with milky sap, with petiolate, nonlinear leaves, in fruit (or sterile)

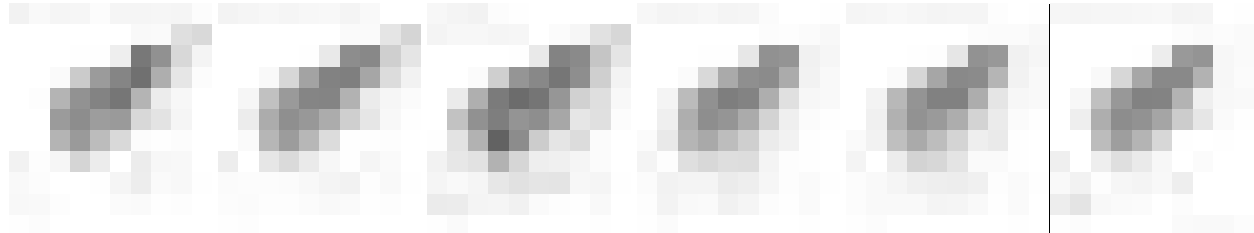
- 1 Leaves subopposite *A. viridis*
- 1 Leaves opposite (or apparently whorled in *A. quadrifolia*).
 - 2 Follicle pendant; seeds without a coma; [of swamp forests of SC and southward] *A. perennis*
 - 2 Follicle erect; seeds with a coma; [collectively widespread].
 - 3 Leaf-bearing nodes 3-4, the upper and lower opposite, the middle with a whorl of 4 leaves *A. quadrifolia*
 - 3 Leaf-bearing nodes 3-many, all opposite.
 - 4 Follicle slightly to strongly muricate *A. syriaca*
 - 4 Follicle smooth.
 - 5 Lower leaf surface glabrous, or pubescent on the midrib only *A. exaltata*
 - 5 Lower leaf surface pubescent.
 - 6 Leaves lanceolate, 4-10× as long as wide.
 - 7 Leaves coriaceous, 3-10 cm long, 1.5-4.5 cm wide; corolla pale green; [of dry upland situations] *A. viridiflora*
 - 7 Leaves herbaceous, 6-15 cm long, 2-7 cm wide; corolla rose; [of moist to wetland situations].
 - 8 Stems and leaves sparsely pubescent to glabrescent; leaves narrow, the base obtuse to truncate, the apex long-acuminate; plants usually much branched *A. incarnata* var. *incarnata*
 - 8 Stems and leaves moderately to densely pubescent; leaves broader, the base rounded to subcordate, the apex acute to short-acuminate; plants usually relatively strict *A. incarnata* var. *pulchra*
 - 6 Leaves ovate to elliptic, 1.5-4× as long as wide.
 - 9 Stem moderately to densely pubescent; plants 1.5-5 (-7) dm tall; [of xeric pinelands of the Coastal Plain of NC, SC, and southward].
 - 10 Stem and leaves densely tomentulose; leaves mucronate *A. obovata*
 - 10 Stem and leaves softly puberulent; leaves apiculate *A. tomentosa*
 - 9 Stem glabrous to pubescent in lines only; plants 2-12 dm tall; [collectively of various habitats throughout our area].
 - 11 Lower leaf surface densely puberulent; [primarily of moist to wet habitats] *A. purpurascens*
 - 11 Lower leaf surface slightly pubescent; [primarily of moist to dry habitats].
 - 12 Leaves 4-9 cm wide, acuminate at the apex *A. variegata*
 - 12 Leaves 1-6 cm wide, mostly obtuse at the apex *A. viridiflora*

Asclepias amplexicaulis J.E. Smith, Claspng Milkweed. Sandhills, other dry woodlands of various types. May-July; June-August. NH and NY west to MN, IA, and KS, south to c. peninsula. FL, west to e. TX. The flowers have a fragrance or cloves and roses. [= RAB, C, F, G, K, Pa, S, W, WH, Z]

Asclepias cinerea Walter, Carolina Milkweed. Pine savannas. June-July; August-September. Se. SC south to n. peninsular FL, west to Panhandle FL. [= RAB, K, S, WH, Z]

Asclepias connivens Baldwin, Largeflower Milkweed. Wet pine flatwoods. July-August. Se. SC (McMillan et al. 2002) south to s. FL, west to Santa Rosa County, FL. [= GW, K, WH, Z; = *Anantherix connivens* (Baldwin) Feay – S]

* *Asclepias curassavica* Linnaeus, Scarlet Milkweed. Disturbed areas; native of tropical America, cultivated as an ornamental and sometimes slightly persistent. Kartesz (1999) reports it for TN. [= K, WH, Z] {not yet keyed}



Asclepias curtissii A. Gray, Curtiss's Milkweed. Scrub. Endemic to FL, from Clay County south to s. peninsular FL. [= K, WH, Z; = *Oxypteryx curtissii* (A. Gray) Small – S] {not yet keyed}

Asclepias exaltata Linnaeus, Tall Milkweed. Moist forests, slopes, and forest margins. June-July; August-September. ME and s. ON west to MN and IA, south to n. GA, n. AL (Schotz 2009). e. and c. TN (Chester, Wofford, & Kral 1997), KY, and IL. [= RAB, C, F, G, K, Pa, S, W, Z]

Asclepias feayi Chapman ex A. Gray, Feay's Milkweed. Sandhills, scrubby pine flatwoods. Endemic to FL, from Clay County south to s. peninsular FL. [= K, WH, Z; = *Asclepiodella feayi* (Chapman ex A. Gray) Small – S] {not yet keyed}

Asclepias hirtella (Pennell) Woodson, Barrens Milkweed. Limestone glades, prairies. MI, WI, and MN south to w. WV (Mason County), KY, e. TN (Bradley County) (Chester, Wofford, & Kral 1997), nw. GA (Jones & Coile 1988), AR, w. LA, and e. TX. This species of midwestern prairies and barrens that closely resembles *A. longifolia*. The two taxa have sometimes been treated as distinct only at the rank of subspecies (see synonymy) or as "very distinct varieties" (Turner 2009). [= C, F, K, Z; = *Acerates hirtella* Pennell – S; = *Asclepias longifolia* Michaux ssp. *hirtella* (Pennell) J. Farmer & C.R. Bell – X; = *Asclepias longifolia* var. *hirtella* (Pennell) B.L. Turner – Y]

Asclepias humistrata Walter, Fleshy Milkweed. Sandhills. May-June; June-July. E. NC south to s. FL, west to e. LA. [= RAB, K, S, WH, Z]



Asclepias incarnata Linnaeus var. *incarnata*, Western Swamp Milkweed. Swamps, marshes, especially over limestone or calcareous shale. July-September; August-October. ME and s. QC west to MB, south to VA, s. TN (Chester, Wofford, & Kral 1997), AR, TX, and CO; disjunct from n. FL south to s. FL; disjunct in TX, NM, and UT. The distribution is peculiar. [= C, F, G, GW; = *Asclepias incarnata* ssp. *incarnata* – RAB, K, Pa, W, Z; = *Asclepias incarnata* – S; < *Asclepias incarnata* – WH]

Asclepias incarnata Linnaeus var. *pulchra* (Ehrhart ex Willdenow) Persoon, Eastern Swamp Milkweed. Marshes, bogs, swamps. July-September; August-October. NS and ME south to e. NC, w. SC, GA, and e. TN (Chester, Wofford, & Kral 1997). [= C, F, G, GW; = *Asclepias incarnata* ssp. *pulchra* (Ehrhart ex Willdenow) Woodson – RAB, K, Pa, W, Z; = *Asclepias pulchra* Ehrhart ex Willdenow – S]

Asclepias lanceolata Walter, Few-flower Milkweed. Swamps, fresh to slightly brackish marshes, wet pine savannas. June-August; August-September. NJ south to s. FL, west to e. TX. [= RAB, C, GW, K, S, WH, Z; > *Asclepias lanceolata* var. *lanceolata* – F, G; > *Asclepias lanceolata* var. *paupercula* (Michaux) Fernald – F, G]

Asclepias longifolia Michaux, Longleaf Milkweed, Savanna Milkweed. Wet pine savannas. May-June; June-July. DE (formerly) south to s. FL, west to e. TX. *A. longifolia* and *A. hirtella* are closely related; the two taxa have sometimes been treated as distinct only at the rank of subspecies (see synonymy) or as "very distinct varieties" (Turner 2009). [= RAB, C, F, GW, K, WH, Z; = *Acerates longifolia* (Michaux) Elliott – G; ? *Acerates floridana* (Lamarck) A.S. Hitchcock – S; = *Asclepias longifolia* var. *longifolia* – Y; = *Asclepias longifolia* ssp. *longifolia* – X]

Asclepias michauxii Decaisne, Michaux's Milkweed. Pine savannas. May. S. SC south to peninsular FL, west to e. LA. [= RAB, K, S, WH, Z]

Asclepias obovata Elliott, Pineland Milkweed. Sandhills. June-September. Se. SC south to Panhandle FL, west to AR and TX. [= RAB, K, S, WH, Z]



Asclepias pedicellata Walter, Stalked Milkweed, Savanna Milkweed. Dry pine savannas. July-August. Se. NC south to s. FL and Panhandle FL. This species generally occurs in small populations of widely scattered individuals; populations of more than 50 individuals are rare. [= RAB, GW, K, WH, Z; = *Podostigma pedicellata* (Walter) Vail – S]

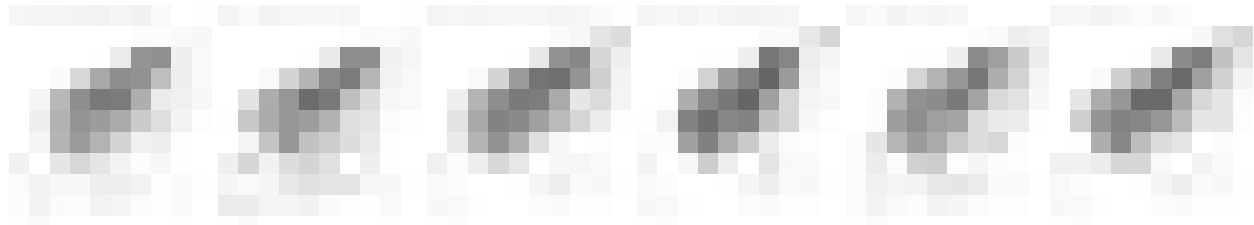
Asclepias perennis Walter, Smoothseed Milkweed, Swampforest Milkweed. Swamp forests. June-August; August-September. E. SC south to c. peninsular FL, west to e. TX, north in the interior to s. IN and s. IL. [= RAB, C, F, G, GW, K, S, WH, Z]

Asclepias purpurascens Linnaeus, Purple Milkweed. Openings in moist bottomlands and swamp forests, perhaps mostly on soils derived from mafic or calcareous rocks. June. NH and s. ON west to WI, IA, and KS, south to NC, nw. TN (Chester, Wofford, & Kral 1997), KY, AR, and OK. [= RAB, C, F, G, K, Pa, S, W, Z]

Asclepias quadrifolia Jacquin, Fourleaf Milkweed. Moist to dryish forests and forest margins, most common on mafic and calcareous substrates; common (rare in DE). May-June; August-September. NH and NY west to IN, south to NC, n. GA, n. AL, and c. TN; also from w. IL west to MO, south to AR and OK. [= RAB, C, F, G, K, Pa, S, W, Z]

Asclepias rubra Linnaeus, Purple Savanna Milkweed, "Red Milkweed." Pocosin ecotones, wet pine savannas, sandhill seeps, seepage swamps. June-July; July-September. Se. NY (Long Island), se. PA, and NJ south to wc. GA and w. Panhandle FL, west to e. TX. *A. laurifolia* is alleged to differ in sessile, cordate-clasping leaf bases (vs. petioled and rounded), and other characters (see Small 1933); it may warrant recognition and needs additional study. [= RAB, C, F, G, GW, K, Pa, WH, Z; > *A. rubra* – S; > *A. laurifolia* Michaux – S; > *A. rubra* var. *rubra*; > *A. rubra* var. *laurifolia* (Michaux) Harper]

Asclepias syriaca Linnaeus, Common Milkweed. Pastures, roadsides, disturbed areas. June-August; July-September. NB and ME west to s. MB and ND, south to SC, GA, c. TN (Chester, Wofford, & Kral 1997), AR, OK, and KS. This species is apparently expanding its range southward; see Wyatt et al. (1993) and Wyatt (1996) for discussion. [= RAB, C, K, Pa, S, W, Z; > *Asclepias syriaca* var. *syriaca* – F, G]



Asclepias tomentosa Elliott, Sandhills Milkweed. Sandhills. June; July. Sc. NC south to s. FL, west to c. TX. [= RAB, K, Z; ? *Asclepias aceratooides* M.A. Curtis – S]

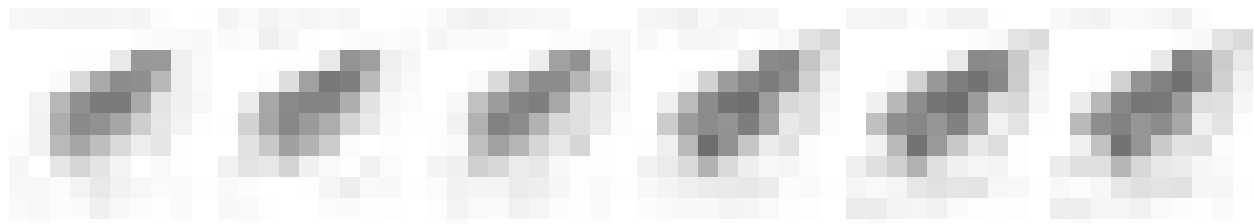
Asclepias tuberosa Linnaeus var. *interior* (Woodson) Shinnars, Midwestern Butterfly-weed. Dry forests, roadbanks. QC, ON, MN, SD, CO, UT, and CA south to PA, WV, KY, TN, and MS (Kartesz 1999). [= C; < *A. tuberosa* – F, S; = *A. tuberosa* Linnaeus ssp. *interior* Woodson – G, K, Z]

Asclepias tuberosa Linnaeus var. *rolfsii* (Britton ex Vail) Shinnars, Sandhills Butterfly-weed. Sandhills. May-August; August-September. Se. VA south to s. FL, west to s. MS. The flowers are typically lighter in color than those of var. *tuberosa*, yellow or yellowish-orange rather than deep orange to reddish. The first occurrence in Virginia is discussed by Belden et al. (2004). [= *Asclepias tuberosa* ssp. *rolfsii* (Britton ex Vail) Woodson – RAB, K, Z; = *Asclepias rolfsii* Britton ex Vail – S; < *Asclepias tuberosa* – WH]

Asclepias tuberosa Linnaeus var. *tuberosa*, Common Butterfly-weed. Woodland margins, roadsides, pastures. May-August; August-September. S. NH west to OH, south to Panhandle FL and e. TX. [= C; = *Asclepias tuberosa* ssp. *tuberosa* – RAB, G, K, Z; < *Asclepias tuberosa* – F, S, Pa, W, WH; >> *Asclepias tuberosa* – S; > *Asclepias decumbens* Linnaeus – S]

Asclepias variegata Linnaeus, White Milkweed. Upland forests and woodlands. May-June; July-September. CT west to OH, s. IN, s. IL, se. MO, and se. OK, south to Panhandle FL, LA, and e. TX. [= RAB, C, F, G, K, Pa, W, WH, Z; = *Biventrisia variegata* (Linnaeus) Small – S]

Asclepias verticillata Linnaeus, Whorled Milkweed. Barrens, thin soils of rock outcrops (especially mafic rocks), thin woodlands, sandhills. June-September; September-October. E. MA west to ND and MB, south to s. FL, TX, NM, and AZ. [= RAB, C, F, G, K, Pa, S, W, Z]



Asclepias viridiflora Rafinesque, Green Milkweed. Open woodlands, woodland edges, barrens, glades, especially over mafic or calcareous rocks, and also in disturbed areas. June-August; August-September. CT west to s. ON, MB, ND, and MT, south to NC, SC, GA, Panhandle FL, AL, LA, TX, n. Mexico, NM, and AZ. [= RAB, C, K, Pa, W, WH, Z; > *Asclepias viridiflora* var. *viridiflora* – F; > *Asclepias viridiflora* var. *lanceolata* (Ives) Torrey – F; = *Acerates viridiflora* (Rafinesque) Pursh ex Eaton – G, S]

Asclepias viridis Walter, Green Antelope-horn. Prairies, dry woodlands, calcareous hammocks. S. SC south to s. FL, west to TX; and from OH, w. WV, and KY west to NE, south to se. TN, c. TN (Chester, Wofford, & Kral 1997), nw. GA, c. AL, c. MS, AR, TX, and OK. [= K, WH, Z; = *Asclepiodora viridis* (Walter) A. Gray – S]

Asclepias viridula Chapman, Southern Milkweed. Wet longleaf pine savannas and flatwoods, seepage slopes, pitcherplant bogs. April-July. GA and AL south to ne. FL and Panhandle FL. See Chafin (2000) for additional information. [= GW, K, S, Z] {not yet keyed}

Catharanthus G. Don 1836 (Rosy-periwinkle)

A genus of about 8 species, herbs, 7 endemic to Madagascar and 1 endemic to India. References: van Bergen (1996)=Z; Snoeijer (1996).

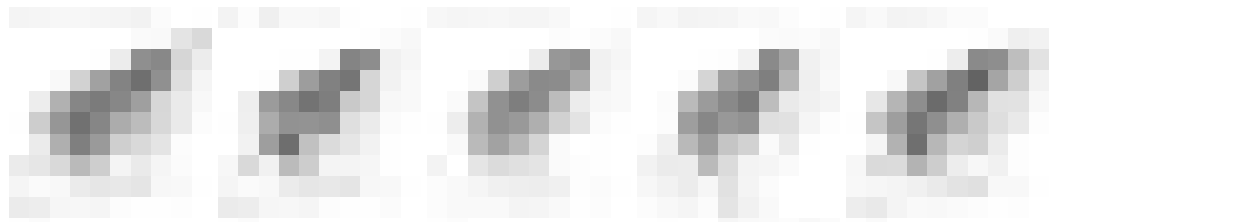
* ***Catharanthus roseus*** (Linnaeus) G. Don, Rosy-periwinkle, Madagascar Periwinkle, Cayenne Jasmine. Disturbed areas, persistent after cultivation or as a waif or "throwout" after cultivation; native of Madagascar, now a pantropical weed. May-October. *C. roseus* is the source of a powerful anti-leukemia drug. [= K, S, WH, Z; = *Vinca rosea* Linnaeus – RAB]

Cynanchum Linnaeus 1753 (Swallow-wort)

A genus of about 200-300 species, vines and lianas, primarily of tropical and warm temperate portions of the New World and Old World. *Ampelamus* was retained as a genus by Liede (1997a), but later results suggest that it is not distinct from some other portions of *Cynanchum* (Liede & Täuber 2002). However, *Cynanchum* itself is strongly polyphyletic and is being broken up; further taxonomic and nomenclatural changes are likely. *C. laeve* will probably remain in *Cynanchum* s.s. (which is primarily Old World in distribution). References: Liede (1997b); Liede & Meve (1997); Liede (1997a); Krings (2001)=Z; Liede & Täuber (2002).

- 1 Leaves oblong or ovate.
 - 2 Leaves broadly cordate, deeply cordate at base; corona of 5 erect, petaloid segments, each divided into 2 slender lobes..... *C. laeve*
 - 2 Leaves oblong or ovate, rounded or subcordate at base; corona a fleshy, lobed cup[see *Vincetoxicum nigrum*]
- 1 Leaves linear.
 - 3 Calyx lobes deltoid, obtuse, ca. 1 mm long; leaves petiolate, not reflexed, often caducous; follicle 1-3 mm in diameter; [of se. SC and south][see *Orthosia scoparia*]
 - 3 Calyx lobes lanceolate, acute, (1.3-) 1.5-2.5 mm long; leaves sessile, reflexed, persistent; follicle 6-7 mm in diameter; [of ne. NC and south][see *Seutera angustifolia*]

Cynanchum laeve (Michaux) Persoon, Sandvine, Honeyvine, Bluevine. Bottomlands and disturbed areas. July-September; August-October. Se. PA and KS south to sw. GA, Panhandle FL, and c. TX. [= RAB, GW, K, Pa, W, WV; = *Ampelamus laevis* (Michaux) Krings – WH, Z; = *Ampelamus albidus* (Nuttall) Britton – C, F, G; = *Gonolobus laevis* Michaux – S]



Gonolobus Michaux 1803 (Anglepod)

A genus of about 100 species, vines, primarily tropical. Liede (1997a), Lipow & Wyatt (1998), and others recognize *Gonolobus* as separate from *Mateleia*. References: Krings (2008)=U; Rosatti (1989)=Z; Lipow & Wyatt (1998)=Y; Drapalik (1969)=X; Krings & Xiang (2005)=V; Reveal & Barrie (1992); Krings & Xiang (2004).

- 1 Upper surface of corolla lobes uniformly colored, olive green at anthesis, glabrous; laminar dorsal anther appendage yellow, apex rounded or truncate; [of c. KY, e. TN, nw. AL westward]..... *G. suberosus* var. *granulatus*
- 1 Upper surface of corolla lobes multi-colored, generally dark maroon to brownish near the base and green to yellowish near the tips at anthesis (or uniformly yellowish-green to neon green in rare mutants), pubescent or glabrous; laminar dorsal anther appendage darkly purplish or maroonish tinted, apex bilobed to emarginate; [of se. VA south to c. peninsular FL, west to s. MS and inland to nw. GA] *G. suberosus* var. *suberosus*

Gonolobus suberosus (Linnaeus) R. Brown var. *granulatus* (Scheele) Krings & Q.-Y. Xiang, Western Anglepod. C. KY, e. TN, nw. AL, and MS west to c. OK and c. TX. [= U, V; > *Gonolobus suberosus* (Linnaeus) R. Brown – Y; < *Matelea gonocarpus* (Walter) Shinnars – K; >< *Vincetoxicum gonocarpus* Walter – S; >< *Vincetoxicum suberosum* (Linnaeus) Britton – S; >< *Matelea gonocarpa* – X; >< *Gonolobus gonocarpus* – Z]

Gonolobus suberosus (Linnaeus) R. Brown var. *suberosus*, Eastern Anglepod. Mesic to wet forests and thickets. June-August; September-November. Se. VA south to s. peninsular FL, west to s. MS, inland to nw. GA and c. KY. Rosatti (1989) and Drapalik (1969) have expressed considerable doubt about whether two species should be recognized; their view, supporting the recognition of a single species in our area, is followed here for now. However, studies by Krings & Xiang (2004, 2005) suggest that 2 entities should be circumscribed at the varietal level. Drapalik (1969) considered the basionym "*suberosa*" as not applicable to *Matelea* of North America; Reveal & Barrie (1992) lectotyped the name, resulting in it applying to our material. It has priority over "*gonocarpus*." [= U, V; > *Matelea gonocarpa* (Walter) Shinnars – RAB, C, W; > *Matelea suberosa* (Linnaeus) Shinnars – RAB, C, W; > *Gonolobus gonocarpus* (Walter) Perry – F, G; > *Gonolobus suberosus* (Linnaeus) R. Brown – F, Y; < *Matelea gonocarpus* (Walter) Shinnars – K, WH; < *Vincetoxicum gonocarpus* Walter – S; > *Vincetoxicum suberosum* (Linnaeus) Britton – S; = *Matelea gonocarpa* – X; = *Gonolobus gonocarpus* – Z]

Matelea Aublet 1775 (Spinypod)

A genus of about 180 species, herbaceous vines, primarily tropical and restricted to the New World. References: Drapalik (1969)=Z.

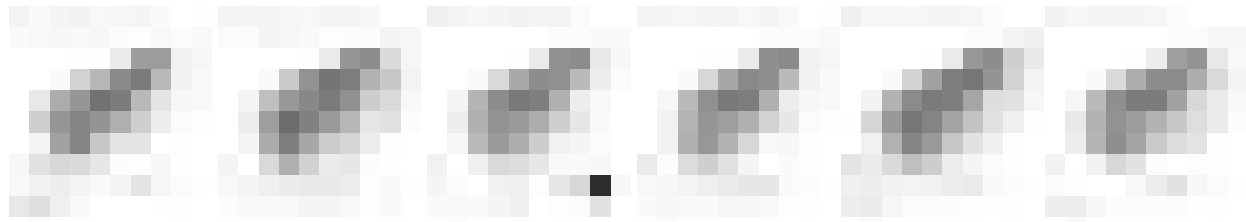
- 1 Plant a prostrate herb, usually not twining, with stems 0.2-0.6 (-1.1 m) long at maturity; leaf blades 2-4 (-6) cm long; cymes sessile; flowers (2-) 3-4 (-5) per inflorescence; upper (inner) surface of the petals pubescent; [of xeric sandhills, from e. GA southward].....*M. pubiflora*
- 1 Plant a twining herbaceous vine, with stems 1-2 m long at maturity; leaf blades 7-27 cm long; cymes borne on peduncles; flowers (2-) 9-19 (-53) per inflorescence, except *M. alabamensis*, with (1-) 4-5) (-12) flowers per inflorescence; upper (inner) surface of the petals glabrous; [of various habitats, but more mesic, collectively widespread in our area].
- 2 Inflorescence with 1-12 flowers, averaging 4-5; corolla light green, reticulated with darker green; corona disc-shaped, lacking 5 pairs of appendages; [of mesic slopes of s. GA southward and westward]*M. alabamensis*
- 2 Inflorescence with 2-53 flowers, averaging 9-19; corolla white, yellow, rose, or maroon (or greenish and reticulate in *M. flavidula*); corona cup-shaped, with 5 pairs of upright appendages alternating with 5 corona lobes; [collectively widespread].
- 3 [endemic to FL]*M. floridana*
- 3 [collectively widespread].
- 4 Corolla lobes in a horizontal plane or slightly reflexed; flower buds ovoid, < 1.5× as long as wide; corolla lobes 1.5-2.6× as long as wide.
- 5 Corolla dark maroon (rarely maroon-yellow or yellow), not reticulate with darker veins; paired corona appendages always higher than the alternating corona lobes.....*M. carolinensis*
- 5 Corolla green, green-yellow, or yellow (rarely rosy or olive-maroon), reticulate with darker green veins; paired corona appendages about as high as the alternating corona lobes *M. flavidula*
- 4 Corolla lobes ascending; flower buds conical, > 2× as long as wide; corolla lobes 2.4-6.2× as long as wide.
- 6 Corolla white (or fading or drying cream); corona 2.2-2.7 mm in diameter, cream or creamy-yellow; [of sw. GA westward].....*M. baldwyniana*
- 6 Corolla rose or maroon (rarely cream); corona 2.6-4.0 mm in diameter, rose to dark maroon (rarely green, cream, or orange); [primarily of the Mountains and Piedmont].
- 7 Corolla lobes 2.4-3.6 (-4.0)× as long as wide, the widest part above the sinus; corolla dark maroon*M. decipiens*
- 7 Corolla lobes (3.2-) 4.0-6.2× as long as wide, the widest part at the sinus; corolla rose to light maroon (rarely dark maroon, green, or cream).....*M. obliqua*

Matelea alabamensis (Vail) Woodson, Alabama Milkvine, Alabama Spinypod. Open forests on river bluffs, mesic margins of sand ridges. April-June. Sw. and apparently se. GA, Panhandle FL, and s. AL. [= K, WH, Z; = *Cyclodon alabamense* (Vail) Small – S]

Matelea baldwyniana (Sweet) Woodson, White Spinypod. Dry to mesic bluffs over calcareous rocks. Panhandle FL and sw. GA west to MO, AR, and OK. Drapalik (1969) discusses the probability that the name *M. baldwyniana* is based on material of *M. flavidula*. [= K, WH, Z; = *Odontostephana baldwiniana* (Sweet) Alexander – S]

Matelea carolinensis (Jacquin) Woodson, Carolina Spinypod. Moist to dry, nutrient-rich forests. April-June; July-October. DE, MD, KY, and s. MO south to GA and MS. [= RAB, C, K, W; = *Gonolobus carolinensis* (Jacquin) R. Brown ex J.A. Schultes – F, G; = *Odontostephana carolinensis* (Jacquin) Alexander – S]

Matelea decipiens (Alexander) Woodson, Deceptive Spinypod. Woodlands and thickets, generally over mafic (in the Piedmont) or calcareous rocks (in the Coastal Plain). April-June; August-October. VA south to nc. GA, AL, and e. TX, north in the interior to s. IL and MO. [= RAB, C, K; = *Gonolobus decipiens* (Alexander) Perry – F, G; = *Odontostephana decipiens* Alexander – S]



Matelea flavidula (Chapman) Woodson, Yellow Spiny pod. Moist, nutrient-rich forests. May-June; August-October. E. NC (?) and e. SC south to Panhandle FL, apparently rare throughout its range. [= RAB, K, WH, Z; = *Odontostephana flavidula* (Chapman) Alexander – S]

Matelea floridana (Vail) Woodson, Florida Milkvine. Hammocks. Ne. FL and e. Panhandle FL south to s. FL. [= K, WH, Z; = *Odontostephana floridana* (Vail) Alexander – S]

Matelea obliqua (Jacquin) Woodson, Northern Spiny pod, Limerock Milkvine. In forests, woodlands, or thickets over calcareous rocks. June-July; August-November. PA west to OH, IN, and MO, south to w. NC, nw. GA (Jones & Coile 1988), and TN. [= RAB, C, K, Pa, W; = *Gonolobus obliquus* (Jacquin) R. Brown ex J.A. Schultes – G; > *G. obliquus* – F; > *G. shortii* A. Gray – F; > *Odontostephana obliqua* (Jacquin) Alexander – S; > *O. shortii* (A. Gray) Alexander – S; = *Matelea carolinensis* – WV, misapplied]

Matelea pubiflora (Decaisne) Woodson, Trailing Milkvine. Sand ridges, sandhills. Late May-early August; mid-June-late September. E. GA (Jones & Coile 1988) south to ne. FL (Wunderlin 1998). [= K, WH, Z; = *Edisonia pubiflora* (Decaisne) Small – S]

Nerium Linnaeus 1753 (Oleander)

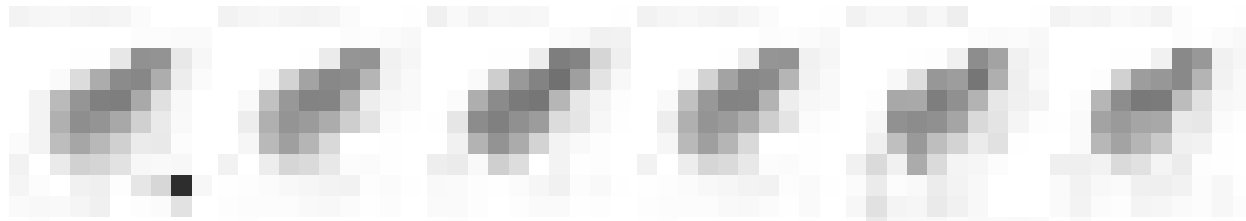
A monotypic genus, a shrub, of Mediterranean Europe.

* *Nerium oleander* Linnaeus, Oleander. Frequently cultivated, especially on barrier islands (because of its salt resistance), sometimes persistent; native of Mediterranean Europe. [= K, S, WH]

Orthosia Decaisne 1844 (Swallow-wort)

A genus of ca. 40 species, lianas, of the se. United States, West Indies, Central America, and n. South America. References: Liede-Schumann & Meve (2008)=Z; Liede (1997b).

Orthosia scoparia (Nuttall) Liede & Meve, Leafless Swallow-wort. Coastal hammocks. Se. SC south to s. FL, west to s. MS; West Indies; Central America south to South America. [= Z; = *Cynanchum scoparium* Nuttall – RAB, K, WH; = *Amphistelma scoparia* (Nuttall) Small – S]



Periploca Linnaeus 1753 (Silkvine)

* *Periploca graeca* Linnaeus, Silkvine. Disturbed areas; native of Mediterranean Europe. July-August. Sometimes cultivated and escaped or persistent; it is reported for various states in e. North America, as in Knox County, TN (Chester, Wofford, & Kral 1997). [= RAB, C, K, Pa]

Seutera Reichenbach 1828 (Swallow-wort)

A genus of 2-3 species (as newly circumscribed by Fishbein & Stevens 2005), of tropical and subtropical se. United States, West Indies, and Baja California. Liede & Meve (2003) follow a broader circumscription, including *Seutera* in *Funastrum*, but Fishbein & Stevens (2005) argue that *Seutera* is discordant as a component of *Funastrum*; the appropriate generic placement remains imperfectly resolved. References: Fishbein & Stevens (2005)=Y; Liede & Meve (2003)=Z; Liede & Meve (1997).

Seutera angustifolia (Persoon) Fishbein & W.D. Stevens, Swallow-wort. Coastal hammocks, edges of marshes, generally or always on barrier islands. June-July; July-October. E. NC (Dare County) south to s. FL, west to TX; Bahamas and West

Indies; Mexico (Yucatán) and Belize. See Krings (2005) for a discussion of typification. [= Y; = *Cynanchum angustifolium* Persoon – GW, K, WH; = *C. palustre* (Pursh) Heller – RAB; = *Lyonia palustris* (Pursh) Small – S; = *Funastrum angustifolium* (Persoon) Liede & Meve – Z]

Thrysanthella (Baillon) Pichon 1948 (Climbing Dogbane)

A monotypic genus, a liana, of se. North America. This species has been traditionally treated as the only North American taxon of *Trachelospermum*, an otherwise se. Asian genus of about 15-20 species. Such a treatment is untenable, however, as morphological and molecular evidence clearly show that our native taxon is only distantly related to Asian *Trachelospermum* (Livshultz et al. 2007). References: Livshultz et al. (2007)=Z.

Identification notes: *Thrysanthella difformis* is sometimes mistaken at a glance for *Gelsemium* (both woody vines with opposite lanceolate leaves), but in the field the milky sap of *Thrysanthella* provides an immediate identifying characteristic.

Thrysanthella difformis (Walter) Pichon, Climbing Dogbane. Bottomlands, swamp forests, marshes, upland forests and woodlands. May-July; July-September. DE south to n. peninsular FL, west to e. TX, north in the interior to MO and IN. See Krings (2003) for a discussion of nomenclature. [= Z; = *Trachelospermum difforme* (Walter) A. Gray – RAB, C, F, G, GW, K1, K2, S, WH]

Trachelospermum Lemaire 1851 (Climbing Dogbane)

A genus of 15-20 species, lianas, of se. Asia. References: Livshultz et al. (2007).

* ***Trachelospermum jasminoides*** (Lindley) Lemaire, Confederate Jasmine, Star Jasmine. Disturbed areas; native of se. Asia. April-May. Cultivated and sometimes persistent or spreading. Also reported for e. LA and to be expected along the Gulf coast in AL and MS. [= K1, K2, WH]

Vinca Linnaeus 1753 (Vinca, Periwinkle)

A genus of 5-7 species of Europe, n. Africa, and c. Asia.

- 1 Leaves ovate, broadest near the base, cordate or subcordate-rounded at the base, 2-6 cm wide, thin in texture and deciduous to semi-evergreen; leaf margins ciliate; flowers 3-5 cm across, on a pedicel 3-5 cm long..... ***V. major***
- 1 Leaves lanceolate or elliptic, broadest near the middle, rounded to cuneate at the base, 1-2 cm wide, thick in texture and evergreen; leaf margins not ciliate; flowers 2-3 cm across, on a pedicel 1-1.5 cm long..... ***V. minor***

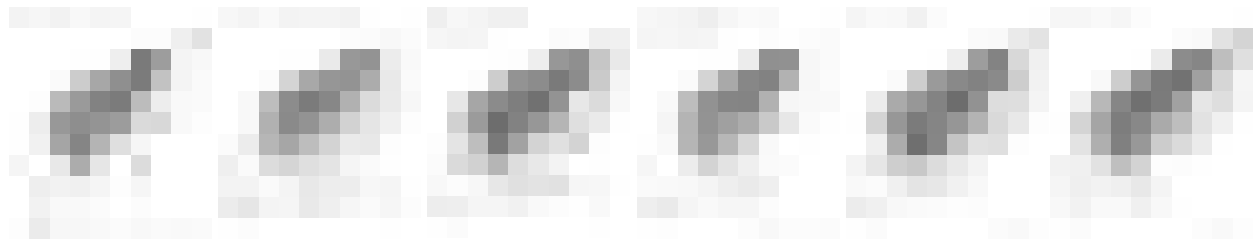
* ***Vinca major*** Linnaeus, Greater Periwinkle. Disturbed areas, suburban woodlands, around old house sites, persistent and spreading from cultivation; native of Europe. Late February-May; June-July. [= RAB, C, F, G, K, S, W]

* ***Vinca minor*** Linnaeus, Common Periwinkle, Myrtle. Disturbed areas, around old house sites and especially old cemeteries, persistent and spreading from cultivation; native of Europe. April-June; June-July. [= RAB, C, F, G, K, Pa, S, W, WH, WV]

Vincetoxicum Wolf 1776 (Swallow-wort)

A genus of ca. 70 species, woody lianas, native of the Old World.

* ***Vincetoxicum nigrum*** (Linnaeus) Moench, Black Swallow-wort. Disturbed areas; native of Mediterranean Europe. May-July. Reported for many states in ne. United States, south to MD, KY, TN. [= C, Pa; = *Cynanchum louiseae* Kartesz & Gandhi – K; = *Cynanchum nigrum* (Linnaeus) Persoon – F, G]





356. BORAGINACEAE A.L. de Jussieu 1789 (Borage Family) [order assignment uncertain]

A family of about 155 genera and ca. 3200 species, herbs, shrubs, and trees, nearly cosmopolitan (Al-Shehbaz 1991). Subfamily and tribe classification is that of Nazaire & Hufford (2012). References: Nazaire & Hufford (2012); Ferguson 1998; Diane, Förther, & Hilger 2002; Hilger & Diane 2003; Al-Shehbaz (1991)=Z throughout the family; Wilson (1960a); Constance (1963). Key to genera based on RAB, C, and Z. [including *HELIOTROPIACEAE* and *HYDROPHYLLACEAE*]

- 1 Leaves dissected, lobed, or toothed (sometimes the basalmost leaves simple); style fused for a portion of its length, 2-cleft toward the tip; ovary with 1 locule; [subfamily *Hydrophyloideae*].
 - 2 Flowers solitary opposite the leaves on the upper portion of the stem (sometimes also terminal in a lax, (1-) 2-6-flowered cyme).
 - 3 Leaves opposite below, alternate above; petals 5-8 mm long; leaves elliptical in outline, pinnatifid into 7-13 lanceolate segments; calyx lobes to 10 mm long in fruit; capsule 4-seeded **15. *Ellisia***
 - 3 Leaves all alternate; petals 2-4 mm long; leaves broadly triangular in outline, divided into 3-5 obovate segments; calyx lobes 1-3 mm long; capsule 1-2 (-3)-seeded **16. *Nemophila***
 - 2 Flowers all terminal in 3-many-flowered cymes.
 - 4 Inflorescence repeatedly branched subdichotomously; larger leaf blades > 8 cm wide; stamens well exerted from the corolla (3 mm or more beyond the corolla); plants perennial from fibrous roots **17. *Hydrophyllum***
 - 4 Inflorescence with a strong central axis (some secondary branching in *P. bipinnatifida*, but not as above); larger leaf blades < 5 cm wide (except *P. bipinnatifida*); stamens slightly exerted from the corolla (< 3 mm beyond the corolla) (except well-exserted in *P. bipinnatifida*, included in *P. covillei*); plants annual (biennial in *P. bipinnatifida*) from a taproot **18. *Phacelia***
- 1 Leaves entire, simple; style various.
 - 5 Styles 2, distinct to the summit of the ovary
 - 6 Flowers in axillary cymes; capsule subglobose; leaves 2-12 cm long [see *Hydrolea* in *HYDROLEACEAE*]
 - 6 Flowers solitary or paired in the leaf axils; capsule cylindrical; leaves 0.8-1.5 (-3.5) cm long; [subgenus *Hydrophyloideae*] **14. *Nama***
 - 5 Styles absent (the stigma sessile and terminal), single, or with 2 branches.
 - 7 Ovary slightly 2-4-lobed, or not at all lobed; style terminal or reduced to a sessile terminal stigma; [subfamily *Heliotropioideae*] **20. *Heliotropium***
 - 7 Ovary deeply 4-parted; style gynobasic; [subfamily *Boraginoideae*].
 - 8 Mericarps with glochidiate prickles (like grappling hooks), these visible early in development; [tribe *Cynoglosseae*].
 - 9 Mericarps spreading or divergent, attached to the gynobase on the upper third of the mericarp **1. *Cynoglossum***
 - 9 Mericarps erect, attached to the gynobase near the middle of the mericarp.
 - 10 Fruiting pedicels deflexed; plant perennial or biennial **2. *Hackelia***
 - 10 Fruiting pedicels erect-ascending; plant annual **3. *Lappula***
 - 9 Mericarps smooth, rugose, or pitted, lacking glochidiate prickles.
 - 11 Corolla rotate, lacking a well-developed tube, blue; [tribe *Boragineae*] **6. *Borago***
 - 11 Corolla with a well-developed tube at least 3 mm long, of various colors (including blue).
 - 12 Corolla lobes distinctly unequal, pink to blue.
 - 13 Stamens equal in length, entirely included within the corolla tube; [tribe *Boragineae*] **5. *Anchusa***
 - 13 Stamens unequal in length, the longer conspicuously exerted; [tribe *Lithospermeae*] **7. *Echium***
 - 12 Corolla lobes equal, of various colors (including pink to blue).
 - 14 Plant a scrambling climber with retrorsely prickly-hispid stems; [tribe *Cynoglosseae*] **19. *Asperugo***
 - 14 Plant not climbing.
 - 15 Mericarps attached laterally to a pyramidal gynobase; [tribe *Cynoglosseae*].
 - 16 Corolla yellow, the tube 4-5 mm long; corolla throat lacking appendages **4. *Amsinckia***
 - 16 Corolla white (with a yellow eye), or pink to blue, the tube 6-20 mm long; corolla throat with appendages.
 - 17 Corolla pink to blue (rarely white), 18-25 mm long; leaves elliptic or ovate; [plant a native, of moist, nutrient-rich habitats, and sometimes grown as an ornamental] **10. *Mertensia***
 - 17 Corolla white with a yellow eye; leaves linear; [plant a rare alien, of disturbed habitats] **12. *Plagiobothrys***
 - 15 Mericarps attached basally to a flat or broadly convex gynobase.
 - 18 Mericarps laterally compressed, with an evident raised margin; [tribe *Cynoglosseae*] **11. *Myosotis***
 - 18 Mericarps neither laterally compressed nor with an evident thickened margin.
 - 19 Mericarps with a prominent, toothed, basal rim; [tribe *Boragineae*] **13. *Symphytum***
 - 19 Mericarps lacking a prominent, toothed, basal rim; [tribe *Lithospermeae*].
 - 20 Corolla whitish or bluish white; plant annual from a slender taproot; leaves without evident lateral veins; mericarps brown, dull, wrinkled and pitted; [plant a weedy alien] **8. *Buglossoides***
 - 20 Corolla bright yellow-orange, or greenish-white; plant perennial from a thickened, woody rhizome; mericarps white, shining, smooth or pitted; [plant a native] **9. *Lithospermum***

1. *Cynoglossum* Linnaeus (Comfrey)

A genus of about 75 species, herbs, of temperate regions. References: Al-Shehbaz (1991)=Z; Haines (2010)=Y.

- 1 Flowering stem with leaves above the first inflorescence branch; corolla reddish-purple; [plant a biennial alien, weedy] *C. officinale*
 1 Flowering stem leafless above the first branch; corolla blue or white; [plant a perennial native, not weedy].
 2 Nutlets 3.5-5 mm; calyx at anthesis 2-2.5 mm long; corolla 6-8 mm wide, the lobes oblong and not overlapping
 [*C. virginianum* var. *boreale*]
 2 Nutlets 5.5-9 mm; calyx at anthesis (3.0-) 3.5-4.5 mm long; corolla (8-) 10-12 mm wide, the lobes broadly rounded and more or less overlapping *C. virginianum* var. *virginianum*

* *Cynoglossum officinale* Linnaeus, Garden Comfrey, Hound's-tongue. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE): disturbed areas, roadsides, pastures, calcareous shale barrens; common (uncommon in DE and WV, rare in NC), native of Eurasia. May-July. [= RAB, C, F, G, K, Pa, S, W, WV, Z]

Cynoglossum virginianum Linnaeus var. *boreale* (Fernald) Cooperrider, Northern Hound's-tongue. Forests, roadsides. May-June. NB west to BC, south to CT, NY, c. PA, n. OH, MI, and MN. Cooperrider (1995) prefers varietal status for this taxon, stating that in OH there are numerous intermediates, while Voss (1996) and Rhoads & Klein (1993) maintain *C. boreale* at the species level. [= C, K; = *C. boreale* – F, G, Pa, Z; = *C. virginianum* ssp. *boreale* (Fernald) A. Haines – Y]

Cynoglossum virginianum Linnaeus var. *virginianum*, Wild Comfrey. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): moist deciduous forests; common (uncommon in DE Piedmont, rare in Coastal Plain). April-June. Var. *virginianum* ranges from CT west to OK, south to FL and LA. [= C, K; < *C. virginianum* – RAB, W, WV; = *C. virginianum* – F, G, Pa, Z; = *C. virginicum* – S, orthographic error; = *C. virginianum* ssp. *virginianum* – Y]

2. *Hackelia* Opiz (Stickseed)

A genus of ca. 45 species, of north temperate regions, Central America, and South America, especially diverse in w. North America. References: Al-Shehbaz (1991)=Z.

Hackelia virginiana (Linnaeus) I.M. Johnston, Virginia Stickseed. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, VA): rich forests and woodlands; common (rare in GA, NC, and SC). June-September. S. QC west to ND, south to ne. GA (Jones & Coile 1988), LA, and TX. [= RAB, C, F, G, K, Pa, W, WV, Z; = *Lappula virginiana* (Linnaeus) Greene – S]

3. *Lappula* Moench (Sheepbur)

A genus of about 40 species, of Eurasia, w. North America. References: Al-Shehbaz (1991)=Z.

- 1 Nutlets with 1 row of marginal prickles *L. occidentalis* var. *occidentalis*
 1 Nutlets with 2-3 rows of marginal prickles *L. squarrosa*

* *Lappula occidentalis* (S. Watson) Greene var. *occidentalis*. Cp (SC): waste areas near wool-combing mill; rare, perhaps only a waif, native of w. North America. April-June. [= K; = *L. redowskii* var. *redowskii* – C, Z; = *L. redowskii* (Hornemann) Greene var. *occidentalis* (S. Watson) Rydberg – F, G]

* *Lappula squarrosa* (Retzius) Dumortier, Stickseed, Beggar's-lice. Mt (WV): disturbed areas; rare, native of Europe. May-September. Introduced south to MD, WV, KY, and TN. [= C, Pa, Z; = *L. echinata* Gilibert – F, G, WV; = *L. lappula* (Linnaeus) Karst. – S]

4. *Amsinckia* Lehmann (Fiddleneck)

A genus of about 15 species, herbs, of western North America and western South America. References: Al-Shehbaz (1991)=Z.

* *Amsinckia menziesii* (Lehmann) A. Nelson & Macbride. Pd (NC), Cp (SC): disturbed areas, waste areas near wool-combing mill; rare, native of w. United States. May-September. [= Z; >> *A. hispida* (Ruiz & Pavón) I.M. Johnston – RAB, misidentification; > *A. menziesii* var. *menziesii* – K; >> *A. parviflora* Heller – S, misidentification; >< *Amsinckia lycopsoides* Lehmann, misidentification]

5. *Anchusa* Linnaeus (Bugloss, Alkanet)

A genus of about 35 species, herbs, of Europe, n. Africa, and w. Asia. References: Al-Shehbaz (1991)=Z.

* *Anchusa arvensis* (Linnaeus) M. Bieberstein, Small Bugloss, Alkanet. Pd (NC, VA), Mt (WV): disturbed areas, rare, native of Europe. [= C, K; = *Lycopsis arvensis* Linnaeus – F, G, S]

6. *Borago* Linnaeus (Borage)

A genus of 3 species, herbs, of Mediterranean Europe and Asia. References: Al-Shehbaz (1991)=Z.

- * *Borago officinalis* Linnaeus, Borage. Pd (VA), Mt (WV): disturbed areas; rare, native of s. Europe. [= C, F, G, K, Z]

7. *Echium* Linnaeus (Viper's-bugloss, Blueweed)

A genus of about 60 species, herbs, widespread in the Old World. The common name is pronounced "bew-gloss", not "bug-loss", as it refers to an ox's tongue rather than to the departure of insects. References: Al-Shehbaz (1991)=Z.

- 1 Hairs of the stem pustular-based..... *E. pustulatum*
1 Hairs of the stem not pustular-based..... *E. vulgare*

* *Echium pustulatum* Sibthorp & Smith, Blue-devil. Disturbed areas; native of Mediterranean Europe. Reported by F for "N.J. to W.Va.," by G and K as south to VA, and bt Kartesz (2010) as in DC. [= K; = *E. vulgare* var. *pustulatum* (Sibthorp & Smith) Coincy – F, G; < *E. vulgare* – Z]

* *Echium vulgare* Linnaeus, Viper's-bugloss, Blueweed. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, GA, VA): roadsides, dry pastures, disturbed areas; common (uncommon in DE Piedmont, rare in DE Coastal Plain), native of Mediterranean Europe. June-September. Reported for Cook County, GA (Carter, Baker, & Morris 2009). [= RAB, C, K, Pa, W, WV; = *E. vulgare* var. *vulgare* – F, G; < *E. vulgare* – Z (also see *E. pustulatum*)]



8. Buglossoides Moench (Corn-gromwell)

A genus of about 7 species, herbs or shrubs, of temperate Eurasia. References: Al-Shehbaz (1991)=Z.

* *Buglossoides arvensis* (Linnaeus) I.M. Johnston ssp. *arvensis*, Corn-gromwell. Mt (NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): roadsides, dry disturbed areas, sandy fields; common (uncommon in DE Piedmont, rare in DE Coastal Plain), native of Eurasia. March-June. Other subspecies are not known to be naturalized in our area. [= Z; < *B. arvensis* – K; < *Lithospermum arvense* Linnaeus – RAB, C, F, G, S, W; < *B. arvense* – Pa, orthographic variant]

9. *Lithospermum* Linnaeus (Gromwell, Puccoon, Stoneseed)

A genus of about 60 species, herbs (mostly perennials), nearly cosmopolitan. Recent studies strongly suggest that *Onosmodium* is better included in a broadened *Lithospermum* (Cohen & Davis 2009; Weigend et al. 2009), as *Onosmodium* is embedded within *Lithospermum* in a subclade also including *L. tuberosum*; morphologically, *Onosmodium* shows a subset of the characteristics in a broader and more diverse *Lithospermum*. References: Weakley et al. (2011)=U; Cohen & Davis (2009); Cochrane (1976)=X; Turner (1995a)=Y; Cusick (1985)=V; Al-Shehbaz (1991)=Z. Key based in part on X and Y.

- 1 Corolla lobes acute to acuminate, erect (continuing the plane of the corolla tube); style exerted.
2 Corolla lobes yellow to orange; nutlet 2.0-2.8 mm long; corolla lobes either 2.5-4× as long as wide and acuminate (*L. virginianum*) or 1.5-2× as long as wide, acute (*O. decipiens*).
3 Stem hairs 2.5-5.0 mm long; corolla lobes 1.5-2× as long as wide, acute; tips of the anthers reaching the base of the corolla sinuses; [endemic to Ketona dolomite glades, Bibb County, c. AL]..... *L. decipiens*
3 Stem hairs < 2.0 mm long; corolla lobes 2.5-4× as long as wide and acuminate; tips of the anthers below the corolla sinuses; [widespread in our area]..... *L. virginianum*
2 Corolla lobes dull greenish-white; nutlet 2.5-3.0 mm long; corolla lobes 1.5-2× as long as wide, acute.
4 Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white)..... *L. molle*
4 Leaf vestiture at least in part of spreading or ascending hairs.
5 Stems glabrescent (with widely scattered appressed hairs) below the inflorescence branches..... *L. subsetosum*
5 Stems persistently and obviously pubescent below the inflorescence branches.
6 Upper leaf surface with hairs of similar length, these appressed to ascending; corolla 11-20 mm long; nutlets tapered to the base, lacking a collar; longest stem hairs near midstem < 2.2 mm long..... *L. occidentale*
6 Upper leaf surface with hairs of two lengths, these spreading; corolla 6-10 mm long; nutlets flared at the base, forming a collar; longest stem hairs near midstem > 2.3 mm long..... *L. parviflorum*
1 Corolla lobes rounded, spreading; style included.

- 7 Corolla white or yellowish-white, the tube 4-8 mm long.
- 8 Plant with basal rosette; lower cauline leaves about equal in size to the upper cauline leaves; leaves acute to obtuse.....*L. tuberosum*
- 8 Plant lacking basal rosette; lower cauline leaves smaller than the upper cauline leaves; leaves acuminate or acute.
- 9 Upper stem internodes mostly 3-6 cm long; leaves mostly >2 cm wide, acuminate.....*L. latifolium*
- 9 Upper stem internodes mostly 1-2 cm long; leaves mostly <2 cm wide, acute.....*L. officinale*
- 7 Corolla yellow-orange, the tube 7-30 mm long.
- 10 Corolla tube 13-30 mm long; corolla lobes denticulate to lacerate; nutlets pitted.....*L. incisum*
- 10 Corolla tube 7-14 mm long; corolla lobes entire; nutlets smooth.
- 11 Plant with dense, soft, appressed pubescence, the hairs usually without pustular bases; calyx lobes 6-8 mm long at maturity; nutlets 2-3 mm long; [mostly of rocky or clayey circumneutral soils of the Piedmont and Mountains].....*L. canescens*
- 11 Plant with scattered, stiff, spreading pubescence, the hairs with or without pustular bases; calyx lobes 10-15 mm long at maturity; nutlets 3.5-4.5 mm long; [variously of sandy acidic soils of the Coastal Plain or inland].
- 12 Pubescence with slender bases; mature calyx lobes flat; plants with 15-25 well-developed leaves below the inflorescence; [of sandy Coastal Plain habitats from se. VA southward].....*L. caroliniense*
- 12 Pubescence with pustular bases; mature calyx lobes strongly keeled; plants with (30-) 35-45 well-developed leaves below the inflorescence; [inland, known from west and north of our area].....[*L. croceum*]

Lithospermum canescens (Michaux) Lehmann, Hoary Puccoon, Indian-paint. Pd (NC, SC, VA), Mt (GA, VA, WV), Cp? (VA): dry woodlands and glades over calcareous rocks (such as limestone, dolostone) or mafic rocks (such as diabase); uncommon (rare in NC). April-May. ON west to SK, south to c. NC, nw. GA, AL, and TX. [= RAB, C, F, G, K, Pa, V, W, WV, Z; = *Batschia canescens* Michaux - S]

Lithospermum caroliniense (Walter ex J.F. Gmelin) MacMillan, Coastal Plain Puccoon. Cp (FL, GA, SC, VA): sandhills, dry sandy soils; common (rare north of s. SC). April-June. A Southeastern Coastal Plain endemic: se. SC south to Panhandle FL, and west to TX. The disjunction from SC to se. VA, skipping over large amounts of apparently suitable sandhill habitat in NC, is surprising. The sibling taxa *L. caroliniense* and *L. croceum* have been variously treated as distinct species, subspecies, or varieties, or as mere forms (see synonymy). They appear to be as clearly separable as *L. caroliniense* is from *L. canescens*; I regard them as allopatric species. [= F; < *L. caroliniense* - RAB, G, WH, Z; = *L. caroliniense* var. *caroliniense* - C, K; = *Batschia caroliniensis* Walter ex J.F. Gmelin - S; = *L. carolinense* ssp. *carolinense* - V]

Lithospermum croceum Fernald. ON west to MT, south to nw. PA, n. OH, AR, OK, and CO. Reports by Kartesz (1999) for WV, KY, and TN have not been verified. [= F; = *L. caroliniense* (Walter ex J.F. Gmelin) MacMillan var. *croceum* (Fernald) Cronquist - C, K; < *L. caroliniense* - G, Pa, Z; = *L. caroliniense* ssp. *croceum* A.W. Cusick - V]

Lithospermum decipiens (J. Allison) Weakley, Witsell, & D. Estes, Deceptive Marbleseed. Dolomitic Ketona glades. April-early May; June-August. Endemic to c. AL (Bibb County) (Allison & Stevens 2001). [= U; = *Onosmodium decipiens* J. Allison - K2]

Lithospermum incisum Lehmann, Narrowleaf Gromwell. Cp (FL): disturbed areas; rare. April-July. S. ON west to BC, south to IN, LA, TX, and CA; disjunct from FL Panhandle south to c. peninsular FL. [= C, F, G, K, WH; = *Batschia linearifolia* (Goldie) Small - S]

Lithospermum latifolium Michaux, American Gromwell, Broadleaf Gromwell. Mt (GA, VA, WV): dry to moist woodlands over calcareous rocks; uncommon (rare in GA and VA). May-June. NY west to MN, south to nw. GA, s. TN and MO. [= C, F, G, K, Pa, S, W, WV, V, Z]

Lithospermum molle (Michaux) Muhlenberg. Limestone barrens. C. KY, c. TN (Chester, Wofford, & Kral 1997), nw. AL, and disjunct in the Ozarkian Highlands of MO. *O. molle* has been attributed to Durham County, NC (RAB); Baskin *et al.* (1983) determined that this report was based on a misidentification of a specimen of *O. virginianum*. [= *Onosmodium molle* Michaux - F, G, Y; = *O. molle* var. *molle* - C; = *O. molle* ssp. *molle* - K1, X, Z; < *O. molle* - S; < *O. bejariense* Alphonse de Candolle ssp. *bejariense* - K2]

Lithospermum occidentale (Mackenzie) Weakley, Witsell, & D. Estes. Mt (GA): open woodlands over limestone; rare. Ranges east to e. TN (Chester, Wofford, & Kral 1997) and nw. GA (Jones & Coile 1988). [= U; = *Onosmodium occidentale* Mackenzie - F, G; = *O. molle* Michaux var. *occidentale* (Mackenzie) I.M. Johnston - C; = *O. molle* Michaux ssp. *occidentale* (Mackenzie) T.S. Cochrane - K1, X, Z; < *O. molle* - S; = *O. bejariense* Alphonse de Candolle var. *occidentale* (Mackenzie) B.L. Turner - K2, Y]

* *Lithospermum officinale* Linnaeus, European Gromwell. Native of Europe and occurring at scattered localities in ne. North America, south to PA and NJ (Kartesz 1999). [= C, F, G, K, Y, Z]

Lithospermum parviflorum Weakley, Witsell, & D. Estes, Eastern Prairie Marbleseed, Shaggy Marbleseed. Mt (VA, WV): calcareous woodlands, barrens, and glades, and nearby in disturbed areas, such as older pasture edges; rare. May-July. W. NY and ON west to MN, south to sc. PA (Rhoads & Klein 1993), w. VA, e. TN (Chester, Wofford, & Kral 1997), LA, and TX. This species was attributed to NC by F and S; the documentation of these reports is not known. [= U; = *Onosmodium hispidissimum* Mackenzie - G, S, W, WV; = *O. molle* Michaux var. *hispidissimum* (Mackenzie) Cronquist - C, Pa; > *O. hispidissimum* var. *hispidissimum* - F; > *O. hispidissimum* var. *macrospermum* Mackenzie & Bush - F; = *O. molle* Michaux ssp. *hispidissimum* (Mackenzie) Boivin - K1, X, Z; = *O. bejariense* Alphonse de Candolle ssp. *hispidissimum* (Mackenzie) B.L. Turner - K2, Y]

Lithospermum subsetosum (Mackenzie & Bush) Weakley, Witsell, & D. Estes. Calcareous glades and woodlands. MO south to AR and OK; disjunct in c. TN (Chester, Wofford, & Kral 1997) and ne. AL (Cumberland Plateau escarpment (D. Estes, pers. comm. 2011)). [= U; = *Onosmodium subsetosum* - F, G; = *O. molle* Michaux ssp. *subsetosum* (Mackenzie & Bush) T.S. Cochrane - K1, X, Z; < *O. molle* - S; = *O. bejariense* Alphonse de Candolle var. *subsetosum* (Mackenzie & Bush) B.L. Turner - K2, Y]

Lithospermum tuberosum Rugel ex A.P. de Candolle, Southern Stoneseed. Mt (GA, VA, WV), Pd (GA, SC), Cp (FL, GA): nutrient-rich forests, especially over calcareous rocks; rare. March-June. Sw. VA, s. WV, KY, and TN, south to n. peninsular FL, FL Panhandle, and LA. [= RAB, C, F, G, K, S, WH, Z]

Lithospermum virginianum Linnaeus, Virginia Marbleseed. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandhill woodlands, shell middens in the outer Coastal Plain, woodlands and barrens over diabase and other mafic rocks in the Piedmont and low Mountains, barrens, glades, or woodlands over calcareous rocks in the Mountains;

uncommon (rare in DE, NC, and VA). April-September; late May-October. LA to FL, north to NY and MA, primarily on the Coastal Plain; the species has become very rare north of NC. It is peculiarly distributed in our area, occurring on highly acidic sands in the fall-line sandhills, but seemingly restricted to circumneutral soils derived from mafic rocks (Piedmont), calcareous rocks (Mountains), or calcareous shell (Coastal Plain) in the rest of our area. The unifying ecological factor determining its distribution may be an open, woodland condition maintained by fire. The species seems characteristically to occur in very small populations, consisting often of fewer than five plants. [= *Onosmodium virginianum* (Linnaeus) Alphonse de Candolle – RAB, C, F, G, K1, K2, Pa, S, W, V, Z]



10. *Mertensia* Roth (Bluebell)

A genus of about 45 species, north temperate. References: Al-Shehbaz (1991)=Z.

Mertensia virginica (Linnaeus) Persoon ex Link, Virginia Bluebells, Virginia Cowslip. Mt (GA, NC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): nutrient-rich, moist, alluvial soils of floodplain forests and thickets; common (rare in DE, rare south of VA). March-May. NY west to WI, and IA, south to n. NC, nw. GA, AL, and n. AR. Pringle (2004) discusses the nomenclatural reasons for retaining the name *M. virginica*. [= RAB, C, F, G, K, Pa, S, W, WV, Z; = *M. pulmonarioides* Roth]

11. *Myosotis* Linnaeus (Forget-me-not, Scorpion-grass)

A genus of about 100 species, temperate and montane tropical. References: Al-Shehbaz (1991)=Z. Key based closely on RAB and C.

- 1 Calyx strigose, the hairs neither spreading nor uncinat; [mostly of moist to wet habitats].
 - 2 Corolla limb 2-5 mm wide; mericarps distinctly surpassing the style.....*M. laxa* ssp. *laxa*
 - 2 Corolla limb 5-10 mm wide; mericarps not surpassing the style.....*M. scorpioides*
- 1 Calyx with some loose or spreading, uncinat hairs; [of various habitats, mostly dry].
 - 3 Corolla limb 5-8 mm wide; perennial.....*M. sylvatica*
 - 3 Corolla limb 1-4 mm wide; annual or biennial.
 - 4 Calyx lobes unequal, 3 lobes shorter than the other 2; corolla white; [native, of dry or moist habitats].
 - 5 Fruiting pedicels divergent; fruiting calyx deciduous, 3-10 mm long; inflorescence internodes usually longer than 10 mm; mericarps 1.4-2.2 mm long.....*M. macrosperma*
 - 5 Fruiting pedicels more-or-less erect; fruiting calyx persistent, 3-5.5 mm long; inflorescence internodes usually shorter than 10 mm; mericarps 1.2-1.5 mm long.....*M. verna*
 - 4 Calyx lobes equal, all 5 the same size; corolla blue (occasionally yellow or white); [alien, mostly of dry disturbed habitats].
 - 6 Fruiting pedicels equaling or generally longer than the calyx.....*M. arvensis*
 - 6 Fruiting pedicels distinctly shorter than the calyx.
 - 7 Plants floriferous from about the middle upward; style surpassing the mericarps.....*M. discolor*
 - 7 Plants floriferous nearly to the base; style shorter than the mericarps.....*M. stricta*

* ***Myosotis arvensis*** (Linnaeus) Hill, Field Forget-me-not, Field Scorpion-grass. Pd (DE, NC, SC, VA), Cp (VA), Mt (NC, WV): roadsides, fields, disturbed areas; uncommon (rare south of DE), native of Eurasia. May-October. [= RAB, C, F, G, K, Pa, S, W, WV, Z]

* ***Myosotis discolor*** Persoon, Yellow-and-blue Scorpion-grass, Changing Forget-me-not. Pd (DE, GA, NC, SC, VA), Cp (VA): fields, disturbed areas, roadsides; uncommon, native of Europe. May-August. [= RAB, C, GW, K, Pa, Z; ? *M. versicolor* (Persoon) Sm. – F, G]

Myosotis laxa Lehmann ssp. *laxa*, Smaller Forget-me-not, Tufted Forget-me-not. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, VA): marshes, streambanks; common (uncommon in DE). May-October. The species is circumboreal, represented nearly throughout North America by ssp. *laxa*. The other subspecies are Eurasian. [= Z; < *M. laxa* – RAB, C, F, G, GW, K, Pa, S, W, WV]

Myosotis macrosperma Engelman, Bigseed Forget-me-not. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), {DE}: bottomland forests and alluvial fields, probably associated with nutrient-rich soils; uncommon. April-May. MD west to MO, south to FL and TX. [= RAB, C, F, G, GW, K, Pa, S, W, WV, Z]

* ***Myosotis scorpioides*** Linnaeus, Water Scorpion-grass. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE, VA): wet meadows, streambanks; common (uncommon in DE Piedmont, rare in DE Coastal Plain), native of Europe. May-August. [= RAB, C, F, G, GW, K, Pa, W, WV, Z; ? *M. palustris* (Linnaeus) Hill – S]

* *Myosotis stricta* Link ex Roemer & J.A. Schultes, Blue Scorpion-grass. Pd (NC, VA), Cp (DE, VA), Mt (NC, WV): disturbed areas; uncommon (rare in DE and WV), native of Eurasia. April-June. [= F, K, Pa, Z; ? *M. micrantha* Pallas – RAB, C, G, apparently misapplied]

* *Myosotis sylvatica* Ehrhart ex Hoffman, Garden Forget-me-not. Pd (NC): gardens, rarely persistent or found as a waif; rare, native of Eurasia. April-September. [= RAB, C, F, G, K, Pa, Z]

Myosotis verna Nuttall, Early Forget-me-not. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dry woodlands, roadsides, disturbed areas, dry fields; common (rare in DE). March-July. ME west to SD, south to GA and TX; also from ID and BC south to OR. [= RAB, C, F, G, K, Pa, W, WV, Z; = *M. virginica* – S, misapplied]

12. *Plagiobothrys* Fischer & C.A. Meyer (Popcorn-flower)

A genus of about 70 species, of w. North America, w. South America, e. Asia, and Australia. References: Al-Shehbaz (1991)=Z; Chambers (1989)=Y.

* *Plagiobothrys figuratus* (Piper) I.M. Johnston ex M.E. Peck ssp. *figuratus*, Popcorn-flower. Pd (NC): fields and roadsides; rare, native of nw. North America. April-May. [= K, Y; = *P. hirtus* (Greene) I.M. Johnston var. *figuratus* (Piper) I.M. Johnston – RAB, Z; < *P. hirtus* – F, G]

13. *Symphytum* Linnaeus (Comfrey)

A genus of ca. 25 species, herbs, of Europe. References: Al-Shehbaz (1991)=Z.

- 1 Upper leaves not decurrent, or decurrent < 1 cm below the leaf attachment; pubescence of stem in part of strong, recurved prickles (resembling miniature rose thorns).....[*S. asperum*]
 1 Upper leaves decurrent on the stem; pubescence of the stem not of prickles.....*S. officinale*

* *Symphytum asperum* Lepechin, Prickly Comfrey, another Eurasian species, is reported by F as occurring south to MD. It may occur in our area. [= C, F, G, K, Z]

* *Symphytum officinale* Linnaeus, Common Comfrey. Mt (GA, VA, WV), Pd (DE, VA), Cp (DE): disturbed areas; uncommon, native of Europe. June-August. *Symphytum* is a traditional "medicinal herb," but recent evidence suggests that it can cause dangerous (even fatal) liver damage. [= C, F, G, K, Pa, S, WV, Z]

14. *Nama* Linnaeus 1753 (Fiddleleaf)

A genus of about 45 species, herbs, of sw. North America, tropical America, and Hawaii. [also see *Hydrolea* in *HYDROLEACEAE*]

* *Nama jamaicense* Linnaeus, Jamaica Weed. Cp (FL, SC): lawns; rare, native of tropical America (including s. FL and TX). May. [= K; = *N. jamaicensis* – RAB, WH, orthographic variant; = *Marilaunidium jamaicense* (Linnaeus) Kuntze – S]

15. *Ellisia* Linnaeus 1763 (Waterpod)

Ellisia is considered to be a monotypic genus, an herb of c. and e. North America, but generic limits in the Hydrophyllaceae are badly in need of critical reassessment. References: Constance (1940)=Z.

Ellisia nyctelea (Linnaeus) Linnaeus, Waterpod, Aunt Lucy. Pd (VA), Mt (VA, WV): moist shaded forests, especially bottomlands; uncommon (rare in WV). April-July. IN and MI west to AB, south to AR and OK; disjunct in e. North America from s. NY and NJ south to sc. VA. Likely to occur in nc. NC. [= C, F, G, GW, K, Pa, W, WV, Z; = *Nyctelea nyctelea* (Linnaeus) Britton – S]

16. *Nemophila* Nuttall 1822 (Baby Blue-eyes)

A genus of 11 species, herbs, of North America (mostly w. North America). References: Constance (1941).

Identification notes: *Nemophila* is superficially similar to *Phacelia covillei* and *P. ranunculacea*, with which it often co-occurs. They can be distinguished with the following key.

- 1 Flowers solitary, on pedicels opposite the leaves, the pedicels mostly > 12 mm long; corolla white (sometimes aging to pale lavender), 2.5-3.5 mm long; fruits ovoid, longer than thick, turning purple at maturity, exceeding the 2-4 mm long calyx lobes.....*Nemophila aphylla*
 1 Flowers borne in 2-6-flowered terminal cymes, the pedicels mostly < 12 mm long; corolla pale blue or lavender, 4-5 mm long; fruits depressed globular and weakly 4-lobed, the apex depressed, remaining green at maturity, shorter than the calyx, the lobes of which expand to 5-8 mm long.

- 2 Pubescence of the middle stem (from 2nd to 5th node from the base) consisting of appressed to ascending, stiff, pointed hairs, sometimes also with a few gland-tipped hairs < 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with acute to cuneate bases; [of rivers in the Atlantic drainage, very rarely disjunct west of the Appalachians] *Phacelia covillei*
- 2 Pubescence of the middle stem spreading or even retrorse, most of the hairs weak and twisted, and many of them glandular-tipped and > 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with obtuse to rounded or truncate bases; [of rivers in the Mississippi drainage]..... *Phacelia ranunculacea*

Nemophila aphylla (Linnaeus) Brummitt. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): moist, nutrient-rich floodplain forests; uncommon, though often locally abundant (rare in FL). March-April. MD south to Panhandle FL and west to TX, north in the interior to e. TN, w. KY, and se. MO. [= GW, K; = *N. microcalyx* (Nuttall) Fischer & Meyer – RAB, F, G, S; = *N. triloba* (Rafinesque) Thieret – C]

17. *Hydrophyllum* Linnaeus 1753 (Waterleaf)

A genus of 8 species, herbs, of e. and w. North America. References: Constance (1942)=Z; Beckmann (1979)=Y; Alexander (1941)=X.

- 1 Principal cauline leaves palmately lobed, maple-like, differing from the pinnately divided basal leaves.
- 2 Sepals with small reflexed appendages exerted at each sinus of the calyx; plant biennial from a taproot; stamens exerted 1-3 mm beyond the corolla; leaf lobing relatively shallow and irregular *H. appendiculatum*
- 2 Sepals with appendages absent or rudimentary; plant perennial from fibrous roots; stamens exerted 3-6 mm beyond the corolla; leaf lobing relatively deep and regular *H. canadense*
- 1 Principal cauline leaves pinnately divided, similar to the basal leaves.
- 3 Inflorescence and upper stem densely hirsute with spreading hairs 1-2 mm long; leaves pinnatifid with (7-) 9-13 segments, these toothed but not lobed *H. macrophyllum*
- 3 Inflorescence and upper stem glabrate to strigose with appressed to ascending hairs < 0.5 mm long; leaves with 5-7 (-9) segments, some of them sometimes deeply 2-lobed.
- 4 Corolla deep purple to maroon; lower stem glabrous to slightly (rarely moderately) pubescent with retrorse hairs; [of low to high elevations in the Mountains] *H. virginianum* var. *atranthum*
- 4 Corolla white to lavender or pale purple; lower stem slightly to densely pubescent with retrorse to spreading hairs; [of low elevations of the Piedmont, Mountains, and Coastal Plain] *H. virginianum* var. *virginianum*

Hydrophyllum appendiculatum Michaux, Biennial Waterleaf. Mt (WV): rich forests; rare. May-June. S. ON and MN, south to sw. PA, a. and sc. WV, e. TN, n. AL (Jackson Co.), MO, and e. KS. It was attributed to NC by Small (1933) on unknown grounds. [= C, F, G, K, Pa, WV, Y, Z; = *Decemium appendiculatum* (Michaux) Small – S]

Hydrophyllum canadense Linnaeus, Mapleleaf Waterleaf, Canada Waterleaf, Broadleaf Waterleaf. Mt (GA, NC, SC, VA, WV), Pd (NC, VA), Cp (VA): cove forests, rocky streambanks, other moist and nutrient-rich forests; common (rare in VA Coastal Plain, rare in NC Piedmont, rare in SC Mountains). May-August; August-September. VT and s. ON west to MI and WI, south to n. GA, AL, AR, and MO. [= RAB, C, F, G, K, Pa, S, W, WV, Y, Z]

Hydrophyllum macrophyllum Nuttall, Hairy Waterleaf. Mt (GA, NC, VA, WV): cove forests and other moist rocky forests, especially over calcareous or mafic rocks; uncommon (rare in GA, NC, and VA). May-June; July-August. WV west to OH, and IL, south to sw. VA, w. NC, n. GA, and n. AL; reports from AR are erroneous, and are based on material of *Hydrophyllum brownei* Kral & Bates (Peck 2003). The w. North American *H. occidentale* (S. Watson) A. Gray is rather closely related. [= RAB, C, F, G, K, Pa, S, W, WV, Y, Z]

Hydrophyllum virginianum Linnaeus var. *atranthum* (E.J. Alexander) Constance, Appalachian Waterleaf. Mt (NC, VA): cove forests and other moist rocky forests; common (uncommon in WV). May-June; July-August. N. WV south through w. and sw. VA and e. KY to w. NC and e. TN. Since its naming as a species (Alexander 1941) and subsequent reduction to a variety (Constance 1942) there has been little consensus about this taxon, some regarding it as merely a color form. Alexander lists numerous characters additional to that of flower color; they need further investigation. "*H. atranthum* differs from *H. virginianum* in the dark-violet flowers, the brown hairs on the appendages, brown filaments, corolla-lobes longer than the tube, stamens shorter [11.5 mm] and more slender, and the more numerous leaf-lobes. *H. virginianum* has flowers white to pale lavender or pinkish, white hairs on the appendages, white filaments, corolla-lobes and tube equal in length, filaments longer (13.5 mm) and stouter, and 5-7 leaf-segments." Beckmann (1979) did not accept the variety, stating that "this pigment combination appears sporadically in other sectors of the species range." Based on herbarium material, I have seen darker than usual flowers that are found outside of the Southern Appalachians; they do not, however, approach in darkness the flowers of Southern Appalachian material, and the somewhat darker-flowered plants outside the Southern Appalachians do not share the stem pubescence character stated in the key above. The general correlation of flower color and lower stem pubescence and the tight geographical range of var. *atranthum* incline me to accept it provisionally as a variety. It is not, however, limited to high elevations, as stated or implied by some authors. The two varieties provisionally accepted here need more careful study, including either statistical studies of morphology, or electrophoretic or molecular studies. [= C, F, G, WV, Z; < *H. virginianum* – RAB, K, W, Y; < *H. virginicum* – S, orthographic error; = *H. atranthum* E.J. Alexander – X]

Hydrophyllum virginianum Linnaeus var. *virginianum*, Eastern Waterleaf, Virginia Waterleaf. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): cove forests, moist rocky forests, alluvial forests; common (rare in DE Coastal Plain). April-June; July-August. NH and QC west to ND, south to e. VA, c. NC, KY, s. IN, s. IL, nc. AR, and ne. OK. As discussed by Beckmann (1979) and Constance (1941), *H. virginianum* is a closely related vicariant of *H. tenuipes* Heller of BC south to CA. See

Phacelia bipinnatifida for additional suggestions on distinguishing it from this species. [= C, F, G, WV, Z; < *H. virginianum* – RAB, K, Pa, W, Y; < *H. virginicum* – S, orthographic error; = *H. virginianum* – X]

18. *Phacelia* A.L. de Jussieu 1789 (*Phacelia*)

A genus of about 100-150 species, of North America and South America, concentrated in w. North America. References: Constance (1949)=Z; Levy (1991)=Y; Sewell & Vincent (2006)=X; Murdy (1966); Gillett (1968, 1964).

Identification notes: 1. *Phacelia bipinnatifida* and *Hydrophyllum virginianum* are sometimes confused. *P. bipinnatifida* has the larger and more basal leaves distinctly bipinnatifid, the lower pinnae often stalked (vs. pinnatifid, the basal or terminal pinnae sometimes 2-lobed, all the pinnae more-or-less sessile), pubescence of the upper stem and inflorescence in part glandular (pubescence nonglandular), and seeds 4 per capsule, black (vs. 2 per capsule, light brown). 2. *Phacelia covillei* and *P. ranunculacea* are superficially similar to and sometimes confused with *Nemophila aphylla*, which see for discussion.

- 1 Corolla lobes fimbriate; seeds 4 per capsule.
 - 2 Corolla white (rarely slightly lavender); pubescence of the stem spreading; lobes of cauline leaves mostly obtuse; seeds 3.0-3.5 mm long.....*P. fimbriata*
 - 2 Corolla lavender to blue; pubescence of the stem appressed; lobes of cauline leaves mostly acute; seeds 1.5-3.0 mm long.....*P. purshii*
- 1 Corolla lobes entire; seeds 4-15 per capsule.
 - 3 Stamens 1.5-2 mm long; style 1.5-2 mm long; corolla tubular; seeds globose-ovoid, nearly spherical, 4 per capsule.
 - 4 Pubescence of the middle stem (from 2nd to 5th node from the base) consisting of appressed to ascending, stiff, pointed hairs, sometimes also with a few gland-tipped hairs < 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with acute to cuneate bases; [of rivers in the Atlantic drainage, very rarely disjunct west of the Appalachians in rivers of the Mississippi drainage]*P. covillei*
 - 4 Pubescence of the middle stem spreading or even retrorse, most of the hairs weak and twisted, and many of them glandular-tipped and > 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with obtuse to rounded or truncate bases; [of rivers in the Mississippi drainage]*P. ranunculacea*
 - 3 Stamens 3-10 mm long; style 3-15 mm long; corolla rotate to broadly campanulate; seeds ovoid-angled, 4-15 per capsule.
 - 5 Corolla 10-15 mm across, blue; plant 10-60 cm tall; seeds 2.5-4 mm long, black; ultimate segments of the leaf 15-45 mm long, 10-25 mm wide; pedicels recurved in fruit; [of moist forests of the Mountains and (very rarely) Piedmont]*P. bipinnatifida*
 - 5 Corolla 5-11 mm across, white to blue; plant 5-40 cm tall; seeds 1.5-2.2 mm long, brown; ultimate segments of the leaf 5-15 mm long, 5-9 mm wide; pedicels ascending to spreading in fruit; [of alluvial forests, granitic flatrocks, and other habitats, of the Piedmont, Coastal Plain, and Mountains].
 - 6 Sepals 4-8 mm long, linear or oblanceolate; marginal bristles of sepals spreading, 1.0-1.5 mm long; plants mostly erect.....*P. maculata*
 - 6 Sepals 2-4 mm long, narrowly ovate; marginal bristles of sepals appressed, 0.3-1.0 mm long; plants mostly decumbent, branched from the base.
 - 7 Sepals 2.6-4.0 mm long; petals 4-6 mm long; marginal bristles of sepals 0.6-0.9 mm long; basal leaves with 1-3 pairs of lateral leaflets, the terminal leaflet larger and usually 3-lobed; cauline leaves with 1-3 pairs of rather broad lobes; [of various habitats (including granitic flatrocks and domes) in SC, NC, and VA]*P. dubia* var. *dubia*
 - 7 Sepals 2.0-3.0 mm long; petals 3.5-5 mm long; marginal bristles of sepals 0.4-0.7 mm long; basal leaves with 4-5 pairs of lateral leaflets, the terminal leaflet about the same size and unlobed; cauline leaves with 2-4 pairs of narrow lobes; [of granitic flatrocks and domes of the Piedmont of SC and southwestward].....*P. dubia* var. *georgiana*

Phacelia bipinnatifida Michaux, Fernleaf *Phacelia*, Forest *Phacelia*. Mt (GA, NC, SC, VA, WV): cove forests, especially where rocky; common (uncommon in VA and WV, rare in SC). April-May; June. W. VA west to s. OH, n. IN, n. IL, and c. MO, south to w. NC, nw. SC, n. GA, c. AL, and n. AR. *P. bipinnatifida* var. *plummeri* (= *P. brevistyla*) is "based on a variation with sparser pubescence, larger and less divided leaf segments, smaller flowers, and sub-included stamens and style. These variations are not concomitant, and the distribution of forms showing a complete or partial combination of them is sporadic" (Constance 1949). The matter deserves additional study. [= RAB, C, G, K, W, Z; > *P. bipinnatifida* var. *bipinnatifida* – F; > *P. bipinnatifida* var. *plummeri* Wood – F; > *P. brevistyla* Buckley – S; > *P. bipinnatifida* – S]

Phacelia covillei S. Watson ex A. Gray, Eastern Buttercup *Phacelia*. Pd (NC, VA), Mt? (WV?): rich soils of floodplains, and contiguous terraces and slopes; rare. April; May. Ranging in three disjunct areas – c. NC and sc. VA (in the drainages of the Cape Fear, Tar, and Roanoke rivers), DC, n. VA, and sc. MD (in the drainage of the Potomac River), and disjunct in Texas County, MO. Most recent authors have included this taxon within the closely similar *P. ranunculacea*; as thus broadly defined, *P. ranunculacea* was considered to occur in three peculiarly disjunct areas; one centered around St. Louis, MO (w. KY, w. TN, e. MO, ne. AR, se. MO, s. IL, and s. IN), one near Washington, DC (DC, n. VA, and sc. MD), and a third in c. NC and sc. VA. Sewell & Vincent (2006) have clarified the status of *P. covillei* and *P. ranunculacea*. Chuang & Constance (1977) felt that *P. covillei* and *P. ranunculacea* (sensu stricto) have numerous characteristics that rendered their inclusion in *Phacelia* uncomfortable (also see discussion in Constance 1949 and Gillett 1968), but Sewell & Vincent (2006) countered this idea. See *Nemophila aphylla* for suggestions on distinguishing these two superficially similar species. [= K, X; < *P. ranunculacea* (Nuttall) Constance – RAB, C, F, G, Z]

Phacelia dubia (Linnaeus) Trelease var. *dubia*, Appalachian *Phacelia*. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (DE, NC, SC, VA): floodplain forests, rocky forests, fields, roadsides, granitic flatrocks; common (rare in DE). April-May; June. Var. *dubia* ranges from NY and PA west to WV, south to nc. SC, sw. NC, and se. TN. The *Phacelia dubia* complex has been under detailed biosystematic study by Foster Levy and associates (Levy 1991a, 199b, 1997; Levy et al. 1996; Levy & Malone 2001; Levy & Neal 2001; Taylor & Levy 2002; del Castillo 1994, 1998). Male sterile cytotypic variants are common in

some populations but formal taxonomic recognition is not warranted (Levy 1991a, 1991b; del Castillo 1994, 1998). Additionally, an incipient variety, informally termed "imitator", occurs in c. SC (Levy 1991a; Levy & Malone 2001). These populations are morphologically variable, some more similar to var. *georgiana*, others more similar to var. *dubia*; see Levy (1991a) for further discussion. They may warrant taxonomic recognition, as they are allopatric from each of the 3 named varieties, and show degrees of sterility when bred with each of the three, but morphologic differences have not evolved (Levy & Malone 2001). [= K, Y; < *P. dubia* – RAB, C, F, Pa, S, W, WV; > *P. dubia* var. *dubia* – G; > *P. dubia* var. *fallax* (Fernald) Gleason – G; > *P. dubia* var. *dubia* – Z (also including var. *interior*)]

Phacelia dubia (Linnaeus) Trelease var. ***georgiana*** McVaugh, Georgia Phacelia. Pd (GA): granitic flatrocks; rare. April-May; June. Var. *georgiana* ranges from GA west to ec. AL, in the Piedmont. It has sometimes been attributed to SC, and Levy found plants in SC which morphologically resemble var. *georgiana*, but he concluded that this "imitator" genotype was largely sterile when bred with var. *georgiana*. See var. *dubia* for additional discussion. [= K, Y, Z; < *P. dubia* – RAB, C, F, S, W; ? *P. dubia* var. *dubia* – G]

Phacelia dubia (Linnaeus) Trelease var. ***interior*** Fernald, endemic in c. TN. [= K1; < *P. dubia* – C, F, G, S; < *P. dubia* var. *dubia* – Z] {not yet keyed}

Phacelia fimbriata Michaux, Fringed Phacelia, Blue Ridge Phacelia. Mt (GA, NC, VA): moist forests on slopes and floodplains, at low to high elevations, perhaps mainly over circumneutral soils; uncommon, but locally abundant (rare in GA and VA). April-May. Sw. VA south to w. NC, e. TN, and n. GA (Jones & Coile 1988), a Southern Appalachian endemic. [= RAB, C, F, G, K, S, W, Z]

Phacelia maculata Wood, Flatrock Phacelia. Pd (GA, NC, SC): bottomlands, granitic flatrocks; uncommon (rare in NC). April; May. Sc. NC south to GA and west to ec. AL. [= RAB, K, W, Y, Z; ? *P. hirsuta* – S, misapplied]

Phacelia purshii Buckley, Miami-mist. Mt (GA, NC, SC, VA, WV), Pd (VA): moist forests on floodplains and slopes; uncommon (rare in GA, NC, SC, and VA). May-June. S. PA west to s. ON, OH and MO, south to nw. SC, nw. GA, and c. AL. Plants "with smaller flowers, shorter pedicels, and smaller capsules and seeds" are the basis of *P. boykinii* and *P. bicknellii* (Constance 1949). A study of the matter was initiated and specimens annotated as "*P. purshii* ssp. *boykinii*," but the research was not completed and the name was never published; further study is warranted. [= RAB, C, F, G, K, Pa, W, WV, Z; > *P. purshii* – S; > *P. boykinii* (A. Gray) Small – S; > *P. bicknellii* Small – S]

Phacelia ranunculacea (Nuttall) Constance, Western Buttercup Phacelia. Bottomland forests. In the Mississippi and Ohio river drainages, centered around St. Louis, MO (w. KY, w. TN, e. MO, ne. AR, se. MO, s. IL, and s. IN). See Sewell & Vincent (2006). [= K, X; < *P. ranunculacea* – RAB, C, F, G, Z]

Phacelia strictiflora (Engelmann & Gray) Gray var. ***robbinsii*** Constance. East to AL. [= K1, Z] {not yet keyed}

19. *Asperugo* Linnaeus (Madwort, Catchweed)

A monotypic genus, an annual scrambling herb, of Eurasia.

* ***Asperugo procumbens*** Linnaeus, Madwort, Catchweed. Cp (DE), Pd (DE): disturbed areas; rare, native of Eurasia. [= C, F, G, K] {not yet keyed}

20. *Heliotropium* Linnaeus (Heliotrope, Turnsole)

A genus of ca. 250 species, widespread in tropical and temperate regions. Either treated as part of a broadly defined Boraginaceae, or else better placed in the family Heliotropiaceae, as it is apparently more closely related to Hydrophyllaceae than to Boraginaceae. Currently under study and additional taxonomic changes may be forthcoming (Hilger & Diane 2003).

References: Al-Shehbaz (1991)=Z; Hilger & Diane (2003).

- 1 Flowers solitary at the ends of short branches; [of limestone habitats from nw. GA westward]; [section *Orthostachys*, subsection *Bracteata*] ..
.....***H. tenellum***
- 1 Flowers in secund, helicoid cymes.
 - 2 Leaves glabrous, succulent, < 7 mm wide; [of saline coastal situations]; [section *Halmyrophila*]***H. curassavicum* var. *curassavicum***
 - 2 Leaves pubescent, not succulent, > 10 mm wide; [of a variety of mostly disturbed, inland situations].
 - 3 Mericarps separating at maturity; fruit 4-lobed prior to maturation; leaves petiolate, ca. 2× as long as wide; [section *Heliotropium*]
.....***H. europaeum***
 - 3 Mericarps cohering in pairs at maturity; fruit 2-lobed prior to maturation; leaves petiolate or sessile to subsessile, ca. 2-5× as long as wide.
 - 4 Fruit tuberculate, 4-seeded; leaves sessile to subsessile, ca. 4-5× as long as wide; corolla throat and tube densely villous within; [section *Heliophytum*]***H. amplexicaule***
 - 4 Fruit longitudinally ribbed, 2-seeded; leaves petiolate, ca. 2× as long as wide; corolla throat and tube glabrous within; [section *Tiaridium*]***H. indicum***

* ***Heliotropium amplexicaule*** M. Vahl, Wild Heliotrope. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): disturbed areas, roadsides, fields; uncommon (rare north of SC), native of South America. April-September. [= RAB, C, F, G, K, Z]

Heliotropium curassavicum Linnaeus var. ***curassavicum***, Seaside Heliotrope. Cp (DE, FL, GA, NC, SC, VA): edges of brackish and salt marshes, estuarine shores; rare. June-September. Var. *curassavicum* ranges from DE (and farther north as an introduction) south to the New World tropics. Considered by some authors to be introduced and naturalized in our area. Other

varieties occur inland in the mw. and w. United States. [= C, K, Z; < *H. curassavicum* – RAB, GW; = *H. curassavicum* – F, G; = *Heliotropium curassavicum* ssp. *curassavicum*]

* ***Heliotropium europaeum*** Linnaeus, European Heliotrope. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, NC, VA), Mt (WV): roadsides, disturbed areas; rare, native of s. Europe. June-October. [= RAB, C, F, G, K, Pa, Z]

* ***Heliotropium indicum*** Linnaeus, Turnsole. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (WV): roadsides, woodland borders, swamps, ditches; uncommon (rare in WV), native of South America. July-November. [= RAB, C, F, G, GW, K, WV, Z; = *Tiaridium indicum* (Linnaeus) Lehmann – S]

Heliotropium polyphyllum Lehmann, Pineland Heliotrope. Cp (FL): pine flatwoods, pond margins; common. FL. [= K] {add synonymy; not yet keyed}

Heliotropium tenellum (Nuttall) Torrey, Delicate Heliotrope. Mt (GA, WV): limestone glades and barrens; rare. WV, KY, IN, IL, IA, and KS, south to nw. GA, AL, MS, LA, and TX. [= C, F, G, K, Z; = *Lithococca tenella* (Nuttall) Small – S]

357. **CONVOLVULACEAE** A.L. de Jussieu 1789 (Morning Glory Family) [in SOLANALES]

A family of about 56 genera and 1600 species, nearly cosmopolitan, especially in tropical and subtropical areas. Tribes follow the classification of Stefanović, Austin, & Olmstead (2003). References: Wilson (1960b); Austin (1979); Stefanović, Krueger, & Olmstead (2002); Stefanović, Austin, & Olmstead (2003). [including **CUSCUTACEAE**]

- 1 Plant parasitic; stems orange; [tribe *Cuscutae*] ***Cuscuta***
- 1 Plant photosynthetic; stems green.
 - 2 Corolla 0.1-0.2 cm long; capsule deeply 2-lobed; leaves orbicular-reniform, 1-3 cm long and wide, not fleshy; [tribe *Dichondreae*] ***Dichondra***
 - 2 Corolla 1-10 cm long; capsule entire; leaves various, but not as above (most similar vegetatively are *Calystegia soldanella*, *Ipomoea pes-caprae* var. *emarginata*, and *I. imperati*, all beach plants with fleshy, emarginate, and usually larger leaves).
 - 3 Styles 2, free nearly to the ovary or fused most of their length (at least the terminal 1-2 mm free); corolla 1-2.5 cm long; leaves cuneate or rounded at the base, and narrowly ovate, lanceolate, or linear; [tribe *Cresseae*].
 - 4 Styles free, each 2-cleft, the stigmas therefore 4, linear-filiform ***Evolvulus***
 - 4 Styles free or fused at the base, the stigmas 2, globose-peltate ***Stylisma***
 - 3 Styles 1 (sometimes with 2 stigmas, or a bilobed stigma); stigmas capitate, elongate, flattened, or filiform; corolla > 2.5 cm long (except *Jacquemontia*, *Convolvulus*, and a few *Ipomoea* spp.); leaves cordate, sagittate, or truncate at the base, and (mostly) ovate in outline.
 - 5 Flowers in a dense head with numerous interspersed bracts; [tribe *Jacquemontieae*] ***Jacquemontia***
 - 5 Flowers solitary or in an open, few-flowered inflorescence.
 - 6 Calyx concealed by 2 large bracts; [tribe *Convolvuleae*] ***Calystegia***
 - 6 Calyx not concealed by bracts.
 - 7 Stigmas 2, elongate; leaves 2-4 cm long, truncate or weakly hastate at base; corolla white or pink; [tribe *Convolvuleae*] ***Convolvulus***
 - 7 Stigma 1, capitate (sometimes lobed); leaves 3-15 cm long, mostly strongly hastate or cordate at base; corolla white, pink, lavender, blue, orange, or red.
 - 8 Anthers straight after dehiscence; fruits valvate-dehiscent; [tribe *Ipomoeae*] ***Ipomoea***
 - 8 Anthers twisted after dehiscence; fruits longitudinally or irregularly dehiscent; [tribe *Merremieae*] ***Merremia***

Calystegia R. Brown 1810 (Bindweed)

A genus of about 25 species, vines, cosmopolitan. Stefanović, Krueger, & Olmstead (2002) conclude (based on molecular phylogeny) that *Calystegia* should be combined with *Convolvulus*. References: Brummitt in FNA (in prep.); Wilson (1960b)=Z; Lewis & Oliver (1965); Brummitt (1965, 1980); Austin, Diggs, & Lipscomb (1997)=Y.

- 1 Leaves about as wide as long, rounded at the tip ***C. soldanella***
- 1 Leaves longer than wide, obtuse, acute, or acuminate at the tip.
 - 2 Flowers double, the corolla deeply divided into many parts (garden escape occasionally naturalized) ***C. pubescens***
 - 2 Flowers not double, corolla entire
 - 3 Leaves densely white-tomentose beneath ***C. catesbeiana* ssp. *sericata***
 - 3 Leaves not densely white-tomentose beneath.
 - 4 Stems mostly less than 1.5 m, erect at least in the lower part, but sometimes twining toward the apex, flowers mostly borne in lower leaf axils.
 - 5 Stems twining in the upper part; mostly 0.8-1.4 m high; leaves overtopping stem apex by < 1 cm ***C. catesbeiana* ssp. *catesbeiana***
 - 5 Stems not twining, up to 0.6 m high; leaves overtopping the stem apex by 1.5-6 cm.
 - 6 Stem and leaves glabrous to pubescent; leaves more or less flat at maturity, with basal lobes 0-5 mm long ***C. spithamaea* ssp. *spithamaea***
 - 6 Stem and leaves tomentose; leaves tending to be folded along midrib at maturity, with basal lobes 1-11 mm long ***C. spithamaea* ssp. *stans***
 - 4 Stems strongly twining, up to 4 m or more long; flowers borne along middle and upper stems.
 - 7 Margins of the bracts immediately subtending the flower overlapping > ½ their length; bracts inflated at base (saccate), the apex usually obtuse; flowers 1-2 per axil ***C. sylvatica* ssp. *fraterniflora***
 - 7 Margins of the bracts immediately subtending the flower overlapping at the base only or not at all; bracts mostly flat (or often keeled, the apex usually acute; flowers 1 per axil.

- 8 Bracteoles forming a continuous spiral series with sepals, the flower appearing to have 3 bracteoles when seen from side; leaves with almost closed sinus, the lobes posteriorly truncate.....*C. sepium* ssp. *erratica*
- 8 Bracteoles clearly distinct from sepals, obviously only 2; leaves with a wide or v-shaped sinus.
- 9 Corolla pink.
 - 10 Leaves with basal lobes rounded or with a single angle, or if with 2 angles then not spreading; plant glabrous or commonly pubescent to tomentose on stem.....*C. sepium* ssp. *americana*
 - 10 Leaves with lobes with 2 angles, spreading; plant glabrous..... *C. sepium* ssp. *appalachiana*
- 9 Corolla white.
 - 11 Leaves with spreading basal lobes, each lobe more or less 2-angled, sinus broadly rounded; plant glabrous; WV and northwards and westwards].....*C. sepium* ssp. *angulata*
 - 11 Leaves with posteriorly directed lobes, the blade often conspicuously narrowly triangular to linear; stems and leaves often strongly pubescent; [Coastal Plain].....*C. sepium* ssp. *limnophila*

Calystegia catesbeiana Pursh ssp. *catesbeiana*, Catesby's Bindweed. Mt (WV), Cp (VA), {GA, NC, SC): longleaf pine savannas, marsh edges, openings in dry to dry-mesic montane forests; {abundance} (rare in GA, VA, and WV). [= FNA; < *C. catesbeiana* – K; < *Calystegia spithamaea* – C; < *Convolvulus spithamaeus* Linnaeus var. *pubescens* (Gray) Fernald – F; < *Calystegia sericata* (House) Bell – RAB, W; < *Convolvulus sericatus* House – S, Z]

Calystegia catesbeiana Pursh ssp. *sericata* (House) Brummitt, Silky Bindweed, Blue Ridge Bindweed. Openings in dry to dry-mesic montane forests. [= FNA; < *Calystegia catesbeiana* – K; < *Calystegia spithamaea* – C; < *Convolvulus spithamaeus* Linnaeus var. *pubescens* (Gray) Fernald – F; < *Calystegia sericata* (House) Bell – RAB, W; < *Convolvulus sericatus* House – S, Z]

Calystegia macounii (Greene) Brummitt. Reported for NC and VA; Brummitt (pers. comm.) says this species does not occur east of the Mississippi River. [= K, Y; = *Convolvulus macounii* Greene] {rejected; not keyed}

* *Calystegia pubescens* Lindley. Mt (WV), {NC, VA}. rare in WV. Disturbed areas; native of e. Asia. May-August. [= FNA; ? *Calystegia pellita* (Ledebour) G. Don – K; ? *Convolvulus pellitus* Ledebour – F, Z; ? *Convolvulus japonicus* Thunberg – G; ? *Calystegia hederacea* Wallroth – C; < *Calystegia pubescens* – Pa; < *Calystegia hederacea* – Pa]

Calystegia sepium (Linnaeus) R. Brown ssp. *americana* (Sims) Brummitt, Northeastern Bindweed. Openings, woodland edges. [= FNA, K; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *repens* (Linnaeus) A. Gray – F, WV, Z; > *Convolvulus sepium* Linnaeus var. *repens* (Linnaeus) A. Gray – G; > *Convolvulus sepium* var. *americanus* Sims – G; > *Convolvulus americanus* (Sims) Greene – S; > *Convolvulus repens* Linnaeus – S]

Calystegia sepium (Linnaeus) R. Brown ssp. *angulata* (Sims) Brummitt, Northwestern Bindweed. Riverbanks, hedges, roadsides. June-September. NB to BC, south to MD, IN, IL, MO, NE, CO, NM, and OR. [= FNA, K, Y; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, G, Z]



Calystegia sepium (Linnaeus) R. Brown ssp. *appalachiana* Brummitt, Appalachian Bindweed. Woodland edges. [= FNA, K; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, G, Z]

Calystegia sepium (Linnaeus) R. Brown ssp. *erratica* Brummitt.

Calystegia sepium (Linnaeus) R. Brown ssp. *limnophila* (Greene) Brummitt, Coastal Plain Bindweed. Woodland edges. [= FNA, K, Y; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, G, Z; = *Convolvulus limnophilus* Greene]

Calystegia sepium (Linnaeus) R. Brown ssp. *sepium*, European Bindweed. [= FNA, K; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, WV, Z; > *Convolvulus sepium* var. *sepium* – G; > *Convolvulus sepium* var. *communis* R. Tryon – G; < *Convolvulus sepium* – S] {rejected, not definitely reported from our area}

Calystegia silvatica Grisebach ssp. *fraterniflora* (Mackenzie & Bush) Brummitt. Mt (VA, WV), Pd (VA), Cp (VA), {GA, NC, SC}: {habitats}; uncommon in VA, rare in WV. Ssp. *silvatica* and ssp. *disjuncta* are European. [= FNA, K, Y; < *Calystegia sepium* – C; = *Convolvulus sepium* Linnaeus var. *fraterniflorus* Mackenzie & Bush – F, G, WV, Z; = *Calystegia sepium* (Linnaeus) R. Brown var. *fraterniflora* (Mackenzie & Bush) Shinnery]

* *Calystegia soldanella* (Linnaeus) R. Brown ex Roemer & J.A. Schultes. Cp (NC, VA): beaches, dunes; rare, native of { }. [= FNA, RAB, K; = *Convolvulus soldanella* Linnaeus]

Calystegia spithamaea (Linnaeus) Pursh ssp. *spithamaea*, Low Bindweed. Pd (DE, VA), Mt (VA, WV): dry limestone areas; uncommon in VA and WV. [= FNA, K; < *Calystegia spithamaea* – RAB, C, W; = *Calystegia spithamaea* var. *spithamaea*; = *Convolvulus spithamaeus* var. *spithamaeus* – F; > *Convolvulus spithamaeus* Linnaeus – G, S; < *Convolvulus spithamaeus* – Z]

Calystegia spithamaea (Linnaeus) Pursh ssp. *stans* (Michaux) Brummitt, Shale Bindweed. Mt (GA, NC, SC, VA, WV): shale barrens and woodlands, less typically on limestone; uncommon. [> *Calystegia spithamaea* (Linnaeus) Pursh ssp. *purshiana* (Wherry) Brummitt – FNA, K; > *Calystegia spithamaea* ssp. *stans* (Michaux) Brummitt – K; < *Calystegia spithamaea* – RAB, C, W; > *Calystegia spithamaea* var. *pubescens*; > *Convolvulus spithamaeus* Linnaeus var. *pubescens* (A. Gray) Fernald – F; > *Convolvulus purshianus* Wherry – G; > *Convolvulus spithamaeus* – G; < *Convolvulus spithamaeus* – Z]



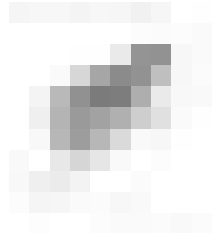
Convolvulus Linnaeus 1753 (Field-bindweed)

A genus of about 100 species, vines, cosmopolitan, especially in temperate areas. [also see *Calystegia*]

- 1 Calyx 3-5 cm long, sparsely pubescent to glabrous; plant sparsely pubescent; leaves entire and unlobed (except the basal lobes); widespread in our area]..... *C. arvensis*
- 1 Calyx 6-12 cm long, densely pubescent; plant densely gray-pubescent; leaves entire, toothed, or deeply lobed (in addition to the basal lobes); [rare waif in our area] *C. equitans*

* **Convolvulus arvensis** Linnaeus, Field Bindweed, Creeping Jenny, Possession-vine, Cornbind. Mt (NC, SC, VA), Pd (DE, GA, NC, VA), Cp (DE, FL, NC, VA): fields, roadsides, disturbed areas; common (uncommon in GA, NC, SC, and WV, uncommon in Coastal Plain of VA, rare in FL), native of Europe. June-November. [= RAB, C, F, G, K, Pa, W, WH, WV; = *Strophocaulos arvensis* (Linnaeus) Small – S]

* **Convolvulus equitans** Bentham, Texas Bindweed, Gray Bindweed, Silver Bindweed. Disturbed areas; native of sw. United States and nw. Mexico. May-November. Recorded for our area only by C. Mohr in 1883; probably not established. []



Cuscuta Linnaeus 1753 (Dodder)

A genus of about 100 species, parasitic, achlorophyllose herbs, nearly cosmopolitan. Variously treated as a monogeneric family, or as a component of the Convolvulaceae; Neyland (2001) and Stefanović, Krueger, & Olmstead (2002) provide molecular evidence for the treatment of *Cuscuta* as a derived member of Convolvulaceae. References: Yuncker (1921); Yuncker (1965)=Z; Musselman (1986)=Y; Gandhi, Thomas, & Hatch (1987)=X; Costea, Nesom, & Stefanović (2006a, 2006b, 2006c)=V; Neyland (2001); Stefanović, Krueger, & Olmstead (2002). Key based on Yuncker (1965).

Identification notes: corolla measurements are from the base to the sinuses of the corolla. The **infrastaminal scales** are transparent structures at the base of the stamens.

- 1 Styles more-or-less united; capsule circumscissile; [subgenus *Monogynella*]
 - 2 Stigmas flattened-depressed; flowers 2.5-4 mm long *C. cassytoides*
 - 2 Stigmas oval or conical; flowers ca. 2 mm long *C. japonica*
- 1 Styles separate and distinct from the base; capsule not circumscissile (except the rare aliens *C. epilinum* and *C. epithymum*).
 - 3 Stigmas elongated, terete or conical; capsule circumscissile; [subgenus *Cuscuta*].
 - 4 Style about equaling the ovary, included in the corolla; fruit 2.0-2.5 mm long..... *C. epilinum*
 - 4 Style (including the stigma) much longer than the ovary, exserted from the corolla; fruit ca. 1.5 mm long..... *C. epithymum*
 - 3 Stigmas capitate, about as wide as long; capsule not circumscissile, either indehiscent or rupturing irregularly; [subgenus *Grammica*].
 - 5 Each flower subtended by 1-10 imbricate bracts; sepals distinct nearly to the base.
 - 6 Bract apex reflexed or spreading [*C. glomerata*]
 - 6 Bract apex erect.
 - 7 Pedicels absent, the flowers in compact clusters sessile on the stem..... *C. compacta*
 - 7 Pedicels 0.5-3 mm long, the flowers in loose panicles [*C. cuspidata*]
- 5 Flowers not bracteate; sepals various.
 - 8 Perianth surface granular; fresh flowers fleshy; corolla lobes acute, tips typically curved inward.
 - 9 Corolla tubular; calyx > ½ as long as the corolla; flowers 4 (-5)-merous; infrastaminal scales reduced, merely bifid or shallowly toothed *C. coryli*
 - 9 Corolla campanulate; calyx ca. ½ as long as the corolla; flowers 5-merous; infrastaminal scales profusely fringed..... *C. indecora*
 - 8 Perianth surface not granular; fresh flowers not especially fleshy; corolla lobes various.
 - 10 Stylopodium (a thickened ridge at the base of the style) present; flowers 5-merous.
 - 11 Ovary blunt to pointed, but not beaked; corolla 2.2-3.5 mm long, 2-3 mm wide; seeds ca. 1.5 mm long; [widespread] *C. gronovii*

- 11 Ovary with a long, beak-like projection at the top; corolla 4-6 mm long, 4-6 mm wide; seeds 2-3 mm long; [of the Mountains].....*C. rostrata*
- 10 Stylopodium absent; flowers 3-4-merous or 5-merous.
 - 12 Flowers subsessile, therefore in globular inflorescences.
 - 13 Flowers 5-merous.....*C. obtusiflora* var. *glandulosa*
 - 13 Flowers mostly 3-4-merous.
 - 14 Corolla lobes rounded or obtuse *C. cephalanthi*
 - 14 Corolla lobes acute *C. polygonorum*
 - 12 Flowers on pedicels slightly shorter than to longer than the flowers, therefore in loose inflorescences.
 - 15 Flowers mostly longer than wide [*C. suaveolens*]
 - 15 Flowers mostly as wide as long.
 - 16 Flowers 1.5-3.0 mm long, at least some exceeding 2.5 mm long; calyx lobes not overlapping at the base in older flowers, and therefore the flowers not pronouncedly 5-angled *C. campestris*
 - 16 Flowers 0.9-2.5 mm long; calyx lobes strongly overlapping and forming definite angles at the sinuses, thus the flower strongly 4-5-angled.
 - 17 Flowers 4-merous; flowers 0.9-1.4 mm long; stems very slender; [on granite and sandstone outcrops].....*C. harperi*
 - 17 Flowers 5-merous; flowers 1.5-2.5 mm long; stems not especially slender; [widespread]*C. pentagona*

Cuscuta campestris Yuncker, Field Dodder. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): roadsides and old fields, often on Fabaceae; common. June-November. Nearly cosmopolitan because of its common association with cultivated legumes, its original distribution unclear. [= RAB, F, GW, Pa, V, W, Y, Z; < *C. pentagona* Engelm. – C, G; < *C. pentagona* var. *pentagona* – K, X; = *Grammica campestris* (Yuncker) Hadac & Chrtek]

* *Cuscuta cassyoides* Nees ex Engelm., African Dodder. Cp (NC): on *Quercus phellos*; rare, native of s. Africa. June. [= RAB, K, Z]

Cuscuta cephalanthi Engelm., Buttonbush Dodder. Cp (GA, VA), Pd (NC, SC), Mt (NC, VA): primarily on woody hosts; rare. August-September. NB west to BC, south to GA, TX, CA, and Mexico. See Nelson (1993) for the first SC record. [= C, F, G, GW, K, S, X, Z; = *C. cephalanthii* – RAB, Pa, Y, orthographic error; = *Grammica cephalanthii* (Engelm.) Hadac & Chrtek]

Cuscuta compacta Antoine Laurent de Jussieu ex Choisy, Compact Dodder. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): wet habitats, on herbaceous and especially on woody hosts; common. August-November. VT, QC, and NE south to s. FL and TX. [= RAB, C, F, G, GW, Pa, S, WH, X; > *C. compacta* var. *compacta* – K, W, Y, Z; > *C. compacta* var. *efimbriata* Yuncker – K, Y, Z]

Cuscuta coryli Engelm., Hazel Dodder. Cp (DE, NC, SC), Mt (NC, VA, WV), Pd (VA): on a wide variety of woody and herbaceous hosts; rare. July-November. MA, NY, and SK south to SC, AL, TX, and AZ. [= C, F, G, GW, K, S, V, WV, X, Z; = *C. corylii* – RAB, Pa, W, orthographic variant; = *Grammica coryli* (Engelm.) Hadac & Chrtek]

Cuscuta cuspidata Engelm. IN, ND, and UT south to KY, MS, TX, and NM. [= C, F, K, X, Z]

* *Cuscuta epilinum* Weihe, Flax Dodder. Cp (DE), Pd (DE): primarily on *Linum*, rare, native of Europe. South to DE, MD, and PA (Kartesz 1999). [= C, F, G, K, Z]

* *Cuscuta epithymum* Linnaeus, Clover Dodder. Mt (WV): primarily on *Trifolium*; rare, native of Europe. June-October. Also known from scattered localities in PA (Rhoads & Klein 1993) reported for VA by Kartesz (1999), based on Massey (1961). [= C, F, G, K, Pa, WV, Z]

Cuscuta glomerata Choisy. OH, MI, MN, and ND south to KY, TN, MS, and TX. [= C, F, G, GW, K, S, X, Z]

Cuscuta gronovii Willdenow ex J.A. Schultes, Common Dodder. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): on a very wide variety of herbaceous and woody plants; common. August-October. QC west to BC, south to s. FL and AZ. [= RAB, C, F, G, GW, Pa, S, W, WH, WV, Y; > *C. gronovii* var. *gronovii* – K, V, X, Z; > *C. gronovii* var. *latiflora* Engelm. – K, V, Z; = *Grammica gronovii* (Willdenow ex J.A. Schultes) Hadac & Chrtek]

Cuscuta harperi Small, Harper's Dodder. Cp (GA), Pd (GA): outcrops of granite (Piedmont) and Altamaha grit (Coastal Plain), typically on plants such as *Liatis microcephala*, *Bigelovia nuttallii*, *Hypericum gentianoides*, and *Croton willdenowii*; rare. September-November. C. and wc. GA west to nw. AL. [= K, S, V, Z]

Cuscuta indecora Choisy, Bigseed Alfalfa Dodder. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, VA), Mt (VA, WV): salt marshes (on *Iva frutescens*), roadsides, disturbed areas; rare. July-August. NJ, MN, and ID, south to s. FL, TX, CA, Mexico, Central America, and South America. See Nelson (1993) for the first SC record. Silberhorn (1998) describes an occurrence of this species in VA. [= C, GW, S, WH, WV, X, Y; > *C. indecora* var. *indecora* – F, K, V, Z; > *C. indecora* var. *neuropetala* (Engelm.) A.S. Hitchcock – F, K, Z; = *Grammica indecora* (Choisy) W.A. Weber]

* *Cuscuta japonica* Choisy, Japanese Dodder. Mt (SC), Cp (FL): disturbed area; rare, native of e. Asia. Apparently eradicated in Pickens County, SC. [= K, WH, Z]

Cuscuta obtusiflora Kunth var. *glandulosa* Engelm., Glandular Dodder. Cp (FL, GA): on herbs in calcareous glades and other habitats; rare. GA and OK south to FL, TX, Mexico; West Indies. See Anderson (2007) for FL Panhandle record. [= G, GW, K, V, WH, X; = *C. glandulosa* Small – S]

Cuscuta pentagona Engelm. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (NC, SC, VA, WV): on a wide variety of hosts; common. May-November. Throughout the United States and s. Canada. [= RAB, C, G, GW, Pa, S, V, W, WH, Y, Z; >> *C. pentagona* var. *pentagona* – K, X; = *Grammica pentagona* (Engelm.) W.A. Weber; > *C. campestris* Yuncker – F, WV; > *C. pentagona* – F, WV]

Cuscuta polygonorum Engelm., Smartweed Dodder. Cp (DE), Pd (DE, VA), Mt (VA, WV): on *Polygonum* and other hosts; rare. NY and ON west to ND, south to FL and TX. [= C, F, G, K, Pa, S, W, V, X, Y, Z]

Cuscuta rostrata Shuttleworth, Appalachian Dodder, Beaked Dodder. Mt (GA, NC, SC, VA, WV): high elevation hardwood forests and thickets; common (uncommon in WV, rare in GA). July-September. A Southern Appalachian endemic:

WV and MD south through w. VA, e. KY, e. TN, w. NC to n. GA. [= RAB, C, F, G, K, S, W, WV, Y, Z; = *Grammica rostrata* (Shuttleworth) Hadac & Chrtek]

* *Cuscuta suaveolens* Searge, Fringed Dodder. Scattered sites in eastern North America, including AL, MD, and OH. [= C, G, K, Z]

Dichondra J.R. Forster & G. Forster 1775 (Ponyfoot, Dichondra)

A genus of about 9 species, of tropical subtropical and warm temperate areas. References: Tharp & Johnston (1961)=Z.

- 1 Calyx lobes > 2x as long as wide, exceeding the fruit; pedicels straight or nearly so*D. carolinensis*
- 1 Calyx lobes < 2x as long as wide, shorter than the fruit; pedicel strongly recurved just below the calyx*D. micrantha*

Dichondra carolinensis Michaux, Carolina Ponyfoot. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt*, (VA*, WV*); lawns, roadsides, moist pinelands; common (uncommon in VA, rare in Mountains of VA and WV). March-May. Se. VA south to s. FL, west to AR and TX; also in Bermuda and reported for the Bahamas; sometimes adventive beyond that range. This plant is rarely seen in a "natural" habitat, but is often seen in lawns and other mowed grassy areas. [= RAB, C, GW, K, S, WH, Z; = *D. repens* J.R. Forster var. *carolinensis* (Michaux) Choisy – F, G]

* ***Dichondra micrantha*** Urban, Kidneyweed, Small-flowered Ponyfoot. Cp (AL, FL, GA): disturbed areas; rare, native of Australia and New Zealand. Reported for Camden County, GA (Carter, Baker, & Morris 2009). [= K, WH, Z]

Evolvulus Linnaeus 1762 (Dwarf Morning-glory)

A genus of about 90-100 species, almost all of tropical, subtropical, and warm temperate America. References: Ward (1968); Wilson (1960b)=Z.

- 1 Leaves densely pilose on both surfaces with spreading to loosely appressed hairs; internodes short, generally < 1 cm long; [calcareous glades and barrens of c. TN]*[E. nuttallianus]*
- 1 Leaves densely pilose with appressed (sericeous) hairs below, the upper surface glabrous or loosely pubescent; internodes long, many over 1.5 cm long; [wet flatwoods, seepages, bogs, Altamaha Grit outcrops in the Coastal Plain]*E. sericeus* var. *sericeus*

Evolvulus nuttallianus J.A. Schultes, Shaggy Dwarf Morning-glory, in c. TN (Chester, Wofford, & Kral 1997), disjunct from the Great Plains. [= F, K, Z; = *E. nuttallianus* – C, orthographic variant; = *E. pilosus* Nuttall – G]

Evolvulus sericeus Swartz var. *sericeus*, Silky Dwarf Morning-glory. Cp (FL, GA): wet flatwoods, seepages, bogs, Altamaha Grit outcrops; uncommon (rare in GA). Coastal Plain of ec. GA (Appling, Jeff Davis, and Coffee counties) (Bridges & Orzell 1989; Patrick, Allison, & Krakow 1995) south to s. FL; AR and LA west to AZ, south into Mexico; West Indies. [= K; < *E. sericeus* – S, WH, Z]

Ipomoea Linnaeus 1753 (Morning-glory)

A genus of about 650 species, herbs, vines, and shrubs, of tropical, subtropical, and warm temperate areas. References: Austin (1984)=Z; Austin & Huáman (1996)=Y; Austin & Bianchini (1998). Key adapted closely from Z.

- 1 Erect woody shrub with hollow stems to 2 m tall; [subgenus *Eriospermum*, section *Eriospermum*, series *Jalapae*].....*I. carnea* ssp. *fistulosa*
- 1 Trailing or twining vine.
 - 2 Corolla salverform, the long narrow tube cylindrical (with sides more-or-less parallel) for most of its length, the limb abruptly flaring at the summit of the tube.
 - 3 Corolla 2-4 cm long, scarlet, orange or yellow; flowers open from early morning to late morning or late afternoon; [subgenus *Quamoclit*, section *Mina*].
 - 4 Leaf blade pinnately divided into 11-31 (or more) linear segments.....*I. quamoclit*
 - 4 Leaf blade entire, or angled or lobed into 3-7 lanceolate or ovate segments.
 - 5 Calyx (5-) 6-8 (-9) mm long; fruit reflexed.....*I. coccinea*
 - 5 Calyx 4-4.5 mm long; fruits erect*I. hederifolia*
 - 3 Corolla 3-14 cm long, lavender to white; flowers open from evening until early morning.
 - 6 Leaves tomentose beneath; corolla mostly white on the outer surface, lavender to purple on the inner surface, thus bicolored in-and-out; [of outer Coastal Plain dunes, hammocks, and shell middens from se. NC southward]; [subgenus *Eriospermum*, section *Eriospermum*, series *Jalapae*]*I. macrorrhiza*
 - 6 Leaves glabrous beneath; corolla either white on both surfaces or lavender on both surfaces, not bicolored in-and-out; [weedy, widespread, of disturbed habitats]; [subgenus *Quamoclit*, section *Calonyction*]
 - 7 Corolla 10-14 cm long, white.....*I. alba*
 - 7 Corolla 3-7 cm long, violet or lavender.....*I. muricata*
 - 2 Corolla funnelliform to campanulate, the short to long tube expanding from below the middle, the limb gradually to abruptly flaring at the summit of the tube.
 - 8 Pedicels and peduncles with spreading, ascending, or reflexed trichomes; gynoeceium 3-parted; [subgenus *Ipomoea*, section *Pharbitis*].
 - 9 Sepals soft-pilose on the outer surface with slender trichomes.....*I. indica* var. *acuminata*
 - 9 Sepals hispid-pilose on the outer surface, with swollen-based trichomes.
 - 10 Sepals with slightly narrowed green tips shorter than to slightly longer than the body of the sepal; [series *Pharbitis*].....*I. purpurea*
 - 10 Sepals with very narrow elongate green tips much longer than the body of the sepal; [series *Heterophyllae*].

- 11 Sepals abruptly narrowed, the long subacute tips strongly spreading or curved *I. hederacea*
- 11 Sepals gradually narrowed, the long acute tips suberect, straight, scarcely spreading [*I. nil*]
- 8 Pedicels and peduncles glabrous or with short, appressed trichomes; gynoecium 2-parted; [subgenus *Eriospermum*].
- 12 Stems trailing, rooting at the nodes; leaf apex emarginate, truncate, or obtuse; [of beaches from se. NC southward]; [subgenus *Eriospermum*, section *Erpipomoea*].
- 13 Corolla white with a yellowish or purple eye; larger leaves 3-7-lobed..... *I. imperati*
- 13 Corolla lavender; larger leaves not lobed (though notched at the apex) *I. pes-caprae* var. *emarginata*
- 12 Stems erect or twining, not rooting at the nodes (except sometimes in *I. batatas*); leaf apex acute to acuminate; [collectively of various habitats, not beaches, widespread]; [subgenus *Eriospermum*, section *Eriospermum*].
- 14 Leaves palmately dissected.
- 15 Axillary buds developing stipule-like leaves *I. cairica*
- 15 Axillary buds not developing leaves *I. wrightii*
- 14 Leaves entire or pinnately lobed.
- 16 Leaf base sagittate; [series *Jalapae*] *I. sagittata*
- 16 Leaf base cuneate to cordate.
- 17 Corolla 1.5-2.5 cm long, white or lavender
- 18 Corolla white; anthers purple; sepals lanceolate; [series *Batatas*] *I. lacunosa*
- 18 Corolla lavender; anthers white; sepals oblong *I. triloba*
- 17 Corolla 3-8 cm long, at least partly pink to lavender (sometimes entirely white in *I. batatas*).
- 19 Sepals ovate to oblong-elliptic; corolla usually white on the limb, the throat purple; anthers 5-7 mm long; [series *Jalapae*] *I. pandurata*
- 19 Sepals oblong-ovate to oblong-lanceolate; corolla usually pink to lavender on the limb, the throat lavender to purple; anthers 1.5-3.2 mm long; [series *Batatas*].
- 20 Sepals unequal in length, oblong-ovate, with acute to caudate apices; leaves mostly 10-15 cm wide *I. batatas*
- 20 Sepals more-or-less equal in length, oblong-lanceolate, with acuminate apices; leaves 2-5 cm wide *I. cordatotriloba* var. *cordatotriloba*

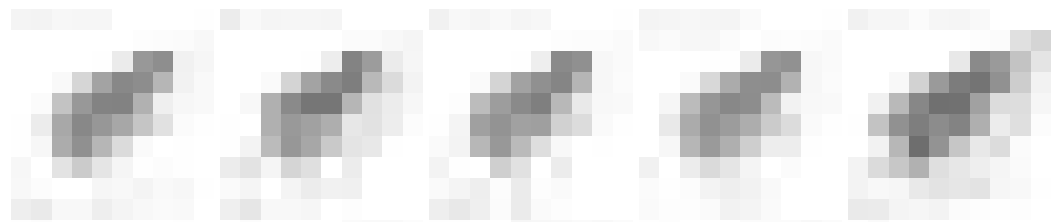
Ipomoea alba Linnaeus, Moonflowers, Tropical Morning-glory. Hammocks, marsh edges. Ne. FL south to s. FL; Mexico south through Central America to Argentina. [= WH; ? *Calonyction aculeatum* (Linnaeus) House]

* *Ipomoea batatas* (Linnaeus) Lamarck, Sweet Potato. Persistent in fields after cultivation, disturbed areas; apparently native of tropical America. [= RAB, K, S, Y, Z]

* *Ipomoea cairica* (Linnaeus) Sweet. Disturbed areas; native of Africa. AL, FL. [= K, S, WH] {synonymy incomplete}

* *Ipomoea carnea* Jacquin ssp. *fistulosa* (Martius ex Choisy) D. Austin, Bush Morning-glory. Persistent from cultivation in suburban gardens, sandy soils of barrier island; native of w. Brazil and e. Bolivia. [= K, Y, Z; = *I. fistulosa* Martius ex Choisy – RAB, S]

Ipomoea coccinea Linnaeus, Scarlet Creeper, Red Morning-glory. Fields, roadsides, thickets, streambanks. August-December. Native distribution uncertain, but apparently native to se. United States. [= RAB, C, F, GW, K, Pa, W, WV, Y, Z; = *Quamoclit coccinea* (Linnaeus) Moench – G, S]



Ipomoea cordatotriloba Dennstedt var. *cordatotriloba*, Coastal Morning-glory, Tie-vine. Dunes, sandy areas on barrier islands, other sandy habitats. September-October. Se. NC south to s. FL, west to e. TX and AR. The correct nomenclature is discussed by Manitz (1983). [= K; ? *I. trichocarpa* Elliott – RAB, GW, S, Z; ? *I. trifida* – S, misapplied; < *I. cordatotriloba* – WH; ? *I. cordatotriloba* – Y]

Ipomoea hederacea Jacquin, Ivyleaf Morning-glory. Fields, disturbed areas. July-December. Native distribution obscure, apparently native to temperate North America, including our area. [= C, GW, K, Pa, W, WH, WV, Y, Z; > *I. hederacea* var. *hederacea* – RAB, F, G; > *I. hederacea* var. *integriuscula* A. Gray – RAB, F, G; > *Pharbitis hederacea* (Linnaeus) Choisy – S; > *Pharbitis barbiger* (Sweet) G. Don – S]

* *Ipomoea hederifolia* Linnaeus, Scarlet Creeper. Disturbed areas; native of tropical America. [= GW, K, WH, Y, Z; = *I. coccinea* Linnaeus var. *hederifolia* (Linnaeus) A. Gray]

Ipomoea imperati (Vahl) Grisebach, Beach Morning-glory. Beaches, dune blowouts, fore-dunes. August-October. Se. NC south to s. FL, west to TX; extensively distributed in the tropics. [= K, WH, Y; = *I. stolonifera* (Cirillo) J.F. Gmelin – RAB, GW, S, Z]

Ipomoea indica (Burmam) Merr. var. *acuminata* (Vahl) Fosberg. Hammocks, coastal areas, disturbed areas. FL west to TX; West Indies, Mexico; Central and South America. [= K, WH; ? *Pharbitis cathartica* (Poir) Choisy – S] {add to synonymy}



Ipomoea lacunosa Linnaeus, White Morning-glory, Whitestar. Riverbanks, fields, roadsides, disturbed areas. July-December. NJ west to OH, IL, and KS, south to FL and e. TX. [= RAB, C, F, G, GW, K, Pa, S, W, WH, WV, Y, Z]

Ipomoea macrorhiza Michaux, Indian-midden Morning-glory, Manroot. Hammocks, shell middens, dunes, dry sands, disturbed maritime areas. June-July. Se. NC south to s. FL, west to s. AL. Sometimes, as by WH3 and K2, considered an alien, native of South America, but this is erroneous (Austin, pers. comm., 2011). [= RAB, K1, K2, S, WH3, Y, Z]

* *Ipomoea* × *multifida* (Rafinesque) Shinnery [*I. coccinea* × *quamoclit*], Cardinal Climber, is cultivated and may escape. [= K] {not keyed; not mapped}

* ***Ipomoea muricata*** (Linnaeus) Jacquin, Lilacbell, Purple Moonflower. Fields, disturbed areas; native (apparently) of Mexico. Austin & Jansson (1988) discuss the species' spread in se. United States, apparently as a contaminant in soybean seeds. Staples et al. (2005) reinstate the name *I. muricata*. [= WH; = *Ipomoea turbinata* Lagasca y Segura – K, Y, Z]

* *Ipomoea nil* (Linnaeus) Roth occurs in scattered states, such as MD and MS, as a rare introduction from tropical America (Kartesz 1999). [= K, Y, Z; = *Pharbitis nil* (Linnaeus) Choisy – S]

Ipomoea pandurata (Linnaeus) G.F.W. Meyer, Wild Sweet Potato, Manroot, Man-of-the-earth. Disturbed areas. May-September; July-October. CT, NY, and s. ON west to OH, s. MI, and KS, south to c. peninsular FL and e. TX. [= RAB, C, F, G, GW, K, Pa, S, W, WH, WV, Y, Z; > *I. pandurata* var. *pandurata* – G; > *I. pandurata* var. *rubescens* Choisy – G]



Ipomoea pes-caprae (Linnaeus) R. Brown var. *emarginata* Hallier f., Railroad Vine, Goat's-foot, Bay Hops, Bay Winders. Ocean beaches. E. NC (Carteret County), SC (Beaufort, Horry, Charleston, Colleton, and Georgetown counties), south to FL, west to TX, and widespread on tropical shores of the New World and Old World. The records in the Carolinas may reflect the periodic arrival of sea-borne seeds. [< *I. pes-caprae* – GW, Pa, S, Z; ? *I. pes-caprae* ssp. *brasiliensis* (Linnaeus) van Oostroom – K, WH, Y]

* ***Ipomoea purpurea*** (Linnaeus) Roth, Common Morning-glory. Fields, disturbed areas; native of tropical America. July-September. [= RAB, C, F, G, GW, K, Pa, W, WH, WV, Y, Z; = *Pharbitis purpurea* (Linnaeus) Voigt – S]

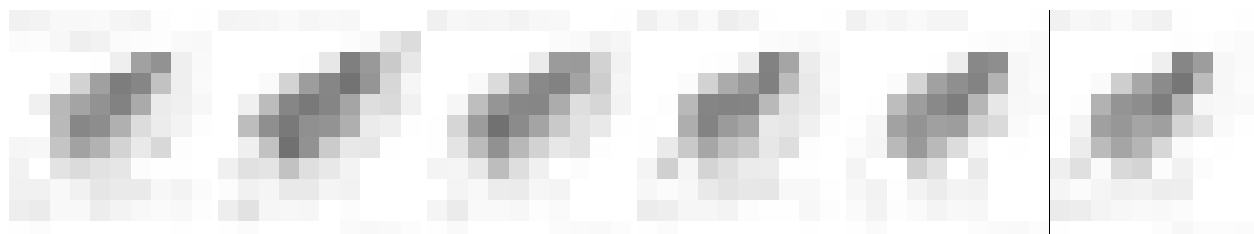
* ***Ipomoea quamoclit*** Linnaeus, Cypress-vine. Fields, hedgerows, disturbed areas; native of tropical America. September-December. [= RAB, C, F, GW, K, Pa, WH, Y, Z; = *Quamoclit vulgaris* Choisy – G; = *Quamoclit quamoclit* (Linnaeus) Britton – S]

Ipomoea sagittata Poir. Edges of brackish marshes, moist thickets on barrier islands, hammocks. July-September. E. NC south to s. FL, west to TX; also in the West Indies. [= RAB, GW, K, S, WH, Y, Z]

* *Ipomoea tricolor* Cavanilles is reported for several locations in se. PA (Rhoads & Klein 1993). [= K] {not yet keyed; synonymy incomplete}

* ***Ipomoea triloba*** Linnaeus, Little-bell. Hammocks, sand dunes. N. FL south to s. FL; West Indies; New World and Old World tropics. [= S, WH] {add to synonymy}

* ***Ipomoea wrightii*** A. Gray. Disturbed areas; native of India. Reported as likely naturalized in central TN, "spreading northward from the Gulf Coastal Plain" (Kral 1981). It also is known from GA (Kartesz 1999). [= K, WH; ? *I. heptaphylla* Voigt – S] {synonymy incomplete}



Jacquemontia Choisy 1834 (Jacquemontia)

A genus of about 90 species, tropical, subtropical, and warm temperate areas, especially America. References: Wilson (1960b)=Z.

* *Jacquemontia tamnifolia* (Linnaeus) Grisebach, Jacquemontia. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): fields, roadsides, other disturbed areas; common (uncommon in GA, NC, SC, rare in VA). August-September. Se. VA south to FL, west to AR and TX; also widespread in West Indies, Central America, and South America, its original range difficult to determine. It is probably adventive in most of our area. Fox, Godfrey, & Blomquist (1952) report the first collections of the species in NC, in 1938 and 1950, from obviously disturbed situations. [= RAB, C, F, G, GW, K, WH, Z; = *Thyella tamnifolia* (Linnaeus) Rafinesque – S]

Merremia Dennstedt ex Endlicher 1838

References: Wilson (1960b)=Z.

* *Merremia dissecta* (Jacquin) Hallier f., Noyau Vine. Cp (FL, GA): disturbed areas; common (rare in GA), native of South America. Ranges as far north as e. and sw. GA. [= K, WH, Z; =? *Ipomoea sinuata* Ortega; = *Operculina dissecta* (Jacquin) House]

Stylisma Rafinesque 1825 (Dawnflower)

A genus of about 6 species (and about 8 taxa), vining to trailing herbs, endemic to se. North America. References: Myint (1966)=Z; Shinnars (1962d)=Y; Wilson (1960b)=X.

- 1 Corolla < 2× as long as the calyx; leaves < 2 cm long; [of FL].....*S. abdita*
- 1 Corolla > 2× as long as the calyx; leaves (at least the larger on a plant) > 2 cm long; [collectively widespread].
- 2 Corolla pink or purple; filaments glabrous, or nearly so; leaves densely and conspicuously silvery-sericeous; [of seasonally wet habitats] ...
.....*S. aquatica*
- 2 Corolla white; filaments villous, at least near the base; leaves puberulent or pubescent, but not conspicuously silky-sericeous; [of dry habitats].
- 3 Larger leaves (7-) 12-30 mm wide; peduncles with (1-) 3-7 (-12) flowers; stems with a tendency to twine, at least near growing tip.
- 4 Sepals glabrous; [widespread in the Coastal Plain and Piedmont of our area]..... *S. humistrata*
- 4 Sepals densely villous; [of s. GA southward and westward]*S. villosa*
- 3 Larger leaves 2-10 mm wide; peduncles with 1 (-5) flowers; stems without a tendency to twine.
- 5 Bracteoles (2-) 10-20 mm long; stylar branches usually fused more than 5/6 of the total length (occasionally fused less than 1/2 of length), the free portion of the stylar branches usually less than 3 mm long; sepals villous, 4-6 (-7) mm long, ovate-elliptic with obtuse to acute apices; leaves 1-3 mm wide.
- 6 Stylar branches 1-1.5 mm long, usually unequal in length, the longer nearly 2× as long as the shorter; sepals mostly acute; [of MS westward].....[*S. pickeringii* var. *pattersonii*]
- 6 Stylar branches 2-3 mm long, nearly equal, the longer 1.0-1.3× as long as the shorter; sepals mostly obtuse; [of NC south and west to AL; disjunct in NJ].....*S. pickeringii* var. *pickeringii*
- 5 Bracteoles 1-3 (-5) mm long; stylar branches free nearly to base, the free portion more than 5 mm long; sepals villous or glabrous, 6-9 mm long, ovate-lanceolate with acuminate apices; leaves 2-10 mm wide.
- 7 Sepals glabrous (-glabrate), though the margins ciliate; leaves 2-3 (-5) mm wide, mostly 7-15 × as long as wide
.....*S. patens* var. *angustifolia*
- 7 Sepals moderately to densely villous; leaves 3-10 mm wide, mostly 4-6 × as long as wide.....*S. patens* var. *patens*

Stylisma abdita Myint. Florida scrub. Ne. FL (Clay County) south to s. FL. [= K, WH, Z; = *Bonamia abdita* (Myint) R.W. Long]

Stylisma aquatica (Walter) Rafinesque, Water Dawnflower. Clay-based Carolina bays and wet savannas. June-July. Se. NC south to c. and w. FL Panhandle, west to se. AR and e. TX. *S. aquatica*, as the epithet implies, occurs in wetter habitats than our other species. [= GW, K, S, WH, Z; = *Bonamia aquatica* (Walter) A. Gray – RAB, Y; = *Breweria michauxii* Fernald & Schubert – F; = *Bonamia michauxii* (Fernald & Schubert) K.A. Wilson – X]

Stylisma humistrata (Walter) Chapman, Southern Dawnflower. Sandhills and other dry woodlands, especially on dryish stream terraces. June-August. Se. VA south to Panhandle FL, west to AR and e. TX, north in the interior to n. AL and w. TN. [= C, K, S, WH, Z; = *Bonamia humistrata* (Walter) A. Gray – RAB, X, Y; = *Breweria humistrata* (Walter) A. Gray – F, G]

Stylisma patens (Desrousseaux) Myint var. *angustifolia* (Nash) Shinnars, Narrowleaf Dawnflower. Sandhills. May-August. SE. NC south to c. peninsular FL, west to w. Panhandle FL. [= *Stylisma patens* (Desrousseaux) Myint ssp. *angustifolia* (Nash) Myint – K, Z; = *Bonamia patens* (Desrousseaux) Shinnars var. *angustifolia* (Nash) Shinnars – RAB, Y; = *S. angustifolia* (Nash) House – S; < *S. patens* – WH; = *Bonamia angustifolia* (Nash) K.A. Wilson – X]

Stylisma patens (Desrousseaux) Myint var. *patens*, Common Dawnflower. Sandhills and other relatively dry sandy areas. June-August. Overall, the most common and widespread taxon of the genus in our area, regularly encountered in its habitat. E. NC south to n. FL, and west to s. MS. [= *Stylisma patens* (Desrousseaux) Myint ssp. *patens* – K, Z; = *Bonamia patens* (Desrousseaux) Shinnars var. *patens* – RAB, Y; = *S. trichosanthes* (Michaux) House – S, misapplied; < *S. patens* – WH; = *Bonamia aquatica* (Walter) A. Gray – X, misapplied]

Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray var. *pattersonii* (Fernald & Schubert) Myint. Sandhills. IL and IA south through KS and OK to w. LA and e. TX; disjunct east of the Mississippi River in w. MS (the material somewhat ambiguous as to varietal affinity). [= K, Z; < *Bonamia pickeringii* (Torrey ex M.A. Curtis) A. Gray – X, Y; < *Stylisma pickeringii* (Torrey ex M.A. Curtis) A. Gray – S]

Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray var. *pickeringii*, Pickering's Dawnflower. Sandhills, usually in the driest, most barren, deep-sand areas, occasionally colonizing dry, disturbed areas in sandhills, such as sandy roadbanks, known from the Fall-line Sandhills, aeolian rims of Carolina bays, and sandhills on relict riverine dunes along Coastal Plain rivers.

June-August (-September); July-September. *Var. pickeringii* ranges from s. NC south through SC, GA, AL, and e. MS, with a disjunct area in the Pine Barrens of s. NJ, sometimes treated as a separate variety "*caesariensis*" (see synonymy). This rare species is easily recognizable by its growth form, with numerous stems arching from a central point, then trailing radially away, forming a mound 1-2 meters in diameter. The narrowly linear leaves are borne vertically. Fernald and Schubert (1949) named four varieties in this widely but disjunctly distributed species; Myint (1966) reduced this to two varieties, one eastern and one western. [= C, K, Z; < *Bonamia pickeringii* (Torrey ex M.A. Curtis) A. Gray – RAB, X, Y; > *Breweria pickeringii* (Torrey ex M.A. Curtis) A. Gray var. *pickeringii* – F; > *Breweria pickeringii* var. *caesariensis* Fernald & Schubert – F; < *Breweria pickeringii* – G; < *Stylisma pickeringii* (Torrey ex M.A. Curtis) A. Gray – SJ]

Stylisma villosa (Nash) House, Hairy Dawnflower. Sandhills, Floprida scrub. Late April-July. S. GA south to s. FL, west to e. TX. [= K, S, WH, Z; = *Bonamia villosa* (Nash) K.A. Wilson – X, Y; = *Breweria villosa* Nash]



358. SOLANACEAE A.L. Jussieu 1789 (Nightshade Family) [in SOLANALES]

A family of about 94 genera and nearly 3000 species, shrubs, trees, vines, and herbs, nearly cosmopolitan but especially diverse in South America. References: Hunziker (2001).

Subfamily Browallioideae: *Browallia, Cestrum*

Subfamily Nicotianoideae: *Calibrachoa, Nicotiana, Nierembergia, Petunia*

Subfamily Solanoideae, tribe Solaneae: *Alkekengi, Capsicum, Physalis, Salpichroa, Solanum*

Subfamily Solanoideae, tribe Datureae: *Datura*

Subfamily Solanoideae, tribe Lycieae: *Lycium*

Subfamily Solanoideae, tribe Nicandreae: *Nicandra*

Subfamily Solanoideae, tribe Hyoscyameae: *Hyoscyamus*

Atropa, Lysianthes, Jaborosa

- 1 Fruiting calyx bright red (fresh or dry); corolla white; [cultivated and weakly naturalized near gardens]***Alkekengi***
- 1 Fruiting calyx green, yellow, or orange, drying brown or tan; corolla yellow, often marked with 5 large spots in the throat; [collectively widespread].....***Calliphysalis***
- 2 Flowers 2 or more per leaf axil; berries with spherical seed-like bodies intermixed with the flattened, reniform seeds; [of the Gulf Coastal Plain].....***Calliphysalis***
- 2 Flowers 1 per leaf axil; berries with flattened, reniform seeds only; [collectively widespread].....***Physalis***

Alkekengi P. Miller 1754 (Chinese-lantern Plant)

A monotypic genus, a perennial herb, native of e. Asia. I here separate *Alkekengi* from *Physalis* as generically distinct, on the presumption that the re-typification of *Physalis* proposed by Whitson (2011) will be accepted. References: Mione et al. (1994); Whitson & Manos (2005); Whitson (2011).

* ***Alkekengi officinarum*** Moench, Chinese-lantern Plant. Disturbed suburban areas; native of Japan, Korea, and n. China. June-July. Commonly cultivated as an ornamental and occasionally naturalized in e. North America, as at scattered locations in TN (Chester, Wofford, & Kral 1997). It is perennial, readily recognized by its mature calyces red-orange and up to 5 cm long. [= *Physalis alkekengi* Linnaeus – C, F, G, K, Pa, WV, Z]



Atropa Linnaeus 1753 (Belladonna)

A genus of 3 species, herbs, of Eurasia and n. Africa. References: Zheng & Vincent in FNA [in prep.].

* ***Atropa belladonna*** Linnaeus, Belladonna. Disturbed areas; native of Mediterranean Europe, w. Asia, and n. Africa. June-August; July-October. [= FNA, K2]

Bouchetia Augustin de Candolle ex Dunal 1852 (Bouchetia)

Bouchetia erecta A.P. de Candolle, Painted-tongue. The reported record for MS is based on a misidentification of *Jacquemontia tamnifolia* (Kings, pers. comm., 2012). [= K; = *Salpiglossis erecta* (A.P. de Candolle) D'Arcy] {excluded from our flora; not mapped}

Browallia Linnaeus 1753

A genus of 5 species, herbs, of sw. United States south through Mexico and Central America to n. South America. References: Jenkins in FNA (in prep.).

* ***Browallia americana*** Linnaeus, Jamaican Forget-me-not, Bush-violet. Disturbed areas; native of n. South America. June-August. [= FNA, WH3] {add to synonymy}

Calibrachoa La Llave & Lexarza 1825 (Seaside Petunia)

A genus of ca. 30 species, herbs, of tropical America. References: Jenkins in FNA (in prep.); Hunziker (2001)=Z.

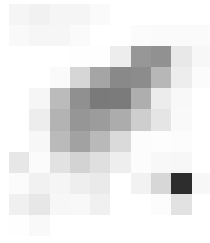
* ***Calibrachoa parviflora*** (Antoine Laurent de Jussieu) D'Arcy, Wild Petunia, Seaside Petunia. Upper edges of salt marshes, waste areas, garbage dumps; native of tropical America. Tatnall (1946) documents its occurrence in Virginia: "upper edge of salt marsh, Wachapreague," Accomack County (Fernald & Long 4169, 26 July 1934). [= FNA, K; = *Petunia parviflora* Antoine Laurent de Jussieu – RAB, C, F, G, S, Z]



Calliphysalis M. Whitson 2012

A monotypic genus, a perennial herb, endemic to se. United States Coastal Plain. References: Whitson (2012)=P; Sullivan (2004)=Z; Ward (2008a)=V.

Calliphysalis carpenteri (Riddell) M. Whitson, Carpenter's Ground-cherry. Sandhills, dry hammocks, dry sandy soils. N. peninsular FL and Panhandle FL west to e. LA. [=P; = *Physalis carpenteri* Riddell – K, S, V, WH3, Z] {add to synonymy}



***Capsicum* Linnaeus 1753 (Red Pepper, Chile)**

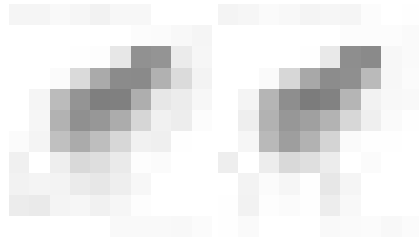
A genus of about 25 species, herbs and shrubs, of tropical America. References: Eshbaugh in FNA (in prep.); D'Arcy & Eshbaugh (1974)=Z; Bosland & Votava (2000)=Y; De (2003)=X; Andrews (1995)=V; Heiser & Pickersgill (1975). Key based on V and Z.

- 1 Flowers usually only one per node after the first flowering node (rarely more); corolla bright to milky white (rarely bluish or violet).....
*C. annuum*
- 1 Flowers 2-5 per node above the first flowering node; corolla greenish-white
- 2 Pedicel of mature fruit with constriction (waist) at junction with calyx; pedicels declining or erect at anthesis; corolla lobes planar; [habanero, scotch bonnet].....[*C. chinense*]
- 2 Pedicel of mature fruit broadening evenly into the calyx, without constriction; pedicels erect at anthesis, the flower itself nodding; corolla lobes usually slightly revolute; [tabasco].....*C. frutescens*

* ***Capsicum annuum*** Linnaeus, Bell Pepper, Chile, Pimiento, Paprika, Chile Piquin, Ancho, Cayenne, Pepperoncini, Jalapeño, Serrano, Chiltepin, and others. Naturalized or persistent from gardens; commonly cultivated, rare as a naturalized species; native of Mexico (but early spread through Central America by native Americans, and since nearly worldwide in distribution at least in cultivation). June-frost. A very influential food crop introduced from the New World to the Old World, now important in various (especially tropical or subtropical) cuisines, including Hunan, Szechuan, Indian, Thai, various African, Mexican, and others. The great majority of our cultivated forms are of this species. The wild form, var. *glabriusculum*, was certainly present at one time in the Southeast and may still be represented in our area as reverted forms; it probably cannot be reliably distinguished from cultivars of *C. annuum*, and the two are not here distinguished taxonomically. [= RAB, S; > *C. annuum* var. *annuum* – K, V, X, Y, Z; > *Capsicum annuum* Linnaeus var. *glabriusculum* (Dunal) Heiser & Pickersgill – FNA, K, V, X; > *C. annuum* var. *aviculare* (Dierbach) D'Arcy & Eshbaugh – Y, Z]

* ***Capsicum chinense*** Jacquin, Habanero, Scotch Bonnet. Rarely cultivated, not (yet) reported as persistent or escaped. Native of Andean South America. [= V, X, Y, Z] {not mapped}

* ***Capsicum frutescens*** Linnaeus, Tabasco. Persistent from gardens, uncommonly cultivated, rare as a waif; native of Andean South America. Reported in e. GA (Duncan 1985; Jones & Coile 1988). [= FNA (but not treated), V, X, Y; = *C. annuum* Linnaeus var. *frutescens* (Linnaeus) Kuntze]



***Cestrum* Linnaeus 1753 (Night-flowering Jessamine)**

A genus of 150-200 shrubs (rarely trees or vines), of Tropical America. References: Hunziker (2001)=Z.

* ***Cestrum nocturnum*** Linnaeus, Night-flowering Jessamine. Cultivated, weakly (if at all) established; native of West Indies. See Small (1933). [= K, Z; ? *C. parqui* – S, misapplied]



***Datura* Linnaeus 1753 (Jimsonweed)**

A genus of about 10 species, herbs, of s. North America (probably originally native to sw. United States and Mexico). Several species of *Datura* are known to have been in our area at the time of first settlement by Europeans. They may have been weeds in Indian fields, or grown for their hallucinogenic properties. The common name "Jimsonweed" is a corruption of "Jamestown Weed." References: Avery, Satina, & Rietsema (1959)=Z. {needs thorough rework, based on herbarium material and clarification of nomenclature}

- 1 Calyx 3-5 cm long, the tube strongly angled, the angles even narrowly winged; corolla 7-10 cm long; capsule erect, dehiscent by 4 valves; [section *Datura*].....*D. stramonium*
- 1 Calyx 5-15 cm long, the tube terete or slightly angled; corolla 12-25 cm long; capsule inclined or nodding, irregularly dehiscent; [section *Dutra*].
 - 2 Corolla with 10 teeth, lavender; spines of capsule few, very stout-based.....*D. metel*
 - 2 Corolla with 5 or 10 teeth, white or pale lavender; spines of capsule many, hispid (the base only slightly thickened).
 - 3 Corolla with 10 teeth; leaves soft-pubescent.....*D. innoxia*
 - 3 Corolla with 5 teeth; leaves glaucescent*D. wrightii*

* *Datura innoxia* J.S. Miller, Indian-apple. Disturbed areas; native of Mexico. September-October. This species may not be distinct from *D. wrightii*. {It is currently not known with confidence which records in our area apply to which taxon} [= K, Z; = *D. innoxia* – F, S, WV, orthographic variant; ? *D. meteloides* – G, misapplied]

* *Datura metel* Linnaeus (NC): location and habitat in our area not known; rare, presumably introduced, allegedly native of tropical Africa and Asia. July-August. [= RAB, C, K, S, Z]

* *Datura quercifolia* Kunth is reported for sw. GA by Jones & Coile (1988). [= K] {not yet keyed}

* *Datura stramonium* Linnaeus, Jimsonweed. Fields, pastures, disturbed areas, especially common in severely over-grazed pastures; presumably introduced from farther south and west (Mexico or Central America). July-September; August-October. The plant is dangerously poisonous. [= RAB, C, K, Pa, S, W, WV, Z; > *D. stramonium* var. *stramonium* – F; > *D. stramonium* var. *tatula* (Linnaeus) Torrey – F; > *D. tatula* Linnaeus]

* *Datura wrightii* Regel, Indian-apple. Disturbed areas; native of Mexico. July-September; September-October. [= K; ? *D. meteloides* Dunal – RAB, S, Z, misapplied; ? *D. metel* – G, misapplied; ? *D. innoxia* – WV, misapplied]



Hyoscyamus Linnaeus 1753 (Henbane)

A genus of about 23 species, herbs, of Eurasia and n. Africa.

* *Hyoscyamus niger* Linnaeus, Black Henbane. Disturbed areas; native of Europe. May-September. [= C, F, G, K]



Jaborosa de Jussieu 1789 (Jaborosa)

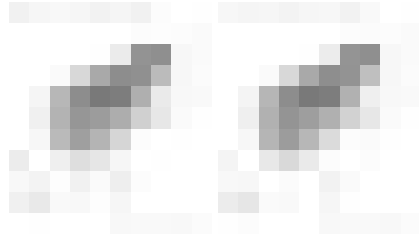
A genus of ca. 23 species, herbs, of South America. References: Vincent in FNA (in prep.).

* *Jaborosa integrifolia* Lamarck, Jaborosa. Disturbed areas, and on ballast; native of South America. April-September. The Mobile County, AL record is from ballast, reported by Mohr (1901), and is likely merely a historical waif, but a more recent collection from a field in Plaquemines Parish, LA (on the western edge of our area) confirms at least sporadic establishment of this species. [= FNA]

Lycianthes (Dunal) Hassler 1917 (Potato-bush, Gingerleaf)

A genus of 150-200 species, herbs, of the New World and Old World tropics. References: Dean in FNA (in prep.).

* *Lycianthes asarifolia* (Kunth & Bouché) Bitter, Gingerleaf. Disturbed areas; suburban and urban parks; native of South America. January-December. [= FNA]



Lycium Linnaeus 1753 (Matrimony-vine, Wolfberry, Goji Berry)

A genus of about 100 species, shrubs, of warm temperate and tropical areas of the Old World and New World (especially America).

- 1 Leaves succulent, oblanceolate, 1-5 mm wide; [native, in maritime situations].....*L. carolinianum*
- 1 Leaves herbaceous, elliptic, ovate, or broadly oblanceolate, 8-30 mm wide; [introduced, persistent or naturalized, usually around old home sites].
 - 2 Corolla lobes shorter than the corolla tube; leaves gray-green, 2-5 cm long*L. barbarum*
 - 2 Corolla lobes longer than the corolla tube; leaves bright green, 3-8 cm long *L. chinense*

* *Lycium barbarum* Linnaeus, Common Matrimony-vine, Wolfberry, Goji Berry. Cp (NC, SC, VA), Pd (DE, GA, NC, VA), Mt (GA, NC, VA, WV): old home sites, disturbed areas, along railroad tracks; rare, native of s. Europe. May-November; August-December. [= K, Pa; ? *L. halimifolium* P. Miller – RAB, F, G, S, W, WV; < *L. barbarum* – C (also see *L. chinense*)]

Lycium carolinianum Walter, Christmas-berry, Carolina Matrimony-vine. Cp (FL, GA, SC): shell middens, shell mounds, shelly sand dunes, brackish marshes, maritime sand spits; uncommon (rare in GA and SC). September-October. Se. SC and e. GA south to FL, west to e. TX; also in the West Indies. Apparently not recently seen in SC; its occurrence in that state is based on Walter's flora. [= RAB, GW, S, WH; > *L. carolinianum* var. *carolinianum* – K]

* *Lycium chinense* P. Miller, Chinese Matrimony-vine, Wolfberry, Goji Berry. Mt (NC, VA), Cp (VA): old home sites; rare, native of China. May-November; August-December. [= RAB, F, G, K, Pa; < *L. barbarum* – C]

Nicandra Adanson 1763 (Apple-of-Peru)

A monotypic genus, an annual herb, native of Peru. References: Whitson in FNA (in prep.); Hunziker (2001).

* *Nicandra physalodes* (Linnaeus) Gaertner, Apple-of-Peru. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (DE, NC, SC, VA): disturbed places, such as cultivated fields; uncommon, native of Peru. July-September; August-October. [= RAB, C, F, FNA, G, K, Pa, W, WV; = *Physalodes physalodes* (Linnaeus) Britton – S]

Nicotiana Linnaeus 1753 (Tobacco)

A genus of about 67 species, of America, Australia, and s. Pacific areas. Fernald (1950) describes the genus as "rank, acrid-narcotic American herbs." References: Goodspeed (1954)=Z; Knapp, Chase, & Clarkson (2004).

- 1 Plant a shrub or small tree, 3-10 m tall; stems glabrous and glaucous; [section *Paniculatae*].....*N. glauca*
- 1 Plant an herb, 0.5-3 m tall; stems densely viscid-puberulent (or sparsely so to merely tuberculate in *N. longiflora*).
 - 2 Corolla tube 1.2-1.7 cm long, greenish yellow, with limb 3-6 mm wide; leaves distinctly petiolate; [section *Rusticae*]..... *N. rustica*
 - 2 Corolla tube 3.0-12.0 cm long, cream, white, yellow, or pink, with limb 10-25 mm wide; leaves auriculate clasping.
 - 3 Larger leaves on a plant 3.5-8 dm long; corolla tube 3.0-5.5 cm long, 4-7× as long as the average diameter, the limb 10-15 mm wide, pink or reddish (rarely white); [section *Nicotiana*] *N. tabacum*
 - 3 Larger leaves on a plant 1-3 dm long; corolla tube 4.0-12.0 cm long, 10-20× as long as the average diameter, the limb 15-25 mm wide, white or lavender; [section *Alatae*].
 - 4 Rosette of a few leaves, not persisting; cauline leaves clasping and decurrent on the stem *N. alata*
 - 4 Rosette persisting; cauline leaves clasping but not decurrent on the stem *N. longiflora*

* *Nicotiana alata* Link & Otto, Jasmine Tobacco. Cp (GA): cultivated in gardens; rarely persistent, native of South America. See Jones & Coile (1988). [= K, Z]

* *Nicotiana glauca* Graham, Tree Tobacco. Cp (GA): cultivated in gardens, rarely persistent or spreading; rare, native of South America. Apparently present at Fort Pulaski National Monument, Chatham County, GA (Jones & Coile 1988; W. Duncan pers.comm. 2004). [= K, S, Z]

* *Nicotiana longiflora* Cavanilles, Long-flower Tobacco. Pd (DE): disturbed areas, rare, native of South America. Cultivated and may be found as a waif or persistent. [= K, S, Z]

* *Nicotiana rustica* Linnaeus, Indian Tobacco, Wild Tobacco. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): formerly commonly cultivated by native Americans in all parts of our area, persistent following cultivation, now apparently extinct in our area; rare, originally native of Peru. This was the tobacco cultivated by American Indians at the time of contact by Europeans, and was the first tobacco taken to Europe and cultivated there. [= RAB, C, F, K, S; > *N. rustica* var. *rustica* – Z]

* *Nicotiana tabacum* Linnaeus, Cultivated Tobacco. Pd (GA, NC, SC, VA), Cp (GA, NC, SC, VA), Mt (GA, NC, SC, VA): persistent after cultivation; commonly cultivated, rarely naturalized, native of tropical America. June-frost; September-October. This is the tobacco currently cultivated in our area for the manufacture of cigarettes, cigars, and other smoking and chewing tobacco products. Two different strains are cultivated. Burley tobacco, with acute to acuminate leaves, grown mostly in the Mountains and upper Piedmont, is air-cured in open barns, and used mostly for cigar and pipe tobacco. Flue-cured tobacco, with obtuse or broadly acute leaves, is grown mostly in the Coastal Plain and lower Piedmont, cured in closed, cubical barns with forced heat, and used mostly for cigarettes. [= RAB, C, F, K, S]

Nierembergia Ruiz & Pavón 1794 (Cupflower)

A genus of about 23 species, of Mexico, Central America, and South America.

* *Nierembergia scoparia* Sendtn., Tall Cupflower. Reported from sw. GA (Jones & Coile 1988). [= K2; = *N. frutescens* Durieu – K1]



Petunia Antoine Laurent de Jussieu 1803 (Petunia)

{ } [also see *Calibrachoa*]

* *Petunia* ×*hybrida* Vilmorin [*P. axillaris* × *integrifolia*], Petunia. Disturbed areas, garden edges, common in cultivation, rare as a waif or persistent; native of Argentina. May-November. Individual plants may closely resemble either parent, but this taxon in our area is best and most conveniently considered as a variable hybrid taxon. [= Pa, WH; = *P. ×atkinsiana* D. Don ex Loudon – RAB; > *P. axillaris* (Lamarck) Britton, Sterns, & Poggenburg – C, F, G, K, S; > *P. violacea* Antoine Laurent de Jussieu – F, S, misapplied; > *P. integrifolia* (Hooker) Schinzus & Thellung – C, G, K; > *P. ×atkinsiana* D. Don ex W.H. Baxter in J.C. Loudon – K]



Physalis Linnaeus 1753 (Ground-cherry)
(contributed by Milo Pyne)

A genus of about 80 species, nearly cosmopolitan, but especially diverse in America. Many of the species of *Physalis* in our area occur primarily in disturbed habitats; their pre-Columbian ranges are unclear and they may have been introduced to e. North America by native Americans. Of the species treated here, only a few are definitely introduced. References: Sullivan (2004)=Z; Waterfall =Y (1958, 1967); Sullivan (1985)=X; Ward (2008a)=V; Turner & Martínez (2011)=U; Martínez (1998)=Q; Mione et al. (1994); Whitson & Manos (2005); Whitson (2011). Key based in part on Sullivan (2004).

- 1 Flowers 2 or more per leaf axil; berries with spherical seed-like bodies intermixed with the flattened, reniform seeds; [of the Gulf Coastal Plain][see *Calliphysalis*]
- 1 Flowers 1 per leaf axil; berries with flattened, reniform seeds only; [collectively widespread].

- 2 Berry 20-40 mm in diameter, green or yellow-green when ripe (tomatillo); anthers strongly coiled after dehiscence, blue; corolla throat with bluish tinge; [cultivated and weakly naturalized near gardens] *P. philadelphica*
- 2 Berry to 20 mm in diameter, orange, yellow, or green when ripe; anthers not coiled after dehiscence, yellow, blue, or purple; corolla throat purple, brown, green, or ochre; [collectively widespread].
- 3 Plants pubescent with stellate hairs, these in some taxa abundantly covering the leaves, or if leaves glabrous, the stellate hairs visible on the tips and margins of the sepals; plants perennial, from deeply buried rhizomes; [section *Stellatae*].
- 4 Leaves linear, 10-20× as long as wide, glabrous; plants erect; [of s. FL and FL Panhandle westward to s. LA] *P. angustifolia*
- 4 Leaves ovate, elliptic, obovate or spatulate, 2-10× as long as wide, stellate pubescent, especially on the young growth, flowering calyces, and pedicels (or glabrous south of our area); [of se. VA south to s. FL, west to s. MS] *P. walteri*
- 3 Plants glabrous, or pubescent with simple hairs; plants annual or perennial.
- 5 Leaves glabrous or essentially so.
- 6 Perennials from rhizomes, frequently with remnant of last year's stem attached to crown; corolla with 5 dark maculations in the throat.
- 7 Hairs on the pedicels and young stems retrorse or retrorse-spreading; fruiting calyx 5-angled, indented at base *P. virginiana* var. *virginiana*
- 7 Hairs on the pedicels and young stems antrorse; fruiting calyx subterete, with 10 ribs, not indented at base *P. longifolia* var. *subglabrata*
- 6 Annuals from taproots; corolla with or without 5 dark maculations in the throat.
- 8 Upper part of the stem glabrous or glabrate (when young, sometimes with minute, deflexed hairs in lines); corolla with or without 5 dark maculations in the throat.
- 9 Corolla 7-15 mm long, yellow and with 5 dark maculations in the throat; anthers 2.5-4 mm long; berry to 40 mm in diameter *P. philadelphica*
- 9 Corolla 4-10 mm long entirely yellow, without 5 dark maculations in the throat; anthers 1-2.3 mm long; berry 8-11 mm in diameter.
- 10 Principal cauline leaf blades generally < 2.5× as long as wide; flowering and fruiting pedicels 0.5-1.0 cm long; pedicels and calyx essentially glabrous at anthesis except for hairs on the margins of the calyx lobes *P. angulata* var. *angulata*
- 10 Principal cauline leaf blades generally > 2.75× as long as wide; flowering pedicels 1.5-2.5 cm long, elongating to 3.0-4.0 cm long in fruit; pedicels and calyx covered at anthesis with fine, even, antrorse hairs, especially at the base of the calyx .. *[P. angulata* var. *pendula]*
- 8 Upper part of the stem with long, spreading hairs; corolla with 5 dark maculations in the throat; [section *Epeteiorhiza*].
- 11 Leaf margins strongly dentate with 7-10 (or more) teeth per side; fruiting pedicels 12 mm or more long; mature fruiting calyx 2.5-4 cm (or more) long, the lobes long-acuminate to attenuate; corolla pubescent internally *P. cordata*
- 11 Leaf margins entire, or dentate with 1-8 teeth per side; fruiting pedicels < 10 mm long; mature fruiting calyx 2.5 cm or less long, the lobes triangular-acuminate; corolla glabrous internally.
- 12 Leaves entire or with few teeth, usually 1-4 teeth per side; leaf blade thin in texture, flaccid and translucent; fruiting calyces 1.2-2.5 cm long, 1-1.5 cm wide, the lobes ovate to deltoid, the apex acute, 3-3.5 mm long *P. pubescens* var. *integrifolia*
- 12 Leaves mostly toothed nearly to the base with 5-8 teeth per side; leaf blade thick in texture, not translucent; fruiting calyces 2-3.5 cm long, 1.2-3 cm wide, the lobes triangular to narrowly lanceolate, the apex narrowly acute to acuminate, (3.5-) 4.5-6.5 mm long *P. pubescens* var. *pubescens*
- 5 Leaves variously pubescent, the hairs copious and villous to sparse and appressed.
- 13 Flowering calyces 6 mm or less long; annuals from taproots; [section *Epeteiorhiza*].
- 14 Stems, young growth, and major veins of the leaves covered with villous pubescence intermixed with sessile glands; leaves gray-green, prominently and coarsely dentate to the base, with well-defined reticulate venation, especially visible on the lower surface, frequently drying orange or with orange spots; anthers yellow, perhaps with a bluish tinge; body of mature calyx about as long as broad, abruptly acuminate at apex; berry tawny orange when mature *P. grisea*
- 14 Stems, young growth, and major veins of leaves with fine, non-villous pubescence; leaves green, obscurely dentate, often in the upper half only, or entire, without well-defined reticulate venation, drying green or brownish; anthers blue or violet; body of mature calyx longer than broad, long-acuminate at the apex; berry green when mature.
- 15 Leaves entire or with few teeth, usually 1-4 teeth per side; leaf blade thin in texture, flaccid and translucent; fruiting calyces 1.2-2.5 cm long, 1-1.5 cm wide, the lobes ovate to deltoid, the apex acute, 3-3.5 mm long *P. pubescens* var. *integrifolia*
- 15 Leaves mostly toothed nearly to the base with 5-8 teeth per side; leaf blade thick in texture, not translucent; fruiting calyces 2-3.5 cm long, 1.2-3 cm wide, the lobes triangular to narrowly lanceolate, the apex narrowly acute to acuminate, (3.5-) 4.5-6.5 mm long *P. pubescens* var. *pubescens*
- 13 Flowering calyces 6 mm or more long; perennials from rhizomes.
- 16 Pubescence viscid, generally composed of glandular trichomes mixed with fine, short hairs and long, multicellular hairs; leaf blades broadly ovate to suborbicular, the base rounded, truncate, or cordate (occasionally widely cuneate) *P. heterophylla*
- 16 Pubescence seldom if at all glandular-viscid, composed of trichomes of varying lengths, from dense, spreading, and long-villous to sparse, strigose, and appressed; leaf blades narrowly ovate to broadly lanceolate, the base cuneate (rarely truncate).
- 17 Pedicels and flowering calyces pubescent with minute, appressed, antrorse hairs; hairs on the calyx primarily confined to 10 narrow longitudinal strips consisting of simple, appressed hairs 0.5 mm or less long *P. longifolia* var. *subglabrata*
- 17 Pedicels and flowering calyces densely pubescent with divergent and appressed hairs mixed (or only with appressed retrorse hairs); hairs on the calyx scattered more or less evenly over the surface, not confined to 10 longitudinal strips.
- 18 Pedicels with both divergent and antrorse hairs; principle leaf blades 5-8 cm long; filaments 0.5 as wide as the anthers; spots at the base of the corolla inconspicuous or absent; berry > 14 mm in diameter when mature *P. lanceolata*
- 18 Pedicels with short, appressed, retrorse hairs, or with short retrorse and longer divergent hairs intermixed; principle leaf blades 3-6 cm long; filaments as wide or wider than the anthers; spots at base of the corolla prominent; berry < 12 mm in diameter when mature *P. virginiana* var. *virginiana*

* *Physalis acutifolia* (Miers emend Sandwith) Sandwith. Disturbed areas; native of sw, United States south into Mexico. Collected once in NC (in 1936), from a nursery in Mecklenburg County, NC, and in MS (Sullivan 2004). It may not be established. It is most similar to *P.*

angulata, but differs in its white to cream-colored corollas, with yellow basal spots, and the presence of 5 hairy pads, alternating with the stamens near the base of the corolla limb. [= K1, K2, Z] {not yet keyed}

Physalis angulata Linnaeus var. *angulata*, Smooth Ground-cherry. Cp (DE*, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): disturbed areas, open woodlands, agricultural fields; common (uncommon in VA, rare in DE). August-October. Var. *angulata* is widely distributed in tropical America, north to se. VA and MO, and scattered as an adventive farther north. [*< P. angulata* – RAB, C, K, S, WH3, Z; = *P. angulata* – F, G]

Physalis angulata Linnaeus var. *pendula* (Rydberg) Waterfall. *P. angulata* var. *pendula* (Rydberg) Waterfall is (in North America) more western, east to nw. TN and, allegedly, to SC. It can be distinguished from var. *angulata* by the following characters: principle cauline leaf blades generally > 2.75× as long as wide (vs. < 2.5× as long as wide), flowering pedicels 1.5-2.5 cm long, elongating to 3.0-4.0 cm long in fruit (vs. flowering and fruiting pedicels 0.5-1.0 cm long), pedicels and calyx covered at anthesis with fine, even, antrorse hairs, especially at the base of the calyx (vs. pedicels and calyx essentially glabrous at anthesis except for hairs on the margins of the calyx lobes). [*< P. angulata* – RAB, C, K, S, WH, Z; = *P. pendula* Rydberg – F, G]

Physalis angustifolia Nuttall, Coastal Ground-cherry. Cp (AL, FL, LA, MS): maritime dunes and coastal sands; uncommon. January-December. Gulf Coast shorelines from S. FL west to s. LA. Reports of *P. viscosa* from the Southeast are based on either *P. angustifolia* or *P. walteri*. [= K, U, V, WH3, Z] {add to synonymy}

Physalis arenicola Kearney, Sandhill Ground-cherry. Cp (FL, GA): sandhills, flatwoods; common (rare in GA). GA, AL, and s. MS south to s. FL. Reported from nc. GA by Jones & Coile (1988) and for "cypress-heads and scrub thickets" by GANHP. [= K, WH3, Z; > *P. arenicola* var. *arenicola* – V; > *P. arenicola* var. *ciliosa* (Rydberg) Waterfall – V] {not yet keyed; synonymy incomplete}

* ***Physalis cinerascens*** (Dunal) A.S. Hitchcock var. *cinerascens*, native to OK, TX, and Mexico, occurs locally in the Southeastern United States in weedy situations; it has been found once in our area, in a disturbed habitat in SC. It is probably not established. It resembles *P. walteri* in having stellate pubescence, but differs in having leaves ovate to suborbicular, with margins sinuate, dentate, or entire (vs. leaves obovate, with margins entire), anthers at least 1.5× as long as the filaments (vs. anthers equal to or shorter than the filaments), and fruiting pedicels mostly at least 1.5× as long as the calyces (vs. fruiting pedicels equal to or shorter than the fruiting calyces). [= K, Z] {not yet keyed; full treatment}

Physalis cordata P. Miller, Toothleaf Ground-cherry. Cp (FL, NC), {GA, SC}: disturbed areas; rare. July-October. This species is scattered in the Southeastern United States, south to s. FL, and is more widespread in Mexico, Central America, and West Indies. [= K, Q, WH3, V, Z; = *P. pubescens* var. *glabra* (Michaux) Waterfall – RAB; = *P. barbadosensis* var. *glabra* (Michaux) Fernald – F]

Physalis grisea (Waterfall) M. Martínez, Gray Ground-cherry, Strawberry-tomato, Dwarf Cape-gooseberry. Mt (GA, NC, VA), Pd (GA, NC, VA), Cp? (GA?), {SC}: wooded slopes, disturbed areas; uncommon. July-September; August-October. The species is mainly distributed in ne. United States, south (mainly) to NC, TN, and MO, and scattered farther south. The fruits are edible, sweet, and tasty. Martínez (1993) discusses the nomenclature of this species, showing that the *P. pruinosa* Linnaeus is properly applied to a Mexican and Central American species. [= K, Q, V, Z; = *P. pubescens* var. *grisea* Waterfall – RAB, C; < *P. pruinosa* Linnaeus – F, G, S, W, misapplied]

Physalis heterophylla Nees, Clammy Ground-cherry. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA): disturbed areas, dry rocky woodlands, hammocks; common (uncommon in Mountains, rare in Coastal Plain of FL, GA, NC, and SC). May-July; July-September. Widespread in e. and c. United States and adjacent Canada, south to ne. FL and Panhandle FL. [= RAB, C, Pa, S, W, WH3, Z; > *P. heterophylla* var. *heterophylla* – F, G; > *P. heterophylla* var. *ambigua* (A. Gray) Rydberg – F, G; > *P. heterophylla* var. *clavipes* Fernald – F; > *P. heterophylla* var. *nyctaginea* (Dunal) Rydberg – F; > *P. heterophylla* var. *heterophylla* – K; > *P. heterophylla* – S; > *P. ambigua* (A. Gray) Britton – S; > *P. nyctaginea* Dunal – S]

Physalis lanceolata Michaux, Sandhills Ground-cherry. Cp (GA, NC, SC): sandhills; rare. June-July; July-September. Endemic to sandhill habitats of (primarily) sc. and (rarely) se. NC (northern limit in Lee, Wayne, and New Hanover counties), south through SC to just over the Savannah River in Richmond County, GA. Many earlier floras included midwestern material in the concept of this species; it is, however, limited to the Carolinas and Georgia. See Hinton (1970) for discussion of its taxonomic status. [= RAB, Z; < *P. lanceolata* – F, G, S (also see *P. hispida* (Waterfall) Cronquist)]

Physalis longifolia Nuttall var. *longifolia*. East to PA, WV, KY, TN, and GA (Kartesz 1999). [= K, Z]

Physalis longifolia Nuttall var. *subglabrata* (Mackenzie & Bush) Cronquist, Longleaf Ground-cherry. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, FL), {GA, SC}: open woodlands, gardens and disturbed areas; common (uncommon in GA, NC, SC, VA). June-August; August-October. The species is widespread in e. and c. United States; var. *subglabrata* is more eastern, south to Panhandle FL, var. *longifolia* more western. [= C, G, K, W, Z; = *P. virginiana* P. Miller var. *subglabrata* (Mackenzie & Bush) Waterfall – RAB; = *P. subglabrata* Mackenzie & Bush – F, Pa, S, WV; < *P. longifolia* – WH3]

Physalis missouriensis Mackenzie & Bush. Reported from nc. GA in Jones & Coile (1988); record not repeated in Kartesz (1999). [= K, Z; *P. pubescens* Linnaeus var. *missouriensis* (Mackenzie & Bush) Waterfall] {investigate; not yet keyed; synonymy incomplete}

* ***Physalis peruviana*** Linnaeus, Cape Gooseberry or Po'ha, is also cultivated. Native to South America, it is now cultivated for its edible fruit in various tropical and temperate areas, and is known to rarely persist in e. North America. [= K1, K2]

* ***Physalis philadelphica*** Lamarck, Tomatillo. Cp (DE), Pd (DE, NC), Mt (VA, WV): naturalized after cultivation; uncommon (rare in NC and VA), native of Mexico and Central America. June-August; July-October. See Kartesz & Gandhi (1994) for a discussion of this group. It is the large-flowered plant (and therefore *P. philadelphica* in the narrow sense) that is weakly naturalized after cultivation in our area. [= C, Pa, Z; < *P. ixocarpa* Brotero ex Hornemann – F, G, misapplied; > *P. philadelphica* var. *immaculata* Waterfall – K]

Physalis pubescens Linnaeus var. *integrifolia* (Dunal) Waterfall, Thinleaf Downy Ground-cherry. Cp (DE), Pd (DE), Mt (WV), {FL?, GA?, NC?, SC?, VA?}: disturbed areas; common (rare in WV). The distribution, abundance, and habitats of the two varieties are poorly known. July-September; August-October. Widespread in the American tropics, north to PA and IA. [= C, K, Pa; < *P. pubescens* var. *pubescens* – RAB; = *P. pubescens* – F; > *P. pubescens* – G, S; > *P. turbinata* Medikus – G, S; = *P. integrifolia* (Dunal) D.B. Ward – V; < *P. pubescens* – Q, W, WH3, Z; < *P. pruinosa* Linnaeus, misapplied]

Physalis pubescens Linnaeus var. *pubescens*, Thickleaf Downy Ground-cherry. Mt (WV), {VA}: disturbed areas; rare in WV. The distribution, abundance, and habitats of the two varieties are poorly known. July-September; August-October.

Widespread in the American tropics, north to VA. [= C, K, Pa; < *P. pubescens* var. *pubescens* – RAB; > *P. barbadensis* Jacquin var. *barbadensis* – F; > *P. barbadensis* Jacquin – G, S; > *P. pubescens* – S; > *P. barbadensis* Jacquin – S; < *P. pubescens* – Q, W, WH3, Z]

Physalis virginiana P. Miller var. *virginiana*, Virginia Ground-cherry. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA): woodlands and disturbed areas; common (rare in FL and WV). April-May; June-July. This complex species is widespread in e. and c. North America. Var. *virginiana* is the most eastern of a number of varieties, some of the others being var. *campaniforma* Waterfall, var. *polyphylla* (Greene) Waterfall, and var. *texana* (Rydberg) Waterfall. The validity and true affinities of some of these varieties is, at present, uncertain; var. *texana* may be actually affiliated with *P. longifolia*. [= RAB, K; < *P. virginiana* – C, F, G, Pa, V, W, WH3, Z; > *P. virginiana* – S; > *P. intermedia* Rydberg – S; > *P. monticola* C. Mohr – S]

Physalis viscosa Linnaeus. Reports in the Southeast are based on a broad interpretation of *P. viscosa* to include southeastern taxa *P. angustifolia* and *P. walteri*. {rejected; not keyed}.

Physalis walteri Nuttall, Dune Ground-cherry. Cp (FL, GA, NC, SC, VA): dunes of sea-beaches, openings in maritime forests, sandhills (southward), and rarely inland as a waif in disturbed areas; common (uncommon in GA, NC, SC, rare in VA). May-September. Se. VA south to s. FL and west to s. MS. See Sullivan (1985) for further information on this species and its relatives. It is largely replaced on the Gulf Coast by the related *P. angustifolia*, with which it locally intergrades in peninsular FL. *P. viscosa* Linnaeus is South American. [= C, K, U, WH3, Z; < *P. viscosa* Linnaeus ssp. *maritima* (M.A. Curtis) Waterfall – RAB; < *P. maritima* M.A. Curtis – F; < *P. viscosa* – G, S; > *P. walteri* var. *walteri* – V; > *P. walteri* var. *glabra* (Waterfall) D.B. Ward – V]

Salpichroa Miers 1845

A genus of about 17 species, herbs and shrubs, native of South America. References: Jenkins in FNA (in prep.); Hunziker (2001)=Z.

* *Salpichroa origanifolia* (Lamarck) Baillon. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): gardens, roadsides, disturbed areas; rare, native of n. South America. May-November. [= FNA, K, RAB, WH3, Z; = *Perizoma rhomboidea* (Gillies & Hooker) Small – S; = *Salpichroa rhomboidea* (Gillies & Hooker) Miers]

Solanum Linnaeus 1753 (Nightshade, Tomato, Potato, Horse-nettle) (contributed by Milo Pyne and Alan S. Weakley)

A genus of about 1700 species, trees, shrubs, vines, and herbs, of tropical and temperate regions of the Old and New World. References: Schilling (1981)=Z; Bohs & Olmstead (1997); Olmstead & Palmer (1997). [including *Lycopersicum*]

- 1 Anthers opening by longitudinal slits, connivent into a slender cone with sterile tip; berry fleshy, seeds pubescent; plant glandular "clammy"-pubescent; [cultivated plant, also appearing as a waif, escape, or discard, e.g. on sewage sludge].....*S. lycopersicum*
- 1 Anthers opening by terminal pores, separate or connivent; berry dry to juicy, not fleshy, seeds glabrous; plant not clammy-pubescent; [plants native, exotic, or cultivated escapes, some are weeds of cultivation].
 - 2 Stems and leaves not prickly or spiny.
 - 3 Leaves irregularly pinnatifid or auriculate-lobed.
 - 4 Woody or suffrutescent climbing or twining vine; leaves with 2 basal lobes or leaflets much smaller than the terminal one (some upper leaves simple).....*S. dulcamara*
 - 4 Herb, not twining; leaves irregularly pinnatifid.
 - 5 Fetid annual, plant more or less prostrate; leaves sessile or short-petiolate, lateral leaflets lanceolate, not alternating with smaller ones.....[*S. triflorum*]
 - 5 Tuberiferous perennial, plant more or less erect; leaves distinctly petiolate, lateral leaflets ovate, alternating with smaller ones.....*S. tuberosum*
 - 3 Leaves not appearing compound or auriculate-lobed.
 - 6 Foliage densely pubescent to puberulent with spreading hairs, especially on undersurface.
 - 7 Trichomes stellate; ripe berry yellow; corolla lavender.....*S. elaeagnifolium*
 - 7 Trichomes simple; ripe berry black or green to yellow; corolla white.
 - 8 Berry black when ripe; leaves lance-elliptic, 1-2.5 cm wide, style usually protruding beyond anthers by > 1 mm; plants strictly coastal, on dunes and similar habitats.....*S. pseudogracile*
 - 8 Berry green to yellow when ripe; leaves ovate, 2.5-6 cm wide, style not protruding; plants widespread, weedy .. *S. sarrachoides*
 - 6 Foliage glabrous, glabrescent or very sparsely pubescent (with appressed hairs).
 - 9 Berry dull red, ca. 1 cm wide at maturity, uncommon horticultural escape.....*S. pseudocapsicum*
 - 9 Berry black (rarely green, never red), up to 0.5 cm wide at maturity, ruderal weeds.
 - 10 Inflorescence subracemose, corymbose or umbellate, pedicels and peduncles becoming stout; anthers 1.8-2.6 [2.2-2.9] mm long; berry dull; seed 1.7-2.2 mm long [1.8 mm wide or wider]; sclerotic granules (concretions of stone cells) typically absent..
.....*S. nigrum*
 - 10 Inflorescence umbellate, pedicels and peduncles remaining slender; anthers 1.4-2 mm long; berry glossy; seed 1.2-1.8 mm long; sclerotic granules typically present but occasionally absent
 - 11 Calyx lobes strongly reflexed in mature fruit; sclerotic granules in fruit five or less if present, occasionally absent; flowers 2-14 per inflorescence, usually > 7 in largest inflorescences; fruiting pedicels erect (may be deflexed with age or in winter), to 8 mm long; fruit shiny, black*S. americanum*
 - 11 Calyx lobes adherent or spreading in mature fruit, occasionally somewhat reflexed; sclerotic granules usually 7-12 per fruit, often visible through skin of dried berry; flowers usually < 6 per inflorescence, fruiting pedicels deflexed, to 13 mm long; fruit dull or shiny black, or rarely green*S. ptychanthum*
 - 2 Stems, and often leaves, prickly and/or spiny.

- 12 Berry enveloped at least until near maturity by prickly calyx; leaves regularly and strongly pinnately parted or very deeply divided (sinus depth greater than 1/2 distance from leaf margin to midvein).
- 13 Corolla yellow, anthers dissimilar, the lowest larger and longer; calyx tightly enveloping the fruit, seeds coarsely undulate-rugose *S. rostratum*
- 13 Corolla violet to (rarely) white, anthers all similar; calyx loosely enveloping the fruit, seeds minutely reticulate-pitted *S. sisymbriifolium*
- 12 Berry not enveloped by prickly calyx; the leaves not pinnately parted or divided (except in *S. sisymbriifolium*), or only weakly so (sinus depth < 1/2 the distance from leaf margin to midvein).
- 14 Berry > 2 cm in diameter; lower leaf surface not stellate-pubescent.
- 15 Ripe berry orange-red to reddish, leaves deeply lobed (sinus depth up to 1/2 distance from leaf margin to midvein) *S. capsicoides*
- 15 Ripe berry yellow, immature berry green with white mottles, leaves shallowly lobed (sinus depth typically < 1/3 distance from leaf margin to midvein) *S. viarum*
- 14 Berry < 2 cm in diameter; lower leaf-surface stellate-pubescent.
- 16 Leaves linear-lanceolate, 1-3 cm wide, trichome clusters 0.5 mm broad, with 12 or more rays *S. elaeagnifolium*
- 16 Leaves ovate to elliptic, 2-8 cm wide, often lobed or cleft, trichome clusters 1 mm broad, with 5-10 rays.
- 17 Stellate trichomes of lower leaf surface stipitate, the 6-8 rays essentially equal; corolla 3-4 cm wide, calyx 8-12 mm long *S. dimidiatum*
- 17 Stellate trichomes of lower leaf surface sessile, 2-5 rays, the central one elongate; corolla 2-3 cm wide, calyx 5-7 mm long.
- 18 Leaves entire, margins at most sinuate; plants up to 2 dm in stature; prickles few, absent, and/or confined to midveins; corollas white; [rare plants of Bibb and Chilton counties, AL] [*S. pumilum*]
- 18 Leaves not entire, lobed, cleft, pinnately parted, or divided; plants 3-10 dm in stature; prickles more abundant and generally distributed; corollas purple, rarely white; [plants more widely distributed, weedy or ruderal].
- 19 Leaves pinnately parted or divided, the segments often pinnately lobed; calyx enveloping fruit when ripe, berry red; plant annual *S. sisymbriifolium*
- 19 Leaves irregularly lobed or cleft, the lobes or segments entire; calyx not enveloping fruit when ripe; berry yellowish orange, never red; plant perennial.
- 20 Leaves lobed to near the middle *S. carolinense* var. *floridanum*
- 20 Leaves lobed < 1/2 way to the middle *S. carolinense* var. *carolinense*

Solanum americanum P. Miller. Cp (FL, GA), {}; hammocks, disturbed areas; common. North to e. GA (SC). South to s. FL. [= K, WH3; < *S. americanum* – RAB, F; < *S. nigrum* – C, G, S]

* *Solanum capsicastrum* Link ex Schauer. Reported for NC and SC (Kartesz 1999), but apparently erroneously. [= K]

Solanum capsicoides Allioni, Soda Apple. Cp (FL, SC), Pd* (NC*); disturbed areas; uncommon (rare in NC and SC). [= K, WH3; = *S. aculeatissimum* – RAB, S, misapplied]

Solanum carolinense Linnaeus var. *carolinense*, Horse-nettle, Ball-nettle. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, gardens, disturbed areas; common (uncommon in DE). [= K, WH3; < *S. carolinense* – RAB, C, F, G, Pa, W, WV; = *S. carolinense* – S]

Solanum carolinense Linnaeus var. *floridanum* (Shuttleworth ex Dunal) Chapman. Cp (FL, GA): sandhills, dry hammocks, maritime forests, disturbed areas; uncommon (rare in GA). S. GA to n. peninsular FL. [= K, WH3; < *S. carolinense* – RAB; = *S. floridanum* Shuttleworth ex Dunal – S]

* *Solanum citrullifolium* A. Braun var. *citrullifolium*, Watermelon Nightshade. Disturbed areas; native of {}. Introduced in scattered states, including DE (Kartesz 1999) and Alachua County, FL (Wunderlin & Hansen 2008). [= K; < *S. citrullifolium* – C, F, G, WH3] {not yet keyed}

* *Solanum dimidiatum* Rafinesque. Disturbed areas; native of w. North America. April-June. [= C, K, WH3; = *S. torreyi* A. Gray – RAB, F, G; = *S. perplexum* Small – S]

* *Solanum dulcamara* Linnaeus, Bittersweet, Nightshade. Disturbed areas; native of Europe. May-August. [= RAB, C, Pa, W, WH3, WV; > *S. dulcamara* var. *dulcamara* – F, K]

* *Solanum elaeagnifolium* Cavanilles, Silverleaf Nightshade, White Horse-nettle. Cp (FL, GA, NC, SC), Pd (NC). Mt (GA): disturbed areas; rare, native of sc. North America. June-September. [= C, F, G, K, WH3; = *S. elaeagnifolium* – RAB, S, orthographic error]

* *Solanum lycopersicum* Linnaeus, Tomato. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): persistent and weakly naturalized around gardens, especially where compost or sewage sludge is spread; commonly cultivated, rare as a naturalized species. June-frost. The species is native to the Andes Mountains of nw. South America. *S. lycopersicum* is one of the most important and influential of edible species native of the New World introduced to the Old World, along with two other Solanaceae, the potato (*Solanum tuberosum*) and the chili (*Capsicum annuum*). There appears to be little reason to separate *Lycopersicon* from *Solanum*. [= *Lycopersicon esculentum* – RAB, C, F, G; > *Solanum lycopersicum* Linnaeus var. *cerasiforme* (Dunal) Spooner, J. Anderson, & R.K. Jansen – K; > *Solanum lycopersicum* var. *lycopersicum* – K; = *Lycopersicon lycopersicon* (Linnaeus) Karsten – S; > *Lycopersicon esculentum* var. *cerasiforme* (Dunal) Alefani]

* *Solanum melongena* Linnaeus, Eggplant, Aubergine. Planted in gardens but does not persist. [= F, G, K, S]

* *Solanum nigrescens* Mart. & Gal. Cp (FL): disturbed areas; uncommon. Reported from NC, SC, GA, FL, etc. (Kartesz 1999), but actual status unclear. [= K; *S. chenopodioides* Lamarck – WH3] {not yet keyed}

* *Solanum nigrum* Linnaeus ssp. *nigrum*, European Black Nightshade. Cp (DE), Pd (DE), {FL, GA, NC, SC, VA}: disturbed areas; common (rare elsewhere?), native of Eurasia. May-November. [= K, Z; = *S. nigrum* – RAB, Pa; < *S. nigrum* – C, F, G, S]

* *Solanum pseudocapsicum* Linnaeus, Jerusalem-cherry. Rarely cultivated, perhaps not established; native of Mediterranean Europe. [= K; = *S. pseudo-capsicum* – F, orthographic variant]

Solanum pseudogracile Heiser, Dune Nightshade. Ocean dunes, usually with *Uniola paniculata*, maritime forests. May-October. E. NC south to FL, west to LA. [= K, Z; = *S. gracile* – RAB, S, misapplied]

Solanum ptycanthum Dunal, American Black Nightshade. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (GA, NC, SC, VA): disturbed areas; common. June-December. [= K, W, Z; < *S. americanum* P. Miller – RAB, F, WV, misapplied; < *S. nigrum* – C, G, Pa, S; = *S. ptycanthum*, orthographic variant]

Solanum pumilum Dunal. {GA} . Known from dolomitic Ketona glades in Bibb County, c. AL (Allison & Stevens 2001) and historically in GA (GAHP). [= *Solanum carolinense* Linnaeus var. *hirsutum* (Nuttall) A. Gray – K]

* *Solanum rostratum* Dunal, Buffalo-bur, Kansas-thistle. Cp (GA, NC, SC, VA), Mt (GA, NC, VA, WV), Pd (DE, GA, NC, VA): disturbed areas; uncommon (rare in DE and WV), native of w. North America. [= RAB, C, F, G, K, Pa, W; = *Androcera rostrata* (Dunal) Rydberg – S; ? *S. cornutum* Lamarck, misapplied]

* *Solanum sarrachoides* Sendtner, Hairy Nightshade. Cp (NC, VA), Pd (DE, NC, VA): disturbed areas; uncommon, native of South America. Works by Edmonds and associates have established that *S. sarrachoides* and *S. physalifolium* Rusby are two distinct species, but both are presently known from North America. Mistaken interpretations of Cronquist's 1991 treatment of *Solanum* (e.g. by Kartesz 1999) have given rise to the incorrect belief that only *S. physalifolium* is found in North America. True *S. physalifolium* is present in the western United States, *S. sarrachoides* in the Southeast. [= RAB, C, Z; < *S. physalifolium* Rusby – K; = *S. sarachoides* – F, orthographic error]

* *Solanum sisymbriifolium* Lamarck, Sticky Nightshade. Disturbed areas; native of South America. July-September; September-October. [= RAB, C, F, G, K, S]

* *Solanum torvum* Swartz, Turkey-berry. Disturbed areas; native of West Indies. January-December. Introduced in AL. [= K]

* *Solanum triflorum* Nuttall. Introduced in c. TN. [= C, F, G, K]

* *Solanum tuberosum* Linnaeus, Potato, Irish Potato, White Potato. Commonly cultivated, rarely escaped or spontaneous from thrown-out tubers; native of Andean South America. June-August. [= RAB, C, F, G, K]

* *Solanum viarum* Dunal, Tropical Soda Apple. Pastures; native of South America (s. Brazil, Paraguay, and n. Argentina). This species has only recently appeared in our area, but has been publicized as a severe, extremely aggressive, and rapidly spreading weed (Wunderlin et al. 1993, Mullahey et al. 1993, Mullahey 1996). [= K, WH3]

* *Solanum villosum* P. Miller. Disturbed areas, most or all collections from ballast, probably only a waif; native of the Old World tropics. [= WH3] {not yet keyed}



360. SPHENOCLEACEAE von Martius ex A.P. de Candolle 1839 (Chickenspike Family) [in SOLANALES]

A family of one genus and 2 species, annual herbs, of tropical regions, native of the Old World. References: Rosatti (1986)=Z.

Sphenoclea Gaertner (Chickenspike)

A genus of 2 species, annual herbs, native of the Old World.

* *Sphenoclea zeylanica* Gaertner, Chickenspike. Cp (FL, SC), Pd (GA, NC): rice plantations, reservoirs, other disturbed wetlands; rare, native of Old World tropics. August-October. [= K, S, WH, Z; = *S. zeylandica* – RAB, GW, orthographic error (presumably from a mistaken notion that the epithet refers to New Zealand rather than Ceylon)]

361. HYDROLEACEAE Berchtold & J. Presl 1820 (Hydrolea Family) [in SOLANALES]

A family of one genus and about 12 species, herbs and shrubs of water bodies and wetlands, primarily tropical. The Hydroleaceae is not closely related to Hydrophyllaceae; recent molecular data confirm the view prevailing through most of the 19th century that *Hydrolea* should be placed in its own family. References: Ferguson (1998); Hilger & Diane (2003); Angiosperm Phylogeny Group (1998, 2003, 2009).

Hydrolea Linnaeus 1762

A genus of about 11 species, aquatic and wetland herbs, of tropical and subtropical regions.

- 1 Flowers in axillary cymes; leaves 3-14 cm long, 1.5-4 cm wide; axillary spines present in the axils of some leaves; corolla 7-8 mm long.
 - 2 Calyx and stem sparsely pubescent with spreading hairs 2-3 mm long *H. quadrivalvis*
 - 2 Calyx and stem glabrous, or minutely puberulent or with sessile glands..... *H. uniflora*
- 1 Flowers in terminal cymes or corymbs; leaves 2-6 cm long, 0.6-2.5 cm wide; axillary spines present or absent; corolla 10-15 mm long.
 - 3 Leaves elliptic to lanceolate, 2-3 cm long, 0.6-1.0 cm wide; axillary spines absent or rudimentary..... *H. corymbosa*
 - 3 Leaves ovate to ovate-lanceolate, 3-6 cm long, 1.5-2.5 cm wide; axillary spines present, well-developed, to 1.5 cm long..... *H. ovata*

Hydrolea corymbosa J. Macbride ex Elliott, Skyflower. Cp (FL, GA, SC): pond cypress savannas, depression meadows; uncommon (rare north of FL). Ne. SC south to sw. GA and s. FL. See Nelson (1993). The author is sometimes stated as J.F. Macbride, but this is an error. [= RAB, GW, K, WH; = *Nama corymbosum* (Macbride ex Elliott) Kuntze – S]

Hydrolea ovata Nuttall ex Choisy, Ovate False-fiddleleaf. Cp (FL, GA): swamps, ponds, ditches; rare. June–August. C. GA and Panhandle FL west to TX, north in the interior to sc. TN and MO. [= C, F, G, GW, K, WH; = *Nama ovatum* (Nuttall ex Choisy) Britton – S]

Hydrolea quadrivalvis Walter, Waterpod. Cp (FL, GA, NC, SC, VA), Pd (NC, VA): swamp forests, backwater sloughs, marshes, ditches; common (VA Watch List). June–September. Se. VA south to c. peninsular FL, west to LA. [= RAB, C, F, G, GW, K, WH; = *Nama quadrivalve* (Walter) Kuntze – S]

Hydrolea uniflora Rafinesque. Swamp forests, sloughs, marshes. June–September. Mainly in the Mississippi River Alluvial Plain, west to e. TX and east to AL, TN, and KY. [= C, F, G, GW, K; = *Nama affine* (A. Gray) Kuntze – S; = *Hydrolea affinis* A. Gray]

364. *OLEACEAE* Hoffmansegg & Link 1813 (Olive Family) [in LAMIALES]

A family of about 25 genera and 600-615 species, trees and shrubs, nearly cosmopolitan, but centered in Asia. References: Hardin (1974)=Z; Green in Kadereit (2004).

- 1 Leaves compound.
 - 2 Leaves pinnately compound with > 5 leaflets; petals absent; fruit a samara; small to large tree; [tribe *Oleeae*, subtribe *Fraxininae*] *3. Fraxinus*
 - 2 Leaves trifoliolate; petals 6-10, yellow, conspicuous; fruit a deeply 2-lobed dryish berry; [tribe *Jasmineae*]..... *1. Jasminum*
- 1 Leaves simple.
 - 3 Flowers bright yellow, showy; fruit a many-seeded capsule; [tribe *Forsythieae*]..... *2. Forsythia*
 - 3 Flowers white, lilac, or purplish; fruit a drupe or 4-seeded capsule.
 - 4 Leaves cordate or truncate at the base; fruit a 4-seeded capsule; corolla lobes shorter than the tube; flowers lilac or white, in terminal panicles; [tribe *Oleeae*, subtribe *Ligustrinae*] *4. Syringa*
 - 4 Leaves cuneate to rounded at the base; fruit a drupe; corolla lobes either shorter or longer than the tube; flowers white or greenish-white, in terminal or lateral panicles or fascicles.
 - 5 Corolla absent; calyx minute or lacking; flowers in axillary fascicles; [tribe *Oleeae*, subtribe *Oleinae*] *9. Forestiera*
 - 5 Corolla present (often conspicuous and showy); calyx present; flowers in lateral or terminal panicles or in terminal subumbellate clusters.
 - 6 Corolla lobes 5-12; flowers in terminal subumbellate clusters; [tribe *Jasmineae*]..... *1. Jasminum*
 - 6 Corolla lobes 4; flowers in axillary or terminal panicles or axillary fascicles.
 - 7 Corolla lobes elongate, much longer than the corolla tube; [tribe *Oleeae*, subtribe *Oleinae*]..... *6. Chionanthus*
 - 7 Corolla lobes short, no longer than the corolla tube.
 - 8 Inflorescence a many-flowered terminal panicle; leaves generally ovate, elliptic or lanceolate (widest below or at the middle); [tribe *Oleeae*, subtribe *Ligustrinae*] *5. Ligustrum*
 - 8 Inflorescence a few-flowered axillary panicle or fascicle; leaves generally oblanceolate or obovate (widest above the middle); [tribe *Oleeae*, subtribe *Oleinae*].
 - 9 Leaf margins entire; leaves usually >7 cm long; inflorescence an axillary panicle (with a central axis); [native tree of Coastal Plain forests] *7. Cartrema*
 - 9 Leaf margins on at least some leaves coarsely spinose-serrate; leaves < 10 cm long; inflorescence an axillary fascicle (lacking a central axis); [horticulturally planted, rarely naturalizing] *8. Osmanthus*

1. Jasminum Linnaeus 1753 (Winter Jasmine)

A genus of about 200 species, shrubs and woody vines, of tropical (and rarely temperate) Eurasia. References: Green in Kadereit (2004)

- 1 Leaves simple; flowers white..... *J. multiflorum*
- 1 Leaves trifoliolate; flowers yellow.
 - 2 Leaflets 2.5-7 cm long; flowers 3.5-5 cm across *J. mesnyi*
 - 2 Leaflets 1-3 cm long; flowers ca. 2.5 cm across *J. nudiflorum*

- * *Jasminum mesnyi* Hance, Japanese Jasmine, Primrose Jasmine. Cp (FL, GA?): cultivated and sometimes persistent or spreading from plantings; rare, native of w. China. Reported for GA (Kartesz 1999) and Panhandle FL (Kunzer et al. 2009). [= K, WH]
- * *Jasminum multiflorum* (Burm. f.) Andrews, Star Jasmine. Cp (FL): cultivated and sometimes persistent or spreading; rare, native of India and Pakistan. Naturalized at least as far north as Jacksonville, Duval County, FL (Wunderlin & Hansen 2004). [= K, WH]
- * *Jasminum nudiflorum* Lindley, Winter Jasmine. Cultivated and rarely persistent or spreading; native of China. Reported for GA (K). [= K]

2. *Forsythia* Vahl 1804 (Forsythia, Golden-bells)

A genus of about 7-9 species, shrubs, of e. Asia and se. Europe. References: Hardin (1974)=Z; Green in Kadereit (2004).

- 1 Mature branches hollow or irregularly pith-filled between the nodes; leaves oblong-ovate, toothed or 3-parted; branches arching when well-developed *F. suspensa*
- 1 Mature branches cross-septate (chambered) between the nodes; leaves oblong-lanceolate, toothed; branches upright *F. viridissima*
- * *Forsythia suspensa* (Thunberg) Vahl, Weeping Forsythia. Pd (GA, NC, VA), Mt (VA, WV): waste places, vacant lots, suburban woodlands; commonly planted and persistent, rarely escaped (native of China). February-early May. [= C, G, K, Pa, Z]
- * *Forsythia viridissima* Lindley, Greenstem Forsythia. Pd (GA, NC, VA), Cp (VA), Mt (VA, WV): waste places, vacant lots, suburban woodlands; commonly planted and persistent, rarely escaped (native of China). February-early May. [= C, G, K, Pa, W, Z]

3. *Fraxinus* Linnaeus 1753 (Ash)

A genus of about 43-65 species, trees, mostly north temperate (Asia, North America, Europe). References: Nesom (2010i)=X; Ward (2010a)=X; Hardin & Beckmann (1982)=Z; Miller (1955)=Y; Wallander (2008); Green in Kadereit (2004).

- 1 Leaves minutely honeycombed-reticulate beneath (best seen at magnification of 40-100×), more-or-less strongly whitened (and otherwise variously glabrous or pubescent).
- 2 Samara wings arising near base of the body; [trees of swamps of s. GA and n. FL] *F. pauciflora*
- 2 Samara wings arising near summit of body; [trees of mesic to xeric upland sites, collectively widespread in our area]
- 3 Petiole bases and leaf scars V- to U- or crescent-shaped with a deeply concave or notched apex; samaras (19-) 25-32 (-38) mm long, samara wings 3-5 (-6) mm wide, samara bodies (5-) 6-11 mm long, 1.5-2.5 mm wide; twigs, petioles, petiolules, and rachises glabrous.. *F. americana*
- 3 Petiole bases and leaf scars oblong-ovate to widely obovate with a nearly truncate apex; samaras (32-) 33-54 mm long, samara wings (4.5-) 5-8 mm wide, samara bodies (7-) 10-15 mm long, 2-4 mm wide; twigs, petioles, petiolules, and rachises glabrous or hirtellous to hirtellous-pubescent to tomentulose.
- 4 Twigs, petioles, petiolules, and rachises sparsely to densely hirtellous to hirtellous-pubescent or tomentulose; samaras 33-54 mm long, samara wings 6-8 mm wide, samara bodies (7-) 11-15 mm long, 2-4 mm wide *F. biltmoreana*
- 4 Twigs, petioles, petiolules, and rachises glabrous; samaras (32-) 36-44 mm long, samara wings (4.5-) 5-7 mm wide, samara bodies (9-) 10-13 mm long, 2-3.5 mm wide *F. smallii*
- 1 Leaves not minutely-honeycombed-reticulate beneath (sometimes with papillae and small scales visible at 40×, but these not forming a developed netlike pattern), pale green (and otherwise variously glabrous or pubescent).
- 5 Youngest twigs 4-angled to narrowly 4-winged; petiole bases raised on a distinct pedestal; lateral leaflets sessile to subsessile.
- 6 Samara bodies strongly flattened and often nearly indistinct from wings, wings 5-8 mm wide; buds black to blackish brown; leaf scars shallowly hemispheric, apex truncate; flowers bisexual and unisexual *F. excelsior*
- 6 Samara bodies flattened but clearly distinct from wings, wings 8-10 mm wide; buds gray to reddish brown; leaf scars crescent-shaped, apex concave; flowers bisexual *F. quadrangulata*
- 5 Youngest twigs terete; petiole bases flush with stem; lateral leaflets sessile to subsessile or petiolulate.
- 7 Multi-trunked shrubs or small trees; samara wings 2-3, arising from the base or proximal ¼ of body, (8-) 10-20 mm wide *F. caroliniana*
- 7 Trees; samara wings 2, arising from near the base to near apex of body, (5.5-) 6-10 (-12) mm or 4-7 mm wide.
- 8 Lateral leaflets sessile; samara bodies strongly flattened and often nearly indistinct from wings; buds black to blackish brown, corky-ridged *F. nigra*
- 8 Lateral leaflets petiolulate; samara bodies distinct from wings; buds brownish, not corky-ridged.
- 9 Leaflets mostly (6-) 7.5-11 (-12) cm × 2.5-5(-6) cm, bases obtuse to acute or abruptly attenuate; samaras 20-45 (-60) mm; samara bodies thickened but not plump, distinctly longitudinally channeled, (12-) 15-22 mm long, 1-2 mm wide, tan (similar to wings) to darker brown or rarely reddish-brown; samara wings 4-7 (-8) mm wide arising abruptly from the upper part of the body, only 20-25% (-50%) of the length of the body winged; fruiting calyx 1-1.5 mm long *F. pennsylvanica*
- 9 Leaflets (7-) 9-15 (-25) cm × (2.5-) 3.5-7 (-11) cm, bases often rounded, less commonly obtuse to acute or acuminate; samaras (35-) 40-70 (-75) mm; samara bodies plump, narrowly ridged but not distinctly channeled, (16-) 18-30 mm long, 3-4.5 mm wide, dark brown to reddish brown; samara wings (5.5-) 6-10 (-12) mm wide, gradually expanded from near the base of the body, (33-) 50-100% of the length of the body winged; fruiting calyx (1-) 4-7 mm long *F. profunda*

Fraxinus americana Linnaeus, White Ash, American Ash. Mesic slopes, rich cove forests, dry calcareous or mafic glades and woodlands (with *Juniperus virginiana* var. *virginiana* and *Carya glabra*). April-May; August-October. NS west to MN,

south to n. peninsular FL and TX. A valuable timber tree. [= S, Y; < *F. americana* – C, K1, W, WH, X, Z; < *F. americana* Linnaeus var. *americana* – RAB, G, Pa, WV; < *F. americana* var. *americana* – F; > *F. americana* var. *microcarpa* A. Gray – F]

* *Fraxinus berlandierana* DC., Mexican Ash. This species, native of sc. OK south to s. TX, has been reported as naturalized in s. MS and e. LA (Kartesz 2010), but these records are discounted as being based on cultivated individuals (Nesom 2010h). [= K1] {excluded; not keyed or mapped}

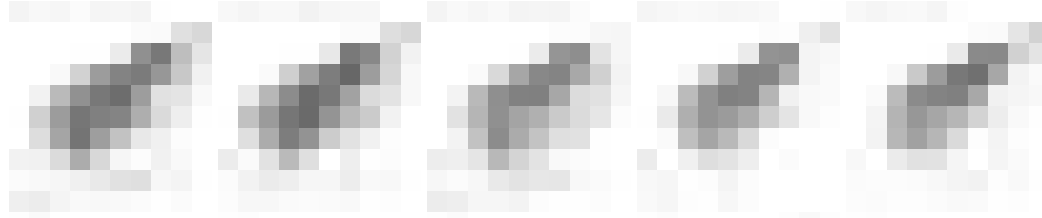
Fraxinus biltmoreana Beadle, Biltmore Ash, Biltmore White Ash. Mesic slopes, rich cove forests, dry calcareous or mafic glades and woodlands (with *Juniperus virginiana* var. *virginiana* and *Carya glabra*). April-May; August-October. NJ, OH, and IL south to c. GA, c. AL, c. MS, and LA. This controversial taxon has been recently clarified by Nesom (2010), though much additional information is needed to fully establish its distribution, ecology, and evolutionary origins. It is hexaploid. [= S, Y; < *F. americana* – C, K1, W, WH, Z; = *F. americana* Linnaeus var. *biltmoreana* (Beadle) J. Wright ex Fernald – RAB, F, G, Pa, WV] {add data}

Fraxinus caroliniana P. Miller, Water Ash, Pop Ash, Carolina Ash. Deeply to shallowly flooded swamps. May; July-October. Se. VA south to s. FL, west to TX, primarily on the Coastal Plain. A small tree, sometimes very abundant (and nearly the only subcanopy species) as the understory in *Taxodium-Nyssa* swamps. [= RAB, C, G, GW, K1, Y, Z; = *F. caroliniana* var. *caroliniana* – X; > *F. caroliniana* var. *caroliniana* – F; > *F. caroliniana* var. *oblanceolata* (M.A. Curtis) Fernald & Schubert – F; > *F. caroliniana* var. *cubensis* (Grisebach) Lingelsheim – F, misapplied; = *F. caroliniana* – S; < *F. caroliniana* – WH3]

Fraxinus cubensis Grisebach, Cuban Water Ash, approaches our area from the south (it is extensively distributed in peninsular FL), but is not known from the Flora area. [= *F. caroliniana* var. *cubensis* (Grisebach) Lingelsh. – X; < *F. caroliniana* – WH3] {excluded; not keyed or mapped}

* *Fraxinus excelsior* Linnaeus, European Ash. Disturbed areas; native of Europe. Naturalized in ne. US, south to KY and s. NJ. [= K2]

Fraxinus nigra Marshall, Black Ash. Mt (VA, WV), Pd (DE, VA), Cp (DE): seepage swamps and mountain streambanks; rare. April-May; August-October. NL (Newfoundland) and QC west to MB, south to DE, VA, IN, and IA. [= C, F, G, K1, Pa, W, WV, Y, Z]



Fraxinus pauciflora Nuttall, Swamp White Ash. Deep swamps. S. GA south to n. peninsular FL. [= S; < *F. caroliniana* – WH3; = *F. caroliniana* var. *pauciflora* (Nuttall) D.B. Ward – X] {add data}

Fraxinus pennsylvanica Marshall, Green Ash, Red Ash. Bottomlands and swamps, especially along brownwater rivers and streams. April-May; August-October. NS west to AB, south to FL and TX. Variation in this species (see synonymy) needs further study. [= C, GW, K1, Pa, W, X, Z; > *F. pennsylvanica* var. *subintegerrima* (Vahl) Fernald – RAB, F, G, WV; > *F. pennsylvanica* var. *pennsylvanica* – RAB, F, G, WV; > *F. pennsylvanica* var. *austinii* Fernald – F; > *F. darlingtonii* Britton – S; > *F. pennsylvanica* – S; < *F. pennsylvanica* – WH3; ? *F. pennsylvanica* ssp. *pennsylvanica* – Y]

Fraxinus profunda (Bush) Bush, Pumpkin Ash. Swamps, especially along blackwater rivers and streams and in freshwater tidal wetlands (as along the James, Pamunkey, Mattaponi, and Rappahannock rivers in e. VA), also in brownwater bottomlands; common (rare in Piedmont and Mountains). April-May; August-October. S. NJ south to n. FL, west to LA, mostly on the Coastal Plain, north in the interior to w. NC, sc. TN, e. AR, se. MO, s. IL, IN, OH, sc. MI, ne. PA, and w. NY. This species has a peculiar distribution; see McCormac, Bissell, & Stine (1995) and Nesom (2010) for additional discussion. The nomenclature has been controversial, but is now resolved. There is also some question as to its taxonomic recognition; it may be an allopolyploid derivative of *F. pennsylvanica*, perhaps from multiple origins. [= C, GW, K1, Pa, W, X, Z; = *F. tomentosa* Michaux f. – RAB, F, G, Y; > *F. profunda* – S; > *F. michauxii* Britton – S; < *F. pennsylvanica* – WH3]

Fraxinus quadrangulata Michaux, Blue Ash. Mesic to dry calcareous woodlands and forests. April; July-October. S. ON west to s. MI and e. KS, south to sw. VA, e. TN, nw. GA, n. AL, and OK. [= C, F, G, K1, S, WV, Y, Z]

Fraxinus smallii Britton, Small's White Ash. [= S; < *F. americana* – C, K1, W, X, Z; < *F. americana* Linnaeus var. *americana* – RAB, G, WV; < *F. americana* var. *americana* – F, Pa; < *F. pennsylvanica* – WH3] {add data}



4. *Syringa* Linnaeus 1753 (Lilac)

A genus of about 20-23 species, shrubs, from s. Europe to se. Asia. References: Hardin (1974)=Z; Green in Kadereit (2004).

* *Syringa vulgaris* Linnaeus, Lilac. Mt (NC, VA, WV): commonly planted, persistent and naturalizing around old farms; rare, native of se. Europe. April-May. [= C, F, G, K, Pa, Z]

5. *Ligustrum* Linnaeus 1753 (Privet)
[contributed by Guy L. Nesom and Alan S. Weakley]

A genus of about 40 species, shrubs and trees, of the Old World. References: Nesom (2009a)=Y; Hardin (1974)=Z; Green in Kadereit (2004). The key is based on Nesom (2009a) and Hardin (1974).

- 1 Leaves (3-) 4-13 (-15) cm long.
 - 2 Leaves mostly (3-) 4-8 (-9) cm long, primary lateral veins 3-5 pairs, apex acute to abruptly acuminate, abaxial midvein covered by epidermis; flowers short-pedicellate on pedicels 0.5-2 mm; corolla tube hardly exerted from calyx, ca. equal lobe length.....*L. japonicum*
 - 2 Leaves (4.5-) 6-13 (-15) cm, primary lateral veins (5-) 6-8 pairs, apex usually long-acuminate, abaxial midvein not covered by epidermis; flowers subsessile on pedicels 0-0.5 mm; corolla tube distinctly exerted from calyx, ca. 2× longer than lobes.....*L. lucidum*
- 1 Leaves 1.5-6 (-6.5) cm long.
 - 3 Branchlets glabrous and usually glossy.....*L. ovalifolium*
 - 3 Branchlets minutely hirtellous, hirsute-hirtellous, or hirsutulous, dull.
 - 4 Leaf blades hirsutulous abaxially, rarely only along the nerves, sparsely hirsute-strigose adaxially, sometimes mostly near the margins, primary lateral veins (5-) 6-8 pairs, apices sharply acute (to slightly acuminate, or rarely obtuse).....*L. tschonoskii*
 - 4 Leaf blades glabrous on both surfaces or sometimes sparsely hairy along the abaxial midvein, primary lateral veins (2-) 3-6 pairs, apices obtuse to acute (in *L. vulgare*) or obtuse to rounded.
 - 5 Leaf blades narrowly oblong-elliptic to oblanceolate-elliptic, oblanceolate or narrowly obovate, usually broadest slightly above the middle; inflorescence usually narrowly cylindrical, flowers sessile to subsessile in verticil-like clusters.....*L. quihoui*
 - 5 Leaf blades variously shaped; inflorescence broadly cylindrical to pyramidal, flowers sessile to pedicellate in broadly cylindrical to pyramidal panicles of cymes.
 - 6 Corolla tube 1.5-3× longer than the lobes.
 - 7 Leaf blades usually sparsely villous abaxially; calyx and pedicels sparsely to densely hirtellous (rarely nearly glabrous); corolla tube 2-3× as long as the lobes.....*L. obtusifolium* var. *obtusifolium*
 - 7 Leaf blades usually glabrous abaxially; calyx and pedicels glabrous to very sparsely hirtellous; corolla tube 1.5-2× as long as the lobes.....*L. obtusifolium* var. *suave*
 - 6 Corolla tube < 1.2× as long as the lobes.
 - 8 Leaves ovate-elliptic to oblong-ovate, elliptic-lanceolate, or suborbicular, primary lateral veins (3-) 4-5 pairs, apex obtuse to rounded or retuse, abaxial midvein usually sparsely hirsutulous to puberulent; inflorescence diffuse and open panicles terminal and on essentially leafless, lateral branches interspersed with leafy ones; branchlets hirtellous to loosely substrigose with straight hairs of uneven length; corolla tube slightly shorter than lobes, often barely exerted from the calyx tube; pedicels glabrous.....*L. sinense*
 - 8 Leaves elliptic-lanceolate to elliptic-ovate, primary lateral veins 4-6 pairs, apex obtuse to acute, abaxial midvein usually glabrous or with a few scattered hairs; inflorescence mostly a compact, terminal panicle; branchlets evenly and minutely hirtellous to hirsutulous with relatively even-length hairs; corolla tube equal the lobes or slightly shorter, distinctly exerted from the calyx tube; pedicels hirtellous.....*L. vulgare*

* *Ligustrum japonicum* Thunberg, Japanese Privet. Cp (FL, GA, NC, SC, VA), Pd (NC, VA): disturbed places; rare, native of Japan and Korea. April-June. [= RAB, K, WH, Y, Z]

* *Ligustrum lucidum* Aiton f., Glossy Privet, Broadleaf Privet. Pd (NC), Cp (FL, NC): disturbed places; rare, native of China, Japan, and Korea. This species is superficially similar to *L. japonicum*; the lateral leaf veins are translucent in this species. [= K, S, WH, Y, Z]

* *Ligustrum obtusifolium* Siebold & Zuccarini var. *obtusifolium*. Cp (NC, VA), Pd (NC, VA), Mt (VA, WV), {SC}: disturbed places; uncommon (rare in WV), native of Japan. [= Y; = *L. obtusifolium* - C, F, G, K, Pa, Z]

* *Ligustrum obtusifolium* Siebold & Zuccarini var. *suave* (Kitagawa) H. Hara, Amur Privet. Cp, Pd (NC, VA), Mt (VA), {SC}: disturbed places; uncommon, native of Japan. [= Y; = *L. amurense* Carrière - RAB, C, F, G, K, Pa, Z; = *Ligustrum obtusifolium* Siebold & Zuccarini var. *amurense* (Carrière) Mansfeld]

* *Ligustrum ovalifolium* Hasskarl, California Privet. Cp (FL, NC, VA), Pd (NC, VA), Mt (WV): disturbed places; rare, native of Japan. April-July. [= RAB, C, F, G, K, Pa, S, WH, Y, Z]

* *Ligustrum quihoui* Carrière, Waxy-leaf Privet. Cp (FL, NC, VA): disturbed places; rare, native of China. May-July. Though seemingly established only rarely in our area, this species has the potential to become another noxious "shrub weed". [= K, WH, Y, Z]

* *Ligustrum sinense* Loureiro, Chinese Privet. Moist forests, especially alluvial bottomlands; native of China. This species is one of the most noxious of all our weeds, choking out native vegetation. The rapidity with which it has engulfed southern wetlands is hinted at by Small's (1933) mention of it only as "an escape in southern Louisiana". [= RAB, C, G, GW, K, S, W, WH, Y, Z]

* *Ligustrum tschonoskii* Decaisne. Pd (DC): suburban forests; rare, native of Japan. Known in the flora area "only from the woods along the bank of Rock Creek in Rock Creek Park" (Nesom 2009a; Shetler and Orli 2000). Two varieties within *L. tschonoskii* were recognized by Noshiro (1985), distinguished by slight and overlapping size differences. Var. *tschonoskii* is restricted in native range to Japan; var. *kiyozumianum* (Nakai) Ohwi occurs in Japan and Korea. [= Y]

* *Ligustrum vulgare* Linnaeus, Common Privet. Mt (WV), Pd (NC, VA), Cp (NC, VA): disturbed places; common (rare in NC and VA), native of Europe and n. Africa. (May-) June-July. [= C, F, G, K, Pa, S, WV, Y, Z]



6. *Chionanthus* Linnaeus 1753 (Fringe-tree, Old Man's Beard)

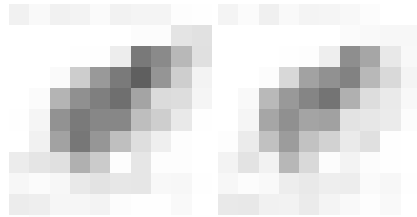
A genus of controversial circumscription, either of only 3 species, limited to se. North America and e. Asia, or (if including *Linociera*) of about 60, shrubs and trees, primarily tropical. *C. pygmaeus* Small is endemic to scrub in peninsular FL. References: Hardin (1974)=Z.

Chionanthus virginicus Linnaeus, Fringe-tree, Old Man's Beard. Dry, mesic, or wet forests and woodlands, granitic flatrocks and domes, glades and barrens over various rocks (including granite, greenstone, etc.), swamp forests in the Coastal Plain, rarely pocosins. April-May; July-September. NJ, s. PA, s. OH, and MO south to c. peninsular FL and e. TX. *C. virginicus* in our area shows a diversity of morphology and correlated habitat that suggests the possible presence of two taxa. Swamp- and pocosin-inhabiting populations in the outer Coastal Plain have leaves 4-8× as long as wide and seem very different than Piedmont dry woodland populations with leaves 1-2× as long as wide; further and more careful study is needed. *C. virginicus* is a traditional southern yard plant, often used as a "specimen plant," very showy in spring, particularly when grown to its full size. [= RAB, C, F, G, GW, K, Pa, S, W, WH, Z]

7. *Cartrema* Rafinesque (Wild Olive, Devilwood)

A genus of 5-6 species, trees, of se. Asia and North America. References: Weakley et al. (2011); Guo et al. (2011).

Cartrema americana (Linnaeus) Rafinesque, Wild Olive, Devilwood. Maritime forests and (in FL, GA, SC, and extreme s. NC) hammocks and other dry, sandy forests well inland, and reported for wet habitats as well farther south. April-May; August-October. Se. VA south to c. peninsular FL, west to LA; also in Mexico. *C. megacarpa* (Small) Weakley, sometimes treated as a variety (in the genus *Osmanthus*), *Osmanthus americanus* var. *megacarpus* (Small) P.S. Greene, is endemic to pine scrub in peninsular FL and differs primarily in having a larger fruit. The very hard, tough, and "unsplittable" wood is the inspiration for the common name "Devilwood." *C. americana* is a conspicuous element of maritime forests in most of our area, readily recognizable by the flattened twigs characteristic of the family, and the opposite (or typically, actually subopposite), glossy, oblanceolate to obovate, evergreen leaves. [= *Osmanthus americanus* (Linnaeus) Bentham & Hooker f. – RAB, F, G, WH, WH3; = *Osmanthus americanus* var. *americanus* – C, K, Z; = *Osmanthus americana* – GW (orthographic variant); = *Amarolea americana* (Linnaeus) Small – S]



8. *Osmanthus* Loureiro 1790 (Wild Olive, Devilwood)

A genus of about 10-25 species, shrubs and trees, of se. Asia (most species) and se. North America. References: Hardin (1974)=Z; Guo et al. (2011); Green in Kadereit (2004).

- 1 Leaf margins entire; leaves usually >7 cm long; inflorescence an axillary panicle (with a central axis); [native tree of Coastal Plain forests] [Cartrema]
- 1 Leaf margins on at least some leaves lobed, the lobes tipped by spines; leaves < 10 cm long; inflorescence an axillary fascicle (lacking a central axis); [horticulturally planted, rarely naturalizing].
 - 2 Leaves on a plant often a mixture of lobed and unlobed, the lobed leaves with sinuses extending < ½ to the midrib *O. ×fortunei*
 - 2 Leaves always lobed, the leaf sinuses extending ca. ½ the way to the midrib *O. heterophylla*

* *Osmanthus ×fortunei* Carrière [= *O. fragrans* × *heterophyllus*], Fortune's Sweet Olive, Fortune's Osmanthus. Pd (NC): suburban woodlands, escaped from horticultural plantings; rare, hybrid originating in Japan of two species native to Japan.

* *Osmanthus heterophyllus* D. Don, Holly Osmanthus. Pd (NC): suburban woodlands; rare, native of Japan. Naturalizing in Guilford County, NC (W. Cook, pers. comm. 2010).

9. *Forestiera* Poiret 1812 (Forestiera)

A genus of about 15-20 species, shrubs, of sw. and se. North America, Central America, and the West Indies. References: Anderson (1985)=Y; Godfrey (1988)=X; Hardin (1974)=Z; Johnston (1957)=Q; Green in Kadereit (2004).

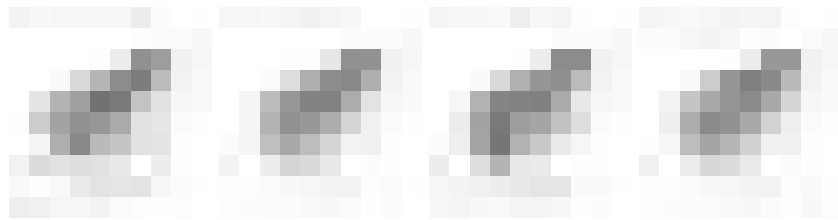
- 1 Leaves (6-) 7-8 (-9) cm long, long-acuminate or acuminate (rarely acute) at the apex, the tip sharply pointed; [of swamp forests, sloughs, and ponds].....*F. acuminata*
- 1 Leaves 1.5-7 (-8) cm long, obtuse at the apex, or if short-acuminate the ultimate tip blunt; [of shell middens and calcareous bluffs].
 - 2 Leaves evergreen, glabrous above, glabrous and punctate below; leaf margins entire*F. segregata* var. *segregata*
 - 2 Leaves deciduous, at least sparsely pubescent on the midrib above, pubescent and non-punctate below; leaf margins serrulate.
 - 3 First-year twigs pubescent, the pubescence evenly distributed (not in 2 lines); petioles moderately pubescent; flowering in early spring from buds on twigs of the previous season; leaves 5-7 (-8) cm long.....*F. godfreyi*
 - 3 First-year twigs pubescent, the pubescence in 2 lines on either side of the twig; petioles glabrous (or with a very few hairs; flowering in mid-late summer, the flowers in leaf axils; leaves mostly 2-5 cm long.....*F. ligustrina*

Forestiera acuminata (Michaux) Poiret, Swamp-privet. Swamp forests, especially over calcareous substrates. March; May-June. SC south to n. FL, west to TX, north in the interior to KY, e. and c. TN, IN, IL, MO, and KS. [= RAB, C, F, G, GW, K, S, Q, WH, X, Y, Z]

Forestiera godfreyi L.C. Anderson, Godfrey's Forestiera. Shell middens, maritime forests over shell substrate. Mid January-February; April-May. Se. SC (Beaufort and Charleston counties) to e. GA and n. peninsular and e. Panhandle FL. [= K, WH, X, Y; < *F. pubescens* Nuttall - S, in part (apparently)]

Forestiera ligustrina (Michaux) Poiret, Southern-privet. Upland forests and slopes along streams, mostly on shell middens or calcareous rocks. E. SC south to n. peninsular FL, west to se. TX, north in the interior to c. TN and KY. [= K, S, Q, X, Z]

Forestiera segregata (Jacquin) Krug & Urban var. *segregata*, Florida-privet. Calcareous scrub, shell middens, maritime forests and thickets. Se. SC south to s. FL, and in the West Indies. Var. *pinetorum* (Small) M.C. Johnston is restricted to s. FL. [= K, Q, Z; > *F. porulosa* (Michaux) Poiret - S; > *F. globularis* Small - S; < *F. segregata* - WH, X]



365. TETRACHONDRACEAE Wettstein 1924 (Tetrachondra Family) [in LAMIALES]

A family of 2 genera, *Polyprenum* and *Tetrachondra* (Oxelman et al. 1999), and 3 species, perennial herbs, of s. North America south to South America, and New Zealand. The assignment of *Polyprenum* to family has been controversial, with placement formerly in Loganiaceae or Buddleiaceae. A recent molecular analysis strongly suggests that its closest relationship is with *Tetrachondra* (Oxelman et al. 1999), and the treatment followed here reflects the current general consensus. References: Oxelman et al. (1999); Wagstaff in Kadereit (2004).

Polyprenum Linnaeus 1753 (Polyprenum)

The genus is monotypic, an herb, of warm temperate, subtropical and tropical America. References: Rogers (1986)=Z; Wagstaff in Kadereit (2004).

Polyprenum procumbens Linnaeus, Polyprenum, Rustweed, Juniperleaf. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): fields, disturbed areas; common, rare in Mountains. Late May-September; August-October. Se. NY, NJ, and MO south to FL and TX, and south into Central America, South America, and the West Indies. [= RAB, C, F, G, GW, K, S, W, Z]



368. **PLANTAGINACEAE** A.L. de Jussieu 1789 (Plantain Family) [in LAMIALES]

As radically recircumscribed, a family of about 120 genera and 1800 species. References: Albach, Meudt, & Oxelman (2005); Olmstead et al. (2001); Schwarzbach in Kadereit (2004); Fischer in Kadereit (2004).

- 1 Leaves alternate, at least those on the upper stem; calyx 5-merous; stamens 4.
 - 2 Corolla lacking a spur or pouch at the base.
 - 3 Stem erect; flowers > 10 mm long; [tribe *Digitaleae*].....*Digitalis*
 - 3 Stems prostrate; flowers < 5 mm long; [tribe *Limoselleae*].....*Limosella*
 - 2 Corolla with a distinct spur or broad pouch protruding between the 2 lower calyx lobes; [tribe *Antirrhineae*].
 - 4 Corolla with a broad pouch at the base.
 - 5 Calyx lobes about equal, all shorter than the corolla tube; corolla 25-40 mm long; leaves to 15 mm wide*Antirrhinum*
 - 5 Calyx lobes distinctly unequal, all longer than the corolla tube; corolla 10-13 mm long; leaves to 5 mm wide*Misopates*
 - 4 Corolla with a slender spur at the base.
 - 6 Flowers in terminal racemes.
 - 7 Corolla yellow; capsule 9-12 mm long.....*Linaria*
 - 7 Corolla blue; capsule 2-3 mm long*Nuttallanthus*
 - 6 Flowers solitary in leaf axils.
 - 8 Stems erect; leaves linear*Chaenorhinum*
 - 8 Stems prostrate; leaves orbicular, ovate, or triangular.
 - 9 Leaves orbicular in outline, palmately lobed and veined; stems rooting at nodes*Cymbalaria*
 - 9 Leaves ovate or triangular, pinnately veined; stems not rooting*Kickxia*
 - 1 Leaves either strictly basal, or opposite or whorled throughout; calyx 0-, 4-, or 5-merous; stamens 1, 2, or 4.
 - 10 Leaves strongly basally disposed, usually all the leaves basal; petals 4, scarious and translucent in texture; inflorescence a spike; [tribe *Plantagineae*].....*Plantago*
 - 10 Leaves cauline, either opposite or whorled; petal 0, or 4, or 5; inflorescence various.
 - 11 Leaves whorled.
 - 12 Aquatic; leaves 5-30 mm long, lanceolate, toothed to deeply dissected into linear segments; [tribe *Gratioloae*]*Limnophila*
 - 12 Terrestrial; leaves 40-15 cm long, lanceolate or elliptic, toothed; [tribe *Veroniceae*].....*Veronicastrum*
 - 11 Leaves opposite.
 - 13 Petals 0; sepals 0, stamens 1; leaves both < 2 cm long and entire; [tribe *Callitricheae*]*Callitriche*
 - 13 Petals 4 or 5; sepals 4 or 5; stamens 2 or 4; leaves > 2 cm long, or serrate, or both.
 - 14 Calyx and corolla 4-merous.
 - 15 Leaves punctate; stamens 4; [tribe *Gratioloae*].....*Scoparia*
 - 15 Leaves not punctate; stamens 2; [tribe *Veroniceae*].....*Veronica*
 - 14 Calyx and corolla 5-merous.
 - 16 Plants erect, moderately robust, usually > 4 dm tall, larger leaves > 5 cm long; inflorescences terminal (the bracts subtending flowers strongly reduced in size in comparison to main leaves of the stem); [tribe *Cheloneae*].
 - 17 Inflorescence compact, the inflorescence axis generally hidden by the closely packed and overlapping flowers; each flower subtended by large overlapping bracts*Chelone*
 - 17 Inflorescence more diffuse, the inflorescence axis readily visible between the flowers; flowers lacking extra subtending bracts.....*Penstemon*
 - 16 Plants creeping, decumbent or erect, small, usually < 4 dm tall (except *Mecardonia*, to 5 dm tall), larger leaves < 5 cm long; inflorescences axillary (all or most of the flowers axillary to more-or-less normally sized leaves).
 - 18 Stamens 2; [section *Gratioloae*].
 - 19 Capsule flattened, wider than long, notched; leaves dimorphic, with narrow submersed leaves on the lower stems, and broad floating leaves just subtending the aerial inflorescences; [of vernal pools on granite outcrops in Piedmont SC, GA, and AL].....*Gratiola amphiantha*
 - 19 Capsule turgid, longer than wide; leaves monomorphic; [collectively of many habitats and widespread].
 - 20 Flowers and fruits on definite pedicels; annual or perennial; leaves not papillose*Gratiola*
 - 20 Flowers and fruits sessile or subsessile, the pedicels < 1 mm long; perennial; leaves papillose on the surfaces and margins.....*Sophranthe*
- 18 Stamens 4.
 - 21 Sepals evidently connate into a tube about as long as the lobes; [section *Cheloneae*]*Collinsia*
 - 21 Sepals distinct or very nearly so.
 - 22 Leaves deeply pinnatifid; [tribe *Stemodieae*].....*Leucospora*
 - 22 Leaves entire or toothed; [tribe *Gratioloae*].
 - 23 Corolla nearly radially symmetrical; corolla lobes about as long as the corolla tube; leaves palmately veined, with parallel veins diverging from the base, margins entire to crenulate; of aquatic to moist habitats, often somewhat succulent.....*Bacopa*

- 23 Corolla distinctly bilabiate; corolla lobes shorter than the corolla lobe; leaves pinnately veined, with a single main-vein and lateral veins diverging along it, margins serrate; of moist habitats, not succulent.....*Mecardonia*

Antirrhinum Linnaeus 1753 (Snapdragon)

A genus of about 20 species, herbs, of Mediterranean Europe. References: Sutton (1988)=Z; Pennell (1935)=P. [also see *Misopates*]

* *Antirrhinum majus* Linnaeus, Common Snapdragon. Cultivated, rarely persistent or naturalized; native of Mediterranean Europe. June-October. [= C, G, K, P, Pa, WV, Z]



Bacopa Aublet 1775 (Water-hyssop)

A genus of about 50 species, herbs (mostly aquatic or at least wetland), of tropical, subtropical, and warm temperate regions of the Old and New Worlds. References: Schuyler (1989)=Z; Fernald (1942); Pennell (1935)=P.

- 1 Leaves obovate to oblanceolate, cuneate at the base, 1-veined (or with 1-2 additional obscure veins), 3-8 mm wide; stems glabrous; fresh plants not aromatic.....*B. monnieri*
- 1 Leaves mostly orbicular to ovate (or sometimes obovate in the very rare *B. repens*), rounded to clasping at the base, 3-9-veined; stems pubescent or puberulent, at least when young (check at growing tips) or glabrous (in tidal forms of *B. innominata*); fresh plants aromatic or not.
 - 2 Fresh plants strongly aromatic when bruised; corolla pale to bright blue, 9-13 mm long; calyx subtended by 2 subulate bractlets; stamens 4*B. caroliniana*
 - 2 Fresh plants not aromatic when bruised; corolla predominantly white (in some species slightly pink or marked with yellow), 2-10 mm long; calyx not subtended by bractlets; stamens 2 or 4.
 - 3 Corolla 4-10 mm long, white with a yellow throat; capsule ca. 5 mm long*B. rotundifolia*
 - 3 Corolla 2-5 mm long, white or pink, without a yellow throat; capsule 2-3 mm long.
 - 4 Leaves strongly clasping, mostly ovate; stamens 2 (or very rarely 4); [native]*B. innominata*
 - 4 Leaves only slightly clasping, mostly obovate; stamens 4; [a very rare introduction]*B. repens*

Bacopa caroliniana (Walter) B.L. Robinson, Blue Water-hyssop, Sweet Water-hyssop, Carolina Water-hyssop, Lemon Bacopa. Wet shores, tidal muds, marshes. May-September. Se. VA south to s. FL, west to e. TX; disjunct in KY. The strongly fragrant stems and leaves are unique. [= RAB, C, F, G, GW, K, W, WH; = *Hydrotrida caroliniana* (Walter) Small - P, S]

Bacopa innominata (Gómez Maza) A.H. Liogier, Tropical Water-hyssop. Freshwater tidal muds, marshes, shallow water. June-September. MD south to s. FL, and in the West Indies and Central America. *B. stragula* Fernald has been considered a rare endemic of tidal areas in VA and MD, differing from *B. innominata* in its glabrous stems (vs. pubescent), smaller flowers (the corolla < 3 mm long vs. > 3 mm long), and shorter, glabrous pedicels 3-6 mm long (vs. pubescent and to 8 mm long). Schuyler (1989) concluded that *B. stragula* is an intertidal form of *B. innominata*, the morphologic differences induced by the flooding regime. Additional work, perhaps involving growth under experimental conditions or chemical or molecular studies, is needed to corroborate Schuyler's conclusion. See Schuyler (1989), F, and Fernald (1942) for further discussion. [= C, GW, K, WH, Z; > *B. cyclophylla* Fernald - RAB; > *B. stragula* Fernald - F, G; ? *Herpestis rotundifolia* Gaertner f. - P, S; ? *Macuillamia obovata* Rafinesque - P]

Bacopa monnieri (Linnaeus) Wettstein, Monnier's Water-hyssop. Freshwater tidal marshes, muddy shores, streams and pools. E. VA south to s. FL, west to c. TX, and in the West Indies and the New World subtropics and tropics. [= RAB, C, F, G, GW, K, WH; = *Bramia monnieri* (Linnaeus) Drake - P, S]

* *Bacopa repens* (Swartz) Wettstein, South American Water-hyssop. Freshwater pools; presumably native of the New World tropics. [= RAB, GW, K; = *Macuillamia repens* (Swartz) Pennell - P, S]

Bacopa rotundifolia (Michaux) Wettstein, Midwestern Water-hyssop. Tidal muds, shallow water of large natural lake. June-September. IN and IA west to ND and MT, south to AL and AZ; disjunct in e. MD, e. VA, and ne. NC, where apparently native (though C considers introduced). Known in NC only from Lake Mattamuskeet, Hyde County, where not seen since 1929. *B. simulans* Fernald has been considered a rare endemic of tidal areas in VA and MD. It is alleged to differ from *B. rotundifolia* in its glabrous to glabrescent stems (vs. pubescent), more succulent condition, smaller leaves (the larger 1-2 cm long and 0.6-1.5 cm wide vs. 2-3.5 cm long and 1.5-2.7 cm wide), smaller flowers (corolla 3-4 mm long vs. 6-10 mm long). Schuyler (1989) concluded that *B. simulans* is an intertidal form of *B. rotundifolia*, the morphologic differences the result of differences in inundation. Additional work, perhaps involving growth under experimental conditions or chemical or molecular studies, is needed to corroborate Schuyler's conclusion. See Schuyler (1989), F, and Fernald (1942) for further discussion. [= C, GW, K, Z; > *B. rotundifolia* - F, G; > *B. simulans* Fernald - F, G; = *Macuillamia rotundifolia* (Michaux) Rafinesque - P, S]



Callitriche Linnaeus 1753 (Water-starwort)

A genus of 20-50 species, annual and perennial herbs of aquatic, wetland, and upland habitats, nearly cosmopolitan. This genus should be included in a greatly expanded Plantaginaceae. References: Lansdown (2009)=X; Crow & Hellquist (2000)=Z; Fassett (1951)=Y; Angiosperm Phylogeny Group (2003, 2009); Erbar & Leins in Kadereit (2004). Key based on Z.

- 1 Flowers and young fruits with 2 inflated bracteoles at the base; leaves dimorphic (with floating rosettes of spatulate leaves and submersed linear leaves) or monomorphic.
 - 2 Fruit margin distinctly winged, the wing nearly 0.1 mm wide, extending the entire distance from the summit to the base of the fruit; fruit globose *C. stagnalis*
 - 2 Fruit margin either not winged or with a wing < 0.05 mm wide, narrowing toward the base of the fruit before ending above the base; fruit ellipsoidal, obovoid, or nearly heart-shaped.
 - 3 Fruit as wide as long, obovoid or nearly heart-shaped *C. heterophylla* var. *heterophylla*
 - 3 Fruit longer than wide by > 0.2 mm, ellipsoidal *C. palustris*
- 1 Flowers and young fruits lacking bracts at their base; leaves monomorphic, obovate-spatulate, rounded at the tip.
 - 4 Mericarps bent at an angle and thickened on one side at the base; [of SC southward] *C. peploides*
 - 4 Mericarps not bent at an angle nor thickened at the base; [collectively widespread].
 - 5 Fruit on pedicels 0.5-7 mm long; margin of fruit curled over on itself, appearing thickened; fruit developing underground *C. nuttallii*
 - 5 Fruit on pedicels 0.1-0.6 mm long; margin of fruit narrow, thin; fruit developing aboveground *C. terrestris*

Callitriche heterophylla Pursh var. *heterophylla*, Common Water-starwort. Pools, slow-moving streams, ditches. March-October. Greenland west to AK, south to c. peninsular FL, TX, CA, and Mexico. The other variety, var. *bolanderi* (Hegelmann) Fassett, with larger fruits, co-occurs with var. *heterophylla* in nw. North America and is of uncertain taxonomic status, having been treated as species, subspecies, variety, and lumped. [= X; < *C. heterophylla* – RAB, C, G, GW, Pa, S, W, WH, Z; > *C. heterophylla* – F; > *C. anceps* Fernald – F, Y; = *C. heterophylla* ssp. *heterophylla* – K; > *C. heterophylla* var. *heterophylla* – Y]

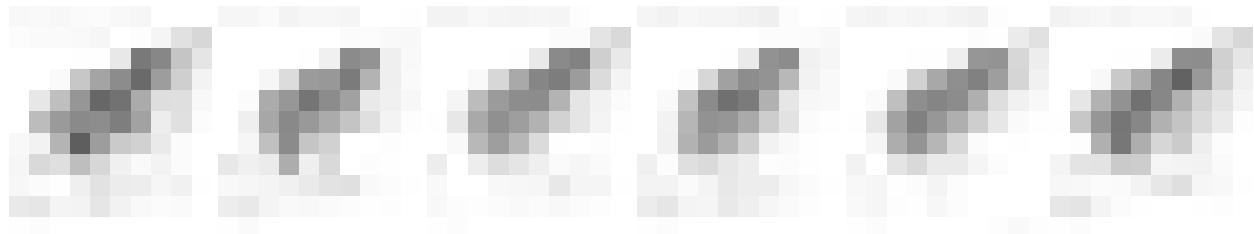
Callitriche nuttallii Torrey. Low fields, pond shores. NC, c. TN, and OK south to c. peninsular FL, AL, and TX. [= GW, X, Y, Z; = *C. pedunculosa* Nuttall – K, WH, of uncertain application; = *C. nuttallii* Torrey – GW, X, Y, Z]

Callitriche palustris Linnaeus, Swamp Water-starwort. Ponds, lakes, stagnant streams, wet soil. Circumboreal, in North America south to VA, WV, IL, TX, and CA; South America. The nomenclatural debate between *C. palustris* and *C. verna* is difficult to resolve. [= C, F, K, Pa, S, X; = *C. verna* Linnaeus – G, W, Y, Z]

Callitriche peploides Nuttall. Low fields, ditches. April-June. SC south to s. FL, west to TX; disjunct inland in AR (the report for Polk Co., TN erroneous); e. Mexico south to Costa Rica. [= RAB, GW, K, S, WH, X; > *C. peploides* var. *peploides* – Y]

* **Callitriche stagnalis** Scopoli. Ponds, stagnant water, wet soil; native of Europe, or possibly also native in some areas. See Philbrick, Aakjar, & Stuckey (1998) for additional discussion of the spread of this species in North America. [= C, F, G, K, Pa, X, Y, Z]

Callitriche terrestris Rafinesque, Terrestrial Water-starwort. Streambanks, ditches, low fields, wet paths. April-June. MA to KS, south to GA, TX, and Mexico. [= C, GW, K, Pa, S, W, X, Z; = *C. deflexa* A. Braun – RAB, Y; > *C. deflexa* var. *austini* (Engelmann) Hegelmann – F, G]



Chaenorhinum (A.P. de Candolle) Reichenbach 1828
(Dwarf Snapdragon, Lesser Toadflax)

A genus of about 21 species, herbs, of Mediterranean Europe. References: Sutton (1988)=Z; Pennell (1935)=P.

* **Chaenorhinum minus** (Linnaeus) Lange ssp. *minus*, Dwarf Snapdragon, Small Toadflax, Lesser Toadflax. Disturbed areas; native of Eurasia. May-November. [= *Chaenorhinum minus* ssp. *minus* – Z; ? *Chaenorhinum minus* – C, F, G, K, P, Pa, W]



Chelone Linnaeus 1753 (Turtlehead)

A genus of about 4 species, perennial herbs, of e. North America. References: Nelson in FNA (in prep.); Nelson, Elisens, & Benish (1998); Pennell (1935)=P.

Identification notes: The four fertile stamens are inserted on either side of the corolla near its base and are flattened and conspicuously pilose. The single staminodium (the color of which is used in the key) is much shorter (often only a few mm long), and is inserted uppermost on the corolla near its base.

- 1 Leaves sessile or nearly so, the petioles 0-3 mm long; flowers distinctly 4-ranked; staminodes with purple tips; corolla purple *C. cuthbertii*
- 1 Leaves petiolate, the petioles 2-40 mm long; flowers less distinctly 4-ranked; staminodes with white, green, or pinkish tips; corolla purple or white.
 - 2 Petioles (2-) 10-40 mm long; leaf blade rounded or truncate at the base; leaf blades averaging ca. 2× as long as wide, 4-8 cm wide; staminodes with white to light pink tips; corolla purple; inflorescence bracts 2-7 mm long..... *C. lyonii*
 - 2 Petioles 0.1-1.5 cm long; leaf blade cuneate at the base; staminodium white or green; leaf blades averaging 3× (or more) as long as wide, 1-6 cm wide; corolla purple or white; inflorescence bracts 4-23 mm long.
 - 3 Corolla white (or tinged with purple, pink, or green near the mouth); staminodes with green tips; palate white-bearded (rarely greenish-yellow-bearded) *C. glabra*
 - 3 Corolla pink or purple throughout; staminodes with white tips (rarely with green or purple tips); palate yellow-bearded (rarely white-bearded).
 - 4 Stamines 4-8 (-12) mm long; calyx lobes densely ciliate; [KY westward] *C. obliqua* var. *speciosa*
 - 4 Stamines (6-) 8-12 (-14) mm long; calyx lobes glabrous or sparsely ciliate; [more widespread in our area].
 - 5 Lower corolla lobes 12-15 (-16) mm long; mid-cauline leaves (6-) 8-20 cm long; [Southern Appalachians] *C. obliqua* var. *erwiniae*
 - 5 Lower corolla lobes (12-) 15-19 mm long; mid-cauline leaves 5.3-8 (-12) cm long; [mainly Coastal Plain] *C. obliqua* var. *obliqua*

Chelone cuthbertii Small, Cuthbert's Turtlehead. Bogs, sphagnum swamps, seeps. Late July-September; September-October. This species has a curious, disjunct distribution: Mountains and rarely upper Piedmont of w. NC and n. GA, and Coastal Plain of se. VA and e. NC. The species is diploid (Nelson, Elisens, & Benish 1998). [= C, F, FNA, G, GW, F, K1, K2, P, RAB, S, W]

Chelone glabra Linnaeus, White Turtlehead. Streambanks, seeps, swamp forests. Late July-October; September-November. NL (Newfoundland) and MN south to GA and AL. The named varieties (or subspecies) are intergrading and the characters used to distinguish them do not correlate well. The species is diploid (Nelson, Elisens, & Benish 1998). [= C, FNA, GW, K1, K2, Pa, RAB, W; > *C. glabra* var. *dilatata* Fernald & Wiegand - F; > *C. glabra* var. *elatior* Rafinesque - F, G, S; > *C. glabra* var. *elongata* - F, G, S; > *C. glabra* var. *ochroleuca* Pennell & Wherry - F, G, S; > *C. glabra* ssp. *ochroleuca* (Pennell & Wherry) Pennell - P; > *C. glabra* var. *glabra* - F, G, S; > *C. glabra* ssp. *chlorantha* (Pennell & Wherry) Pennell - P; > *C. glabra* ssp. *dilatata* (Fernald & Wiegand) Pennell - P; > *C. glabra* ssp. *elatior* (Rafinesque) Pennell - P; > *C. glabra* ssp. *elongata* (Pennell & Wherry) Pennell - P; > *C. glabra* ssp. *typica* - P; > *C. chlorantha* Pennell & Wherry - S; > *C. montana* (Rafinesque) Pennell & Wherry var. *montana* - S; > *C. montana* var. *elatior* (Rafinesque) Small - S]

Chelone lyonii Pursh, Appalachian Turtlehead. Cove forests, spruce-fir forests, balds, streambanks. July-September; October. W. NC and e. TN south to nw. SC and ne. AL. The species is diploid (Nelson, Elisens, & Benish 1998); scattered localities away from the Southern Appalachians area result of cultivation. [= C, FNA, GW, K1, K2, RAB, W; = *C. lyonii* - F, G, P, S, orthographic variant]

Chelone obliqua Linnaeus var. *erwiniae* Pennell & Wherry, Mountain Purple Turtlehead, Erwin's Turtlehead. Streambanks, swamp forests. July-October; September-November. Sw. NC and nw. SC. Var. *erwiniae* is tetraploid; the other varieties are hexaploid (Nelson, Elisens, & Benish 1998). [= FNA, K1, K2; = *C. obliqua* ssp. *erwiniae* (Pennell & Wherry) Pennell - P < *C. obliqua* - GW, RAB, S, W]

Chelone obliqua Linnaeus var. *obliqua*, Purple Turtlehead. Streambanks, swamp forests. July-October; September-November. MD and KY south to GA and MS. Var. *obliqua* is hexaploid (Nelson, Elisens, & Benish 1998). [= FNA, K1, K2; = *C. obliqua* ssp. *obliqua* - P; < *C. obliqua* - C, GW, F, G, RAB, S, W]

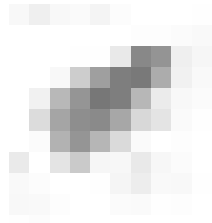
Chelone obliqua Linnaeus var. *speciosa* Pennell & Wherry, Midwestern Purple Turtlehead. Streambanks, swamp forests. July-October; September-November. MI and IA south to c. KY, sw. KY, and nw. AR. Var. *speciosa* is hexaploid (Nelson, Elisens, & Benish 1998). [= FNA, K1, K2; = *C. obliqua* ssp. *speciosa* (Pennell & Wherry) Pennell - P; < *C. obliqua* - C, GW, F, G, S]



Collinsia Nuttall 1817 (Blue-eyed Mary)

A genus of about 20 species, herbs, of North America (especially diverse in w. North America). References: Pennell (1935)=P.

Collinsia verna Nuttall, Eastern Blue-eyed Mary. Nutrient-rich, moist bottomlands and forested slopes. April-June. NY west to s. WI, south to w. VA, WV, nc. TN (Chester, Wofford, & Kral 1997), KY, and AR. [= C, F, G, K, P, Pa, S, W, WV]



Cymbalaria Hill 1756 (Kenilworth-ivy)

A genus of about 9 species, herbs, of Europe west to c. Asia. References: Sutton (1988)=Z; Pennell (1935)=P.

* *Cymbalaria muralis* P.G. Gaertner, B. Meyer, & Scherbius *ssp. muralis*, Kenilworth-ivy. Naturalized on walls and rock outcrops near plantings, roadsides, disturbed areas; native of Eurasia. March-December. The other two subspecies, both villous throughout (vs. glabrous or with a few scattered hairs in *ssp. muralis*) are Mediterranean and are not known to be naturalized in North America. Reported for NC (Henderson County) by Pittillo & Brown (1988) as “derived from potted plants that have become established beneath the overhang of a porch for over a decade,” and reported again more recently as spreading from plantings in Alleghany County, NC (Poindexter 2006) and Buncombe County, NC (C.A. McCormick, pers.comm. 2009). Reported by Pennell (1935) as being “in herbaria” from DC, KY, MD, SC, TN, WV, and other states beyond our area. [= Z; < *C. muralis* – C, F, G, K, P, Pa, WV; = *C. cymbalaria* (Linnaeus) Wettstein; = *Linaria cymbalaria* (Linnaeus) P. Miller]



Digitalis Linnaeus 1753 (Foxglove)

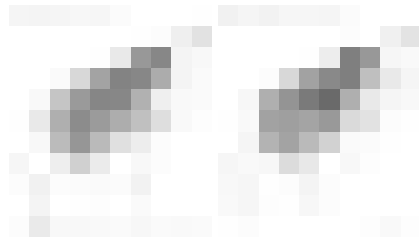
A genus of about 19 species, herbs, of Europe west to central Asia. Famous as the source of the drug digitalis, a cardiac glycoside. References: Pennell (1935)=P.

- 1 Corolla 1.3-1.8 cm long, pale yellow to white; plant nearly glabrous..... *D. lutea*
- 1 Corolla 2-5.5 cm long, white, yellow, or purple; plant conspicuously pubescent on the stem and/or leaves.
 - 2 Corolla 2-3 cm long, white to pale yellow, the lower median lobe much longer than the others..... *D. lanata*
 - 2 Corolla 4-5.5 cm long, purple or white, the lower median lobe only slightly longer than the others..... *D. purpurea*

* *Digitalis lanata* Ehrhart, Grecian Foxglove, Hairy Foxglove. Naturalized along roadside; native of Mediterranean Europe. May-July. Reported for South Carolina by Hill & Horn (1997). [= C, F, G, K, P, Pa]

* *Digitalis lutea* Linnaeus, Straw Foxglove. Disturbed areas; native of Europe. July. Naturalized south to MD, PA, and OH. [= C, G, K, Pa] {not yet mapped}

* *Digitalis purpurea* Linnaeus, Digitalis, Common Foxglove, Purple Foxglove, Lady’s-glove. Disturbed areas, bog margins; native of Europe. May-August. Introduced and established at scattered locations in ne. North America, as far south as PA (Rhoads & Klein 1993). [= C, P, Pa, WV; > *D. purpurea* var. *purpurea* – K; > *D. purpurea* var. *alba* – K]



Gratiola Linnaeus 1753 (Hedge-hyssop)

A genus of about 20 species, herbs, of temperate regions (and tropical mountains) of the Old and New Worlds. References: Estes & Small (2007)=Z; Estes & Small (2008)=Y; Pennell (1935)=P. Key based in part on Estes & Small (2007). [including *Amphianthus*]

Identification notes: *Gratiola amphiantha* somewhat resembles *Callitriche*, but has floating leaves in single pairs rather than in a whorl.

- 1 Capsule flattened, wider than long, notched; leaves dimorphic, with narrow submersed leaves on the lower stems, and broad floating leaves just subtending the aerial inflorescences; [of vernal pools on granite outcrops in Piedmont SC, GA, and AL]*G. amphiantha*
- 1 Capsule turgid, longer than wide; leaves monomorphic; [collectively of many habitats and widespread].
 - 2 Flowers and fruits sessile or subsessile, the pedicels < 1 mm long; perennial.
 - 3 Leaves linear-subulate; corolla 2-3× as long as the calyx[see *Sophronanthe hispida*]
 - 3 Leaves ovate; corolla 1-1.5 × as long as the calyx[see *Sophronanthe pilosa*]
 - 2 Flowers and fruits on definite pedicels; annual or perennial.
 - 4 Leaves clasping or subclasping-rounded at the base; perennial; [section *Gratiola*].
 - 5 Calyx subtended by 0 (-1) bractlet; corolla lobes white; corolla tube greenish yellow, conspicuously veined *G. ramosa*
 - 5 Calyx subtended by 2 bractlets; corolla lobes white or yellow-orange; corolla tube greenish yellow and conspicuously veined, or orange and not conspicuously veined.
 - 6 Corolla lobes and tube yellow-orange (very rarely white), not conspicuously veined; sepals and flower stalks sparsely or not at all glandular-puberulent *G. aurea*
 - 6 Corolla lobes white to lavender, corolla tube greenish yellow, usually conspicuously veined; sepals and flower stalks densely glandular-puberulent.
 - 7 Leaves triangular to lanceolate, margins entire, or with a few teeth toward the tip; corolla veined with brown lines; sepals linear-lanceolate *G. brevifolia*
 - 7 Leaves oblong-ovate to ovate (or linear-lanceolate in submersed forms), finely dentate; corolla veined with purple lines; sepals lanceolate to oblong-lanceolate *G. viscidula*
 - 4 Leaves cuneate at the base; annual; [section *Nibora*].
 - 8 Pedicels stout, erect, 1-5 (-12) mm long *G. virginiana*
 - 8 Pedicels slender, spreading, 10-45 mm long.
 - 9 Corolla 13-25 mm long; leaves oval or oblanceolate *G. floridana*
 - 9 Corolla 5-14 mm long; leaves elliptic, rhombic-lanceolate, or lanceolate
 - 10 Mid-stem leaves (6-) 7-13 (-18) mm long; proximal fruiting pedicels (5-) 7-17 (-22) mm long, (0.9-) 1-2 (-2.3) × as long as the subtending bracteal leaves; bracteoles shorter than to barely exceeding the sepals; [of granite outcrops in the GA Piedmont] *G. graniticola*
 - 10 Mid-stem leaves (11-) 20-41 (-66) mm long; proximal fruiting pedicels (8-) 13-25 (-37) mm long, (0.3-) 0.5-1 (-1.6) × as long as the subtending bracteal leaves; bracteoles slightly to conspicuously longer than the sepals; [collectively of more habitats and more widespread].
 - 11 Leaves narrowly elliptic or rhombic to oblanceolate, not conspicuously falcate, (2.7-) 5-11 (-18) mm wide, (2.5-) 3.5-5 (-6) × as long as wide; leaf margins with (1-) 3-5 (-7) teeth per side; primary veins 3-5 (-7); mid-stem moderately to densely glandular pubescent (rarely glabrate); seeds (0.18-) 0.22-0.26 (-0.29) mm thick; [widespread] *G. neglecta*
 - 11 Leaves linear, linear-lanceolate, to elliptic-lanceolate, often falcate, (1-) 2.5-4 (-4.5) mm wide, (5.5-) 6-9.5 (-11) × as long as wide; leaf margins with 0-2 (-3) teeth per side; primary veins 1 (-3); mid-stem glabrous; seeds (0.19-) 0.26-0.32 (-0.37) mm thick; [limestone cedar glades of n. AL and c. TN] *G. quartermaniae*

Gratiola amphiantha D. Estes & R.L. Small, Pool-sprite, Snorkelwort. Vernal pools on granitic flatrocks. April. Endemic to granitic flatrocks of ec. AL, nc. GA (17 counties), and sc. SC. Hilton & Boyd (1996) and Patrick, Allison, & Krakow (1995) discuss the ecology and population ecology of this remarkable plant in detail. [= Y; = *Amphianthus pusillus* Torrey – RAB, GW, K, P, S]

Gratiola aurea Pursh, Yellow Hedge-hyssop, Golden-pert. Blackwater river banks, pondcypress savannas in Carolina bays, other acidic wetlands. May-September. NL (Newfoundland) and QC south in the Coastal Plain to Panhandle FL; disjunct around the Great Lakes and inland in NY, ON, IL, and ND. [= RAB, C, F, G, GW, K, Pa, S, WH; > *G. lutea* Rafinesque var. *typica* – P; > *G. lutea* var. *obtusata* (Pennell) Pennell – P]

Gratiola brevifolia Rafinesque. Wet places. E. GA, south and west to c. peninsular FL, e. Panhandle FL, and se. AL; c. AR, se. OK, se. LA, and e. TX; c. TN; s. DE (Knapp & Estes 2006). Previous reports from SC are based on misidentifications (Knapp & Estes 2006). [= GW, K, P, S, WH]

Gratiola floridana Nuttall. Stream banks, spring runs, blackwater swamps. Ne. GA and se. TN (in counties adjacent to NC) (Chester, Wofford, & Kral 1997), south to e. GA (in counties adjacent to SC) (Jones & Coile 1988), ne. FL, Panhandle FL, AL, and MS. [= GW, K, P, S, WH]

Gratiola graniticola D. Estes, Granite Hedge-hyssop. Granitic flatrocks. April-May. Endemic to granitic flatrocks of GA and SC (Estes & Small 2007, 2008; Brunton 2009). [= Z; < *G. neglecta* – RAB, GW, K, P, S]

Gratiola neglecta Torrey, Mud-hyssop. Ditches, wet areas, bottomlands. March-October. QC and ME west to BC, south to c. GA, e. TX, AZ, and CA. [= Z; < *G. neglecta* – RAB, C, G, GW, K, P, Pa, S, W, WV; < *G. neglecta* var. *neglecta* – F]

Gratiola quartermaniae D. Estes, Limestone Hedge-hyssop, Quarterman’s Hedge-hyssop. Limestone glades. April-early June. C. TN south to n. AL; c. TX (Edwards Plateau); s. ON; ne. IL. [= Z; < *G. neglecta* – C, G, GW, K, P, S, W; < *G. neglecta* var. *neglecta* – F]

Gratiola ramosa Walter. Wet pine savannas, marshes, pond margins; ditches. May-June. Se. NC south to s. FL, west to sw. LA; disjunct in se. VA (Greensville County) and (at least historically) in e. MD. [= RAB, C, F, G, GW, K, P, S, WH]

Gratiola virginiana Linnaeus, Virginia Hedge-hyssop. Sluggish streams, bogs, wet areas. March-May. NJ west to OH and IA and KS, south to c. peninsular FL and e. TX. Var. *aestuariorum* Pennell, of s. NJ south to e. VA, is alleged to differ in being shorter, with more rounded leaves, short pedicels (< 2 mm long), a shorter calyx and corolla, and a smaller capsule; it is likely merely a stunted aquatic form, but needs additional study – see Fernald (1950) and Pennell (1935) for additional details. [= RAB, C, G, GW, S, W, WH, WV; > *G. virginiana* var. *virginiana* – F, K, P; > *G. virginiana* var. *aestuariorum* Pennell – F, K, P]

Gratiola viscidula Pennell, Viscid Hedge-hyssop. Bogs, wet areas, ditches, margins of Coastal Plain ponds. June-November. DE, MD and e. VA, south to c. SC and ne. GA; disjunct in s. OH, WV, e. TN, MO, and ne. FL. Spooner (1984) studied infraspecific taxa recognized in *G. viscidula* and determined that they did not warrant recognition. [= RAB, C, F, GW, K, S, W, WH; > *G. viscidula* var. *viscidula* – G; > *G. viscidula* var. *shortii* Pennell – G, P; > *G. viscidula* var. *typica* – P]



Kickxia Dumortier 1827 (Fluellen, Cancerwort)

A genus of about 47 species, herbs, of Mediterranean Europe west to c. Asia. References: Sutton (1988)=Z; Pennell (1935)=P.

- 1 Leaves round-ovate, rounded to cordate at the base; pedicels villous throughout their length; [ballast waif] ***K. spuria***
- 1 Leaves triangular-ovate or hastate, truncate at the base; pedicels glabrous through much of their length **or** villous; [more widespread alien].
- 2 Stems densely villous; stems robust (usually 1.5-3.5 mm thick), often much-branched; pedicels 5-12 (-20) mm long, 0.25-0.35 mm in diameter, often villous their entire lengths ***K. elatine* ssp. *crinita***
- 2 Stems sparsely villous; stems slender (to 1.5 mm thick), sparingly (if at all) branched, pedicels mostly (8-) 15-25 (-30) mm long, 0.1-0.2 mm in diameter, glabrous except for immediately below the calyx ***K. elatine* ssp. *elatine***

* ***Kickxia elatine*** (Linnaeus) Dumortier ssp. *crinita* (Mabille) W. Greuter, Sharp-leaved Fluellen. Pd (NC, VA), Cp (VA), {GA?}: disturbed areas; uncommon, native of Eurasia. May-November. [= Z; < *K. elatine* – RAB, C, F, G, K, P, Pa, S]

* ***Kickxia elatine*** (Linnaeus) Dumortier ssp. *elatine*, Sharp-leaved Fluellen. Pd (NC, SC, VA), Mt (NC, VA, WV), Cp (VA), {GA?}: disturbed areas; uncommon, native of Eurasia. May-November. [= Z; < *K. elatine* – RAB, C, F, G, K, P, Pa, S, WV]

* ***Kickxia spuria*** (Linnaeus) Dumortier, Round-leaved Fluellen, Female Fluellen. Cp (FL, NC): ballast near old port (Wilmington, New Hanover County, NC), other disturbed sites; rare, perhaps only a waif, native of s. Europe. July. [= RAB, C, F, G, K, P, Pa, S, WH; > *K. spuria* ssp. *spuria* – Z]

Leucospora Nuttall 1834 (Leucospora)

A genus of 2 species, herbs, of e. North America and Coahuila, Mexico. *Leucospora* may not be distinct from *Stemodia*. References: Pennell (1935)=P.

Leucospora multifida (Michaux) Nuttall, Leucospora, Narrowleaf Paleseed. Moist to wet, sandy margins of artificial ponds, drawdown areas on riverbanks, drawdown depressional wetlands, other seasonally ponded disturbed areas, probably introduced in some of our area from c. United States. June-September. S. ON west to IA and KS, south to nw. GA, AL, LA, and

e. TX; scattered occurrences farther east (as in e. NC, FL, KY, TN, VA, and se. PA) may be recent introductions. [= C, G, GW, K, P, Pa, S; = *Conobea multifida* (Michaux) Bentham – F, WH; = *Stemodia multifida* (Michaux) Sprengel]



Limnophila R. Brown 1810 (Marshweed)

A genus of about 37 species, of tropical regions of the Old World.

* ***Limnophila sessiliflora*** (Vahl) Blume, Asian Marshweed. Cp (FL, GA): ponds, ditches, lakes; rare, native of Old World tropics. Reported as introduced in sw. GA (Jones & Coile 1988). [= GW, K, WH]

Limosella Linnaeus 1753 (Mudwort, Awl-leaf)

A genus of about 11 species, aquatic herbs, of cosmopolitan distribution. References: Pennell (1935)=P.

Limosella australis R. Brown, Mudwort, Awl-leaf. Fresh or slightly brackish tidal flats. June-September. NL (Newfoundland) and QC south along the Atlantic Coast to se. VA and extreme ne. NC. This plant is very inconspicuous, though locally abundant. [= K, Pa; ? *L. subulata* Ives – RAB, C, F, G, GW, P]

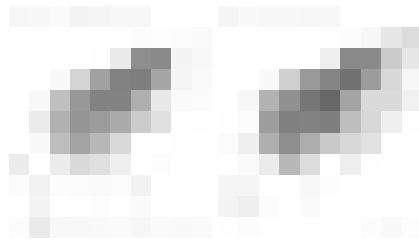


Linaria P. Miller 1754 (Yellow-toadflax)

A genus of about 150 species, of temperate regions of Eurasia. References: Sutton (1988)=Z; Pennell (1935)=P. [also see *Nuttallanthus*]

* ***Linaria maroccana*** Hooker f., Moroccan Toadflax. Disturbed areas; native of n. Africa. Introduced in VA (perhaps just a waif) and WV. [= K] {investigate; not yet keyed; synonymy incomplete}

* ***Linaria vulgaris*** P. Miller, Butter-and-eggs, Yellow Toadflax, Wild-snapdragon. Fields, pastures, roadsides, disturbed areas; native of Europe. June-November. Reported for Coastal Plain of GA (Taylor County) by Carter, Baker, & Morris (2009). [= RAB, C, F, G, K, P, Pa, W, WV, Z; = *Linaria linaria* (Linnaeus) Karsten – S]



Mecardonia Ruiz & Pavón 1794 (Mecardonia, Axil-flower)

A genus of about 10 species, of tropical, subtropical, and warm temperate regions of America. References: Pennell (1935)=P.

- 1 Corolla yellow; outer sepals broadly lanceolate to ovate, overlapping the shorter, much narrower inner sepals***M. procumbens***
- 1 Corolla white, with purple veins; sepals lanceolate nearly equal in length.
 - 2 Peduncles > 10 mm long; sepals < 2 mm wide.....***M. acuminata* var. *acuminata***
 - 2 Peduncles < 10 mm long; sepals > 2 mm wide.....***M. acuminata* var. *microphylla***

Mecardonia acuminata (Walter) Small var. **acuminata**, Mecardonia, Common Axil-flower. Marshes, ditches, bottomland forests, wet disturbed areas. July-September; August-October. DE and MD south to n. peninsular FL, west to e. TX, north in the interior to KY, TN, and MO. The long, ascending pedicels are distinctive. The plant blackens on drying. [= K, S; < *M. acuminata* – RAB, C, G, GW; < *Bacopa acuminata* (Walter) B.L. Robinson – F; = *Pagesia acuminata* (Walter) Pennell ssp. *typica* – P; = *M. acuminata* ssp. *acuminata* – WH]

Mecardonia acuminata (Walter) Small var. **microphylla** (Rafinesque) Pennell, Pond Axil-flower. Margins of Coastal Plain ponds. Sc. GA south to Panhandle FL and west to e. LA. [= K, S; < *M. acuminata* – GW; = *Pagesia acuminata* (Walter) Pennell ssp. *microphylla* (Rafinesque) Pennell – P; = *M. acuminata* var. *microphylla* – WH (misspelling)]

Mecardonia procumbens (Miller) Small, Baby Jump-up. Ponds, streams, ditches. June-September. [= K, WH; ? *M. vandellioides* (Kunth) Pennell – GW, misspelled; = *Pagesia procumbens* (Miller) Pennell – P; > *M. procumbens* – S; > *M. tenuis* Small – S; ? *M. vandellioides* (Kunth) Pennell]



Misopates Rafinesque 1840 (Weasel's-snout)

A genus of about 8 species, herbs, of Mediterranean Europe and n. Africa west to c. Asia. References: Sutton (1988)=Z; Pennell (1935)=P.

* **Misopates orontium** (Linnaeus) Rafinesque, Weasel's-snout, Lesser Snapdragon. Disturbed sites, cultivated, persistent or possibly naturalized; native of Eurasia. Introduced at least far south as se. PA (Rhoads & Klein 1993), KY (Pennell 1935), and FL Panhandle (Hansen & Wunderlin 2008). [= K, WH; = *Antirrhinum orontium* Linnaeus – C, G, P, Z]



Nuttallanthus D.A. Sutton 1988 (American-toadflax)

A genus of 4 species, herbs, of North and South America. Sutton (1988) separates these three species, along with *N. subandinus* (Diels) D.A. Sutton, of Bolivia, Chile, Ecuador, Peru, and Uruguay, from *Linaria* on the basis of "the corolla with the abaxial lip greatly exceeding the adaxial lip; the palate weakly developed and scarcely occluding the tube; the spur very slender or absent and the prismatic seeds with 4-7 longitudinal ridges." *Nuttallanthus* is American; *Linaria* is Eurasian. References: Sutton (1988)=Z; Pennell (1935)=P. Key based on Z.

- 1 Inflorescence axis zigzag; fruiting pedicels densely glandular pubescent, 5-13 mm long, 2× or more as long as the calyx.....*N. floridanus*
- 1 Inflorescence axis straight or nearly so; fruiting pedicels glabrous or with a few scattered glandular hairs, 2-6 (-9) mm long, < 1× as long as the calyx.
- 2 Corolla 8-11 (-13) mm long (measured from the tip of the spur to the apex of the adaxial lip), the abaxial lip 2-6 mm long; seeds longitudinally ridged, the intervening faces smooth or with sparse low tubercles.....*N. canadensis*
- 2 Corolla 14-22 mm long (measured from the tip of the spur to the apex of the adaxial lip), the abaxial lip 6-11 mm long; seeds densely tuberculate, not longitudinally ridged.....*N. texanus*

Nuttallanthus canadensis (Linnaeus) D.A. Sutton, Common Toadflax. In a wide variety of natural and disturbed habitats, especially common and weedy in disturbed sites such as roadsides and fields, also common and apparently native in thin soil of rock outcrops. March-July. NS west to ND, south to s. FL and TX; also adventive on the west coast, from WA to CA. Sutton (1988) comments that there is substantial variation in this species not taxonomically explained. [= K, Z; < *Linaria canadensis* (Linnaeus) Dumortier – RAB, W (also see *N. texanus*); = *Linaria canadensis* var. *canadensis* – C, F, G, S; = *Linaria canadensis* (Linnaeus) Dumortier – P, Pa, WH, WV]

Nuttallanthus floridanus (Chapman) D.A. Sutton, Florida Toadflax. Sandhills, scrub, dunes, other dry, sandy places. E. GA south to s. FL and west to s. MS. [= K, Z; = *Linaria floridana* Chapman – P, S, WH]

Nuttallanthus texanus (Scheele) D.A. Sutton, Texas Toadflax. Granite flatrocks, dry sandy soils, tdisturbed soils of roadsides and fields; native of sc. United States, not clear how far east the original range extended. March-May. Ranging as a

native species in sc. and sw. North America and in temperate South America; introduced elsewhere (as in most of our area, the exact limits unclear). [= K, Z; < *Linaria canadensis* (Linnaeus) Dumortier – RAB, W; = *Linaria canadensis* var. *texana* (Scheele) Pennell – C, F, G, S; = *Linaria texana* Scheele – P, WH]



Penstemon Schmidel 1763 (Beard-tongue, Penstemon)
[contributed by Alan S. Weakley and Dwayne Estes]

A genus of about 250 species, perennial herbs and shrubs, of w. North America, e. North America, and (a single species) ne. Asia. References: Estes (2012)=Y; Clements, Baskin, & Baskin (1998)=Z; Pennell (1935)=P. Key based on Y and Z.

- 1 Cauline leaves bipinnatifid (or merely deeply pinnatifid); basal leaves sessile; [endemic to GA]; [section *Dissecti*]..... *P. dissectus*
- 1 Cauline leaves entire or toothed; basal leaves petioled; [collectively widespread].
 - 2 Inflorescence with many nodes; anther cells dehiscent by short proximal slits; [s. GA south to s. FL]; [section *Multiflora*].....*P. multiflorus*
 - 2 Inflorescence with <10 nodes; anther cells dehiscent their entire length; [collectively widespread].
 - 3 Corolla weakly bilabiate, white, unlined, glandular-puberulent within; stem leaves abruptly reduced upwards; [section *Tubiflora*]
.....*P. tubiflorus*
 - 3 Corolla strongly bilabiate, white or variously pinkish to purplish, lined (except *P. hirsutus* and *P. tenuiflorus*), glabrous or pubescent with non-glandular hairs within; stem leaves gradually reduced upwards; [section *Graciles*].
 - 4 Lower lobes of the corolla essentially equaling the upper lobes; corolla throat not strongly 2-ridged within, the tube conspicuously dilated into the throat; mid and upper stem (but below the inflorescence) glabrous or with short eglandular hairs distributed in patches or lines; [*Penstemon digitalis* complex].
 - 5 Corolla 20-35 mm long.
 - 6 Corollas purplish to lavender; sepals linear-lanceolate, straight and attenuate, 5-9 mm long at anthesis; anthers glabrous to papillose *P. calycosus*
 - 6 Corollas white with purple lines; sepals ovate to ovate-lanceolate, acuminate, 4.5-6.5 mm long at anthesis; anthers with several to many hairs *P. digitalis*
 - 5 Corollas 15-23 mm long.
 - 7 Sepals 1.5-3.5 (-4.0) mm long; corollas white; [approaching our area in s. IN and s. IL] [*P. deamii*]
 - 7 Sepals 3-6 mm long; corollas white or tinged with lavender.
 - 8 Leaves mostly 2.5-4 cm wide; anthers bearded with long papillae *P. alluviorum*
 - 8 Leaves mostly 1.5-2.5 cm wide; anthers glabrous or papillose *P. laevigatus*
 - 4 Lower lobes of the corolla projecting beyond the upper lobes; corolla throat strongly 2-ridged on its floor, the tube also slightly to moderately dilated into the throat; mid and upper stem (but below the inflorescence) pubescent throughout, consisting of short eglandular hairs and sometimes also with an overstorey of longer glandular hairs.
 - 9 Stem vestiture (mid and upper stem, but below the inflorescence) of short eglandular hairs only (or rarely also with a few glandular hairs in *P. smallii*).
 - 10 Leaves 4-28 mm wide, 4-5× as long as wide *P. laxiflorus*
 - 10 Leaves 15-60 mm wide, 2.5-4× as long as wide; [*Penstemon smallii* complex].
 - 11 Corollas 28-35 mm long, lavender, violet, or purple; staminodes 15-18 mm long, densely bearded in the upper 13-15 mm; largest leaf blades mostly 30-60 mm wide *P. smallii*
 - 11 Corollas 10-16 mm long, pale lavender, pink, violet, or almost white; staminodes 7-9 mm long, densely bearded in the upper 4-5 mm; largest leaf blades mostly 10-40 mm wide.
 - 12 Leaves mostly 30-40 mm wide; corolla pale-lavender to whitish, usually strongly lined with dark purple; sepals linear-attenuate; [plants of dry to mesic calcareous uplands, of ne. AL and se. TN] *P. kralii*
 - 12 Leaves mostly 10-30 mm wide; corolla lavender, pink, or violet, inconspicuously lined with reddish-purple; sepals ovate-lanceolate; [plants of wetlands, of MS, LA, and westwards] *P. tenuis*
 - 9 Stem vestiture (mid and upper stem, but below the inflorescence) of a mixture of long glandular hairs and short eglandular hairs.
 - 13 Corolla throats closed or nearly so (the lower lip arching upwards and pressing against the upper lip); corollas unlined or very obscurely lined (except strongly lined in *P. australis*).
 - 14 Corollas lined; inflorescence branches erect-ascending, nearly paralleling the inflorescence axes *P. australis*
 - 14 Corollas unlined; inflorescence branches spreading-ascending, obviously diverging from the vertical inflorescence axis; [*Penstemon hirsutus* complex].
 - 15 Corollas tinged with purplish-violet, the lobes often white; leaves sparsely pubescent to glabrate, the pubescence often mainly restricted to the veins *P. hirsutus*
 - 15 Corollas creamy-white throughout; leaves moderately to densely glandular pubescent, across the surface *P. tenuiflorus*
 - 13 Corolla throats open, not as described above (except sometimes nearly closed in *P. australis*); corollas lined, at least internally; [*Penstemon canescens* complex].
 - 16 Corollas 14-23 mm long.
 - 17 Sepals 2-3.5 mm long, 1-1.5× as long as wide; corollas pale lavender (sometimes faded to white in herbarium specimens) *P. brevisepalus*

- 17 Sepals 3-5 mm long, 1.5-2.5× as long as wide; corollas creamy white, with violet lines.....*P. pallidus*
 16 Corollas 20-32 mm long.
 18 Inflorescence branches erect-ascending, nearly paralleling the inflorescence axes; sepals 4-5.2 mm long; corollas 20-25 mm long; corolla:calyx length ratio 4-5*P. australis*
 18 Inflorescence branches spreading-ascending, obviously diverging from the vertical inflorescence axis; sepals 3.2-4.5 mm long; corollas 20-30 mm long; corolla:calyx length ratio 7-9*P. canescens*

Penstemon alluviorum Pennell, Lowland Beardtongue. East to AL, TN, KY. [= C, F, G, K, P, S, Y, Z]

Penstemon australis Small, Southern Beardtongue, Sandhill Beardtongue. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, SC): sandhills, flatwoods, dry hammocks, dry sandy roadsides; common (rare in Piedmont of VA). May-July; July-August. Se. VA south to c. peninsular FL, west to s. and wc. AL, primarily on the Coastal Plain, but not uncommon westward into the Piedmont and lower Mountains, and extending in the interior into c. TN. [= K, P, S, Y, Z; < *P. australis* – RAB, C, F, G, W, WH]

Penstemon brevisepalus Pennell, Short-sepaled Beardtongue. Endemic to the sedimentary rock provinces of WV, sw. VA, KY, and TN. [= P, Y; < *P. canescens* (Britton) Britton – F, G, P, S, WV]

Penstemon calycosus Small. Mt (GA, NC, SC, VA): limestone ledges, other woodlands; rare. May-July. OH and s. MI and IL south to w. VA, GA, and AL. [= F, G, GW, K, P, Pa, S, W, Y, Z; < *P. laevigatus* – C]

Penstemon canescens (Britton) Britton, Appalachian Beardtongue. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (VA): woodlands, glades, forest edges, rocky woodlands, roadsides; common (uncommon in Coastal Plain of VA). May-July. PA and s. IN south to nc. GA, n. AL, and c. TN. [= F, G, S, WV; > *P. canescens* – RAB, C, K, Pa, W, Z; > *P. canescens* var. *typicus* – P; > *P. canescens* var. *brittonorum* (Pennell) Pennell – P; > *P. brittonorum* Pennell – S]

Penstemon deamii Pennell, Deam's Beardtongue. Endemic to s. IN and s. IL, just across the Ohio River from KY. [= K2, Y] {not yet keyed; add to synonymy}

Penstemon digitalis Nuttall ex Sims, Tall White Beardtongue. Mt (NC, SC, VA, WV), Pd (DE, VA), Cp (DE, VA): alluvial forests, moist fields, disturbed areas; common (rare in Coastal Plain of VA). May-July; July-August. NS and ME west to MN and SD, south to e. VA, w. SC, AL, and TX. [= RAB, C, F, G, GW, K, P, S, W, WV, Y, Z]

Penstemon dissectus Elliott, Georgia Beardtongue, Grit Beardtongue. Cp (GA): Altamaha Grit outcrops, sandhills; rare. Endemic to Altamaha Grit outcrops and other sandy areas from e. GA south and west to sw. GA. This species is unmistakable because of its bipinnatifid leaves. [= K, P, S, Y, Z]

Penstemon hirsutus (Linnaeus) Willdenow, Northeastern Beardtongue. Pd (DE, VA), Mt (VA, WV): dry woodlands, forests, and fields; uncommon (rare in DE). May-July. QC and ME west to MI and WI, south to n. VA and KY. [= C, F, G, K, P, Pa, S, W, WV, Y, Z]

Penstemon kralii D. Estes, Kral's Beardtongue. Dry, calcareous juniper-oak-hickory woodlands. May-June. Endemic to the sw. Cumberland Escarpment of ne. AL and se. Tennessee (Blount, Madison, Morgan, and Jackson counties, AL, and Franklin County, TN. See Estes (2012) for detailed information. [= Y]

Penstemon laevigatus Aiton, Eastern Beardtongue. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): low meadows, bottomlands, forest edges, hammocks; common (rare in DE and FL). May-July; July-August. ME west to MI, south to s. GA, Panhandle FL, MS, and AR. [= RAB, F, G, GW, K, P, Pa, W, WH, WV, Y, Z; < *P. laevigatus* – C (also see *P. calycosus*); = *P. pentstemon* (Linnaeus) MacMillan – S]

Penstemon laxiflorus Pennell. Cp (FL, GA): dry sandy areas; rare. C. GA, FL Panhandle, and n. AL west to c. OK and c. TX. [= K, P, S, Z; < *P. australis* – WH; = *P. australis* Small ssp. *laxiflorus* (Pennell) Bennett]

Penstemon multiflorus Chapman ex Benth. Cp (FL, GA): sandhills, dry flatwoods; uncommon. S. and e. GA south to s. FL. [= K, P, S, WH, Y, Z]

Penstemon tenuiflorus Small, Eastern White Beardtongue. Cp (GA, NC, VA), Pd (GA, VA), Mt (GA, VA, WV): limestone and shale barrens, other dry, disturbed areas; uncommon (rare in GA). May-June. ME west to MN, south to NC, GA, and AR. [= RAB, C, F, G, K, P, Pa, S, W, Y, Z]

Penstemon smallii A. Heller, Blue Ridge Beardtongue. Mt (GA, NC, SC): woodlands, cliffs, glades, roadbanks; common. May-June; July. A Southern Appalachian endemic, distributed from nw. NC and ne. TN south to nw. SC, n. GA, and n. AL. [= RAB, K, P, S, W, Y, Z]

Penstemon tenuiflorus Pennell, Plateau Beardtongue, Limestone Beardtongue, Kentucky Beardtongue. Endemic to the Interior Low Plateau of wc. KY, c. TN, n. AL, extending slightly into the Coastal Plain to the west, and disjunct in the Black Belt of AL and MS. [= C, F, G, K, P, S, Y, Z]

Penstemon tenuis Small. [= Y]

Penstemon tubiflorus Nuttall, Tube Beardtongue. A more western species, reaching its eastern limit in w. TN (Chester, Wofford, & Kral 1997). It is also known from adventive sites farther east, as in e. PA (Rhoads & Klein 1993). [= S; = *P. tubaeiflorus* – C, G, P, Y, Z, orthographic variant; > *P. tubaeiflorus* var. *achoreus* Fernald – F; > *P. tubaeiflorus* var. *tubaeiflorus* – F; > *P. tubiflorus* var. *achoreus* Fernald – K; > *P. tubiflorus* var. *tubiflorus* – K]



Plantago Linnaeus 1753 (Plantain)

A genus of about 270 species, herbs and rarely shrubs, of cosmopolitan distribution. Harper (1944) discusses at length the interesting issue of the native distributions of the many weedy species of *Plantago*. The native or introduced status of many of our species is uncertain or controversial. References: Rosatti (1984)=Z; Bassett (1966)=Y; Bassett (1967)=X; Schwarzbach in Kadereit (2004).

- 1 Leaves cauline, opposite; spikes on peduncles from the leaf axils; [section *Psyllium*] *P. psyllium*
- 1 Leaves basal; spikes on scapes from the base of the plant.
 - 2 Leaves pinnatifid; [section *Coronopus*]..... [*P. coronopus*]
 - 2 Leaves unlobed and either entire or obscurely toothed.
 - 3 Leaves ovate to broadly lanceolate or broadly oblanceolate, distinctly broadened upward from a petiolar base, the leaves > 1 cm wide (some species keyed both ways).
 - 4 Leaf venation pinnate, some major veins departing from the midvein well above the leaf base; perennial from thick, fleshy rootstock, typically 3-8 cm wide near its summit, with a cavity below (like an inverted bowl), and with 3-10 fleshy roots 3-15 mm thick descending or spreading from the bowl rim; capsule 2-4-seeded; scapes hollow and terete; [aquatic or semi-aquatic]; [section *Palaeopsyllium*]..... *P. cordata*
 - 4 Leaf venation parallel, with all of the major veins separating at the base of the leaf; **either** perennial from thin, fibrous roots or an erect caudex, **or** annual from a small taproot; capsule 2-30-seeded; scapes either solid and terete, solid and angled, or hollow and terete; [terrestrial].
 - 5 Leaves broadly ovate-elliptic, the blades 1-3× as long as wide, distinctly petiolate; scapes solid and terete; [section *Plantago*].
 - 6 Fruit 2.5-4 mm long, dehiscent near the middle, the terminal portion about as long as the basal; sepals broadly ovate, ca. 1.5× as long as wide, mostly obtuse; petioles usually green and pubescent at the base..... *P. major*
 - 6 Fruit 4-6 mm long, dehiscent below the middle, the terminal portion about 2× as long as the basal; sepals narrowly elliptic, 2-4× as long as wide, mostly acute; petioles usually purple and glabrous at the base *P. rugelii*
 - 5 Leaves mostly broadly oblanceolate, broadly lanceolate, or spatulate, (3-) 4-10× as long as wide, attenuate to the only somewhat petiolar base; scapes solid and 5-angled, or hollow (to solid) and terete.
 - 7 Bracts and calyx pubescent, at least on the keels; ephemeral annual, flowering late March-June, and then senescing; [section *Virginica*]
 - 8 Mature seeds 2.5-3 mm long, reddish, nearly flat on both sides; sepals with an excurrent midrib; leaves typically toothed; [rare adventive in western part of our area] *P. rhodosperma*
 - 8 Mature seeds tan or brown, 1.5-2 mm long, concave on one side, convex on the other; sepals obtuse to rounded; leaves entire; [common in our area]..... *P. virginica*
 - 7 Bracts and calyx glabrous; perennial, flowering April-November.
 - 9 Spikes very densely flowered, the rachis hidden; scape 5-angled; [widespread weedy alien]; [section *Lanceifolia*] *P. lanceolata*
 - 9 Spikes loosely flowered, the rachis visible its entire length; scape terete; [rare native of Coastal Plain pinelands and adjacent fire-plow lines and ditches]; [section *Palaeopsyllium*] *P. sparsiflora*
 - 3 Leaves lanceolate or linear, slightly if at all broadened upward, the base not petiolar, the leaves typically < 1 cm wide.
 - 10 Summer and winter leaves dimorphic, the winter leaves lanceolate (typically submersed), the summer leaves ovate or cordate (emersed except in floods); plant perennial from thick, fleshy rootstock, typically 3-8 cm wide near its summit, with a cavity below (like an inverted bowl), and with 3-10 fleshy roots 3-15 mm thick descending or spreading from the bowl rim; [aquatic or semi-aquatic]; [section *Palaeopsyllium*]..... *P. cordata*
 - 10 Summer and winter leaves not dimorphic, all leaves lanceolate or linear; plant either perennial from thin, fibrous roots, or annual from a small taproot; [terrestrial].
 - 11 Leaves fleshy; corolla tube pubescent on its outer surface; [of sea beaches]..... *P. maritima* var. *juncooides*
 - 11 Leaves herbaceous (though often rather thick and leathery); corolla tube glabrous on its outer surface; [of various habitats, not as above].
 - 12 Bracts of the inflorescence glabrous or inconspicuously ciliate-margined; stamens 2 or 4; [annual or perennial].
 - 17 Annual; flowers with 2 stamens; capsule 4-25-seeded; leaves linear, 0.5-5 mm wide; [section *Micropsyllium*].
 - 18 Capsule mostly 10-25-seeded; seeds 0.5-0.8 mm long..... *P. heterophylla*
 - 18 Capsule 4-seeded; seeds 0.75-1.8 mm long..... *P. pusilla*
 - 17 Perennial; flowers with 4 stamens; capsule 1-2-seeded; leaves lanceolate (or broader), 7-50 mm wide.
 - 19 Spikes very densely flowered, the rachis hidden; scape 5-angled; [widespread weedy alien]; [section *Lanceifolia*]..... *P. lanceolata*
 - 19 Spikes loosely flowered, the rachis visible its entire length; scape terete; [rare native of Coastal Plain pinelands and adjacent fire-plow lines, ditches, and mowed roadsides]; [section *Palaeopsyllium*] *P. sparsiflora*
 - 12 Bracts of the inflorescence and sepals conspicuously pubescent; annual (rarely biennial), with a taproot; stamens 4.
 - 13 Leaves oblanceolate; [section *Virginica*]..... *P. virginica*
 - 13 Leaves linear; [section *Gnaphaloides*].

- 14 Bracts of the lower flowers in the spikes conspicuously exerted, at least 2 × as long as the subtended flower.
 - 15 Leaves glabrous or puberulent above; longer bracts 8-30 mm long; seeds 2.2-3.0 mm long*P. aristata*
 - 15 Leaves silky-pubescent above; longer bracts mostly < 5 mm long; seeds 1.3-1.9 mm long*P. patagonica*
- 14 Bracts of the lower flowers in the spikes not conspicuously exerted, < 2 × as long as the subtended flower.
 - 16 Bracts 1-2 × as long as the calyx; seeds 1.3-1.9 mm long*P. patagonica*
 - 16 Bracts 0.5-1 × as long as the calyx; seeds 2.7-3 mm long*P. wrightiana*

* *Plantago aristata* Michaux, Buckhorn Plantain. Disturbed areas, especially dry, barren, exposed soil, such as clay soils denuded by bull-dozing; introduced from farther west (though the original distribution is unclear, and the species is sometimes considered native in at least portions of our area). Late April-August. [= RAB, C, F, G, K1, K2, Pa, S, W, WH, WV, Z]

Plantago cordata Lamarck, King-root, Heartleaf Plantain. Aquatic or semi-aquatic in streambeds with outcrops of slate, aquatic in tidal estuaries. March-April; May-June. NY and s. ON west to WI, south to w. VA, c. NC, nw. GA, AL, sc. TN, and MO, very scattered and rare in every state in which it occurs, except MO. Characteristically, *P. cordata* is a very robust plant, the inflorescences often 1 meter in height, and the glabrous leaves with ovate blades to 30 cm long and 20 cm wide, on ascending petioles up to 40 cm long and 2 cm wide. Winter leaves are 3-10 cm long, ca. 1 cm wide, and remotely toothed. Spring leaves show a gradual transition from the winter form to the summer form. *P. cordata* is not known to be extant in VA, where it formerly occurred in the estuary of the Potomac River and in Smyth County in sw. VA. In NC, *P. cordata* is apparently limited to 2 slate-bottomed streams in s. Davidson County, where it is locally abundant. A recent study of morphological and genetic variability in the species found the 2 NC populations to "represent sites of primary [conservation] concern with unique genetic composition" (Mymudes & Les 1993). [= RAB, C, F, G, GW, K1, K2, S, W, X, Z]

* *Plantago coronopus* Linnaeus, Buckhorn Plantain. Disturbed areas, especially on ballast at old ports, and probably only a waif; native of Eurasia. [= C, F, G, K2] {not yet keyed}

* *Plantago floccosa* Decaisne. Cp (FL): disturbed areas; native of Mexico. Panhandle FL. [= K2, WH] {not yet keyed; add to synonymy}

Plantago heterophylla Nuttall, Many-seeded Plantain. Fields, roadsides, disturbed areas. March-May. Se. VA and MO south to Panhandle FL and TX; adventive at scattered sites farther north (at least as far north as NY). [= RAB, C, F, G, K, S, W, WH, Y, Z; = *P. hybrida* W. Bart. – GW]

Plantago hookeriana Fischer & C.A. Meyer, Tallow-weed. Disturbed areas; native of sc. North America. [= K2] {not yet keyed; add to synonymy}



* *Plantago lanceolata* Linnaeus, English Plantain, Rib-grass. Lawns, roadsides, disturbed areas; native of Europe. April-November. [= RAB, C, K, Pa, S, W, WH, WV, Z; > *P. lanceolata* var. *lanceolata* – F, G; > *P. lanceolata* var. *sphaerostachya* Mertens & Koch – F, G; > *P. lanceolata* var. *angustifolia* Poiret – G]

*? *Plantago major* Linnaeus, Common Plantain, Whiteman's-foot. Lawns, roadsides, disturbed areas; native of Europe, possibly also native in ne. North America, possibly as far south as the northern part of our area. June-November. Very variable, and possibly worthy of some of the infraspecific subdivisions suggested by various authors. The Coastal Plain populations associated with the Chesapeake Bay in VA may represent a native, estuarine genotype. [= RAB, C, GW, K, Pa, S, W, WH, WV, Z; > *P. major* var. *major* – F; > *P. major* var. *scopulorum* Fries & Broberg – F; > *P. major* ssp. *pleiosperma* Pilger var. *paludosa* Béguinot – G; > *P. major* ssp. *pleiosperma* Pilger var. *scopulorum* Fries & Broberg – G; > *P. major* var. *intermedia* (A.P. de Candolle) Pilger]

Plantago maritima Linnaeus var. *juncooides* (Lamarck) A. Gray, Seaside Plantain. Salt marshes. Var. *juncooides* apparently ranges from Greenland and ne. Canada south to e. VA. Other varieties occur in nw. North America and n. Eurasia, the species as a whole is an interruptedly circumboreal plant of ocean shores, also disjunct inland in saline areas. [= K; = *P. maritima* ssp. *juncooides* (Lamarck) Hultén – C; > *P. juncooides* Lamarck var. *decipiens* (Barnéoud) Fernald – F; < *P. maritima* – G]

* *Plantago patagonica* Jacquin, Woolly Plantain. Roadsides. United States and s. South America. May-June. [= K, Z; > *P. purshii* Roemer & Schultes – RAB, F; > *P. patagonica* var. *patagonica* – C, G; > *P. patagonica* var. *gnaphaloides* (Nuttall) A. Gray – C, G]

* *Plantago psyllium* Linnaeus, Leafy-stemmed Plantain. Disturbed areas; introduced from Europe. June-November. [= C, K, Pa, Z; = *P. psyllium* – RAB, orthographic variant; > *P. indica* Linnaeus – F, G; ? *P. arenaria* Waldstein & Kitaibel]

Plantago pusilla Nuttall, Little Plantain. Roadsides, disturbed areas; probably native of sc. United States (the original range uncertain). March-June. Belden et al. (2004) discuss the Virginia occurrence, on Fort Pickett Military Reservation, Nottoway County. [= C, K, Pa, S, WH, Y, Z; > *P. pusilla* var. *pusilla* – F, G; > *P. pusilla* var. *major* Engelmann – F, G; = *P. elongata* Pursh – GW]



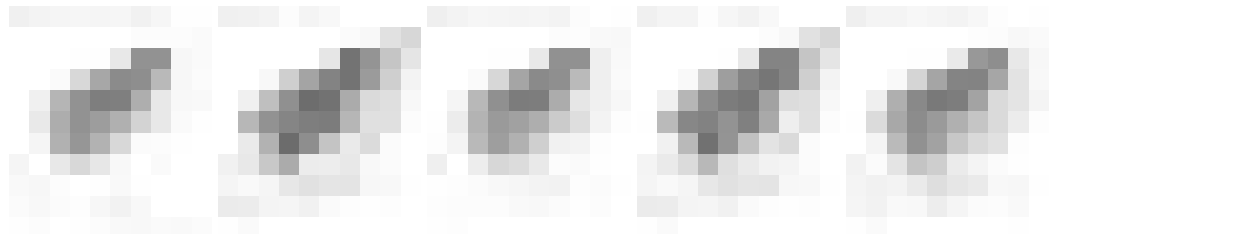
* ***Plantago rhodosperma*** Decaisne, Redseed Plantain. Reported as ranging east to KY, TN, and GA (Kartesz 1999), probably as adventive from farther west. The reports for GA and TN require confirmation. [= C, F, G, K]

Plantago rugelii Decaisne, American Plantain, Broad-leaved Plantain, Blackseed Plantain. Roadsides, lawns, disturbed areas. June-November. Widespread in e. and c. North America, the original distribution obscure. [= RAB, C, F, G, GW, Pa, S, W, WH, WV, Z; > *P. rugelii* var. *rugelii* – K; > *P. rugelii* var. *asperula* Farwell – K]

Plantago sparsiflora Michaux, Pineland Plantain. Wet savannas over calcareous substrates (coquina limestone), now usually found in moister human-created microhabitats adjacent to these sites, such as fire-plow lines, shallow ditches along roadsides, or mowed powerline rights-of-way. April-October. Se. NC south to ne. FL, restricted to the Coastal Plain. Harper (1944), with his usual keen understanding of the ecology of southeastern plants, has provided the most succinct and accurate description of the habitat of this plant: "flattish pine-barrens where there is evidently some calcareous material not far from the surface." Reports of this species for VA are in error. [= RAB, GW, K, S, WH, X, Z]

Plantago virginica Linnaeus, Virginia Plantain. Roadsides, lawns, disturbed areas. Late March-July. MA and NY west to SD, south to s. FL and TX. [= RAB, C, G, K, Pa, S, W, WH, WV, Z; > *P. virginica* var. *virginica* – F; > *P. virginica* var. *viridescens* Fernald – F]

Plantago wrightiana Decaisne, Wright's Plantain. Roadsides, lawns, disturbed areas. Late April-July. VA, NC, OK, and AZ south to c. peninsular FL, MS, TX, and Mexico, the original distribution unclear. [= K, WH, Z; = *P. hookeriana* Fischer & C.A. Meyer var. *nuda* (A. Gray) Poe – RAB, W]



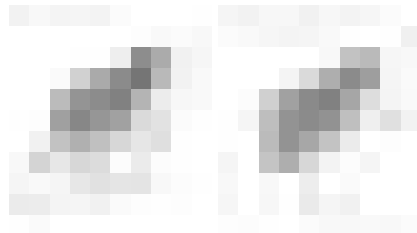
Scoparia Linnaeus 1753 (Goat-weed, Sweet-broom)

A genus of about 20 species, herbs, of tropical and subtropical America. References: Pennell (1935)=P.

- 1 Corolla white; sepals 4, ovate; stem 3-8 dm tall; annual.....*S. dulcis*
- 1 Corolla yellow; sepals 5, lanceolate; stem 1-1.5 d tall; perennial*S. montevidensis* var. *glandulifera*

Scoparia dulcis Linnaeus, Goat-weed, Sweet-broom, Licorice-weed. Marshes, wet hammocks, flatwoods, disturbed places, rather weedy and the original distribution unclear. May-October (or all year southward). [= RAB, GW, K, P, S, WH]

* ***Scoparia montevidensis*** (Sprengel) R.E. Fries var. *glandulifera* (Fritsch) R.E. Fries. On ballast, other disturbed areas; native of South America. [= K, P, WH]



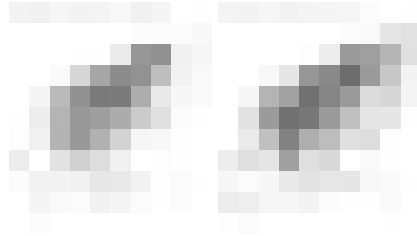
Sophranthe Bentham 1836

A genus of 2 species, herbs, of southeastern North America. The two taxa included here are not part of *Gratiola*. References: Pennell (1935)=P.

- 1 Leaves linear-subulate; corolla 2-3× as long as the calyx*S. hispida*
- 1 Leaves ovate; corolla 1-1.5 × as long as the calyx*S. pilosa*

Sophronanthe hispida Benth. ex Lindley, Pineland Hedge-hyssop. Dry pinelands, dunes. E. GA (within a few counties of SC) south to s. FL, and west to MS. [= P, S; = *Gratiola hispida* (Benth. ex Lindley) Pollard – GW, K, WH]

Sophronanthe pilosa (Michaux) Small, Shaggy Hedge-hyssop. Marshes, wet areas, wet pine savannas. June-September. NJ south to s. FL, west to e. TX, northward in the interior to KY, TN, AR, and e. OK. [= *Gratiola pilosa* Michaux = RAB, C, F, G, GW, K, W, WH; > *Tragiola pilosa* (Michaux) Small & Pennell var. *typica* – P; = *Tragiola pilosa* (Michaux) Small & Pennell – S]



Veronica Linnaeus 1753 (Speedwell)

A genus of about 180 species, herbs, nearly cosmopolitan (at least now), most diverse in Europe. The genus appears to be paraphyletic as currently circumscribed (Albach & Chase 2001). References: Walters & Webb (1972)=Z; Crow & Hellquist (2000)=Y; Pennell (1935)=P. Key partly based on C.

- 1 Flowers in axillary racemes; upper bracteal leaves opposite throughout.
 - 2 Leaves and stems pubescent; [plants of mesic to dry habitats]; [section *Veronica*].
 - 3 Leaves cuneate at the base; leaves widest at the middle or beyond; pedicels shorter than the subtending bracts *V. officinalis*
 - 3 Leaves cordate, truncate or rounded at the base; leaves widest toward the base; pedicels equaling or longer than the subtending bracts.
 - 4 Stem pubescence generally distributed; calyx shorter than the capsule; style 6-8 mm long; stems erect [*V. austriaca* ssp. *teucrium*]
 - 4 Stem pubescence restricted to 2 lines; calyx longer than the capsule; style 3-5 mm long; stems creeping or ascending *V. chamaedrys*
 - 2 Leaves and stems glabrous, or with fine glandular hairs in the inflorescence only; [plants of wetlands].
 - 5 Leaves (even the upper) short-petiolate; [section *Beccabunga*].
 - 6 Leaves broadest toward the base, acute at the tip; style 2.5-3.5 mm long *V. americana*
 - 6 Leaves broadest near or above the middle, rounded at the tip; style 1.8-2.2 mm long *V. beccabunga*
 - 5 Leaves (at least the middle and upper) sessile.
 - 7 Capsule flattened, conspicuously notched at the style and therefore appearing 2-lobed, wider than long; seeds 1.2-1.8 mm long; leaves (3-) 4-20× as long as wide; < 1 cm wide, tapering to the base and not clasping; [section *Veronica*] *V. scutellata*
 - 7 Capsule turgid, slightly or not notched at the style, about as long as wide; seeds <0.5 mm long; leaves 1.5-5 (-8)× as long as wide, mostly > 1 cm wide, clasping at the base; [section *Beccabunga*].
 - 8 Racemes 20-65-flowered; pedicels 4-8 mm long; capsule ovoid to globose, not notched or barely so *V. anagallis-aquatica*
 - 8 Racemes 5-25 (-35)-flowered; pedicels 3-6 mm long; capsule broadly obcordate, distinctly though slightly notched at the style..... [*V. catenata*]
- 1 Flowers in terminal racemes or solitary and axillary, subtended by normally-sized leaves; upper bracteal leaves often alternate.
 - 9 Bracts abruptly smaller than the foliage leaves, the flowers thus in well-developed terminal racemes or spikes; perennials from rhizomes.
 - 10 Stems 3-10 dm tall; flowers in a crowded terminal spike; larger leaves > 4 cm long, sharply serrate; [section *Pseudolysimachium*]..... *V. longifolia*
 - 10 Stems 1-3 dm tall; flowers in loose racemes; larger leaves < 2.5 cm long, entire to weakly toothed; [section *Veronicastrum*].
 - 11 Flowers bright blue; pedicels with some longer gland-tipped hairs; flowers usually < 12 per raceme... [*V. serpyllifolia* var. *humifusa*]
 - 11 Flowers pale blue with darker blue lines; pedicels puberulent; flowers usually > 12 per raceme *V. serpyllifolia* var. *serpyllifolia*
 - 9 Bracts gradually reduced in size upward, all of the flowers or at least those lower on the stem axillary in the axils of well-developed foliage leaves; annuals (except *V. filiformis*); [section *Pocilla*].
 - 12 Pedicels 0-2 mm long; flowers in the axils of bracts, all or at least the upper of which are very different than foliage leaves.
 - 13 Leaves 3-10× as long as wide, toothed or entire; flowers white or very pale, ca. 2 mm across; stems usually glabrous (except *V. peregrina* var. *xalapensis*).
 - 14 Stem glabrous; sepals and fruit glabrous *V. peregrina* var. *peregrina*
 - 14 Stem pubescent with short, gland-tipped hairs; sepals and fruit glabrous or pubescent with short, gland-tipped hairs *V. peregrina* var. *xalapensis*
 - 13 Leaves 1-2× as long as wide, palmately lobed or toothed; flowers blue, 2-4 mm across; stems pubescent.
 - 15 Upper leaves and lower bracts trilobed, the lobes cut > ½ way to base *V. triphyllos*
 - 15 Leaves unlobed (though crenate-serrate).
 - 16 Style 0.4-1.0 mm long *V. arvensis*
 - 16 Style ca. 1.5 mm long *V. dillenii*
 - 12 Pedicels 5-40 mm long; flowers in the axils of leaves similar in shape and size to foliage leaves (though the upper are sometimes somewhat smaller).
 - 17 Perennial, the stems rooting at the nodes the length of the stem; pedicels > 2× as long as the leaves *V. filiformis*
 - 17 Annual, the stems not rooting at the nodes (or at most only at the base of the plant); pedicels < 2× as long as the leaves.
 - 18 Calyx lobes cordate at the base; leaves with 3-7 teeth or shallow lobes *V. hederifolia*
 - 18 Calyx lobes cuneate to rounded at the base; leaves with usually > 7 small teeth or crenations.
 - 19 Lobes of the capsule with apices diverging at ca. 90 degrees; corolla > 8 mm wide *V. persica*
 - 19 Lobes of the capsule with apices parallel or diverging at an acute angle; corolla < 8 mm wide.
 - 20 Capsule with all hairs straight and gland-tipped; corolla white to pale blue or violet *V. agrestis*

20 Capsule with a mixture of short, arching, non-glandular hairs and longer, straight, gland-tipped hairs; corolla bright blue.....
*V. polita*

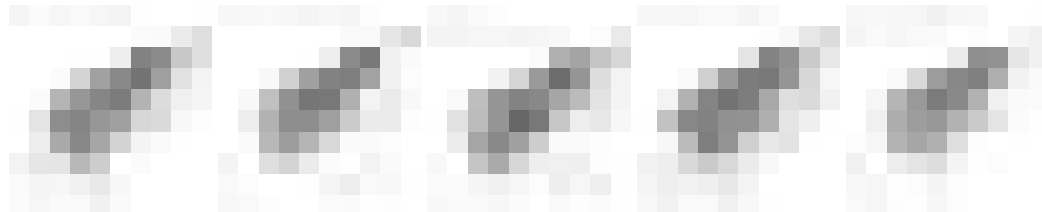
* *Veronica agrestis* Linnaeus, Field Speedwell. Lawns and disturbed areas; native of Eurasia. April-July. [= C, F, G, K, P, Pa, WH, Z; < *V. agrestis* – RAB, G; < *V. polita* – WV]

Veronica americana Schweinitz ex Bentham, American Speedwell, Brooklime. Bogs, marshes, streamsides. May-October; July-November. NL (Newfoundland) west to AK, south to NC, TN, TX, and CA; ne. Asia. [= RAB, C, F, G, K, P, Pa, S, W, WV, Y]

Veronica anagallis-aquatica Linnaeus, Water Speedwell. Bogs, marshes, streamsides, ditches. May-September; July-October. Circumboreal, south in North America to c. peninsular FL, TX, and CA; some occurrences probably represent introductions of European material. Some authors interpret *V. anagallis-aquatica* as being non-native in North America. [= C, F, G, P, Pa, WH, WV, Y; < *V. anagallis-aquatica* – RAB, C, K, W, Z]

* *Veronica arvensis* Linnaeus, Corn Speedwell, Wall Speedwell. Fields, roadsides, disturbed areas; native of Eurasia. March-September. [= RAB, C, F, G, K, P, Pa, S, W, WH, WV, Z]

* *Veronica austriaca* Linnaeus ssp. *teucrium* (Linnaeus) D.A. Webb. Disturbed areas. June. Native of Eurasia, is naturalized at scattered locations in PA (Rhoads & Klein 1993) and MD (Kartesz 1999). [= K, Z; = *V. teucrium* Linnaeus – C; = *V. latifolia* Linnaeus – F, G, P, nomen ambiguum, perhaps misapplied; < *V. austriaca* – Pa]



* *Veronica beccabunga* Linnaeus, European Brooklime. Wet places; native of Europe. September-November. Naturalized south to MD, WV, and perhaps VA. [= C, F, G, K, P, Pa, WV, Y, Z]

Veronica catenata Pennell. Streams and wetlands. Circumboreal, the southern limits obscure because of taxonomic confusion, misidentifications, and misattributions. [= C, Y; < *V. anagallis-aquatica* Linnaeus – K, W, Z; > *V. comosa* Richter – F; > *V. salina* Schur – G; > *V. connata* Rafinesque var. *typica* – P; > *V. glandifera* Pennell – P, S; > *V. catenata* Pennell – P, Z] {not yet mapped}

* *Veronica chamaedrys* Linnaeus, Germander Speedwell. Golf courses, lawns; native of Eurasia. April-June. [= RAB, C, F, G, K, P, Pa, WV; ? *V. chamaedrys* ssp. *chamaedrys* – Z]

* *Veronica dillenii* Crantz, Dillenius's Speedwell. Disturbed areas; native of Europe. [= C, G, K, P, Z; < *V. verna* Linnaeus – F]

* *Veronica filiformis* J.E. Smith, Creeping Speedwell. Lawns, disturbed areas; native of Eurasia. April-August. In WV, MD, and scattered in PA (Rhoads & Klein 1993). [= C, F, G, K, P, Pa, WV, Z]



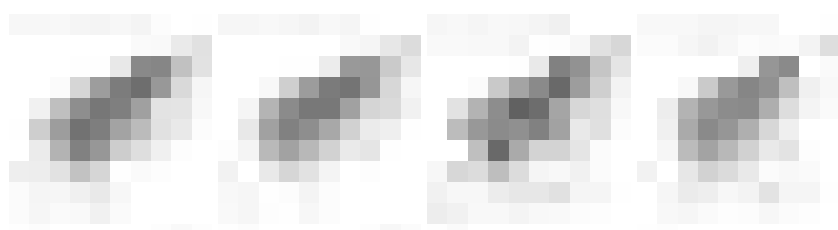
* *Veronica hederifolia* Linnaeus, Ivyleaf Speedwell. Lawns, fields, disturbed areas; native of Europe. March-June. [= K, Pa, W; = *V. hederifolia* – RAB, C, F, G, P, S, WV, orthographic variant; ? *V. hederifolia* ssp. *hederifolia* – Z]

* *Veronica longifolia* Linnaeus, Garden Speedwell, Longleaf Speedwell. Disturbed areas; native of Europe. May-September. In WV, scattered in PA (Rhoads & Klein 1993), KY, and in MD (F). [= C, F, G, K, P, Pa, WV, Z] (not yet mapped)

*? *Veronica officinalis* Linnaeus, Common Speedwell, Gypsyweed, Heath Speedwell. Fields and forests; often interpreted as being of mixed native and alien background. May-September. [= RAB, C, G, P, Pa, S, W, WV, Z; > *V. officinalis* var. *officinalis* – F, K; > *V. officinalis* var. *tournefortii* (Vill.) Reichenbach – F, K]

Veronica peregrina Linnaeus var. *peregrina*, Common Purslane Speedwell, Neckweed. Fields, roadsides, disturbed areas. April-August. NS and ND south to FL and TX; AK south to OR (perhaps only as an introduction?); South America. [= C, F, G, S, WV; = *V. peregrina* ssp. *peregrina* – K, Pa; < *V. peregrina* – RAB, W, Z; = *V. peregrina* var. *typica* – P; ? *V. peregrina* – WH]

* *Veronica peregrina* Linnaeus var. *xalapensis* (Kunth) Pennell, Western Purslane Speedwell. Fields, lawns, disturbed places; in the eastern part of our area probably introduced on ballast. April-May. QC and AK south to MA, KY, TX, and south to Guatemala. [= C, F, G, P, S; = *V. peregrina* ssp. *xalapensis* (Kunth) Pennell – K, Pa; < *V. peregrina* – RAB, W, Z]



* *Veronica persica* Poiret, Bird's-eye Speedwell. Lawns, fields, roadsides, disturbed areas; native of Eurasia. March-October. [= RAB, C, F, G, K, P, Pa, S, W, WV, Z]

* *Veronica polita* Fries. Lawns, waste areas; native of Eurasia. March-August. This species is introduced in c. TN (Chester, Wofford, & Kral 1997), WV, and s. PA (Rhoads & Klein 1993), FL (Pennell 1935; Kunzer et al. 2009), NC, and VA (Kartesz 1999). It is similar to *V. agrestis* and has been much confused with it. [= C, F, K, Pa, S, WH, Z; < *V. agrestis* – RAB, G; ? *V. didyma* Tenore – P, misapplied; < *V. polita* – WV]

Veronica scutellata Linnaeus, Narrowleaf Speedwell. Marshes, swamps. May-September. Circumboreal, south in North America to w. VA, NC?, TN, and CA. In ne. TN (Chester, Wofford, & Kral 1997). [= C, G, K, P, Pa, W, WV, Y, Z; ? *V. scutellata* var. *scutellata* – F]

*? *Veronica serpyllifolia* Linnaeus var. *humifusa* (Dickson) Vahl. May range south to MD (Pennell 1935, Kartesz 1999). It is native in n. North America. April-June. [= C, G; < *V. serpyllifolia* – F; = *V. serpyllifolia* ssp. *humifusa* (Dickson) Syme – K, Z; = *V. humifusa* Dickson – P]

* *Veronica serpyllifolia* Linnaeus var. *serpyllifolia*, Thymeleaf Speedwell. Meadows, lawns, roadsides, other disturbed areas; native of Eurasia. April-August. [= C, G; = *V. serpyllifolia* ssp. *serpyllifolia* – K, Z; < *V. serpyllifolia* – RAB, F, Pa, S, W, WV; = *V. serpyllifolia* – P]

* *Veronica triphyllos* Linnaeus. Cultivated fields; native of Eurasia. April. [= RAB, K, P]



Veronicastrum Heister ex Fabricius 1759 (Culver's-root)

A genus of 2 species, herbs, of e. North America and e. Asia. References: Pennell (1935)=P.

Veronicastrum virginicum (Linnaeus) Farwell, Culver's-root. Streambanks, bogs, wet meadows, dryish soils in areas with prairie affinities. July-September. VT west to MB, south to nc. and nw. GA, w. FL Panhandle (Escambia County), and LA. Populations seem to be of somewhat sporadic or irregular appearance from year to year. [= RAB, C, F, G, GW, K, P, Pa, S, W, WH, WV]



369. SCROPHULARIACEAE A.L. de Jussieu 1789 (Figwort Family) [in LAMIALES]

There is increasing evidence that the Scrophulariaceae as traditionally constituted includes two main and quite distinct groups (Olmstead & Reeves 1995; Young, Steiner, & dePamphilis 1999; Albach, Meudt, & Oxelman 2005). Based on molecular analysis, Young, Steiner, & dePamphilis (1999) suggest that Scrophulariaceae, Antirrhinanthaceae, and Orobanchaceae be restructured to include the current members of Orobanchaceae, Scrophulariaceae, and Callitrichaceae. Beardsley & Olmstead (2002) suggest that *Mimulus* and *Mazus* be included with *Phryma* in a redefined Phrymaceae. Additional changes have been suggested, as summarized below. References: Pennell (1935)=P; Olmstead & Reeves (1995); Young, Steiner, & dePamphilis (1999); Olmstead et al. (2001); Beardsley & Olmstead (2002). [also see OROBANCHACEAE, PAULOWNIACEAE, PHRYMACEAE, and PLANTAGINACEAE]

Disposition of the traditional Scrophulariaceae (including Antirrhinanthaceae), Orobanchaceae, Plantaginaceae, Buddlejaceae, Phrymaceae: Linderniaceae: *Lindernia*, *Hemianthus*, *Micranthemum*, *Torenia*

Orobanchaceae: *Agalinis, Aureolaria, Buchnera, Castilleja, Conopholis, Dasistoma, Epifagus, Macranthera, Melampyrum, Orobanche, Pedicularis, Schwalbea, Seymeria, Striga.*

Plantaginaceae (Veronicaceae): *Amphianthus, Antirrhinum, Bacopa, Callitriche, Chaenorrhinum, Chelone, Collinsia, Cymbalaria, Digitalis, Gratiola, Kickxia, Leucospora, Limmophila, Limosella, Linaria, Mecardonia, Misopates, Nuttallanthus, Penstemon, Plantago, Scoparia, Veronica, Veronicastrum.*

Mazaceae: *Mazus.*

Phrymaceae: *Glossostigma, Mimulus, Phryma, Erythranthe.*

Scrophulariaceae s.s.: *Buddleja, Scrophularia, Verbascum.*

- 1 Plant a shrub; inflorescence a terminal thyrse**Buddleja**
- 1 Plant an herb; inflorescence a raceme, a spike, or a diffuse panicle.
 - 2 Corolla cylindrical, purplish; fertile stamens 4.....**Scrophularia**
 - 2 Corolla rotate, yellowish; fertile stamens 5**Verbascum**

Buddleja Linnaeus 1753 (Butterfly-bush)

A genus of about 90 species, trees and shrubs, of subtropical and tropical America, Asia, and Africa. Members of the genus are grown for ornament and for their attractiveness as nectaring sites for butterflies. References: Rogers (1986)=Z; Oxelman, Kornhall, & Norman in Kadereit (2004).

- 1 Leaves serrate or crenate; corolla, calyx, pedicels, and inflorescence rachis pubescent (not granular-farinoso)**B. davidii**
- 1 Leaves entire or remotely dentate; corolla, calyx, pedicels, and inflorescence rachis granular-farinoso**B. lindleyana**

* *Buddleja alternifolia* Maximowicz. Reported as introduced in NC by Kartesz (1999), but the alleged documentation is not present. {not keyed; not mapped; rejected as a component of our flora}

* *Buddleja davidii* Franchet, Summer-lilac, Orange-eye Butterfly-bush. Planted, rarely escaped to disturbed places, such as thickets or streambanks (Wise Co., VA); native of China. June-October. [= RAB, C, F, G, Pa, K, Z]

* *Buddleja lindleyana* Fortune ex Lindley. Rarely escaped to disturbed areas; native of China. June-October. [= RAB, K, Z; = *Adenoplea lindleyana* (Fortune ex Lindley) Small – S]

* *Buddleja officinalis* Maximowicz. Reported as introduced in GA by Kartesz (1999), but the alleged documentation is not available. {not keyed; not mapped; rejected as a component of our flora}

Scrophularia Linnaeus 1753 (Figwort)

A genus of about 200 species, of temperate and tropical regions of the Old and New Worlds. Though our 2 species are only subtly distinct morphologically, they are clearly distinct. References: Pennell (1935)=P; Fischer in Kadereit (2004).

- 1 Staminode (hidden under the upper corolla lip) yellowish-green, usually wider than long; leaf serrations coarse, often > 3 mm long; flowering May-early July; capsule 6-10 mm long.....**S. lanceolata**
- 1 Staminode dark purple or brownish, usually longer than wide; leaf serrations fairly fine, < 3 mm long; flowering mid July-October; capsule 4-7 mm long **S. marilandica**

Scrophularia lanceolata Pursh, American Figwort. Woodlands and forests. May-early July. QC and NS west to BC, south to VA, MO, NM, and n. CA. [= C, F, G, K, P, Pa, W, WV]

Scrophularia marilandica Linnaeus, Eastern Figwort. Moist to dry, nutrient-rich woodlands and forests, especially over mafic or calcareous rocks. July-October. QC west to MN, south to SC, ne. GA, sw. GA, and LA. [= RAB, C, F, G, K, P, Pa, S, W, WV]

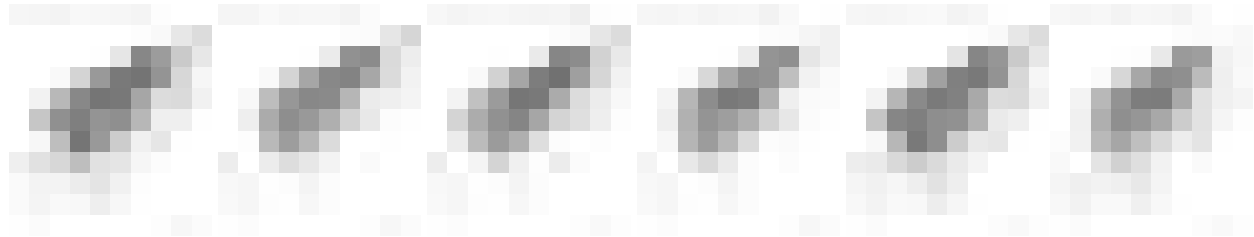


Verbascum Linnaeus 1753 (Mullein)

A genus of about 360 species, herbs (annual, biennial, and perennial) and shrubs, of Eurasia and ne. Africa. References: Pennell (1935)=P; Fischer in Kadereit (2004).

- 1 Leaves green and glabrous on both sides, or sparsely pubescent with glandular hairs; hairs of the calyx and upper stem simple and glandular.
 - 2 Flowers 1 per node throughout the inflorescence; pedicels longer than the calyx; glandular hairs usually restricted to the upper part of the plant **V. blattaria**

- 2 Flowers usually > 1 per node in the lower parts of the inflorescence; pedicels shorter than the calyx; glandular hairs extending down the stem to the base..... **V. virgatum**
- 1 Leaves densely tomentose at least on the lower surface, and often the upper as well; hairs of the calyx and upper stem branched, not glandular (except in *V. sinuatum*).
 - 3 Inflorescence generally simple (sometimes with 1-several small branches), dense and spike-like (at least initially); leaves moderately to densely tomentose above; upper 3 filaments bearing white hairs.
 - 4 Leaves sessile to auriculate-clasping, slightly or not at all decurrent on the stem; stigma patulate, decurrent on the style; corolla white or yellow..... **V. phlomoides**
 - 4 Leaves sessile, decurrent down the stem to the next leaf; stigma capitate; corolla yellow..... **V. thapsus**
 - 3 Inflorescence freely branched, paniculate; leaves green and nearly glabrous above; all 5 filaments bearing either white or violet hairs.
 - 5 Basal leaves not lobed; inflorescence lacking glandular hairs; filaments bearing white hairs..... **V. lychnitis**
 - 5 Basal leaves lobed; inflorescence with glandular hairs; filaments bearing violet hairs..... **V. sinuatum**
- * **Verbascum blattaria** Linnaeus, Moth Mullein. Fields, roadsides, disturbed areas; native of Eurasia. May-June; June-July. [= RAB, C, F, G, K, P, Pa, S, W, WH, WV]
- * **Verbascum lychnitis** Linnaeus, White Mullein. Disturbed areas, fields; native of Eurasia. June-August. [= RAB, C, F, G, K, P, Pa, S]
- * **Verbascum phlomoides** Linnaeus, Clasping Mullein, Orange Mullein. Disturbed areas, roadsides; native of Europe. May-August; July-September. [= RAB, C, F, G, K, P, Pa, W, WV]
- * **Verbascum sinuatum** Linnaeus, Wavyleaf Mullein. Disturbed areas; on ballast; native of Eurasia. July-August. Introduced at scattered locations in MD, PA, NJ, and NY, on ballast and in disturbed areas. [= G, K, Pa]
- * **Verbascum thapsus** Linnaeus, Woolly Mullein, Common Mullein, Flannel-plant, Velvet-plant. Fields, roadsides, disturbed areas; native of Europe. June-September; July-October. [= RAB, C, F, G, K, P, Pa, S, W, WH, WV]
- * **Verbascum virgatum** Stokes, Twiggy Mullein. Sandhills, sandy disturbed areas, roadsides; native of Europe. April-May; June. [= RAB, C, F, G, K, P, Pa, S, WH]



371. LINDERNIACEAE Borsch, K. Müller, & Eb. Fischer 2005 (False-pimpernel Family) [in LAMIALES]

A family of about 13 genera and 195 species, herbs, pantropical and warm temperate. References: Tank et al. (2006); Pennell (1935)=P; Fischer in Kadereit (2004).

- 1 Calyx conspicuously 5-winged..... **Torenia**
- 1 Calyx not winged.
 - 2 Flowers > 4 mm long..... **Lindernia**
 - 2 Flowers < 2 mm long.
 - 3 Leaves elliptic, cuneate at the base; calyx lobes even, all of the sinuses reaching nearly to the base of the calyx..... **Hemianthus**
 - 3 Leaves orbicular, rounded at the base; calyx lobes uneven, 3 of the sinuses extending about halfway to the base of the calyx, the lowermost sinus extending to the base..... **Micranthemum**

Hemianthus Nuttall 1817

A genus of 3-4 species, annual herbs, of se. North America and Central America. The recognition of *Hemianthus* as separate from *Micranthemum* is uncertain and needs additional study. References: Pennell (1935)=P; Fischer in Kadereit (2004).

- 1 Calyx lobes acute, 1/3 to 1/2 as long as the calyx tube; flowers opening, chasmogamous..... **H. glomeratus**
- 1 Calyx lobes obtuse, < 1/4 as long as the calyx tube; flowers not opening, cleistogamous..... **H. micranthemoides**

Hemianthus glomeratus (Chapman) Pennell. Lake margins, ponds. January-December. Panhandle FL (Gadsden County) south to s. FL. [= P; = *Micranthemum glomeratum* (Chapman) Shinners WH]

Hemianthus micranthemoides Nuttall, Nuttall's *Micranthemum*. Muddy, freshwater intertidal shores, possibly extinct. September-October. NY (Hudson River) south to VA (Chesapeake Bay, Potomac River, James River). [= C, G, P; = *Micranthemum micranthemoides* (Nuttall) Wettstein - F, K, Pa]

Lindernia Allioni 1755 (False-pimpernel)

A genus of about 80-100 species, of warm temperate and subtropical regions of the Old and New Worlds. References: Cooperrider & McCready (1975)=Z; Qualls (1984)=Y; Lewis (2000)=X; Pennell (1935)=P; Fischer in Kadereit (2004).

- 1 Fertile stamens 4; calyx lobes connate at anthesis for $> \frac{1}{2}$ their length, later separating; [section *Torenioides*] *L. crustacea*
- 1 Fertile stamens 2 (with 2 staminodia without anthers, or with rudimentary anthers); calyx lobes separate, or connate at base for $< \frac{1}{4}$ the length of the calyx.
 - 2 Capsule lanceoloid, $> 8\times$ as long as its diameter; calyx lobes connate at base $< \frac{1}{4}$ the length of the calyx; [section *Bonnaya*] *L. antipoda*
 - 2 Capsule ovoid to ellipsoid, $< 5\times$ as long as its diameter; calyx lobes distinct to the base at anthesis and after; [section *Brachycarpae*].
 - 3 Pedicels shorter than or about as long as the subtending leaves *L. dubia* var. *dubia*
 - 3 Pedicels longer than the subtending leaves (or bracteal leaves in some species).
 - 4 Leaves nearly orbicular; stems creeping *L. grandiflora*
 - 4 Leaves distinctly longer than wide; stems erect (sometimes decumbent at the base and rooting if knocked down by water).
 - 5 Leaves not glandular punctate; seeds $2-3\times$ as long as wide *L. dubia* var. *anagallidea*
 - 5 Leaves glandular punctate; seeds ca. $1\times$ as long as wide.
 - 6 Leaves primarily in a basal rosette, leaves of the stem strongly reduced upward to bracts; capsule (1.8-) 3.4-7 mm long; [primarily of seepage of flatrocks] *L. monticola* ("*monticola*" form)
 - 6 Leaves primarily on the stem, not conspicuously reduced upward; capsule 1.4-3.4 mm long; [of stream or river banks] *L. monticola* ("*saxicola*" form)

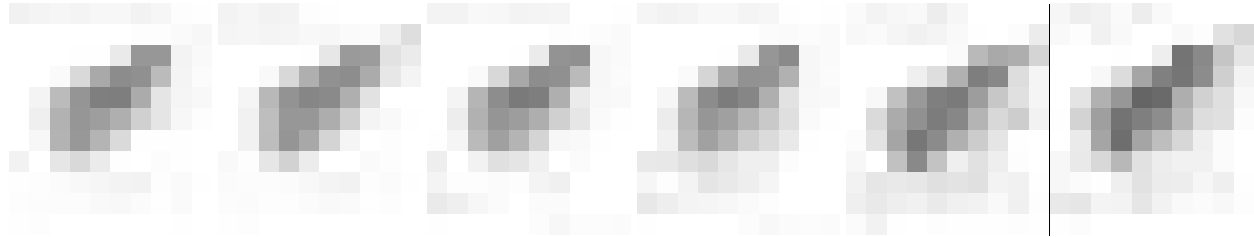
* *Lindernia antipoda* (Linnaeus) Alston. Disturbed areas; native of se. Asia, Polynesia, and n. Australia. [= K, Y]

* *Lindernia crustacea* (Linnaeus) F. Mueller. Lawns; native of Malaysia. September. [= RAB, GW, K, P, WH, X, Y]

* *Lindernia diffusa* (Linnaeus) Wettstein. Reported for SC by Kartesz (1999) on the basis of specimens at NCU, but the specimens so labelled are actually *L. dubia*. {rejected; not keyed or mapped}

Lindernia dubia (Linnaeus) Pennell var. *anagallidea* (Michaux) Cooperrider. Wet sandy or muddy areas. June-September. Nearly throughout North America, Central America, and South America. The extensive and essentially coincident ranges of the two varieties of *L. dubia* suggests that they may be merely forms, as suggested by Voss (1996). [= C, K, Pa, WH, X, Y, Z; = *L. anagallidea* (Michaux) Pennell – RAB, F, G, GW, P, WV; = *Ilysanthes inequalis* (Walter) Pennell – S; < *L. dubia* – W]

Lindernia dubia (Linnaeus) Pennell var. *dubia*. Wet sandy or muddy areas. May-November. Nearly throughout North America, Central America, and South America. [= C, WH, X, Y, Z; = *L. dubia* (Linnaeus) Pennell – RAB, GW, WV; > *L. dubia* var. *dubia* – F, G, K, Pa; > *L. dubia* var. *riparia* (Rafinesque) Fernald – F, G; > *L. dubia* var. *inundata* Pennell – F, G, K, Pa; > *L. dubia* var. *major* (Pursh) Pennell – P; > *L. dubia* var. *typica* – P; = *Ilysanthes dubia* (Linnaeus) Barnhart – S; < *L. dubia* – W]



Lindernia grandiflora Nuttall. Depressional wetlands. S. GA south to s. FL. [= GW, K, P, WH, X, Y; = *Ilysanthes grandiflora* (Nuttall) Bentham – S]

Lindernia monticola Muhlenberg ex Nuttall, Flatrock Pimpernel, Riverbank Pimpernel. In seasonal seepage on granitic flatrocks, and on river-scoured siliceous rocks. April-June (-September). Nc. and sw. NC south to ne. FL and ec. AL. *L. saxicola* appears to be merely a form of *L. monticola*, the leafy stems the result of the basal leaves being covered by silt deposited by floodwaters (Qualls 1984; Lewis 2000); this needs additional study. [= K, WH, X; > *L. monticola* – RAB, GW, P, W, Y; > *L. saxicola* M.A. Curtis – RAB, P, W, Y; > *Ilysanthes monticola* (Muhlenberg ex Nuttall) Rafinesque – S; > *Ilysanthes saxicola* (M.A. Curtis) Chapman – S]

* *Lindernia procumbens* (Krock.) Borb. One record as a waif in Arlington County, VA. {rejected; not keyed or mapped}

Micranthemum Michaux 1803

A genus of 14-17 species, annual herbs, of s. North America, Central America, and South America. The recognition of *Hemianthus* as separate from *Micranthemum* is uncertain and needs additional study. References: Pennell (1935)=P; Fischer in Kadereit (2004).

Micranthemum umbrosum (J.F. Gmelin) Blake, Shade Mudflower. Shallow pools, stagnant streams, wet depressions in swamp forests. May-October. Se. VA south to FL, west to TX, and south into tropical America (Mexico, Central America, West Indies, e. South America). [= RAB, C, F, G, GW, K, P, WH; = *Globifera umbrosa* J.F. Gmelin – S]

Torenia Linnaeus 1753 (Blue-wings)

A genus of about 40 species of the Old World tropics. References: Fischer in Kadereit (2004)

* *Torenia fournieri* Linden ex E. Fournier, Bluewings, Wishbone-flower. Disturbed areas, flowerbeds; native of China. Also reported for Mountains of NC (Pittillo & Brown 1988), but it appears that it was a short-lived waif there. Likely to be found sporadically, especially southward. [= K, WH]

372. PEDALIACEAE R. Brown 1810 (Sesame Family) [in LAMIALES]

A family of about 13 genera and 70 species, herbs, shrubs, and trees, of the Old World tropics.

Sesamum Linnaeus 1753 (Sesame)

A genus of about 19 species, of the old World tropics.

* *Sesamum orientale* Linnaeus, Sesame. Disturbed areas; native of the India and the East Indies. January-December. Also reported for AL. [= K, Pa, WH; = *S. indicum* Linnaeus – S]



373. LAMIACEAE Lindley 1836 or LABIATAE A.L. de Jussieu 1789 (Mint Family) [in LAMIALES]

A family of about 230-250 genera and 6700-7170 species, herbs, shrubs, vines, and trees, cosmopolitan. The placement in the Lamiaceae of several genera traditionally placed in Verbenaceae (e.g. *Clerodendrum*) is strongly supported by several lines of evidence. References: Harley et al. in Kadereit (2004).

incertae sedis: 1. *Callicarpa*.

subfamily Viticoideae: 2. *Vitex*.

subfamily Ajugoideae: 3. *Ajuga*, 4. *Teucrium*, 5. *Clerodendrum*, 6. *Trichostema*.

subfamily Scutellarioideae: 7. *Scutellaria*.

subfamily Lamiioideae:

tribe Synandreae: 8. *Synandra*, 9. *Macbridea*, 10. *Physostegia*

tribe Stachydeae: *Galeopsis*, *Stachys*, *Sideritis*

tribe Leonuridae: *Leonurus*

tribe Marrubieae: *Marrubium*

tribe Lamieae: *Lamium*

subfamily Nepetoideae:

tribe Elsholtzieae: *Collinsonia*, *Elsholtzia*, *Mosla*, *Perilla*.

tribe Mentheae:

subtribe Salviinae: *Rosmarinus*, *Salvia*.

subtribe Menthinae: *Blephilia*, *Clinopodium*, *Conradina*, *Cunila*, *Dicerandra*, *Hedeoma*, *Stachydeoma*, *Hyssopus*, *Lycopus*, *Mentha*, *Monarda*, *Origanum*, *Piloblephis*, *Prunella*, *Pycnanthemum*, *Thymus*.

subtribe Nepetinae: *Agastache*, *Dracocephalum*, *Glechoma*, *Meehania*, *Nepeta*.

incertae sedis: *Melissa*.

tribe Ocimeae:

subtribe Hyptidinae: *Hyptis*.

subtribe Ociminae: *Ocimum*.

- 1 Fruit a fleshy drupe; plant a small tree, shrub, or sprawling vine; mature stems terete or obscurely 4-sided (by secondary growth).
- 2 Flowers zygomorphic; leaves simple or palmately (3-) 5-7 (-9) foliolate; [subfamily Viticoideae].....2. *Vitex*
- 2 Flowers essentially actinomorphic; leaves simple.
 - 3 Stems pubescent with dendritic hairs; inflorescence axillary; calyx 0.5-2 mm, lobes diminutive to nearly obsolete; [genus incertae sedis]1. *Callicarpa*
 - 3 Stems glabrous or pubescent with simple hairs; inflorescence terminal (rarely only axillary); calyx 5-18 mm, lobes conspicuous; [subfamily Ajugoideae].....5. *Clerodendrum*
- 1 Fruit a schizocarp of 4 dry mericarps; plant **either** an herb **or** a shrub to 5 (-20) dm tall; mature stems usually distinctly 4-sided (sometimes terete or obscurely 4-sided).
 - 4 Calyx with either a distinctly enlarged protuberance on the upper surface, or the upper lobe expanded and “cap-like”.
 - 5 Calyx with 5 lobes, clearly separate apically, with the upper lobe expanded and “cap-like” *Ocimum*
 - 5 Calyx with 2 entire lobes joined at the margins, rounded apically, with a distinct protuberance on the upper surface.....7. *Scutellaria*
 - 4 Calyx without an enlarged protuberance or “cap-like” upper lobe.

- 6 Upper lip of corolla greatly reduced or lobes laterally disposed, thus the corolla appearing to consist of one large lower lip; [subfamily *Ajugoideae*].
- 7 Lower lip with 2-4 lobes; flowers yellow or deep blue-purple; plants stoloniferous3. *Ajuga*
- 7 Lower lip appearing 5-lobed (proximal 2 lateral, erect lobes represent the cryptic upper lip); flowers white to pink; plants cespitose...
..... 4. *Teucrium*
- 6 Upper lip of corolla conspicuous, flaring or galeate.
- 8 Plants distinctly repent and rooting at the nodes, or producing elongate stolons.
- 9 Plants repent.
- 10 Herbs; leaves cordate-reniform, coarsely crenate, the blade > 1 cm long; inflorescence of axillary cymules; corollas 10-20 mm .
.....*Glechoma*
- 10 Subshrubs; leaves ovate to elliptic, entire, the blade < 1 cm long; inflorescence a terminal thyrse; corollas 4-5 mm.....*Thymus*
- 9 Plants stoloniferous.
- 11 Inflorescence in dense axillary verticils; calyx and corolla actinomorphic, calyx 4-5-lobed, flowers 3-4 mm long.....*Lycopus*
- 11 Inflorescence terminal; calyx and corolla zygomorphic, calyx 5-lobed, flowers 20-30 mm long*Meehania*
- 8 Plants not distinctly repent or stoloniferous.
- 12 Calyx with 6-10 lobes or teeth.
- 13 Calyx zygomorphic, canescent with simple trichomes, spinose lobe tips straight.....*Leonotis*
- 13 Calyx actinomorphic or essentially so, densely pubescent with stellate hairs, spinose lobe tips uncinately.....*Marrubium*
- 12 Calyx with 5 or fewer lobes or teeth.
- 14 Calyx with 3-4 prominent lobes (rarely 5 including small teeth).
- 15 Calyx and corolla essentially actinomorphic*Lycopus*
- 15 Calyx and corolla zygomorphic.
- 16 Calyx with 4 unequal primary lobes; flowers large, 2.5-3.5 cm long, in bracteate terminal racemes8. *Synandra*
- 16 Calyx with 3 primary lobes (upper lobe occasionally with 3 apiculate teeth, e.g. *Salvia lyrata*); flowers 3 cm or less, in terminal thyrse.
- 17 Stamens 4; calyx enveloped and partially concealed by subtending bracts.....9. *Macbridea*
- 17 Stamens 2; calyx not enveloped by subtending bracts.
- 18 Shrubs; calyx with simple and dendritic hairs; leaves revolute, coriaceous*Rosmarinus*
- 18 Herbs; calyx with simple trichomes; leaves non-revolute, margins various, membranaceous.....*Salvia*
- 14 Calyx usually with 5 prominent lobes (except for *Clinopodium* with rarely fused upper lobes).
- 19 Fertile stamens 0-2.
- 20 Calyx actinomorphic or essentially so; corollas actinomorphic or zygomorphic.
- 21 Corolla actinomorphic, lobes spreading and nearly equal (one lobe slightly emarginate and/or enlarged).
- 22 Inflorescences axillary; foliage not or faintly aromatic*Lycopus*
- 22 Inflorescences terminal; foliage strongly aromatic.....*Mentha*
- 21 Corolla zygomorphic (bilabiate).
- 23 Inflorescence in loose terminal and axillary cymules; corollas not galeate or arching*Cunila*
- 23 Inflorescence densely capitate (often also axillary); corollas strongly galeate, arching.....*Monarda*
- 20 Calyx and corollas clearly zygomorphic.
- 24 Corolla 7-20 mm; inflorescence a densely clustered terminal or axillary cyme, or a well developed panicle.
- 25 Inflorescence a dense cluster of one or more terminal cymules (occasionally just axillary); lower lip of corolla not fringed.....*Blephilia*
- 25 Inflorescence a panicle; lower lip of corolla conspicuously fringed.....*Collinsonia*
- 24 Corolla ca. 3-10 mm long; inflorescence a loose axillary cyme or slender terminal spike or spike-like panicle.
- 26 Corolla 3.5-4 mm, borne 2 per node in a slender terminal spike; middle lobe of upper calyx reduced*Mosla*
- 26 Corolla 4-10 mm, borne in axillary cymes or spike-like panicle; upper calyx lobes similar.
- 27 Flowers in loose axillary cymes; calyx gibbous, throat closed by hairs; corollas ca. 4-5 mm long.....*Hedeoma*
- 27 Flowers in a spike-like panicle; calyx not gibbous or closed by hairs; corollas ca. 10 mm long.....*Stachydeoma*
- 19 Fertile stamens 4.
- 28 Stamens ascending under the upper corolla lip, either included within the tube (or at least not clearly exerted beyond it).
- 29 Calyx actinomorphic.
- 30 Flowers borne in terminal verticils or thyrses, with reduced bracteal leaves.
- 31 Calyx 15-nerved; verticils tightly aggregated*Nepeta*
- 31 Calyx 5-10-nerved; verticils well spaced*Stachys*
- 30 Flowers borne in axils of well developed leaves, or a terminal raceme with 1 flower per node.
- 32 Calyx lobes with thickened spinescent apices.
- 33 Stems often with swollen nodes (areas just below appear dark and sunken upon drying, except *G. ladanum*); hairs of the stem either exclusively hispid or short recurved and mixed with longer glandular trichomes; corolla 15-28 mm long*Galeopsis*
- 33 Stems without swollen nodes; hairs of the stem finely and softly retrorse, generally lacking glandular hairs (though sessile glands may be present); corolla 5-14 mm long.
- 34 Corolla 5-7 mm long, not much longer than the calyx, weakly bilabiate and lacking an annulus*Chaiturus*
- 34 Corolla 8-14 mm long and well-exceeding the calyx, strongly galeate and annulate*Leonurus*
- 32 Calyx lobes without spinescent apices (although lobes may be pointed or acute).
- 35 Flowers in terminal racemes, corolla tube broadly inflated10. *Physostegia*
- 35 Flowers borne in axils of well developed leaves, corolla tube not broadly inflated.
- 36 Verticils 2-6-flowered, loose; corollas 5-7 mm.....*Satureja*
- 36 Verticils 6-12-flowered, compact; corollas 10-30 mm.
- 37 Corolla 10-15 mm long; calyx with 10+ nerves*Ballota*
- 37 Corolla 10-30 mm long; calyx 5-nerved.....*Lamium*
- 29 Calyx zygomorphic.

- 38 Shrubs, diffusely branched; [restricted to se. Coastal Plain and Cumberland Plateau].....*Conradina*
- 38 Herbs, branched or unbranched; [collectively widespread].
- 39 Calyx teeth distinctly white or pink, noticeably different from the tube*Dicerandra*
- 39 Calyx teeth coloration not noticeably different from the tube.
- 40 Flowers 1 per bracteal axil.
- 41 Corolla nearly regular, 4-6 mm long.....*Perilla*
- 41 Corolla bilabiate, >10 mm long*10. Physostegia*
- 40 Flowers 2-many per bract or leaf axil.
- 42 Plants lemon-scented, flowers in the axils of well developed leaves*Melissa*
- 42 Plants mint-scented or non-aromatic, flowers terminal and/or axillary.
- 43 Upper median calyx lobe longer and wider than the other 4; flowers terminal.....*Dracocephalum*
- 43 Upper lobes differing in sinus depth and/or size from the lower lobes; flowers borne variously.
- 44 Bracts broadly rounded, apiculate or absent.
- 45 Bracts broadly rounded, apiculate; inflorescence terminal*Prunella*
- 45 Bracts wanting; inflorescence axillary*Sideritis*
- 44 Bracts setaceous or elliptic, but not broadly rounded or apiculate, present.
- 46 Calyx clearly bilabiate; corollas 7-15 mm long*Clinopodium*
- 46 Calyx scarcely bilabiate; corollas 5-7 mm long*Satureja*
- 28 Stamens (at least some) well exerted beyond the upper corolla lobe.
- 47 Lower lip of corolla distinctly fringed*Collinsonia*
- 47 Lower lip of corolla not fringed.
- 48 Calyx zygomorphic.
- 49 Flowers in dense terminal capitate clusters, subtended by large bracteal leaves (these often whitened on the upper surface and especially towards the base)*Pycnanthemum*
- 49 Flowers borne otherwise.
- 50 Flowers borne in few-flowered cymose axillary clusters, overall appearing paniculate; [subfamily *Ajugoideae*]*6. Trichostema*
- 50 Flowers borne in a spike-like terminal thyrse.
- 51 Corolla pink to lavender or white, 11-17 mm long*Dicerandra*
- 51 Corolla blue (rarely white), 7-12 mm long.....*Hyssopus*
- 48 Calyx actinomorphic.
- 52 Flowers borne in a dense terminal spike, 2-3-verticilled globose head, or spiciform thyrse.
- 53 Inflorescence secund*Elsholtzia*
- 53 Inflorescence terete.
- 54 Small plants to ca. 30 cm; leaves short, sessile, linear-lanceolate with revolute, entire margins; [endemic to FL and se. GA]*Piloblephis*
- 54 Large plants, well over 30 cm tall; leaves often petiolate, broadly ovate or lanceolate, margins not revolute or entire; [collectively widespread].
- 55 Bracts broadly rounded; corolla distinctly bilabiate; plants 1-3 m tall.....*Agastache*
- 55 Bracts linear-lanceolate; corolla nearly regular; plants < 1 m tall.....*Mentha*
- 52 Flowers borne in axillary verticils or terminal capitate to loosely flowered clusters.
- 56 Flowers in axillary clusters, corolla nearly regular.
- 57 Axillary clusters dense, many-flowered; corolla white-pink*Mentha*
- 57 Axillary clusters loose, 1-3-flowered; corolla blue-purple; [subfamily *Ajugoideae*].....*6. Trichostema*
- 56 Flowers in densely capitate or loosely flowered terminal clusters, corolla distinctly bilabiate.
- 58 Flowers in loosely branched terminal and axillary cymes.....*Origanum*
- 58 Flowers densely capitate cluster or terminal spike of well spaced verticils.
- 59 Inflorescence either capitate or a spike, not subtended by large bracteal leaves*Hyptis*
- 59 Inflorescence capitate, subtended by large bracteal leaves (these often whitened on the upper surface and especially towards the base)*Pycnanthemum*

1. *Callicarpa* Linnaeus 1753 (Beautyberry)

A genus of about 140 species, small trees, shrubs, and lianas, mainly tropical and subtropical. References: Moldenke (1980)=Z; Harley et al. in Kadereit (2004).

- 1 Leaves 7-23 cm long, stellate-scurfy beneath; peduncles 1-5 mm long*C. americana*
- 1 Leaves 2-6.5 (-7) cm long, glabrous or nearly so beneath (except on the midrib); peduncles 10-20 mm long.
- 2 Inflorescence supra-axillary, diverging from the twig 1-4 mm above the leaf axil*C. dichotoma*
- 2 Inflorescence axillary, borne directly in the axil of the leaf.....*C. japonica*

Callicarpa americana Linnaeus, Beautyberry, American Beautyberry, French-mulberry. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, NC, SC): hammocks, other forests (especially with sandy or rocky soils), maritime forests (the main habitat northward), disturbed areas; common (rare in Mountains). June-July; August-October (persisting into the winter). MD and AR south to s. FL, TX, Mexico; West Indies. [= RAB, C, F, G, K, S, W, WH]

* *Callicarpa dichotoma* (Loureiro) K. Koch, Chinese Beautyberry. Pd (NC, VA), Cp (DE, NC, VA), Mt (NC), {SC}: roadsides, powerline rights-of-way, woodland edges, suburban woodlands, bogs; uncommon (rare in DE and VA), native of Asia. September-November. This species is beginning to spread more rapidly in the Southeast. [= RAB, C, K]

* *Callicarpa japonica* Thunberg, Japanese Beautyberry. Pd (NC): suburban woodlands; rare, native of e. Asia. Reported for Durham County, NC by Moldenke (1980); corroborated by specimens from Orange County, NC (Giencke, prs. comm., 2005). [= K, Z]

2. *Vitex* Linnaeus 1753 (Chaste-tree)

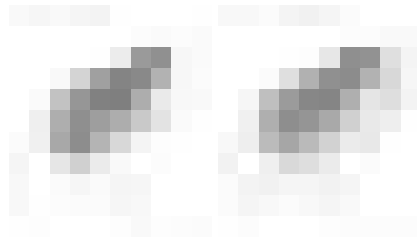
A genus of about 250 species, trees and shrubs, tropical to temperate. References: Chen & Gilbert (1994)=Z; Harley et al. in Kadereit (2004).

- 1 Leaves palmately (3-) 5-7(-9) foliolate; leaflets lanceolate; plant an upright small tree *V. agnus-castus*
 1 Leaves unifoliate (or palmately 3-foliolate); leaflets orbicular or obovate; plant a sprawling and spreading shrub/vine *V. rotundifolia*

* *Vitex agnus-castus* Linnaeus, Chaste-tree. Cp (FL, GA, NC, VA), Pd (GA, NC, VA), Mt (VA): pastures, woodland edges, suburban woodlands; rare, native of Mediterranean Europe. June-August. [= RAB, C, G, Pa, S, WH; > *V. agnus-castus* var. *agnus-castus* - K; > *V. agnus-castus* var. *caerulea* Rehder - K]

* *Vitex negundo* Linnaeus, Chinese Chaste-tree. Reported for FL, MS, LA, KY. June-July; August-November. [= WH; > *V. negundo* var. *intermedia* (S.J. Pei) Moldenke - K; > *V. negundo* var. *negundo* - K, Z; > *V. negundo* var. *heterophylla* (Franchet) Rehder - K, Z; *V. negundo* var. *cannabifolia* (Siebold & Zuccarini) Handel-Mazzetti - Z] {not keyed; rejected as not definitively naturalized in Flora area}

* *Vitex rotundifolia* Linnaeus f., Beach Vitex, Roundleaf Chaste-tree. Coastal dunes, planted for ornament and stabilization and now spreading aggressively as an invasive species; native of e. Asia, se. Asia, and nearby islands. See Cousins et al. (2010) and Roecker & Socha (2004) for additional information. The runners are reported to reach 10 m in length. [= K, Z; < *V. trifolia* Linnaeus ssp. *littoralis* Steenis]



3. *Ajuga* Linnaeus 1753 (Bugle, Bugleweed)

A genus of about 40-50 species, herbs, of the temperate Old World. References: Harley et al. in Kadereit (2004)

- 1 Leaves deeply cleft into narrow segments; corolla yellow; annual *A. chamaepitys*
 1 Leaves entire to shallowly lobed; corolla blue (to white or pink); perennial.
 2 Plants not stoloniferous; stems hairy all around *A. genevensis*
 2 Plants stoloniferous; stems hairy in lines *A. reptans*

* *Ajuga chamaepitys* (Linnaeus) Schreber, Yellow Bugle, Ground-pine Bugle. Cp (VA): disturbed areas; rare, native of Europe. May-September. [= C, F, G, K]

* *Ajuga genevensis* Linnaeus, Standing Bugle. Mt (WV): disturbed areas; rare, native of Europe. April-June. Cultivated and rarely escaped in ne. North America, reported as naturalized as far south as PA (Rhoads & Klein 1993), MD (Kartesz 1999), and WV (Harmon, Ford-Werntz, & Grafton 2006), where considered "not confirmed as naturalized." [= C, F, G, K, Pa, WV]

* *Ajuga reptans* Linnaeus, Carpet Bugle. Pd (DE, NC, VA), Mt (NC, VA, WV), Cp (DE, FL, VA): lawns and roadsides; uncommon (rare in DE Coastal Plain, rare in FL, NC, and VA), native of Europe. March-June. [= RAB, C, F, G, K, Pa, WH]

4. *Teucrium* Linnaeus 1753 (Germander)

A genus of about 100-250 species, herbs and shrubs, nearly cosmopolitan in distribution. References: Harley et al. in Kadereit (2004).

* *Teucrium botrys* Linnaeus, Cutleaf Germander. Mt (WV): disturbed areas; rare, native of Europe. July-September. [= C, K] {add to synonymy}

Teucrium canadense Linnaeus var. *canadense*. Mt (WV), Cp (DE), {GA, NC, SC, VA}: rich bottomlands; common. Mainly coastal, NS south to FL, west to TX and OK. [= C, F, G, K; < *T. canadense* - RAB, GW, W; = *T. littorale* Bicknell - S]

Teucrium canadense Linnaeus var. *hypoleucum* Grisebach. {GA, NC, SC}. E. NC south to FL, west to TX. [= K; < *T. canadense* - RAB, GW, W; = *T. nashii* Kearney - S]

Teucrium canadense Linnaeus var. *occidentale* (A. Gray) McClintock & Epling. Mt (VA, WV*). Reported for VA (Kartesz 1999). {investigate} Occurs at least as far south and east as PA (Rhoads & Klein 1993) and ne. WV. [= C, G, K; > *T. occidentale* A. Gray var. *occidentale* - F; > *T. occidentale* A. Gray var. *boreale* (Bicknell) Fernald - F, WV; = *T. canadense* var. *boreale* (E.P. Bicknell) Shinnery - Pa]

Teucrium canadense Linnaeus var. *virginicum* (Linnaeus) Eaton. Pd (DE), {AL, GA, MS, NC, SC, VA}: {habitat}; common. NY, QC, and MN south to GA, AL, MS, and TX. [= C, F, G, K, Pa; < *T. canadense* – RAB, GW, W; = *T. canadense* – S]
Teucrium cubense Jacquin var. *cubense*. AL. [= K] {synonymy incomplete}

5. *Clerodendrum* Linnaeus 1753 (Glory-bower)

A genus of about 400-500 species, trees and shrubs, mostly tropical and warm temperate, African and Asian (after removal of the “Pantropical Coastal” clade into *Volkameria* (Yuan et al. 2010). References: Yuan et al. (2010); Steane et al. (1999); Hsiao & Lin (1995); Steane, de Kok, & Olmstead (2004); Harley et al. in Kadereit (2004).

- 1 Corolla tube > 8 cm long *C. indicum*
- 1 Corolla tube < 3 cm long.
 - 2 Calyx 5-8 mm long.....*C. bungei*
 - 2 Calyx > 10 mm long.
 - 3 Corolla double*C. chinense*
 - 3 Corolla single.....*C. trichotomum* var. *ferrugineum*

* *Clerodendrum bungei* Steudel, Rose Glory-bower. Cp (FL, GA), Pd (GA, SC): roadsides and suburban woodlands; rare, native of e. Asia. August-September. First reported from South Carolina by Hill & Horn (1997); also reported for our area by W. Duncan (pers. comm.). [= K, WH]

* *Clerodendrum chinense* (Osbeck) Mabberley, Stickbush. Cp (FL): disturbed areas; rare, native of Asia. Cultivated and naturalized in FL, including the Panhandle (Escambia County) (Wunderlin & Hansen 2004). [= K, WH; ? *Clerodendrum japonicum* (Thunberg) Sweet var. *pleniflorum* (Schauer) Maheshwari]

* *Clerodendrum japonicum* (Thunberg) Sweet. Also cultivated and is reported to be naturalized in MD (Staff of the Bailey Hortorium 1976). [= K] {not yet keyed}

* *Clerodendrum indicum* (Linnaeus) Kuntze, Tubeflower, Turk's-turban. Cp (FL, GA, SC): disturbed areas, roadsides; rare, native of the Malaysian Archipelago. August-October; November-December. [= K, WH; = *Clerodendron indicum* – RAB, orthographic variant]

* *Clerodendrum trichotomum* Thunberg var. *ferrugineum* Nakai, Harlequin Glory-bower. Pd (NC), Mt (NC, TN), Cp (FL), {GA}: roadsides, streambanks; rare, cultivated and strongly naturalized, native of e. Asia. [= K; < *Clerodendrum trichotomum* – WH]

6. *Trichostema* Linnaeus 1753 (Blue Curls)

A genus of about 18 species, shrubs, annual and perennial herbs, of temperate North America (especially diverse in w. North America, with a second center of diversity in se. North America). Morphology, pollen, and phylogeography suggest the plausible recognition of *Trichostema* section *Orthopodium* (which includes this species and several from w. North America) as *Isanthus*, a genus distinct from section *Trichostema* (which includes all other eastern North American species). References: Weakley (in prep.)=Z; Lewis (1945)=Y; Harley et al. in Kadereit (2004).

- 1 Calyx lobes essentially equal; stamens straight, < 10 mm long; leaves acute to slightly acuminate, the two main lateral veins reconnecting to the midvein; [section *Orthopodium*] *T. brachiatum*
- 1 Calyx strongly bilabiate; stamens strongly arched, 12-20 mm long; leaves obtuse, the two main lateral veins not reconnecting to the midvein; [section *Trichostema*].
 - 2 Plants annual; larger leaves 3-7 cm long (including the petiole); plants with long internodes near the base, near-basal branches absent, the best-developed branches from the mid or upper stem; hairs on the upper stem long (0.5-2.0 mm long) or short (0.1-0.4 mm long); [collectively widespread, in a wide variety of habitats, primarily inland, though occasionally occurring as a weed in coastal areas].
 - 3 Leaves 2.5-4× as long as wide; longer hairs of the upper stem (0.3-) 0.5-2.0 mm long*T. dichotomum*
 - 3 Leaves 5-15× as long as wide; longer hairs of the upper stem 0.1-0.3 (-0.4) mm long*T. setaceum*
 - 2 Plants perennial; larger leaves 1-4 cm long (including the petiole); plants with short internodes near the base, near-basal branches well-developed, these often branching again; hairs on the upper stem short (0.1-0.4 mm long); [of the Coastal Plain].
 - 4 Corolla deep blue (almost black in bud); flowers stems typically virgate, not branched above the base; hairs of the stem not longer at each node; [of peninsular FL, inland as well as on sand ridges near the coasts] *T. suffrutescens*
 - 4 Corolla pastel blue or pink; stems typically rebranching above the base, the plant more-or-less bushy; hairs of the stem longer at the node (in a line between the 2 petioles); [of NC south to s. FL and west to s. MS; restricted to barrier islands, coastal peninsulas, and other maritime situations within 10 km of the ocean]
 - 5 Anthers lemon yellow; leaves ovate-rhombic, 1-1.5× as long as wide; corolla lavender (definitely with a pinkish tint); bark on older stems dark, tight; plants 1-4 dm tall, forming a tight, compact, hemispheric bush; [of maritime dunes, grasslands, and forest openings from 10 km north of Cape Hatteras (Dare County, NC) south to near Cape Romain (Georgetown County, SC)]*T. species 1*
 - 5 Anthers blue; leaves spatulate, the petiole relatively well-developed, 1.5-3× as long as wide; corolla bluish (lacking a well-developed pinkish tint); bark on older stems yellow to tan, somewhat papery; plants 3-7 dm tall, often gangly and irregularly shaped; [of maritime dunes, grasslands, and coastal scrub from e. GA around the FL peninsula west to s. MS]*T. species 2*

Trichostema brachiatum Linnaeus, Glade Blue Curls, False Pennyroyal. Mt (GA, NC, VA, WV), Pd (NC, SC, VA): shale barrens, outcrops of calcareous or mafic rock, diabase barrens, calcareous dry prairies, disturbed rocky areas; uncommon (rare in

NC). August-September. VT and s. ON west to MN and NE, south to c. NC, nw. GA, AL, TX, and AZ. [= Pa, W, Y; = *Isanthus brachiatus* (Linnaeus) Britton, Sterns, & Poggenburg – C, F, K, S, WV; > *Isanthus brachiatus* var. *brachiatus* – G]

Trichostema dichotomum Linnaeus, Common Blue Curls. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dry woodlands, disturbed areas, thin soils around rock outcrops; common. August-November. ME, ON, QC, MI, and IA, south to FL and TX. [= RAB, C, K, Pa, S, W, WV, Z; > *T. dichotomum* var. *dichotomum* – F; >> *T. dichotomum* var. *puberulum* Fernald & Griscom – F; = *T. dichotomum* var. *dichotomum* – G; < *T. dichotomum* – WH]

Trichostema setaceum Houttuyn, Narrowleaf Blue Curls. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA): thin soils around rock outcrops, especially granite flatrocks, dry sandy soils of the Coastal Plain; uncommon (rare in DE, NC, VA, and WV). August-November. CT west to OH, south to FL and TX, primarily on the Coastal Plain. [= RAB, C, F, K, Pa, W, WH, Y, Z; = *T. dichotomum* var. *lineare* (Walter) Pursh – G; = *T. lineare* Walter – S]

Trichostema species 1, Dune Blue Curls, Carolina Blue Curls. Cp (NC, SC): dunes on barrier islands, vegetated with perennial grasses (especially *Uniola paniculata*), openings in maritime scrub; rare. August-November. Endemic to barrier islands from slightly north of Cape Hatteras, Dare County, NC south to North Island, Georgetown County, SC, north of Cape Romain. When growing together, the flowering period of *T. species 1* is about 2-3 weeks later than that of *T. dichotomum*. Despite a considerable overlap of blooming period, only one hybrid has been seen, and that in common-garden cultivation in the Piedmont. [= Z]

Trichostema species 2, Florida Blue Curls. Cp (AL, FL, GA, MS): maritime dunes, grasslands, and coastal scrub; uncommon. August-November. E. GA around the FL peninsula west to s. MS; Bahamas. [= Z; >> *T. dichotomum* var. *puberulum* Fernald & Griscom – F; < *T. dichotomum* – WH; < *T. dichotomum* – Y (“pubescence type B”); < *T. suffrutescens* – Y]

Trichostema suffrutescens Kearney, Scrub Blue Curls. Cp (FL): scrub, sandhills; rare. August-November. Ne. FL (Clay County) south to s. peninsular FL. [= S, Z; < *T. dichotomum* – WH; < *T. suffrutescens* – Y]

7. *Scutellaria* Linnaeus 1753 (Skullcap)

(contributed by Bruce A. Sorrie and Alan S. Weakley)

A genus of about 350-360 species, herbs and shrubs, almost cosmopolitan. References: Pittman (1988)=Z; Collins (1976)=Y; Epling (1942)=X; Leonard (1892); Harley et al. in Kadereit (2004).

Identification notes: Recognizable by the "tractor seat"-shaped protuberance on the upper calyx. *Note: in key break 22b, corollas of *S. alabamensis* may reach 22 mm long; its calyces are both stipitate glandular and punctate glandular, thus differing from *S. arenicola* and *S. mellichampii*. In key break 22a, corollas of *S. mellichampii* may be as short as 21 mm; its calyces are punctate glandular only, unlike *S. incana* var. *australis* which has both punctate glands and stipitate glands on calyces.

- 1 Flowers axillary, bracts resembling stem leaves; stem leaves sessile or petioles < 4 mm.
 - 2 Corollas 12-32 mm long.....*S. galericulata*
 - 2 Corollas 5-10 mm long.
 - 3 Lower leaves hastate; plants glabrous.....*S. racemosa*
 - 3 Lower leaves ovate or deltoid-ovate; plants puberulent or pubescent.
 - 4 Stems glabrate, the pubescence ascending, curled or appressed, eglandular.
 - 5 Median leaves 10-15 mm long; corolla 6.5-9 mm long..... *S. leonardii*
 - 5 Median leaves 20-40 mm long; corolla 8-10 mm long..... *S. nervosa*
 - 4 Stems obviously hairy, pubescence spreading, glandular or not (or both).
 - 6 Lower leaf surface with glandular hairs only; leaf veins tending to anastomose along leaf margins.....*S. australis*
 - 6 Lower leaf surface with glandular hairs or eglandular; leaf veins usually unbranched along margins.....*S. parvula*
- 1 Flowers in racemes, bracts much reduced (not leaf-like); stem leaf petioles > 4 mm.
 - 7 Corolla tube glabrous within or sparsely hairy, lacking a sharply defined ring of hairs at bend of tube (non-annulate).
 - 8 Racemes secund.
 - 9 Corollas ca. 6 mm long; racemes terminal and axillary.....*S. lateriflora*
 - 9 Corollas ca. 10 mm long; racemes terminal or terminating axillary branches.....*S. saxatilis*
 - 8 Racemes not secund, flowers on more than one side of axis.
 - 10 Stems and petioles with ascending hairs; at least some racemes from axillary branches; mid to upper leaves truncate basally.....*S. saxatilis*
 - 10 Stems and petioles with spreading or retrorse hairs; racemes terminal or in panicles; mid to upper leaves strongly cordate.
 - 11 Margins of lower lip cleft and erose; lower lip with large lateral auricles (flabelliform).....[*S. ovata* ssp. *bracteata*]
 - 11 Margins of lip entire; lip undulate or weakly auriculate.
 - 12 Lower lip entirely white with a few blue spots; leaf surface smooth with sparse glandular hairs.....*S. ovata* ssp. *ovata*
 - 12 Lower lip blue with two longitudinal white bands; leaf surface rugose, usually densely glandular hairy (but may be eglandular).
 - 13 [Ridge and Valley (especially shale barrens) of VA, WV, MD].....*S. ovata* ssp. *rugosa* var. *rugosa*
 - 13 [Blue Ridge (moist talus slopes) of NC, TN].....*S. ovata* ssp. *rugosa* var. *1*
 - 7 Corolla tube with sharply defined ring of hairs (annulus) at bend of tube.
 - 14 At least some upper leaves entire.
 - 15 Leaves with stipitate glands.....*S. multiglandulosa*
 - 15 Leaves without stipitate glands.
 - 16 Corolla glabrous, lower lip with immaculate white central band; leaf bases long-attenuate.....*S. glabriuscula*
 - 16 Corolla short pilose, lower lip with blue spots or lines on white central band; leaf bases cuneate to deltoid.
 - 17 Lowest pedicels of main axis of inflorescence >4 mm, or if less, then subtending bracts < 13 mm.....*S. arenicola*
 - 17 Lowest pedicels < 4 mm, or if more, then bracts >13 mm.....*S. integrifolia*

- 18 Second internode below base of inflorescence stipitate glandular.
- 19 Corollas 24-39 mm long **and** upper surfaces of leaves punctate glandular *S. pseudoserrata*
- 19 Corollas 14-36 mm long, and if longer than 23 mm long, then the upper surfaces of the leaves eglandular.
- 20 Corollas 25-36 mm long; bracts elliptic to oblanceolate, apices acute *S. montana*
- 20 Corollas 14-23 mm; bracts obovate to broadly oblanceolate, apices obtuse.
- 21 Bases of upper leaves cuneate to rounded; corollas 14-18 (-21) mm *S. elliptica* var. *hirsuta*
- 21 Bases of upper leaves cordate to rounded; corollas 18-23 mm *S. ocmulgee*
- 18 Second internode below base of inflorescence eglandular.
- 22 Corollas > 21 mm long*.
- 28 Stems glabrous or glabrate below inflorescence; calyces eglandular; [Mountains and Piedmont] *S. serrata*
- 28 Stems canescent below inflorescence; calyces stipitate glandular or punctate glandular; [mainly Coastal Plain].
- 29 Lower lip with 20+ blue spots; calyces stipitate glandular; [peninsular FL and s. GA] *S. arenicola*
- 29 Lower lip lacking blue spots; calyces punctate glandular; [s. SC to se. GA; disjunct to c. AL] *S. mellichampii*
- 22 Corollas < 21 mm long*.
- 23 Calyces densely to sparsely canescent, eglandular or with punctate glands (stipitate glands may also be present).
- 24 Leaves softly villous beneath; calyces and bracts eglandular *S. incana* var. *incana*
- 24 Leaves glabrate, with appressed hairs on veins.
- 25 Stems canescent; calyces and bracts densely punctate glandular *S. incana* var. *1*
- 25 Stems glabrate (rarely puberulent); calyces and bracts eglandular *S. incana* var. *punctata*
- 23 Calyces pilose with spreading stipitate glandular hairs.
- 26 Bracts with stipitate glands; leaves eglandular *S. elliptica* var. *elliptica*
- 26 Bracts without stipitate glands; leaves densely punctate glandular.
- 27 Corollas 19-22 mm long; [Mountains of AL] [*S. alabamensis*]
- 27 Corollas 11-16 mm long; [Coastal Plain of SC and GA] *S. altamaha*

Scutellaria alabamensis Alexander. AL (Epling 1942, Kartesz 1999). [= K, S, X, Y]

Scutellaria altamaha Small, Altamaha Skullcap. Cp (GA, SC), Pd (GA, SC): sandy or rocky, dry forests; rare (GA Special Concern). Nc. SC to ec. GA and se. GA. [= K, S, Y; < *S. mellichampii* Small – RAB]

Scutellaria arenicola Small, Sandhill Skullcap. Cp (FL, GA): sandy scrub; rare. GA and ne. FL south to s. FL. [= K, S, WH, Y]

Scutellaria australis (Fassett) Epling, Southern Skullcap. Pd (GA, NC, SC, VA), Mt (WV), Cp (FL, GA): bottomland forests; rare. VA, s. WV, KY, IN, IL, MO, and KS, south to Panhandle FL, LA, and e. TX. [= G, WV, X; < *S. parvula* – RAB, S, WH; = *S. parvula* Michaux var. *australis* Fassett – F, K]

Scutellaria drummondii Bentham var. *drummondii*, Drummond's Skullcap. Cp (FL*, GA): blackland prairies, dry disturbed areas; rare. GA west to LA, south into Mexico. First reported for GA by Lee Echols in 2005 (pers. comm.). [= K; < *S. drummondii* – WH] {not yet keyed}

Scutellaria elliptica Muhlenberg ex Sprengel var. *elliptica*. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): mesic to dry forests; common (rare in FL). Late May-June; June-July. NY, KY and MO, south to s. GA, Panhandle FL, LA, and e. TX. [= C, F, G, K, Pa, W, WV, Y; < *S. elliptica* – RAB, WH; < *S. ovalifolia* – S; = *S. ovalifolia* ssp. *mollis* Epling – X]

Scutellaria elliptica Muhlenberg ex Sprengel var. *hirsuta* (Short & Peter) Fernald. Mt (GA, NC, VA, WV), Pd (VA): mesic to dry forests; uncommon. Late May-June; June-July. PA and MI south to w. VA, w. NC, nw. GA, s. AL, and e. TX. [= C, F, G, K, Pa, W, WV, Y; < *S. elliptica* – RAB; < *S. ovalifolia* – S; = *S. ovalifolia* ssp. *hirsuta* (Short & Peter) Epling – X]

Scutellaria floridana Chapman, Florida Skullcap. Cp (FL): pine flatwoods; rare. Endemic to FL Panhandle. [= K, S, WH] {not yet keyed}

Scutellaria galericulata Linnaeus, Hooded Skullcap. Mt (NC, VA, WV), Cp (DE): spring-fed seepage, bogs, swamps, freshwater tidal marshes; rare. June-August. Circumboreal, south in North America to DE, MD, VA, ne. WV, w. NC, IN, MO, and CA. The NC occurrence is based on a single specimen from the 19th century. Reported recently from MD (Steury, Tyndall, & Cooley 1996). [= C, G, K, Pa, X; > *S. epilobifolia* A. Hamilton – F, S, WV]

Scutellaria glabriuscula Fernald, Georgia Skullcap. Cp (AL, FL, GA, MS): sandhills; rare. Sw. GA and w. FL Panhandle west through s. AL to s. MS. [= K, S, WH, Y]

Scutellaria incana Biehler var. *1*. Cp (FL, GA, NC): dry sandy open woods or woodland margins; rare. July-August. Gulf Coastal Plain of sw. GA, nw. FL, s. AL, and c. MS; disjunct to Brunswick County, NC. [= *S. altamaha* Small ssp. *australis* Epling; < *S. incana* – WH; = *S. incana* var. *australis* (Epling) Collins comb. nov. ined.]

Scutellaria incana Biehler var. *incana*. Pd (NC, VA), Cp (NC, VA), Mt (WV): dry to mesic forests and woodlands; uncommon. NY, OH, IN, and IL, south to e. VA, c. NC, KY, w. TN, MS, and AR. [= C, F, G, K, WV, Y; < *S. incana* – RAB, Pa, S; = *S. incana* – X]

Scutellaria incana Biehler var. *punctata* (Chapman) C. Mohr. Mt (GA, NC, SC, VA): dry to mesic forests and woodlands; common (rare in WV). A southern Appalachian endemic: sw. VA and WV south through w. NC, nw. SC, e. TN to n. GA and ne. AL. [= C, F, G, K, W, WV, Y; < *S. incana* – RAB, S; ? *S. punctata* (Chapman) Leonard – X]

Scutellaria integrifolia Linnaeus. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): wet pine savannas, seeps in forests, bottomlands, other moist sites; common (uncommon in VA Mountains). May-July; July-August. MA south to c. peninsular FL, west to TX, northward in the interior to OH, KY, and TN. [= C, G, GW, K, Pa, S, W, WH, Y; > *S. integrifolia* var. *hispidula* Bentham – RAB, F; > *S. integrifolia* var. *integrifolia* – RAB, F]

Scutellaria lateriflora Linnaeus, Mad-dog Skullcap. Cp (DE, FL, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): alluvial forests, bogs, seeps, marshes; common (rare in FL). July-November. NL (Newfoundland) west to BC, south to GA, Panhandle FL, and CA. [= RAB, C, F, G, GW, Pa, S, W, WH, WV; > *S. lateriflora* var. *lateriflora* – K]

Scutellaria leonardii Epling, Shale-barren Skullcap, Glade Skullcap. Mt (GA, VA, WV), Pd (NC, VA), Cp (DE, VA): limestone glades, diabase barrens, shale barrens and woodlands, dry sandy soils; rare. April-June; May-July. MA west to MI and ND, south to se. VA, nc. NC, AR, and OK. [= C, G, Pa, W, WV, X; < *S. parvula* – RAB; > *S. nervosa* Pursh var. *ambigua* (Nuttall) Fernald – F; = *S. parvula* Michaux var. *missouriensis* (Torrey) Goodman & Lawson – K; = *S. ambigua* Nuttall – S; > *S. parvula* Michaux var. *leonardii* (Epling) Fernald – F]

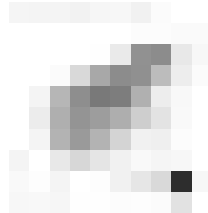
Scutellaria mellichampii Small, Mellichamp's Skullcap. Cp (GA, SC): sandy deciduous forests on river bluffs; rare (GA Special Concern). June; July. Se. SC south to e. GA; seemingly disjunct in c. AL. [= S, X, Y; < *S. mellichampii* – RAB; = *S. incana* Biehler var. *australis* (Epling) Collins, comb. nov. – K, misapplied]

Scutellaria montana Chapman, Large-flowered Skullcap. Mt (GA): mesic hardwood (or hardwood-shortleaf pine) forests; rare. Se. TN south to nw. GA. [= K, S, Y; = *S. serrata* Andrzedowski var. *montana* (Chapman) Penland – F]

Scutellaria multiglandulosa (Kearney) Small ex R.M. Harper. Cp (FL, GA, SC), Pd (GA, SC): sandhills, dry sandy bluff forests; rare. SC (Abbeville and Anderson counties) to e. GA, south to e. Panhandle FL and c. peninsular FL. [= K, S, WH, Y; = *S. integrifolia* Linnaeus var. *multiglandulosa* Kearney – F]

Scutellaria nervosa Pursh, Bottomland Skullcap, Veined Skullcap. Pd (DE, NC, SC, VA), Cp (NC, VA), Mt (VA, WV), {GA}: alluvial forests, mesic forests; common (uncommon in VA Mountains and Piedmont, rare in DE, GA, NC, and SC, rare in VA Coastal Plain). May-June; June-July. NY, MI, and IA, south to GA, AL, and LA. [= RAB, K, Pa, S, W, WV; > *S. nervosa* var. *nervosa* – C, F, G; > *S. nervosa* var. *calvifolia* Fernald – C, F, G]

Scutellaria ocmulgee Small, Ocmulgee Skullcap. Bluff forests and other mesic hardwood forests. Endemic to s. SC and e. GA. [= K, S, Y]



Scutellaria ovata Hill ssp. *bracteata* (Benth) Epling. Mt (GA), Cp (FL): dry forests and woodlands, hammocks; rare. MO south through AR and OK to c. TX; disjunct eastward in s. MS, c. and n. AL, w. Panhandle FL, and nw. GA. [= K, W, WH, X; < *S. ovata* var. *ovata* – C, F, G; = *S. ovata* var. *bracteata* Benth; > *Scutellaria ovata* Hill ssp. *cuthbertii* (Alexander) Epling – K, X; > *S. cuthbertii* Alexander – S; = *S. ovata* ssp. *bracteata* (Benth) Epling var. *bracteata* – Z] {synonymy incomplete}

Scutellaria ovata Hill ssp. *ovata* var. *ovata*. Mt (VA, WV), Cp (VA): {GA, NC, SC}. {overall distribution}. [= Z; > *S. ovata* ssp. *ovata* – K; < *S. ovata* – RAB, S; >> *S. ovata* var. *ovata* – C, F, G; > *S. ovata* var. *calcareo* (Epling) Gleason – C, G; > *S. ovata* var. *versicolor* (Nuttall) Fernald – C, G, WV; = *S. ovata* ssp. *ovata* – W; > *S. ovata* ssp. *calcareo* Epling – X; > *S. ovata* ssp. *versicolor* (Nuttall) Epling – X; > *Scutellaria ovata* Hill ssp. *venosa* Epling – K, X]

Scutellaria ovata Hill ssp. *rugosa* (Wood) Epling var. *rugosa*. Mt (VA, WV): shale barrens, other dry woodlands; uncommon. {overall distribution} [= *S. ovata* var. *rugosa* – F; > *S. ovata* ssp. *rugosa* – K, W, X; > *Scutellaria ovata* Hill ssp. *pseudoarguta* Epling – K, X; < *S. ovata* – RAB, S; = *S. ovata* ssp. *rugosa* (Wood) Epling var. *rugosa* – Z; > *Scutellaria ovata* Hill ssp. *virginiana* Epling – K, X; > *S. ovata* var. *rugosa* – WV; > *S. ovata* var. *pseudoarguta* (Epling) Core – WV; > *S. ovata* var. *virginiana* (Epling) Core – WV]

Scutellaria ovata Hill ssp. *rugosa* (Wood) Epling var. *I*, Appalachian Skullcap. Mt (GA, NC): moist boulderfields at high elevations; rare. Endemic to the high Blue Ridge of w. NC and e. TN. [= *Scutellaria arguta* Buckley – C, G, K, S, W, X; = *S. saxatilis* Riddell var. *pilosior* Benth – F; = "*S. ovata* Hill ssp. *rugosa* (Wood) Epling var. *arguta* (Buckley) Pittman" – Z (not published)]

Scutellaria parvula Michaux, Dwarf Skullcap. Pd (SC, VA). ME west to MN, south to GA and TX. In c. TN and scattered locations in e. TN (Chester, Wofford, & Kral 1997). [= G, W, X; = *S. parvula* var. *parvula* – C, F, K; < *S. parvula* – RAB, S]

Scutellaria pseudoserrata Epling. Mt (GA), Pd (GA), {NC?, SC}: rich, rocky forests; rare. Also in e. TN (Chester, Wofford, & Kral 1997), nc. and c. GA (Jones & Coile 1988). Cultivated in Highlands, Macon Co., NC. [= K, W, X, Y]

* **Scutellaria racemosa** Persoon, South American Skullcap. Cp (FL, GA, SC), Pd (NC): disturbed areas; uncommon (rare in GA, NC, and SC), native of South America. Reported from FL, AL, GA, and SC by Kral (1981). Krings & Neal (2001a, 2001b) report it for Chatham Co., NC and discuss its occurrence in se. United States. [= GW, K, WH]

Scutellaria saxatilis Riddell, Rock Skullcap. Mt (GA, NC, SC, VA, WV), Pd (DE, VA): rocky forests; uncommon (rare in GA, NC, SC, and WV, rare in Piedmont). June-August. DE to OH and IN, south to SC and TN. [= RAB, C, G, K, Pa, S, W, WV, X, Z; = *S. saxatilis* var. *saxatilis* – F]

Scutellaria serrata Andrzedowski, Showy Skullcap, Serrate Skullcap. Mt (NC, VA, WV), Pd (NC, VA), {GA, SC?}: rich forests; uncommon. Mid May-late June. NY, OH, and KY south to GA and AL. [= RAB, C, G, K, Pa, S, W, WV, X, Y; = *S. serrata* var. *serrata* – F]

8. *Synandra* Nuttall 1818 (*Synandra*)

A monotypic genus, an herb, of e. North America. References: Cantino (1985); Harley et al. in Kadereit (2004).

Synandra hispidula (Michaux) Baillon, *Synandra*, Gyandotte Beauty. Mt (NC, VA, WV): moist, rich forests; rare. Late April-May; May-June. A broad Appalachian endemic: s. OH west to s. IL, south to sw. VA, w. NC, and n. AL. [= RAB, C, F, G, K, S, W, WV]

9. *Macbridea* Elliott in Nuttall 1818 (Birds-in-a-nest, Macbridea)

A genus of 2 species, herbs, of se. North America. References: Harley et al. in Kadereit (2004).

- 1 Corolla white (faintly marked with purple in the throat); leaf tips obtuse to rounded; [FL Panhandle] *M. alba*
 1 Corolla lavender or pink; leaf tips acute; [se. NC south to s. GA] *M. caroliniana*

Macbridea alba Chapman, White Birds-in-a-nest, White Macbridea. Cp (FL): wet pine savannas, pitcherplant bogs; rare. Endemic to Panhandle FL. [= GW, K, S, WH]

Macbridea caroliniana (Walter) Blake, Carolina Birds-in-a-nest, Carolina Macbridea. Cp (GA, NC, SC): swamp forests, especially in sphagnum seepage areas away from direct flooding, savanna edges, ditches; rare. July-November. Se. NC to s. GA; reported but undocumented from n. FL, AL, and MS. Apparently rare throughout its range. [= RAB, GW, K; = *M. pulchra* Elliott – S]

10. *Physostegia* Bentham 1829 (Obedient-plant)

A genus of about 12 species, perennial herbs, of North America. References: Cantino (1982)=Z; Harley et al. in Kadereit (2004). Key adapted from Z and GW.

- 1 Leaves, 1 or more of them, conspicuously or inconspicuously clasping the stem.
 2 Perennating buds borne directly on the primary rhizome or at the ends of short, vertical secondary rhizomes (horizontal secondary rhizomes lacking), the plant thus forming clumps
 3 Most or all of the larger leaves sharply serrate; larger leaves usually < 2.5 cm wide and > 5× as long as wide *P. angustifolia*
 3 Most or all of the larger leaves bluntly serrate to entire; larger leaves usually > 3 cm wide or < 5× as long as wide *P. purpurea*
 2 Perennating buds borne at the ends of elongate, horizontal, secondary rhizomes, the plant thus forming clonal patches.
 4 Flowers 22-35 mm long; larger stem leaves acute to attenuate at the tip; axis of raceme with at least some of the hairs 0.13-0.25 mm long; larger stem leaves mostly sharply serrate *P. angustifolia*
 4 Flowers smaller, or most of the leaves obtuse at the tip, or hairs of the raceme axis < 0.13 mm long; larger stem leaves bluntly toothed to entire.
 5 Flowering calyx tube (1-) 2-4 mm long; flowers < 20 mm long *P. intermedia*
 5 Flowering calyx tube 3-7 (-8) mm long; flowers usually > 20 mm long.
 6 Uppermost pair of leaves below the terminal raceme usually considerably larger than the floral bracts, the next pair of leaves down the stem (1.5-) 2.0-12.8 cm long and 0.3-2× as long as the internode above; principal stem leaves usually widest at or below the middle of the blade *P. leptophylla*
 6 Uppermost pair of leaves below the terminal raceme often no larger than the floral bracts, the next pair of leaves down the stem 0.4-3.2 cm long, generally 0.1-0.3× as long as the internode above; principal stem leaves usually widest at or above the middle of the blade *P. purpurea*
 1 Leaves petiolate or sessile, none of them clasping the stem.
 7 All or most of the largest leaves sharply serrate; apex of the leaves acute to attenuate.
 8 Axis of raceme with at least some of the hairs 0.13-0.25 mm long; nutlets 2-3 mm long; flowering April to early July (or later if burned) *P. angustifolia*
 8 Axis of raceme with hairs < 0.1 mm long; nutlets usually 3-4 mm long; flowering July-October.
 9 Perennating buds usually borne directly on the primary rhizome or at the ends of short, vertical secondary rhizomes (horizontal secondary rhizomes usually lacking), the plant thus forming clumps; nonglandular trichomes of the raceme axis < 0.1 (-0.13) mm long; sterile floral bracts usually present below lowest flowers; flowers (16-) 18-37 mm long *P. virginiana* ssp. *praemorsa*
 9 Perennating buds usually borne at the ends of elongate, horizontal, secondary rhizomes, the plant thus forming clonal patches; nonglandular trichomes of the raceme axis frequently 0.15 (0.20) mm long; sterile floral bracts usually not present below lowest flowers; flowers (13-) 14-28 mm long *P. virginiana* ssp. *virginiana*
 7 Half or more of the larger leaves bluntly toothed to entire; apex of the leaves obtuse, or acute to attenuate.
 10 Calyx and rachis of the inflorescence bearing stalked glands (visible at 10× magnification or greater); nutlets 1.7-2.0 mm long, usually warty over the surface *P. godfreyi*
 10 Calyx and rachis lacking stalked glands; nutlets 2.0-3.6 mm long, smooth.
 11 Uppermost pair of leaves below the terminal raceme often no larger than the floral bracts, the next pair of leaves down the stem 0.4-3.2 cm long, generally 0.1-0.3× as long as the internode above *P. purpurea*
 11 Uppermost pair of leaves below the terminal raceme usually considerably larger than the floral bracts, the next pair of leaves down the stem (1.5-) 2.0-12.8 cm long and 0.3-2× as long as the internode above.
 12 Leaves (some of them) present at or after anthesis usually petiolate, the petioles often > 2 cm long, the petiolate leaves typically the lowest and among the largest leaves present *P. leptophylla*
 12 Leaves present at or after anthesis usually sessile (rarely a few petiolate, but these with petioles < 2 cm long and the petiolate leaves usually not among the largest leaves present) *P. virginiana* ssp. *virginiana*

Physostegia angustifolia Fernald, Narrowleaf Obedient-plant. Cp (GA): calcareous openings; rare. Sw. GA and AL west to KS and TX. [= GW, K, Z]

Physostegia godfreyi Cantino, Apalachicola Dragonhead. Cp (FL): wet savannas and flatwoods, adjacent ditches; rare. Endemic to Panhandle FL. [= GW, K, WH, Z]

Physostegia intermedia (Nuttall) Engelman & A. Gray. Swamps; moist forests, ditches. IL, KY, AR, and LA west to OK and TX. Also mapped as widespread in Coastal Plain of GA (Jones & Coile 1988); {investigate}. [= C, GW, K, Z; = *Dracocephalum intermedium* Nuttall]

Physostegia leptophylla Small, Tidal Marsh Obedient-plant, Swamp Obedient-plant. Cp (FL, GA, NC, SC, VA): bottomland hardwood forests, swamps, tidal freshwater or slightly brackish (oligohaline) marshes, rarely wet savannas (GA); uncommon. Late May-early August; June-September. Se. VA south to sc. peninsular FL, west to sw. GA and Panhandle FL. *P. leptophylla* is a tetraploid; Cantino (1982) suggests that this species may be an allotetraploid, perhaps originating from *P. purpurea* × *virginiana*. [= C, GW, K, WH, Z; < *Dracocephalum purpureum* (Walter) McClintock ex Gleason – RAB, G; > *P. denticulata* (Aiton) Britton – F, misapplied; > *P. aboriginorum* Fernald – F; > *Dracocephalum leptophyllum* Small – S; > *Dracocephalum veroniciformis* Small – S]

Physostegia purpurea (Walter) Blake, Savanna Obedient-plant. Cp (FL, GA, NC, SC): wet savannas, savanna-swamp ecotones, ditches adjacent to former pinelands; common (uncommon in GA, NC, and SC). Late May-early August; June-September. Ec. NC south to s. FL, west to sw. GA and Panhandle FL. Cantino (1982) discusses clinal variation within *P. purpurea*. [= GW, K, WH, Z; < *Dracocephalum purpureum* (Walter) McClintock ex Gleason – RAB (also see *P. leptophylla*); = *P. obovata* (Elliott) Godfrey ex Weatherby – F; = *Dracocephalum denticulatum* Aiton – S]

Physostegia virginiana (Linnaeus) Benth. *ssp. praemorsa* (Shinners) Cantino, Southern Obedient-plant. Mt (NC, SC, VA), Pd (NC, SC, VA), Cp (FL, NC, SC, VA), {GA}: woodlands, glades, seepages, especially over calcareous or mafic rock; common. July-October. OH west to n. IL, south to c. NC, n. FL, TX, NM, and Mexico. [= K, W, Z; < *Dracocephalum virginianum* Linnaeus – RAB, G, S; = *P. virginiana* var. *arenaria* Shimek – C; >> *P. virginiana* var. *virginiana* – F; >> *P. virginiana* var. *speciosa* – F; < *P. virginiana* – GW, WH]

Physostegia virginiana (Linnaeus) Benth. *ssp. virginiana*, Northern Obedient-plant. Mt (NC, SC, VA, WV), Pd (NC, SC, VA), Cp (NC, SC, VA), {DE}: streambanks, seepages, marshes, grassy balds (native occurrences usually over mafic or calcareous rocks), other open or semi-open moist to wet habitats, disturbed areas, ditches; rare as a native, more common as an escape from cultivation. July-October. Native from QC west to MB, south to e. VA, nc. TN, and ne. KS; escaped elsewhere (as in most of our area). Cantino (1982) discusses ambiguous plants from a zone of intergradation between the 2 subspecies in sw. NC, n. GA, ne. AL, e. TN, and sc. KY. Moreover, garden escapes show some intermediacy between the 2 subspecies, and Cantino (1982) suggests that cultivars are likely inter-subspecific hybrids, stating "because the genetic background of modern cultivars is unknown, they cannot be reasonably placed in either subspecies and should not be identified below the species level." [= K, Z; < *Dracocephalum virginianum* Linnaeus – RAB, G, S; = *P. virginiana* var. *virginiana* – C; >> *P. virginiana* var. *virginiana* – F; >> *P. virginiana* var. *speciosa* (Sweet) A. Gray – F; > *P. virginiana* var. *granulosa* (Fassett) Fernald – F; < *P. virginiana* – GW, Pa; > *Dracocephalum virginianum* var. *virginianum* – WV; > *Dracocephalum virginianum* var. *granulosum* (Fassett) Core – WV]

11. *Ballota* Linnaeus 1753 (Black Horehound)

A genus of about 30 species, herbs or small shrubs, of Africa and Eurasia. References: Stace (2010)=Z; Harley et al. in Kadereit (2004).

* ***Ballota nigra*** Linnaeus. Disturbed areas; native of the Mediterranean region. June-September. Introduced in several northern localities, and apparently documented from sw. AL. [= C, F, G; > *B. nigra* var. *nigra* – K2; > *B. nigra* ssp. *nigra* – Z; > *B. nigra* ssp. *meridionalis* (Béguinot) Béguinot – Z] synonymy incomplete]



12. *Galeopsis* Linnaeus 1753 (Hemp-nettle)

A genus of about 10 species, herbs, of Eurasia. References: Stace (2010)=Z; Harley et al. in Kadereit (2004). Key adapted from Stace (2010).

- 1 Stem with soft, appressed hairs; stem not swollen at the nodes*G. ladanum* var. *ladanum*
- 1 Stem with rigid, bristly hairs; stem swollen at the nodes.
 - 2 Terminal lobe of lower lip of corolla clearly emarginate and also convex (the sides revolute); corolla 13-16 mm long *G. bifida*
 - 2 Terminal lobe of the lower lip of the corolla entire to very slightly emarginate, essentially planar, not revolute; corolla 13-20 (-25) mm long*G. tetrahit*

* ***Galeopsis bifida*** Boenninghausen, Bifid Hemp-nettle. Mt (NC, VA, WV): streamsides, pastures, roadsides; rare, native of Eurasia. June-frost. [= K, Z; < *G. tetrahit* – RAB, S; = *G. tetrahit* Linnaeus var. *bifida* (Boenninghausen) Lejeune & Courtois – C, F, G, WH]

- * *Galeopsis ladanum* Linnaeus var. *ladanum*, Red Hemp-nettle. Disturbed areas; native of Eurasia. June-September. Naturalized in ne. North America, south at least to se. PA (Rhoads & Klein 1993) and s. NJ. [= F, K; > *G. ladanum* Linnaeus var. *angustifolia* (Ehrhart ex Hoffmann) Wallroth – C, G, misapplied]
- * *Galeopsis tetrahit* Linnaeus, Common Hemp-nettle. Disturbed areas; native of Eurasia. June-September. Naturalized in ne. North America and may occur in our area. [= Z; = *G. tetrahit* var. *tetrahit* – C, F, G; > *G. tetrahit* var. *tetrahit* – K]

13. *Stachys* Linnaeus 1753 (Hedge-nettle)

(contributed by John B. Nelson, Gary P. Fleming, and Derick B. Poindexter)

A genus of about 300 species, herbs and shrubs, mainly temperate, nearly cosmopolitan (except Australia and New Zealand). References: Nelson (1981)=Z; Nelson & Fahey (1979); Mulligan & Munro (1989); Pringle (2002); Harley et al. in Kadereit (2004). Key adapted from various manuscript keys of the contributors.

- 1 Herbage softly and densely white-woolly; [rare escapes from cultivation].
 - 2 Perennial; leaf blades heavily lanate, narrowed to the base, the dentations (if any) concealed by the felt; calyx lobes concealed by tomentum *S. byzantina*
 - 2 Biennial; leaf blades silky-pilose or tomentose, rounded to cordate at the base, obviously dentate; calyx lobes projecting beyond the pubescence *S. germanica*
- 1 Herbage variously pubescent or glabrous, but never white-woolly.
 - 3 Annuals from fibrous roots, typically freely branching from the base or from lower nodes; leaf blades 1-5 cm long, with rounded or obtuse apices (except acute to acuminate in *S. annua*); [aliens].
 - 4 Leaves cuneate at base, acute to acuminate at tip; corolla 10-16 mm long (well exceeding the calyx), white to yellow *S. annua*
 - 4 Leaves cordate or truncate at base, rounded or obtuse at tip; corolla 4-9 mm long (barely or not exceeding the calyx), white to pink.
 - 5 Calyx 7-9 mm long; corolla 7-9 mm long *S. arvensis*
 - 5 Calyx 3-5 mm long; corolla 4-6 mm long *S. agraria*
 - 3 Perennials from rhizomes, not branching in the lower portion (unless damaged); leaf blades often > 5 cm long, with acute apices; [natives, except *S. floridana* and *S. palustris*].
 - 6 Petioles well developed and obvious, at least some of those of the principal stem leaves at least one-fifth as long as the blades or longer.
 - 7 Calyx strongly glandular with atomiferous glands or gland-tipped hairs, or both.
 - 8 Calyx lobes narrowly lanceolate, about as long as the calyx tube; leaf blades lance-ovate to lanceolate, < 3 cm wide; stem angles glabrate to short retrorse pubescent; root tips with moniliform tubers; [adventive weed of the Coastal Plain] *S. floridana*
 - 8 Calyx lobes deltoid to deltoid-lanceolate, shorter than the calyx tube; leaf blades broadly cordate-ovate, usually > 3 cm wide; stem angles hispid; roots without tubers; [native species of rich mountain forests].
 - 9 Calyx lobes deltoid; leaves broadly rounded with a cordate base and crenulate margins *S. cordata*
 - 9 Calyx lobes deltoid-lanceolate; leaves various.
 - 10 Leaves ovate to elliptic with long acuminate apex and truncate base, margins strongly dentate *S. clingmanii*
 - 10 Leaves elliptic-oblong with an acute apex and a rounded to slightly cordate base, margins serrate to crenate *S. nuttallii*
 - 7 Calyx sparsely glandular or eglandular.
 - 11 Leaves ovate to broadly ovate, deeply cordate at base *S. cordata*
 - 11 Leaves oblong, lanceolate, elliptic, or ovate-elliptic, not cordate or only slightly so.
 - 12 Calyx hispidulous to strongly hispid with long, stiff, deflexed hairs; stem moderately to densely pubescent on the angles with hairs to 3 mm; leaves usually pubescent above (some forms glabrate); petioles rarely 1-2 cm long *S. hispida*
 - 12 Calyx glabrous to moderately pubescent with short, soft hairs; stem glabrous to moderately pubescent on the angles; leaves sparsely pubescent or glabrate; petioles well developed (1 to 3 cm long), especially in shade forms.
 - 13 Leaf blades wider, ovate-oblong to elliptic; calyx lobes deltoid-acuminate to an apiculate tip, 1/2 to 2/3 as long as the calyx tube; bracts of the inflorescence usually conspicuous and only gradually reduced upward; plants generally more pubescent *S. subcordata*
 - 13 Leaf blades oblanceolate, oblong, or narrowly elliptic; calyx lobes lanceolate, usually recurved-spreading in fruit, about as long as the calyx tube; bracts of the inflorescence inconspicuous, rapidly reduced upward; plants generally glabrate *S. tenuifolia*
 - 6 Petioles poorly developed, less than one-fifth as long as the blade or absent.
 - 14 Stem below the inflorescence pubescent on the sides, as well as the angles.
 - 15 Calyx lobes deltoid, no more than half as long as the calyx tube; leaf blades pubescent but never velvety.
 - 16 Calyx lobes strongly deltoid; stem and abaxial leaf surface densely atomiferous glandular and with few eglandular hairs *S. eplingii*
 - 16 Calyx lobes deltoid-lanceolate; stem and abaxial leaf surface moderately glandular and with frequent soft eglandular hairs *S. nuttallii*
 - 15 Calyx lobes lanceolate, more than half as long as the tube; leaf blades velvety-pubescent.
 - 17 Stem hairs spreading; leaf blades strongly velvety-pubescent; corolla pink *S. arenicola*
 - 17 Stem hairs strongly reflexed; leaf blades slightly velvety-pubescent; corolla purple *S. palustris*
 - 14 Stem below the inflorescence glabrous on the sides (rarely with a few remote hairs and/or glands) or atomiferous-glandular only.
 - 18 Leaves linear-lanceolate to lanceolate or lance-elliptic, often widest below the middle, 3-15(-20) mm wide; leaf margins entire to crenate or finely serrate.
 - 19 Leaf blades very narrow, 3-6(-10) mm wide, the margins entire to obscurely crenulate; herbage glabrous to moderately pubescent *S. hyssopifolia*
 - 19 Leaf blades broader, 5-15(-19) mm wide, the margins crenulate to finely serrate; herbage hispidulous to strongly pubescent *S. aspera*
 - 18 Leaves ovate-oblong to elliptic, usually widest near the middle, (1.6-)2.0-5.0(-6.0) cm wide; leaf margins crenate to sharply serrate.

- 20 Stem (including the sides) and usually the leaves with minute but copious atomiferous glands.....*S. eplingii*
- 20 Leaves and stem eglandular or with a few scattered glands.
- 21 Mature calyx lobes triangular deltoid and abruptly apiculate, less than half as long as the calyx tube.
- 22 Leaf margins serrulate or serrate; stem nodes not bearded (sometimes obscurely fine-hairy); stem angles with scattered, pustulate, short deflexed hairs; [high-elevation montane habitats]..... *S. latidens*
- 22 Leaf margins crenulate or crenate; stem nodes bearded; lower stem angles copiously pubescent with 3-celled spreading hairs; [low-elevation Piedmont and Coastal Plain habitats]*S. species 1*
- 21 Mature calyx lobes lanceolate or deltoid-acuminate to an apiculate tip, more than half as long as the calyx tube.
- 23 Calyx sparsely to moderately pubescent with short, soft hairs; stem angles moderately pubescent to nearly glabrous; leaves sparsely pubescent or glabrate; principal leaves on petioles 1 to 3 cm long; bracts of the inflorescence usually conspicuous and only gradually reduced upward, the cilia ± incurved-ascending *S. subcordata*
- 23 Calyx hispidulous to strongly hispid with long, stiff hairs; stem angles moderately to densely pubescent; leaves usually pubescent above (some forms glabrate); principal leaves usually subsessile, with very short petioles; bracts of the inflorescence usually inconspicuous and rapidly reduced upward; if conspicuous, bracts ciliate with long, stiffly spreading hairs.
- 24 Calyx flaring at maturity, conspicuously glandular with long stipitate trichomes and shorter sessile and subsessile glandular hairs; stem faces with occasional glandular and/or eglandular trichomes *S. appalachiana*
- 24 Calyx erect at maturity, sparsely short glandular to eglandular; stem faces usually with a few atomiferous glands only.. *S. hispida*

Stachys agraria Chamisso & Schlechtendal, Mouse's-ear, Shade Betony. Cp (FL, SC): calcareous hammocks; rare. SC south to s. FL, west to TX. [= *Stachys crenata* Rafinesque – K, WH] {add synonymy}

* *Stachys annua* (Linnaeus) Linnaeus, Annual Woundwort, Annual Hedge-nettle. Cp (VA): disturbed areas; rare, probably only a waif (Virginia Botanical Associates 2009). [= C, F, G, K]

Stachys appalachiana D.B. Poindexter & J.B. Nelson. Mt (NC, VA): fens, usually over mafic or ultramafic rocks, rare. Apparently endemic to nw. NC (Alleghany, Ashe, and Watauga counties) and sw. VA (Caldwell, Floyd, and Grayson counties). See Poindexter & Nelson (2011) for additional information.

Stachys arenicola Britton, Woundwort. Marl fens, roadsides, banks of waterfowl impoundments; possibly adventive in part from farther west, but at least some populations native. July-August. NS and QC west to AK, south to VA, KY, AR, OK, NM, AZ, and CA. [< *S. palustris* Linnaeus var. *pilosa* (Nuttall) Fernald – C, F, G, Pa; < *S. palustris* Linnaeus ssp. *pilosa* (Nuttall) Epling; = *S. pilosa* var. *arenicola* (Britton) Mulligan & Monroe – K; < *S. palustris* – WV]

* *Stachys arvensis* (Linnaeus) Linnaeus, Staggerweed. Cp? (VA?): disturbed areas; rare, native of { }. Reported for VA by C, G, and K; documentation uncertain (Virginia Botanical Associates 2009). [= C, F, G, K]

Stachys aspera Michaux, Rough-leaved Hedge-nettle. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA, WV): moist or wet sandy soil of savannas, marshes, or swamp forests, sinkhole ponds in the Great Valley; uncommon (rare in DE and VA). June-August; August-September. NJ and NY west to IL and IA, south to GA, MS, and MO. [= C, G, K, WV; = *S. hyssopifolia* Michaux var. *ambigua* A. Gray – RAB, F, GW, Pa, Z; = *S. ambigua* (A. Gray) Britton – S; ? *S. grayana* House]

* *Stachys byzantina* K. Koch ex Scheele, Lamb's-ear. Pd (VA), Mt (NC): roadsides; rare, doubtfully established. Reported for Prince Edward County, VA (Virginia Botanical Associates 2010). [= C, K; = *S. olympica* Poirlet – F, G]

Stachys clingmanii Small, Clingman's Hedge-nettle. Mt (NC), Cp? (VA?), {SC?}: cove forests, especially periglacial boulderfields, mostly at high elevations (and see comments below); rare. June-August; September-October. A narrow Southern Appalachian endemic, known only from sw. NC and se. TN. Some plants similar to and perhaps referable to this species occur in Surry County VA (calcareous bushy thickets and ravines) and in IN. [= C, F, G, K, S, W, Z; < *S. clingmanii* – RAB]

Stachys cordata Riddell, Heart-leaved Hedge-nettle. Mt (GA, NC, VA), Pd (NC, VA): moist forests, especially alluvial bottomlands or over calcareous rocks; uncommon (rare in GA). June-August; September-October. NY west to IL, south to SC, GA, AL, and AR. Primarily montane, but extending east to Stokes County, NC, and Campbell County, VA. See Pringle (2002) for a discussion of nomenclature. [= S; < *S. nuttallii* Shuttleworth ex Bentham – K, W, Z; > *S. cordata* – C; = *S. riddellii* House – F, G; > *S. salvioides* Small – S]

Stachys eplingii J.B. Nelson, Epling's Hedge-nettle. Mt (GA, NC, SC, VA, WV), Pd (VA): mesic forests, bogs, wet meadows over calcareous or mafic substrates; rare. June-August; August-September. W. VA and WV south to e. TN, w. NC, and w. SC. This species has a scattered and sporadic range in the southern and central Appalachians; material in the Interior Highlands previously included in *S. eplingii* has been separated as *S. iltisii* J.B. Nelson (Nelson 2008). See Nelson & Fairley (1979) for a discussion of the nomenclatural change. [< *S. eplingii* – C, GW, K, W, Z; < *S. nuttallii* – RAB, F, G, S, WV, misapplied]

* *Stachys floridana* Shuttleworth ex Bentham, Florida Betony, Rattlesnake-weed. Cp (FL, GA*?, NC*, SC*?, VA*), Pd* (GA, NC, SC, VA): disturbed sites, roadsides; uncommon (rare in VA), probably not native northward, native of Florida. April-July; May-August. Native from n. FL and Panhandle FL south to s. FL. The common name "Rattlesnake-weed" refers to the moniliform rhizomes. [= RAB, GW, K, S, WH, Z]

* *Stachys germanica* Linnaeus. Mt (VA, WV): disturbed areas, roadsides; rare, doubtfully established, native of Europe. June-August. Reported for VA, TN, FL (Kartesz 1999). [= C, F, G, K, Pa, WV]

Stachys hispida Pursh, Hispid Hedge-nettle. Mt (NC, VA), Pd (DE, VA), Cp (DE, VA), ?? (GA): wet meadows and mesic forests; common (uncommon in NC and VA, rare in GA). {distribution} A highly variable taxon. [= C, G; = *S. tenuifolia* Willdenow var. *hispida* (Pursh) Fernald – F; < *S. tenuifolia* var. *tenuifolia* – K, Z; < *S. tenuifolia* – Pa]

Stachys hyssopifolia Michaux var. *hyssopifolia*, Hyssop-leaved Hedge-nettle. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): moist soils of savannas, marshes, seasonally flooded sinkhole ponds, roadside ditches; uncommon (rare in VA). June-August; August-September. {distribution} [= RAB, F, GW, Pa, Z; = *S. hyssopifolia* – C, G, K, S, W; ? *S. atlantica* Britton]

Stachys hyssopifolia Michaux var. *lythroides* (Small) J.B. Nelson. Cp (FL, GA): floodplain forests; rare. E. Panhandle of FL and adjacent GA. [= WH, Z; < *S. hyssopifolia* – K; = *S. lythroides* Small – S] {not yet keyed}

Stachys latidens Small ex Britton, Broad-toothed Hedge-nettle. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA): mesic forests in coves and on mountain slopes, mountain pastures and forest edges; common (rare in GA, SC, and WV). June-August; September-October. A Southern Appalachian endemic: w. VA and WV south to GA, AL, and TN. [= RAB, C, F, G, S, WV; = *S. tenuifolia* Willdenow var. *latidens* (Small ex Britton) J.B. Nelson – K, W, Z; < *S. tenuifolia* – GW]

Stachys matthewsii G.P. Fleming, J.B. Nelson, & J.F. Townsend, Yadkin Hedge-nettle. Pd (NC, VA): in sandy alluvium along forest edges in river floodplains; rare. Known from Amelia, Brunswick, Charlotte, Halifax, Pittsylvania, and Surry counties, VA, and Durham, Granville, and Montgomery counties, NC. See Fleming, Nelson, and Townsend (2011) for additional details.

Stachys nuttallii Shuttleworth ex Bentham, Nuttall's Hedge-Nettle. Mt (GA, NC, VA, WV), Pd (NC, VA): moist forests, especially alluvial bottomlands or over calcareous rocks; uncommon (rare in GA and NC). June-August; September-October. {distribution} Primarily montane, but extending east to Stokes County, North Carolina. See Pringle (2002) for a discussion of nomenclature. [= K, Pa, W, Z; < *S. clingmanii* – RAB; = *S. riddellii* House – F, G; > *S. nuttallii* – S; > *S. salvioides* Small – S]

* *Stachys officinalis* (Linnaeus) Trevis, Common European Hedge-nettle. Mt (NC): persisting and spreading clonally from cultivation; rare, native of Europe. [= K] {not yet keyed}

* *Stachys palustris* Linnaeus. Cp (DE): disturbed areas; uncommon. July-August. {distribution} South to MD, PA, NJ. [= K; > *S. palustris* var. *palustris* – C, F, G, Pa]

Stachys species 2. Cp (SC): {habitat}; rare. Santee River, SC. Under study by John Nelson. {not yet keyed}

Stachys subcordata Rydberg. Mt (VA): moist forests over calcareous or mafic rocks; common. Wc. VA south to ne. TN. [= C, G]

Stachys tenuifolia Willdenow, Smooth Hedge-nettle. Mt (NC, WV), Pd (DE, VA), Cp (DE, FL, NC, SC, VA): wooded alluvial river bottoms, swamp forests, and roadsides; uncommon (rare in DE, NC, SC, and WV). June-August; September-October. {distribution} [= RAB, C, G, K, S; > *S. tenuifolia* var. *tenuifolia* – F, Z; > *S. tenuifolia* var. *perlonga* Fernald – F, WH, Z; > *S. tenuifolia* var. *platyphylla* Fernald – F; < *S. tenuifolia* – GW, Pa; = *S. tenuifolia* var. *tenuifolia* – W]



14. *Sideritis* Linnaeus 1753

A genus of about 140-150 species, herbs and shrubs, of temperate Eurasia. References: Harley et al. in Kadereit (2004).

* *Sideritis romana* Linnaeus, Ironwort. Disturbed areas; native of Eurasia. June-August. Introduced and naturalized as far south as PA (Rhoads & Klein 1991, Cronquist 1991) and WV (Cronquist 1991). [= C, K] {synonymy incomplete}

15. *Leonurus* Linnaeus 1753 (Motherwort)

A genus of 25 species, herbs, of temperate Eurasia. [also see *Chaiturus*]

- 1 Calyx strongly 5-angled, the lower 2 lobes deflexed; upper corolla lip white-villous; leaves lacerately toothed and the larger shallowly lobed *L. cardiaca*
- 1 Calyx slightly 5-angled, no lobes notably deflexed; upper corolla lip with densely and finely puberulent; leaves **either** entire to few-toothed (but not lobed) **or** deeply 3-parted, the 3 divisions further lacerately toothed or lobed.
 - 2 Leaves entire to few-toothed (but not lobed) [see *Chaiturus marrubiastrum*]
 - 2 Leaves deeply 3-parted, the 3 divisions further lacerately toothed or lobed *L. sibiricus*

* *Leonurus cardiaca* Linnaeus, Motherwort, Lion's-tail. Pd (DE, SC, VA), Mt (GA, VA, WV), Cp (DE, VA), {NC}: roadsides, pastures, disturbed areas; common (rare in DE), native of c. Asia. May-August; July-October. Nelson (1993) reports the occurrence of this species in SC. [= RAB, C, F, G, Pa, S, W, WV; ? *L. cardiaca* ssp. *cardiaca* – K]

* *Leonurus sibiricus* Linnaeus, Siberian Motherwort. Cp (DE, FL, VA), Mt (WV): disturbed areas; rare, native of Asia. May-September. [= C, F, G, K, Pa, S; ? *L. japonicus* Houttuyn – WH] {for FL, Wunderlin & Hansen have *L. japonicus* and state that *L. sibiricus* is misapplied – investigate}

16. *Marrubium* Linnaeus 1753 (Horehound)

A genus of about 30-40 species, herbs, of Mediterranean Europe and Asia. References: Harley et al. in Kadereit (2004).

* *Marrubium vulgare* Linnaeus, Horehound. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE): fencerows, disturbed places; uncommon, native of Eurasia. June-August. Used for cough-syrups in folk medicine. [= RAB, C, F, G, K, Pa, S, W, WV]

17. *Lamium* Linnaeus 1753 (Dead-nettle, Henbit)

A genus of about 17-40 species, herbs, of n. Africa and Eurasia. References: Mennema (1989)=Z; Harley et al. in Kadereit (2004).

- 1 Corolla yellow; anthers glabrous; bracts present, reflexed.....*L. galeobdolon*
- 1 Corolla blue or white; anthers with tufts of hairs; bracts absent or present (if present not reflexed).
- 2 Perennial, with rhizomes or stolons; corolla 18-35 mm long, the tube curved; leaves all petioled; [section *Lamiotypus*].
 - 3 Corolla white; leaves not blotched with white; lower corolla lip with 2-3 teeth on each side; pollen light yellow *L. album* ssp. *album*
 - 3 Corolla pinkish-purple (rarely white); leaves usually marked with white; lower corolla lip with 1 tooth on each side; pollen orange
.....*L. maculatum*
- 2 Annual, lacking rhizomes or stolons; corolla 10-18 (-20) mm long, the tube straight; leaves all petioled or upper leaves sessile and clasping.
 - 4 Leaves subtending flower clusters sessile; [section *Amplexicaule*].....*L. amplexicaule* var. *amplexicaule*
 - 4 Leaves all petioled; [section *Lamium*].
 - 5 Leaves subtending whorls deeply serrate, with many teeth > 2 mm long; nutlets (2.5-) 2.7-3.0 (-3.3) mm long.....*L. dissectum*
 - 5 Leaves subtending whorls crenate-serrate, with teeth < 2 mm long; nutlets (2.0-) 2.2-2.5 (-2.8) mm long.....*L. purpureum*

* *Lamium album* Linnaeus ssp. *album*, White Dead-nettle, Snowflake. Disturbed areas; native of Eurasia. April-September. Reported from our area (VA) by many earlier manuals; not documented in Harvill et al. (1992). [=Z; < *L. album* - C, F, G, K, Pa]

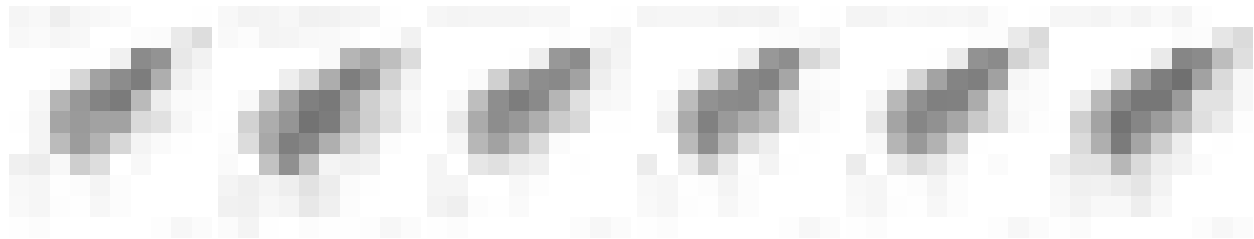
* *Lamium amplexicaule* Linnaeus var. *amplexicaule*, Henbit, Henbit Dead-nettle. Lawns, fields, roadsides, disturbed areas, gardens, pastures; native of Eurasia and n. Africa. January-December. [=Z; < *L. amplexicaule* - RAB, C, F, G, K, Pa, S, W, WH, WV]

* *Lamium dissectum* Withering, Cutleaf Dead-nettle. Lawns, fields, roadsides, disturbed areas; native of Eurasia. April-May. This taxon is apparently an allopolyploid derivative (2n=36), resulting from hybridization of *L. purpureum* and another species, perhaps *L. amplexicaule*. Because of its allopolyploid status, this taxon should not be treated as a variety of *L. purpureum*. It is, however, possible that some individuals identified here may be sterile hybrids (2n=18). [= *L. hybridum* Villars - RAB, C, F, G, misapplied; = *L. purpureum* Linnaeus var. *incisum* (Willdenow) Persoon - K, Z]

* *Lamium galeobdolon* (Linnaeus) Linnaeus, Yellow Archangel. Disturbed areas; native of Europe and e. Asia. Several subspecies are recognized in Europe. [=Z; = *Lamiastrum galeobdolon* (Linnaeus) Ehrendorfer & Polatschek - FNA, K, Pa; = *Galeobdolon luteum* Hudson]

* *Lamium maculatum* Linnaeus, Spotted Dead-nettle. Lawns, fields, roadsides, disturbed areas; native of Eurasia. April-September. [=RAB, C, F, G, K, Pa, S, WV, Z]

* *Lamium purpureum* Linnaeus, Red Dead-nettle, Purple Dead-nettle. Lawns, fields, roadsides, disturbed areas, pastures; native of Eurasia. March-October. Only recently documented in the Coastal Plain of GA and in FL (Carter, Baker, & Morris 2009; Wunderlin & Hansen 2008). [=RAB, C, F, G, Pa, S, W, WV; = *L. purpureum* var. *purpureum* - K, Z]



18. *Collinsonia* Linnaeus 1753 (Horsebalm, Richweed, Stoneroot)

A genus of about 4 species, perennial herbs, of e. North America. References: Peirson, Cantino, & Ballard (2006)=Y; Shinnars (1962b)=Z; Harley et al. in Kadereit (2004). Key adapted from Y and Z.

- 1 Inflorescence an unbranched thyrses, the lower nodes with (3-) 6 flowers per node; floral bracts absent; pedicels flattened at base; leaves (2-) 4 (-6), the 4 upper (or only) leaves subverticillate; flowers light pink to lavender; flowering April-June; [subgenus *Micheliella*].... *C. verticillata*
- 1 Inflorescence a panicle (rarely unbranched), the flowers 2 per node; floral bracts present, minute to large; pedicels not enlarged basally; leaves 6 or more, opposite; flowers cream to yellow; flowering July-September; [subgenus *Collinsonia*].
 - 2 Fertile stamens 4; fresh plants with anise scent; [GA southward and westward].....*C. anisata*
 - 2 Fertile stamens 2; fresh plants with lemon scent; [collectively widespread in our area].
 - 3 Blades of the larger stem leaves 4.0-10.5 cm long, with 5-15 teeth on each margin, glabrous or hispidulous on the main veins beneath; plant from a small, rounded tuber-like crown, to 6 cm long and 5 cm in diameter*C. tuberosa*
 - 3 Blades of the larger stem leaves 8-25 cm long, with 11-42 teeth on each margin, glabrous or variously pubescent beneath; plant from an elongate, woody, rhizome-like crown, to 15 cm long.
 - 4 Calyx 2-5 mm long; calyx teeth lance-subulate to narrowly lanceolate; flowers 8-13 mm long.....*C. canadensis*
 - 4 Calyx 4.5-7 mm long; calyx teeth broadly lanceolate; flowers 12-17 mm long.....*C. punctata*

Collinsonia anisata Sims, Southern Horsebalm, Anise Horsebalm. Pd (GA), Cp (FL, GA): rich forests; uncommon. Late July-September; September-October. C. GA south and west to Panhandle FL and west to s. MS, on the Piedmont and Coastal Plain. This species is apparently distinct, but Shinnery's concept of it included hybrids with *C. canadensis* and aberrant *C. canadensis* (Peirson, Cantino, & Ballard 2006). [= Y; < *Collinsonia serotina* Walter – K, W, WH, Z; < *C. canadensis* var. *punctata* (Elliott) A. Gray – F, misapplied; < *C. punctata* Elliott – S; ? *Micheliella anisata* (Sims) Briquet – S]

Collinsonia canadensis Linnaeus, Richweed, Northern Horsebalm. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): cove forests, rich forests, especially over calcareous or mafic substrates; common (rare in VA Coastal Plain). Late July-September; September-October. QC, MI, and WI, south to Panhandle FL and LA. [= RAB, C, F, G, K, Pa, S, W, WV, Z; < *C. canadensis* – Y (also see *C. tuberosa*)]

Collinsonia punctata Elliott, Florida Horsebalm. Cp (FL, GA, SC): rich woods; rare. Late August-mid October; September-October. S. SC (Barnwell County) to e. LA, on the Coastal Plain. [= Y; < *Collinsonia serotina* – K, WH, Z]

Collinsonia species I. Pd (GA). Under study by Steve Bowling. {not yet keyed}

Collinsonia tuberosa Michaux, Stoneroot. Pd (GA, NC, SC), Mt (GA): rich forests, over calcareous or mafic substrates; rare (NC Watch List). Late July-September; September-October. C. NC west to c. TN, south to n. GA and MS (or LA?). Peirson, Cantino, & Ballard (2006) conclude that *C. tuberosa* should be merged into *C. canadensis*, a conclusion not followed here. [= RAB, K, S, W, Z; < *C. canadensis* – Y; = *C. canadensis* Linnaeus var. *tuberosa* (Michaux) A. Wood]

Collinsonia verticillata Baldwin, Whorled Horsebalm. Pd (GA, NC, SC, VA), Mt (GA): rich forests, ranging from moist (cove) forests to rather dry oak forests over mafic or calcareous rocks; rare. Late April-early June; June-July. Sc. VA west to e. TN, south to w. NC, nw. SC, c. GA, and MS; disjunct in s. OH. The range is strangely scattered and fragmented. [= RAB, C, G, K, W, Y, Z; = *Micheliella verticillata* (Baldwin) Briquet – F, S]

19. *Elsholtzia* Willdenow 1790

A genus of about 35-40 species, herbs, of temperate e. hemisphere. References: Harley et al. in Kadereit (2004).

* ***Elsholtzia ciliata*** (Thunberg) Hylander. Mt (NC, WV): disturbed areas; rare, native of Asia. July-September. First reported for NC by Leonard (1971b). [= C, F, G, K, Pa, WV]

20. *Mosla* (Benth) Buchanan-Hamilton ex Maximowicz 1875 (Mosla)

A genus of about 10-22 species, of e. Asia. References: Harley et al. in Kadereit (2004).

* ***Mosla dianthera*** (Buchanan-Hamilton ex Roxburgh) Maximowicz, Mosla. Mt (GA, NC), Pd (VA): disturbed areas; rare, native of e. Asia. August-September. This species is becoming a noxious weed west of our area (in KY and TN); it should be expected to become more widespread in our area. [= RAB, F, G, K; = *Orthodon dianthera* (Buchanan-Hamilton) Handel-Mazzetti – C]

21. *Perilla* Linnaeus 1764 (Perilla, Beefsteak-plant)

A genus of about 1-6 species, herbs, of s. and e. Asia. References: Harley et al. in Kadereit (2004).

* ***Perilla frutescens*** (Linnaeus) Britton, Perilla, Beefsteak-plant. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA): moist disturbed areas; common (uncommon in DE Coastal Plain, rare in FL), native of India. August-October; October-December. Two varieties are sometimes recognized. Var. *crispa* (Benth) Deane (leaves purple above and below; leaf margins lacinate-dentate and also crisped) and var. *frutescens* (leaves purple below; leaf margins dentate, not crisped). These probably represent cultivars rather than taxonomically distinct entities. [= RAB, C, G, Pa, S, W, WH; > *P. frutescens* var. *frutescens* – F, K, WV; > *P. frutescens* (Linnaeus) Britton var. *crispa* (Benth) Deane – F, K, WV]

Agastache Clayton ex Gronovius 1762 (Giant-hyssop)

A genus of about 22 species, herbs, of c. and e. Asia, and North America to Mexico. References: Vogelmann (1985); Lint & Epling (1945); Harley et al. in Kadereit (2004).

- 1 Leaves densely white tomentose below; corolla blue; [cultivated as an ornamental and rarely naturalized].....***A. foeniculum***
- 1 Leaves glabrous to villous beneath, appearing green; corolla yellow, greenish-yellow, or pinkish; [native].
- 2 Corolla yellow or greenish-yellow; calyx lobes obtuse or subacute, 1-1.5 mm long at anthesis; calyx lobes and bracts green; midstem internodes glabrous or minutely pubescent; lower surface of the leaf pubescent on the veins and surface.....***A. nepetoides***
- 2 Corolla pinkish; calyx lobes acute or acuminate, 2-2.5 mm long at anthesis; calyx lobes and bracts with white or pink margins; midstem internodes at least sparsely long-pubescent; lower surface of the leaf pubescent mainly on the veins***A. scrophulariifolia***

* ***Agastache foeniculum*** (Pursh) Kuntze, Lavender Giant-hyssop. Pd (DE, NC): disturbed areas, spread from cultivation; rare, native of w. North America. July-August. Cultivated as an ornamental and naturalized in scattered locations in PA (Rhoads & Klein 1993), KY (Kartesz 1999), and elsewhere. [= C, F, G, K, Pa]

Agastache nepetoides (Linnaeus) Kuntze, Yellow Giant-hyssop. Pd (DE, NC, SC, VA), Cp (DE, NC, VA), Mt (GA, NC, VA, WV): woodlands and forests, generally over calcareous or mafic rocks; uncommon (rare in DE, rare in Coastal Plain of NC and VA). July-September; September-October. VT west to MN, south to nw. GA and OK. In our area, this species occurs mostly in the Piedmont. [= RAB, C, F, G, K, Pa, S, W]

Agastache scrophulariifolia (Willdenow) Kuntze, Purple Giant-hyssop. Mt (GA, NC, VA, WV), Pd (DE, NC, VA): rich woodlands and forests, bottomlands; uncommon (rare in GA and DE). July-September; September-October. VT west to MN, south to NC, e. TN, n. GA, and e. KS. [= K, Pa; = *A. scrophulariaefolia* – RAB, C, G, S, W, an orthographic variant; > *A. scrophulariaefolia* var. *scrophulariaefolia* – F; > *A. scrophulariaefolia* var. *mollis* (Fernald) Heller – F]

***Blephilia* Rafinesque 1819 (Woodmint, Pagoda-plant)**

A genus of 3 species, herbs, of e. North America. References: Simmers & Kral (1992)=Z; Harley et al. in Kadereit (2004).

- 1 Stem glabrate below the middle; leaf lower surface glabrous or with a few unicellular hairs on the midvein; [of moist forests over limestone in ne. AL and se. TN] ***B. subnuda***
- 1 Stem strongly pubescent below the middle; leaf lower surface distinctly pubescent, at least on the larger nerves; [of various moist to dry forests, woodlands, and meadows, collectively widespread in our area].
 - 2 Lobes of the lower lip of the calyx linear, approaching the sinuses of the upper lip; outer bracteoles acute; leaves with rounded to acutish tips (rather *Prunella*-like); petioles 1-7 (-12) mm long; stem canescent, rarely with intermixed long trichomes; [primarily in the Piedmont] ***B. ciliata***
 - 2 Lobes of the lower lip of the calyx deltoid, not reaching the sinuses of the upper lip; outer bracteoles long-acuminate; leaves with acuminate to acute tips (rather *Monarda*-like); petioles 9-42 mm long; stem densely to sparsely pubescent with long, spreading trichomes; [primarily in the Mountains] ***B. hirsuta***

Blephilia ciliata (Linnaeus) Benth. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (NC, SC, VA): woodlands, meadows, forests, usually in circumneutral soils (over diabase, limestone, etc.); uncommon (rare in DE, rare in Coastal Plain of VA). May-early July; August-October. MA and WI south to c. GA and AR. [= RAB, C, F, G, K, Pa, S, W, Z]

Blephilia hirsuta (Pursh) Benth. Mt (NC, VA, WV), Pd (DE, NC, VA), {GA}: rocky or alluvial forests, montane forests up to at least 5000 feet elevation; common (uncommon in Mountains of VA, rare in DE and Piedmont of VA). Late June-October; August-November. QC and MN south to NC, AL, AR, and e. TX. [= RAB, C, G, Pa, S, W, Z; > *B. hirsuta* var. *hirsuta* – F, K]

Blephilia subnuda R.W. Simmers & Kral. Moist calcareous forests. Endemic (so far as is known) to the Cumberland Plateau of ne. AL (Jackson and Madison counties) and se. TN. [= K, Z]



***Chaiturus* Willdenow 1787 (Horehound Motherwort)**

A monotypic genus, an herb, of Europe and n. Asia.

* *Chaiturus marrubiastrum* (Linnaeus) Reichenbach, Horehound Motherwort. Mt (VA, WV), Pd (DE, VA): disturbed areas; rare, native of Europe and n. Asia. June-September. [= K; = *Leonurus marrubiastrum* Linnaeus – C, F, G, Pa, S]

***Clinopodium* Linnaeus 1753 (Calamint)**

A genus of about 100 species (as here circumscribed including *Acinos*, *Calamintha*, *Satureja*, etc.), herbs and shrubs, of temperate and subtropical areas of the w. and e. hemispheres. References: Cantino & Wagstaff (1998)=Y; Shinnars (1962a)=Z; Shinnars (1962f)=X. Key adapted in part from Z.

- 1 Flowers 1 per leaf axil ***C. brownii***
- 1 Flowers > 1 per leaf axil.
 - 2 Plant a shrubby perennial, not flowering the first year; [of sandy or rocky habitats of the Coastal Plain and Piedmont, from s. NC southward].
 - 3 Corolla bright scarlet, 27-50 mm long; calyx 8-18 mm long ***C. coccineum***
 - 3 Corolla light lavender or pink with darker spots, 10-20 mm long; calyx 5.0-7.5 mm long.
 - 4 Leaves ovate or elliptic, sharply serrate, not revolute; leaves distinctly petioled; leaf surfaces glabrous ***C. georgianum***
 - 4 Leaves linear to linear-elliptic, entire, strongly revolute; leaves subsessile; leaf surfaces minutely and densely pubescent ***C. ashei***

- 2 Plant an herbaceous to suffrutescent perennial, often flowering the first year; [of various habitats, collectively widely distributed in our area].
- 5 Stem glabrous or pubescent at the nodes only; leaves of flowering stems linear to oblanceolate; [native, of limestone glades, barrens, and bluffs].
- 6 Plant stoloniferous, bearing leafy stolons with ovate leaves; leaves of the flowering stems 1-2 cm long, 1-5 mm wide, entire *C. arkansanum*
- 6 Plant not bearing leafy stolons; leaves of the flowering stems oblanceolate, 2.5-5 cm long, 5-17 mm wide, with several teeth on each side *C. glabellum*
- 5 Stem pubescent; leaves of flowering stems elliptic to ovate; [alien or native, generally of disturbed or weedy situations].
- 7 Axillary flower clusters in peduncled, contracted cymes.
- 8 Calyx 6.0-10.2 mm long, the hairs inside the throat barely or not exerted; blades of larger stem leaves 2-5 cm long *C. ascendens*
- 8 Calyx 2.8-6.0 mm long, the hairs inside the throat exerted, prominent; blades of the larger stem leaves 0.8-2.4 cm long *C. calamintha*
- 7 Axillary flower clusters sessile, dense.
- 9 Corolla 4-5 mm long; calyx 2.5-5.5 mm long *C. gracile*
- 9 Corolla 7-22 mm long; calyx 4.5-10 mm long.
- 10 Whorls with 8 or fewer flowers; calyx 4.5-7 mm long; corolla 7-10 mm long *C. acinos*
- 10 Whorls with > 8 flowers; calyx 7-10 mm long; corolla 12-22 mm long *C. vulgare*

* *Clinopodium acinos* (Linnaeus) Kuntze, Mother-of-thyme, Basil-thyme. Mt (VA, WV): cultivated, rarely escaped or persisting; rare, native of Europe. June-September. [= *Satureja acinos* (Linnaeus) Scheele - C, F, G; = *Acinos arvensis* (Lamarck) Dandy - K, Pa]

Clinopodium arkansanum (Nuttall) House, Arkansas Calamint. Mt (VA): dry limestone glades; rare (VA Rare). ON west to MN, south to w. NY, nw. PA, w. VA, WV, IL, c. TN, and s. WI; also in MO, OK, AR, and TX. There appears to be confusion about the identities and distributions of this taxon and *C. glabellum*. [= K, Y; = *Satureja glabella* (Michaux) Briquet var. *angustifolia* (Torrey) Svenson - C, G; = *Satureja arkansana* (Nuttall) Briquet - F; < *Calamintha arkansana* (Nuttall) Shinnery - GW (also see *Clinopodium glabellum*); = *Calamintha arkansana* (Nuttall) Shinnery - Pa, Z; < *Clinopodium glabellum* (Michaux) Kuntze - S]

* *Clinopodium ascendens* (Jordan) Sampaio, Common Calamint. Cp (VA): rich calcareous slope; rare, native of Europe. August. [= *Calamintha sylvatica* Bromfield ssp. *ascendens* (Jordan) P.W. Ball - K; ? *Calamintha officinalis* - Z]

Clinopodium ashei (Weatherby) Small, Ashe's Calamint, Ashe's Savory, Ochoopee Dunes Wild Basil. Cp (GA): xeric sandhills; rare. Peninsular FL (south of our area); disjunct in e. GA (Candler and Tatnall counties). [= K, S, Y; = *Calamintha ashei* (Weatherby) Shinnery - WH, Z; = *Satureja ashei* Weatherby]

Clinopodium brownei (Swartz) Kuntze, Browne's Savory. Cp (FL, GA, SC): floodplain forests, pondshores; uncommon (rare in GA and SC). In sw. GA (Jones & Coile 1988). Reported for SC (Beaufort County, SC) (Daniel Payne, pers. comm. 2006, specimen at CLEMS). [= K; > *Micromeria pilosiuscula* (A. Gray) Small - S; > *Micromeria brownei* (Swartz) Benth. var. *pilosiuscula* A. Gray - GW, WH, X]

* *Clinopodium calamintha* (Linnaeus) Stace, Lesser Calamint, Basil-thyme. Mt (NC, VA), Pd (NC, VA), Ip (KY), Cp (NC, VA), {GA}: disturbed areas; common (uncommon in NC), native of Europe. June-October. [> *Satureja calamintha* (Linnaeus) Scheele var. *nepeta* (Linnaeus) Briquet - RAB, F, G, W; = *Satureja calamintha* (Linnaeus) Scheele - C; > *Satureja calamintha* var. *calamintha* - F; > *Satureja calamintha* var. *nepetoides* (Jordan) Briquet - F, G; > *Satureja calamintha* var. *glandulosa* (Riquien) Briquet - F; > *Calamintha nepeta* (Linnaeus) Savi ssp. *nepeta* - K; > *Calamintha nepeta* ssp. *glandulosa* (Riquien) P.W. Ball - K, Pa; = *Clinopodium nepeta* (Linnaeus) Kuntze - S; > *Calamintha officinalis* Moench - Z; > *Calamintha nepeta* (Linnaeus) Savi - Z]

Clinopodium coccineum (Nuttall ex Hooker) Kuntze, Scarlet Calamint, Scarlet Wild Basil, Red Mint Shrub. Cp (FL, GA): sandhills and flatwoods; uncommon. E. GA south to c. peninsular FL, west to s. MS. [= K, S, Y; = *Calamintha coccinea* (Nuttall ex Hooker) Benth. var. *nepeta* - WH, Z; = *Satureja coccinea* (Nuttall ex Hooker) Bertolini]

Clinopodium dentatum (Chapman) Kuntze, Florida Calamint, Toothed Savory. Cp (FL, GA): sandhills and xeric steepheads; rare. Endemic to sw. GA and Panhandle FL. [= K, S; = *Satureja dentata* (Chapman) Briquet; = *Calamintha dentata* Chapman - WH] {not yet keyed; add to synonymy}

Clinopodium georgianum R.M. Harper, Georgia Calamint. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): longleaf pine sandhills, dry rocky or sandy woodlands; uncommon (rare in FL and NC). July-September. S. NC south to Panhandle FL and west to LA. [= K, S, Y; = *Satureja georgiana* (R.M. Harper) H.E. Ahles - RAB; = *Calamintha georgiana* (R.M. Harper) Shinnery - WH, Z]

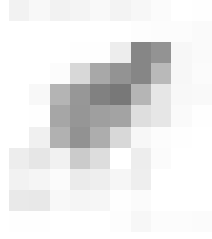
Clinopodium glabellum (Michaux) Kuntze. Ip (KY): dry-mesic to mesic shaley forests, limestone barrens; uncommon. Nc. KY, c. TN, south to c. AL; MO and AR. Reports of this for VA (Kartesz 1999) are apparently based on confusion with *Clinopodium arkansanum*. [= Y; = *Satureja glabella* (Michaux) Briquet var. *glabella* - C; = *Clinopodium glabellum* (Michaux) Kuntze - K; < *Calamintha arkansana* (Nuttall) Shinnery - GW; < *Clinopodium glabellum* (Michaux) Kuntze - S; = *Calamintha glabella* (Michaux) Benth.]

* *Clinopodium gracile* (Benth.) Kuntze, Slender Wild Basil. Disturbed areas, bottomland forests; native of Asia. June-August; August-October. Introduced in s. AL, FL, LA (Kartesz 1999; Woods, Diamond, & Searcy 2003), MS (S.W. Leonard, pers. comm. 2005), and GA (Zomlefer et al. 2011, 2012). [= K, WH] {add to synonymy}

Clinopodium species 1, Indian Grave Mountain Wild Basil. It occurs in montane longleaf pine/chestnut oak/Georgia oak woodlands on Hollis quartzite along the main Pine Mountain ridge. Under study by Jim Allison. {not yet keyed}

Clinopodium vulgare Linnaeus, Wild Basil. Mt (KY, NC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, VA), Ip (KY): pastures, roadbanks, forests, thin soils around rock outcrops; common (uncommon in DE Piedmont, rare in DE Coastal Plain). July-September. NL (Newfoundland) to MB, south to NC, sc. TN, and KS, scattered in the west, widespread in Europe. Plants in our area may reflect both native and introduced genotypes. [= K, Pa, S, Y, Z; = *Satureja vulgaris* (Linnaeus) Fritsch - RAB, C, F, G,

W; > *Satureja vulgaris* var. *vulgaris* – F; > *Satureja vulgaris* var. *diminuta* (Simon) Fernald & Wiegand – F; > *Satureja vulgaris* var. *neogaea* Fernald – F; > *Clinopodium vulgare* var. *neogaea* (Fernald) C.F. Reed]



Conradina A. Gray 1870 (Conradina, Rosemary)

A genus of 6 species, shrubs and suffrutescent herbs, of temperate se. North America. References: Edwards et al. (2009)=Y; Shinnery (1962g)=Z; Harley et al. in Kadereit (2004). Key based in part on Y.

- 1 Leaves oblanceolate, slightly revolute, the leaf undersurface mostly visible and showing 1-4 raised lateral veins; [Putnam County, FL, adjacent to the coverage area].
 - 2 Calyx 8.5-11 mm long, the upper lobe 3.6-4.4 mm long; cyme 1-5-flowered; unicellular hairs of the lower leaf surface thin-walled, collapsing and flattened in drying; [ec. Putnam County, FL] *C. cygniflora*
 - 2 Calyx 7-8.5 mm long, the upper lobe 1.8-3.5 mm long; cyme 3-7-flowered; unicellular hairs of the lower leaf surface thick-walled, terete to conical, unchanged in drying; [nw. Putnam County, FL] *C. etonia*
- 1 Leaves either linear and strongly revolute such that essentially only the midvein is visible on the undersurface (*C. canescens*) or linear to narrowly oblanceolate, slightly to strongly revolute, some leaf surface sometimes showing on the leaf undersurface, but lacking raised lateral veins (*C. glabra* and *C. verticillata*); [collectively more widespread].
 - 3 Leaves densely gray-pubescent above and below; midrib on lower leaf surface densely gray-pubescent to gray-pilose..... *C. canescens*
 - 3 Leaves green above, glabrous or inconspicuously short-pubescent; midrib on lower leaf surface glabrous or glabrate, contrasting with the more densely pubescent lower leaf surface.
 - 4 Plants upright to 8 dm tall; calyx tube glabrous or minutely and inconspicuously puberulent; [Coastal Plain of Panhandle FL and s. AL] *C. glabra*
 - 4 Plants decumbent, rooting at the nodes; calyx tube densely short-pubescent and also pilose with longer glandular hairs; [Cumberland Plateau of KY and TN] *C. verticillata*

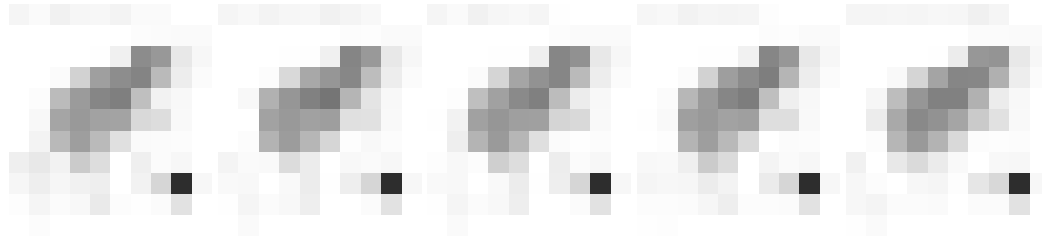
Conradina canescens A. Gray, Gray Rosemary. Sandhills, scrub, flatwoods. January-May. Panhandle FL and s. AL west to s. MS. [= K, WH, Y, Z; > *C. canescens* – S; > *C. puberula* Small – S]

Conradina cygniflora C.E. Edwards, Judd, Ionta, & Herring, Swan-flowered Rosemary. Sand pine scrub and sandhills. September-October. Endemic to ec. Putnam County, FL. [= Y; < *C. etonia* – WH]

Conradina etonia Kral & McCartney, Etoniah Rosemary. Sand pine scrub and sandhills. Endemic to nw. Putnam County, FL. [= Y; < *C. etonia* – WH]

Conradina glabra Shinnery, Apalachicola Rosemary. Sandhills. Panhandle FL and s. AL. [= K, WH, Y, Z]

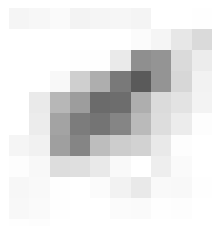
Conradina verticillata Jennison, Cumberland Rosemary. Flood-scoured cobble bars of large rivers. Endemic to the Cumberland Plateau area of ne. TN and se. KY. It has an odor similar to rosemary, and showy purplish flowers. [= K, Y, Z; = *C. montana* Small – S]



Cunila D. Royen ex Linnaeus 1759 (Stone-mint, American-dittany, Wild-oregano)

A genus of about 15 species, herbs, from e. North America to South America. References: Harley et al. in Kadereit (2004).

Cunila organoides (Linnaeus) Britton, Stone-mint, American-dittany, Wild-oregano. Dry rocky slopes, other dry slopes. August-October; October-December. S. NY and PA west to MO, south to c. SC, n. GA, OK, and ne. TX (Singhurst & Holmes 2004). [= RAB, C, F, G, K, Pa, W, WV; = *Mappia organoides* (Linnaeus) House – S]



Dicerandra Bentham 1830 (*Dicerandra*)

A genus of 9 species, herbs, endemic to se. North America. References: Huck (1987)=Z; Huck (1984)=Y; Ward (2009d)=X; Huck (2010)=V; Huck (2007); Huck & Chambers (1997); Harley et al. in Kadereit (2004).

- 1 Corolla tubular, straight or slightly curved; superior lobe cucullate (hoodlike); stamens and style arching under the hooded upper lobe of the corolla, included or slightly exerted beyond its apex; filaments inserted at 2 levels within the corolla; odor of fresh plant cinnamon-like, spicy; [section *Lecontea*].
 - 2 Corolla tube ca. 18 mm long, the orifice ca. 2 mm wide; leaves (15-) avg. 25 (-45) mm long, linear, the margins entire; [s. SC south through much of the Coastal Plain of GA] *D. odoratissima*
 - 2 Corolla tube >20 mm long, the orifice ca. 4 mm wide; leaves (19-) avg. 40 (-55) mm long, narrowly oblong, the margins often dentate; [endemic to McIntosh County, GA] *D. radfordiana*
- 1 Corolla funnel-shaped, the tube geniculate; superior corolla lobe a lobed, flaring standard; stamens and style exerted, the stamens either widely flaring to the sides or declined along the lower lobe of the corolla; filaments inserted at the same level within the corolla; odor of fresh plant minty; [section *Dicerandra*].
 - 3 Cymes epedunculate; flowers nearly sessile in compact verticils; pollen white to pale yellow; anther spurs obtuse to barely acute, with domes of minute hairs *D. densiflora*
 - 3 Cymes on peduncles 3-6 mm long; flowers on pedicels (3-) avg. 5 (-9) mm long; pollen bright yellow; anther spurs acuminate, glabrous.
 - 4 Leaves narrowly rhombic, 2-10 mm wide, not revolute, the margins pubescent but not denticulate; leaf surfaces smooth; cymes 3-7-flowered; corolla purplish red to vivid purple; anthers reddish brown; [extreme s. GA south into e. Panhandle FL and ne. FL] *D. linearifolia* var. *robustior*
 - 4 Leaves linear, 0.5-5 mm wide, usually revolute, the margins denticulate; leaf surfaces rugose, hispid, rough to the touch; cymes 1-7-flowered; corolla white to pale purple or salmon; anthers vivid yellow; [widespread in the Coastal Plain of GA south to ne. FL and s. AL]
 - 5 Leaves 1-5 mm wide, usually revolute; inflorescences simple or compound; cymes (1-) 3-5 (-7) flowered, the center buds of each dichasium developing; corolla tubes 6-7 mm long, visible above the calyx; corolla limb funnel-shaped, with the upright lobe appearing taller than wide; [s. AL Coastal plain and adjacent FL Panhandle] *D. fumella*
 - 5 Leaves 0.5-1 mm wide, tightly revolute; inflorescences simple; cymes usually 2-flowered, the center buds of each dichasium not developing; corolla tubes 4-5 mm long, usually hidden by the calyx; corolla limb bowl-shaped with the upright lobe appearing wider than tall; [Georgia Coastal Plain, inland near the Fall Line] *D. linearifolia* var. *linearifolia*

Dicerandra densiflora Bentham, Florida Balm. Longleaf pine sandhills. October-early November. Reported for GA by Small (1933), but this report is apparently in error; Huck (1987) regards it as endemic to n. peninsular FL. This taxon is tetraploid. [= K, S, WH, X, Y, Z]

Dicerandra fumella R.B. Huck. Sandhills and dry sandy hammocks. Mid September-late November. Panhandle of FL west to s. AL. [= V; < *D. linearifolia* var. *linearifolia* – K, WH, X, Y, Z; < *D. linearifolia* – S]

Dicerandra linearifolia (Elliott) Bentham var. *linearifolia*. Sandhills and flatwoods. Mid September-late November. W. and ec. Coastal Plain of GA south to ne. FL and s. AL. This taxon is hexaploid. Huck (2010) regards this taxon as specifically distinct from *D. linearifolia* var. *robustior*, *D. species 1*, and *D. fumella*. [= V; < *D. linearifolia* var. *linearifolia* – K, WH, X, Y, Z; < *D. linearifolia* – S]

Dicerandra linearifolia (Elliott) Bentham var. *robustior* R.B. Huck. Sandhills and flatwoods. Late September-late November. Sc. Coastal Plain of GA (Brooks, Echols, Lowndes counties) (Huck 1987) south to e. Panhandle FL and ne. FL. This taxon is tetraploid. Huck (2010) expresses the plan to elevate this to species rank. [= K, WH, V, X, Y, Z; < *D. linearifolia* – S]

Dicerandra odoratissima R.M. Harper. Sandhills. Late August-early October. S. SC south to se. GA. This taxon is tetraploid. [= RAB, K, S, Y, Z]

Dicerandra radfordiana R.B. Huck, Radford's *Dicerandra*. Dry flatwoods and sandhills. September-October. Endemic to e. GA (McIntosh County). This species was postulated to be a polyploid derivative of *D. odoratissima* by Huck (1984, 1987); later study has shown that this is not the case (Huck & Chambers 1997). Both taxa are tetraploid. [= K, Y, Z]

Dicerandra species 1. Dry flatwoods and sandhills. Mid September – early November. Endemic to e. GA (in the Atlantic Coastal Plain). Under study by R.B. Huck (Huck 2010). [= V; < *D. linearifolia* var. *linearifolia* – K, WH, X, Y, Z; < *D. linearifolia* – S] {not yet keyed}



***Dracocephalum* Linnaeus 1753 (Dragon's-head)**

A genus of about 45-70 species, herbs, of Eurasia and North America. References: Harley et al. in Kadereit (2004). [also see *Physostegia*]

* ***Dracocephalum parviflorum*** Nuttall, Dragon's-head. Pd (DE, NC), WV (Mt): cultivated ground; rare, native west of the Appalachians. May-July; July-September. [= C, F, G, K, Pa, WV; = *Moldavica parviflora* (Nuttall) Britton – RAB]

***Glechoma* Linnaeus 1753 (Gill-over-the-ground)**

A genus of about 4-10 species, herbs, of temperate Eurasia. References: Harley et al. in Kadereit (2004).

* ***Glechoma hederacea*** Linnaeus, Gill-over-the-ground, Ground-ivy. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, NC, SC, VA): lawns, gardens, disturbed areas; common (rare in FL, rare in DE Coastal Plain), native of Eurasia. Late March-June; May-July. [= C, K, Pa, WH; = *Glechoma hederacea* – RAB, S, W, misspelled; > *G. hederacea* var. *hederacea* – F, WV; > *G. hederacea* var. *micrantha* Moricand – F, WV; > *Glechoma hederacea* var. *parviflora* (Benth) House – G]

***Hedeoma* Persoon 1807 (American Pennyroyal)**

A genus of about 38-42 species, herbs, of North America, Central America, and South America. References: Turner (2011)=Y; Irving (1980)=Z; Harley et al. in Kadereit (2004).

- 1 Leaves elliptic, 4-11 mm wide, slightly to strongly crenate; nutlets subspherical, 0.7-1.0 mm long, 0.6-0.9 mm wide, the surface smoothish, mottled, not glaucous; [subgenus *Hedeoma*] ***H. pulegioides***
- 1 Leaves linear to narrowly elliptic, 1-4 mm wide, entire; nutlets narrowly ovoid, 1.0-1.3 mm long, 0.4-0.6 mm wide, the surface areolate and strongly glaucous; [subgenus *Saturejoides*].
 - 2 Calyx teeth convergent, closing the orifice at maturity; bracteoles subtending the individual flower pedicels 1-2 mm long, about ½ as long as the pedicel; leaves (5.0-) avg. 7.7 (-11.0) mm long, (1.2-) avg. 2.2 (-4.0) mm wide, 3-5× as long as wide..... ***H. drummondii* var. *drummondii***
 - 2 Calyx teeth spreading (the upper) to slightly convergent (th lower), not closing the orifice at maturity; bracteoles subtending the individual flower pedicels (1.5-) 2.5-6 mm long, generally as long as or longer than the pedicel; leaves (11.0-) avg. 16.4 (-21.0) mm long, (1.0-) avg. 2.2 (-3.0) mm wide, > 5× as long as wide ***H. hispida***

Hedeoma drummondii Benth var. ***drummondii***. Blackland prairies; rare. MN and MT south to TX, n. Mexico, and CA; disjunct eastward to AR, MS, and AL, where it occurs in blackland prairies. A second variety, var. *crenulata* Irving, is restricted to Mexico. [= Y; < *H. drummondii* – K1, K2, Z]

*? ***Hedeoma hispida*** Pursh, Rough Pennyroyal. Pd (GA, SC, VA), Mt (GA, WV*), Cp (FL, GA): disturbed areas, pastures, granitic flatrocks; rare, apparently adventive from farther south and west. Irving (1980) shows *H. hispida* east to e. Panhandle FL, c. AL, nc. TN, and s. OH; it may be recently arrived farther east or previously overlooked. First reported for SC by Hill & Horn (1997). [= C, F, G, K, WV, Z; = *H. hispidum* – Pa, WH (orthographic variant)]

Hedeoma pulegioides (Linnaeus) Persoon, American Pennyroyal. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): dry soils of woodlands, roadbanks, woods-roads, especially common in shaly parts of the VA and WV mountains; common (uncommon in NC and SC). Late July-October. NS, s. QC, s. ON, MI, WI, and IA south to c. SC, c. GA, and AR. The fragrant oil is apparently very similar to that of the European Pennyroyal, *Mentha pulegium* Linnaeus. The oil is a powerful insect repellent and insecticide, often used on pets to repel fleas. It is also poisonous to humans, however, at least in

substantial quantities. It is sometimes used as a tea; native Americans are reputed to have used it as an abortion inducer. This plant should be used with great caution, if at all. [= RAB, C, F, G, K, Pa, S, W, WV, Z]



***Hyptis* Jacquin 1786 (Cluster Bushmint)**

A genus of about 280-300 species, herbs and shrubs, of warm temperate, subtropical, and tropical America. References: Harley et al. in Kadereit (2004).

- 1 Flowers borne in large, globose heads, 1.5-2.5 cm across, borne on peduncles 2-6 cm long; leaves lanceolate, narrowed to a narrowly cuneate, subpetiolar base ***H. alata***
- 1 Flowers borne in irregular verticillate spikes, sessile to pedunculate on peduncles 1-2 mm long; leaves **either** ovate to deltate, narrowed to a broadly cuneate to truncate base and well-developed petiole (4-6 cm long on larger leaves), **or** lanceolate and narrowed to a cuneate, subpetiolar base.
 - 2 Stem scabrous on the angles; corolla blue-purple; leaves ovate to deltate ***H. mutabilis***
 - 2 Stem glabrous or pubescent; corolla white; leaves lanceolate ***H. verticillata***

Hyptis alata (Rafinesque) Shinnars, Musky Mint, Cluster Bushmint. Cp (FL, GA, NC, SC): wet pine savannas, margins of swamp forests, wet powerline rights-of-way, ditches; common. Late June-September. Ne. NC south to s. FL, west to se. TX; West Indies. [= RAB, GW, K, WH; = *H. radiata* Willdenow – S]

* ***Hyptis mutabilis*** (A. Richard) Briquet, Tropical Bushmint. Cp (FL, GA, SC, VA); moist disturbed areas; common (uncommon in GA, rare in SC and VA), native of South America. [= GW, K, S, WH; = *Cantinoa mutabilis* (A. Richard) Harley & J.F.B. Pastore – Z]

* ***Hyptis verticillata*** Jacquin, John Charles. Cp (FL): hammocks, disturbed areas; rare, native of tropical America. [= K, S, WH; = *Condea verticillata* (Jacquin) Harley & J.F.B. Pastore – Z]

***Hyssopus* Linnaeus 1753 (Hyssop)**

A genus of 2-5 species, herbs, of s. Europe to c. Asia. References: Harley et al. in Kadereit (2004).

* ***Hyssopus officinalis*** Linnaeus, Hyssop. {NC} Reported for NC (see G and S); documentation not known. Native of Eurasia. July-October. [= RAB, C, F, G, K, S]

***Leonotis* (Persoon) R. Brown 1810 (Lion's-ears)**

A genus of about 9 species, herbs, shrubs, and small trees, of sub-Saharan Africa. References: Iwarsson & Harvey (2003)=Z.

* ***Leonotis nepetifolia*** (Linnaeus) Aiton f. var. ***nepetifolia***, Lion's-ears, Lightning-rod-plant. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): pastures, disturbed areas; uncommon, native of s. Africa. Late August-October. [= Z; < *L. nepetifolia* – K, WH; < *L. nepetaefolia* – RAB, S, orthographic variant]

***Lycopus* Linnaeus 1753 (Bugleweed, Water-horehound)**

A genus of about 10-14 species, herbs, of temperate Eurasia, North America, and Australia. References: Sorrie (1997)=Z; Henderson (1962); Harley et al. in Kadereit (2004). Key adapted from Sorrie.

- 1 Calyx lobes acute at the apex, shorter than or equaling the nutlets.
 - 2 Plant without tubers; leaf base tapered to a long, winged petiole; corolla lobes 4, erect; leaf teeth (6-) avg. 8.6 (-11) per side....***L. virginicus***
 - 2 Plant usually with tubers; leaf base sessile or tapered to a short, winged petiole; corolla lobes 4 or 5, all or some spreading; leaf teeth (2-) avg. 5.0 (-7) per side.
 - 3 Corolla lobes 4, one erect and three spreading; nutlet tubercles well-developed, deeply toothed; leaf teeth (2-) avg. 4.5 (-6) per side; [fall-line sandhills of NC and SC].....***L. cokeri***
 - 3 Corolla lobes 5, spreading; nutlet tubercles weakly developed, undulate; leaf teeth (4-) avg. 5.4 (-7) per side; [Mountains, upper Piedmont, and VA Coastal Plain]***L. uniflorus***
- 1 Calyx lobes acuminate to subulate-tipped, much exceeding the nutlets.
 - 4 Nutlet tubercles not developed or only weakly so.

- 5 Calyx 2.0-3.3 mm long; stems and branches glabrous to sparsely pubescent with hairs < 0.5 mm long; leaf teeth sharply acute to short-acuminate.....*L. americanus*
- 5 Calyx 3.0-4.5 mm long; stems and branches densely to sparsely pubescent with hairs 0.5-1.6 mm long; leaf teeth blunt to acute.....*L. europaeus*
- 4 Nutlet tubercles well developed.
- 6 Leaves evidently petiolate, the petioles narrowly winged.....*L. rubellus*
- 6 Leaves sessile or subsessile.
- 7 Leaves ovate to lanceolate, usually rounded at the base, scarcely reduced upward on the stem.....*L. amplexans*
- 7 Leaves lanceolate to linear, cuneate at the base, upper leaves conspicuously narrower (and often also shorter) than the lower leaves.....*L. angustifolius*

Lycopus americanus Muhlenberg ex W.P.C. Barton, American Bugleweed. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, NC, VA), Mt (GA, VA, WV): marshes, bottomlands; common (rare in FL and GA). June-November. NL (Newfoundland) west to BC, south to FL Panhandle and CA. See comment under *L. europaeus* about hybridization between *L. americanus* and *L. europaeus*. [= RAB, C, GW, K, Pa, S, W, WH, WV, Z; > *L. americanus* var. *americanus* – F, G; > *L. americanus* var. *longii* Benner – F, G; > *L. americanus* var. *scabrifolius* Fernald – F]

Lycopus amplexans Rafinesque, Claspig Water-horehound. Cp (DE, FL, GA, NC, SC), Mt? (NC?), {VA}: clay-based Carolina bays, other moist habitats; uncommon (rare in DE). June-November. MA south to ne. FL; disjunct inland around the Great Lakes and (allegedly) in w. NC. [= RAB, C, GW, K, W, WH, Z; > *L. amplexans* var. *amplexans* – F, G; > *L. amplexans* var. *pubens* (Britton) Fernald – F, G; > *L. pubens* Britton – S; > *L. sessilifolius* A. Gray – S]

Lycopus angustifolius Elliott, Narrowleaf Bugleweed, Southern Bog Water-horehound. Cp (FL, GA, NC, SC, VA): bogs, marshes; uncommon. June-November. Se. VA south to FL, west to e. TX, north in the interior to s. TN and s. MO. [= C, Z; = *L. rubellus* Moench var. *angustifolius* (Elliott) H.E. Ahles – RAB, GW; = *L. rubellus* Moench var. *lanceolatus* Benner – F; < *L. rubellus* – G, K, W, WH]

Lycopus cokeri H.E. Ahles ex Sorrie, Coker's Bugleweed, Carolina Bugleweed. Cp (NC, SC): sandhill pocosins, boggy streamheads, seepage bogs; uncommon. July-November. Endemic to the fall-line sandhill region of sc. NC and SC. See Sorrie (1997) for a detailed discussion of this species. [= RAB, K, Z; < *L. uniflorus* Michaux – GW]

* *Lycopus europaeus* Linnaeus, Gypsywort, European Bugleweed. Cp (DE, NC, VA), Pd (DE), Mt (WV): marshes, ditches; common (uncommon in NC and VA, rare in WV), native of Europe. June-November. In the Great Lakes and St. Lawrence River regions, hybrid swarms involving *L. americanus* and *L. europaeus* are numerous (Webber & Ball 1980). However, to date there is no evidence that these species have hybridized within the Flora region. [= RAB, C, G, K, Pa, S, Z; > *L. europaeus* var. *europaeus* – F; > *L. europaeus* var. *mollis* (Kern.) Briq. – F]

Lycopus rubellus Moench, Stalked Bugleweed. Cp (DE, FL, GA, NC, SC, VA), Pd (NC, SC, VA), Mt (GA, VA, WV*): marshes, swamp forests, bottomlands; common (rare in WV, rare in VA Mountains). June-November. ME west to MI, south to FL and TX. [= C, Pa, S, Z; = *L. rubellus* var. *rubellus* – RAB, GW; < *L. rubellus* – G, K, W, WH (also see *L. angustifolius*); > *L. rubellus* – S; > *L. velutinus* Rydberg – S]

Lycopus xsherardii E.S. Steele (pro. sp.) [*Lycopus uniflorus* × *virginicus*]. Mt (GA, NC, SC, VA, WV): swamps, bogs, roadsides; uncommon. July-November. Scattered in the eastern US where the ranges of the two parents overlap, apparently resulting in large hybrid swarms (see Henderson 1962). Additional study needed. [= C] {not yet keyed}

Lycopus uniflorus Michaux, Northern Bugleweed. Mt (NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE): bogs, seeps, wet forests; common. July-October. NL (Newfoundland) west to AK, south to w. NC, AR, and CA. [= RAB, C, F, G, Pa, S, W, WV, Z; < *L. uniflorus* – GW (also see *L. cokeri*); > *L. uniflorus* var. *uniflorus* – K]

Lycopus virginicus Linnaeus, Virginia Bugleweed. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): swamps, bottomlands, other wet habitats; common. July-November. MA west to PA, s. IN, MO, and OK, south to n. peninsular FL, Panhandle FL, and e. TX. [= RAB, C, F, G, GW, K, Pa, S, W, WH, WV, Z]

Meehania Britton 1894 (*Meehania*)

A genus of 2-6 species, herbs, ours in temperate e. North America, and the other species in e. Asia. References: Harley et al. in Kadereit (2004).

Meehania cordata (Nuttall) Britton, *Meehania*. Mt (NC, VA, WV): moist, rocky, forested slopes; common (uncommon in VA, rare in NC). Late May-July; June-July. A Central and Southern Appalachian endemic: sw. PA and OH south to sw. VA, nw. NC, and ne. TN. [= RAB, C, F, G, K, Pa, S, W, WV]

Melissa Linnaeus 1753 (Balm)

A genus of 3-4 species, herbs, from Europe to Iran and c. Asia. References: Harley et al. in Kadereit (2004).

* *Melissa officinalis* Linnaeus, Lemon Balm, Common Balm. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (VA): disturbed areas; uncommon (rare in NC, SC, and VA), native of w. Asia. June-August. [= RAB, C, F, G, K, Pa, S, W]

Mentha Linnaeus 1753 (Mint)

A genus of about 20-25 species, herbs, of temperate Eurasia and n. North America. References: Stace (2010)=Z; Tucker & Naczi (2007)=Y; Denslow & Poindexter (2009); Harley et al. in Kadereit (2004). Key largely adapted from C, Y, and Z.

Identification notes: The distribution, habitats, phenology, and abundance of all *Mentha* species need substantial additional herbarium investigation.

- 1 Flowers in axillary verticils subtended by ordinary foliage leaves, and separated by internodes of ordinary length.
 - 2 Calyx glabrous throughout, or pubescent toward the tips only; calyx 2-3.5 mm long; plants usually sterile; fresh plant usually with spearmint odor or flavor *M. ×gracilis*
 - 2 Calyx pubescent throughout its length; calyx 1.5-2.5 mm long; plants usually fertile; fresh plant usually with a rather unpleasant odor of flavor.
 - 3 Leaves subtending the inflorescence mostly broadly rounded at the base; leaves of the inflorescence relatively narrow; [alien] *M. arvensis ssp. arvensis*
 - 3 Leaves subtending the inflorescence mostly cuneate at the base; leaves of the inflorescence relatively broad; [native, though often in weedy situations] *M. canadensis*
- 1 Flowers in terminal spikes or heads, the subtending leaves absent or distinctly smaller than the foliage leaves.
 - 4 Inflorescence a terminal globose to ovoid head of 1-3 verticils.
 - 5 Pedicels, calyx, and leaves pubescent; plants usually fertile *M. aquatica var. aquatica*
 - 5 Pedicels and calyx glabrous, leaves glabrous or nearly so; plants usually sterile *M. aquatica var. citrata*
 - 4 Inflorescence a spike of several to many verticils.
 - 6 Bracteal leaves much longer than the flowers, resembling the foliage leaves, but smaller or narrower *M. ×gracilis*
 - 6 Bracteal leaves linear to lanceolate, little surpassing the flowers.
 - 7 Calyx tube glabrous; leaves glabrous, or with scattered hairs on the lower surface.
 - 8 Petioles of the main leaves 4-15 mm long; spikes stout; plants sterile; fresh plant with peppermint odor or flavor *M. ×piperita var. piperita*
 - 8 Petioles of the main leaves 0-3 mm long; spikes slender; plants fertile; fresh plant with spearmint odor or flavor *M. spicata var. spicata*
 - 7 Calyx tube pubescent; leaves moderately to densely hairy on the lower surface.
 - 9 Leaves lanceolate to oblong-lanceolate, > 3× as long as wide.
 - 10 Hairs of the leaf undersurface unbranched; leaves widest near the middle, slightly rugose; fertile anthers 0.28-0.38 mm long; fresh plant with musty flavor or odor *M. longifolia ssp. longifolia*
 - 10 Hairs of the leaf undersurface dendritic; leaves oblong lanceolate, widest toward the base, conspicuously rugose; fertile anthers 0.38-0.52 mm long; fresh plant with spearmint odor or flavor *M. spicata var. spicata*
 - 9 Leaves oblong to ovate, 1-3× as long as wide.
 - 11 Leaves generally 1-2× as long as wide, ovate-orbicular, broadly rounded to subcordate at the base, obtuse at the apex; leaf serrations rounded and often turned downward (thus appearing crenate); leaf surface strongly rugose, with scattered dendritic hairs below; fresh plant with sickly or sweet flavor or odor *M. suaveolens*
 - 11 Leaves generally 1-3× as long as wide, ovate to oblong, broadly cuneate to rounded at the base, acute at the apex; leaf serrations sharp; leaf surface moderately rugose; fresh plant with spearmint odor.
 - 12 Leaves generally oblong, with nearly parallel sides and a broadly rounded base; flowers consistently with 4 fertile anthers *M. ×rotundifolia*
 - 12 Leaves generally ovate, infrequently oblong; flowers typically with all or mostly sterile anthers *M. villosa*

* *Mentha aquatica* Linnaeus var. *aquatica*, Water Mint, Lemon Mint. Cp (DE), Mt (WV), {NC, VA}: disturbed areas; uncommon, native of Europe. [= Y; = *M. aquatica* - C, F, G, S, Z; < *M. aquatica* - K, Pa (also see *Mentha aquatica* var. *citrata*)]

* *Mentha aquatica* Linnaeus var. *citrata* (Ehrhart) Fresen., Lemon Mint, Orange Mint, Bergamot Mint. {VA} native of Europe. [= Y; = *M. ×piperita* Linnaeus (pro sp.) var. *citrata* (Ehrhart) Briquet (pro sp.) - Z; = *M. ×citrata* Ehrhart - C; = *M. citrata* - F, G, S; < *M. aquatica* - K, Pa]

* *Mentha arvensis* Linnaeus ssp. *arvensis*, Field Mint. Pd (DE), Mt (VA, WV): marshes, disturbed areas; uncommon (rare in VA and WV), native of Europe. [= Y; = *M. arvensis* var. *arvensis* - C, F, G; = *M. arvensis* Linnaeus - S, Z; = *M. arvensis* ssp. *arvensis* - Y; < *M. arvensis* - K, Pa]

Mentha canadensis Linnaeus, Canada Mint. Mt (VA, WV), Cp (DE, VA), Pd (DE, VA), {NC}: moist soils; common. {distribution} [= S, Y; = *M. arvensis* Linnaeus var. *canadensis* (Linnaeus) Kuntze - C; ? *M. arvensis* - RAB, misapplied; ? *M. gentilis* Linnaeus - RAB; = *M. arvensis* var. *villosa* (Benth) S.R. Stewart - F, WV; > *M. arvensis* var. *glabrata* (Benth) Fernald - G; > *M. arvensis* var. *lanata* Piper - G; = *M. arvensis* Linnaeus ssp. *canadensis* (Linnaeus) H. Hara; < *M. arvensis* - K]

* *Mentha ×gracilis* Sole (pro sp.) [*Mentha arvensis* × *spicata*], Spearmint. Mt (VA, WV), Pd (VA), Cp (VA), {NC, SC}: moist soils; rare, native of Europe. [= K, Y, Z; > *M. cardiaca* (S.F. Gray) Gerarde ex Baker - RAB, F, G, WV; ? *M. gentilis* Linnaeus (pro sp.) - C; > *M. gentilis* Linnaeus - F, WV; ? *M. ×gentilis* Linnaeus (pro sp.) - Pa]

* *Mentha longifolia* (Linnaeus) Linnaeus ssp. *longifolia*, Horse Mint. {VA} Native of Europe. [= Y; < *M. longifolia* - RAB, C, G, Pa, WV; > *M. longifolia* (Linnaeus) Hudson var. *longifolia* - F; > *M. longifolia* var. *undulata* (Willdenow) Fiori & Paoletti - F]

* *Mentha ×piperita* Linnaeus (pro sp.) var. *piperita* [*Mentha aquatica* × *spicata*], Peppermint. Cp (DE, FL, VA), Pd (DE, VA), Mt (VA), {GA, NC, SC}: disturbed areas; uncommon, native of Europe. [= C, K, Y, Z; = *M. piperita* - RAB, G, S, WV; > *M. piperita* - F; > *M. crispa* Linnaeus - F; < *M. ×piperita* - WH; = *M. ×piperata* - Pa, misspelling]

* *Mentha pulegium* Linnaeus var. *pulegium*, European Pennyroyal. Disturbed areas; native of Europe. Introduced in MD, PA, and NJ (Kartesz 1999). [= Y; < *M. pulegium* - C, G, K, Pa, Z] {not yet keyed}

* *Mentha ×rotundifolia* (Linnaeus) Hudson (pro sp.) [*Mentha longifolia* × *suaveolens*]. Mt (NC, VA), Pd (VA), Cp (VA), {GA, SC}; rare, native of Europe. June-September. [= C, K, Pa, Y; = *M. rotundifolia* - G, S, WV]

* *Mentha spicata* Linnaeus var. *spicata*, Spearmint. Mt (VA), Pd (DE, VA), Cp (FL, VA), {GA, NC, SC}: disturbed areas; uncommon (rare in FL and VA Coastal Plain), native of Europe. June-September. [= Y; < *M. spicata* – RAB, C, F, G, K, Pa, S, WH, WV, Z]

* *Mentha suaveolens* Ehrhart ssp. *suaveolens*, Apple Mint, Pineapple Mint, Round-leaved Mint. Cp (DE, FL, NC), Mt (NC), Pd (DE, NC?), {SC, VA?}: disturbed areas; rare, native of Europe. June-September. See Denslow & Poindexter (2009) for helpful information on distinguishing *M. suaveolens* from *M. ×rotundifolia*. [= Y; < *M. suaveolens* – C, K, WH, Z]

* *Mentha ×verticillata* Linnaeus (pro sp.) [*Mentha arvensis* × *aquatica*]. Mt (WV): most soils; rare, native of Europe. June-September. [= C, K, Pa, WV, Z] {add synonymy; not yet keyed}

* *Mentha ×villosa* Hudson (pro sp.) [*Mentha spicata* × *suaveolens*], Woolly Mint. Disturbed areas; native of Eurasia. June-September. Introduced south to PA and KY. [= C, K, Pa, Z; > *M. alopecuroides* Hull – F; > *M. ×villosa* var. *villosa* – Y; > *M. ×villosa* var. *alopecuroides* (Hull) Briquet – Y] {not yet keyed}

Monarda Linnaeus 1753 (Bergamot)

A genus of about 12-20 species, herbs, of North America. Many of our species are cultivated, especially *M. didyma* in various selected forms. Additional studies are needed on a number of taxonomic problems in *Monarda*. Most of the varieties recognized above have been considered valid by a succession of workers; they do seem to describe morphologically distinguishable (if not entirely discrete) entities which make phylogeographic sense. References: McClintock & Epling (1942)=Z; Scora (1967)=Y; Fosberg & Artz (1953)=X; Gill (1977); Prather & Keith (2003); Harley et al. in Kadereit (2004).

- 1 Flowers in 2-6 glomerules, terminal and at 2-5 successive nodes down the stem; stamens included; leaves lanceolate to narrowly elliptic, usually broadest near the middle and tapered to a cuneate base, (2.5-) 3-8× as long as wide.
- 2 Calyx lobes attenuated into a spinose awn 2-7 mm long; corolla white to pink; inner bracts subtending the flowers 4-9 mm wide, abruptly acuminate into a spinose bristle *M. citriodora* var. *citriodora*
- 2 Calyx lobes narrowly to broadly triangular, acute or long-acuminate but not awned; corolla yellow, spotted with purple; inner bracts 8-14 mm wide, acuminate.
- 3 Lower leaf surface moderately to densely silvery-tomentose; stem densely villous with spreading or downwardly-curved coarse hairs, lacking coarse, horizontal bristles and short downwardly-curved hairs *M. punctata* var. *villicaulis*
- 3 Lower leaf surface pubescent mainly on the midvein and other main veins, appearing green; stem pubescent with short downwardly-curved hairs, also with coarse, horizontal bristles and/or upwardly-curved hairs.
- 4 Stem with many coarse horizontal bristles, also pubescent with short, downwardly-curved hairs; leaves (40-) 50-70 (-95) mm long, 10-28 mm wide (at least some over 15 mm wide), averaging ca. 3× as long as wide *M. punctata* var. *arkansana*
- 4 Stem with few or no coarse horizontal bristles, also pubescent with a mixture of upwardly-curved and downwardly-curved hairs; leaves (25-) 35-55 (80) mm long, 5-17 mm wide (the widest very rarely over 15 mm wide), averaging ca. 4× as long as wide *M. punctata* var. *punctata*
- 1 Flowers in 1 (-2) glomerule, terminal (rarely also 1 at the next node down the stem); stamens exserted; leaves ovate to ovate-lanceolate, broadest near the rounded, truncate, or subcordate base, 1.5-3 (-4)× as long as wide.
- 5 Corolla 30-45 mm long, scarlet-red, (3-) 4-8 mm broad at the expanded portion of the throat; [primarily of mountain seepages, streambanks, and boggy places] *M. didyma*
- 5 Corolla 14-33 (-36) mm long, white, lavender, or purple, 1-3 (-4) mm broad at the expanded portion of the throat; [of various habitats, usually dryish to mesic].
- 6 Leaves deltoid-ovate to ovate, 2-6 cm wide, usually ca. 2× as long as wide; orifice of the calyx glabrous to slightly hirsute with a few long hairs; upper lip of the corolla 5-8 mm long and not bearded (*M. clinopodia*) or 13-16 mm long and slightly bearded (*M. media*) near its apex; outer surface of the corolla glabrous to evenly pubescent with short curled hairs.
- 7 Corolla white, greenish, or pale pink, the lower lip purple-spotted; outer bracts subtending the inflorescence green or pale (rarely with a purplish midvein); upper lip of the corolla 5-8 mm long, not bearded *M. clinopodia*
- 7 Corolla deep purple, the lower lip usually not spotted; outer bracts subtending the inflorescence purple to red; upper lip of the corolla 13-16 mm long and slightly bearded near its apex *M. media*
- 6 Leaves narrowly-deltoid, ovate-lanceolate to lanceolate, 1-4 cm wide, usually ca. 3× as long as wide; orifice of the calyx densely hirsute with numerous erect, stiff, white hairs; upper lip of the corolla prominently bearded near its apex; outer surface of the corolla evenly pubescent with short curled hairs.
- 8 Corolla deep purple; middle lobe of the lower corolla lip 4-6 mm long; outer bracts subtending the inflorescence reddish *M. fistulosa* var. *rubra*
- 8 Corolla lavender, rose, or nearly white; middle lobe of the lower corolla lip 2-4 mm long; outer bracts subtending the inflorescence green (rarely the midvein only reddish).
- 9 Plants 10-30 cm tall; leaves subcoriaceous, glabrous, dark green, shiny; calyx 5-8 mm long, the lobes conspicuously pustulate-glandular; [of limestone glades and barrens] *M. fistulosa* var. *brevis*
- 9 Plants 30-130 cm tall; leaves herbaceous, pubescent, light to medium green, not shiny; calyx 7-11 mm long, the lobes not pustulate-glandular; [of various habitats].
- 10 Pubescence of the petioles and lower leaf surface hirsute or villous, the trichomes spreading, 1-3 mm long *M. fistulosa* var. *fistulosa*
- 10 Pubescence of the petioles and lower leaf surface canescent, the trichomes appressed (sometimes also with an admixture of longer, spreading trichomes) *M. fistulosa* var. *mollis*

Monarda bradburiana Beck. East to c. TN (Chester, Wofford, & Kral 1997), KY, and AL. [= G, K; < *M. russeliana* – C, F] {not yet keyed; synonymy incomplete}

* *Monarda citriodora* Cervantes ex Lagasca y Segura var. *citriodora*, Lemon Bergamot. Cp (FL, GA, SC): disturbed places; rare, native of sc. United States (centered in TX). June-July; July-August. [= Y; < *M. citriodora* – RAB, F, G, WH; = *M. citriodora* ssp. *citriodora* var. *citriodora* – K; ? *M. dispersa* – S; = *M. citriodora* ssp. *citriodora* – Z]

Monarda clinopodia Linnaeus, Basil Bergamot. Mt (NC, SC, VA), Pd (DE, NC, SC, VA): mesic, forested slopes; common (uncommon in VA Piedmont, rare in DE). Late May-September; July-October. NJ, w. NY, and IL, south to n. GA and c. AL (some of the range perhaps accountable to cultivation). There appear to be a number of chemical races in *M. clinopodia* which may warrant taxonomic status. [= RAB, C, F, G, K, Pa, S, W, Y, Z; = *M. fistulosa* Linnaeus var. *clinopodia* (Linnaeus) Cooperrider]

Monarda didyma Linnaeus, Bee-balm, Oswego Tea. Mt (NC, SC, VA, WV), Pd (DE*, NC, VA), Cp* (NC*): seepage slopes, periglacial boulderfields with abundant seepage, streambanks, boggy places, usually in strong to moderately filtered sunlight; common (rare in Piedmont, rare in Coastal Plain, rare in SC). July-September; September-October. ME west to MI, south to PA and OH, and in the Appalachians south to sw. NC, se. TN, and ne. GA (part of the northern range is likely only by introduction). McClintock & Epling (1942) describe 2 forms of *M. didyma*: the "broad-leaved form," with leaves averaging 9.2 cm long and 5.2 cm wide and corollas averaging 35 mm long, ranging south to sc. PA and ne. WV, and the "narrow-leaved form," with leaves averaging 11.8 cm long and 4.4 cm wide and corollas averaging 39 mm long, occurring throughout the range of the species. Further study seems warranted. [= C, F, G, K, Pa, S, W, WV, Y, Z; < *M. didyma* – RAB (also see *M. media*)]

Monarda fistulosa Linnaeus var. *brevis* Fosberg & Artz, Smoke Hole Bergamot, Cedar Glade Bergamot. Mt (VA, WV): limestone outcrops, cliffs, barrens, and glades, and on limestone talus; rare. June-August; July-October. Apparently endemic to w. VA (Giles County) and e. WV. This variety is seemingly very distinct (Kimball et al. 2002). It had been collected only a very few times prior to the work of Bartgis (1993), who found it to be a characteristic plant of limestone barrens and woodlands in localized areas in the Ridge and Valley Province of WV. It flowers about a month earlier than *M. fistulosa* in the vicinity (Bartgis, pers. comm.). [= WV, X, Y; = *M. fistulosa* ssp. *brevis* (Fosberg & Artz) Scora, comb. nov. ined. – K; < *M. fistulosa* – W]

Monarda fistulosa Linnaeus var. *fistulosa*, Appalachian Bergamot. Mt (NC, VA, WV), Pd (DE, NC, VA): moist wooded slopes, roadsides, woodland edges, old fields; common (rare in DE). June-September; August-October. CT south to sw. NC, nearly or entirely limited to the Appalachians. I have interpreted var. *fistulosa* and var. *mollis* somewhat differently than some previous workers. A more coherent geographic pattern is achieved by limiting var. *fistulosa* to plants with spreading hairs only. [= F, WV, X, Y; < *M. fistulosa* – RAB, Pa, W; = *M. fistulosa* ssp. *fistulosa* var. *fistulosa* – K; < *M. fistulosa* var. *fistulosa* – C, G, Z (also see var. *mollis*); = *M. fistulosa* – S]

Monarda fistulosa Linnaeus var. *mollis* (Linnaeus) Bentham, Eastern Bergamot. Mt (NC, SC, WV), Pd (DE, NC, SC), {GA, VA}: moist wooded slopes; common (rare in DE and WV). June-September; August-October. See comments under var. *fistulosa*. ME west to MN, south to GA, AL, and se. TX. [= F, WV, X, Y; < *M. fistulosa* – RAB, W; < *M. fistulosa* var. *fistulosa* – C, G, Z; = *M. fistulosa* ssp. *fistulosa* var. *mollis* (Linnaeus) Bentham – K; > *M. mollis* Linnaeus – S; > *M. scabra* Beck – S]

Monarda fistulosa Linnaeus var. *rubra* A. Gray, Purple Bergamot. Mt (NC, VA), {GA}: moist slope forests; rare (NC Watch List). ME to NJ, and from nw. NC to n. GA, in the Appalachians. Perhaps native only in the Southern Appalachians. A problematic taxon; see *M. media* for comments. [= X, Y, Z; < *M. fistulosa* – RAB, W; = *M. fistulosa* ssp. *fistulosa* var. *rubra* A. Gray – K; < *M. media* – C, F, S]

Monarda media Willdenow, Purple Bee-balm. Mt (GA, NC, VA, WV): grassy balds, moist slopes, mostly at high elevations; rare. July-September; September-October. VT west to IN, south to w. MD; disjunct in w. NC and sw. TN, part of the range perhaps the result of cultivation. *M. media* is a problematic taxon, especially in combination with *M. fistulosa* var. *rubra*. Many have suggested that *M. media* is the result of hybridization or introgression of *M. didyma* with either *M. fistulosa* or *M. clinopodia*, or both (see Scora 1967). Scora (1967) implies that *M. media* consists of hybrids, backcrosses, and "introgressive elements" involving all three pairwise combinations, and the three-way combination, but that *M. fistulosa* var. *rubra* is not of hybrid origin. Needed are studies of *M. media*, *M. fistulosa* var. *rubra*, and their possible parents which go beyond the herbarium and determine the genetics, origin, and population structure of these taxa. It seems best for the moment to recognize (or to attempt to!) *M. media* and *M. fistulosa* var. *rubra* in order to foster additional observation and study, hopefully leading to a more definite understanding of their taxonomic status(es). [= G, K, Pa, Z; < *M. didyma* – RAB; < *M. media* – C, F, S, WV (also see *M. fistulosa* var. *rubra*); = *M. ×media* Willdenow (pro sp.) – W, Y]

Monarda punctata Linnaeus var. *arkansana* (McClintock & Epling) Shinnars, Arkansas Horse-mint. Mt (NC), Pd (GA): dryish forests over mafic rock; rare. McClintock & Epling (1942) map and discuss this taxon as endemic to AR and immediately adjacent TX, but mention that "a specimen collected near Columbus, Polk County, North Carolina (Townsend, 1897) is scarcely different from subsp. *arkansana*." Scora (1967) treats var. *arkansana* as similarly endemic, though he cites (but does not map) a specimen from Cherokee County, GA and annotated (following the publication of his paper) a later collection from Polk County, NC as var. *arkansana*. The Polk County, NC material is manifestly var. *arkansana* and might be considered merely aberrant or a chance introduction, were it not for its repeated collection and the phytogeographic interest of the Blue Ridge Escarpment of Polk County, which harbors numerous Ozarkian and other Midwestern disjuncts, such as *Veratrum woodii*. [= Y; < *M. punctata* – RAB, S, W; = *M. punctata* ssp. *punctata* var. *arkansana* (McClintock & Epling) Shinnars – K; = *M. punctata* ssp. *arkansana* McClintock & Epling – Z]

Monarda punctata Linnaeus var. *punctata*, Eastern Horse-mint. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): maritime forests, dunes, roadsides, rocky or sandy woodlands; common (uncommon in Piedmont and GA, NC, and SC Mountains, rare in VA Mountains). Late July-September; September-October. NJ to s. FL, west to TX, mainly on the Coastal Plain, but extending inland southward. [= C, F, Y; < *M. punctata* – RAB, Pa, S, W, WH; = *M. punctata* ssp. *punctata* – G, Z; = *M. punctata* ssp. *punctata* var. *punctata* – K]

Monarda punctata Linnaeus var. *villicalis* (Pennell) Palmer & Steyermark, Hairy-stem Horse-mint. Cp (NC): disturbed areas, rare, perhaps only adventive in our area. August; October. NY west to MN, south to TN, AR, and OK. [= C, F, Y; < *M.*

punctata – RAB, Pa, S, W; = *M. punctata* ssp. *villicaulis* Pennell – G, Z; = *M. punctata* ssp. *punctata* var. *villicaulis* (Pennell) Palmer & Steyermark – K]

Monarda russeliana Nuttall ex Sims, White Beebalm. East to AL and KY. [= G, K; = *M. virgata* Rafinesque – C; < *M. russeliana* – F (also see *M. bradburiana*)] {not yet keyed; synonymy incomplete}

***Nepeta* Linnaeus 1753 (Catnip, Catmint)**

A genus of about 250 species, herbs, of Eurasia and n. Africa. References: Harley et al. in Kadereit (2004).

* ***Nepeta cataria*** Linnaeus, Catnip, Catmint. Mt (GA, NC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, SC, VA): fencerows, barnyards, disturbed areas; common (uncommon in DE, GA, NC, and SC, uncommon in VA Piedmont, rare in VA Coastal Plain), native of Eurasia. July-October. [= RAB, C, F, G, K, Pa, S, W, WV]

***Ocimum* Linnaeus 1753 (Basil)**

A genus of about 65 species, herbs and shrubs, of warm temperate and tropical areas. References: Harley et al. in Kadereit (2004).

* ***Ocimum basilicum*** Linnaeus, Basil. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): commonly cultivated in gardens, rarely persistent for short times around gardens or as a waif on trash-heaps, probably not persistent; commonly cultivated, rarely persistent, native of tropical Asia and tropical Africa. [= C, G, K, S, WH]

***Origanum* Linnaeus 1753 (Oregano, Marjoram)**

A genus of about 36-40 species, herbs and dwarf shrubs, of Eurasia. References: Harley et al. in Kadereit (2004).

* ***Origanum vulgare*** Linnaeus, Wild Marjoram. Mt (NC, VA), Pd (DE), Cp (DE): commonly cultivated in gardens, persistent around gardens or as a waif; rare, native of Eurasia. July-September. [= RAB, C, G, K, S]

***Piloblephis* Rafinesque 1838 (Florida Pennyroyal)**

A monotypic genus, a shrub, of se. North America. References: Harley et al. in Kadereit (2004).

Piloblephis rigida (Bartram ex Benth) Rafinesque, Florida Pennyroyal. Cp (GA): xeric oak scrub, with *Quercus myrtifolia*; rare. S. GA; c. to s. peninsular FL. [= K, WH; = *Pycnothymus rigidus* (Bartram ex Benth) Small – S; = *Satureja rigida* Bartram ex Benth]

***Prunella* Linnaeus 1753 (Self-heal, Heal-all)**

A genus of about 4-7 species, herbs, of n. temperate areas. References: Harley et al. in Kadereit (2004).

- 1 Upper leaves pinnatifid; flowers creamy yellow or white (rarely pale blue).....***P. laciniata***
 1 Upper leaves entire to obscurely toothed; flowers blue-violet (rarely pink or whitish).
 2 Principal or median cauline leaves lanceolate to oblong, (2-) avg. 3 (-5)× as long as wide; leaf cuneate at the base
***P. vulgaris* var. *lanceolata***
 2 Principal or median cauline leaves ovate to ovate-oblong, (1.5-) avg. 2 (-2.5)× as long as wide; leaf broadly rounded at the base
***P. vulgaris* var. *vulgaris***

* ***Prunella laciniata*** (Linnaeus) Linnaeus, Cutleaf Self-heal. Mt (NC!, VA), {GA}: disturbed areas; rare, native of Eurasia. June-August. [= RAB, C, G, K, Pa, S]

Prunella vulgaris Linnaeus var. ***lanceolata*** (W. Barton) Fernald, American Self-heal. Pd (DE), Cp (DE), {Mt, Pd, Cp (FL, GA, NC, SC, VA, WV): disturbed areas, pastures, roadsides, bottomland forests; other forests and woodlands; common. April-December. Additional herbarium work is needed to determine the relative ranges, distributions, habitats, and abundances of the two varieties. NL (Newfoundland) west to AK, south to NC, SC?, TN, MO, KS, NM, AZ, and CA. [= C, F, G, Pa; < *P. vulgaris* – RAB, S, W; = *P. vulgaris* ssp. *lanceolata* (W. Barton) Hultén – K]

* ***Prunella vulgaris*** Linnaeus var. ***vulgaris***, Eurasian Self-heal. Pd (DE), {Mt, Pd, Cp (FL, GA, NC, SC, VA, WV): disturbed areas, pastures, roadsides, bottomland forests; other forests and woodlands; uncommon in DE, native of Eurasia. April-December. Additional herbarium work is needed to determine the relative ranges, distributions, habitats, and abundances of the two varieties, var. *vulgaris* and var. *lanceolata*. The possible additional recognition of var. *hispid* also needs assessment. Var. *hispid* Benth, considered to have been originally e. Asian, is alleged to be widespread in se. United States. It differs from *P. vulgaris* var. *vulgaris* in having the "stems, petioles, and often the lower surfaces of leaves densely villous-hispid" (vs. "only sparingly and not conspicuously pilose" – F). [= Pa; < *P. vulgaris* – RAB, S, W, WH; > *P. vulgaris* var. *vulgaris* – C, F, G; > *P. vulgaris* var. *hispid* Benth – C, F, G; = *P. vulgaris* ssp. *vulgaris* – K]

Pycnanthemum Michaux 1803 (Mountain-mint, Wild-basil)

A genus of 20-25 species, herbs, of temperate North America. *Pycnanthemum* remains a complicated and difficult group, with speciation apparently having proceeded by allopolyploidy, autopolyploidy, and aneuploidy. Numerous aberrant forms and (probably) sterile hybrids complicate identification and understanding. References: Chambers (1993); Grant & Epling (1943)=Z; Chambers & Hamer (1992)=Y; Harley et al. in Kadereit (2004).

- 1 Leaves 1-15 mm wide (to 30 mm wide in *P. setosum*), mostly $> 3\times$ as long as wide (except in *P. nudum*); calyx lobes not tipped with a tuft of long, jointed bristles (except *P. clinopodioides*).
 - 2 Longer calyx lobes 1.5-5 mm long, attenuate-aristate, stiff, whitened; [Coastal Plain pinelands, rarely in Mountain bogs with Coastal Plain affinities].
 - 3 Principal stem leaves 5-15 mm wide.....*P. flexuosum*
 - 3 Principal stem leaves 10-30 mm wide.....*P. setosum*
 - 2 Longer calyx lobes 0.5-1.6 mm long, deltoid to narrowly triangular, not notably stiff (except in *P. tenuifolium*) or whitened; [widespread in our area, but mainly of the Piedmont and Mountains].
 - 4 Leaves 10-15 mm wide (or more often even wider, to 25 mm wide, in *P. clinopodioides*); longer calyx lobes 0.7-1.6 mm long, tipped with a few long (1-3 mm) jointed bristles (*P. clinopodioides*) or not tipped (*P. nudum*).
 - 5 Leaves 3-5 \times as long as wide, herbaceous; stems and leaves pubescent; [NC northward].....*P. clinopodioides*
 - 5 Leaves 1-2.5 \times as long as wide, coriaceous; stems and leaves glabrous; [se. SC southward].....*P. nudum*
 - 4 Leaves 1-12 (-15) mm wide; longer calyx lobes 0.5-1.5 mm long, variously pubescent but not tipped with a tuft of long jointed bristles.
 - 6 Leaves glabrous on the lower and upper surface, with 2-3 pairs of lateral veins; stems glabrous on the faces and angles (rarely with a few small upwardly-curved hairs on the angles).
 - 7 Leaves 5-15 mm wide, 1-2.5 \times as long as wide; calyx lobes and inner bracts of the inflorescence herbaceous.....*P. nudum*
 - 7 Leaves 1-4 (-5.5) mm wide, 8-15 \times as long as wide; calyx lobes and inner bracts of the inflorescence semi-spinose, their tips subulate, thickened, and stiff.....*P. tenuifolium*
 - 6 Leaves pubescent at least on the lower surface along the midrib and main veins; leaves with 4-5 pairs of lateral veins; stems glabrous or pubescent on the faces, pubescent on the angles.
 - 8 Stems pubescent on the angles only (or distinctly less pubescent on the faces); leaves 3-10 mm wide.....*P. virginianum*
 - 8 Stems pubescent on the faces and angles, the hairs distributed more-or-less evenly; leaves 8-12 (-15) mm wide.
 - 9 Longer calyx teeth 1.0-1.5 mm long, lanceolate and attenuate; bracts of the inflorescence and leaves glabrous or very sparsely pubescent on the upper surface.....*P. torreyi*
 - 9 Longer calyx teeth 0.5-1.0 mm long, narrowly deltoid; bracts of the inflorescence (and usually also the leaves) canescent on the upper surface.....*P. verticillatum* var. *verticillatum*
 - 1 Leaves broad, 15-40 mm wide, mostly 1.5-3 \times as long as wide; calyx lobes usually tipped with a tuft of long, jointed bristles (except *P. curvipes*, *P. muticum*, *P. setosum*).
 - 10 Bracts of the inflorescence glabrous (or very sparsely pubescent) on the upper surface, the margins long-ciliate; calyx lobes and upper part (at least) of the tube with long spreading hairs (independent of the apical tufts).....*P. montanum*
 - 10 Bracts of the inflorescence puberulent on the upper surface, the margins not ciliate; calyx lobes and tube variously glabrous or puberulent (independent of the apical tufts).
 - 11 Calyx lobes not tipped with a tuft of long, jointed bristles.
 - 12 Calyx lobes 1.5-3 mm long, attenuated into a subulate tip; [Coastal Plain].....*P. setosum*
 - 12 Calyx lobes 0.5-1.2 mm long, triangular to narrowly triangular, acute to acuminate, but not subulate; [collectively widespread in our area].
 - 13 Petioles 5-15 mm long; inflorescence corymbose, loose, the branches 5 apparent; [dry rocky woodlands, in sw. NC, w. SC, and southward].....*P. curvipes*
 - 13 Petioles 0-3 mm long; inflorescence capitate, tight, the branches within the clusters not apparent; [moist habitats, widespread in our area].....*P. muticum*
 - 11 Calyx lobes usually tipped with a tuft of long, jointed bristles.
 - 14 Calyx not distinctly bilabiate, all of the calyx lobes about the same length, the sinuses about the same depth.
 - 15 Longer calyx lobes 1-2 mm long; [Mountains].....*P. beadleii*
 - 15 Longer calyx lobes 2.5-3 mm long; [Coastal Plain].....*P. monotrichum*
 - 14 Calyx distinctly bilabiate, the lower 2 lobes 1.5-2.5 \times longer than the upper 3 lobes, and separated from each other and the upper 3 lobes by deeper sinuses.
 - 16 Leaves lanceolate, (10-) 15-25 mm wide, $> 3\times$ as long as wide.....*P. clinopodioides*
 - 16 Leaves ovate, 13-50 mm wide, $< 3\times$ as long as wide.
 - 17 Leaves of the lower and middle stem with lower surfaces glabrate, glandular-punctate, similar in color to the dark green upper surface; calyx 5-7 mm long.....*P. beadleii*
 - 17 Leaves of the lower and middle stems with lower surface canescent, distinctly paler than the dark green upper surface; calyx 3-6.5 mm long.
 - 18 Calyx lobes broadly triangular, their apices obtuse, acute, or somewhat acuminate; calyx tube $> 2\times$ as long as the longest (lower) calyx lobes.
 - 19 Pubescence of the stem of dense, very small downwardly-curved hairs, usually mixed with scattered longer and spreading hairs.....*P. incanum* var. *incanum*
 - 19 Pubescence of the stem of sparse, coarse, downwardly-curved hairs.....*P. incanum* var. *puberulum*
 - 18 Calyx lobes narrowly triangular, their apices acuminate to attenuate; calyx tube 1-2 \times as long as the longest (lower) calyx lobes.
 - 20 Mericarps 0.5-1.3 mm long, with a smooth surface, glabrous or with a few short hairs at the tip.....*P. loomisii*
 - 20 Mericarps 1.2-1.5 mm long, with a rugose or pitted surface, densely pubescent at the tip.

- 21 Stems and lower leaf surfaces canescent, the short hairs often intermixed with longer, spreading ones.....
 *P. pycnanthemoides* var. *pycnanthemoides*
- 21 Stems and lower leaf surfaces with coarse, spreading hairs only..... *P. pycnanthemoides* var. *viridifolium*

Pycnanthemum albescens Torrey & A. Gray, White-leaved Mountain-mint. Cp (FL), Pd (GA): bluff forests, hammocks, other open, mesic forests; common (rare in GA). Reported for NC by Small, as *Koellia albescens*. It is known from nc. GA (Jones & Coile 1988). [= C, F, G, K, WH; = *Koellia albescens* (Torrey & A. Gray) Kuntze – S] {not yet keyed; synonymy incomplete}

Pycnanthemum beadleii (Small) Fernald, Beadle's Mountain-mint. Mt (GA, NC, SC, VA), Pd (NC): forests, woodland borders; uncommon (rare in GA and VA). August-September. A Southern Appalachian endemic: sw. VA and ne. TN south to sw. NC, nw. SC, and n. GA. A tetraploid species (n = 38), probably an allotetraploid derived from *P. montanum* × *muticum*. [= C, K, W, Y, Z; < *P. incanum* – RAB; = *Koellia beadleii* Small – S]

Pycnanthemum clinopodioides Torrey & A. Gray. Cp (NC, VA), Pd (DE, NC, VA), Mt (WV): forests, woodland borders; rare. July-September. MA south to NC, mostly on the Coastal Plain. A tetraploid species (n = 38). Probably an allotetraploid hybrid. [= C, F, K, Pa, Y, WV, Z; < *P. verticillatum* – RAB; = *Koellia clinopodioides* (Torrey & Gray) Kuntze – S]

Pycnanthemum curvipes (Greene) E. Grant & Epling, Tennessee Mountain-mint, Stone Mountain Mountain-mint. Mt (GA, NC), Pd (GA): dry rocky woodlands and rock outcrops (granite or mafic); rare. June-August. Sw. NC and se. TN south nc. GA and n. AL; disjunct in nc. TN (Chester, Wofford, & Kral 1997). A diploid species (n = 20). [= K, Y, Z; = *Koellia curvipes* Greene – S]

Pycnanthemum flexuosum (Walter) Britton, Sterns, & Poggenburg, Savanna Mountain-mint. Cp (FL, GA, NC, SC, VA), Mt (NC): moist to wet pine savannas, pocosin margins, mountain bogs, seepage areas on low elevation granite domes; common (rare in Mountains). June-September; September-October. Se. VA south to ne. FL, west to Panhandle FL and s. MS (Sorrie & LeBlond 2008) on the Coastal Plain; disjunct inland in bogs and rock outcrops of sw. NC with Coastal Plain affinities and in sc. TN. A diploid species (n = 18). Sometimes mistaken in vegetative condition for *Eupatorium leucolepis*, *P. flexuosum* can be distinguished by its square stem and aromatic odor. *Koellia hugeri* Small, alleged to differ details of the calyx, was established for the plants of bogs of the Blue Ridge; it apparently is not morphologically segregated from other variation within the species (Grant & Epling 1943). [= RAB, C, F, K, W, Y; = *P. hyssopifolium* Bentham – G, GW, Z; > *Koellia hyssopifolia* (Bentham) Britton – S; > *Koellia hugeri* Small – S]

Pycnanthemum floridanum E. Grant & Epling. Cp (FL, GA): sandhills; rare. Se. GA south to n. peninsular FL and e. Panhandle FL. [= K, WH] {not yet keyed; synonymy incomplete}

Pycnanthemum incanum (Linnaeus) Michaux var. *incanum*. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE): forests and woodland borders; common (uncommon in NC, rare in DE). Late June-August; September-October. VT west to s. OH and s. IL, south to nc. NC, w. NC, and nc. TN. A tetraploid species (n = 38). [= F, K; < *P. incanum* – RAB (also see *P. beadleii*, *P. loomisii*, *P. pycnanthemoides*); < *P. incanum* – C, G, Pa, W, Y; > *Koellia incana* (Linnaeus) Kuntze – S; > *Koellia dubia* (Gray) Small – S; = *P. incanum* – WV, Z; = *P. incanum* (Linnaeus) Michaux ssp. *incanum*]

Pycnanthemum incanum (Linnaeus) Michaux var. *puberulum* (E. Grant & Epling) Fernald. Mt (GA, NC, SC, WV), Pd (NC): forests and woodland borders; rare. Late June-August; September-October. WV and NC south to FL and AL. A tetraploid species (n = 38). [= F, K; < *P. incanum* – RAB (also see *P. beadleii*, *P. loomisii*, *P. pycnanthemoides*); < *P. incanum* – C, G, Pa, W, Y; < *Koellia incana* (Linnaeus) Kuntze – S; = *P. puberulum* E. Grant & Epling – WV, Z]

Pycnanthemum loomisii Nuttall, Loomis's Mountain-mint. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (GA, NC, VA): forests and woodland borders; rare. Late June-August; September-October. VA west to IL, south to n. FL. A diploid species (n = 19). [= C, K, WV, Y, Z; < *P. incanum* – RAB; = *P. incanum* var. *loomisii* (Nuttall) Fernald – F; < *P. pycnanthemoides* var. *pycnanthemoides* – G]

Pycnanthemum monotrichum Fernald. Cp (VA): sandy woodlands; rare. Allegedly endemic to se. VA. Perhaps only a hybrid or else likely more widespread and merely overlooked. [= F, G, K]

Pycnanthemum montanum Michaux, Appalachian Mountain-mint. Mt (GA, NC, SC, VA, WV): balds, woodlands, forests, and forest edges; uncommon (rare in VA and WV). June-August; September-October. W. VA and WV south through w. NC and e. TN to nw. SC and n. GA, a Southern Appalachian endemic. A diploid species (n = 20). [= RAB, C, F, G, K, Y, Z; = *Koellia montana* (Michaux) Kuntze – S]

Pycnanthemum muticum (Michaux) Persoon. Mt (GA, NC, SC, VA, WV), Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), {GA}: bogs, wet meadows, moist to wet forests; common (uncommon in Piedmont, uncommon in DE Coastal Plain, rare in WV). June-August; September-October. MA west to MI and MO, south to FL and LA. A diploid, tetraploid, and hexaploid (?) species (n = 20, 40, ca. 54). [= RAB, C, F, G, GW, K, Pa, Y; = *Koellia mutica* (Michaux) Kuntze – S]

Pycnanthemum nudum Nuttall, Smooth Mountain-mint. Cp (FL, GA, SC): wet pine flatwoods; uncommon (rare in GA and SC). Se. SC south to n. peninsular FL, Panhandle FL, and se. AL. Small (1933) attributes this species to NC; the documentation is unknown (and doubtful). This is a diploid species (n = 20). [= GW, K, WH, Z; = *Koellia nuda* (Nuttall) Kuntze – S]

Pycnanthemum pycnanthemoides (Leavenworth) Fernald var. *pycnanthemoides*. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): forests and woodland borders; common. July-August. VA and IL south to w. SC and n. GA. A tetraploid species (n = 36). [= F, K; < *P. incanum* – RAB; < *P. pycnanthemoides* – C, Y; < *P. pycnanthemoides* var. *pycnanthemoides* – G (also see *P. loomisii*); < *Koellia pycnanthemoides* (Leavenworth) Kuntze – S; > *P. tullia* Bentham – Z]

Pycnanthemum pycnanthemoides (Leavenworth) Fernald var. *viridifolium* Fernald. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, NC, VA): forests and woodland borders; uncommon (rare in FL). July-August. VA and WV south to ec. GA, AL, and Panhandle FL. A tetraploid species (n = 36). The recognition of this variety is doubtful. [= F, G, K; < *P. incanum* – RAB; < *P. pycnanthemoides* – C, WH, Y; > *Koellia pycnanthemoides* (Leavenworth) Kuntze – S; > *Koellia dubia* (A. Gray) Small – S; = *P. viridifolium* (Fernald) E. Grant & Epling – Z]

Pycnanthemum setosum Nuttall. Cp (DE, FL, GA, NC, SC, VA): dry pinelands; uncommon (rare in NC and VA). Mid June-August; August-October. NJ south to ne. FL and Panhandle FL, on the Coastal Plain; not known from MS (Sorrie & LeBlond 2008). See Wieboldt et al. (1998) for discussion of the taxonomy and rarity of this species. A tetraploid species (n = 38), probably an allotetraploid derived from *P. flexuosum* × *muticum*. [= RAB, C, GW, K, WH, Y; > *P. setosum* – F, G; > *P. umbratile* Fernald – F, G; = *Koellia aristata* (Michaux) Kuntze – S; = *P. aristatum* Michaux – Z]

Pycnanthemum tenuifolium Schrader. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): bogs, wet meadows, moist to wet forests; common (rare in FL). June-August; September-October. ME west to MN, KS, and OK, south to FL and TX. A diploid and tetraploid species (n = 20 and 40). [= RAB, C, F, GW, K, Pa, W, WH, Y; = *P. flexuosum* – G, Z, misapplied; = *Koellia flexuosa* – S, misapplied]

Pycnanthemum torreyi Benth., Torrey's Mountain-mint. Mt (NC, SC?, VA), Pd (DE, VA), Cp (DE, VA), {GA?}: dry rocky woodlands, over mafic, ultramafic, or calcareous rocks, dry powerline rights-of-way; rare. NH west to IL, south to NC (and SC?). A tetraploid and hexaploid species (n = 40 and ca. 60). The epithet spelling 'torrei' is a correctable error under the Vienna code. [= C, G, Y, Z; < *P. verticillatum* – RAB; = *P. torrei* – K, Pa, orthographic variant; > *P. torrei* var. *torrei* – F; > *P. torrei* var. *leptodon* (Gray) Boomhour – F; = *Koellia leptodon* (Gray) Small – S]

Pycnanthemum verticillatum (Michaux) Persoon var. ***pilosum*** (Nuttall) Cooperrider. Mt (WV): {GA}. Var. ***pilosum*** (Nuttall) Cooperrider ranges from s. ON west to MI and IA, south to TN, AR, and OK. It differs in having the stems thickly (vs. thinly pubescent), the lower surface of the leaves evenly pubescent (vs. pubescence chiefly restricted to the midrib). In c. TN, and reported from a single county in e. TN (Chester, Wofford, & Kral 1997), in se. PA (Rhoads & Klein 1993), and WV (Kartesz 1999). [= C, K, Pa; = *P. pilosum* Nuttall – F, G; = *Koellia pilosa* (Nuttall) Britton – S] {not yet keyed; synonymy incomplete}

Pycnanthemum verticillatum (Michaux) Persoon var. ***verticillatum***. Mt (NC, SC, VA), Pd (DE, NC, VA), Cp (DE, VA): upland rocky woodlands; common (uncommon in DE). July-September. Var. ***verticillatum*** ranges from VT west to MI, south to NC and KY. A tetraploid species (n = 38-39). [= C, K, Pa; < *P. verticillatum* – RAB (also see *P. clinopodioides*, *P. torrei*); = *P. verticillatum* – F, G, Y, Z; > *Koellia verticillata* (Michaux) Kuntze – S; > *Koellia leptodon* (A. Gray) Small – S; < *P. verticillatum* – W]

Pycnanthemum virginianum (Linnaeus) T. Durand & B.D. Jackson ex B.L. Robinson & Fernald, Virginia Mountain-mint. Mt (GA, NC, VA), Pd (DE, NC, VA), Cp (DE, VA?, NC?): wet meadows and marshes over calcareous or mafic rocks; common (uncommon in VA Mountains, rare in VA Piedmont and VA Coastal Plain, rare in GA and NC). June-September; September-October. ME west to ND, south to NC, nw. GA, n. AL, and OK. A tetraploid species (n = 40). [= RAB, C, F, G, GW, K, Pa, W, Y, Z; = *Koellia virginiana* (Linnaeus) MacMillan – S]

Rosmarinus Linnaeus 1753 (Rosemary)

A genus of 2-3 species, herb/shrubs, of Mediterranean Europe. Closely related to *Salvia* (Walker et al. 2004), and probably to be combined there. References: Harley et al. in Kadereit (2004).

* ***Rosmarinus officinalis*** Linnaeus, Rosemary. Cp (NC, SC), Pd (NC, SC): gardens; commonly cultivated, rarely persistent or established, native of Mediterranean Europe. October-April. [= K]

Salvia Linnaeus 1753 (Sage, Clary)

A genus of about 900 species, shrubs and herbs, almost cosmopolitan. Walker et al. (2004) have determined that *Salvia* as traditionally circumscribed is polyphyletic. References: Epling (1938)=Z; Stace (2010)=Y; Walker et al. (2004).

- 1 Leaves predominantly basal.
 - 2 Veins of the 3 upper calyx lobes parallel, the lobes themselves minute and widely-spaced (> 1 mm between the 2 lateral teeth), separated by flattish sinuses; basal leaves lobed; [native, though weedy, common throughout our area]***S. lyrata***
 - 2 Veins of the 3 upper calyx lobes converging, the lobes themselves minute and spaced within a distance of 1 mm; basal leaves lobed or toothed; cauline leaves toothed (rarely lobed); [alien weeds, rarely naturalized in our area].
 - 3 Upper corolla-lip strongly arched; leaves serrate***S. pratensis***
 - 3 Upper corolla-lip straight; leaves lobed***S. verbenacea***
- 1 Leaves predominantly cauline, not lobed.
 - 4 Leaves rhombic-ovate, the base cordate, subcordate, truncate, or broadly cuneate.
 - 5 Petiole not clearly differentiated from the leaf blade (leaf tissue decurrent on the petiole for most or all its length); corolla blue***S. urticifolia***
 - 5 Petiole clearly differentiated from the leaf blade; corolla blue, white, or scarlet.
 - 6 Corolla scarlet; larger leaves 3-6.5 cm long***S. coccinea***
 - 6 Corolla blue or whitish; leaves 5-20 cm long
 - 7 Upper calyx lip > ½× as long as the calyx tube; flowers 4-12 per node; leaves (8-) 12-20 cm long***S. sclarea***
 - 7 Upper calyx lip < 1/3× as long as the calyx tube; flowers 12-30 per node; leaves 5-10 cm long***S. verticillata***
 - 4 Leaves lanceolate, linear, or narrowly elliptic, the base cuneate to attenuate.
 - 8 Leaves canescent, gray; [introduced, rarely persistent from cultivation in gardens]***S. officinalis***
 - 8 Leaves puberulent, green; [native, of dry woodlands from sc. NC southward and westward].
 - 9 Flowers 2 (-4) per node; corolla 81-12 mm long***S. reflexa***
 - 9 Flowers 6-10 flowers per node; corolla > 13 mm long
 - 10 Stem usually with sparse, antrorse or somewhat spreading pubescence; calyx with antrorse hairs limited to major veins; flowers of mature inflorescences spaced out, most internodes elongate and ranging up to 25 (-34) mm; [Atlantic and Gulf Coastal Plain and adjacent piedmont, from south-central NC to central FL to southeast LA]***S. azurea*** var. ***azurea***

- 10 Stem usually with dense, retrorse pubescence; calyx with dense antrorse pubescence; flowers of mature inflorescences densely arranged, internodes between flowers very short, only the lowermost 1-3 internodes elongate and ranging up to 12 (-17) mm; [inland and prairie sites, ranging from IL, IA, NE, and e. CO south to nw. GA, n. AL, ne. MS, LA, and se. and c. TX].....
*S. azurea* var. *grandiflora*

Salvia azurea Michaux ex Lamarck var. *azurea*, Azure Sage. Cp (FL, GA, NC, SC), Pd (GA, NC, SC), Mt (GA): sandhills, hammocks, other sandy or rocky woodlands; common (rare in NC). Late August-October; October-November. S. NC south to Panhandle FL, west to TX. [= K; < *S. azurea* – RAB, S, WH]

Salvia azurea Michaux ex Lamarck var. *grandiflora* Benth. Mt (GA): prairies, woodlands over calcareous or mafic rocks; rare. August-October; October-November. IL, IA, NE, and eastern CO south to nw. AL, ne. MS, LA, se. TX, and c. TX. [= F, K; = *S. pitcheri* Torrey ex Benth. – C, G; < *S. azurea* – S; = *S. azurea* ssp. *pitcheri* (Torrey ex Benth.) Epling]

Salvia champanii A. Gray. AL and FL. Uncertain taxonomic status, often included in *S. urticifolia*. [= K, S] {not yet keyed; synonymy incomplete}

Salvia coccinea P.J. Buc'hoz ex Etlinger, Scarlet Sage, Blood Sage. Cp (FL, GA, SC*), Pd (GA*?): hammocks, disturbed areas; uncommon (rare in GA and SC), in the more northern part of its distribution (such as SC) perhaps only introduced from farther south and west. May-November. [= RAB, G, K, S, WH]

Salvia lyrata Linnaeus, Lyreleaf Sage. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): hammocks, lawns, roadsides, woodlands; common. April-May; May-July. CT west to MO, south to FL and TX. A common and familiar native weed. [= RAB, C, F, G, K, Pa, S, W, WH, WV]

* *Salvia sylvestris* Linnaeus, Balkan Clary. Disturbed areas; native of Europe. [= F, K2= *Salvia nemorosa* Linnaeus C, Y] {not yet keyed; add synonymy}

* *Salvia officinalis* Linnaeus, Garden Sage. Cp (VA, WV), Pd (VA): cultivated as a garden herb, rarely persistent; rare, native of Europe. [= C, F, G, K, WV, Y]

* *Salvia pratensis* Linnaeus, Meadow Sage, Meadow Clary. Cp (VA): fields and disturbed areas; rare, native of Europe. June-August. [= C, F, G, K, Pa, Y]

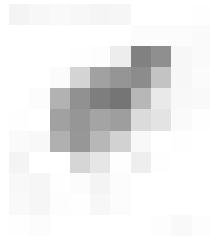
* *Salvia reflexa* Hornemann, Lanceleaf Sage, Mintweed. Mt (WV): dry sandy soil, disturbed areas; rare, native of c. North America. June-September. In c. TN (Chester, Wofford, & Kral 1997). The apparent ascription by C of *S. reflexa* Hornemann to "N.C." is a typographic error for "N.D." This species is, however, sometimes adventive as far east as WV. [= C, F, G, K, Pa, Y, Z]

* *Salvia sclarea* Linnaeus, Clary. Mt (NC?, VA): cultivated as a garden herb, rarely persistent; rare, native of Europe. [= C, G, K, S, Y]

Salvia urticifolia Linnaeus, Nettle-leaf Sage. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Cp (FL, GA, VA): woodlands and glades, usually over mafic or calcareous rocks; uncommon (rare in Coastal Plain). April-June; May-July. PA west to w. KY, south to SC, c. GA, Panhandle FL, and AL. Quite showy when in flower. [= RAB, C, F, G, K, S, W, WH, Z]

* *Salvia verbenacea* Linnaeus, Wild Clary. Mt (VA), {GA, NC?}: fields and disturbed areas; rare, native of Europe. [= C, G, K, S; > *S. verbenaca* Linnaeus ssp. *verbenaca* – Y; > *S. verbenaca* Linnaeus ssp. *horninoides* (Pourr.) Nyman – Y]

* *Salvia verticillata* Linnaeus, Whorled Clary. Mt (WV): disturbed areas; rare, native of Europe. July-September. Introduced as far south as scattered locations in PA (Rhoads & Klein 1993), MD, and WV (Kartesz 1999). [= C, F, G, K, Pa, WV, Y]



Satureja Linnaeus 1753 (Savory)

A genus of ca. 38 species, herbs, of Mediterranean Europe west to c. Asia.

* *Satureja hortensis* Linnaeus, Summer Savory. Pd (DE), Mt (WV): disturbed areas; uncommon, native of Mediterranean Europe and sw. Asia. July-September. [= C, K]

Stachydeoma Small 1903

A monotypic genus, an herb, endemic to the FL Panhandle.

Stachydeoma graveolens (Chapman ex A. Gray) Small. Cp (FL): sandhills, pine flatwoods; rare. Endemic to Panhandle FL. [= K, S; = *Hedeoma graveolens* Chapman ex A. Gray – WH]

Thymus Linnaeus (Thyme)

A genus of about 220-350 species, herbs and shrubs, of temperate Eurasia. References: Harley et al. in Kadereit (2004).

* *Thymus praecox* Opiz ssp. *arcticus* (Dur.) Jalas, Mother-of-Thyme. Pd (DE, NC), Mt (GA, WV): commonly cultivated and sometimes escaped or persisting; uncommon (rare in DE and GA), native of Eurasia. July-September. [= K; ? *T. serpyllum* Linnaeus – RAB, C, F, G, WV, misapplied]

* *Thymus pulegioides* Linnaeus, Lemon Thyme. Pd (VA), Cp (VA): disturbed areas; rare, native of Eurasia. June-September. [= K, Pa]

374a. MAZACEAE Reveal 2011 (Mazus Family) [in LAMIALES]

A family of 2 genera and ca. 35 species, herbs, of e. Asia south to Australia. References:

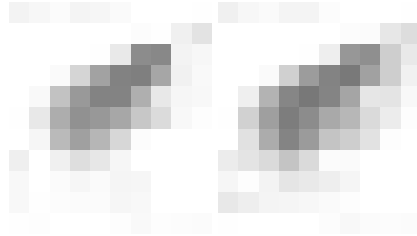
Mazus Loureiro 1790 (Mazus)

A genus of ca. 30 species, herbs, of Asia to Australia. References: Keener in FNA (in prep.); Pennell (1935)=P.

- 1 Plant stoloniferous, perennial; corolla 13-22 mm long *M. miquelii*
 1 Plant not stoloniferous, annual; corolla 7-10 mm long *M. pumilus*

* *Mazus miquelii* Makino. Lawns; native of e. Asia. April-July. [= C, FNA, K, Pa; = *M. miquelii* – RAB, misspelling; ? *M. reptans* N.E. Brown]

* *Mazus pumilus* (Burm. f.) Steenis. Lawns, rocky river-banks; native of e. Asia. December-September. [= C, FNA, K, Pa; ? *M. japonicus* (Thunberg) Kuntze – RAB, F, G, P, WV]



374b. PHRYMACEAE Schauer 1847 (Lopseed Family) [in LAMIALES]

As radically circumscribed, a family of about 20 genera and 240 species, herbs, cosmopolitan. See Tank et al. (2006) and Barker et al. (2012). References: Lee et al. (1996)=Z; Tank, Beardsley, Kelchner, & Olmstead (2006); Thieret (1972); Wagstaff & Olmstead (1997); Fischer in Kadereit (2004); Cantino in Kadereit (2004).

- 1 Plant a rhizomatous aquatic; leaves spatulate, entire, 10-20 mm long and 0.3-2 mm wide (reminiscent of *Limosella* or *Lilaepsis*) *2. Glossostigma*
 1 Plant terrestrial (though sometimes in wetlands) with an aerial; leaves ovate, elliptic, or obovate, > 20 mm long and > 2 mm wide.
 2 Inflorescence of a solitary, terminal flower; bracteal leaves alternate [see *Mazus* in MAZACEAE]
 2 Inflorescence either of axillary flowers or of terminal and axillary spikes; bracteal leaves or bracts opposite.
 3 Inflorescence of terminal and axillary spikes; flowers 6-8 mm long *3. Phryma*
 3 Inflorescence of axillary flowers; flowers 17-30 mm long
 4 Corolla yellow; stem viscid glandular-pubescent; plant usually 2-4 dm tall *4. Erythranthe*
 4 Corolla blue; stem glabrous; plant usually 3-15 dm tall *1. Mimulus*

1. Mimulus Linnaeus 1753 (Monkey-flower)

A genus of about 7 species, perennial herbs, of e. North America, Australia, s. and se. Asia, s. Africa, and Madagascar, as narrowed by Barker et al. (2012). References: Barker et al. (2012)=Z; Grant (1924)=Y; Pennell (1935)=P.

- 1 Leaves petiolate (the upper sessile or nearly so); pedicels 2-15 mm long; stem with 4 winged angles *M. alatus*
 1 Leaves sessile; pedicels 20-45 mm long; stem with 4 rounded angles *M. ringens* var. *ringens*

Mimulus alatus Aiton, Winged Monkey-flower. Marshes, bottomlands, ditches. July-November. MA and CT west to s. MI and s. IA, south to Panhandle FL and TX. [= RAB, C, F, G, GW, K, P, Pa, S, W, WV, Y]

Mimulus ringens Linnaeus var. *ringens*, Allegheny Monkey-flower. marshes, bogs, wet meadows, bottomlands. June-September. NS and QC west to SK, south to c. GA, LA, OK, and CO. [= G, K; < *M. ringens* – RAB, C, GW, Pa, S, W, WV; > *M. ringens* var. *minthodes* (Greene) A.L. Grant – F, Y; > *M. ringens* var. *ringens* – F, Y; = *M. ringens* var. *typica* – P]

2. *Glossostigma* Wight & Arnott 1836

A genus of 7-8 species, annual or perennial aquatic herbs, native to Australia, East Africa, India, and New Zealand. References: Barker et al. (2012)=Z; Les, Capers, & Tippery (2006)=Y; Les & Capers in FNA (in prep.).

* *Glossostigma cleistanthum* W.R. Barker. Aquatic in oligotrophic lakes, reservoirs, and stormwater retention ponds; native of Australia. July-September. Introduced, naturalized, and invasive in NJ, PA, CT, and RI (Les, Capers, & Tippery 2006). [= Pa, Y, Z]

3. *Phryma* Linnaeus 1753 (Lopseed)

A genus of 2 species, herbs, of e. North America and Asia. The disjunct populations in e. North America and e. Asia have been variously treated as species, varieties, or races; following the analysis of Nie et al. (2006), I opt to recognize the continentally disjunct populations as being morphologically and genetically different enough (and with a long enough time since separation) to warrant specific status. References: Barker et al. (2012)=Z; Nie et al. (2006); Lee et al. (1996)=Y; Thieret (1972); Wagstaff & Olmstead (1997); Cantino in Kadereit (2004).

Phryma leptostachya Linnaeus, American Lopseed. Bottomland forests, nutrient-rich slopes, mesic hammocks, in the Coastal Plain primarily in places underlain by coquina limestone ("marl") and essentially absent from the more acidic portions of the Coastal Plain. June-August; August-October. QC west to MB, south to ne. FL, Panhandle FL, and TX; an e. Asian relative has been variously treated as separate species, subspecies, variety, or merely a form. The fruits "lopped down" against the stem are unmistakable. [= *P. leptostachya* var. *leptostachya* – Y; < *P. leptostachya* – RAB, C, G, K, Pa, S, W, WH, WV, Z; > *P. leptostachya* var. *leptostachya* – F; > *P. leptostachya* var. *confertifolia* Fernald – F]

4. *Erythranthe* Spach 1838 (Monkey-flower)

A genus of about 112 species, annual or perennial herbs, of w. North America, s. Africa, Asia, South America, and e. North America. References: Barker et al. (2012)=Z; Grant (1924)=Y; Pennell (1935)=P.

Erythranthe moschata (Douglas ex Lindley) Nesom, Muskflower, Musky Monkey-flower. streambanks, brookbanks, saturated soil of cold springs. July-August; August-September. NL (Newfoundland) and QC west to MI, south to w. VA, WV, NC, and MI, and in w. North America. The native/naturalized status of *E. moschata* in e. North America is controversial. Some at least of our populations appear to be native, not occurring in situations where likely to have been introduced. [= Z; = *Mimulus moschatus* Douglas ex Lindley – RAB, C, F, G, P, Pa, W, WV; > *Mimulus moschatus* var. *moschatus* – K]

375. *PAULOWNIACEAE* Nakai 1949 (Paulownia Family) [in LAMIALES]

A monogeneric family, trees, of e. Asia. There has been disagreement over whether *Paulownia* is best placed in Scrophulariaceae, Bignoniaceae, or its own family, Paulowniaceae; superficially it closely resembles *Catalpa* of the Bignoniaceae. Armstrong (1985) concluded that *Paulownia*'s affinities lie with the Scrophulariaceae, based on floral anatomy, embryo morphology, and seed morphology. A molecular study by Spangler & Olmstead (1999) conclude that *Paulownia* is best retained in its own family. Manning (2000) concurs with its removal from Bignoniaceae. Molecular evidence supports that it is sister to the reconstituted Orobanchaceae. References: Spangler & Olmstead (1999); Manning (2000).

Paulownia Siebold & Zuccarini 1835 (Princess-tree)

A genus of 6 species, trees, of e. Asia. References: Armstrong (1985).

* *Paulownia tomentosa* (Thunberg) Siebold & Zuccarini ex Steudel, Princess Tree, Empress Tree, Paulownia. Roadsides, disturbed areas, roadcuts, forests; native of China. April-June; September-October. *Paulownia* is becoming a nuisance, showing

an ability to invade pristine woodlands. The very soft wood is highly prized in Asia. The leaves of stump sprouts can reach very large sizes (at least to 80 cm long and wide). The woody capsules are persistent, and the densely tomentose, tan flower buds are conspicuous through the winter. [= RAB, C, F, G, K, Pa, S, W, WH, WV]



376. OROBANCHACEAE Ventenat 1799 (Broomrape Family) [in LAMIALES]

A family of about 96 genera and 2060 species, root-parasitic herbs lacking chlorophyll (Orobanchaceae sensu stricto) and chlorophyllous hemi-parasites (formerly placed in the Scrophulariaceae), of temperate and subtropical regions of the Northern Hemisphere (Manen et al. 2004). References: Thieret (1971); Olmstead et al. (2001); Fischer in Kadereit (2004).

- 1 Plants lacking chlorophyll (parasitic), variously pink, purple, brown, tan, orange, or white.
 - 2 Stem paniculately branched; flowers dimorphic, those low in the inflorescences small, pistillate, and fertile, those high in the inflorescence larger, apparently perfect but functionally staminate; [tribe *Orobancheae*].....6. *Epifagus*
 - 2 Stem simple (rarely few-branched); flowers all alike.
 - 3 Calyx deeply cleft on the lower side; stamens exserted; [tribe *Rhinantheae*].....14. *Conopholis*
 - 3 Calyx either nearly regular, or deeply cleft above and below into 2 lateral halves; stamens included; [tribe *Orobancheae*]7. *Orobanche*
- 1 Plants with chlorophyll (hemiparasitic), with foliage and stems normally green.
 - 4 Stem leaves alternate.
 - 5 Leaves pinnately lobed; [tribe *Rhinantheae*].....12. *Pedicularis*
 - 5 Leaves entire or 3-5-lobed at the tip.
 - 6 Bracts subtending flowers orange, red, or yellow; calyx 4-lobed; capsule loculicidal; pedicel lacking bracteoles; seeds broad, wingless; [tribe *Castillejeae*]11. *Castilleja*
 - 6 Bracts subtending flowers green; calyx 5-lobed; capsule septicidal and tardily also loculicidal; pedicel with 2 bracteoles; seeds narrow, winged; [tribe *Cymbarieae*].....10. *Schwalbea*
 - 4 Stem leaves (at least the lower) opposite.
 - 7 Corolla salverform; [tribe *Buchnereae*].
 - 8 Plant strict, unbranched unless damaged; flowers in a terminal spike; corolla purple; [native, sometimes weedy]8. *Buchnera*
 - 8 Plant strongly branched; flowers solitary and axillary; corolla red or orange; [alien, in agricultural fields]9. *Striga*
 - 7 Corolla various, but not salverform.
 - 9 Calyx 4-lobed or essentially unlobed; corolla strongly bilabiate, the upper lip consisting of 2 petals almost wholly connate and strongly cucullate (hooded); corolla white or yellow; [tribe *Rhinantheae*].
 - 10 Lower lip of corolla with raised yellow, densely pubescent palate; stem leaves entire (bracteal leaves in and near the inflorescence sometimes pectinately fringed; annual, 1-4 dm tall13. *Melampyrum*
 - 10 Lower lip of corolla without raised palate; stem leaves pinnately lobed, the lobes themselves crenate; perennial, 3-8 dm tall12. *Pedicularis*
 - 9 Calyx 5-lobed; corolla 5-lobed, the lobes relatively similar in size and shape, spreading; corolla yellow, orange, red, or pink; [tribe *Gerardieae*].
 - 11 Corolla pink; leaves linear and thread-like (except lanceolate in *A. auriculata*)1. *Agalinis*
 - 11 Corolla yellow or orange; leaves **either** lanceolate or broader, at least the basal pinnately or bipinnately lobed or toothed, **or** pinnately or bipinnately divided into linear segments.
 - 12 Leaves pinnately or bipinnately divided into linear segments up to 2 mm wide; corolla rotate, the tube shorter than the lobes2. *Seymeria*
 - 12 Leaves not lobed or divided, or the segments broader; corolla tubular, campanulate, or funnellform, the tube much longer than the lobes.
 - 13 Corolla orange, tubular, the tube narrow and straight, > 5× as long as the diameter3. *Macranthera*
 - 13 Corolla yellow, campanulate or funnellform, the tube conical, < 4× as long as the diameter.
 - 14 Anthers pubescent; lower leaves < 12 cm long4. *Aureolaria*
 - 14 Anthers glabrous; lower leaves 20-40 cm long5. *Dasistoma*

I. Agalinis Rafinesque 1836 (Agalinis, Purple-foxglove)

A genus of about 40 species, hemiparasitic herbs, of tropical and warm temperate regions of America. References: Canne (1979); Hays (1998b); Pennell (1935)=P.

- 1 Perennial, from horizontal rootstalk bearing slender, scaly rhizomes; corollas 3-4 cm long; [of Carolina bays, cypress savannas, limesink ponds]*A. linifolia*
- 1 Annual, with 1-several fibrous roots from the stem base; corollas < 3 cm long (except sometimes *A. fasciculata* and *A. purpurea*).

- 2 Stem retrorse-hispid; leaves lanceolate to ovate, usually lobed at the base; [of mafic glades and woodlands].....*A. auriculata*
- 2 Stem ascending scabridulous or glabrous; leaves linear or filiform, entire.
- 3 Leaves reduced to scales < 2.5 mm long, plant thus appearing leafless*A. aphylla*
- 3 Leaves not scale-like, > 8 mm long.
- 4 Pedicels less than 1.5× as long as the calyx, mostly 1-5 mm long at anthesis, mostly < 8 mm long in fruit.
 - 5 Plants fleshy; [of saline or brackish marshes and salt flats].
 - 6 Pedicels usually longer than or equaling the leaflike bracts; corollas 15-20 mm long; anther cells 1.8-2.3 mm long, usually long-lanose; [of Princess Anne County, VA, southward]*A. maritima* var. *grandiflora*
 - 6 Pedicels usually less than or equaling the leaflike bracts; corollas 12-17 mm long; anther cells 1.3-1.8 mm long, glabrous or somewhat pubescent; [of the Delmarva Peninsula northward]*A. maritima* var. *maritima*
 - 5 Plants not fleshy; [not inhabiting saline habitats, though some species may be found in freshwater interdune swales].
 - 7 Stems appearing copiously leafy because of the well-developed fascicles of axillary leaves; [inhabiting dry to moist, often ruderal, habitats]*A. fasciculata*
 - 7 Stems not copiously leafy, the axillary fascicles absent or poorly developed; [inhabiting moist to wet natural habitats].
 - 8 Corolla (10-) 15-20 mm long; calyx lobes from 0.4-1.9× as long as the calyx tube; pollen sacs 1.4-2.0 mm long.....*A. paupercula* var. *paupercula*
 - 8 Corolla 18-38 mm long; calyx lobes 0.2-0.5× as long as the calyx tube; pollen-sacs 2.5-3.5 mm long.
 - 9 Branches spreading or ascending; stems more-or-less scabridulous; corollas 18-38 mm long.....*A. purpurea*
 - 9 Branches virgate; stems glabrous; corollas 20-25 mm long*A. virgata*
 - 4 Pedicels > 2.5× as long as the calyx, mostly 5-20 mm long at anthesis, mostly > 10 mm long in fruit.
 - 10 Living plants dull green, usually suffused with much purplish pigment; leaves > 20 mm long; dried plants dark, sometimes blackish; dried calyx deep purple, the veins obscure (difficult to see even at 10×).
 - 11 Upper lip of the corolla arched forward over the stamens, greatly reducing the opening of the throat; corolla throat glabrous or glabrate within; [of the Piedmont and Mountains].....*A. tenuifolia*
 - 11 Upper lip of the corolla erect or reflexed, the throat open; corolla throat densely long-hairy within; [of the Coastal Plain].
 - 12 Branches widely spreading or laxly ascending; pedicels > 4× as long as the leaflike bracts; anterior filaments 5-5.5 mm long; [of Berkeley and Beaufort counties, SC, southward].....*A. laxa*
 - 12 Branches ascending to somewhat spreading; pedicels < 3× as long as the leaflike bracts; anterior filaments 7-9 mm long; [widespread].
 - 13 One pair of slender short bracts present on pedicel just below calyx.....*A. plukenetii*
 - 13 bracts absent on pedicel just below calyx.....*A. setacea*
 - 10 Living plants light green or glaucescent, usually with no purple pigment; leaves < 15 (-20) mm (except *A. decemloba*, with leaves 15-25 mm long); dried plants not dark, but turning pale yellowish green; dried calyx pale yellowish green, the veins distinct and obvious without magnification.
 - 14 Corolla throat within lacking 2 yellow lines; leaves widen distally to obtuse tips; stem and branches distinctly rough-scabridulous to the touch*A. obtusifolia*
 - 14 Corolla throat with 2 prominent yellow lines; leaves taper to acute or acuminate tips; stem and branches not (or very slightly) scabridulous.
 - 15 Corolla 10-15 mm long, its lobes emarginate or retuse; [of the Piedmont and Mountains, and rarely the upper Coastal Plain].*A. decemloba*
 - 15 Corolla 15-20 mm long, its lobes entire to slightly emarginate; [of the Coastal Plain, from e. NC southward].....*A. tenella*

Agalinis acuta Pennell, Sandplain Agalinis. Cp (MD): coastal sand plains; rare. MA south to Baltimore County, MD. [= C, K; = *Gerardia acuta* Pennell –F, G, P] {not yet keyed}

Agalinis aphylla (Nuttall) Rafinesque, Scale-leaf Agalinis. Cp (FL, GA, NC, SC): wet pine savannas; uncommon (rare in GA, NC, SC). September-October; October-November. Se. NC south to ne. FL and Panhandle FL, west to e. LA. [= RAB, GW, K, S, WH; = *Gerardia aphylla* Nuttall – P]

Agalinis auriculata (Michaux) S.F. Blake, Earleaf Foxglove. Pd (SC, VA), Cp (AL), PD (WV): glades, barrens, blackbelt prairies, and disturbed clearings over mafic rocks (such as diabase and gabbro) or calcareous rocks; rare. August-October; September-November. KY and OH west to MN, south to n. AL, wc. AL (Schotz 2009), AR, and TX; also rarely disjunct east of the Blue Ridge, in NJ, n. VA, and nc. SC. In Lewis County, KY (D. White, pers. comm.). Sometimes treated in the genus *Tomanthera*. [= C, K, Pa; = *Tomanthera auriculata* (Michaux) Rafinesque – G, P, S; = *Gerardia auriculata* Michaux – F]

Agalinis decemloba (Greene) Pennell. Pd (NC, SC, VA), Mt (GA, NC): dry clayey or sandy woodlands; rare. [= Pa, RAB, S, W; < *A. obtusifolia* – C, K; = *Gerardia decemloba* Greene – F, G, P]

Agalinis divaricata (Chapman) Pennell, Pineland Agalinis. Cp (FL, GA): sandhills; common (rare in GA). GA (Decatur County) south to c. peninsular FL, west to MS (Sorrie & LeBlond 2008). [= K, S, WH; = *Gerardia divaricata* (Chapman) Pennell – P] {not yet keyed}

Agalinis fasciculata (Elliott) Rafinesque. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, VA): sandhills, pine savannas, disturbed sandy areas, roadsides; common (uncommon in VA). S. MD south to s. FL, west to e. TX, northward in the interior to s. IN, s. IL, sw. MO, AR, , e. NE, and nc. TX. [= RAB, C, S, W, WH; = *Gerardia fasciculata* Elliott – F, G; < *A. fasciculata* (Elliott) Rafinesque – GW, K; > *Gerardia fasciculata* ssp. *typica* – P; > *Gerardia fasciculata* ssp. *peninsularis* (Pennell) Pennell – P]

Agalinis filicaulis (Benth) Pennell, Spindly Agalinis. Cp (FL, GA): wet pine savannas, prairies; rare. E. GA (Tattnall County) south to c. peninsular FL and Panhandle FL, west to w. LA. [= K, S, WH; = *Gerardia filicaulis* (Benth) Chapman – P] {not yet keyed}

Agalinis filifolia (Nuttall) Rafinesque, Seminole Agalinis. Cp (FL, GA): dry longleaf pine savannas, scrub; uncommon (rare in GA). S. GA (east to Liberty County) south to s. FL, west to sw. AL (Baldwin County) (Sorrie & LeBlond 2008). [= K, S, WH; = *Gerardia filifolia* Nuttall – P] {not yet keyed}

Agalinis flexicaulis Hays. Cp (FL): wet pinelands; rare. Endemic to ne. FL (Bradford County, to be expected in adjacent counties). See Hays (2010) for detailed information. {not yet keyed}

Agalinis gattingeri (Small) Small ex Britton. Barrens, glades, outcrops, woodlands. ON, MN, and NE south to AL, MS, LA, and TX. In c. TN, east to e. TN (Rhea and Scott counties) (Chester, Wofford, & Kral 1997). Reported for NC (Kartesz 1999). {investigate} [= K, S; = *Gerardia gattingeri* Small – G, P]

Agalinis georgiana (C.L. Boynton) Pennell. Cp (FL, GA): mesic to wet pine savannas, bogs; rare. S. GA (Crisp, Dooly, Lowndes, Thomas, and Worth counties) south to w. Panhandle FL (Carter, Baker & Morris 2009). [= S, WH; < *A. fasciculata* – K; = *Gerardia georgiana* C.L. Boynton – P]

Agalinis harperi Pennell in Small. Cp (FL, GA, SC?): wet pinelands, interdune swales; uncommon (rare in GA). GA south to s. FL, west to w. LA. Glynn County, GA and east to McIntosh County, GA as *A. pinetorum*. See Hays (1998a) who has established the nomenclatural priority of *A. harperi*. Reported for SC (Kartesz 1999); [investigate]. [= WH; > *A. harperi* Pennell in Small – S; > *A. pinetorum* – S; = *A. pinetorum* Pennell – K; > *A. delicatula* Pennell; = *Gerardia harperi* (Pennell in Small) Pennell – P] {not yet keyed}

Agalinis heterophylla (Nuttall) Small ex Britton. GA west to s. MO, AR, e. OK, and e. TX. [= G, K]

Agalinis laxa Pennell. Cp (FL, GA, SC): sandhills; rare. SC south to GA and c. peninsular FL. [= K, S, WH; < *A. divaricata* (Chapman) Pennell – GW; = *Gerardia laxa* (Pennell) Pennell – P]

Agalinis linifolia (Nuttall) Britton. Cp (DE, FL, GA, NC, SC): Coastal Plain depression ponds, cypress savannas, wet pine savannas; common (uncommon in GA, NC, and SC, rare in DE). August-September; September-October. Se. NC south to s. FL, west to e. LA; disjunct in e. DE (reports for MD are in error). [= RAB, C, GW, K, S; = *Gerardia linifolia* Nuttall – F, G, P]

Agalinis maritima (Rafinesque) Rafinesque var. *grandiflora* (Benth) Shinnars. Cp (FL, GA, NC, SC, VA): tidal marshes; uncommon (rare in VA). July; August. Se. VA south to s. FL, west to s. TX and Tamaulipas; West Indies; Yucatan. [= K, S; < *A. maritima* – RAB, C, GW, WH; = *Gerardia maritima* Rafinesque var. *grandiflora* Benth – F; < *Gerardia maritima* – G; = *Gerardia maritima* ssp. *grandiflora* (Benth) Pennell – P]

Agalinis maritima (Rafinesque) Rafinesque var. *maritima*. Cp (DE, NC, VA): tidal marshes; uncommon (rare in DE). July; August. NS and s. ME south to se. VA and e. NC. [= K; < *A. maritima* – RAB, C, GW; = *Gerardia maritima* Rafinesque var. *maritima* – F; < *Gerardia maritima* – G; = *Gerardia maritima* ssp. *typica* – P]

Agalinis obtusifolia Rafinesque. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, VA), Mt (VA): pine savannas, wet pine flatwoods, sandhill seeps, disturbed areas; uncommon (rare in DE, rare in VA Mountains). September-October; October-November. DE south to s. FL, west to e. LA, in the interior north to KY and TN. [= RAB, GW, W; < *A. obtusifolia* – C, K, WH (also see *A. decemloba* and *A. tenella*); = *Gerardia obtusifolia* (Rafinesque) Pennell – F, G, P]

Agalinis oligophylla Pennell. Sc. TN (Coffee and Warren counties) (as *A. pseudaphylla*) (Chester, Wofford, & Kral 1997), c. and s. AL, west through s. MS to w. LA. [= K, S; > *Gerardia pseudaphylla* (Pennell) Pennell – P; > *A. pseudaphylla* (Pennell) Shinnars; > *A. pseudophylla* (Pennell) Shinnars, an orthographic variant]

Agalinis paupercula (A. Gray) Britton var. *paupercula*. Mt (VA): calcareous fens, pondshores; rare. NS west to MB, south to NJ, PA, OH, IN, IL, and IA; disjunct in sw. VA (Washington County). [= K; < *A. purpurea* (Linnaeus) Pennell var. *parviflora* (Benth) B. Boivin – C; = *Gerardia paupercula* (A. Gray) Britton var. *paupercula* – F; < *Gerardia purpurea* Linnaeus var. *parviflora* Benth – G; = *Gerardia paupercula* var. *typica* – P; < *A. paupercula* – Pa] {not yet keyed}

Agalinis plukenetii (Elliott) Rafinesque. Sandhills, other dry forests. SC south to c. peninsular FL, west to wc. LA, and northward in the interior to extreme se. TN (Polk County) (Chester, Wofford, & Kral 1997). Scattered in GA (e.g., Baldwin and Laurens counties). [= K, S; = *Gerardia plukenetii* Elliott – P]

Agalinis pulchella Pennell. Cp (FL, GA): pine savannas and sandhills; rare. Reported for Coffee and Ware counties, GA. [Nomenclatural and typification problems] [= K, S, WH; = *Gerardia pulchella* Pennell – P] {not yet keyed; synonymy incomplete}

Agalinis purpurea (Linnaeus) Pennell. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA), WV): woodlands, roadsides, in a wide variety of open habitats; common (uncommon in WV, uncommon in VA Mountains). August-October; September-November. NS west to MN, south to s. FL and e. TX. [= RAB, K, Pa, S, W, WH; < *A. purpurea* var. *purpurea* – C; = *Gerardia purpurea* var. *purpurea* – G; = *Gerardia purpurea* Linnaeus – F, P; < *A. purpurea* – GW (also see *A. virgata*)]

Agalinis setacea (J.F. Gmelin) Rafinesque. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandhills, other dry forests and openings; common (rare in DE and FL, rare in VA Piedmont). September-October; October-November. NY (Long Island) south to ne. FL, c. peninsular FL, and AL. [= RAB, C, K, S, W, WH; > *Gerardia setacea* J.F. Gmelin – F, G, P; > *G. stenophylla* (Pennell) Pennell – P; > *A. stenophylla* Pennell]

Agalinis skinneriana (A. Wood) Britton. Coffee County, TN (Chester, Wofford, & Kral 1997). [= K; = *Gerardia skinneriana* A. Wood – G, P] {not yet keyed; synonymy incomplete}

Agalinis tenella Pennell. Cp (FL, GA, NC, SC, VA), Pd (SC): sandhills, other dry woodlands; uncommon (rare in NC and VA). S. NC south to n. FL, west to s. AL; disjunct in Amelia County, VA. [= RAB, S; < *A. obtusifolia* – K, WH; = *Gerardia tenella* (Pennell) Pennell – P]

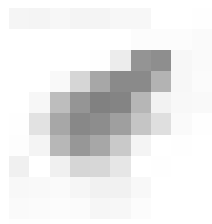
Agalinis tenuifolia (Vahl) Rafinesque var. *leucanthera* (Rafinesque) Pennell. Cp (FL, GA): savannas; rare (GA Special Concern). [= K, S; < *A. tenuifolia* – WH] {not yet keyed; synonymy incomplete}

Agalinis tenuifolia (Vahl) Rafinesque var. *macrophylla* (Benth) Blake. [= K, S; = *Gerardia tenuifolia* Vahl ssp. *macrophylla* (Benth) Pennell – P] {not yet keyed; synonymy incomplete}

Agalinis tenuifolia (Vahl) Rafinesque var. *polyphylla* (Small) Pennell. Pd (GA): granitic flatrocks; uncommon? Endemic to granite flatrocks in GA. [= K, S; = *Gerardia tenuifolia* Vahl ssp. *polyphylla* (Small) Pennell – P; = *Gerardia polyphylla* Small] {not yet keyed; synonymy incomplete}

Agalinis tenuifolia (Vahl) Rafinesque var. *tenuifolia*. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): wooded slopes, roadsides; common (uncommon in WV, rare in DE). August-October; September-November. ME, ON, MI, and MO, south to GA and LA. [= K, S; < *A. tenuifolia* – RAB, C, Pa, W; = *Gerardia tenuifolia* Vahl var. *tenuifolia* – F, G]

Agalinis virgata Rafinesque. Cp (GA, NC, SC): pine savannas; rare. September-October; October-November. NY south to GA. [= RAB, S; < *A. purpurea* var. *purpurea* – C; = *Gerardia racemulosa* Pennell – F, P; = *Gerardia purpurea* Linnaeus var. *racemulosa* (Pennell) Gleason – G; < *A. fasciculata* (Elliott) Rafinesque – K; < *A. purpurea* (Linnaeus) Pennell – GW]



2. *Seymeria* Pursh 1814 (Seymeria)

A genus of about 25 species, herbs, of s. North America (including Mexico). References: Pennell (1935)=P.

- 1 Corolla glabrous on its outer surface; leaf segments linear, < 0.5 mm wide; stem glabrous or puberulent; seeds wingless (though with ridges). *S. cassioides*
- 1 Corolla pubescent externally; leaf segments lanceolate, 1-2 mm wide; stem pubescent; seeds 3-4-winged *S. pectinata* ssp. *pectinata*

Seymeria cassioides (J.F. Gmelin) Blake, Senna Seymeria. Dry to moist pinelands, wet pine savannas, sandhills, other dry woodlands. August-October. Se. VA south to c. peninsular FL, west to LA; disjunct in nc. AL and se. TN (Chester, Wofford, & Kral 1997). [= RAB, C, F, G, GW, K, P, WH; = *Afzelia cassioides* J.F. Gmelin – S]

Seymeria pectinata Pursh ssp. *pectinata*, Comb Seymeria. Dry pinelands, sandhills. July-October. Ssp. *pectinata* ranges from se. NC south to c. peninsular FL, west to s. MS, a Southeastern Coastal Plain endemic. Ssp. *peninsularis* (Pennell) Pennell ranges from n. peninsular FL south to s. FL. [= K; < *S. pectinata* – RAB, WH; = *S. pectinata* ssp. *typica* – P; = *Afzelia pectinata* (Pursh) Kuntze ssp. *pectinata* – S]

3. *Macranthera* Nuttall ex Bentham 1836 (Flameflower)

A monotypic genus, a hemiparasitic herb, of se. North America. References: Pennell (1935)=P.

Macranthera flammaea (Bartram) Pennell, Flameflower, Hummingbird-flower. Pitcherplant bogs, bayheads. July-September. Nearly restricted to the East Gulf Coastal Plain (e. GA and FL Panhandle west to se. LA), but ranging east to the Atlantic Coastal Plain of e. GA (Bullock County), within a county of the SC border. [= GW, K, P, S, WH]

4. *Aureolaria* Rafinesque 1836 (Oak-leech, False-foxtail)

A genus of about 10 species, hemiparasitic herbs, of e. North America and Mexico. References: Pennell (1935)=P.

- 1 Plant pubescent (especially on the calyx, corolla, capsule, and lower stem) with glandular hairs; annual; seeds 0.8-1.0 mm long, not winged.
 - 2 Calyx tube hemispherical, glandular-hirsute to glandular-lanate on the outer surface; capsule ovoid; trichomes of the leaves usually glandular, at least in part; leaf lobes usually acute..... *A. pectinata*
 - 2 Calyx tube turbinate, glandular-puberulent on the outer surface; capsule ellipsoid; trichomes of the leaves usually nonglandular; leaf lobes usually obtuse..... *A. pedicularia*
- 1 Plant glabrous or pubescent with nonglandular hairs; perennial; seeds 1.3-2.7 mm long, winged.
 - 3 Capsule pubescent; inflorescence, pedicels, and/or calyx pubescent with nonglandular hairs; pedicels 1-3 mm at anthesis; flowering May-July..... *A. virginica*
 - 3 Capsule glabrous; inflorescence, pedicels, and calyx glabrous (or pubescent with nonglandular hairs in *Au. patula*); pedicels 1-25 mm long at anthesis; flowering August-September.
 - 4 Inflorescence, pedicels, and calyx pubescent (at least sparsely so); pedicels slender, ca. 0.5 m in diameter *A. patula*
 - 4 Inflorescence, pedicels and calyx glabrous; pedicels stout, ca. 1 mm in diameter.
 - 5 Lower leaves entire to serrate (or with only a few shallow lobes at the base of the leaf); pedicels 1-8 mm long at anthesis, straight; corolla 3.0-4.0 cm long; capsule 10-15 mm long; stem not glaucous *A. laevigata*
 - 5 Lower leaves pinnately lobed, the lobes themselves usually serrate, the sinuses extending over half of the distance to the midrib; pedicels 4-25 mm long at anthesis, upwardly curved; corolla 3.5-6 cm long; capsule 12-20 mm long; stem slightly to strongly glaucous *A. flava*

Aureolaria calycosa (Mackenzie & Bush) Pennell. Distinct from *A. flava* (D. Estes, pers. comm.). [< *A. flava* var. *flava* – K1, K2] {not yet mapped; not yet keyed; add to synonymy and other info}

Aureolaria flava (Linnaeus) Farwell, Smooth Oak-leech. Oak forests and woodlands. August-September; September-October. ME west to MN, south to GA, c. peninsular FL, AL, and e. LA. The various named varieties or subspecies need additional study; the variation seems to be too clinal to be practically recognized taxonomically. [= RAB, W, WH; >> *A. flava* var. *flava* – C, G, K1, K2, Pa; > *Gerardia flava* Linnaeus var. *flava* – F; > *Gerardia flava* var. *reticulata* (Rafinesque) Cory – F; > *A. flava* ssp. *typica* – P; >> *A. flava* ssp. *flava* – S; > *A. flava* ssp. *reticulata* (Rafinesque) Pennell – P, S; > *A. flava* (Linnaeus) Farwell var. *macrantha* Pennell – C, G, K1, K2, Pa, > *Gerardia flava* Linnaeus var. *macrantha* (Pennell) Fernald – F, K1; > *A. flava* ssp. *macrantha* Pennell – P; > *A. flava* ssp. *flava* – S]

Aureolaria grandiflora (Benth) Pennell, Large-flowered Oak-leech. Nw. IN and WI south to sw. MS, se. LA, s.LA, and e. TX. [= *A. grandiflora* var. *serrata* (Torrey) Pennell – K1, K2] {not yet mapped; not yet keyed; add to synonymy and other info}

Aureolaria laevigata (Rafinesque) Rafinesque, Appalachian Oak-leech. Oak forests and woodlands. August-September; September-October. PA west to s. OH, south to SC and GA, primarily a Central and Southern Appalachian endemic, but extending into adjacent provinces, and, rarely, even the Coastal Plain. [= RAB, C, G, K1, P, Pa, S, W; = *Gerardia laevigata* Rafinesque – F]



Aureolaria patula (Chapman) Pennell, Cumberland Oak-leech. Rich alluvial forests. August-October; September-October. C. KY south through TN to nw. GA, and approaching w. NC and sw. VA. [= C, G, K1, P, S]

Aureolaria pectinata (Nuttall) Pennell, Southern Oak-leech. Turkey oak sandhills, other dry oak forests and woodlands. May-September; September-October. NC south to s. FL, west to LA, inland north to AR and MO. Related to *A. pedicularia*, but much more southerly in distribution. [= RAB, K1; = *A. pedicularia* (Linnaeus) Rafinesque var. *pectinata* (Nuttall) Gleason – C, G, WH; = *Gerardia pectinata* (Nuttall) Benth – F; > *A. pectinata* ssp. *eurycarpa* (Pennell) Pennell – P, S; > *A. pectinata* ssp. *transcedens* (Pennell) Pennell – P, S; > *A. pectinata* ssp. *typica* – P; > *A. pectinata* ssp. *pectinata* – S; < *A. pedicularia* – W]

Aureolaria pedicularia (Linnaeus) Rafinesque ex Pennell, Annual Oak-leech. Oak forests and woodlands. September-October; November. ME west to NY and e. MN, south to nw. SC, ne. GA, e. TN, and n. IL. The various named varieties or subspecies need additional study; the variation seems to be too clinal to be practically recognized taxonomically. [= Pa, RAB, W; > *A. pedicularia* var. *pedicularia* – C, G, K1; = *Gerardia pedicularia* Linnaeus var. *pedicularia* – F; > *A. pedicularia* ssp. *caesariensis* Pennell – S; > *A. pedicularia* ssp. *carolinensis* Pennell – P, S; > *A. pedicularia* var. *austromontana* Pennell – C, G, K1; > *Gerardia pedicularia* Linnaeus var. *austromontana* (Pennell) Fernald – F; > *A. pedicularia* ssp. *austromontana* (Pennell) Pennell – P, S; > *A. pedicularia* var. *intercedens* – Pennell – C, G, K1; > *Gerardia pedicularia* Linnaeus var. *intercedens* (Pennell) Fernald – F; > *A. pedicularia* ssp. *intercedens* (Pennell) Pennell – P]

Aureolaria virginica (Linnaeus) Pennell, Downy Oak-leech, Virginia Oak-leech. Oak forests and woodlands. May-July; August-September. MA west to MI, south to ne. FL, Panhandle FL, and AL. [= RAB, C, G, K1, Pa, W, WH; = *Gerardia virginica* (Linnaeus) Britton, Sterns, & Poggenburg – F; > *A. virginica* – P, S; > *A. microcarpa* Pennell – P, S]

5. *Dasistoma* Rafinesque 1819 (Mullein Foxglove)

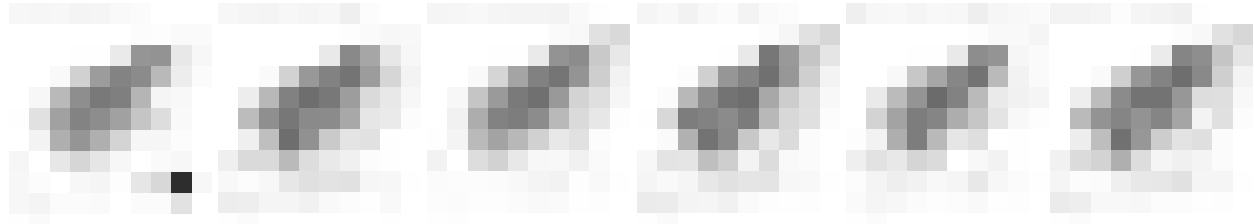
A monotypic genus, a hemiparasitic herb, endemic to se. North America. The genus is sometimes spelled '*Dasystoma*,' a later orthographic variant. References: Pennell (1935)=P.

Dasistoma macrophyllum (Nuttall) Rafinesque, Mullein Foxglove. Xeric to dry-mesic woodlands and bluffs, riverbanks, over limestone or diabase. July-September. WV, OH, s. WI, IA, and NE, south to sw. VA (Lee County), nc. SC, nw. GA, c. AL, MS, LA, and nc. TX. First reported for VA by Wieboldt et al. (1998). [= *Dasistoma macrophylla* – RAB, C, G, K1, K2, P, S; = *Seymeria macrophylla* Nuttall – F, GW, WV; = *Dasystoma macrophylla*, orthographic variant]

6. *Epifagus* Nuttall 1818 (Beechdrops)

A monotypic genus, an herb parasitic on the roots of *Fagus*, of e. North America. References: Thieret (1971)=Z.

Epifagus virginiana (Linnaeus) W. Barton, Beechdrops. Moist to rather dry forests under *Fagus grandifolia*. September-November. NS west to WI, south to ne. FL, Panhandle FL, and LA; disjunct in the mountains of e. Mexico (Tamaulipas). [= RAB, C, F, G, K, Pa, W, WH, WV, Z; = *Leptammium virginianum* (Linnaeus) Rafinesque – S]



7. *Orobanche* Linnaeus 1753 (Cancer-root, Broomrape)

A genus of about 150 species, parasitic herbs, of mainly north temperate regions. References: Musselman (1982)=Z; Thieret (1971)=Y; Collins, Colwell, & Yatskiyevych (2009)=X; Manen et al. (2004).

- 1 Flowers solitary on a long pedicel (appearing as a scape, the true stem entirely underground or nearly so); [section *Gymnocaulis*] *O. uniflora*
- 1 Flowers several-many, sessile or subsessile in a dense spike.
 - 2 Calyx 5-lobed, the lobes subequal, all well-developed; [section *Nothaphyllon*]
 - 3 Corolla 14-20 mm long, slightly curved, the lobes 4-8 mm long and rounded-obtuse; inflorescence a dense raceme, the flowers in a dense and often irregular spiral; flowering April-August; [of uplands, usually parasitizing perennial composites such as *Artemisia*, *Heterotheca*, and *Grindelia*] [*O. ludoviciana*]
 - 3 Corolla 15-22 mm long, strongly curved, the lobes 4-5 mm long and triangular-acute; inflorescence an open raceme, the flowers in a loose and regular spiral; flowering August-October; [of bottomlands, usually parasitizing annual composites such as *Ambrosia* and *Xanthium*] *O. riparia*
 - 2 Calyx 2-4-lobed, rarely 5-lobed, but then the fifth lobe minute and much smaller than the other lobes; [section *Orobanche*].
 - 4 Calyx divided to the base into 2 lateral halves, these usually 2-lobed, the 4 lobes long-attenuate or caudate *O. minor*
 - 4 Calyx tubular, with 4 (-5) lobes about the length of the calyx tube *O. ramosa*

Orobanche ludoviciana Nuttall, Prairie Broomrape. Pastures, upland areas, and glades, parasitic on perennial composites such as *Grindelia*, *Artemisia*, and *Heterotheca*. April-August. SK and BC south to MO, w. TX, AZ, and n. Mexico. [= X; < *O. ludoviciana* – F, G, Z; < *O. ludoviciana* var. *ludoviciana* – C; < *O. ludoviciana* ssp. *ludoviciana* – K] {excluded; not keyed or mapped}

* *Orobanche minor* J.E. Smith, Hellroot, Lesser Broomrape. Cultivated fields, parasitic on various hosts, especially *Trifolium*, *Nicotiana tabacum*, and *Solanum lycopersicum*; native of Eurasia. [= RAB, C, F, G, K, Pa, S, WH, WV, Z]

* *Orobanche ramosa* Linnaeus, Branching Broomrape. Disturbed areas; native of Asia. As discussed by Musselman (1984), the identity of the sole NC record (collected in 1884) is somewhat presumptive, and the precise location uncertain. An infestation of this serious weed was discovered in 2007 at a car wash in urban Norfolk, VA (Musselman & Bolin 2008). [= C, F, G, K]

Orobanche riparia L.T. Collins, Riparian Broomrape. Bottomlands, parasitic on annual composites such as *Ambrosia trifida*, *Xanthium strumarium*, and *Ambrosia artemisiifolia*. August-October. VA, s. WV, and DC (James, Potomac, Shenandoah, and New rivers); OH, IN, IL, MO, TN (Mississippi and Ohio rivers and their tributaries); NE and CO south to w. TX and NM. See Collins, Colwell, & Yatskiyevych (2009) for detailed discussion. [= X; < *O. ludoviciana* var. *ludoviciana* – C; < *O. ludoviciana* – F, G, WV, Z; < *O. ludoviciana* ssp. *ludoviciana* – K]

Orobanche uniflora Linnaeus, Cancer-root. Sandy streambanks and riverbanks, rich forests. April-May. Nearly throughout s. Canada and the United States. [= RAB, F, G, K, Pa, W, WH, Z; > *O. uniflora* var. *uniflora* – C; = *Thalesia uniflora* (Linnaeus) Britton – S]

8. *Buchnera* Linnaeus 1753 (Bluehearts)
(contributed by Bruce A. Sorrie)

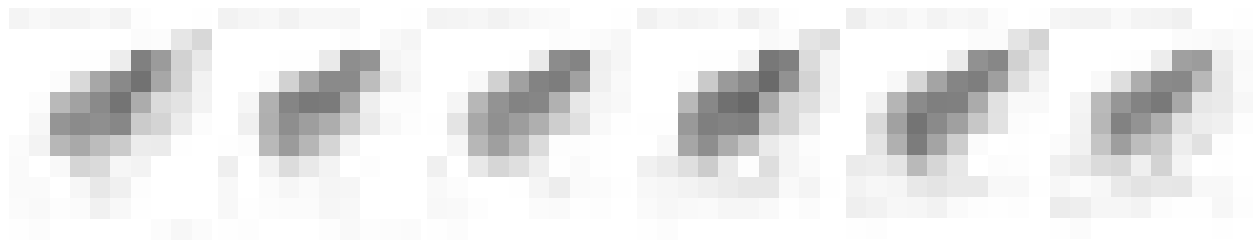
A genus of about 100 species, hemiparasitic herbs, of tropical and warm temperate regions of the Old and New Worlds. The taxonomy of this genus is poorly understood. The plants are root hemi-parasites, apparently not particular about the host species. References: Sorrie & Weakley (in prep.)=Z; Pennell (1935)=P.

Identification notes: Lower leaves are broadest, mid and upper leaves narrowest, often markedly so; the key refers to lower leaves. Leaf teeth are usually few in number and vary in development, from crenate to 2-3 mm long and sharply pointed. The former condition is normal for *B. floridana*, the latter for *B. americana*. Calyx length is ca. 0.5 mm longer in fruit than in flower. The foliage turns black on drying.

- 1 Leaves lanceolate to narrowly ovate, tapering to a point; veins of lower stem leaves consisting of 3 major and 2 minor ones (narrow leaves may only have 3 total veins); leaf teeth usually well developed, rarely absent, usually 2-3 mm long; calyx (6.0-) 6.5-8.0 mm long; corolla lobes 5.0-7.0 mm long; [primarily of moderate to high pH soils in southern Great Plains, ranging to southern margin of the Great Lakes and eastward to the mid Atlantic seaboard, especially in mafic or calcareous glades and prairies, sometimes in more acid sites] *B. americana*
- 1 Leaves narrowly oblanceolate to lanceolate, rounded at tip; veins of lower stem leaves consisting of 1 major and 2 minor ones (narrow leaves may only have 1 vein); leaf teeth usually crenate but may be absent, < 2 mm long; calyx (4.0-) 4.5-5.5 mm long; corolla lobes 4.0-5.0 mm long; [primarily of low pH soils on the southern Atlantic and Gulf Coastal Plain, sometimes in calcareous sites (especially outside of our area)] *B. floridana*

Buchnera americana Linnaeus, Prairie Bluehearts, American Bluehearts, Plains Bluehearts. Dry (seasonally moist) rocky, gravelly, or clayey soil of limestone glades, glades over mafic rock (such as diabase, gabbro, etc.), wet meadows, sandy roadsides. July-September; August-October. NY and s. ON west to MI, IL, MO, and s. KS, south to c. NC, GA, Panhandle FL, and TX. In addition to the key characters given, *B. americana* is overall a larger and more robust plant than *B. floridana*, though both are quite variable in size, depending on the conditions in which they grow. *B. americana* has apparently declined very greatly in our area, probably owing to fire suppression in its habitats. [= RAB, C, F, G, GW, P, Pa, S, W, Z; < *B. americana* – K, WH (also see *B. floridana*)]

Buchnera floridana Gandoger, Savanna Bluehearts, Florida Bluehearts. Pine savannas, flatwoods, seepage bogs, sandy roadsides. April-October; May-November. Se. NC south to s. FL, west to TX, and in the West Indies. Previous attributions of *B. longifolia* Kunth (including *B. elongata* Small) to southeastern states (notably FL, AL, GA, and MS) are based on misidentifications of material which is actually *B. floridana*. [= RAB, GW, S, Z; > < *B. americana* – K; > *B. longifolia* Sw. – K, by misattribution; > *B. floridana* – S; > *B. breviflora* Pennell – S, by misattribution; > *B. elongata* Sw. – S; < *B. americana* – WH]



9. *Striga* Loureiro 1790 (Witchweed)

A genus of about 40 species, hemiparasitic herbs, of tropical to temperate regions of the Old World.

* *Striga asiatica* (Linnaeus) Kuntze, Witchweed. Cultivated fields, parasitic on the roots of corn and other grasses; native of the Old World. A serious weed, *Striga* has been the subject of eradication efforts and quarantine policies since its appearance in our area. [= K; = *S. lutea* Loureiro – RAB]

10. *Schwalbea* Linnaeus 1753 (Chaffseed)

The genus is monotypic, a hemiparasitic herb, of se. North America. References: Pennell (1935)=P.

Schwalbea americana Linnaeus, Chaffseed. Savannas, sandhill-pocosin ecotones (in the uphill portions), mesic loamy-soil slopes or swales in sandhill longleaf pine woodlands, fire-maintained interior woodlands and barrens. May-June; August. Formerly rather widespread in e. North America, primarily in the Coastal Plain, from e. MA, south to c. peninsular FL and west to TX, and disjunct in the Cumberland Mountains of KY and TN. The species is now limited to a few scattered sites in NJ, NC, SC, GA, FL, AL, and LA. It appears to require high fire frequency, especially during the growing season, perhaps related to its establishment ecology. The tiny seeds are hyaline-winged. [= RAB, C, F, G, GW, K, WH; > *S. americana* – P; > *S. australis* Pennell – P, S; > *S. americana* var. *australis* (Pennell) Reveal & C.R. Broome]

11. *Castilleja* Mutis ex Linnaeus f. 1782 (Indian Paintbrush)

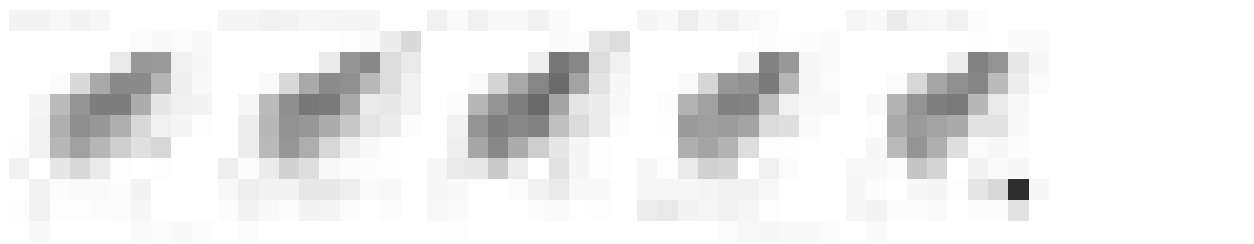
A genus of about 200 species, hemiparasitic herbs, primarily of w. North America, with a few species also in e. North America, Eurasia, Central America, and Andean South America. References: Pennell (1935)=P.

- 1 Inflorescence bracts mostly entire, yellow, < 2 cm long; [endemic to c. AL]*C. kraliana*
- 1 Inflorescence bracts either deeply lobed or entire, red (rarely yellow), mostly > 2 cm long; [collectively widespread in our area].
- 2 Lower corolla lip 2-3.5 mm long, thin, yellowish or orangish; inflorescence bracts deeply lobed; basal rosettes of leaves usually well-developed*C. coccinea*
- 2 Lower corolla lip <2 mm long, thickened, greenish; bracts simple; basal rosettes absent*C. indivisa*

Castilleja coccinea (Linnaeus) Sprengel, Eastern Indian-paintbrush. Woodlands, fens, barrens, rock outcrops, meadows, wet pastures, grassy openings, usually over mafic rocks. April-May; May-June. ME, NY, and MN south to SC, n. GA, n. AL, c. MS, w. LA, and OK. [= RAB, C, F, G, GW, K2, P, Pa, S, W]

* *Castilleja indivisa* Engelman, Texas Indian-paintbrush. Dry, disturbed areas; introduced from sc. North America (AR and OK south to w. LA and TX). March-April. [= K2, P, WH]

Castilleja kraliana J. Allison, Cahaba Paintbrush. Dolomitic Ketona glades. March-April. Endemic to dolomitic Ketona glades in Bibb County, c. AL (Allison & Stevens 2001). [= K2]



12. *Pedicularis* Linnaeus 1753 (Wood-betony, Lousewort)

A genus of about 350 species, hemiparasitic herbs, of temperate regions of c. and e. Asia, Europe, w. North America, e. North America, and Andean South America. References: Pennell (1935)=P.

- 1 Inflorescence 1-4 dm tall; stem leaves alternate; stem pubescent, at least near the inflorescence; flowering April-May*P. canadensis*
- 1 Inflorescence 4-10 dm tall; stem leaves opposite; stem glabrous; flowering August-October*P. lanceolata*

Pedicularis canadensis Linnaeus, Eastern Lousewort, Wood-betony. Moist to dry forests and woodlands, streambanks. April-May; May-July. ME, QC, and MB south to ne. FL, FL Panhandle, TX, and n. Mexico. Var. *dobbsii* Fernald, alleged to differ in having nearly solitary flowering stems and stoloniform basal offsets, needs additional study. [= RAB, C, G, GW, P, Pa, S, W, WH, WV; > *P. canadensis* var. *canadensis* - F; > *P. canadensis* var. *dobbsii* Fernald - F; > *P. canadensis* ssp. *canadensis* - K]

Pedicularis lanceolata Michaux, Swamp Lousewort. Springheads and swampy areas, over calcareous, mafic, or ultramafic rocks. August-October; September-October. MA and NY west to MN and ND, south to e. VA, w. NC, e. TN, ne. GA, w. TN, n. AR, and NE. [= RAB, C, F, G, GW, K, P, Pa, S, W, WV]

13. *Melampyrum* Linnaeus 1753 (Cow-wheat)

A genus of about 35 species, hemiparasitic herbs, of temperate regions of North America and Eurasia. References: Pennell (1935)=P.

- 1 Lowermost bracteal leaves entire or nearly so, or the uppermost with a few short basal teeth; leaves (2-) 10-30 mm wide, the widest leaves on a plant usually over 10 mm wide; plants usually simple or with 4 (rarely more) branches; internodes of the midstem usually 4-6 cm long.....*M. lineare* var. *latifolium*
- 1 Lowermost bracteal leaves generally with a few prominent sharp teeth or segments; leaves 2-10 mm wide; plants usually with numerous branches (often 10 or more); internodes of the midstem usually 1-3 cm long.
 - 2 Teeth of the middle and upper bracts shorter than the width of the undivided portion of the bracts; leaves lanceolate, (2-) 5-10 mm wide; [widespread in our area].....*M. lineare* var. *americanum*
 - 2 Teeth of the middle and upper bracts commonly about as long as the width of the undivided portion of the bracts; leaves linear to lanceolate, 2-6 (-8) mm wide; [of the Coastal Plain]*M. lineare* var. *pectinatum*

Melampyrum lineare Desrousseaux var. *americanum* (Michaux) Beauverd, Common Cow-wheat. Dry soils. May-July; August-September. QC west to MN, south to VA, NC, and TN. Our three varieties are quite distinctive in morphology and have distinctive geographic ranges; they seem worthy of distinction from one another at the varietal level, at least. The fourth variety, var. *lineare*, is more northern, ranging from NL (Labrador) west to BC, south to New England, n. MI, and n. MN. It is similar to var. *latifolium* in its entire bracteal leaves, but overall is more like var. *americanum*, differing in the bracteal teeth and in its linear leaves, rarely over 5 mm wide. The distinction between var. *americanum* and var. *lineare* may not be worth making; if combined (as by K), the correct name is var. *lineare*. [= C, F, G; < *M. lineare* - RAB, W; < *M. lineare* var. *lineare* - K, Pa, WV; < *M. lineare* var. *typicum* - P; < *M. lineare* - S]

Melampyrum lineare Desrousseaux var. *latifolium* Barton, Appalachian Cow-wheat. Dry soils in ridgetop woodlands, in thin soils around rock outcrops. Late April-July; August-September. MA and NY south to n. GA, mostly in the Appalachians. [= C, F, G, K, P, WV; < *M. lineare* - RAB, W; = *M. latifolium* (Barton) Muhlenberg ex Britton - S]

Melampyrum lineare Desrousseaux var. *pectinatum* (Pennell) Fernald, Pine-barren Cow-wheat. Dry sandy areas. May-July; August-September. E. MA to se. VA, on the Coastal Plain. [= C, F, G, K, P, Pa; < *M. lineare* - RAB, W]

14. *Conopholis* Wallroth 1825 (Squawroot, Bearcorn)

A genus of 3 species, herbs parasitic on *Quercus*, of e. North America and sw. North America south to Central America. Rodrigues, Colwell, & Stefanović (2011) determined that a division of the genus into 3 species best reflects genetic differentiation, the other 2 being *C. alpina* Liebmann, ranging from AZ, NM, and TX south to s. Mexico, and *C. panamensis* Woodson of Costa Rica and Panama. References: Rodrigues, Colwell, & Stefanović (2011)=X; Haynes (1971)=Z; Thieret (1971)=Y.

Conopholis americana (Linnaeus) Wallroth, Squawroot, Bearcorn. Rich, moist forests, under *Quercus* species. March-June. NS west to WI and south to c. peninsular FL, AL, and TN; disjunct in e. Mexico (Chiapas, Oaxaca, and Puebla). Haynes (1971) discusses the nature of the parasitism. *Conopholis* apparently germinates near an oak root, forms a parasitic connection to the root, resulting in the formation of a gall consisting of both *Quercus* and *Conopholis* tissue. The gall can be up to 25 cm in diameter, and lasts for many years, repeatedly sending up flowering shoots. It is believed that the gall exists underground for some years prior to first flowering. [= RAB, C, F, G, K, Pa, S, W, WH, WV, X, Y, Z]



A family of 3 genera and about 270-320 species, insectivorous herbs, cosmopolitan. References: Fischer et al. in Kadereit (2004).

- 1 Leaves ovate or elliptic, in a basal rosette; carnivory via the viscid-slimy upper leaf surfaces; flowers solitary on bractless peduncles.....*Pinguicula*
- 1 Leaves or leaf segments linear, borne along a subterranean or submersed stem; carnivory via specialized bladder-like traps; flowers in (1-) many-flowered racemes, each flower pedicel subtended by a bract.....*Utricularia*

Pinguicula Linnaeus 1753 (Butterwort)

A genus of about 46-80 species, herbs, of America, Mediterranean Europe, and circumboreal America and Eurasia. References: Schnell (2002b)=Z; Godfrey & Stripling (1961); Wood & Godfrey (1957); Schnell (1980a); Fischer et al. in Kadereit (2004). Key based in part on GW.

- 1 Expanded corolla < 1.5 cm across; palate not exerted from the throat of the corolla; rosettes usually 2-4 cm in diameter; flowers usually white to pale violet (rarely medium violet); seeds 0.4 mm long*P. pumila*
- 1 Expanded corolla > 1.8 cm across; palate markedly exerted from the throat of the corolla; rosettes usually 5-10 (-15) cm across; corolla yellow, violet, or white; seeds (0.4-) 0.5-0.8 mm long.
 - 2 Corolla yellow.....*P. lutea*
 - 2 Corolla lavender-blue or white.
 - 3 Hairs on the lower portion of the scape elongated, pointed, multicellular, nonglandular, transitioning upward to 1-celled glandular hairs; expanded portion of corolla markedly "veiny" (darker along the veins); [of se. NC southward to s. peninsular FL and e. Panhandle FL]..*P. caerulea*
 - 3 Hairs throughout scape glandular; expanded portion of corolla not "veiny;" [collectively of sw. GA and FL Panhandle westward to s. MS].
 - 4 Fresh leaves dull red or reddish green; corolla lobes ca. 2x as long than broad, the lobes notched almost 1/2 their length...*P. planifolia*
 - 4 Fresh leaves bright yellow-green; corolla lobes ca. 1x as long than broad, the lobes notched about 1/4 their length
 - 5 Corolla tube violet, with darker violet veins; hairs of the inner corolla tube white*P. ionantha*
 - 5 Corolla tube yellow, with reddish-brown veins; hairs of the inner corolla tube yellow.....*P. primuliflora*

Pinguicula caerulea Walter, Blue Butterwort. Pine savannas and wet pine flatwoods, mostly in the outer Coastal Plain, rarely extending inland to seepages and sandhill-pocosin ecotones in the fall-line Sandhills of NC and SC. April-May. Se. NC (Carteret and Johnston counties) south to s. peninsular FL, west to e. Panhandle FL. Schnell (1980a) discusses populations with white corollas. [= RAB, GW, K, S, WH, Z; *Pinguicula elatior* Michaux]

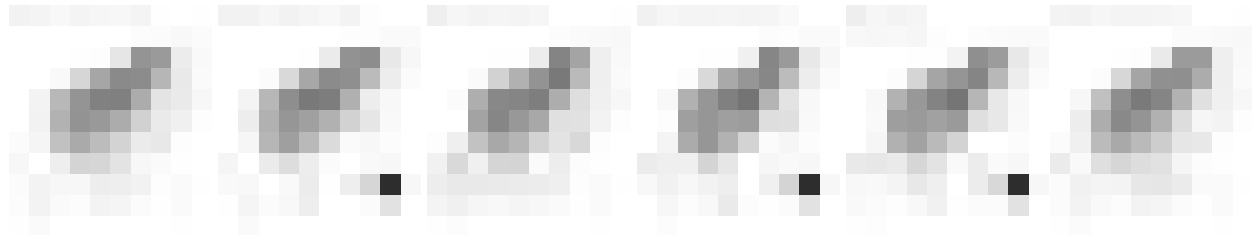
Pinguicula ionantha Godfrey, Panhandle Butterwort. Pond margins, bogs, flatwoods. Endemic to FL Panhandle. [= GW, K, WH, Z]

Pinguicula lutea Walter, Yellow Butterwort. Pine savannas and wet pine flatwoods, mostly in the outer Coastal Plain, rarely extending inland to seepages and sandhill-pocosin ecotones in the fall-line Sandhills of SC. Late March-May. Se. NC (Pender and New Hanover counties) south to s. FL, west to e. LA. [= RAB, GW, K, S, WH, Z]

Pinguicula planifolia Chapman, Chapman's Butterwort. Pond margins, bogs, flatwoods. S. AL, Panhandle of FL, and s. MS. [= GW, K, S, WH, Z]

Pinguicula primuliflora Wood & Godfrey, Clearwater Butterwort. Clearwater streams and seeps. Sw. GA, s. AL, Panhandle FL, and s. MS. [= GW, K, WH, Z]

Pinguicula pumila Michaux, Small Butterwort. Pine savannas and wet pine flatwoods. April-May. Se. NC (Carteret and Pender counties) south to s. FL, west to se. TX; and in the Bahamas. [= RAB, GW, K, S, WH, Z]



Utricularia Linnaeus 1753 (Bladderwort)

Utricularia, as monographed by Taylor (1989), consists of 214 species in 35 sections, with a nearly cosmopolitan distribution. In our area, 14 or 15 species in 5 sections are known to occur. References: Taylor (1989)=Z; Schnell (2002b)=Y; Müller & Borsch (2005); Fischer et al. in Kadereit (2004). Key based in part on Z and GW.

- 1 Flowers white or cream-white, 1-3 mm long; inflorescence peduncles very reduced, the pedicels appearing to arise directly from the stolons; traps 0.3-0.8 mm long; plants floating unattached in water (sometimes deposited land by dropping water, but then the principal branch systems stranded on the soil surface); capsules ca. 1 mm long, fusiform, indehiscent, with 1 seed; seeds essentially smooth, unornamented; leaves absent; [section *Utricularia*]*U. olivacea*

- 1 Flowers yellow, pink, or purple (sometimes fading whitish), (2-) 5-20 mm long; inflorescence peduncles well-developed, the inflorescence clearly a raceme; traps 0.2-5.0 mm long (< 0.7 mm long only in the terrestrial species (see key lead 2); plants attached (with principal branch systems within the soil), or floating unattached in water (sometimes deposited on land by dropping water, but then the principal branch systems stranded on the soil surface); capsules 1-8 mm long, globose, subglobose, or ovoid, with many seeds; seeds reticulate, papillose, echinate, multi-angled, or winged (rarely more-or-less smooth); leaves present (sometimes absent in the terrestrial species).
- 2 Plants attached (with principal branch systems within the soil); leaves absent or simple, linear, grass-like aerial leaves; bladders 0.2-1.1 mm long, most or all on a plant usually < 1.0 mm long; seeds reticulate-alveolate (also angled in *U. resupinata*), 0.20-0.25 mm long.
- 3 Flowers pink; inflorescence 1 (-2)-flowered; bract at base of the pedicel tubular, attached circumferentially around the stem; aerial leaves (when present) terete, septate; [very rare in our area]; [section *Lecticula*] *U. resupinata*
- 3 Flowers yellow (sometimes fading whitish); inflorescence (1-) 2-15-flowered; bract at base of the pedicel peltate or ovate, attached on one side of the stem; aerial leaves (when present) flattened, not septate; [collectively common in our area].
- 4 Bracts subtending the pedicels peltate (attached near their middles), unattached at either end; pair of bracteoles absent; spur of the corolla oriented forward, more-or-less appressed to the lower lip; aerial leaves (when present) with subacute to obtuse apex; [section *Setiscapella*] *U. subulata*
- 4 Bracts subtending the pedicels ovate (attached at their bases), free only at their upper end; pair of bracteoles associated with each bract present, linear to lanceolate; spur of the corolla oriented downward or backward, at approximately a right angle to the lower lip; aerial leaves (when present) with acute apex; [section *Stomoisial*].
- 5 Corolla 1.5-2.0 cm long; spur 8-12 mm long; raceme usually short, the (1-) 2-6 flowers crowded together, all of them chasmogamous *U. cornuta*
- 5 Corolla 0.25-1.5 cm long; spur 5-7 (-9) mm long; raceme usually elongate, the (1-) 2-15 flowers well-spaced, often the lower (sometimes all) cleistogamous and much smaller than the chasmogamous flowers *U. juncea*
- 2 Plants floating unattached in water (sometimes deposited on land by dropping water, but then the principal branch systems stranded on the soil surface); leaves present and dissected into linear segments; bladders 0.7-5.0 mm long, most or all on a plant > 1.0 mm long; seeds papillose, reticulate, ridged, angled, or winged, 0.5-2.0 mm long.
- 6 Flowers purple; leaves divided into verticillate segments with terminal traps; [section *Vesiculina*] *U. purpurea*
- 6 Flowers yellow; leaves divided into alternate segments with lateral traps; [section *Utricularia*].
- 7 Peduncle with whorl of inflated leaf-like organs (floats).
- 8 Floats 4-7, not fused basally to one another, fusiform, tapering gradually to base and apex from a widest point near the middle; leaves with the 2 primary divisions unequal; bracts of the scape longer than broad, entire; flowers (6-) 9-14 (-17) per scape; apex of corolla spur bifid *U. inflata*
- 8 Floats (5-) 6-8 (-10), fused basally to one another, cylindrical, more-or-less parallel-sided through most of their length, tapering abruptly to base and apex; leaves with the 2 primary divisions equal; bracts of the scape broader than long, the apex slightly to strongly 3-lobed; flowers (1-) 3-4 (-7) per scape; apex of corolla spur usually entire (rarely bifid) *U. radiata*
- 7 Peduncle without whorl of inflated leaf-like organs (floats).
- 9 Main axes distinctly flattened in cross-section, up to 10 mm wide *U. foliosa*
- 9 Main axes round in cross-section.
- 10 Lower lip of corolla 3-lobed; seeds disk-shaped, not angular or winged; inflorescences of 2 types, the chasmogamous on erect peduncles 5-25 cm long bearing 2-8 flowers, the cleistogamous without a peduncle, the solitary pedicels borne directly on the stolons, 0.5-2 cm long, deflexed *U. geminiscapa*
- 10 Lower lip of corolla entire or slightly irregular, not 3-lobed; seeds angular or winged; inflorescences of 1 type (erect, chasmogamous).
- 11 Upper corolla lip smaller than the lower, entire; capsule circumscissilely dehiscent; seeds 0.7-1.0 mm long, 4-6-angled; corolla without stipitate glands on its external surface.
- 12 Leaves of one kind only, divided into numerous capillary segments bearing lateral traps; bracts scarcely auriculate; plant distinctly aquatic, floating in water and only rarely stranded; [of the Coastal Plain] *U. macrorhiza*
- 12 Leaves of 2 or 3 kinds, some divided into capillary or narrowly linear segments and bearing few or no traps, others divided into fewer capillary segments and bearing more-or-less numerous traps; bracts distinctly auriculate; plants typically in boggy situations, in shallow water or frequently stranded; [either of the Mountains at high elevations or of various physiographic provinces northward].
- 13 Broadest leaf segments with 9-20 lateral setae (use 10× magnification); spur of corolla cylindrical, distinctly longer than wide, the apex distinctly curved forward [*U. intermedia*]
- 13 Broadest leaf segments lacking lateral setae; spur of corolla shortly saccate to broadly conical, wider than long, the apex not curved forward *U. minor*
- 11 Upper corolla lip larger than the lower, obscurely 3-lobed; capsule laterally 2-valved or indehiscent; seeds 0.8-2.5 mm long, lenticular, with an irregular, lobed, or continuous wing; corolla (or at least the spur) with a few to many short stipitate glands (sometimes patchily distributed).
- 14 Vegetative shoots uniform, all bearing rather sparsely divided leaf segments bearing traps, seeds 0.8-1.1 mm long, with a continuous, circumferential wing, slightly to irregularly lobed.
- 15 Lower corolla lip 8-10 mm long, about equaling or slightly shorter than the conical, 5-9 mm long spur; leaves usually forked twice *U. biflora*
- 15 Lower corolla lip 5-6 mm long, exceeding the blunt, 3.5-4.5 mm long spur; leaves usually forked once *U. gibba*
- 14 Vegetative shoots of 2 kinds, some bearing leafy segments and few or no traps, others bearing reduced segments and more-or-less numerous traps; seeds 1.0-2.5 mm long, with an irregularly deeply lobed or partial wing.
- 16 Plant anchored in mud up to 100 cm below water surface; green leafy shoots up to 40 cm long and 5 cm wide; peduncle flexuous, to 100 cm long, only the uppermost ca. 10 cm emergent *U. floridana*
- 16 Plant in shallow water or stranded; green leafy shoots usually not > 10 cm long and 2 cm wide; peduncle erect, straight, to 30 cm long, the uppermost 10-25 cm emergent *U. striata*

Utricularia biflora Lamarck, Longspur Creeping Bladderwort. Ponds, lakes, and ditches. June-October. This species may not be distinct from *U. gibba* (which see for discussion). E. MA south to FL, west to TX and OK, primarily on the Coastal Plain;

also apparently widespread in the New World and Old World tropics. [= RAB, C, F, G, GW, W; = *U. pumila* Walter – S, apparently misapplied; < *U. gibba* – K, WH, Y, Z]

Utricularia cornuta Michaux, Horned Bladderwort. Saturated peaty soils of shores of limesink ponds (dolines), bogs, fens. May-September. NL (Newfoundland) and QC west to n. ON, AB, and MN, south to s. FL and e. TX; also in the Bahamas and Cuba. Taylor (1989) states that where sympatric with *U. juncea*, *U. cornuta* flowers much earlier. [= RAB, C, F, G, GW, K, Pa, W, WH, WV, Y, Z; = *Stomosisia cornuta* (Michaux) Rafinesque – S]

Utricularia floridana Nash, Florida Bladderwort. In deep water of natural Carolina bay lakes, other natural lakes, and limesink ponds (dolines). July-August. Se. NC south to c. peninsular FL, west to Panhandle FL and sw. GA. [= GW, K, S, WH, Y, Z]

Utricularia foliosa Linnaeus, Flatstem Bladderwort. In deep water of natural lakes and ponds. Se. NC south to s. FL, west to TX (Brown & Marcus 1998); West Indies, South America, Africa. This species is reported for NC by Taylor (1989). See GW for a detailed description of this species. [= GW, K, S, WH, Y, Z]

Utricularia geminiscapa Benjamin, Two-flowered Bladderwort, Hidden-fruited Bladderwort. Beaver ponds, mucky seepages. July-August. NL (Newfoundland) and QC west to n. MI and n. WI, south to PA and sc. NC. [= C, F, G, K, Pa, W, WV, Y, Z]

Utricularia gibba Linnaeus, Shortspur Creeping Bladderwort. Ponds, lakes, and ditches. May-September. QC west to WI, south to FL and LA; also apparently widespread in the West Indies and Central America and apparently the Old World tropics. Taylor (1989) includes *U. biflora* in *U. gibba*. Other authors have expressed doubts about the distinction, including RAB ("doubtfully distinct"). Taylor suggests that "further research is clearly indicated, but to be at all meaningful, it must be conducted on a worldwide basis." I have here, for the moment, retained the 2 traditionally recognized species, though intermediates will be encountered. [= RAB, C, F, G, S, W, WV; < *U. gibba* – K, Pa, Y, Z (also see *U. biflora*)]



Utricularia inflata Walter, Swollen Bladderwort, Inflated Bladderwort. Ponds, lakes, ditches. May-November. NJ south to s. FL, west to e. TX; disjunct in WA (probably introduced). Also disjunct in an artificial pond in Henderson County, NC (Carl Sandburg Home National Historic Site). [= C, G, GW, K, Pa, S, WH, Y, Z; = *U. inflata* var. *inflata* – RAB, F]

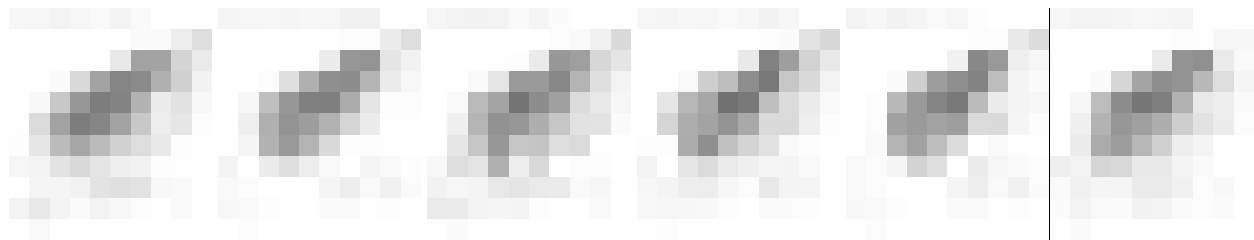
Utricularia intermedia Hayne, Northern Bladderwort. Flat-leaved bladderwort. Lakes, floating bog mats. July-August. Circumboreal, south in North America to se. PA (Rhoads & Klein 1993), DE (?), and MD, OH, IN, IL, IA, SD, CO, UT, and CA; the report from sc. GA (Jones & Coile 1988) is in error. [= C, F, G, K, Pa, Y, Z]

Utricularia juncea M. Vahl, Southern Bladderwort. Shores of limesink ponds (dolines), borrow pits, wet sands. July-September. NY (Long Island) and NJ south to s. FL, west to e. TX and se. AR; also in the West Indies, Central America and South America. [= RAB, C, F, G, GW, K, WH, Y, Z; > *Stomosisia juncea* (M. Vahl) Barnhart – S; > *Stomosisia virgatula* Barnhart – S]

Utricularia macrorhiza Le Conte, Greater Bladderwort. Pools and ponds. May-September. NL (Newfoundland) west to AK, south to NC, SC, TX, CA, and Mexico; also in e. Asia. See Taylor (1989) for a discussion of the differences between this species and *U. vulgaris* of Europe and w. Asia, with which it has often been combined or associated as a variety. [= K, Pa, S, Y, Z; < *U. vulgaris* Linnaeus – RAB, C, F, G, WV, misapplied to American plants]

Utricularia minor Linnaeus, Lesser Bladderwort, Small Bladderwort. Fens and bogs, in the Southern Blue Ridge at about 1400 meters elevation. Circumboreal, south in North America to NJ, DE, PA, IN, IL, IA, NE, CO, UT, NV, and CA; disjunct in w. NC. [= C, F, G, K, Pa, W, Y, Z]

Utricularia olivacea Wright ex Grisebach, Dwarf Bladderwort, Minute Bladderwort. In floating mats (often algal) in water of limesink ponds (dolines), artificial lakes or beaver ponds. September-October. NJ south to FL, west to s. AL and s. MS (Sorrie & Leonard 1999), in the Coastal Plain; also in the West Indies (Cuba), Central America, and South America. [= RAB, GW, K, WH, Y, Z; = *Biovularia olivacea* (Wright ex Grisebach) Kam. – S]



Utricularia purpurea Walter, Purple Bladderwort. In water of ponds, ditches, other slow-moving water. May-September. NS and QC west to MN, south to NY, n. IN, s. MI, and WI, and on the Coastal Plain south to s. FL, west to se. TX; also in Mexico, the West Indies, and Central America. [= RAB, C, F, G, GW, K, Pa, WH, Y, Z; = *Vesiculina purpurea* (Walter) Rafinesque – S]

Utricularia radiata Small, Floating Bladderwort, Small Swollen Bladderwort. Ponds, depression ponds, lakes, and ditches. May-November. NS south to s. FL, west to TX; disjunct in w. VA, w. TN, nw. IN; reports of this species in Cuba and South America are apparently in error. [= C, G, GW, K, Pa, S, W, WH, Y, Z; = *U. inflata* var. *minor* Chapman – RAB, F]

Utricularia resupinata B.D. Greene ex Bigelow, Northeastern Bladderwort, Resupinate Bladderwort. Wet pine flatwoods, pond margins, shores of natural lakes. NS west to nw. WI, south (irregular and scattered in part) to FL and sw. GA; also in the Bahamas (Sorrie & LeBlond 1997). Although "the curious gap in the North American range" [NC, SC, and VA] (Taylor 1989) is no longer strictly a gap, *U. resupinata* does appear to have a strangely bimodal range, with a center of distribution in ne. United States and se. Canada and a second extending from se. United States south into the West Indies and Central America. [= C, F, G, GW, K, Pa, WH, Y, Z; = *Lecticula resupinata* (B.D. Greene) Barnhart – S]

Utricularia striata Le Conte ex Torrey, Fibrous Bladderwort. Ponds, lakes, and ditches. May-November. Se. MA south to n. FL, west to e. TX and e. OK. [= K, WH, Y, Z; = *U. fibrosa* Walter – RAB, C, F, G, GW, S, of uncertain application and likely misapplied]

Utricularia subulata Linnaeus, Slender Bladderwort, Zigzag Bladderwort. Moist sands or peats of various kinds of acidic wetlands, including wet pine savannas and flatwoods, shores of limesink ponds (dolines), borrow pits, ditches. March-July (-later). In North America primarily in the Coastal Plain, from NS and e. MA south to s. FL, west to TX, north in the interior to TN and AR; also in the West Indies, Central America, South America, Africa, and Asia. Taylor (1989) terms this "the most widespread of *Utricularia* species." [= RAB, C, F, G, GW, K, Pa, W, WH, Y, Z; > *Setiscapella subulata* (Linnaeus) Barnhart – S; > *Setiscapella cleistogama* (A. Gray) Barnhart – S]

378. ACANTHACEAE Durande 1762 (Acanthus Family) [in LAMIALES]

A family of about 230 genera and about 3450 species, herbs, shrubs, vines, and trees, largely tropical. References: Wasshausen (1998); Long (1970); McDade & Moody (1999).

- 1 Plant a tree, with opposite leathery leaves; [of FL, s. MS, s. LA southward].....*Avicennia*
- 1 Plant an herb, with various leaf arrangements.
 - 2 Leaves in a basal rosette (sometimes with smaller leaves on a scape).
 - 3 Leaves glabrate, to 22 cm long and 8 cm wide; corolla 0.8-1.3 cm long; capsule 8-10 mm long; stamens 2; [of moist to wet swamps].....*Elytraria*
 - 3 Leaves pubescent, to 10 cm long and 3 cm wide; corolla 1.8-4 cm long; capsule 9-18 mm long; stamens 4; [of dry upland pinelands].
 - 4 Leaves 2-10 cm long, 1-3 cm wide; corolla 3-4 cm long; calyx lobes 15-30 mm long; capsule 12-18 mm long.....*Ruellia ciliosa*
 - 4 Leaves 1.5-2.5 cm long, 0.7-0.8 cm wide; corolla ca. 2 cm long; calyx lobes 6-9 mm long; capsule ca. 10 mm long.....*Stenandrium*
 - 2 Leaves cauline.
 - 5 Fertile stamens 4; corolla not distinctly 2-lipped, the corolla lobes of nearly equal size (except distinctly 2-lipped in *Hygrophila*).
 - 6 Corolla distinctly 2-lipped.....*Hygrophila*
 - 6 Corolla not distinctly 2-lipped, the corolla lobes of nearly equal size.
 - 7 Plant an herbaceous vine; leaves cordate-hastate at the base; flowers yellow to orange, usually with a dark purple "eye".....*Thunbergia*
 - 7 Plant an herb; leaves cuneate to rounded at the base; flowers white to various shades of blue or pink.
 - 8 Calyx lobes linear-aristate; anther sacs awned or pointed at the base.....*Dyschoriste*
 - 8 Calyx lobes lanceolate or linear; anther sacs blunt.....*Ruellia*
 - 5 Fertile stamens 2; corolla distinctly 2-lipped (except salverform in *Pseuderanthemum* and with 4 nearly equal lobes in *Yeatesia*).
 - 9 Corolla salverform, 5-lobed (but still zygomorphic).....*Pseuderanthemum*
 - 9 Corolla distinctly 2-lipped or 4-lobed.
 - 10 Bracts and bractlets inconspicuous, 2-5 mm long, linear or triangular; stem subterete or obscurely 4-angled.....*Justicia*
 - 10 Bracts and/or bractlets subtending the flowers conspicuous, 5-15 mm long, obovate; stem terete or 6-angled.
 - 11 Stem six-angled in cross-section; corolla conspicuously 2-lipped.....*Dicliptera*
 - 11 Stem terete in cross-section; corolla 4-lobed, the lobes nearly equal.....*Yeatesia*

Andrographis Wallich (False Water-willow)

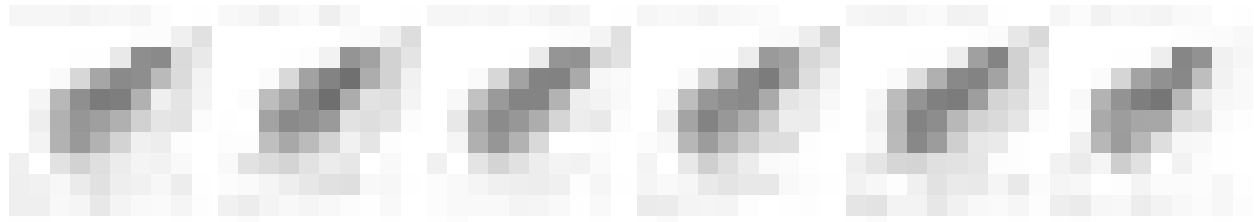
A genus of about 20 species of tropical Asia.

* *Andrographis echioides* (Linnaeus) Nees, native of India, is reported for chrome ore piles near Newport News, VA, by Reed (1961); it is likely not established in our area. [= K] {not keyed; not mapped; rejected as a component of our flora}

Avicennia Linnaeus (Black Mangrove)

A genus of 4-7 species, tropical. Of variable family placement, having been variously placed in the Acanthaceae, Verbenaceae, or Avicenniaceae.

Avicennia germinans (Linnaeus) Linnaeus, Black Mangrove. Brackish and salt marshes and swamps. Scattered on the Gulf Coast in FL peninsula (Dixie county southward on the west coast, St. Johns County southward on the east coast), Panhandle FL (Franklin and Taylor counties), s. MS, s. LA, and se. TX, southward into the West Indies and Tropical America. [= GW, K, WH; = *A. nitida* Jacquin – S]



Dicliptera Antoine Laurent de Jussieu (Dicliptera, Foldwing)

A genus of about 150 species, largely tropical, but extending into warm temperate regions. References: Wasshausen (1998)=Y; Long (1970)=Z.

- 1 Corolla tan to purplish-pink, 15-20 mm long, the tube straight or nearly so*D. brachiata*
 1 Corolla scarlet red, 20-25 mm long, the tube curved*D. sexangularis*

Dicliptera brachiata (Pursh) Sprengel, Dicliptera, Branched Foldwing. Bottomland forests. August-October. Se. VA south to c. peninsular FL, west to TX, and north in the interior to c. TN, s. IN, s. IL, MO, and se. KS. [= RAB, C, F, GW, K, WH, Y; = *Diapedium brachiatum* (Pursh) Kuntze – S; > *Dicliptera brachiata* var. *brachiata* – Z]

Dicliptera sexangularis (Linnaeus) de Jussieu, Six-angle Foldwing. Disturbed areas, hammocks. [= K, WH, Y; = *Diapedium assurgens* (Linnaeus) Kuntze – S; > *Dicliptera assurgens* (Linnaeus) de Jussieu var. *vahlia* (Nees) M. Gómez – Z]

Dyschoriste Nees (Twinflower, Snakeherb, Dyschoriste)

A genus of about 65 species, of tropical and warm temperate regions. References: Wasshausen (1998)=Y; Long (1970)=Z.

- 1 Corolla 25-27 mm long (including the 5-10 mm lobes); capsule 10-14 mm long; [of pinelands]*D. oblongifolia*
 1 Corolla 10-15 mm long (including the 3-5 mm lobes); capsule 7-10 mm long
 2 Leaves linear to linear-elliptic; [of moist pinelands]*D. angusta*
 2 Leaves elliptic to elliptic-ovate; [of floodplain forests]*D. humistrata*

Dyschoriste angusta (A. Gray) Small, Pineland Twinflower. Moist pinelands. N. FL south to s. peninsular FL. Reported for FL Panhandle (Wakulla County) by Kunzer et al. (2009). [= K, S, WH] {add GW, Y, Z to synonymy; improve key}

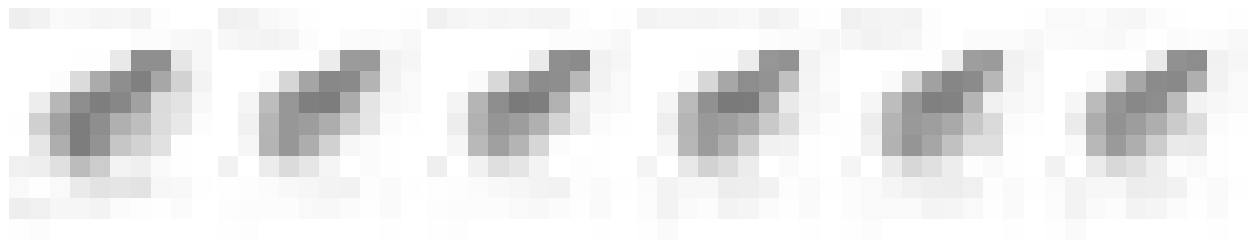
Dyschoriste humistrata (Michaux) Kuntze, Swamp Twinflower, Swamp Dyschoriste. Bottomland forests, especially on soils over limestone. April-May. SC to c. peninsular FL, west to e. Panhandle FL. [= RAB, GW, K, S, WH, Y, Z]

Dyschoriste oblongifolia (Michaux) Kuntze, Blue Twinflower, Pineland Dyschoriste. Pine savannas, flatwoods, and sandhills. April-May. SC to s. FL, west to se. AL and e. Panhandle FL. The basis of Small's (1933) attribution of this species to VA is unknown. [= RAB, K, S, WH, Y; > *Dyschoriste oblongifolia* var. *oblongifolia* – Z]

Elytraria Michaux (Elytraria)

A genus of about 17 species, of tropical and warm temperate regions of the Western and Eastern Hemispheres. The placement of this genus in the Acanthaceae is uncertain (McDade & Moody 1999, McDade et al. 2000). References: Long (1970)=Z; Ward (2004d)=Y.

Elytraria caroliniensis (J.F. Gmelin) Persoon var. *caroliniensis*, Carolina Elytraria. Swamp forests over coquina limestone ("marl"). June-August. Var. *caroliniensis* ranges from se. SC south to c. peninsular FL, west to Panhandle FL and sw. GA. Var. *angustifolia* (Fernald) Blake is restricted to s. FL. Ward (2004d) also recognizes *E. caroliniensis* var. *vahlia* (Nees in A.P. de Candolle) D.B. Ward, in ne. and Panhandle FL, south to c. peninsular FL. [= K, Z; < *E. caroliniensis* – RAB, WH; = *E. carolinensis* var. *carolinensis* – GW, misspelling; = *Tubiflora carolinensis* J.F. Gmelin – S, misspelling; > *E. carolinensis* var. *carolinensis* – Y; > *E. carolinensis* var. *vahlia* (Nees in A.P. de Candolle) D.B. Ward – Y]



Hygrophila R. Brown

A genus of about 25 species, of tropical regions. References: Wasshausen (1998)=Y; Les & Wunderlin (1981)=Z. Key based on Y.

- 1 Leaf blades 5-12 cm long; calyx segments ca. 5 mm long, glabrous; flowers borne in axillary clusters *H. lacustris*
 1 Leaf blades 1-3.5 cm long; calyx segments ca. 2 mm long, pubescent; flowers borne in terminal and axillary spikes *H. polysperma*

Hygrophila lacustris (Schlectendahl & Chamisso) Nees, Gulf Swampweed. Shallow water of swamps and shores. Sw. GA south to c. FL Peninsula, west to e. TX; West Indies. [= GW, K, S, Y, Z; = *Hygrophila costata* Nees et al. – WH; = *Ruellia lacustris* Schlectendahl & Chamisso]

* *Hygrophila polysperma* (Roxburgh) T. Anderson, East Indian Swampweed, Hygro, Mramar-weed, East Indian Hygrophila. Lakes, rivers, canals; established in AL, FL, and SC (Hook & Nelson 2011), doubtfully established in VA, native of the East Indies. Grown for the aquarium trade, and sporadically introduced to bodies of water, apparently well-established in FL (Les & Wunderlin 1981). [= GW (footnote), K, WH, Y, Z]

Justicia Linnaeus (Water-willow)

A genus of about 600 species, herbs and shrubs of the tropics and warm temperate North America. References: Wasshausen (1998)=Y; Long (1970)=Z. Key based in part on Y.

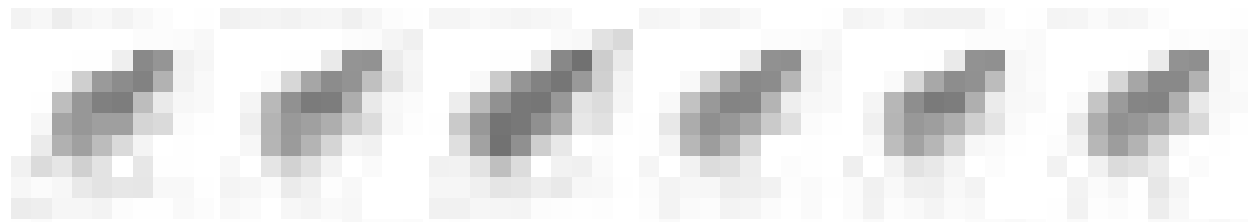
- 1 Bracts of the inflorescence foliaceous and overlapping; [alien species, cultivated and sometimes escaping in upland or bottomland situations].
 2 Bracts yellow or red; corolla white *J. brandegeana*
 2 Bracts green; corolla pink to purplish (rarely white) *J. carnea*
 1 Bracts of the inflorescence small, neither foliaceous nor overlapping; [native species, of various wetlands].
 2 Spike densely flowered; seeds verrucose; primary leaves averaging 6-8× as long as wide; [of the Piedmont, Mountains, and Coastal Plain].
 *J. americana*
 2 Spike loosely flowered; seeds smooth or minutely muricate (with very fine, sharp projections); primary leaves **either** ca. 2-6× as long as wide **or** > 8× as long as wide; [of the Coastal Plain].
 3 Corolla purple, 18-30 mm long; leaves averaging > 8× as long as wide; cystoliths parallel to the midvein of the leaf; [of s. GA south into FL].
 4 Upper leaf blades 4-7 cm long, not channeled, tough but not fleshy; calyx segments 5-7 mm long, < 1 mm wide *J. angusta*
 4 Upper leaf blades 8-13.5 cm long, channeled, fleshy; calyx segments 11-15 mm long, ca. 1 mm wide *J. crassifolia*
 3 Corolla pale lavender to white, 8-13 mm long; leaves averaging 2-6× as long as wide; cystoliths parallel to the secondary veins of the leaf; [of the Coastal Plain throughout our area].
 5 Spikes lax, the flowers usually borne singly, secund; seeds smooth; leaves averaging ca. 5× as long as wide
 *J. ovata* var. *lanceolata*
 5 Spikes somewhat congested, the flowers borne in opposite pairs; seeds minutely muricate (with very fine, sharp projections); leaves averaging ca. 3× as long as wide *J. ovata* var. *ovata*

Justicia americana (Linnaeus) Vahl, American Water-willow. River and stream beds, in shallow water, often rooted in rocky shallows. June–October. W. QC west to MI and NE, south to sw. GA, Panhandle FL, and s. TX. [= RAB, C, GW, K, Pa, W, WH, WV, Y, Z; > *J. americana* var. *americana* – F, G; > *J. americana* var. *subcoriacea* Fernald – F, G; > *J. mortuifluminis* Fernald – F; = *Dianthera americana* Linnaeus – S]

Justicia angusta (Chapman) Small, Pineland Water-willow, Narrowleaf Water-willow. Pond-cypress depressions, roadside ditches, savannas. Se. GA (Camden and Charlton counties) (Sorrrie 1998b; Carter, Baker, & Morris 2009) south to s. FL. [= K, WH, Y; < *J. ovata* – GW; < *J. crassifolia* (Chapman) Chapman ex Small – S; = *J. ovata* (Walter) Lindau var. *angusta* (Chapman) R.W. Long – Z]

* *Justicia brandegeana* Wasshausen, Shrimp-plant. Disturbed areas; native of Mexico. January–December. [= K2, WH]

* *Justicia carnea* Lindley, Brazilian Plume-flower, Flamingo-flower, Jacobinia. Planted, rarely escaping; native of South America. . [= K2] [not yet keyed]



Justicia crassifolia (Chapman) Chapman ex Small. Flatwoods, cypress ponds. S. GA to the FL Panhandle. [= GW, K, WH, Y; < *J. crassifolia* – S]

Justicia ovata (Walter) Lindau var. *lanceolata* (Chapman) R.W. Long. Swamps, marshes. May. Se. GA west to TX, north in the Mississippi Embayment to s. IL, s. IN, w. KY. Needs additional study; may warrant specific status. [= K, WH, Y, Z; < *J. ovata* – GW; = *J. lanceolata* (Chapman) Small – S]

Justicia ovata (Walter) Lindau var. *ovata*, Coastal Plain Water-willow, Loose-flower Water-willow. Swamps, marshes. May-July. S. VA south to c. peninsular FL, Panhandle FL, and se. AL. [= C, K, WH, Y, Z; < *J. ovata* – RAB, F, GW; ? *J. humilis* Michaux var. *humilis* – G; = *J. ovata* (Walter) Lindau – S]

Pseuderanthemum Radlk.

A genus of about 60 species, mostly shrubs, of tropical regions.

* *Pseuderanthemum variable* (R. Brown) Radlkofer, Night-and-Afternoon. Disturbed areas, also in potted plants and greenhouses; native of the Old World. Reported as a greenhouse weed from SC (Nelson & Kelly 1997), but not included as a regular member of the flora of SC because "it is unlikely that it could persist anywhere in South Carolina outside a greenhouse environment" (Nelson & Kelly 1997). [= K, Y; ? *P. fasciculatum* (Oersted) Leonard – WH]

Ruellia Linnaeus (Wild-petunia)

A genus of about ca. 300 species, of the tropics and temperate North America (E. Tripp, pers. comm., 2009). References: Ward (2007c)=X; Wasshausen (1998)=Y; Long (1970)=Z; Ezcurra & Daniel (2007)=Q; Fernald (1945)=V.

- 1 Principal leaves linear-lanceolate, > 10× as long as wide (8-27 cm long, 0.7-2 cm wide); [alien, cultivated and naturalized] *R. simplex*
- 1 Principal leaves elliptic, ovate or broadly lanceolate, 2-5 × as long as wide (2-16 cm long, 0.5-7 cm broad); [native].
- 2 Calyx lobes narrowly linear-lanceolate, flattened to the tip, 1-4 mm wide..... *R. strepens*
- 2 Calyx lobes linear, filiform or setaceous at least apically, < 1.2 mm wide at their widest point (usually the base), hairlike at the tip.
- 3 Corolla 6-10 cm long, opening at night and withering by mid-morning, white to pale lavender; calyx lobes 2.5-4.5 cm long; [of Coastal Plain seepage bogs and wet pine flatwoods] *R. noctiflora*
- 3 Corolla 3-7 cm long, opening during the day, lavender to lavender-blue (rarely white in *R. humilis*); calyx lobes 1-3 cm long; [of various habitats].
- 4 Flowers borne on peduncles 0.2-7 cm long, from the axils of lower and median nodes, not from the terminal node or terminal cluster; capsules glabrous (*R. pinetorum*) or puberulent (*R. purshiana*).
- 5 Stem divergently branched (rarely simple); calyx glabrous or glabrate, with many partially imbedded cystoliths; calyx lobes 0.5-1 mm wide, tapering from the base to a very slender tip; capsules glabrous; [of dry to wet pine woodlands of the Coastal Plain]..... *R. pinetorum*
- 5 Stem simple (rarely with a few ascending branches); calyx pubescent, without cystoliths; calyx lobes 0.7-1.2 mm wide, widest near the middle and tapering to the apex; capsules puberulent; [of dry woodlands, forests, and glades of the Piedmont and Mountains]..... *R. purshiana*
- 4 Flowers sessile or subsessile, in the axils of median and upper nodes, and usually also from the terminal node or cluster; capsules glabrous (or at most with a few scattered hairs).
- 6 Leaves sessile or subsessile; flower-bearing nodes usually 4-8; stem typically branched at base; stigma lobe 1 (sometimes with a vestige of a second lobe visible)..... *R. humilis*
- 6 Leaves petioled; flower-bearing nodes usually 1-3; stem typically simple below (unless damaged), sometimes branched upward; stigma lobes (1-) 2.
- 7 Plant with all leaves caulescent; leaves ovate, lanceolate, elliptic, or oblong; [widespread in our area] *R. caroliniensis*
- 7 Plant with a rosette of purplish basal leaves, flat on the ground; leaves spatulate to obovate; [restricted to dry pinelands in the Coastal Plain] *R. ciliosa* var. *ciliosa*

Ruellia caroliniensis (J.F. Gmelin) Steudel, Carolina Wild-petunia, Common Wild-petunia. Dry to moist forests and woodlands. (May-) June-September. NJ, s. OH, s. IN, s. IL, and OK, south to s. FL and e. TX. [= RAB, C, G, Pa, WH, X; > *R. caroliniensis* var. *caroliniensis* – F; > *R. caroliniensis* var. *typica* – V; > *R. caroliniensis* var. *cheloniformis* Fernald – F, V; > *R. caroliniensis* var. *dentata* (Nees) Fernald – F, V, WV; > *R. caroliniensis* var. *membranacea* Fernald – F, V, WV; > *R. caroliniensis* var. *nanella* Fernald – F, V; > *R. caroliniensis* var. *salicina* Fernald – F, V; > *R. caroliniensis* var. *semicalva* Fernald – F, V; = *R. caroliniensis* ssp. *caroliniensis* var. *caroliniensis* – K, Y, Z; ? *R. parviflora* (Nees) Britton – S; < *R. caroliniensis* – W (also see *R. ciliosa*)]

* *Ruellia ciliatiflora* Hooker, Hairyflower Wild-petunia. Disturbed areas; native of South America. [= K2, WH] {not yet keyed; add to synonymy}

Ruellia ciliosa Pursh var. *ciliosa*, Sandhills Wild-petunia. Sandhills, particularly in loamy, submesic swales. May-September. Sc. NC south to c. peninsular FL, west to se. LA. Although treated as only subspecifically distinct from *R. caroliniensis* by many recent authors, there seem ample differences in morphology, distribution, and habitat to warrant specific distinction. Var. *cinerascens* Fernald of the FL Panhandle needs additional assessment. [< *R. ciliosa* – RAB, S, WH, X; = *R.*

caroliniensis (J.F. Gmelin) Steudel ssp. *ciliosa* (Pursh) R.W. Long var. *cinerascens* (Fernald) Kartesz & Gandhi – K; = *R. caroliniensis* ssp. *ciliosa* var. *ciliosa* – Y, Z; < *R. caroliniensis* – W; > *R. ciliosa* var. *cinerascens* Fernald – V; > *R. ciliosa* var. *typica* – V]

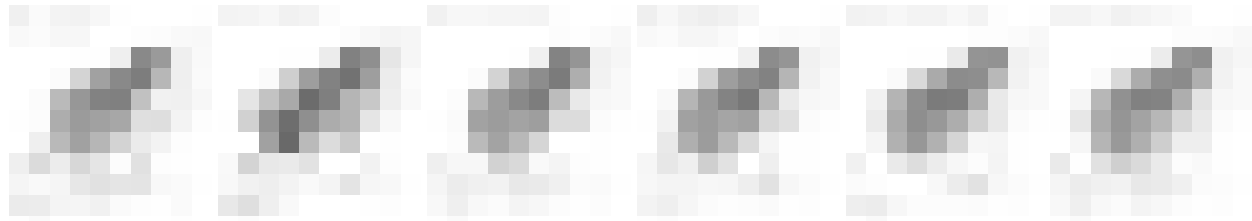
Ruellia humilis Nuttall, Low Wild-petunia, Hairy Wild-petunia. Calcareous or mafic glades and woodlands. May-September. S. PA west to se. MN and e. NE, south to c. NC, c. AL, s. MS, s. LA, and c. and s. TX. Piedmont plants of NC are uniformly white-flowered. [= RAB, K, Pa, W, WV, Y, Z; > *R. humilis* var. *calvescens* Fernald – C, F, G, V; > *R. humilis* var. *frondosa* Fernald – F, G, V; > *R. humilis* var. *humilis* – C, F, G; > *R. humilis* var. *typica* – V; > *R. humilis* var. *longiflora* A. Gray – V; > *R. humilis* var. *frondosa* Fernald – V; > *R. humilis* var. *expansa* Fernald – F]

Ruellia noctiflora (Nees) A. Gray, Night-flowering Wild-petunia. Wet pinelands and savannas. (May-) June-July (-August). E. GA (in counties immediately adjacent to SC) south to ne. FL; Panhandle FL west to se. LA. [= GW, K, S, WH, X, Y, Z]

Ruellia nudiflora (Engelmann & Gray) Urban var. *nudiflora*. {habitats}. {overall distribution East to LA, MS, and AL. [= K2]

Ruellia pedunculata Torrey ex A. Gray, Stalked Wild-petunia. Dry woodlands and forests. IL and MO south to w. LA and e. TX, apparently not in our area. [= F; < *R. pedunculata* – C, G; = *R. pedunculata* ssp. *pedunculata* – K, Y, Z] {not yet keyed}

Ruellia pinetorum Fernald, Pineland Wild-petunia. Dry to wet pinelands. May-September. SC south to Panhandle FL, west to e. TX. Although treated as only subspecifically distinct from *R. pedunculata* by many recent authors, there seem ample differences in morphology, distribution, and habitat to warrant specific distinction. First reported for GA by Sorrie (1998b). [= RAB, F, X; = *R. pedunculata* Torrey ex A. Gray ssp. *pinetorum* (Fernald) R.W. Long – K, WH, Y, Z]



Ruellia purshiana Fernald, Pursh's Wild-petunia. Dry woodlands and forests, especially over mafic or calcareous rocks. May-(June). MD south to c. GA and c. AL, in and adjacent to the Appalachians. [= RAB, F, K, W, WV, Y, Z; < *R. pedunculata* Torrey ex A. Gray – C, G]

* ***Ruellia simplex*** C. Wright in Sauvalle, Mexican Bluebell. Commonly cultivated, especially in maritime situations along the south Atlantic and Gulf coasts, disturbed areas; native of e. Mexico. May-September. [= Q; = *R. brittoniana* Leonard – RAB, GW, X, Z = *R. coerulea* Morong – Y; = *R. tweediana* Grisebach – WH; = *R. caerulea* – K, orthographic variant; = *R. malacosperma* Greenman – S]

Ruellia strepens Linnaeus, Limestone Wild-petunia. Calcareous forests. May-July. NJ west to OH and IA, south to se. and sc. NC, e. SC, AL, and TX. [= RAB, C, F, G, K, Pa, S, W, WV, Y, Z]

Stenandrium Nees

A genus of about 25 species, of tropical to warm temperate New World. References: Wasshausen (1998)=Y; Long (1970)=Z.

Stenandrium dulce (Cavanilles) Nees var. *dulce*, Sweet Shaggytuft. Pine savannas. GA to FL. Var. *dulce* ranges from GA south to FL; var. *floridanum* A. Gray is restricted to s. peninsular FL. [= K, Y; < *Gerardia floridana* (A. Gray) Small – S; < *S. dulce* – WH; < *S. dulce* var. *floridanum* A. Gray – Z]

Thunbergia Retzius (Clock-vine)

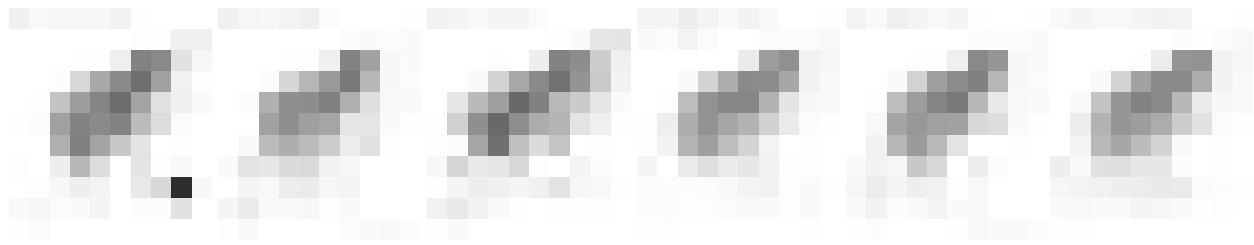
A genus of 100-200 species, of the Old World tropics. References: Wasshausen (1998)=Y; Long (1970)=Z.

* ***Thunbergia alata*** Bojer ex Sims, Black-eyed-Susan Vine. Disturbed areas; native of Africa. [= K, S, WH, Y, Z]

Yeatesia Small (Bractspike)

A genus of 3-4 species, of warm temperate to tropical areas, se. United States to ne. Mexico. References: Wasshausen (1998)=Y; Long (1970)=Z.

Yeatesia viridiflora (Nees) Small, Yellow bract-spike. Rich bottomlands. Sw. GA (Jones & Coile 1988) and Panhandle FL west to TX (Kartesz 1999). See Sorrie & LeBlond (2008) for additional distributional information. [= K, S, WH, Y; = *Dicliptera viridiflora* (Nees) R.W. Long – Z; *Dicliptera halei* Riddell]



379. *BIGNONIACEAE* A.L. de Jussieu 1789 (Bignonia Family) [in LAMIALES]

A family of about 110 genera and 800 species, trees, shrubs, and lianas, mainly tropical and especially of South America. The monophyly of the Bignoniaceae (excluding *Paulownia*) was confirmed by Spangler & Olmstead (1999). References: Manning (2000)=Z; Spangler & Olmstead (1999); Fischer, Theisen, & Lohmann in Kubitzki (2004).

- 1 Leaves simple, cordate; plant a tree; corolla white (marked internally with other colors); [tribe *Tecomeae*].....**1. *Catalpa***
- 1 Leaves compound; plant a vine; corolla reddish or yellowish.
 - 2 Leaves 7-15-foliolate, with a leaflet in the terminal position; [tribe *Tecomeae*].....**2. *Campsis***
 - 2 Leaves 2-foliolate, with a 3-branched tendril in the terminal position; [tribe *Bignonieae*].
 - 3 Tendrils not hooked, claw-like.....**3. *Bignonia***
 - 3 Tendrils hooked, claw-like.....**4. *Macfadyena***

1. *Catalpa* Scopoli 1777 (Catalpa)

A genus of about 10 species, trees, of e. North America (2 species), e. Asia (4 species), and the West Indies (4 species). References: Manning (2000)=Z; Paclt (1952)=Y; Li (2008); Fischer, Theisen, & Lohmann in Kubitzki (2004).

- 1 Flowers creamy yellow, striped inside with deeper yellow and spotted with dark violet; leaves usually lobed; seeds elliptical, 2.5-3 mm long, 8-10 mm wide.....***C. ovata***
- 1 Flowers white or pale rose, striped inside with yellow and spotted with purple; leaves rarely lobed; seeds elongate, 4-10 mm long, 20-35 mm wide.
 - 2 Corolla 2-4 cm wide, the lower corolla lobe densely spotted with purple, entire; pod 6-10 mm thick, each valve 9-15 mm wide when flattened; seeds with 2 elongated wings, each wing narrowing to an acutish end, the hairs at the end appressed to one another in 2 planes, thus forming a pointed tail; fresh foliage with a fetid odor; leaves abruptly acuminate.....***C. bignonioides***
 - 2 Corolla 4-6 cm wide, the lower corolla lobe sparsely spotted with purple, notched; pod 10-15 mm thick, each valve 13-18 mm wide when flattened; seeds with 2 elongated wings, each wing narrowing only slightly to a rounded or oblique end, the hairs at the end appressed to one another only in one plane, thus forming a flattish fringe; fresh foliage essentially odorless; leaves long-acuminate.....***C. speciosa***

Catalpa bignonioides Walter, Southern Catalpa. Bottomlands and streambanks (as a native), escaped or persistent after cultivation. May-early July; October. S. GA, ne. FL, n. peninsular FL, and Panhandle FL west to s. MS (or LA?), on the Coastal Plain, early naturalized in a more widespread area, and now extending north to CT and MI. [= RAB, C, F, G, GW, K, Pa, W, WH, Z; = *C. catalpa* (Linnaeus) Karsten – S]

* ***Catalpa ovata*** G. Don, Chinese Catalpa. Suburban woodlands; native of China. Introduced in WV, MD, DC, PA, and other northeastern states (Manning 2000; Kartesz 1999), and showing signs of becoming invasive. [= C, F, G, K, Z; > *C. ovata* var. *ovata* – Y; > *C. ovata* var. *flavescens* Bean – Y]

Catalpa speciosa (Warder) Warder ex Engelmann, Northern Catalpa. Bottomlands and river banks (as a native), also escaped or persistent after cultivation, and sometimes thoroughly naturalized. May-July; July-August. Native in the upper Mississippi River Embayment of s. IN and s. IL, south to w. TN and e. AR; early naturalized in a more widespread area. [= RAB, C, F, G, K, Pa, S, W, Z]

2. *Campsis* Loureiro 1790 (Trumpet-creeper)

The only other species in the genus is the e. Asian *C. grandiflora* (Thunberg) K. Schumann. Wen & Jansen (1995) estimated the age since divergence to be 24.4 million years, based on molecular divergence. References: Manning (2000)=Z; Wen & Jansen (1995); Fischer, Theisen, & Lohmann in Kubitzki (2004).

Campsis radicans (Linnaeus) Seemann ex Bureau, Trumpet-creeper. Bottomland forests, swamp forests, fencerows, old fields, forests, thickets, disturbed areas. June-July; September-October. NJ west to IA, south to s. FL and c. TX. In the pre-Columbian landscape this plant was primarily limited to swamps and bottomlands; it has done well as a weedy colonizer of abandoned farmland, fencerows, and thickets (where particularly conspicuous on fenceposts and old tobacco barns). In swamps of the Coastal Plain it is a common liana, often with its foliage in the canopy 30-40 m above the ground, and with stems to 15 cm in diameter. Even when the foliage cannot be seen, *Campsis* is immediately recognizable by its shreddy tan or yellow bark (unlike any of our other high-climbing vines). [= RAB, C, F, G, GW, K, Pa, W, WH, Z; = *Bignonia radicans* Linnaeus – S]

3. *Bignonia* Linnaeus 1753 (Cross-vine)

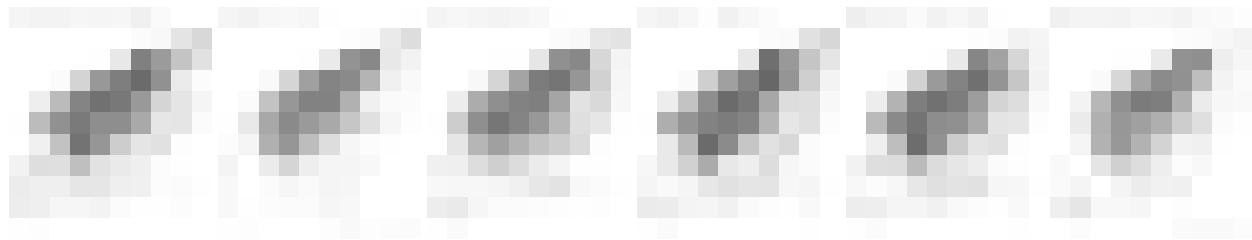
A monotypic genus, a woody vine, of Southeastern North America. References: Manning (2000)=Z; Fischer, Theisen, & Lohmann in Kubitzki (2004).

***Bignonia capreolata* Linnaeus, Cross-vine.** Swamp forests, bottomlands, forests, woodlands. April-May; July-August. MD west to s. OH and s. MO, south to c. peninsular FL and e. TX. This species is absent from most of the Mountains in our area (also scarce in the Piedmont of Virginia and upper Piedmont of NC), reappearing at lower elevations on the west side of the Blue Ridge. Though primarily a species of swamp and bottomland forests, *Bignonia* often occurs as well in mesic or even dry forests, where it generally remains stunted (most individuals with only a few leaves) and does not flower or fruit. [= C, F, GW, K, W, WH, Z; = *Anisostichus capreolata* (Linnaeus) Bureau – RAB, G; = *Anisostichus crucigera* (Linnaeus) Bureau – S]

4. *Macfadyena* Alphonse de Candolle 1845 (Claw-vine)

A genus of 3-4 species, woody vines, of Mexico and the West Indies south through Central America to northern South America. References: Manning (2000)=Z; Fischer, Theisen, & Lohmann in Kubitzki (2004).

* ***Macfadyena unguis-cati* (Linnaeus) A.H. Gentry, Claw-vine, Cat's-claw-vine.** Cultivated and naturalized; native of tropical America. This vine is introduced and naturalized in s. and e. GA (Jones & Coile 1988) and is locally commonly naturalized in Charleston. [= K, WH, Z; = *Bignonia unguis-cati* Linnaeus]



382. VERBENACEAE J. St.-Hilaire 1805 (Verbena Family) [in LAMIALES]

As recently reworked, a family of about 34-41 genera and 950-1200 species, trees, shrubs, vines, and herbs, widespread in tropical, subtropical, and warm temperate regions of the Old World and New World. Tribal classification follows Marx et al. (2010). References: Marx et al. (2010); Atkins in Kadereit (2004). [also see *LAMIACEAE* and *PHRYMACEAE*]

- 1 Shrubs; fruits fleshy; [tribe *Lantaneae*] *Lantana*
- 1 Herbs; fruits dry.
 - 2 Mericarps 2; corolla 4-lobed, evidently zygomorphic (bilabiate); [tribe *Lantaneae*]..... *Phyla*
 - 2 Mericarps 4; corolla 5-lobed, actinomorphic or only weakly irregular; [tribe *Verbeneae*].
 - 3 Styles > 6 mm long; calyx 8-10 mm long, longer than the fruit; corolla salverform *Glandularia*
 - 3 Styles < 3 mm long; calyx 2-4 mm long, often shorter than the fruit; corolla funnellform *Verbena*

***Aloysia* Palau 1784 (Bee-brush)**

A genus of about 30 species, shrubs, of tropical and subtropical America. References: Atkins in Kadereit (2004).

* ***Aloysia triphylla* (L'Héritier) Britton, Lemon Bee-brush.** Allegedly introduced in Iredell County, in the Piedmont of NC (Moldenke 1980); the documentation is unknown and the record rejected. [= K] {not keyed; not mapped; rejected as a component of our flora}

***Glandularia* J.F. Gmelin 1796 (Vervain)**

A genus of about 100 species, herbs, of s. North America, Central America, and South America. References: Unger (1979)=Z; Atkins in Kadereit (2004).

- 1 Leaves finely dissected, the divisions 1 mm or less wide, the margins strongly revolute.
 - 2 Bracts as long as or longer than the calyx; leaf segments 1-4 mm wide *G. bipinnatifida* var. *bipinnatifida*
 - 2 Bracts much shorter than the calyx; leaf segments 0.5-1.5 mm wide *G. pulchella*
- 1 Leaves coarsely dissected or lobed, the divisions > 1 mm wide, the margins slightly or not at all revolute.
 - 3 Calyx lobes > 3 mm long *G. canadensis*
 - 3 Calyx lobes < 3 mm long *G. ×hybrida*

Glandularia bipinnatifida (Nuttall) Nuttall var. ***bipinnatifida***, Dakota Vervain. Dry prairies on clay soils. KY, MO, SD, and CO south to c. GA, AL, AZ and s. Mexico; elsewhere in e. North America as waifs. [= K; = *Verbena bipinnatifida* Nuttall – C] {synonymy incomplete}

Glandularia canadensis (Linnaeus) Nuttall, Rose Vervain, Rose Verbena, Creeping Vervain. Roadsides, sandhills, other dry (especially sandy) soils. March-May. PA, IL, and CO, south to FL and TX, and introduced elsewhere. [= K, S, Z; = *Verbena canadensis* Linnaeus – RAB, C, F, G, Pa]

* ***Glandularia ×hybrida*** (Grönland & Rümpler) G.L. Nesom & Pruski, Garden Vervain. Cultivated in gardens, uncommonly cultivated, rarely escaped or persistent; of garden origin. March-July. Nesom & Pruski (1992) have provided the transfer to *Glandularia* of this common garden plant. [= *Verbena ×hybrida* Grönland & Rümpler – RAB, G, K; = *Verbena hybrida* – C]

* ***Glandularia pulchella*** (Sweet) Troncoso, Moss Vervain, South American Vervain. Pastures, roadsides, other disturbed areas; native of South America. March-November. [= K, Z; = *Verbena tenuisecta* Briquet – RAB, C; = *G. tenuisecta* (Briquet) Small – S]

Glandularia specios I, Cumberland River Vervain. Endemic to limestone bluffs and talus slopes in Smith, DeKalb, Clay, and Jackson counties, TN, and adjacent KY (D. Estes, pers. comm., 2012). {not yet keyed}



Lantana Linnaeus 1753 (Lantana)

A genus of about 150 species, shrubs and subshrubs, of tropical and subtropical America and Africa. References: Sanders (1987)=Z; Sanders (2006)=Y; Atkins in Kadereit (2004).

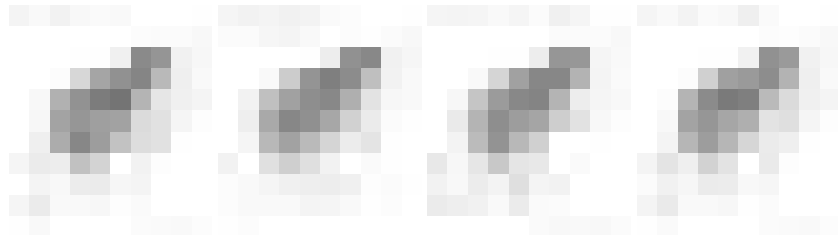
- 1 Heads with an involucre; flowers pink or purple ***L. montevidensis***
- 1 Heads with bracts, but not an involucre; flowers orange, yellow, or multicolored.
 - 2 Stems lacking prickles..... ***L. depressa* var. *floridana***
 - 2 Stems with scattered retrorse prickles.
 - 3 Calyx lobes acute, as long as or longer than the calyx tube..... ***L. camara***
 - 3 Calyx lobes obtuse, shorter than the calyx tube ***L. urticoides***

* ***Lantana camara*** Linnaeus, Common Lantana, Hedgeflower. Disturbed areas, especially near the coast; native of the West Indies. [= RAB, K, S, Z]

Lantana depressa Small var. ***floridana*** (Moldenke) R. Sanders, Florida Lantana. Edges of brackish marshes, dunes; the SC occurrence apparently introduced from FL. Native from ne. FL south to se. FL. [= K, Z; < *L. ovatifolia* Britton – RAB, S, misapplied; < *L. depressa* Small – S]

* ***Lantana montevidensis*** (Sprengel) Briquet, Trailing Shrub-verbena, Polecat-geranium. Disturbed areas; native of South America. Scattered locations in s. and e. GA (Jones & Coile 1988). [= K; = *L. sellowiana* Link & Otto – S]

* ***Lantana urticoides*** Hayek, West Indian Lantana. Disturbed and brackish areas; native of West Indies. May-December. [= K; < *L. horrida* Kunth – RAB, misapplied]



Phyla Loureiro 1790 (Frogfruit)

A genus of about 11-15 species, herbs, of tropical, subtropical, and warm temperate regions of the Old and New Worlds. References: Atkins in Kadereit (2004).

- 1 Leaves 2-6 cm long, lanceolate, widest at or below the middle, acute at the tip; leaf teeth (5-) 7-11 per leaf side..... ***P. lanceolata***
- 1 Leaves 1-4 cm long, obovate, widest above the middle, obtuse to rounded at the tip; leaf teeth (0-) 1-5 (-7) per leaf side.
 - 2 Teeth (0-) 1-4 per leaf side; corolla tube 4-5 mm long; [LA and westward]..... ***P. cuneifolia***
 - 2 Teeth (3-) 5 (-7) per leaf side; corolla tube 1.5-2.5 mm long; [widespread in our area] ***P. nodiflora***

Phyla cuneifolia (Torrey) Greene, Wedgeleaf Frogfruit. Moist open areas. MO, SD, WY, and UT south to LA, TX, NM, AZ, s. CA, and n. Mexico. [= K2]

Phyla lanceolata (Michaux) Greene, Marsh Frogfruit, Northern Frogfruit. Brackish marshes, other marshes, ditches. June-November. ON west to SD, south to Panhandle FL, AL, MS, LA, CA, and n. Mexico; primarily in the outer Coastal Plain in the Carolinas, but extending inland in VA. [= C, G, GW, K1, K2, Pa, S, W, WH; = *Lippia lanceolata* Michaux – RAB, WV; > *L. lanceolata* var. *lanceolata* – F; > *Lippia lanceolata* var. *recognita* Fernald & Griscom – F]

Phyla nodiflora (Linnaeus) Greene, Creeping Frogfruit, Capeweed, Turkey-tangle, Matgrass. Sandy soils of roadsides, lawns, ditches, disturbed areas. May-November. Pantropical, in North America from se. VA south to s. FL and west to CA, north in the interior to AR, se. MO, and southward into the tropics. This species is very weedy, and is a familiar component of road margins and lawns in the southeastern Coastal Plain. [= C, G, GW, K1, K2, S, WH; = *Lippia nodiflora* (Linnaeus) Michaux – RAB, F]



Verbena Linnaeus 1753 (Verbena, Vervain)

A genus of about 70 species, herbs, of tropical, subtropical, and warm temperate regions of the New World and (rarely) Old World. Infrageneric taxonomy follows Nesom (2010b). References: Nesom (2010b)=X; Nesom (2010c)=V; Nesom (2010d)=U; Barber (1982)=Z; O’Leary, Múlgara, & Morrone (2007)=Y; Atkins in Kadereit (2004). Key based in part on V. [also see *Glandularia* and *Stylodon*]

- 1 Spikes short and stout, the flowers or fruits overlapping and completely obscuring all of the rachis (except in *V. montevidensis*, the fruits spaced toward the base of the spike).
 - 2 Plant procumbent or decumbent; leaves pinnately lobed or dissected; [section *Verbena*, series *Bracteatae*] *V. bracteata*
 - 2 Plant erect; leaves coarsely serrate.
 - 3 Leaves basally attenuate to short-petiolate.
 - 4 Central spikes sessile to subsessile, spikes compact, 3-5 mm wide, fruits remaining densely overlapping at maturity; [section *Verbenaca*, series *Pachystachyae*] *V. brasiliensis*
 - 4 Central spikes pedunculate, spikes loose, 2-3 mm wide, with fruits becoming remote at least in the proximal portion at maturity’ section *Verbenaca*, series *Litorales*].....[*V. montevidensis*]
 - 3 Leaves basally clasping to subclasping; [section *Verbenaca*, series *Pachystachyae*].
 - 5 Corolla tube > 10 mm long..... *V. rigida*
 - 5 Corolla tube 2.5-6 (-7) mm long.
 - 6 Corolla tube 4-6 (-7) mm, 1.5-2 mm longer than the calyx; distal stems, peduncles, and calyces stipitate-glandular; spikes 8-30 mm in fruit; floral bracts 2.1-2.8 mm; nutlets 1.5-1.9 mm; basal and midstem leaves oblong-lanceolate to oblong-oblancheolate *V. bonariensis*
 - 6 Corolla tube 2.5-4 mm, 0-0.5 mm longer than the calyx; stems, peduncles, and calyces eglandular; spikes 6-55 mm in fruit; floral bracts 3-4 mm; nutlets 1-1.2 (-1.4) mm; basal and midstem leaves ovate to ovate-lanceolate, oblong-elliptic, or obovate..... *V. incompta*
- 1 Spikes elongate, the flowers or fruits well-spaced and not obscuring the rachis.
 - 7 Leaves mostly lobed or dissected.
 - 8 Plants much branched at base, stems decumbent to ascending; leaves 1-5 cm long; [section *Verbena*, series *Tricesimae*] [*V. canescens*]
 - 8 Plants little branched, stems erect; leaves 3-12 cm long.
 - 9 Bractlets about as long as the calyx; [AL westward]; [section *Verbena*, series *Candelabrae*].....[*V. xutha*]
 - 9 Bractlets about ½ as long as the calyx; [collectively widespread].
 - 10 Basal and lower cauline leaves persistent, relatively thick, large and spatulate, margins revolute, cauline leaves quickly reduced in size distally and becoming linear-entire; rachis and calyces eglandular; [section *Verbena*, series *Haleae*].....*V. halei*
 - 10 Basal leaves usually deciduous, relatively thin, margins not revolute, cauline leaves relatively even-sized upward or largest near midstem; rachis and calyces stipitate-glandular, sometimes sparsely so; [section *Verbena*, series *Verbena*] *V. officinalis*
 - 7 Leaves not lobed or dissected, or some of the leaves lower on the stem 3-lobed.
 - 11 Stem leaves sessile or subsessile, cuneate to base.
 - 12 Leaves linear to narrowly oblanceolate, < 1.5 cm wide, > 6× as long as wide; [section *Verbena*, series *Simplices*] *V. simplex*
 - 12 Leaves ovate, 2-4 cm wide, < 4× as long as wide
 - 13 Mericarps tightly adhering in fruit, appearing as one; calyx lobes curved inward in fruit; corolla pink to pinkish lavender; [section *Verbena*, series *Connaticarpae*].....*V. carnea*
 - 13 Mericarps separate in fruit; calyx lobes erect to divergent in fruit; corolla blue to violet; [section *Verbena*, series *Candelabrae*] *V. stricta*
 - 11 Stem leaves with well-developed petioles.
 - 14 Flowers and fruits distinctly overlapping in the upper part of the spikes; [section *Verbena*, series *Candelabrae*].....*V. hastata*
 - 14 Flowers and fruits well-spaced throughout the inflorescence; [section *Verbena*, series *Leptostachyae*].

- 15 Upper leaf surfaces densely scabrous or hispidulous to hispid or hispid-hirsute; calyx lobes triangular, connivent; corollas mostly pinkish to bluish, lavender, or purple; nutlet outer surfaces deeply ridged and grooved, often with prominent cross-ridges, commissural faces consistently densely silver-white minutely papillate-bullate; fibrous-rooted *V. scabra*
- 15 Upper leaf surfaces hirsutulous to hirsute or strigose-hirsute; calyx lobes deltate-subulate, not connivent or subconnivent; corollas white, rarely pinkish; nutlet outer surfaces smooth to longitudinally ridged, sometimes with cross-ridges distally, commissural faces smooth or rarely with slight development of minutely bullate ornamentation; taprooted.....*V. urticifolia*

* *Verbena bonariensis* Linnaeus. Roadsides, disturbed areas, old fields; native of South America. May-October. [= V, X; < *V. bonariensis* – RAB, C, G, GW, Pa, S, WH (also see *V. incompta*) ; = *V. bonariensis* var. *conglomerata* Briquet – K1, K2]

* *Verbena bracteata* Lagasca & Rodriguez, Prostrate Vervain, Big-bracted Vervain. Disturbed areas, waste areas near wool-combing mills. June-October. The original distribution uncertain, now distributed from ME west to BC, south to FL and Mexico, but apparently native of mw. and w. North America. [= RAB, C, F, G, K1, K2, Pa, WH, WV, X, Z; = *V. bracteosa* Michaux – S]

* *Verbena brasiliensis* da Conceição Vellozo, Brazilian Vervain. Roadsides, disturbed areas, old fields; native of South America. May-October. [= RAB, C, F, G, GW, K1, S, WH, V, X; = *V. litoralis* Kunth var. *brevibracteata* (Kuntze) N. O’Leary – K2, Y]

* *Verbena canescens* Kunth, Gray Vervain. Disturbed areas; rare, native of TX. Reported for s. AL. [= K1, K2, X]

Verbena carnea Medikus, Carolina-vervain. Sandy woodlands, sandhills. April-July. E. NC (se. VA?) south to c. peninsular FL, west to e. TX. Sometimes placed in a monotypic genus, *Stylodon* Rafinesque, but apparently evolved from within *Verbena*. See discussion in Nesom (2010b, 2010e). [= RAB, F; = *Stylodon carneus* (Medikus) Moldenke – K; = *Stylodon carolinensis* (Walter) Small – S; = *Stylodon carneum* – WH, orthographic variant; = *Verbena caroliniana* Michaux]



Verbena halei Small, Texas Vervain. Dry hammocks, roadsides, pastures. April-June. C. GA south to c. peninsular FL, TX, AZ, and Mexico; scattered as an introduction farther north, as in NC and SC. [= RAB, K, S, X; = *V. officinalis* ssp. *halei* (Small) S.C. Barber – WH, Z]

Verbena hastata Linnaeus, Common Vervain, Blue Vervain, Simpler’s-joy. Marshes, bogs, low fields. June-October. NS west to BC, south to NC, n. AL, AR, OK, n. TX, NM, AZ, CA; scattered occurrences farther south appear to be introductions. The hybrid with *V. urticifolia*, *Verbena* × *engelmannii* Moldenke, is known from our area. [= RAB, C, F, G, GW, Pa, S, W, WV, X, Z; > *V. hastata* var. *hastata* – K; > *V. hastata* var. *scabra* Moldenke – K]

* *Verbena incompta* P.W. Michael. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC): roadsides, disturbed areas, old fields; common, native of South America. May-October. [= V, X; < *V. bonariensis* Linnaeus – RAB, C, F, G, GW, K, S, WH; = *V. litoralis* Kunth var. *brevibracteata* (Kuntze) N. O’Leary – Y = *V. bonariensis* var. *bonariensis* – K, Y]

* *Verbena montevidensis* Sprengel. Disturbed areas; native of South America. June-July (-September). [= K, V, X]

* *Verbena officinalis* Linnaeus, European Vervain, Juno’s Tears, Herb-of-the-cross. Disturbed areas; native of Europe. June-October. The enigmatic *V. riparia* is represented by a few collections, and the taxonomic status of the taxon is unclear; it probably represents an unusual form of *V. officinalis*. [= X; > *V. officinalis* – RAB, C, F, G, Pa, S; > *V. riparia* Rafinesque ex Small & Heller – RAB, C, F, G, K, S, W; > *V. officinalis* var. *officinalis* – K, WH; > *V. officinalis* var. *prostrata* Grenier & Godron – K; = *V. officinalis* ssp. *officinalis* – Z]



* *Verbena rigida* Sprengel. Roadsides, disturbed areas; native of South America. Late March-July. [= K, S, WH, X, Y]

Verbena scabra Vahl, Rough Vervain, Harsh Vervain. Brackish marshes, shell deposits, other wet habitats. May-October. VA and WV south to s. FL, west to TX and CA, south into tropical America; mainly coastal in our area but with scattered inland records (probably adventive). [= RAB, C, F, G, GW, K, S, U, WH, WV, X]

Verbena simplex Lehmann, Narrowleaf Vervain. Glades, woodlands, forests, and roadsides, over mafic or igneous rocks. May-September. NH west to MN and NE, south to Panhandle FL (Jackson County) and TX. [= RAB, C, F, G, K, Pa, W, WH, X, Z; ? *V. angustifolia* Michaux – S]

* *Verbena stricta* Ventenat, Hoary Vervain. Pastures and roadsides; native of c. United States. June-September. Perhaps native as far east as prairie-like sites in TN, AL, and (?) GA. [= RAB, C, F, G, K, Pa, S, W, WV, X, Z]

Verbena urticifolia Linnaeus, White Vervain, Velvetleaf Vervain. {habitats}. May-November. NB west to SK, south to Panhandle FL and TX. Two varieties have been distinguished by many authors (see synonymy), but the characters used are poorly correlated and the distributional ranges largely overlapping. The hybrid with *V. hastata*, *Verbena* × *engelmannii* Moldenke, is known from our area. [= RAB, GW, W, X, U, Z; > *V. urticifolia* var. *leiocarpa* Perry & Fernald – C, F, G, K, Pa, WV; > *V. urticifolia* var. *urticifolia* – C, F, G, K, Pa, WV; = *V. urticaefolia* – S, orthographic variant]
Verbena xutha Lehmann, Gulf Vervain. {habitat}. AL west to TX. [= K, S, X]



384. MARTYNIACEAE Stapf 1895 (Martynia Family) [in LAMIALES]

A family of 5 genera and about 16 species, herbs, tropical and subtropical. Bretting & Nilsson (1988) present evidence for maintaining the Martyniaceae as distinct from the Pedaliaceae. References: Ihlenfeldt in Kadereit (2004).

Proboscidea Schmidel 1763 (Unicorn-plant)

A genus of about 9 species, herbs, of warm temperate to subtropical America. References: Thieret (1977)=Y; Bretting & Nilsson (1988)=Z; Ihlenfeldt in Kadereit (2004).

* ***Proboscidea louisianica*** (Miller) Thellung, Unicorn-plant, Devil's-claw, Cow Catcher. Disturbed areas; native of the Great Plains. June-September. The curious fruits are unmistakable. [= RAB, F, GW, Pa, WV, Y; = *P. louisiana* – C, G, orthographic variant; = *Martynia louisiana* Miller – S; > *P. louisianica* ssp. *louisianica* – K, Z]

389. AQUIFOLIACEAE Bartling 1830 (Holly Family) [in AQUIFOLIALES]

A monogeneric family of about 500 species, nearly cosmopolitan.

Ilex Linnaeus 1753 (Holly, Winterberry, Gallberry)

A genus of 400-500 species, mostly trees and shrubs, cosmopolitan and widespread in tropical and temperate areas, especially Asia and America. The genus *Nemopanthis* is clearly best subsumed into *Ilex*. References: Godfrey (1988)=Y; Krakow (1989)=Z; Powell et al. (2000)=X; Wunderlin & Poppleton (1977).

Identification notes: Some of our species can be superficially similar to various shrubs and trees of the Rosaceae, in their alternate toothed leaves borne on spur shoots.

- 1 Leaves coriaceous, evergreen.
- 2 Leaves with a well-developed apical spine (and usually also marginal spines) 2-6 mm long.
- 3 Flowers in axillary clusters, on growth of the previous year; [alien shrub, rarely naturalized, especially in suburban areas] ***I. cornuta***
- 3 Flowers in 1-few-flowered axillary cymes, on growth of the same year; [native trees of a wide variety of habitats].
 - 4 Leaves dark green above, 1.5-5.0 cm long, 1.0-2.5 cm wide; fruits orange; [of FL]..... ***I. opaca* var. *arenicola***
 - 4 Leaves somewhat yellowish green above, 3-12 cm long, 2.0-5.5 cm wide; fruits red (rarely yellow); [widespread in our area]..... ***I. opaca* var. *opaca***
- 2 Leaves with margins either entire, crenate, serrate, or with marginal spinose prickles < 1 mm long (the apex sometimes mucronate, but not stiff and spinose).
- 5 Leaves crenate from base to apex, 0.5-4.5 cm long; calyx and corolla 4-lobed.
 - 6 Fruits black; leaf undersurface with punctate glands; leaf apex obtuse to broadly acute, tipped with a small but obvious sharp tooth (best seen with 10× handlens); [alien shrub, rarely naturalized, especially in suburban areas] ***I. crenata***
 - 6 Fruits red or yellow; leaf undersurface lacking punctate glands; leaf apex notched (retuse), with a very small mucro in the notch (best seen with 10× handlens); [native shrub of the Coastal Plain, sometimes planted and naturalized elsewhere] ***I. vomitoria***
- 5 Leaves entire, crenate (if so, only beyond the midpoint), serrate, or with marginal spinose prickles, 2-10 cm long; calyx and corolla 4-lobed or 5-9-lobed; fruits red, yellow, or black.
- 7 Fruits black; calyx and corolla 5-9-lobed; leaves crenate near the tip or with a few marginal spinose prickles, or entire, with dark punctate dots beneath.
 - 8 Leaves 1.5-3× as long as wide, with a few, irregularly spaced, marginal spinose prickles (or commonly entire), generally about 2-3 cm wide..... ***I. coriacea***
 - 8 Leaves 3-4× as long as wide, crenate in the apical 1/2 to 1/3 (or rarely entire), generally about 1 cm wide (almost never > 2 cm wide)..... ***I. glabra***

- 7 Fruits red or yellow; calyx and corolla 4-lobed; leaves entire (or with spinose serrations), lacking dark punctate dots beneath.
- 9 Leaves oblanceolate, oblong, or elliptic, 3-12 cm long, (8-) 15-40 mm wide, 2-4× as long as wide; petioles (3-) 5-15 mm long; leaf apex acute, obtuse, or rounded; branchlets strongly ascending, most of them forming an angle of < 45 degrees to the branch *I. cassine*
- 9 Leaves lanceolate to narrowly oblong, 2-4 cm long, 3-8 mm wide, 3-7× as long as wide; petioles 1-3 (-5) mm long; leaf apex acute to acuminate; branchlets ascending to spreading, most of them forming angles greater than 45 degrees to the branch, and often at right angles *I. myrtifolia*
- 1 Leaves membranous, deciduous.
- 10 Leaves entire, or nearly so; [of moist to wet sites, from WV northward] *I. mucronata*
- 10 Leaves toothed; [collectively widespread in our area].
- 11 Leaves oblanceolate or obovate, broadest above the middle, 8-30 (-45) mm wide, narrowly cuneate basally, mostly 2-3× as long as wide.
- 12 Pedicels of fruits and pistillate flowers 2-6 mm long; pedicels of staminate flowers (2-) 4-8 (-16) mm long; leaves mostly gray green, often revolute, especially toward the base; pubescence of the lower leaf surface tomentose, primarily on or near the midrib; leaf margins rarely ciliate.
- 13 Leaves 2-4.8 cm long, 0.6-1.5 cm wide; fruits 4-5 mm in diameter; sepals usually ciliate; [plant apparently endemic to the Suwanee River drainage of sc. GA and e. Panhandle FL] *I. decidua* var. *curtissii*
- 13 Leaves 4.5-8.5 (-10) cm long, 1.5-3 cm wide; fruits (4-) 5-8 (-9) mm in diameter; sepals not ciliate; [plant widespread in our area, in the Coastal Plain, Piedmont, and rarely Mountains of our area] *I. decidua* var. *decidua*
- 12 Pedicels of fruits and pistillate flowers (5.5-) 10-30 mm long; pedicels of staminate flowers (10-) 15-25 mm long; leaves rarely revolute; pubescence of the lower leaf surface strigose, distributed on the surface; leaf margins often ciliate.
- 14 Upper leaf surface with trichomes throughout; sepals ciliate; leaf blades entire to shallowly crenate *I. cuthbertii*
- 14 Upper leaf surface glabrous, or with trichomes confined to the veins or their vicinity; sepals eciliate; leaf blades crenate to distinctly serrate *I. longipes*
- 11 Leaves elliptic or ovate, broadest near the middle, (10-) 20-55 mm wide, rounded to broadly cuneate basally, mostly 1-2.5× as long as wide.
- 15 Veins on undersurface of leaf blades reticulate, defining areoles; fruit surface dull; fruiting pedicels 6-14 mm long (averaging about 10 mm); [of blackwater floodplains and clay-based Carolina bays of the Coastal Plain] *I. amelanchier*
- 15 Veins on undersurface of leaf blades obscure, not defining areoles; fruit surface shiny; fruiting pedicels either (8-) 10-30 mm long or 2-9 mm long (averaging either < 6 mm or > 15 mm long); [collectively of various habitats, widespread in our area].
- 16 Fruiting pedicels (8-) 10-30 mm long; fruit (7-) 8-12 mm in diameter, bright cherry-red; [of bogs and very moist forests of the Mountains] *I. collina*
- 16 Fruiting pedicels 2-9 mm long; fruit 5-9 (-12) mm in diameter, red to orange; [collectively of various habitats, widespread in our area].
- 17 Nutlets (5-) 6-8 per fruit, smooth on the (curved) back; staminate flower clusters on peduncles 2-6 mm long; pistillate flowers with entire corolla lobes; flowers mostly in axils of leaves on normal shoots.
- 18 Sepals glabrous (in flower or fruit), acute; leaves lighter green, slightly if at all rugose *I. laevigata*
- 18 Sepals ciliate (in flower or fruit), obtuse; leaves darker green, often moderately rugose *I. verticillata*
- 17 Nutlets 4-5 per fruit, with striate ridges on the (curved) back; staminate flower clusters sessile or very short-peduncled (0-2 mm long); pistillate flowers with ciliate corolla lobes; flowers mostly in axils of leaves on lateral short-shoots.
- 19 Leaves 2-9 (-10.5) cm long, elliptic to broadly ovate, often nearly round, the apex abruptly to gradually acuminate, the marginal teeth usually inconspicuous; petioles of mature leaves usually < 1 cm long; fruits 5-9 mm in diameter; plant a shrub to 6 m tall; [of the Coastal Plain, Piedmont, and Mountains] *I. ambigua*
- 19 Leaves 6-16 cm long (the largest, at least, > 8 cm long), narrowly to broadly ovate, the apex long acuminate to attenuate, the marginal teeth rather coarse; petioles of mature leaves usually > 1 cm long; fruits 9-12 mm in diameter; plant shrub or small tree to 10 m tall; [of the Mountains and upper Piedmont] *I. montana*

Auxiliary Key to Deciduous *Ilex* of Moist to Wet Habitats of the Mountains

[Note: trichotomous lead]

- 1 Fruits bright cherry-red, broader than long, (7-) 8-12 mm in diameter, borne on stalks 9-20 mm long, primarily in the axils of leaves on spur shoots; bark of 2-3 year old twigs usually light tan; calyx (persistent on fruit) 4 (-5) lobed; nutlets 4 (-5) per fruit, with bony white longitudinal striations on the back, the furrows between the striations very shallow if developed at all; petiole with a deeply U- to V-shaped channel on its upper side (made by the decurrent leaf edges), with dark ascending trichomes in the channel; leaves variable, but mostly 3-6 cm wide and about 1.5× as long as wide, usually abruptly short-acuminate; [plant of bogs, seepages, streambanks, and (rarely) moist forests, mostly at high elevations] *I. collina*
- 1 Fruits duller red, longer than broad, 5-8 mm in diameter, borne on stalks 1-6 mm long, primarily in the axils of leaves on spur shoots; bark of 2-3 year old twigs usually brown, gray, or purplish; calyx (persistent on fruit) 4-6 lobed; nutlets 4-6 per fruit, with longitudinal ridges, the furrows between the ridges about as deep as the distance between the ridges; petiole with U-shaped channel on its upper side, with white appressed trichomes in the channel; leaves variable, but mostly 3-7 cm wide and about 2× as long, usually long-acuminate; [plant of moist forests and (rarely) bog edges] *I. montana*
- 1 Fruits duller red, longer than broad, 5-7 mm in diameter, borne on stalks 1-6 mm long, primarily in the axils of leaves on normal shoots with elongate internodes; bark of 2-3 year old twigs usually brown, gray, or purplish; calyx (persistent on fruit) (4-) 5-6 lobed; nutlets (4-) 5-6 per fruit, smooth and unmarked on the back; petiole nearly terete in cross-section (or very shallowly channeled on the upper surface); leaves variable, but mostly 2-3.5 (-5) cm wide and about 2× as long, usually merely acute; [plant of bogs and other wetlands] *I. verticillata*

Ilex ambigua (Michaux) Torrey, Carolina Holly. Sandy upland forests, dry slope forests, rarely in pocosin ecotones in the fall-line sandhills region. April-June; August-September. Ne. NC, se. TN, n. AR, and se. OK south to c. peninsular FL, s. MS, and se. TX; disjunct in the Sierra Madre Oriental and Chiapas, Mexico. The various taxa that have been distinguished in this

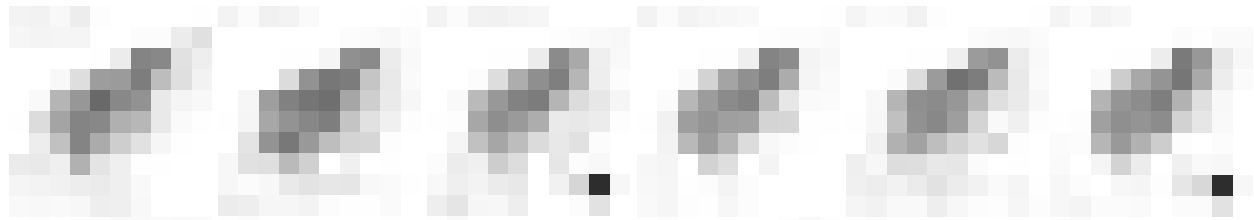
complex may have some merit, though a detailed study by Krakow (1989) did not show a clear basis for their recognition. *I. buswellii* Small, strictly of xeric habitats of the Coastal Plain from se. NC southward, has the larger leaves 2-3.5 (-4) cm long and 0.7-1.7 (-2.5) cm wide. *I. ambigua* (*sensu stricto*) is distributed in the Coastal Plain, Piedmont and low Mountains, and has leaves 3-9 (-10.5) cm long and 1.7-6 cm wide. *I. beadlei* of the low Mountains and Piedmont has leaves 7-9 (-10.5) cm long and 2-6 cm wide. [= K2, Z; = *I. ambigua* var. *ambigua* – RAB, W, Y; > *I. montana* var. *mollis* (A. Gray) Britton – C, F; > *I. montana* var. *beadlei* (W.W. Ashe) Fernald – G; > *I. ambigua* – S; > *I. beadlei* W.W. Ashe – Pa, S; > *I. buswellii* Small – S; > *I. ambigua* (Michaux) Torrey var. *monticola* (A. Gray) Wunderlin & Poppleton – Y, misapplied; > *I. beadlei* var. *laevis* W.W. Ashe; > *I. caroliniana* Trelease ex Small; > *I. mollis* A. Gray]

Ilex amelanchier M.A.Curtis ex Chapman, Sarvis Holly. Banks of blackwater creeks and rivers, clay-based Carolina bays. April-May; October-November (-April). A Southeastern Coastal Plain endemic: se. NC south to the FL Panhandle and west to se. LA (reports from se. VA appear to be based on confusion of material). The fruits are sometimes persistent until the following spring; the species is perhaps most conspicuous in the winter, when the dull red fruits can be easily seen. [= RAB, C, F, G, GW, K2, S, Y, Z]

* ***Ilex aquifolium*** Linnaeus, English Holly. [= K2]

Ilex cassine Linnaeus, Dahoon, Cassena. Blackwater stream swamps, pocosins, nearly always in very acid peaty or sandy sites. May-June; October-November. Primarily a Southeastern Coastal Plain endemic: se. NC south to s. FL and west to se. TX; also in the Bahamas, Cuba (González-Gutiérrez 2007), and Mexico. *I. cassine* is variable in leaf shape, sometimes approaching *I. myrtifolia*. Some populations in our area show intergradation with or poor differentiation from *I. myrtifolia*, lending some credibility to their treatment as varieties. [= GW, S, Y; = *I. cassine* var. *cassine* – RAB; > *I. cassine* var. *cassine* – K2]

Ilex collina Alexander, Long-stalked Holly, Cherry Holly. In peats of bogs and seepages, on banks of cold, high elevation streams (less commonly on moist, rocky slopes in northern hardwood forests or mixed spruce-hardwood forests) at moderate to high elevations (1100-1800m). May-June; (August-) September-October. A Southern Appalachian endemic: e. and c. WV, sw. VA, w. NC, and e. TN (Sevier County) (Boetsch & Nielsen 2003). The affinities of this species are with *Ilex montana* and *I. verticillata*, not with *Ilex (Nemopanthus) mucronata* (Baas 1984). See Clark (1974) and Boetsch & Nielsen (2003) for additional information about this species. *I. collina* often occurs with or in close proximity to the similar *I. montana* and *I. verticillata*; the long fruiting pedicels will separate fruiting plants readily. [= K2, WV; = *Nemopanthus collinus* (Alexander) R.C. Clark – C, W; < *I. longipes* – F, G]



Ilex coriacea (Pursh) Chapman, Big Gallberry, Sweet Gallberry. Pocosins, more restricted to wet, peaty sites than *I. glabra*. April-May; September-October. A Southeastern Coastal Plain endemic: se. VA south to c. peninsular FL and west to e. TX. [= RAB, C, F, G, GW, K2, S, Y]

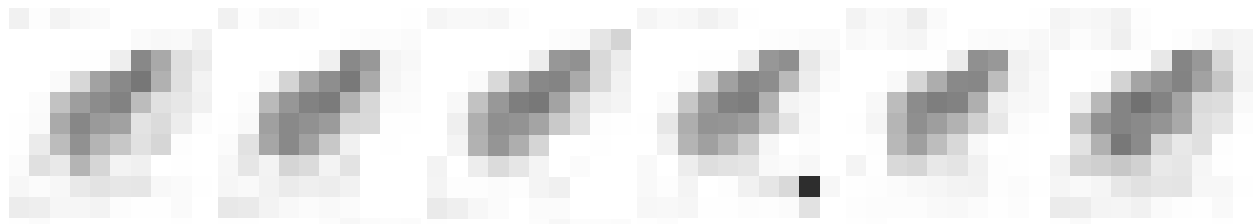
* ***Ilex cornuta*** Lindley, Chinese Holly, Burford Holly. Escaped into forests in suburban areas; native of China. Escaped from suburban plantings in AL, NC, and KY (Clark et al. 2005). [= K2]

* ***Ilex crenata*** Thunberg, Japanese Holly. Planted as a landscaping shrub, escaped into forests in suburban areas; native of Japan. First reported for NC by Pittillo & Brown (1988). [= K2, Pa]

Ilex cuthbertii Small, Cuthbert Holly. Upland circumneutral woodlands and forestse. Endemic to an area along the Fall Line in SC and adjacent GA (Krakow 1989). Perhaps best treated as a variety of *I. longipes*, but the combination has not yet been made. [= K2; > < *I. cuthbertii* – S (as to type, not as to range); = *I. longipes* var. *cuthbertii* (Small) G.A. Krakow, in prep. – Z]

Ilex decidua Walter var. *curtissii* Fernald, Suwanee Possum-haw, Curtiss's Holly. Floodplains and moist forests in the Suwanee River drainage. Mid-March-mid-April; September-October. Apparently endemic to the Suwanee River drainage of s. GA and n. FL. [= Z; < *I. decidua* – GW, K2, Y; = *I. curtissii* (Fernald) Small – S]

Ilex decidua Walter var. *decidua*, Possum-haw. Floodplain forests, less commonly on mesic (or even dry), upland slopes. March-May; September-October. MD south to Panhandle FL, west to TX on the Coastal Plain, extending also to adjacent provinces (the Piedmont and rarely Mountains in our area), and extending north in the interior to c. TN, w. KY, s. IL, c. MO, se. KS, and e. OK; also disjunct (as a variety) in the Sierra Madre Oriental of e. Mexico. The Mexican material was recognized by Krakow (1989) at the varietal level, but has not been formally named; it is known from a single collection from Nuevo León, Mexico. [= Z; < *I. decidua* var. *decidua* – RAB; < *I. decidua* – C, F, G, GW, K2; > *I. decidua* var. *decidua* – Y (also including *I. cuthbertii*)]



Ilex glabra (Linnaeus) A. Gray, Little Gallberry, Inkberry. Savannas, pine flatwoods, pocosin margins, swamps, primarily in wetlands, but extending upslope even into sandhills. May-June; September-November. NS and ME south to FL, west to TX. [= RAB, C, F, G, GW, K2, Pa, S, Y]

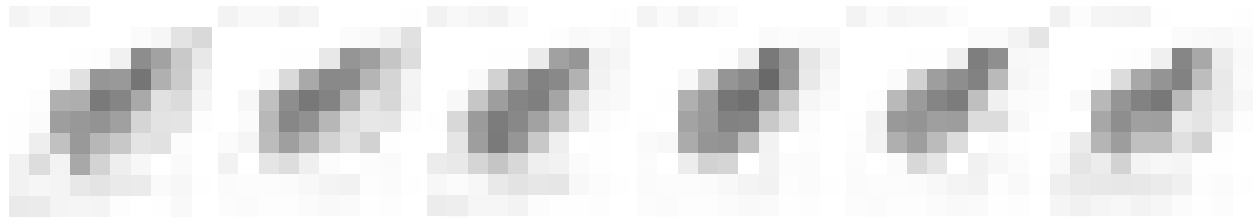
Ilex laevigata (Pursh) A. Gray, Smooth Winterberry. Pocosins, other wet, acidic sites, such as in small blackwater stream swamps. April-May; September-October. ME and NY south to SC, mostly near the coast. [= RAB, C, F, G, GW, K2, Pa, S]

Ilex longipes Chapman ex Trelease, Georgia Holly, Chapman's Holly. Upland forests. April-May; September-October. Sc. NC, sc. TN (Chester, Wofford, & Kral 1997), and wc. AR south to Panhandle FL, s. MS, and se. TX. [= GW, K2, S; = *I. decidua* var. *longipes* (Chapman ex Trelease) H.E. Ahles – RAB, Y; < *I. longipes* – F, G (apparently also including *I. collina*); = *I. longipes* var. *longipes* – Z]

Ilex montana Torrey & A. Gray ex A. Gray, Mountain Holly. Mesic forests, rarely bogs or bog edges. April-June; August-September. W. MA and w. NY south to n. GA and n. AL, essentially an Appalachian endemic. The range of this species is sometimes stated or shown as broader, extending into the Coastal Plain in our area, and as far south as n. FL, LA, and e. TX, but these reports are based on misidentifications, primarily of the "beadlei" component of *I. ambigua*. [= K2, Pa, WV, Z; = *I. ambigua* var. *montana* (Torrey & A. Gray ex A. Gray) H.E. Ahles – RAB; = *I. montana* var. *montana* – C, F, G; = *I. monticola* A. Gray – S; = *I. ambigua* var. *monticola* (A. Gray) Wunderlin & Poppleton – W]

Ilex mucronata (Linnaeus) M. Powell, V. Savolainen, & S. Andrews, Catberry, Nemopanthus. Bogs and moist, high-elevation forests. May-June; August-September. NL (Newfoundland) west to ON and MN, south to MD, WV, OH, IN, and IL (and allegedly in VA, according to Fernald 1950). It can be separated vegetatively from other hollies in the mountain regions of w. VA (*I. montana*, *I. collina*, *I. opaca*, and *I. verticillata*) by its smaller, narrower, entire (or nearly so) leaves, 2-5 (-6) cm long, 1-2.5 cm wide. Debate about the distinctiveness of *Nemopanthus* from *Ilex* have now been unequivocally answered, with *Nemopanthus* to be included in *Ilex* (Powell et al. 2000; Manen, Boulter, & Naciri-Graven 2002). [= Pa, X; = *Nemopanthus mucronatus* (Linnaeus) Trelease – C, F, G, K2, WV]

Ilex myrtifolia Walter, Myrtle Holly. Limesink (doline) ponds, wet savannas. May-June; October-November. A Southeastern Coastal Plain endemic: se. NC south to n. peninsular FL and west to e. LA. See *I. cassine* for comments about these two taxa. [= GW, K2, S, Y; = *I. cassine* var. *myrtifolia* (Walter) Sargent – RAB]

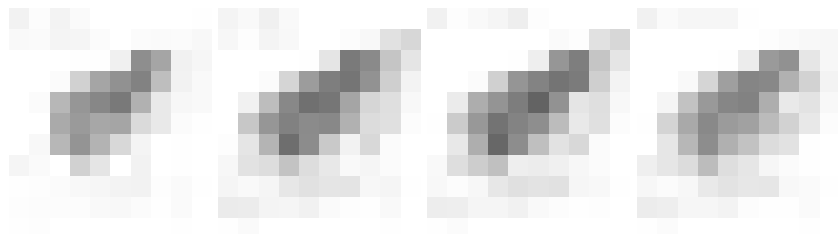


Ilex opaca Aiton var. *arenicola* (Ashe) Ashe, Scrub Holly. Xeric sands of sand pine scrub. Baker and Clay counties (ne. FL) south to c. peninsular FL. [= K2; = *I. cumulicola* Small – S; = *I. arenicola* Ashe]

Ilex opaca Aiton var. *opaca*, American Holly, Christmas Holly. In a wide variety of forests, ranging from xeric to wetland. April-June; September-October. MA (? NS and ME), IL, MO, and OK south to s. peninsular FL and TX. This is our only species of *Ilex* that becomes a medium to large tree. [= GW, K2, Y; < *I. opaca* – RAB, C, F, G, Pa, W, WV; = *I. opaca* – S]

Ilex verticillata (Linnaeus) A. Gray, Winterberry. Bogs, pocosins, swampy forests. April-June; September-November. NL (Newfoundland) west to MN, south to FL and TX. [= RAB, GW, K2, Pa, S, W, WV, Y; > *I. verticillata* var. *padifolia* (Willdenow) Torrey & A. Gray ex S. Watson – C, F, G; > *I. verticillata* var. *verticillata* – C, F, G]

Ilex vomitoria Aiton, Yaupon. Maritime forests, other dry sandy forests. March-May; October-November. Widespread in the Southeastern United States, primarily on the Coastal Plain, from e. VA (from Northampton County south) south to c. peninsular FL and west to se. TX. *I. vomitoria* from the Deep South often has much smaller leaves than plants in our area. In NC and VA, yaupon is nearly restricted to maritime habitats, on the barrier islands and in a narrow band on the mainland, in forests with substantial maritime influence. *I. vomitoria* is increasingly popular as an ornamental shrub, and is persistent or establishing in suburban woodlands. [= RAB, C, F, G, GW, K2, S, Y]



391. CAMPANULACEAE A.L. de Jussieu 1789 (Bellflower Family) [in ASTERALES]

A family of about 80-82 genera and 2000-2400 species, mostly herbs, cosmopolitan. There is controversy about the circumscription of the family, specifically whether subfamily Lobelioideae should be recognized at the family level. References: Rosatti (1986)=Z; Eddie et al. (2003); Shulkina, Gaskin, & Eddie (2003); Lammers in Kadereit & Jeffrey (2007). [also see SPHENOCLEACEAE]

- 1 Corollas bilaterally symmetrical (zygomorphic); carpels 2; [subfamily *Lobelioideae*]..... **1. Lobelia**
- 1 Corollas radially symmetrical (actinomorphic); carpels (2-) 3-5; [subfamily *Campanuloideae*].
 - 2 Capsule dehiscent laterally (the pores nearly apical in some *Campanula*); flowers in spikes, racemes, or panicles; [mostly native species of various habitats (some of them weedy)].
 - 3 Inflorescence spicate, the flowers sessile, mostly in the axils of well-developed leaves; corollas rotate and style straight..... **5. Triodanis**
 - 3 Inflorescence racemose or paniculate, the flowers pedicelled, sometimes axillary to well-developed leaves; corollas campanulate, funnellform, or rotate, with a straight or curved style **6. Campanula**
 - 2 Capsule dehiscent apically; flowers solitary or in very diffuse panicles (*Platycodon*, *Wahlenbergia*), or in compact involucrate umbels (*Jasione*); [aliens, generally in weedy or disturbed situations].
 - 4 Flowers and fruits borne in an involucrate umbel **4. Jasione**
 - 4 Flowers and fruits solitary or in a diffuse inflorescence.
 - 5 Flowers large, 1 to few, solitary or nearly so; leaves large, ovate to elliptic; [Platycodonoid clade] **2. Platycodon**
 - 5 Flowers small, several to many, borne in a diffuse inflorescence; leaves small, linear to narrowly elliptic; [Wahlenbergoid clade]..... **3. Wahlenbergia**

1. Lobelia Linnaeus 1753 (Lobelia)
(contributed by A.S. Weakley and B.A. Sorrie)

A genus of over 400 species, herbs, shrubs, trees, cosmopolitan. References: Rosatti (1986)=Z; McVaugh (1936)=Y; Thompson & Lammers (1997); Lammers in Kadereit & Jeffrey (2007). Key based in part on Y, GW, C, and F.

Identification notes: Vegetative *Lobelia* can be recognized by their milky sap, and the alternate leaves with obscure, whitish, callus-tipped, and often irregular or divergent teeth.

- 1 Corolla bright red (faded in dried specimens) or very rarely white, 30-45 mm long; filament-tube 19-33 mm long **L. cardinalis**
- 1 Corolla blue, purple, or white, 10-33 mm long; filament-tube 2-15 mm long.
 - 2 Larger leaves in a basal rosette, **either** linear to linear-oblongate or orbicular, with a well-developed petiole; [plants generally of wetlands, often growing in shallow water, more rarely in dry or seasonally dry habitats].
 - 3 Rosette leaf blades orbicular, broadly rounded at the base and the apex; stems trailing, rooting at nodes, mat-forming; [of FL] **L. feayana**
 - 3 Rosette leaf blades linear to linear-oblongate; stems erect.
 - 4 Calyx segments with small auricles at the base; pedicels with very small bracteoles at the base; filament tube (6-) 7-9 (-11) mm long; corolla tube not fenestrate (lacking lateral slits); larger leaves 10-30 cm long; plants (5-) 8-10 (-15) dm tall **L. floridana**
 - 4 Calyx segments not auriculate; pedicels lacking bracteoles; filament tube 3-4.5 mm long; corolla tube fenestrate (with lateral slits); larger leaves 5-12 cm long; plants (4-) 5-6 (-13) dm tall **L. paludosa**
 - 2 Larger leaves cauline; [collectively of a range of habitats].
 - 5 Flowers relatively large, the corolla (including the hypanthium) 18-33 mm long, fenestrate (with a slit or window on each side of the tube near the base).
 - 6 Calyx with prominent leafy auricles; pedicels with bracteoles near the middle.
 - 7 Stems, leaves, hypanthium, and calyx glabrous (or with very few hairs); leaves usually < 1.5 cm wide; flowers 6-20; [WI, MB, ND, and WY, south to MS, LA, and TX] **L. siphilitica** var. **ludoviciana**
 - 7 Stems, leaves, hypanthium, and calyx hirsute; leaves usually 2-6 cm wide; flowers usually > 20; [ME, ON, and MN, south to GA, AL, MS, AR] **L. siphilitica** var. **siphilitica**
 - 6 Calyx not auriculate; pedicels with bracteoles near the base (or sometimes near the middle in *L. puberula*).
 - 8 Stems and leaves evidently short-pubescent throughout.
 - 9 Stem densely short-hirsute; calyx lobes long-hirsute or villous, the lobes undulate-margined or crisped, 3-5 mm wide at base, and with large and broadly rounded basal auricles; lower and mid stem leaves ascending to appressed, the callous teeth obscure; [of the Coastal Plain and Piedmont] **L. puberula** var. **puberula**
 - 9 Stem minutely puberulent; calyx lobes glabrous to sparsely short-pubescent, the lobes usually entire, 1.2-2 mm wide at the base, with or without prominent auricles; lower and mid stem leaves spreading to strongly ascending, the callous teeth prominent.

- 10 Leaves somewhat to strongly ascending, often short-pilose beneath; sinuses of calyx with prominent auricles; [mainly of sc. United States, east to AL] *L. puberula* var. *mineolana*
- 10 Leaves spreading to somewhat ascending, glabrous or scabrous beneath; sinuses of calyx with small auricles; [Appalachian and south into the Gulf Coastal Plain] *L. puberula* var. *simulans*
- 8 Stems and leaves glabrous or glabrescent, sometimes sparsely hairy near the base of the plant.
- 11 Calyx lobes prominently glandular-toothed (not all lobes will be toothed; check several flowers) (ignore leafy bract at base of calyx).
 - 12 Corolla pubescent on outside; calyx tube with pustular-based translucent hairs, calyx lobes 4.5-8 mm long; leaves linear to lanceolate and < 3 cm; [flowering March-May] *L. brevifolia*
 - 12 Corolla glabrous/glabrate on outside; calyx tube glabrous or hairy as above, calyx lobes 4-12 mm long; leaves linear to elliptical and > 3 cm (usually 4-15 cm); [flowering September-November].
 - 13 Corolla lip glabrous basally; calyx tube glabrous, calyx lobes 6-12 mm long *L. georgiana*
 - 13 Corolla lip densely pubescent basally; calyx tube with pustular-based translucent hairs or not, calyx lobes 4-7 mm long *L. glandulosa*
- 11 Calyx lobes smooth, without prominent glandular teeth (ignore leafy bract at base of calyx).
 - 14 Leaves elliptic to lanceolate; calyx lobes 6-12 mm long; [of river shores and banks, small stream swamps, floodplains].
 - 15 Flowers loosely arranged; anther tube 2.5-3.5 mm; [of Mountains and Piedmont, rarely lower Piedmont] *L. amoena*
 - 15 Flowers densely arranged; anther tube 4 mm long; [of Coastal Plain and lower Piedmont] *L. elongata*
 - 14 Leaves linear, occasionally lanceolate; calyx lobes 4-7 (-8) mm long; [of wet savannas and flatwoods, pitcher-plant bogs, seepage slopes, streamheads].
 - 16 Corolla lip densely pubescent basally, corolla tube relatively densely pubescent within; corolla 19-27(-29) mm long; [of middle and outer Coastal Plain, mostly in wet savannas, flatwoods, pitcher-plant bogs] *L. glandulosa*
 - 16 Corolla lip glabrous basally, corolla tube glabrate within; corolla 17-23 mm long; [endemic of NC-SC Sandhills region, mostly in wet streamheads and adjacent seepage slopes] *L. species 1*
- 5 Flowers relatively small, the corolla (including the hypanthium) 7-22 mm long, not fenestrate (thus lacking a slit or window on each side of the tube near the base) (except sometimes *L. flaccidifolia*).
 - 17 Plants creeping, rooting at the nodes, mat-forming; flowers solitary, axillary in the axils of leaves *L. chinensis*
 - 17 Plants erect or recling, not rooting at nodes nor mat-forming; flowers several-many in bracteate terminal racemes.
 - 18 Stem leaves very narrow, the largest on a plant 1-5 mm wide.
 - 19 Pedicels lacking bracteoles (but with subtending bracts); stem leaves subulate-filiform, < 0.5 mm wide; plant perennial from rhizomes, the stem often spongy-thickened toward the base *L. boykinii*
 - 19 Pedicels bearing bracteoles near the base or middle (and also with subtending bracts); stem leaves linear to lanceolate, flat, 1-4 mm wide; stems not spongy-thickened.
 - 20 Bracteoles borne near the middle of the pedicel; [of northern wetlands, south to WV and PA] *L. kalmii*
 - 20 Bracteoles borne at the base of the pedicel; [collectively widespread in our area].
 - 21 Lower lip of corolla pubescent inside at the base; corolla blue, lacking a white eye *L. canbyi*
 - 21 Lower lip of the corolla glabrous; corolla blue, with a white eye *L. nuttallii*
 - 18 Stem leaves broader, the largest on a plant > 10 mm wide.
 - 22 Bracteoles borne near the middle of the pedicel *L. flaccidifolia*
 - 22 Bracteoles borne at the base of the pedicel.
 - 23 Stems long-hirsute, at least on the lower part of the stem; plant usually repeatedly branched (unless depauperate); hypanthium obovoid, almost as long as the corolla; hypanthium strongly inflated in fruit and including the capsule *L. inflata*
 - 23 Stems lacking hirsute hairs, either densely puberulent (at least below) or glabrous to glabrescent (with a few chaffy hairs on the lower stem); plant unbranched or with a few upright branches; hypanthium obconic, shorter than the corolla; hypanthium slightly inflated in fruit.
 - 24 Stem glabrous to glabrescent (with a few chaffy hairs on the lower stem); leaf bases (all) clasping to rounded; flowers 10-15 mm long.
 - 25 Calyx segments prominently ciliate-margined; basal auricles of the calyx segments prominent and declined, obscuring the corolla tube; plants to 9 dm tall *L. appendiculata*
 - 25 Calyx segments glabrous (rarely minutely ciliate); basal auricles of the calyx segments small, not declined and obscuring the corolla tube; plants to 5.5 dm tall *L. gattingeri*
 - 24 Stem densely puberulent, at least at the base; leaf bases petiolate to sessile (and then decurrent); flowers 7-12 mm long.
 - 26 Leaves chiefly basal, the stem leaves < 5 and much smaller than the basal; [of s. PA south to SC, west to LA, especially on the Piedmont] *L. spicata* var. *scaposa*
 - 26 Leaves mainly on the stem, basal leaves absent or if present no larger than the stem leaves; [collectively widespread].
 - 27 Calyx lobes with long, slender auricles, these often as long as the hypanthium; [of WV south] *L. spicata* var. *leptostachys*
 - 27 Calyx lobes lacking auricles or with these much shorter than the hypanthium.
 - 28 Flowers 7-9 mm long, deep purplish-blue; anthers white; [south to NJ, DE, MD, WV, s. IN, and IL] *L. spicata* var. *campanulata*
 - 28 Flowers 9-12 mm long, light blue to white; anthers pale bluish-gray; [south to GA] *L. spicata* var. *spicata*

Lobelia amoena Michaux, Southern Lobelia. Marshes, streambanks, seeps, floodplain forests. Late July-October. W. NC and e. TN south through w. SC to c. GA and ec. AL; disjunct in FL Panhandle and Coastal Plain of GA and SC. Reported for VA by Kartesz (1999), supposedly on the basis of McVaugh (1936), but McVaugh does not record *L. amoena* for VA and no specimens have been seen from there. [= RAB, C, GW, S, Y; = *L. amoena* var. *amoena* – K, WH; < *L. amoena* – W]

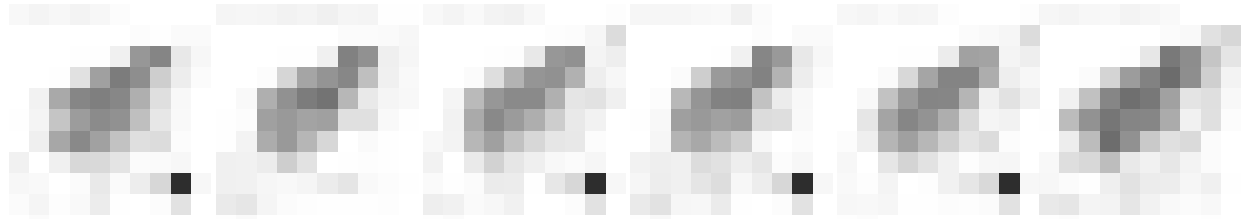
Lobelia appendiculata Alphonse de Candolle. Pinelands, prairies, roadsides, usually in mesic or dry soils. AR and se. KS south to LA and TX; disjunct east of the Mississippi in c. AL, MS, and e. LA. [= GW, S, Y; = *Lobelia appendiculata* Alphonse de Candolle var. *appendiculata* – K]

Lobelia boykinii Torrey & A. Gray ex Alphonse de Candolle, Boykin's Lobelia. Cypress ponds and depression meadows. May-July (-August). NJ and DE (formerly) south to w. Panhandle FL, s. AL, and s. MS (Sorrie & Leonard 1999). [= RAB, C, F, G, GW, K, S, WH, Y]

Lobelia brevifolia Nuttall ex Alphonse de Candolle, Shortleaf Lobelia. Savannas, flatwoods, and bogs. July-November. Endemic to the East Gulf Coastal Plain of c. and w. Panhandle FL, west through s. AL and s. MS to e. LA (Florida Parishes). [= GW, K, S, WH, Y]

Lobelia canbyi A. Gray, Canby's Lobelia. Depression ponds, Carolina bays, pine savannas. July-November. NJ to GA in the Coastal Plain; disjunct in Coffee County (and three other counties), TN, and in Bartow County, GA, with other Coastal Plain plants. [= RAB, C, F, G, GW, K, S, Y]

Lobelia cardinalis Linnaeus, Cardinal Flower. Streambanks, riverbanks, marshes, swamp forests. July-October. NB, QC, ON, MN, CO, UT, and s. CA south to c. peninsular FL, TX, and south through Mexico and Central America to Colombia. See Thompson & Lammers (1997). [= RAB, F, G, K, Pa, S, W, WH, WV, Y; > *L. cardinalis* var. *cardinalis* - C; > *L. cardinalis* ssp. *cardinalis* - GW; > *L. cardinalis* ssp. *cardinalis* var. *cardinalis*]



* ***Lobelia chinensis*** Loureiro, Chinese Lobelia, Creeping Lobelia. Tidal river banks. July-September. Reported for s. NJ and adjacent PA (Rhoads & Block 2007; Kartesz 2010). [= K2, Pa]

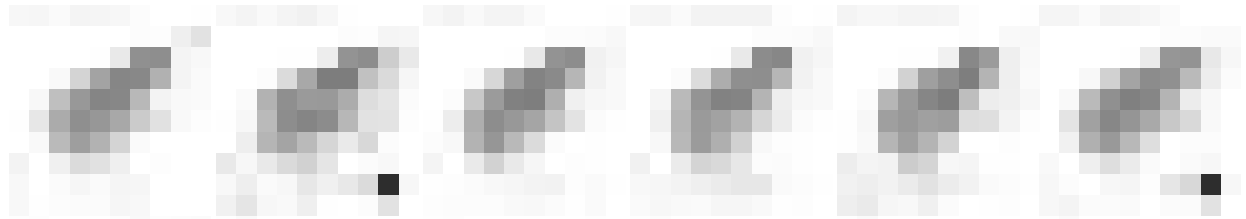
Lobelia elongata Small. River and stream margins, floodplain forests, marshes, bogs, pine savannas. August-October. Primarily a Southeastern Coastal Plain endemic from DE to se. GA, rarely inland onto the lower Piedmont of NC and SC. [= C, F, G, GW, K, S, Y; < *L. elongata* - RAB]

Lobelia feayana A. Gray, Bay Lobelia, Feay's Lobelia. Open, moist areas. Ne. FL (Duval County) and e. Panhandle FL (Madison and Taylor counties) south to s. FL. [= GW, K, S, WH, Y]

Lobelia flaccidifolia Small. Depression ponds, swampy woods along rivers and streams. June-September. E. GA south into Panhandle FL, west to sw. AL (and presumably s. MS); disjunct in sw. LA and e. TX. [= GW, K, S, WH; > *L. halei* Small - Y]

Lobelia floridana Chapman, Florida Lobelia. Wet pine savannas and flatwoods, depression ponds. S. GA (Jones & Coile 1988) and Panhandle FL west to LA; disjunct in se. NC? McVaugh (1936) reports this species for Wilmington, New Hanover County, NC, based on a collection by MacFarlane in 1909 (PENN). This record seems unlikely and needs confirmation; mislabeling is a possibility. [= GW, K, S, WH, Y]

Lobelia gattingeri A. Gray, Gattinger's Lobelia. Calcareous glades. Endemic to sc. KY south through c. TN to n. AL. [= GW, S, Y; = *Lobelia appendiculata* Alphonse de Candolle var. *gattingeri* (A. Gray) McVaugh - K]



Lobelia georgiana McVaugh. Swamps, floodplain forests, wet places. August-October. E. VA to Panhandle FL, inland to w. NC and e. TN. Very close to *L. elongata* and inhabiting apparently the same habitats; additional taxonomic work is desirable. See McVaugh (1940) for an explanation of the need to replace the name *L. glandulifera* with *L. georgiana*. [= C, F, G, GW; < *L. elongata* - RAB; = *L. amoena* Michaux var. *glandulifera* A. Gray - K, WH; = *L. glandulifera* (A. Gray) Small - S, Y; < *L. amoena* - W]

Lobelia glandulosa Walter. Seepage slopes, pitcher-plant bogs, streamhead margins, pine savannas, flatwoods, margins of beaver ponds. September-October. E. NC (or se. VA) to s. FL, west to s. AL. Prior reports from the Piedmont are erroneous, most referring to *L. elongata* and *L. georgiana*. [= RAB, C, F, G, GW, K, S, W, WH, Y]

Lobelia homophylla E. Wimmer. Just south of our area in FL (St Johns County) (Wunderlin & Hansen 2003). [= GW, K, S, WH, Y] {neither keyed nor mapped}

Lobelia inflata Linnaeus, Indian-tobacco. Fields, meadows, gardens, open woodlands, disturbed areas. July-November. PE west to MN, south to GA, AL, se. MS, e. LA, s. AR, and se. OK. [= RAB, C, F, G, GW, K, Pa, S, W, Y; > *L. inflata* var. *inflata* - WV; > *L. inflata* var. *simplex* (Rafinesque) Millspaugh - WV]

Lobelia kalmii Linnaeus, Kalm's Lobelia. Calcareous swamps. July-September. NL (Newfoundland) and BC, south to PA, e. WV, OH, IL, and MN. [= C, F, G, K, Pa, Y]

Lobelia nuttallii J.A. Schultes, Nuttall's Lobelia. Flatwoods, bogs, savannas. May-November. NY (Long Island) south to FL Panhandle on the Coastal Plain; less commonly disjunct inland to w. NC, w. SC, KY, and TN. [= RAB, C, F, G, GW, K, Pa, S, W, WH, Y]



Lobelia paludosa Nuttall, White Lobelia. Flatwoods, savannas, ditches, dune swales. March-May. Se. GA (Jones & Coile 1988) and FL Panhandle south to s. FL. [= F, GW, K, S, WH, Y]

Lobelia puberula Michaux var. ***mineolana*** F. Wimmer, Western Downy Lobelia. Forests, openings. W. KY, s. MO, and e. OK, south to s. AL, MS, LA, and e. TX. [= K; < *L. puberula* – C, G, GW, S; = *L. puberula* "form d" – Y]

Lobelia puberula Michaux var. ***puberula***, Coastal Plain Downy Lobelia. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): forests, openings, fields; common. Late July-October. NJ and PA south to c. peninsular FL, primarily on the Coastal Plain and Piedmont. [= F, K; < *L. puberula* – RAB, C, G, GW, Pa, S, W, WH, Y]

Lobelia puberula Michaux var. ***simulans*** Fernald, Appalachian Downy Lobelia. Mt (GA, NC, SC, VA, WV), Pd (GA), Cp (GA): {habitats}; {abundance}, common in WV. Late July-October. Sw. VA, s. WV, and IL south to n. FL, AL, MS, and LA. [= F, K; < *L. puberula* – RAB, C, G, GW, S, W; = *L. puberula* "form a" – Y]

Lobelia siphilitica Linnaeus var. ***ludoviciana*** A. DC., Western Great Blue Lobelia. Bottomlands, moist forests, ditches, wet meadows, streambanks. Late July-October. WI, MB, ND, and WY, south to MS, LA, and TX. [= C, F, G, GW, K, Y; < *L. siphilitica* – RAB, S]

Lobelia siphilitica Linnaeus var. ***siphilitica***, Eastern Great Blue Lobelia. Bottomlands, moist forests, ditches, wet meadows, streambanks. Late July-October. ME, ON, and MN, south to GA, AL, MS, AR. [= C, F, G, GW, K, Y; < *L. siphilitica* – Pa, RAB, S, W]



Lobelia species 1, Batson's Lobelia. Wet streamheads and seepage slopes. Endemic to the Sandhills Region of NC and SC. Under study by A. Bert Pittman. [= "*L. batsonii*" in prep.]

Lobelia spicata Lamarck var. ***campanulata*** McVaugh. {habitats}. S. ME west to MN, south to NJ, DE, MD, WV, s. IN, and IL. [= F, G, K, WV, Y; < *L. spicata* var. *spicata* – C, Pa; < *L. spicata* – W]

Lobelia spicata Lamarck var. ***leptostachys*** (Alphonse de Candolle) Mackenzie & Bush. Meadows, woodlands, disturbed areas. Late May-August. WV west to IL and KS, south to GA, AL, MS, and AR. [= C, F, G, K, Pa, WV, Y; < *L. spicata* – RAB, GW, W; = *L. leptostachys* Alphonse de Candolle – S]

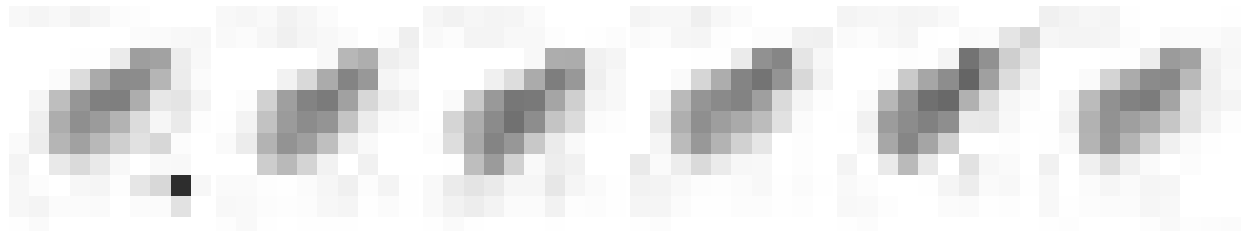
Lobelia spicata Lamarck var. ***scaposa*** McVaugh. Meadows, woodlands, disturbed areas. Late May-August. S. PA south to SC, west to LA. [= C, F, G, K, Pa, WV, Y; < *L. spicata* – RAB, GW, S, W]

Lobelia spicata Lamarck var. ***spicata***. Meadows, woodlands, disturbed areas. Late May-August. ME and NB west to ND, south to PA and AR, and in the mountains to n. GA. [= F, G, K, WV; < *L. spicata* var. *spicata* – C, Pa; < *L. spicata* – RAB, GW, W; > *L. spicata* – S; > *L. bracteata* Small – S; = *L. spicata* var. *originalis* – Y]

2. *Platycodon* Alphonse de Candolle 1830 (Japanese Bellflower, Balloonflower)

A monotypic genus, an herb, of ne. Asia. References: Rosatti (1986)=Z; Lammers in Kadereit & Jeffrey (2007).

* ***Platycodon grandiflorum*** (Jacquin) Alphonse de Candolle, Japanese Bellflower, Balloonflower. Ditches, disturbed areas, spread from horticultural cultivation; native of e. Asia. [= RAB, K, Z]



3. *Wahlenbergia* Schrader ex Roth 1821 (Wahlenbergia)

A genus of ca. 260 species, annual and perennial herbs, and shrubs, of southern South America, southern Africa, e. Asia, and Oceania. References: Rosatti (1986)=Z; Lammers in Kadereit & Jeffrey (2007).

- 1 Hypanthium narrowly obconic to nearly cylindrical, 3.5-4.5 mm long at anthesis, lengthening to as much as 12 mm in fruit; fruit opening by 2 terminal pores; perennial*W. linarioides*
- 1 Hypanthium ellipsoid or ovoid, 1.5-3 mm long at anthesis, lengthening to as much as 7.5 mm in fruit; fruit opening by 3 terminal pores; annual*W. marginata*

* *Wahlenbergia linarioides* (Lamarck) Alphonse de Candolle. Disturbed areas; native of s. South America. [= K] {add Z synonymy}

* *Wahlenbergia marginata* (Thunberg) Alphonse de Candolle. Sandy soils along roadsides and in fields; native of e. Asia and Oceania. February-December. Apparently only recently introduced in se. United States, the earliest recorded date 1937 in Alachua County, FL (Rosatti 1986), but now quite common on sandy roadsides. [= RAB, K, Z]

4. *Jasione* Linnaeus 1753 (Sheep's-bit)

A genus of 16 species, herbs, European and Mediterranean. References: Rosatti (1986)=Z; Lammers in Kadereit & Jeffrey (2007).

* *Jasione montana* Linnaeus, Sheep's-bit. Disturbed areas in sandy soils; native of Europe. June-September. [= C, F, G, K; > *J. montana* var. *montana* - Z]

5. *Triodanis* Rafinesque 1838 (Venus's Looking-glass)

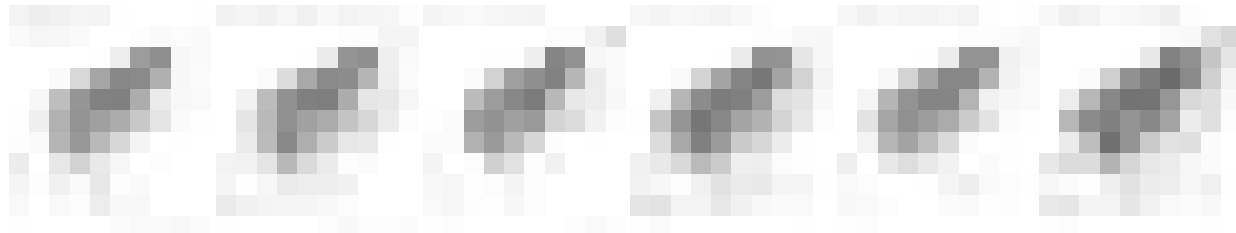
A genus of 6-8 species, annual herbs, of America. References: McVaugh (1945)=Z; McVaugh (1948); Lammers in Kadereit & Jeffrey (2007). Key based on Z.

- 1 Openings of the capsule linear, 0.2-0.4 mm wide; seeds minutely tuberculate in longitudinal lines; [sw. TN westward].....*T. holzingeri*
- 1 Openings of the capsule broadly elliptic, oval, or rounded, 0.5-1.5 mm wide; seeds either muriculate over the entire surface or nearly to quite smooth; [collectively more widespread].
 - 2 Pores at or very near the apex of the capsule; seeds smooth and highly polished; open (chasmogamous) corolla usually 1 (the terminal), the others usually closed (cleistogamous)*T. biflora*
 - 2 Pores well below the apex of the capsule (usually 1-1.5 mm below), usually about midway between apex and base; seeds muriculate or smooth and lustrous; open (chasmogamous) corollas usually several*T. perfoliata*

Triodanis biflora (Ruiz & Pavón) Greene. Roadsides, gardens, glades, disturbed areas. April-June. E. VA, KY, KS, AZ, and OR, south c. peninsular FL and Mexico; South America. [= C, K, WH, Z; = *Specularia biflora* (Ruiz & Pavón) Fischer & C.A. Meyer - RAB, F, G; = *T. perfoliata* var. *biflora* (Ruiz & Pavón) Bradley - Pa, W]

Triodanis holzingeri McVaugh. {habitats} MO west to CO, south to sw. TN, AR, TX, and NM. [= K, Z; = *Specularia holzingeri* (McVaugh) Fernald - F]

Triodanis perfoliata (Linnaeus) Nieuwland. Roadsides, gardens, glades, dry forests, disturbed areas. April-June. ME and BC south to c. peninsular FL and Mexico; West Indies; Ecuador. [= C, K, Z, WH; = *Specularia perfoliata* (Linnaeus) Alphonse de Candolle - RAB, F, G, WV; = *T. perfoliata* var. *perfoliata* - Pa, W]



6. *Campanula* Linnaeus 1753 (Bellflower)

A genus of about 300-425 species, herbs (rarely shrubby), north temperate, most diverse in s. Europe. The appropriate circumscription remains uncertain and controversial, and related genera are sometimes combined into a broadly circumscribed *Campanula*, or alternately, several segregates recognized (*Campanula*, *Rapunculus*, *Campanulastrum*, etc.). A broad circumscription is adopted here, based on considerations discussed in Roquet et al. (2008). Park et al. (2006) propose splitting *Campanula* into a number of segregates, a suggestion which also has some merits; if followed, most or all of our species would likely be placed in the genus *Rapunculus*. References: Roquet et al. (2008); Park et al. (2006); Rosatti (1986)=Z; Shetler & Morin (1986); Shetler (1982)=Y; Shulkina, Gaskin, & Eddie (2003); Lammers in Kadereit & Jeffrey (2007).

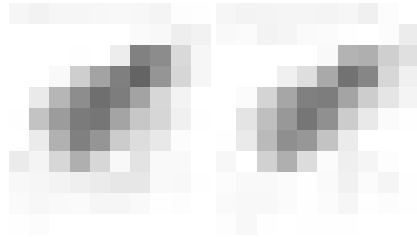
- 1 Corolla rotate

- 2 Stem erect; leaf obviously serrate or crenate; [of FL and northward, of uplands] *C. americana*
- 2 Stem sprawling; leaf entire or with obscure teeth; [of FL wetlands] *C. floridana*
- 1 Corolla campanulate.
 - 3 Stems weak and slender, reclining, 3-angled.
 - 4 Corolla 4-10 mm long; pedicels divergent, the bractless portion 0.4-4 cm long; corolla white to very pale blue.....
.....*C. aparinoides* var. *aparinoides*
 - 4 Corolla 5-13 mm long; pedicels ascending, the bractless portion 1-8 cm long; corolla pale blue [*C. aparinoides* var. *grandiflora*]
 - 3 Stems more robust, erect, terete or nearly so.
 - 5 Flowers on long pedicels (generally longer than 40 mm long), the inflorescence a diffuse panicle; [native species of rock outcrops or rocky woodlands].
 - 6 Corolla 6-8 mm long; leaves lanceolate, averaging about 1 cm wide, generally with prominent, often somewhat divergent teeth
.....*C. divaricata*
 - 6 Corolla 12-20 mm long; leaves (of the stem) linear, averaging < 5 mm wide, generally lacking teeth (or the teeth minute and obscure)
.....*C. rotundifolia*
 - 5 Flowers mostly on short pedicels (the upper < 5 mm long), the inflorescence a raceme; [alien species usually of disturbed areas].
 - 7 Capsules with pores in the apical half.....*C. persicifolia*
 - 7 Capsules with pores at or near the base*C. rapunculoides*

Campanula americana Linnaeus, Tall Bellflower. Moist to fairly dry forests, especially over mafic or calcareous rocks. Late June-September; August-October. NY, ON, MN, and SD, south to Panhandle FL, LA, and OK. Shetler & Morin (1986) stated that "Small's view [segregating *Campanula americana* into the monotypic genus *Campanulastrum*] appears to have increasing justification from palynological, cytological, and now seed evidence." Also recently supported as a genus by Shulkina, Gaskin, & Eddie (2003), but combined into *Campanula* by Lammers in Kadereit & Jeffrey (2007) and Roquet et al. (2008). [= RAB, C, F, G, Pa, W, WH, Z; = *Campanulastrum americanum* (Linnaeus) Small – K, S; *Rapunculus*]

Campanula aparinoides Pursh var. *aparinoides*, Marsh Bellflower. Bogs, marshes, wet meadows, seepage slopes over mafic or calcareous rocks. Late June-August; August-September. Widespread in ne. North America, south to nc. GA (Jones & Coile 1988), KY, MO, and NE. [= C, G; < *C. aparinoides* – RAB, K, Pa, W, Z; = *C. aparinoides* – F, S]

Campanula aparinoides var. *grandiflora* Holzinger ranges south to PA. It should be sought in our area. It has been variously treated as a species, variety, geographic phase, or form; its taxonomic status is uncertain. [= C, G; < *C. aparinoides* – K, Pa; = *C. uliginosa* Rydberg – F] [not mapped]

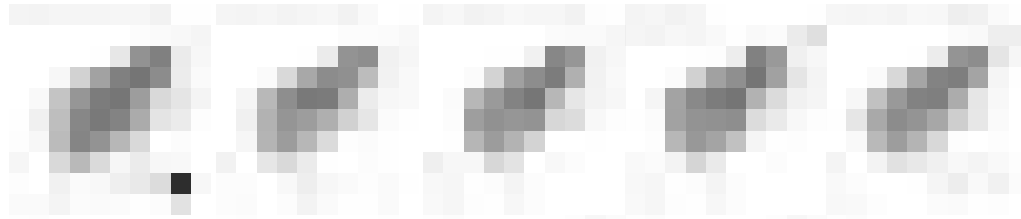


Campanula divaricata Michaux, Southern Harebell, Appalachian Bellflower. Rock outcrops, cliffs, rocky summits, talus, up to at least 1850m. July-October; September-December. A broad endemic of the Southern and Central Appalachians: MD and KY south to AL and GA. [= RAB, C, F, G, K, W, Z; = *C. flexuosa* Michaux – S; *Rapunculus*]

Campanula floridana S. Watson ex A. Gray, Florida Bellflower. Cypress ponds, depressions marshes, wet prairies. March-May. Ne. FL and Panhandle FL south to s. peninsular FL. [= GW, K, WH; = *Rotanthe floridana* (S. Watson ex A. Gray) Small – S]

* ***Campanula persicifolia*** Linnaeus, Peachleaf Bellflower. Naturalized from gardens; native of Eurasia. This species was reported by Small (1933) as "escaping from gardens" in w. NC; no specimens have been seen to document this occurrence. Additional documentation is needed to confirm this record. [= RAB, K, S; = *Rapunculus persicifolius* (Linnaeus) Fournier; = *Neocodon persicifolius* (Linnaeus) A.A.Kolakovskii & L.B.Serdyukova]

* ***Campanula rapunculoides*** Linnaeus, Rampion Bellflower, Rover Bellflower. Disturbed areas; native of Eurasia. June-August (-October). [= RAB, C, F, G, K, Pa, S, Z; *Rapunculus*]



Campanula rotundifolia Linnaeus, Bluebell, Harebell, Bluebell-of-Scotland. Limestone outcrops, high elevation rocky summits (in thin soil over amphibolite). July-August; August-September. A circumboreal species, widespread and common in n. North America and n. Eurasia, south to nw. NC, TN, MO, TX, NM, AZ, and CA. In our area rare, and generally limited to limestone in its occurrences in the Central Appalachians of WV and VA and to mafic rocks in nw. NC. It was added to the flora

of NC in 1991 (Three Top Mountain, Ashe County). See Shetler (1982) for a detailed study of the species. [= C, F, G, K, Pa, Y, Z; *Rapunculus*]

397. **MENYANTHACEAE** Dumortier 1829 (Buckbean Family) [in ASTERALES]

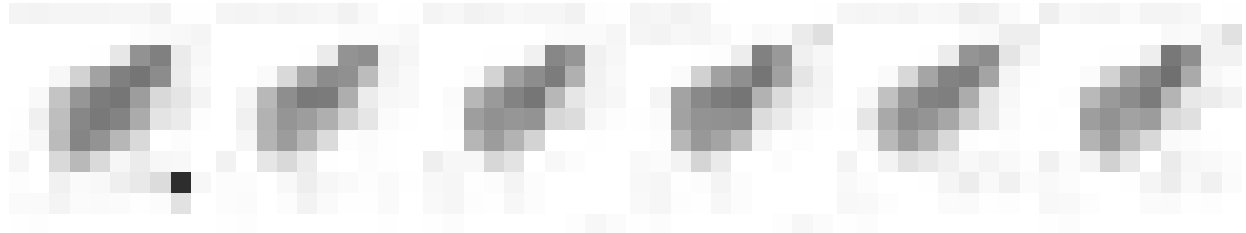
A family of about 5 genera and 40 species, wetland herbs, of cosmopolitan distribution. References: Wood (1983a)=Z.

- 1 Leaves trifoliate; inflorescence a raceme *Menyanthes*
- 1 Leaves simple; inflorescence an umbel *Nymphoides*

Menyanthes Linnaeus 1753 (Buckbean, Bogbean)

The genus is monotypic, an herb, circumboreal. References: Wood (1983a)=Z

Menyanthes trifoliata Linnaeus, Buckbean, Bogbean. Mucky soils of mountain bogs at high elevations over amphibolite (in the Blue Ridge), boggy marshes over calcareous rocks (in the Ridge and Valley), seepage swamps (in the Coastal Plain). May-June. This circumboreal species is widespread in n. North America and n. Eurasia, ranging south in North America to NJ, DE, w. VA, IN, MO, and CA, and disjunct to Long Hope Valley, Watauga County, NC. The NC populations are disjunct about 400 km from the next nearest populations in VA and WV. McDowell (1984) reported the first documentation of the species for NC. [= C, G, K, Pa, W, WV, Z; > *M. trifoliata* var. *minor* Fernald – F]



Nymphoides Séquier 1754 (Floating Heart)

A genus of about 20 species, aquatic herbs, cosmopolitan. References: Wood (1983a)=Z; Burks (2002).

Identification notes: As the scientific name indicates, the leaves of *Nymphoides* bear a superficial resemblance to those of *Nymphaea*. The leaves of *Nymphoides* are more cordate, the two basal lobes more rounded, rather than having a rather sharp corner or angle. *Nymphoides cordata* has much smaller leaves than *Nymphaea*, while the thickly pebbled texturing of *Nymphoides aquatica* is very unlike the glossy smoothness of *Nymphaea*.

- 1 Flowers yellow; floating stems usually with multiple leaves; capsules 12-25 mm long *N. peltata*
- 1 Flowers white; floating stems with single leaves; capsules 3-14 mm long.
 - 2 Adaxial petal surface bearing a ruffled crest down its length in the middle *N. cristata*
 - 2 Adaxial petal surface not crested.
 - 3 Leaves 5-15 cm wide, roughly pebbled below, thick in texture; stems 1.3-2.5 mm in diameter a few cm below the inflorescence, with conspicuous red spots; tuberous roots of floating clusters stout, blunt-tipped; seeds conspicuously papillate; capsule 10-14 mm long *N. aquatica*
 - 3 Leaves 3-7 cm wide, smooth below, thin in texture; stems 0.6-0.9 mm in diameter a few cm below the inflorescence, rarely spotted with red; tuberous roots of floating clusters slender, with pointed tips; seeds smooth (rarely papillate); capsule 4-5 mm long *N. cordata*

Nymphoides aquatica (Walter ex J.F. Gmelin) Kuntze, Big Floating Heart, Banana Floating Heart. Limesink ponds (dolines), other acidic and nutrient-poor water-filled depressions, sluggish streams, beaverponds, primarily in the Outer and Middle Coastal Plain. Late April-September. A Southeastern Coastal Plain endemic: NJ south to FL and west to TX. [= RAB, C, F, GW, K, S, Z; = *N. aquaticum* – G, orthographic variant]

Nymphoides cordata (Elliott) Fernald, Little Floating Heart. Upland depression ponds, sluggish streams, beaverponds, primarily in the fall-line Sandhills. NL (Newfoundland) and ON south MD; disjunct in the Coastal Plain of NC and SC; disjunct from sw. GA and Panhandle FL west to e. LA. [= RAB, C, F, GW, K, Pa, Z; = *N. cordatum* – G, orthographic variant; ? *N. lacunosa* (Ventenat) Kuntze – S, misapplied]

* **Nymphoides cristata** (Roxburgh) Kuntze, Crested Floating Heart, Water Snowflake. Ponds and lakes; native of China and India. Apparently first naturalizing in North America in FL in 2000; introduced for water gardens and aquariums, and considered a noxious aquatic weed in our area.

* **Nymphoides peltata** (S.G. Gmelin) Kuntze, Yellow Floating Heart. Ponds; native of Europe. This European native is sparingly naturalized in e. North America; it is sold for cultivation in water gardens, and will likely become more widely naturalized. [= C, F, K, Pa; = *N. peltatum* – G, orthographic variant]

398. GOODENIACEAE R. Brown 1810 (Goodenia Family) [in ASTERALES]

A family of about 11 genera and 440 species, herbs and shrubs, mostly of the Southern Hemisphere, and especially Australia. References: Carolin in Kadereit & Jeffrey (2007).

Scaevola Linnaeus 1771 (Fanflower, Half-flower, Scaevola)

A genus of about 130 species, perennial herbs, shrubs, woody scramblers and trees, tropical and subtropical, especially in Australia and nearby islands. References: Carolin in Kadereit & Jeffrey (2007).

Scaevola plumieri (Linnaeus) Vahl, Beachberry, Inkberry, Gull-feed, Black Soap, Mad Moll. Coastal dunes, marsh edges. January-December. N. peninsular FL south to s. FL; s. LA; s. TX south through Mexico into Central and South America; West Indies. [= K, S, WH]

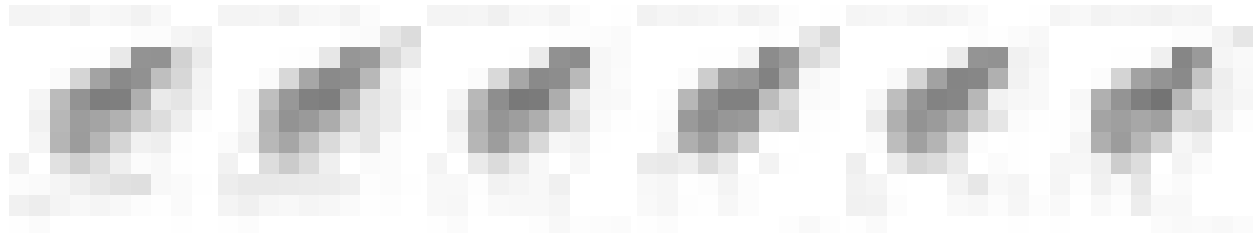
399. CALYCERACEAE R. Brown ex Richard 1820 (Calycera Family) [in ASTERALES]

A family of 4 genera and ca. 60 species, perennial and annual herbs, endemic to s. South America. References: Hellwig in Kadereit & Jeffrey (2007).

Acicarpa Antoine Laurent de Jussieu

A genus of 3-5 species, of subequatorial South America. References: DeVore (1991)=Z; Hellwig in Kadereit & Jeffrey (2007).

* *Acicarpa tribuloides* Antoine Laurent de Jussieu, Madam Gorgon. On ship's ballast near old port-cities; probably no longer present, native of South America (Brazil, Uruguay, Paraguay, and Argentina). The NC and SC records were both collected by Gerald McCarthy in 1888; though the localities are not specified, the likely sites (based on his itinerary and what is known of the species) are Wilmington (New Hanover County, NC) and Charleston (Charleston County, SC). DeVore (1991) discusses ballast plants and the apparent failure of *Acicarpa* to naturalize in North America. This species has not been collected in our area (or North America) since 1888; it is here treated for historical interest and to increase the likelihood that it will be relocated, if it is indeed actually naturalized. [= K, S, WH, Z]



400. ASTERACEAE Dumortier 1822 or **COMPOSITAE** Giseke 1792 (Aster Family) [in ASTERALES]

A family of about 1500-1700 genera and 20,000-25,000 species, shrubs, herbs, trees, and vines, cosmopolitan. References: Cronquist (1980)=SE throughout family treatment.

Identification notes: {define liguliflorous, discoid, disciform, radiant, and radiate heads; define various pappus characters. define calyculus. define palea and phyllary}

- 1 Plant a shrub or woody vine, definitely with woody growth well above ground level **Key A**
- 1 Plant an annual, biennial, or perennial, lacking woody growth above ground level.
 - 2 Leaves opposite or whorled, at least on the lower stem nodes (the leaves higher on the stem sometimes alternate).
 - 3 Heads discoid or disciform **Key B** {under construction}
 - 3 Heads radiate.
 - 4 Rays yellow, orange, or red (sometimes with some brown, maroon, or purple coloration as well) **Key C** {under construction}
 - 4 Rays white, cream-colored, or pale pink or lavender **Key D** {under construction}
 - 2 Leaves **either** alternate (not opposite even at lower nodes of the stem) **or** basal only (the heads on scapiform stems).
 - 6 Heads liguliflorous (composed of ligulate florets); sap usually milky **Key E**
 - 6 Heads discoid, disciform, radiant, or radiate; sap usually clear.
 - 7 Heads discoid or disciform **Key F** {under construction}
 - 7 Heads radiate or radiant {under construction}

Key A – shrubby composites

- 1 Leaves strictly alternate; [tribe *Astereae*].
 - 2 Heads discoid; shrubs to 5 m tall; [widespread in our area] *Baccharis*
 - 2 Heads radiate (most or all on a plant); [of se. NC southward, native in the Coastal Plain only].
 - 3 Leaves with clasping base, with a midvein and lateral veins and tertiary reticulation; rays pink or rose; sprawling viny shrub to 4 m tall; [of wet habitats of SC (or se. NC) southward, also cultivated] *Ampelaster*
 - 3 Leaves with a cuneate base, with a midvein and otherwise minutely pebbled; rays yellow; intricately branched shrub to 1 m tall, with persistent sterile shoots with evergreen leaves and annual flowering shoots (the entire shoot and leaves deciduous); [of xeric sandy barrens, of se. NC southward]..... *Chrysoma*
- 1 Leaves opposite, at least on the lower stem nodes (the leaves higher on the stem sometimes alternate); [tribe *Heliantheae*].
 - 4 Heads radiate, ray florets yellow; disc florets yellow; leaves strictly opposite; [of tidally inundated salt and brackish marshes of the outer Coastal Plain]; [tribe *Heliantheae*; subtribe *Ecliptinae*] *Borrchia*
 - 4 Heads discoid or disciform, ray florets lacking; disc florets pink, purple, or whitish; leaves opposite, but usually at least in part alternate higher on the stem; [collectively of various habitats, Coastal Plain and inland].
 - 5 Heads solitary, axillary in the axils of leaves or leafy bracts; heads nodding, the involucre 2-7 mm high; [collectively widespread in our area, of maritime and inland wetlands or moist disturbed areas]; [tribe *Heliantheae*; subtribe *Ambrosiinae*]..... *Iva*
 - 5 Heads many, terminal on the branches of corymbiform arrays; heads erect, the involucre 4-12 mm high; [of Coastal Plain of FL, s. GA, s. AL, and c. MS, of dry, sandy scrub and pinelands, blackland prairies, or dry, disturbed areas].
 - 6 Leaves with punctate glands; pappus of 60-70 barbellate bristles, 8-12 mm long; [tribe *Heliantheae*; subtribe *Eupatoriae*].... *Garberia*
 - 6 Leaves lacking punctuate glands; pappus of 4-10 scales, 0.3-7 mm long; [tribe *Heliantheae*; subtribe *Chaenactidinae*]..... *Palafoxia*

Key B – herbaceous composites with opposite or whorled leaves and discoid or disciform heads (lacking ray florets)

- 1 Disc florets yellow.
- 2
- 2
- Acmella
- Flaveria
- Pulicaria
- Dittrichia
- Inula

- 1 Disc florets white, pink, purplish.
- 6
- 6
- Ambrosia
- Xanthium
- Iva
- Cyclachaena
- Melanthera
- Lagascea
- Palafoxia
- Eupatorium
- Eutrochium
- Conoclinium
- Ageratum
- Brickellia
- Hartwrightia
- Fleischmannia
- Chromolaena
- Mikania
- Chevreulia
- Sclerolepis

Key C – herbaceous composites with opposite leaves and radiate heads, the rays predominantly yellow, orange, or red

Key D – herbaceous composites with opposite leaves and radiate heads, the rays predominantly white, cream or pale lavender or pink

Key E – herbaceous composites with leaves alternate or basal, liguliflorous heads (composed of ligulate florets), and sap usually milky

- 1 Cypselas (at least of the inner florets of the head) beaked.
- 2 Heads solitary and terminal at the end of a stem unbranched to its base.
 - 3 Leaves basal and cauline, grasslike (untoothed and unlobed); stem leafy *Tragopogon*

- 3 Leaves basal only, variously toothed to pinnately lobed; stem scapiform (leafless).
 - 4 Pappus of bristles *Taraxacum*
 - 4 Pappus **either** of outer scales and inner bristles **or** entirely of aristate scales.
 - 5 Pappus of outer scales and inner plumose bristles; leaves oblanceolate to oblong; plants annual or perennial *Leontodon*
 - 5 Pappus of aristate scales; leaves linear to narrowly lanceolate; plants annual *Uropappus*
- 2 Heads several per stem, in various corymbiform, umbrelliform, spiciform, or paniculiform arrays (rarely solitary and terminal in the smallest and most depauperate individuals in a population).
 - 6 Achenes distinctly flattened..... *Lactuca*
 - 6 Achenes terete or prismatic.
 - 7 Pappus of plumose bristles, at least the inner series; plant an annual or biennial.
 - 8 Receptacles lacking paleae *Helminthotheca*
 - 8 Receptacles with paleae..... *Hypochoeris*
 - 7 Pappus of simple capillary bristles; plant an annual, biennial, or perennial.
 - 9 Beak of the cypsela with a ring of soft white reflexed hairs at the summit (just below the pappus)..... *Pyrrhopappus*
 - 9 Beak of the cypsela lacking a ring of hairs as described.
 - 10 Pappus of 80-150 barbellulate bristles; plant an annual or biennial..... *Crepis*
 - 10 Pappus **either** of 40-50 (or more) smooth bristles **or** of 20-30 barbellulate bristles; plant a perennial
 - 11 Pappus of 40-50 (or more) smooth bristles *Chondrilla*
 - 11 Pappus of 20-30 barbellulate bristles *Ixeris*
 - 1 Cypselas beakless.
 - 12 Leaves basally disposed (stem leaves few or none generally smaller in size than the basal leaves, which are persistent into flowering and fruiting); corollas yellow, orange, or red.
 - 13 Pappus absent **or** of both scales and barbellulate bristles..... *Krigia*
 - 13 Pappus of bristles only (these barbellulate or plumose).
 - 14 Pappus of plumose bristles (these somewhat flattened at their bases)..... *Oporinia*
 - 14 Pappus of barbellulate bristles.
 - 15 Leaves with entire margins; plants perennials, **either** from long to short rhizomes **or** from a short caudex with fibrous roots..... *Hieracium*
 - 15 Leaves coarsely toothed or pinnately lobed; plants annuals, from a taproot.
 - 16 Involucre 5-12 mm high; achenes usually > 2.5 mm long; pappus bristles distinct, 3-7 mm long *Crepis*
 - 16 Involucre 3-5 mm high; achenes 1.5-2.5 mm long; pappus bristles basally connate, 2.5-3.5 mm long *Youngia*
 - 12 Leaves basal and cauline (plant often beginning with a basal rosette, but by flowering bearing well-developed stem leaves about as large as the basal leaves, the basal rosette often withering prior to flowering and fruiting); corollas yellow, orange, red, blue, pink, white, or lavender.
 - 17 Pappus absent or of scales.
 - 18 Corollas pale blue (rarely pink or white) *Cichorium*
 - 18 Corollas yellow (rarely orange).
 - 19 Stem winged and spiny; leaves spiny-margined; receptacle with paleae *Scolymus*
 - 19 Stem not winged or spiny; leaves not spiny-margined; receptacle lacking paleae.
 - 20 Cypselas 1.2-2.8 mm long; heads borne single at the ends of scapiform stems that are unbranched (rarely few-branched near the base); plants to 7 dm tall *Krigia*
 - 20 Cypselas 3-5 mm long; heads borne in corymbiform or thyriform arrays; plants to 15 dm tall..... *Lapsana*
 - 17 Pappus of numerous smooth or barbellate bristles.
 - 21
 - 21

Lygodesmia
 Crepis
 Sonchus
 Hieracium
 Picris
 Prenanthes

Key F

Key G

Acanthospermum Schrank 1820 (Paraguay Bur)

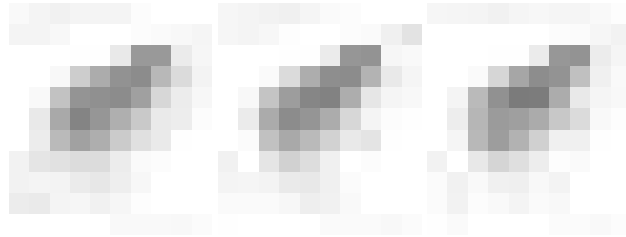
A genus of about 6 species, herbs, of tropical America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

- 1 Stems prostrate and rooting at the nodes; bur 7-9 mm long, slightly compressed, strongly 5-7-ribbed *A. australe*
- 1 Stems erect; bur 2-6 mm long, obviously compressed, obscurely ribbed or 3-ribbed.
 - 2 Leaves (2-) 4-12 (-15) cm long, sessile or subsessile; bur with prickles on all surface..... *A. hispidum*
 - 2 Leaves 1-3 (-4.5) cm long, petiolate, the petiole 4-18 mm long; bur unarmed or nearly so on the side faces, the prickles along the ribs and around the tip *A. humile*

* *Acanthospermum australe* (Loefling) Kuntze, Paraguay Bur, Sheep Bur. Disturbed areas; native of South America. May-November. [= RAB, C, F, FNA, G, K, S, SE, WH]

* *Acanthospermum hispidum* A.P. de Candolle, Hispid Starbur. Disturbed areas, soybean and peanut fields, gardens; native of n. South America. July-November. First reported from SC by Hill & Horn (1997). [= FNA, K, S, SE, WH]

* *Acanthospermum humile* (Swartz) A.P. de Candolle, Low Starbur. Disturbed areas; native of the West Indies. Reported for SC by Nelson (2003). [= FNA, K, S, SE, WH; = *Melampodium humile* Swartz]



Achillea Linnaeus 1753 (Yarrow, Milfoil, Thousand-leaf)

A genus of about 115 species, herbs, primarily Eurasian. References: Ramsey, Robertson, & Husband (2008)=Y; Guo, Ehrendorfer & Samuel (2004); Guo et al. (2005); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z; Trock in FNA (2006a).

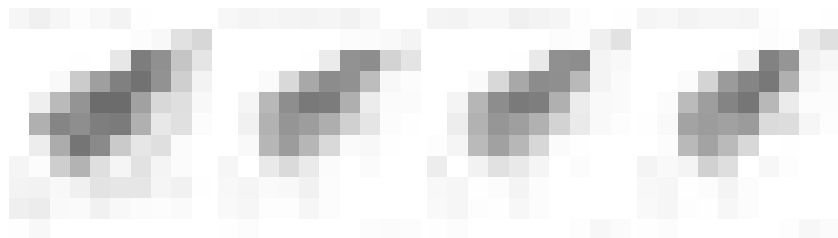
- 1 Heads golden yellow *A. filipendulina*
- 1 Heads white or pinkish.
 - 2 Leaves serrate to almost entire; [section *Ptarmica*] *A. ptarmica*
 - 2 Leaves pinnately dissected into linear segments; [section *Achillea*]
 - 3 Fresh leaves elaborately 3-dimensional, the linear segments arrayed in a 3-D arrangement several millimeters “thick”; [common native] *A. borealis*
 - 3 Fresh leaves essentially flat, the linear segments arrayed in a plane; [rare alien] *A. millefolium*

Achillea borealis Bongard, American Yarrow, American Thousandleaf. Grassy balds, meadows, pastures, roadsides, disturbed areas. April-November. Widespread in North America. The *Achillea millefolium* aggregate is a taxonomically very complex entity, with races of different ploidies, and both introduced and native genotypes in e. North America. Ramsey, Robertson & Husband (2008) have recommended treating native North American races as *A. borealis*; most eastern North American populations represent native North American races, most closely allied to e. Asian taxa, with only a few collections of European races from near old port cities (Ramsey, pers. comm.; Ramsey 2011; Levin 2011). [= Y; < *A. millefolium* Linnaeus – FNA, Pa, RAB, SE; = *A. millefolium* ssp. *lanulosa* (Nuttall) Piper – C, G, W; = *A. lanulosa* Nuttall – F, Z; = *A. millefolium* var. *occidentalis* de Candolle – K]

* *Achillea filipendulina* Lamarck, Fern-leaf Yarrow. Disturbed areas, persistent after cultivation; native of the Caucasus. [= FNA, K]

* *Achillea millefolium* Linnaeus, Yarrow, Thousandleaf. Disturbed areas near ports, native of Eurasia. April-November. Only a few collections of the European races of the *Achillea millefolium* aggregate are known, from near old port cities (J. Ramsey, pers. comm.). [= *A. millefolium* – FNA, Pa, RAB, SE; = *A. millefolium* ssp. *millefolium* – C, G; = *A. millefolium* – F, Y, Z; = *A. millefolium* var. *millefolium* – K]

* *Achillea ptarmica* Linnaeus, Sneezeweed, Sneezewort. Disturbed areas; native of Eurasia. June-September. Naturalized south to WV and at scattered sites in PA (Rhoads & Klein 1993). [= C, F, FNA, G, K, Pa, Z]



Acemella L.C. Richard ex C.H. Persoon 1807 (Spotflower)

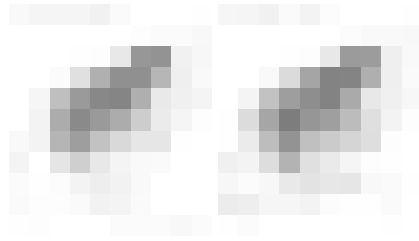
A genus of about 30 species, herbs, primarily of tropical distribution. References: Jansen (1985)=Z; Strother in FNA (2006c); Cronquist (1980)=SE.

- 1 Leaves linear to lanceolate; petioles 2-4.5 mm long; outer series of phyllaries narrowly to broadly ovate, the apex acute; heads radiate or discoid *A. pusilla*
- 1 Leaves narrowly to broadly ovate; petioles (3-) 5-43 mm long; outer series of phyllaries lanceolate, the apex acuminate; heads radiate *A. repens*

* *Acemella pusilla* (Hooker & Arnott) R.K. Jansen, Argentine Spotflower. Lawns, disturbed areas (especially around old seaports); native of South America. May-September. Known from scattered locations in the se. United States (NC, SC, GA,

FL), associated with old seaports, such as Wilmington, NC, Savannah, GA, Pensacola and Apalachicola, FL, and perhaps not well-established at some of the reported locations. Reported as naturalized and "locally common" at a site in Chatham County, GA (Carter, Baker, & Morris 2009). [= FNA, K, WH, Z]

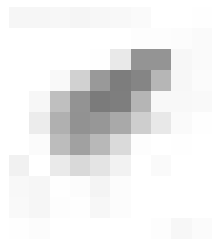
Acmella repens (Walter) L.C. Richard in Persoon, Creeping Spotflower. Floating vegetation mats, roadsides, streambanks, other moist, open, habitats. July-December. Se. NC south to s. FL, west to e. TX, north in the Mississippi Embayment to w. TN and s. MO. Jansen (1985) treats this as var. *repens* of *A. oppositifolia*, the typic var. *oppositifolia* widely distributed from c. Mexico south through Central America into n. South America, stating that var. *repens* "can be easily separated from var. *oppositifolia* by its lanceolate, acuminate phyllaries and short double hairs on the achene margins." Jansen also states that "four factors have caused extreme difficulties in delimiting taxa at the specific and infraspecific level within this group: very close morphological similarity; polyploidy; hybridization, especially between different ploidy levels; and asexual reproduction." In his more statistical taxonomic analyses, his var. *repens* (tetraploid, and the only taxon out of 39 native to North America) separates rather well from *A. oppositifolia* (diploid, tetraploid, and hexaploid). Given the morphological distinctiveness and substantial allopatry of the two taxa, I prefer not to associate this taxon as a variety of the complex *A. oppositifolia*. [= FNA; = *Spilanthes americana* (Mutis ex Linnaeus f.) Hieronymus var. *repens* (Walter) A.H. Moore – RAB, F; < *Spilanthes americana* – C, G, GW, S, SE; = *Acmella oppositifolia* (Lamarck) R.K. Jansen var. *repens* (Walter) R.K. Jansen – K, WH, Z]



Acroptilon Cassini 1827 (Russian Knapweed)

A monotypic genus, native of Eurasia. References: Keil in FNA (2006a); Susanna & Garcia-Jacas in Kadereit & Jeffrey (2007)=Z.

* *Acroptilon repens* (Linnaeus) de Candolle, Russian Knapweed. Disturbed areas; native of Eurasia. Reported for VA (FNA), but there is apparently no documentation for its occurrence there; this serious invasive weed is widespread in western North America, east to OH, KY, and AR. [= FNA, K; = *Centaurea repens* Linnaeus – C, F, G; = *Rhaponticum repens* (Linnaeus) Hidalgo – Z]



Ageratina Spach 1847 (Milk-poison, White Snakeroot)

A genus of about 250-290 species, American. The separation of *Ageratina* from *Eupatorium* is clearly warranted, on morphological, karyological, and molecular grounds. References: Nesom in FNA (2006c); Clewell & Wooten (1971)=Z; Cronquist (1980)=SE. Key based in part on Z and SE.

- 1 Leaves subcoriaceous in texture; leaves crenate or crenate-serrate; leaf blades 3-7 (-10) cm long, 2-5 cm wide; [primarily of xeric or submesic sites].
 - 2 Larger leaf blades >5× as long as the petiole; leaf margins crenate; corolla lobes densely long-pubescent; achenes glabrous; [widespread in our area]..... *A. aromatica*
 - 2 Larger leaf blades (1-) 2-4× as long as the petiole; leaf margins crenate, dentate, or incised; corolla lobes glabrous or sparsely short-pubescent; achenes usually short-pubescent, at least near the apex; [of e. GA southward] *A. jucunda*
- 1 Leaves membranaceous in texture; leaves serrate or coarsely dentate; leaf blades 6-18 cm long, 3-12 cm wide (at least the larger on a given plant usually more 8 cm long); [primarily of mesic sites].
 - 3 Leaves delicately membranaceous, coarsely dentate; larger leaf blades 1.0-1.4× as long as the petiole; [of seepage and waterfall splash zones associated with sandstone rockhouses and cliff bases] *A. luciae-brauniae*
 - 3 Leaves membranaceous, of a "typical" herbaceous character, coarsely serrate; larger leaf blades 1.4-5× as long as the petiole; [of a wide variety of mesic habitats, especially moist forests and forest openings].
 - 4 Phyllaries mostly 3-5 mm long, acute (to obtuse); heads with (9-) 12-25 flowers; leaves deltoid to ovate (the base generally broadly cuneate); heads arranged in open corymbs; [widespread in our area] *A. altissima* var. *altissima*
 - 4 Phyllaries mostly 5-7 mm long, cuspidate-acuminate; heads with (15-) 20-34 flowers; leaves generally deltoid (the base generally subcordate or truncate); heads arranged in dense corymbs; [of moderate to high elevation forests and openings, in the Mountains and upper Piedmont]..... *A. altissima* var. *roanensis*

Ageratina altissima King & H.E. Robinson var. **altissima**. Common White Snakeroot, Common Milk-poison. Moist forests, such as cove forests. Late July-October. Var. **altissima** ranges from QC west to se. ND, south to Panhandle FL and c. TX. Var. **angustata** (A. Gray) Clewell & Wooten ranges from IL and e. KS south to LA and c. TX. This species has been shown to be the cause of the "milk sickness" of pioneer days; the plants contain a poison which is transmissible to humans through cow milk. [= FNA, K, Pa; < *Eupatorium rugosum* Houttuyn – RAB, G, W; = *E. rugosum* Houttuyn var. *rugosum* – C, SE; > *E. rugosum* var. *rugosum* – F; > *E. rugosum* var. *chlorolepis* Fernald – F; > *E. rugosum* var. *tomentellum* (B.L. Robinson) Blake – F; = *Eupatorium urticifolium* Reichard – S; < *A. altissima* var. *altissima* (also see *A. luciae-brauniae*) – WH, Z]

Ageratina altissima King & H.E. Robinson var. **roanensis** (Small) Clewell & Wooten, Appalachian White Snakeroot, Appalachian Milk-poison. Moist forests, often abundant at high elevations. August-October. Endemic to moderate to high elevations of the Southern Appalachians, from nw. VA south to w. SC, n. GA, e. TN, e. KY, and possibly ne. AL. [= FNA, K, Z; < *Eupatorium rugosum* Houttuyn – RAB, G, W; = *Eupatorium rugosum* var. *roanense* (Small) Fernald – C, F, SE; = *Eupatorium roanensis* Small – S]

Ageratina aromatica (Linnaeus) Spach, Small-leaved White Snakeroot, Wild-hoarhound. Woodlands and forests, usually xeric, and often fire-maintained, sandhills, also woodland edges. Late August-October. MA, NY, and OH, south to ne. FL, Panhandle FL, and e. LA (Florida parishes). Two varieties have been delineated, both of them occurring in our area. Var. **incisa** (A. Gray) C.F. Reed is described as differing from var. **aromatica** in having the leaves cuneate (vs. truncate to rounded), acuminate (vs. acute), sharply toothed (vs. bluntly toothed, thin in texture (vs. thick), and the petioles slender and 0.5-2 cm long (vs. less slender and 0.1-1.5 cm). It is supposed to be Southeastern in range, from se. VA south to FL, on the Coastal Plain. The validity of this variety needs further assessment. [= FNA, Pa, WH, Z; = *Eupatorium aromaticum* Linnaeus – RAB, C, G, SE, W; > *Eupatorium aromaticum* var. *aromaticum* – F; > *Eupatorium aromaticum* var. *incisum* A. Gray – F; > *A. aromatica* var. *aromatica* – K; > *A. aromatica* var. *incisa* (Gray) C.F. Reed – K; > *Eupatorium latidens* Small – S; > *Eupatorium aromaticum* Linnaeus – S]

Ageratina jucunda (Greene) Clewell & Wooten, Hammock Snakeroot. Sandhills, dry pinelands, and subxeric hardwood hammocks. Se. GA south to s. FL, west to e. Panhandle FL. [= FNA, K, WH, Z; = *Eupatorium jucundum* Greene – S, SE]

Ageratina luciae-brauniae (Fernald) King & H.E. Robinson, Rockhouse White Snakeroot. Sandstone rockhouses, at the base of sandstone cliffs (usually overhanging) in seepage or splash. Endemic to the Cumberland Plateau of ne. TN (Chester, Wofford, & Kral 1997) and se. KY. Although considered by Clewell & Wooten (1971) as mere aberrant plants, Wofford (1976) determined that *A. luciae-brauniae* is a species. [= FNA, K; = *Eupatorium luciae-brauniae* Fernald – C, F, G, SE; < *A. altissima* var. *altissima* – Z]



Ageratum Linnaeus 1753 (Ageratum, Flossflower, Pussyfoot)

A genus of about 44 species, herbs, of tropical America. References: Nesom in FNA (2006c); Cronquist (1980)=SE. Key based on SE.

- 1 Peduncles with short and long non-glandular hairs; phyllaries glabrous to sparsely pubescent with non-glandular hairs.....*A. conyzoides*
- 1 Peduncles with short and long hairs, many of them glandular; phyllaries stipitate-glandular and sparsely pubescent with non-glandular hairs
.....*A. houstonianum*

* **Ageratum conyzoides** Linnaeus, Ageratum. Disturbed areas; apparently native of South America. July-August. [= FNA, K, S, SE, WH]

* **Ageratum houstonianum** P. Miller, Ageratum. Disturbed areas; apparently native of se. Mexico and Central America. July-August. [= FNA, K, S, SE, WH]

Amblyolepis A.P. de Candolle 1836 (Huisache-daisy)

A monotypic genus, an annual herb, native of Texas and n. Mexico. References: Bierner in FNA (2006c).

* **Amblyolepis setigera** A.P. de Candolle, Huisache-daisy. Wool-combing mill waif (Nesom 2004d); native of TX and n. Mexico. [= FNA, K]



Ambrosia Linnaeus 1753 (Ragweed)

A genus of about 43 species, herbs, cosmopolitan. References: Cronquist (1980)=SE; Strother in FNA (2006c).

- 1 Leaves either undivided, with 2 lateral teeth, or palmately 3-5-lobed.
 - 2 Leaves sessile to clasping, 2.5-7 cm long, undivided, with 2 teeth near the base *A. bidentata*
 - 2 Leaves petiolate, 7-30 cm long, (1-) 3 (-5) lobed *A. trifida* var. *trifida*
- 1 Leaves 1- to 2-pinnatifid.
 - 3 Annual, with fibrous roots; fruiting involucre with short, sharp spines *A. artemisiifolia*
 - 3 Perennial, with deep-seated, creeping roots; fruiting involucre with bumps..... *A. psilostachya*

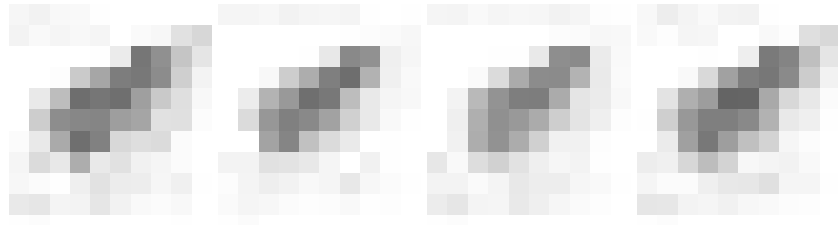
Ambrosia artemisiifolia Linnaeus. Roadsides, gardens, disturbed soils, thin soils on rock outcrops. August-November. NL (Newfoundland), Nunuvut, and BC south to FL, TX, CA and southward. [= RAB, C, FNA, G, Pa, SE; > *A. artemisiifolia* Linnaeus var. *elator* (Linnaeus) Descourtils – F, K; > *A. artemisiifolia* Linnaeus var. *paniculata* (Michaux) Blank – F, K; > *A. artemisiifolia* Linnaeus var. *artemisiifolia* – F, K; > *A. elator* Linnaeus – S; > *A. monophylla* (Walter) Rydberg – S; > *A. glandulosa* Scheele – S]

Ambrosia bidentata Michaux. Mafic woodlands. August-November. CT, NY, and MN south to Panhandle FL and TX. Widely scattered throughout TN, east to e. TN (Chester, Wofford, & Kral 1997) and in nw. GA (Jones & Coile 1988). [= RAB, C, FNA, G, K, S, SE]

Ambrosia psilostachya A.P. de Candolle, Perennial Ragweed. Loamy sandy soil of flats and slight depressions in periodically burned longleaf pine uplands, also in disturbed areas. September-November. MI west to MT, south to LA and NM; also scattered along eastern seaboard states (ME, NH, NY, NC, SC, GA, FL), where perhaps some of the distribution is adventive. Apparently first collected in VA in 2000. [= C, FNA, G, K, Pa, SE, WH; > *A. psilostachya* – RAB; > *A. rugelii* Rydberg – RAB, S; > *A. psilostachya* var. *coronopifolia* (Torrey & Gray) Farwell – F]

Ambrosia species 1, Glade Ragweed. Under investigation by P. McMillan and colleagues at CLEMS. {not yet keyed or mapped}

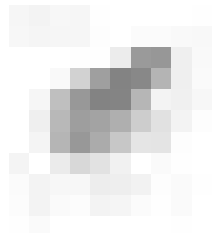
Ambrosia trifida Linnaeus var. *trifida*. Floodplains, moist pastures; disturbed ground. July-November. NS and BC south to n. peninsular FL, Panhandle FL, TX, and CA. [= C, F, G; < *A. trifida* var. *trifida* – K; < *A. trifida* – RAB, FNA, Pa, SE; = *A. trifida* – S]



Ampelaster Nesom 1995 (Climbing-aster)

A monotypic genus, a vining shrub, of se. North America. References: Semple in FNA (2006b); Nesom (2000b); Nesom (1994)=X; Cronquist (1980)=SE.

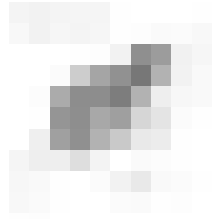
Ampelaster carolinianus (Walter) G.L. Nesom, Climbing Aster. Swamps, thickets, marshes, streambanks. Late September-November. Se. NC south to s. FL. Grown horticulturally. [= FNA, K, X; = *Aster carolinianus* Walter – RAB, GW, S, SE; = *Virgulus carolinianus* (Walter) Reveal & Keener; = *Symphotrichum carolinianum* (Walter) Wunderlin & B.F. Hansen – WH]



Amphiachyris (A.P. de Candolle) Nuttall 1840 (Broomweed)

A genus of 2 species, herbs, of sc. North America. References: Nesom in FNA (2006b); Nesom (2000b); Cronquist (1980)=SE.

* *Amphiachyris dracunculoides* (A.P. de Candolle) Nuttall, Prairie Broomweed, Broom Snakeroot. Disturbed areas over calcareous rocks, wool-combing mill waif (Nesom 2004d). August-September. This species is relatively common and weedy in cedar glade habitats in the Nashville Basin of c. TN, where apparently native (Chester, Wofford, & Kral 1997). [= FNA, K, S; = *Gutierrezia dracunculoides* (A.P. de Candolle) Blake – F, G, SE; = *Xanthocephalum dracunculoides* (A.P. de Candolle) Shinnery]



Anaphalis A.P. de Candolle 1838 (Pearly-everlasting)

A genus of about 35 to 110 species, herbs, of tropical and temperate areas, with a center of diversity in Asia. References: Nesom in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE.

Anaphalis margaritacea (Linnaeus) Benth & Hooker f., Pearly-everlasting. Dry open places, probably persistent from cultivation in NC, seemingly native northward. July-October. Interruptedly circumboreal, in North America from NL (Labrador) and NL (Newfoundland) west to AK, south to NC, TN, OK, TX, NM, CA, and Baja California. Very abundant and weedy in large parts of n. and w. North America, sometimes grown for ornament (especially dried arrangements) in our area. [= C, FNA, G, K, Pa, S, SE, W, Z; > *A. margaritacea* var. *angustior* (Miquel) Nakai – F; > *A. margaritacea* var. *intercedens* Hara – F]



Antennaria Gaertner 1791 (Pussytoes)

A genus of about 70 species, herbs, of temperate and subtropical areas. Of our species, *A. neglecta*, *A. solitaria*, *A. virginica*, and *A. plantaginifolia* are sexual diploids. *A. parlinii* is of multiple hybrid origin, includes sexual and asexual populations, and is derived from *A. plantaginifolia*, *A. solitaria*, and *A. racemosa*. *A. howellii* is strictly asexual, and is derived from *A. plantaginifolia*, *A. racemosa*, *A. virginica*, and *A. neglecta* (Bayer 1985). For reasons discussed in Bayer & Stebbins (1982) and parallel to those applied in this work to allopolyploid taxa in *Eupatorium*, the treatment of Bayer (1985) and Bayer & Stebbins (1993, 1982) is preferable to Cronquist's treatments, used in most of the floras covering or approaching our area. Much remains to be learned about the relative habitats and distributions of the various taxa in our area. References: Bayer in FNA (2006a); Bayer & Stebbins (1993)=Z; Bayer & Stebbins (1982)=Y; Arriagada (1998)=X; Cronquist (1980)=SE; Bayer (1985); Bayer & Stebbins (1987); Bayer (1984). Key closely adapted from Z, Y.

- 1 Flowering stalks with 1 head *A. solitaria*
- 1 Flowering stalks with 2 or more heads.
 - 2 Basal leaves prominently 3-5 (-7)-nerved, mostly > 1.5 cm wide.
 - 3 Pistillate involucres 5-7 mm high; pistillate corollas 3-4 mm high; staminate corollas 2-3.5 mm high; basal leaves tomentose on the upper surface; young stolons mostly ascending; staminate and pistillate plants equally common *A. plantaginifolia*
 - 3 Pistillate involucres 7-10 mm high; pistillate corollas 4-7 mm high; staminate corollas 3.5-5 mm high; basal leaves tomentose or glabrous on the upper surface; young stolons mostly decumbent; sexual and apomictic populations present.
 - 4 Basal leaves tomentose on the upper surface (becoming glabrate in age); summit of young cauline stem usually glandless *A. parlinii* ssp. *fallax*
 - 4 Basal leaves glabrous or nearly so on the upper surface (even when young); summit of young cauline stem usually with purple glandular hairs *A. parlinii* ssp. *parlinii*
 - 2 Basal leaves prominently 1-nerved (sometimes with 2 additional obscure veins), mostly < 1.5 cm wide.
 - 5 Young and mature basal leaves glabrous on the upper surface; phyllary tips whitish; flags (flat scarious appendages similar to the tips of phyllaries on the tip of the leaf) present on the upper cauline leaves; species apomictic, populations consisting of pistillate plants only ... *A. howellii* ssp. *canadensis*
 - 5 Young basal leaves pubescent on the upper surface, mature leaves either remaining pubescent or becoming glabrous with age; phyllary tips white, ivory, to light brown; flags present or absent on the upper cauline leaves; species apomictic or sexual.

- 6 Largest basal leaves < 6.0 mm wide and < 20 mm long; pistillate involucre 4.5-7 mm high; species sexual, populations consisting of both pistillate and staminate plants; [of shale barrens from w. VA northward and westward]..... *A. virginica*
- 6 Largest basal leaves > 6.0 mm wide and > 20 mm long; pistillate involucre 7-10 mm high; species apomictic or sexual; [collectively of various habitats and more widespread].
- 7 Middle and upper cauline leaves tipped with flags; mature basal leaves glabrous, young basal leaves pubescent, glabrescent with age; species sexual, populations consisting of both pistillate and staminate plants *A. neglecta*
- 7 Middle and upper cauline leaves blunt or with subulate tips (only those leaves immediately around the corymb with flags); mature and young basal leaves pubescent; species apomictic, populations consisting of pistillate plants only.
- 8 Basal leaves spatulate, with a distinct petiole; stolons mostly 5-8 cm long, with leaves along the stolon almost equal in size to those of the terminal rosette..... *A. howellii* ssp. *neodioica*
- 8 Basal leaves oblanceolate, lacking a distinct petiole; stolons mostly 8-12 cm long, with leaves along the stolon smaller than those of the terminal rosette..... *A. howellii* ssp. *petaloidea*

Antennaria howellii Greene ssp. *canadensis* (Greene) Bayer. Dry woodlands. April-June. NL (Newfoundland) wet to YT, south to VA, WV, OH, IN, and MN. [= FNA, K, Z; = *A. neglecta* Greene var. *canadensis* (Greene) Cronquist - C; = *A. canadensis* Greene - F; = *A. neglecta* Greene var. *randii* (Fernald) Cronquist - G, SE; = *A. neodioica* Greene ssp. *canadensis* (Greene) Bayer & Stebbins - Y; < *A. howellii* - Pa]

Antennaria howellii Greene ssp. *neodioica* (Greene) Bayer. Dry woodlands and rock outcrops. May-June. NL (Newfoundland) west to North West Territory, south to NC, TN, KS, CO, and OR. [= FNA, K, Z; = *A. neglecta* Greene var. *neodioica* (Greene) Cronquist - C; > *A. neodioica* Greene var. *neodioica* - F; > *A. neodioica* Greene var. *attenuata* Fernald - F; = *A. neglecta* Greene var. *attenuata* (Fernald) Cronquist - G, SE; = *A. neodioica* Greene ssp. *neodioica* - Y; < *A. howellii* - Pa]

Antennaria howellii Greene ssp. *petaloidea* (Fernald) Bayer, Field Pussytoes. Dry woodlands. March-May. NL (Newfoundland) west to BC, south to NC, WV, IN, IL, CO, and OR. [= FNA, K, Z; = *A. neglecta* Greene var. *petaloidea* (Fernald) Cronquist - C; = *A. petaloidea* Fernald var. *petaloidea* - F; < *A. neglecta* Greene var. *neglecta* - G, SE; = *A. neodioica* Greene ssp. *petaloidea* (Fernald) Bayer & Stebbins - W; < *A. howellii* - Pa]

Antennaria neglecta Greene, Field Pussytoes. Dry woodlands and fields. April-June. NS west to NT, south to VA, KY, AR, OK, and CO. *A. neglecta* is a sexual diploid ancestor of the *A. howellii* complex (FNA). [= F, FNA, K, Pa, X, Y, Z; = *A. neglecta* var. *neglecta* - C; < *A. neglecta* Greene var. *neglecta* - G, SE]

Antennaria parlinii Fernald ssp. *fallax* (Greene) Bayer & Stebbins, Big-head Pussytoes. Dry woodlands. Late March-May. NS west to MN, south to GA, AL, MS, LA, and TX. [= FNA, K, X, Z; = *A. plantaginifolia* (Linnaeus) Richardson var. *ambigens* (Greene) Cronquist - RAB, C, G, SE; = *A. fallax* Greene var. *calophylla* (Greene) Fernald - F; > *A. calophylla* Greene - S; > *A. fallax* Greene - S; < *A. parlinii* - Pa, W]

Antennaria parlinii Fernald ssp. *parlinii*, Parlin's Pussytoes. Woodlands, roadbanks. Late March-May. NS west to SK, south to GA, AL, MS, LA, and TX. [= FNA, K, X, Z; = *A. plantaginifolia* (Linnaeus) Richardson var. *arnoglossa* (Greene) Cronquist - RAB, G, SE; = *A. plantaginifolia* var. *parlinii* (Fernald) Cronquist - C; > *A. parlinii* Fernald var. *parlinii* - F; > *A. parlinii* var. *arnoglossa* (Greene) Fernald - F; < *A. parlinii* - Pa, W]

Antennaria plantaginifolia (Linnaeus) Richardson, Plantain Pussytoes. Dry woodlands. Late March-early May. NS west to SK, south to FL, AL, MS, AR, and OK. *A. plantaginifolia* is a sexual diploid ancestor of the *A. howellii* complex (FNA). [= FNA, K, Pa, W, X, Z, WH; = *A. plantaginifolia* var. *plantaginifolia* - RAB, C, G, SE; > *A. plantaginifolia* var. *plantaginifolia* - F; > *A. plantaginifolia* var. *petiolata* (Fernald) Heller - F; > *A. plantaginifolia* - S; > *A. caroliniana* Rydberg - S; > *A. plantaginifolia* - S]

Antennaria solitaria Rydberg, Southern Single-head Pussytoes. Forests and woodlands, often mesic. Late March-early May. VA, WV, sw. PA, and s. IN south to GA, LA, and OK. *A. solitaria* is a sexual diploid ancestor of the *A. parlinii* complex (FNA). [= RAB, C, F, FNA, G, K, Pa, S, SE, W, X, Z]

Antennaria virginica Stebbins, Shale-barren Pussytoes. Shale barrens and other dry, rocky habitats. C. PA and w. VA west to OH. *A. virginica* is a sexual diploid (and tetraploid) ancestor of the *A. howellii* complex (FNA). [= C, FNA, K, Pa, W, Y, Z; > *A. virginica* var. *virginica* - F; > *A. virginica* var. *argillicola* Stebbins - F; = *A. neglecta* Greene var. *argillicola* (Stebbins) Cronquist - G, SE]



Anthemis Linnaeus 1753 (Chamomille)

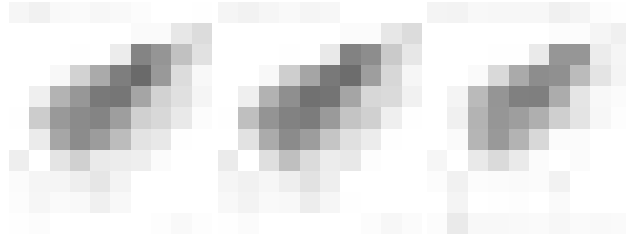
A genus of about 175-210 species, herbs, mainly Eurasian. References: Watson in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. Key adapted from C. [also see *Chamaemelum*, *Cota*]

- 1 Rays yellow [see *Cota tinctoria*]
- 1 Rays white.
 - 2 Rays sterile and usually neutral; receptacle chaffy only toward the middle.....*A. cotula*
 - 2 Rays pistillate and fertile; receptacle chaffy throughout.
 - 3 Achenes not tuberculate; leaves not glandular-punctate beneath *A. arvensis*
 - 3 Achenes tuberculate; leaves glandular-punctate beneath [*A. secundiramea*]

* *Anthemis arvensis* Linnaeus, Corn Chamomille. Roadsides, disturbed areas; native of Europe. Late April-July. Var. *agrestis* differs from var. *arvensis* in having chaff shorter than the disk flowers; both varieties apparently occur in our area. [= RAB, C, FNA, G, Pa, S, SE, W, WH, Z; > *A. arvensis* var. *arvensis* – F, K; > *A. arvensis* var. *agrestis* (Wallroth) A.P. de Candolle – F, K]

* *Anthemis cotula* Linnaeus, Mayweed, Stinking Chamomille, Mayweed, Dog-fennel. Roadsides, disturbed areas; native of Eurasia. May-July. [= RAB, C, F, FNA, G, K, Pa, SE, W, WH, Z; = *Maruta cotula* (Linnaeus) A.P. de Candolle – S]

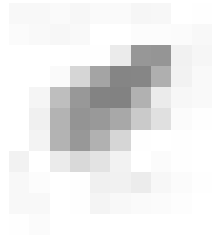
* *Anthemis secundiramea* Bivona-Bernardi. Railroad embankment; native of Mediterranean Europe, probably merely a waif and not established. [= C, F, FNA, K, SE]



Aphanostephus A.P. de Candolle 1836 (Doze-daisy)

A genus of 4 species, of s. United States and Mexico. References: Nesom in FNA (2006b).

Aphanostephus skirrhobasis (Alphonse deCandolle) Trelease var. *thallasius* Shinnars, Dune Doze-daisy. Dunes, disturbed coastal sands. S. LA west to coastal TX and Tamaulipas; scattered in n. FL, both Panhandle FL (Bay and Escambia counties) and ne. FL (St. Johns County) (Wunderlin & Hansen 2004). [= FNA, K, SE, WH; = *A. skirrhobasis* – S, orthographic variant]



Arctium Linnaeus 1753 (Burdock)

A genus of about 11 species (though circumscription remains uncertain), herbs, of the temperate Old World. References: Keil in FNA (2006a); Cronquist (1980)=SE; Duistermaat (1996)=Z.

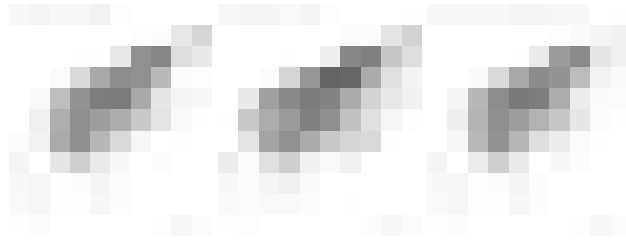
- 1 Inner phyllaries constricted above the middle, widened toward the truncate (or rarely acuminate) apex.....*A. tomentosum*
- 1 Inner phyllaries never constricted above the middle, gradually narrowing toward the acute to acuminate apex.
 - 2 Petiole of the basal leaves solid; heads in the upper part of the inflorescence on peduncles > 2.5 cm long; heads corymbosely arranged on the main branches.....*A. lappa*
 - 2 Petiole of the basal leaves hollow (at least toward its base); heads in the upper party of the inflorescence on peduncles < 2 cm long; heads racemosely arranged on the main branches.
 - 3 Heads 1.1-2.4 cm in diameter; heads on terminal branches sessile or pedunculate; middle phyllaries < 1.8 mm wide; corolla with glandular hairs *A. minus*
 - 3 Heads 1.9-2.9 cm in diameter; heads on terminal branches sessile; middle phyllaries (1.6-) 1.7-2.5 mm wide; corolla glabrous [*A. nemorosum*]

* *Arctium lappa* Linnaeus, Great Burdock. Fields and roadsides; native of Eurasia. July-November. [= RAB, C, F, FNA, G, K, Pa, SE, Z]

* *Arctium minus* Bernhardt, Common Burdock. Pastures, barnyards, roadsides, other disturbed areas; native of Eurasia. Late June-November. [= RAB, C, F, FNA, K, Pa, S, SE, W, Z; < *A. minus* – G; = *A. minus* ssp. *minus*]

* *Arctium nemorosum* Lejeune & Courtois. Reported for VA by Kartesz (1999) on the basis of Fernald (1950); it is probable that this record is a misidentification. [= C, F, FNA, Z; < *A. minus* – G; = *A. vulgare* (Hill) Evans – K; = *A. minus* Bernhardt ssp. *nemorosum* (Lejeune & Courtois) Syme] {rejected as a component of our flora; not mapped}

* *Arctium tomentosum* P. Miller, Cotton Burdock. Disturbed areas; native of Eurasia. July-November. Material purporting to be this taxon from Union County, SC, and the basis of its occurrence in that state, is actually a pubescent form of *A. minus*. [= C, F, FNA, G, K, SE, Z; = *A. nemorosum* Lejeune & Courtois – RAB, misapplied]



***Arctotis* Linnaeus 1753 (African-daisy, Arctotis)**

A genus of about 60 species, annual and perennial herbs, native of South Africa. References: Norlindh (1965)=Z; Mahoney in FNA (2006a); McKenzie et al. (2006).

* *Arctotis venusta* T. Norlindh, Blue-eyed African-daisy, Silver Arctotis. Disturbed areas; native of s. Africa. [= Z; < *Arctotis stoechadifolia* P.J. Bergius – FNA, K]



***Arnica* Linnaeus 1753 (Arnica)**

A genus of about 29-32 species, perennial herbs, north temperate, boreal, and arctic. References: Wolf in FNA (2006c); Cronquist (1980)=SE.

Arnica acaulis (Walter) Britton, Sterns, & Poggenburg, Leopard's-bane, Southeastern Arnica. Pine savannas, sandhills, clayey or sandy woodlands, powerline rights-of-way, roadbanks. Late March-June. DE (historical) and se. PA (where on serpentine) south to Panhandle FL, on the Coastal Plain and lower Piedmont. [= RAB, C, F, FNA, G, GW, K, Pa, S, SE; = *Doronicum acaule* Walter]



***Arnoglossum* Rafinesque 1817 (Indian-plantain)**

A genus of about 8 species, herbs, of e. North America. References: Anderson in FNA (2006b); Cronquist (1980)=SE; Anderson (1998)=Z; Barkley (1999)=Y; Kral & Godfrey (1958)=X; Ward (2004c)=Q; Harper (1905)=V; Pippen (1978)=U; Robinson (1974).

- 1 Larger leaves palmately veined, cordate at the base, either strongly toothed or lobed.
 - 2 Leaves glaucous beneath; stem glaucous and terete (or slightly striate) *A. atriplicifolium*
 - 2 Leaves green beneath; stem green and conspicuously grooved *A. reniforme*
- 1 Larger leaves parallel-veined (the primary veins parallel and converging toward the leaf apex), lanceolate to elliptic-lanceolate, cuneate at the base, entire to remotely toothed (usually fewer than 10 teeth per leaf).
- 3 Phyllaries not wing-keeled; stem terete.
 - 4 Basal and lower cauline leaves linear to lanceolate, green to slightly glaucous below; plants 0.5-2.5 m tall; [usually of pine savannas, se. NC south to s. FL, west to e. TX] *A. ovatum* var. *lanceolatum*

- 4 Basal and lower cauline leaves ovate to ovate-lanceolate, glaucous beneath; plants 1.5-2.5 m tall; [usually of shaded, moist to bottomland habitats, e. GA west to e. LA].....*A. ovatum* var. *ovatum*
- 3 Phyllaries wing-keeled; stem strongly angled or sulcate.
- 5 Basal and low-cauline leaves truncate or subcordate at the base; larger leaves irregularly angulate-lobed or toothed, often somewhat hastate at the base; corolla usually pale lavender.....*A. diversifolium*
- 5 Basal and low-cauline leaves cuneate at the base; larger leaves entire, crenate, sinuate, but not lobed or hastate; corolla creamy yellow (or greenish or tinged with pink).
- 6 Phyllary wings highest toward the base; phyllary wings chalky white, erose; leaves with main lateral veins running with the midrib for 2-4 cm into the blade before diverging; [of FL Panhandle].....*A. album*
- 6 Phyllary wings uniform or highest toward the tip; phyllary wings pale green, entire; leaves with main lateral veins diverging from the midrib at or very near the base of the blade, not concurrent; [collectively more widespread].
- 7 Involucres 12-15 mm high; corollas (9-) 11-12 mm long.....*A. floridanum*
- 7 Involucres 8-14 mm high; corollas 7-11.5 mm long.
- 8 Involucres (9.5-) 10-12 (-14) mm high; corollas 8-10 (-11.5) mm long; leaves usually with 7-9 main parallel veins; mid-stem leaves petiolate, with rounded bases).....*A. plantagineum*
- 8 Involucres (8-) 9.5-10 (-12) mm high; corollas 6-8 (-9.5) mm long; leaves usually with 3-5 main parallel veins; mid-stem leaves sessile, with broadly cuneate bases.....*A. sulcatum*

Arnoglossum album L.C. Anderson. Wet pine savannas. Endemic to FL Panhandle (Bay and Gulf counties). [= FNA, K, WH, Z]

Arnoglossum atriplicifolium (Linnaeus) H.E. Robinson, Pale Indian-plantain. Mesic forests, woodland edges, clearings. June-October. NY, MN, and NE south to Panhandle FL and LA (attribution to MA is in error, A.Haines, pers.comm.). [= FNA, K, Pa, WH, Y, Z; = *Cacalia atriplicifolia* Linnaeus – RAB, C, F, G, SE, U, W; = *Mesadenia atriplicifolia* (Linnaeus) Rafinesque – S]

Arnoglossum diversifolium (Torrey & A. Gray) H.E. Robinson, Variable-leaf Indian-plantain. Calcareous swamps. Sw. GA and Panhandle FL, west to s. AL; disjunct in nw. peninsular FL. May-August; July-September. [= FNA, GW, K, WH, Y, Z; = *Mesadenia diversifolia* (Torrey & A. Gray) Greene – S; = *Cacalia diversifolia* Torrey & A. Gray – SE, U, X]

Arnoglossum floridanum (A. Gray) H.E. Robinson. Sandhills. Ne. FL and e. FL Panhandle south to c. peninsular FL. [= FNA, K, WH, Z; = *Cacalia floridana* A. Gray – SE, U, X; = *Mesadenia floridana* (A. Gray) Greene – S]

Arnoglossum ovatum (Walter) H.E. Robinson var. *lanceolatum* (Nuttall) D.B. Ward, Savanna Indian-plantain. Wet savannas, especially over coquina limestone ("marl"). Late July-October. Se. NC to s. FL, west to e. TX. [= Q; < *Arnoglossum ovatum* – FNA, GW, K, WH, Y, Z; < *Cacalia ovata* Walter – SE, U; = *Mesadenia lanceolata* (Nuttall) Rafinesque – S; > *Mesadenia lanceolata* var. *lanceolata* – V; > *Mesadenia lanceolata* var. *virescens* Harper – V; = *Cacalia lanceolata* var. *lanceolata* – X]

Arnoglossum ovatum (Walter) H.E. Robinson var. *ovatum*, Broadleaf Indian-plantain. Bottomlands, bay forests, moist or wet forests. Late July-October. E. GA west to e. LA. The division of *A. ovatum* into two taxa (species or, as done here, varieties) needs additional study. [= Q; < *Arnoglossum ovatum* – FNA, GW, K, WH, Y, Z; < *Cacalia ovata* Walter – SE, U; > *Mesadenia elliottii* R.M. Harper – S; > *Mesadenia maxima* R.M. Harper – S; = *Cacalia lanceolata* var. *elliottii* (Shinners) Kral & Godfrey – X]

Arnoglossum plantagineum Rafinesque. {habitats} Nashville Basin of c. TN (Chester, Wofford, & Kral 1997), AL, MS, LA, and KY; also reported for sc. SC, in the unpublished flora of the Savannah River Site by Batson, Angerman, and Jones. [= FNA, K, Y, Z; = *Cacalia tuberosa* Nuttall – G; = *Mesadenia tuberosa* (Nuttall) Britton – S; = *Cacalia plantaginea* (Rafinesque) Shinners – SE, U]

Arnoglossum reniforme (Hooker) H.E. Robinson, Great Indian-plantain. Cove forests, other mesic forests. June-October. The very large, reniform leaves (sometimes up to 80 cm across) are conspicuous in rich cove forests. PA and MN, south to GA, MS, and OK. [= FNA, Pa, Y, Z; = *Arnoglossum muehlenbergii* (Schultz 'Bipontinus') H.E. Robinson – K; = *Cacalia muehlenbergii* (Schultz 'Bipontinus') Fernald – RAB, C, F, G, SE, U, V, W; = *Mesadenia reniformis* (Hooker) Rafinesque – S]

Arnoglossum sulcatum (Fernald) H.E. Robinson, Grooved-stem Indian-plantain. Bottomland forests. Sw. GA and Panhandle FL west to s. AL. [= FNA, GW, K, Y, WH, Z; = *Mesadenia sulcata* (Fernald) Harper – S; = *Cacalia sulcata* Fernald – SE, U, X]



Artemisia Linnaeus 1753 (Wormwood, Mugwort, Sage)

If defined (as here) to include the segregate genus *Seriphidium*, a genus of about 500 species, shrubs and herbs, north temperate, boreal, and arctic. References: Shulz in FNA (2006a); Ling Yeou-Ruenn (1995)=Z; Cronquist (1980)=SE; Arriagada & Miller (1997)=Y. Key based primarily on C.

- 1 Disk flowers sterile, with abortive ovaries; plant not aromatic when fresh; [subgenus *Dracunculus*]*A. caudata*
- 1 Disk flowers fertile, with normal ovaries; plant variously aromatic or not when fresh.
 - 2 Receptacle bearing dense long hairs between the flowers; plant strongly aromatic when fresh; [subgenus *Absinthium*]*A. absinthium*
 - 2 Receptacle not pubescent; plant variously aromatic or not when fresh; [subgenus *Artemisia*].
 - 3 Leaves green, essentially glabrous on the lower surface; annuals or biennials from a taproot; plants lacking nonflowering shoots.
 - 4 Inflorescence obviously paniculate, the branches evident, the heads on slender peduncles; involucre 1-2 mm high and 1-2 mm wide; fresh plants sweet-aromatic*A. annua*
 - 4 Inflorescence spike-like, the heads crowded and hiding the branches; involucre 2-3 mm high, 2-3 mm wide; fresh plants not aromatic*A. biennis* var. *biennis*
 - 3 Leaves tomentose on the lower surface, densely so in many species; perennials from a branched rhizome or woody caudex; plants with nonflowering shoots.
 - 5 Principal leaves 2-3-pinnatifid, the terminal segments < 1.5 mm wide; plant a shrub or suffrutescent herb.
 - 6 Leaves green above, 3-6 cm long*A. abrotanum*
 - 6 Leaves white-tomentose above, 1-3 cm long*A. pontica*
 - 5 Principal leaves entire to 2-pinnatifid, the terminal segments > 2 mm wide; plant an herb (sometimes somewhat woody at the base).
 - 7 Involucres 6-10 mm high; disk corollas 3.2-4 mm long*A. stelleriana*
 - 7 Involucres 2.5-5 mm high; disk corollas 1-3 mm long.
 - 8 Leaves entire to 1-pinnatifid; leaves lacking stipule-like lobes at the base*A. ludoviciana*
 - 8 Leaves 2-pinnatifid; leaves with 1-2 stipule-like lobes at the base*A. vulgaris*

- * *Artemisia abrotanum* Linnaeus, Southernwood, Lad's Love, Old Man. Disturbed areas; native of Eurasia. August-September. Also reported as a waif in e. VA (Reed 1964). [= C, F, FNA, G, K, S, SE, Y, Z]
- * *Artemisia absinthium* Linnaeus, Common Wormwood, Absinthium. Disturbed areas; native of Europe. July-September. [= C, F, FNA, G, K, Pa, S, SE, Y, Z; > *A. absinthium* var. *insipida* Stechmann]
- * *Artemisia annua* Linnaeus, Sweet Annie, Sweet Wormwood, Annual Mugwort. Roadsides, disturbed areas, waste areas around wool-combing mills (Nesom 2004d); native of Asia and e. Europe. August-November. [= C, F, FNA, G, K, Pa, S, SE, Y, Z]
- * *Artemisia biennis* Willdenow var. *biennis*, Biennial Wormwood. Disturbed areas, waste area around wool-combing mills; native of the w. United States. Reported for SC by Nesom (2004d); also reported to be naturalized as far east as TN and WV (Hardy County). [= C, K; < *A. biennis* - F, FNA, Pa] {synonymy incomplete}
- * *Artemisia caudata* Michaux. Sandy woodlands; presumably introduced from western United States. September-October. [= RAB, S, Z; = *A. campestris* Linnaeus ssp. *caudata* (Michaux) H.M. Hall & Clements - FNA, K, Pa, SE, WH, Y; > *A. caudata* var. *caudata* - F; > *A. caudata* var. *calvens* Lunell - F; = *Oligosporus caudatus* (Michaux) Poljakov; = *Oligosporus campestris* (Linnaeus) Cassini ssp. *caudatus* (Michaux) W.A. Weber]
- * *Artemisia ludoviciana* Nuttall, White Sage, Prairie Sage. Roadsides, disturbed areas; native of western North America. Late August-November. [= Pa, WH; > *A. ludoviciana* - RAB, Z; = *A. ludoviciana* var. *ludoviciana* - C, G, SE; > *A. ludoviciana* Nuttall var. *gnaphalodes* (Nuttall) Torrey & A. Gray - F; > *A. ludoviciana* var. *ludoviciana* - F; = *A. ludoviciana* ssp. *ludoviciana* - FNA, K]
- * *Artemisia pontica* Linnaeus, Roman Wormwood, Green-ginger. Disturbed areas, old fields, woodland edges, roadsides, ditches; native of Europe. August-September. Naturalized at least as far south as DE, se. PA (Rhoads & Klein 1993), and KY. [= C, F, FNA, G, K, Pa]
- * *Artemisia stelleriana* Besser, Beach Wormwood, Dusty Miller, Hoary Mugwort. Sandy roadsides, dunes, other disturbed areas; native of Japan and ne. Asia. May-September. This plant is reported (with documenting photograph) as naturalized and spreading in Nags Head (Dare County, NC) (Graetz 1973). [= C, F, FNA, G, K, SE, WH, Z; = *A. stelleriana* - Y, orthographic variant]
- * *Artemisia vulgaris* Linnaeus, Mugwort, Felon Herb. Roadsides, pastures, disturbed areas; native of Eurasia. July-November. [= RAB, C, FNA, Pa, S, SE, WH, Y, Z; > *A. vulgaris* var. *vulgaris* - F, K]



Aster Linnaeus 1753 (Aster)

It is now abundantly clear that the traditional, broad circumscription of *Aster*, as a genus of some 250 species of North America and Eurasia, is untenable. All of our native asters have affinities elsewhere than with Old World *Aster*; most are now placed in *Symphotrichum* and *Eurybia*, with fewer species in *Ampelaster*, *Doellingeria*, *Ionactis*, *Oclemena*, and *Sericocarpus*. These changes will undoubtedly cause uproar. It may be worth noting for those that consider the dissolution of *Aster* as radical, that most of the segregate genera were recognized in the 19th century, and many have been widely recognized for much of the time since. For instance, *Sericocarpus* and *Doellingeria* were both segregated from *Aster* in the early 1830's, and were frequently recognized as distinct, including by Small (1903, 1913, 1933); *Sericocarpus* was in fact usually regarded as a good genus until sunk by Cronquist. References: Brouillet in FNA (2006b); Semple & Brouillet (1980a, 1980b); Jones (1980a, 1980b); Brouillet & Semple (1981); Reveal & Keener (1981); Jones & Young (1983); Jones (1984); Semple, Chmielewski, & Lane (1989); Nesom (1993a, 1993b, 1994a, 1994b, 2000b); Semple, Heard, & Xiang (1996); Noyes & Rieseberg (1999); Nesom (1994)=X; Semple, Heard, & Xiang (1996); Cronquist (1980)=SE; R. Jones (1992); Lamboy (1992); Nesom (1997); Xiang & Semple (1996). [also see *Ampelaster*, *Doellingeria*, *Eurybia*, *Ionactis*, *Oclemena*, *Sericocarpus*, *Symphotrichum*]

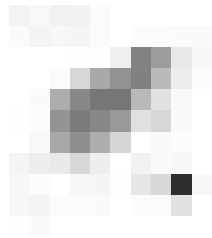
* *Aster tataricus* Linnaeus f., Tartarian Aster. Commonly cultivated, rarely persisting or spreading short distances from plantings; native of Eurasia. September-November. [= RAB, C, FNA, G, K, Pa, SE, W, X]



Astranthium Nuttall 1840 (Western-daisy)

A genus of about 11 species, herbs, of sc. North America and Mexico. References: Nesom in FNA (2006b); Cronquist (1980)=SE; Nesom (2005a)=Z; DeJong (1965)=Y; Nesom (2000b).

Astranthium integrifolium (Michaux) Nuttall. Limestone glades. Nc. KY south through c. TN to nw. GA and ne. AL (primarily in the Interior Low Plateau); disjunct in c. MS and also disjunct in nc. WV, where perhaps introduced. The related *A. ciliatum* (Rafinesque) Nesom of the Ozarkian region and Texas is sometimes treated as a variety, subspecies, or unnamed component of *A. integrifolium*, but see Nesom (2005a) for rationale for recognition at the specific rank. The report for NC by Kartesz (1999) is erroneous; the cited documentation does not mention NC. [= FNA, Z; = *A. integrifolium* var. *integrifolium* - C; = *A. integrifolium* ssp. *integrifolium* - K, Y; < *A. integrifolium* - F, G, SE, W]



Baccharis Linnaeus 1753 (Silverling, High-tide Bush, Mullet Bush, Groundsel Tree)

A genus of about 350-450 species, shrubs, perennial herbs, and trees, of tropical, subtropical, and warm temperate America. References: Sundberg & Bogler in FNA (2006b); Nesom (2000b); Cronquist (1980)=SE. Key based in part on SE.

- 1 Leaves linear, 1-3 mm wide, entire.....*B. angustifolia*
- 1 Leaves obovate, oblanceolate, or elliptic, the larger > 7 mm wide and generally coarsely toothed toward the tip.
 - 2 Leaves entire, spatulate-obovate, 1.5-3 (-3.5) cm long (including the petiole).....*B. dioica*
 - 2 Leaves (at least the larger) with coarse teeth and > 3.5 cm long (including the petiole).
 - 3 Most of the heads sessile (a few pedunculate), the glomerules scattered along leafy branches in the axils of well-developed leaves; [strictly of the outer Coastal Plain, not spread inland as a weed]*B. glomeruliflora*
 - 3 Most of the heads pedunculate (a few sessile), the glomerules grouped into terminal paniculiform inflorescences; [of the outer Coastal Plain and also spread extensively inland as a weed]*B. halimifolia*

Baccharis angustifolia Michaux, False-willow. Interdune swales, wet hammocks, marsh edges. September-October. Ne. NC (Dare County) south to s. FL, west to LA; Bahamas. [= RAB, FNA, GW, K, S, SE, WH]

Baccharis dioica Vahl, Broombush False-willow. Dunes and shores. S. AL; s. FL; West Indies. [= FNA, K, S, SE, WH]

Baccharis glomeruliflora Persoon. Wet hammocks, marsh edges, interdune swales. October-November. Se. NC (Brunswick County) south to s. FL, west to MS; West Indies. [= RAB, FNA, GW, K, S, SE, WH]

Baccharis halimifolia Linnaeus, Silverling, High-tide Bush, Mullet Bush, Groundsel Tree. Fresh and brackish marshes, marsh borders, hammocks, moist abused land, roadsides, ditches, old fields, and a wide variety of disturbed areas. August-October. Se. MA south to s. FL, west to TX, AR, and OK; West Indies. *B. halimifolia* is becoming increasingly common inland, and can be an aggressive invader in sunny sites after silvicultural disturbance. [= RAB, C, F, FNA, G, GW, K, Pa, S, SE, WH]



Balduina Nuttall 1818 (Honeycomb-head, Balduina)

A genus of 3 species, herbs, of se. North America. References: Keener in FNA (2006c); Parker & Jones (1975)=Z; Cronquist (1980)=SE.

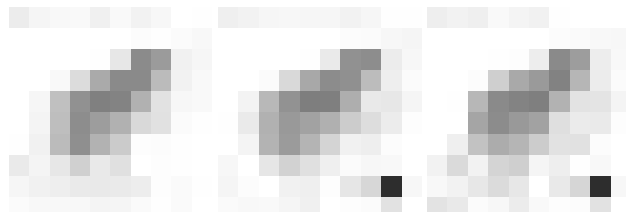
Identification notes: The common name alludes to the honeycomb-like texture of the receptacle, made up of connected receptacular bractlets which surround the achenes. This condition is diagnostic of the genus, and can be seen even when the plant is in flower by stripping the flowers from the receptacle. Superficially, the perennial species resemble some *Helenium* (particularly *H. pinnatifidum* and *H. vernale*), but these bloom months earlier. The punctate leaves are very distinctive.

- 1 Plant an annual or biennial; cauline leaves numerous, linear, 0.5-1.9 mm wide; outer involucre bracts 0.6-1.7 mm wide, lanceolate, acuminate; disk 6-15 mm wide; pappus scales obovate-orbicular, 0.3-0.6 mm long.....[*B. angustifolia*]
- 1 Plant a perennial; cauline leaves few, linear-spatulate, 2-7 mm wide; outer involucre bracts 1.7-3.1 mm wide, ovate, acute; disk (10-) 15-25 mm wide; pappus scales lanceolate, 1.1-2.1 mm long.
- 2 Disk corollas purple; basal leaves linear-spatulate, (7-) avg. 14 (-32) cm long, about 20× as long as wide; cauline leaves 3.8-6.2 cm long; outer phyllaries 2.9-5.4 mm long; inner phyllaries 4.5-7.6 mm long; ray flower ligules 2.3-4.7 mm wide at apex*B. atropurpurea*
- 2 Disk corollas yellow to reddish-orange; basal leaves spatulate, (5-) avg. 7.5 (-10.5) cm long; about 8× as long as wide; cauline leaves 2.7-4.3 cm long; outer phyllaries 4-7.2 mm long; inner phyllaries 5.1-11 mm long; ray flower ligules 3.2-8.6 mm wide at apex*B. uniflora*

Balduina angustifolia (Pursh) B.L. Robinson. Sandhills and other dry, sandy soils. GA south to s. FL, west to s. MS; it should be sought in s. SC. [= FNA, K, SE, WH, Z; = *Actinospermum angustifolium* (Pursh) Torrey & A. Gray – S]

Balduina atropurpurea R.M. Harper, Bog Honeycomb-head, Purple Honeycomb-head, Purple Balduina. Peaty seepage bogs and wet pine savannas. Late August-early November; October-December. A southeastern Coastal Plain endemic, very rare and disjunct in se. NC and nc. SC (where not recently seen), primarily in ne. to sc. GA and ne. FL. [= RAB, FNA, GW, K, SE, Z; = *Endorima atropurpurea* (R.M. Harper) Small – S]

Balduina uniflora Nuttall, Savanna Honeycomb-head, Yellow Balduina. Wet pine savannas and pine flatwoods. Late July-September. A southeastern Coastal Plain endemic: se. NC and immediately adjacent ne. SC (apparently absent from much of SC), and from extreme s. SC south to ne. FL, FL Panhandle, and west to e. LA. [= RAB, FNA, GW, K, SE, Z; = *Endorima uniflora* (Nuttall) Rafinesque – S]



Bellis Linnaeus 1753 (English Daisy)

A genus of about 8 species, herbs, of Europe. References: Nesom (2000b); Brouillet in FNA (2006b); Cronquist (1980)=SE.

* *Bellis perennis* Linnaeus, English Daisy. Lawns, grassy roadsides; native of Europe. March-June. [= RAB, C, F, FNA, G, K, Pa, SE]



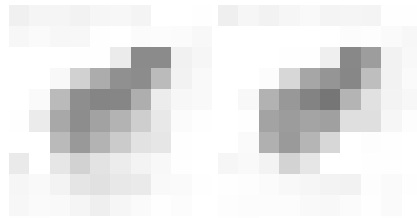
Berlandiera A.P. de Candolle 1836 (Green-eyes)

A genus of 4-5 species, perennial herbs and subshrubs, of s. North America and Mexico. References: Pinkava in FNA (2006c); Cronquist (1980)=SE; Nesom & Turner (1998)=Z.

- 1 Leaves mainly cauline; leaves unlobed; disk flowers red to maroon; [of nc. SC south to n. FL, west to TX].....**B. pumila** var. **pumila**
- 1 Leaves basally disposed; leaves deeply lobed; disk flowers yellow; [of n. FL southward]..... **B. subcaulis**

Berlandiera pumila (Michaux) Nuttall var. **pumila**, Eastern Green-eyes. Sandhills, disturbed sandy areas. Late May-November. Nc. SC south to n. peninsular FL, west to s. AL; w. LA to c. TX. Plants in w. LA and e. TX accepted here as **B. pumila** var. **scabrella** G.L. Nesom & Turner (1998) are also considered to represent introgression between **B. pumila** and **B. texana** de Candolle (Pinkava in FNA 2006c). [= K, Z; < **B. pumila** – RAB, FNA, S, SE, WH]

Berlandiera subcaulis (Nuttall) Nuttall, Florida Green-eyes. Sandhills. Endemic to FL, from ne. FL (Clay and Columbia counties) and e. Panhandle FL (Leon, Jefferson, and Taylor counties) south to s. FL (Wunderlin & Hansen 2004). [= FNA, K, S, SE, WH]



Bidens Linnaeus 1753 (Beggarticks, Bur-marigold)

A genus of about 240 species, herbs, cosmopolitan. Recent molecular studies suggest that the relationship between **Bidens** and **Coreopsis** is complex, and that changes in taxonomy will be needed to more accurately reflect relationships (Kim et al. 1999; Crawford & Mort 2005). References: Strother & Weedon in FNA (2006c); Cronquist (1980)=SE; Sherff & Alexander (1955)=Z; Ballard (1986)=Y. Key based on FNA.

Identification notes: The involucre of phyllaries is subtended by an additional series of bracteal structures, the **calyculus**.

- 1 Plant aquatic, the leaves finely divided into segments < 0.5 mm wide; pappus awns 13-25 (-40) mm long **B. beckii**
- 1 Plant terrestrial or wetland, but not aquatic, the leaf segments > 0.5 mm wide; pappus awns lacking or present, if present < 10 mm long.
 - 2 Inner cypselas more-or-less equally 4-angled, thickest near the middle and equally tapered to both ends; ray florets white, pink, or pale yellow (or absent).
 - 3 Leaves 2-3× dissected, primary lobes > 20, the ultimate segments rounded to acute, 2-10 mm wide; ray florets yellowish.... **B. bipinnata**
 - 3 Leaves mostly once-pinnate, primary lobes 3-7, the ultimate segments serrate and acute, 8-50 mm wide; ray florets white or absent.
 - 4 Ray florets 5-8, the ligule 5-16 mm long; cypselas 2-awned, the awns 1-2 mm long; outer phyllaries (8-) 12 (-16)..... **B. alba** var. **radiata**
 - 4 Ray florets 0 (or if a few present, the ligule < 3 mm long); cypselas 3 (-5)-awned, the awns 1-3 mm long; outer phyllaries 7-10..... **B. pilosa**
 - 2 Inner cypselas flattened (if 4-angled, the alternating angles acute and obtuse), thickest toward the tip; ray florets yellow or orange (or absent).
 - 5 Most leaves simple, the margins dentate to serrate or incised (with 3-7 lobes).
 - 6 Leaves (except sometimes the lower) sessile; heads usually nodding, at least in age.
 - 7 Rays absent, or present and 2-15 (-18) mm long; pales (receptacular bracts) with tan or yellow tips; outer cypselas (3-) 5-6+ mm long, inner cypselas 4-8 mm long (the margins ± thickened or winged); pappus of (2-) 4 awns (1-) 2-4 mm long **B. cernua**
 - 7 Rays present, (10-) 15-25 (-30) mm long; pales (receptacular bracts) with orange or red tips; outer cypselas 6-8 mm, inner cypselas 8-10 mm (margins not notably thickened or winged); pappus of 2-4 awns 3-5 mm long..... **B. laevis**
 - 6 Leaves with a distinct petiole 1-4 cm long (this sometimes winged); heads erect.
 - 8 Rays 12-25+ mm long; cypselas 2.5-4.5 mm long, the margins not barbed or ciliate **B. mitis**
 - 8 Rays absent or 2-5 (-12) mm long; cypselas (3-) 6-13 mm long, the margins sometimes barbed or ciliate.
 - 9 Involucres usually campanulate to cylindric, sometimes ± hemispheric; disc florets (6-) 10-25 (-60); cypselas faces usually ± striate, sometimes tuberculate..... **B. bidentoides**

- 9 Involucres campanulate to hemispheric or broader; disc florets (5-) 20-60 (-150+); cypselas faces usually smooth or tuberculate (not notably striate).
- 10 Cypselas ± flattened, sometimes weakly 3 (-4)-angled and 3 (-4)-awned, the faces usually smooth, seldom notably tuberculate; disc corollas 4-lobed, light yellow; anthers usually pale..... *B. comosa*
- 10 Cypselas (at least inner) usually ± 4-angled and 4-awned, the faces usually strigose or tuberculate; disc corollas 5-lobed, orange-yellow; anthers usually blackish..... *B. connata*
- 5 Most leaves **either** 1-pinnately compound, the 3-5 (-7) leaflets petiolulate, **or** -1-2× pinnately lobed.
- 11 Ray florets 0, or rays 1-3, the laminae 2-3.5 mm long.
 - 12 Calyculus bractlets (3-) 4 (-5), seldom ciliate; disc florets usually 10-20..... *B. discoidea*
 - 12 Calyculus bractlets 5-21, usually ciliate; disc florets 20-150.
 - 13 Calyculus bractlets (5-) 8 (-10); leaves usually 3 (-5)-foliolate..... *B. frondosa*
 - 13 Calyculus bractlets 10-16 (-21); leaves usually laciniate or pinnatisect..... *B. vulgata*
- 11 Ray florets (5-) 8-13, the laminae 10-30 mm long.
 - 14 Cypselas 2.5-4× as long as wide *B. trichosperma*
 - 14 Cypselas 1.5-2 (-2.5)× as long as wide.
 - 15 Cypselas 2.5-5 mm long, the margins not winged, barbed, or ciliate..... *B. mitis*
 - 15 Cypselas (4-) 5-8 mm long, the margins usually barbed or ciliate, and often also corky-winged.
 - 16 Calyculus bractlets 8-12 (-16), these (4-) 5-7 (-12) mm long *B. aristosa*
 - 16 Calyculus bractlets 12-21, these (6-) 8-12 (20) mm long *B. polylepis*

Bidens alba (Linnaeus) A.P. de Candolle var. *radiata* (Schultz ‘Bipontinus’) Ballard ex T.E. Melchert. Cp (FL, GA, NC, SC, VA): disturbed areas; common (uncommon in GA, NC, SC, rare in VA), adventive from the New World tropics. [= K, Y; < *B. pilosa* Linnaeus – RAB, FNA, S, SE; < *B. alba* – WH; = *B. pilosa* Linnaeus var. *radiata* Schultz ‘Bipontinus’ – Z]

Bidens aristosa (Michaux) Britton, Midwestern Tickseed-sunflower. Marshes, wet meadows, ditches. August-October (-November). DE, MD, IL, and MO south to FL and TX (and adventive farther north). [= RAB, C, FNA, G, GW, Pa, S, SE, W; > *B. aristosa* var. *aristosa* – F, S, Z; > *B. aristosa* var. *fritcheyi* Fernald – F, Z; > *B. aristosa* var. *mutica* (A. Gray) Gattinger – F, S, Z; < *B. aristosa* – K (also see *B. polylepis*)]

Bidens beckii Torrey ex Sprengel, Water-marigold, Water Beggar-ticks. South to c. PA and n. NJ. July-October. This species is sometimes treated in the monotypic genus *Megalodonta*; this is contradicted by molecular evidence, which shows *B. beckii* as a component of *Bidens* (Ganders 2000). [= C, FNA, G; = *Megalodonta beckii* (Torrey ex Sprengel) Greene – F, K; > *Megalodonta beckii* var. *beckii* – Z] {approaching our area, but known documentation as a component of our flora; rejected; not mapped}

Bidens bidentoides (Nuttall) Britton. Tidal shores and mudflats. NY south to se. PA, DE, and e. MD. July-October. [= C, FNA, G, Pa, K; > *B. bidentoides* – F; > *B. mariana* Blake – F; > *B. bidentoides* var. *bidentoides* – Z; > *B. bidentoides* var. *mariana* – Z]

Bidens bipinnata Linnaeus, Spanish Needles. Floodplains, disturbed areas, gardens, fields, roadsides, ditches. MA, NY, ON, IA, NE, and AZ south to Mexico; also e. Asia. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WH; > *B. bipinnata* var. *bipinnata* – Z]

Bidens cernua Linnaeus, Bur-marigold. Marshes, wet meadows, bogs, ditches. August-October. Circumboreal, south in North America to GA, AL, LA, NM, AZ, and CA. [= RAB, C, FNA, G, GW, K, Pa, S, SE, W; > *B. cernua* var. *cernua* – F, Z; > *B. cernua* var. *elliptica* Wiegand – F; > *B. cernua* var. *integra* Wiegand – F]

Bidens comosa (A. Gray) Wiegand, Strawstem Beggar-ticks. Cp (DE, VA), Pd (DE, VA), Mt (VA, WV), {GA, NC, SC}: marshes, bogs, wet meadows, disturbed areas; common. August-October. NL (Newfoundland) and BC south to GA, TX, and CA. Closely related to, and sometimes included in, the Eurasian *B. tripartita*. [< *B. comosa* (A. Gray) Wiegand – C, F, G, S; < *B. tripartita* – RAB, FNA, K, Pa; = *B. tripartita* ssp. *comosa* (A. Gray) A. Haines]

Bidens connata Muhlenberg, Purplestem Beggar-ticks. Mt (GA, WV), Cp (DE, VA), {NC, SC}: marshes, bogs, wet meadows, disturbed areas; uncommon? (rare in VA and WV). August-October. QC, ON, and ND south to GA, AL, and KS. [= C, FNA, G, K, Pa, S; < *B. tripartita* Linnaeus – RAB; > *B. connata* var. *anomala* Farwell – F, Z; > *B. connata* var. *connata* – F, Z; > *B. connata* var. *fallax* (Warnstorf) Sherff – F, Z; > *B. connata* var. *petiolata* (Nuttall) Farwell – F, Z]

Bidens discoidea (Torrey & A. Gray) Britton, Few-bracted Beggar-ticks. Floodplain forests, marshes. Late August-November. NS and MN south to ne. FL, Panhandle FL, and TX. [= RAB, C, F, FNA, G, GW, K, Pa, S, SE, W, WH, Z]

Bidens frondosa Linnaeus, Devil’s Beggar-ticks. Fields, pastures, wet meadows, swamp forests, ditches. June-October. Nova Scotia and AK south to FL, TX, CA, and southward. [= RAB, C, FNA, G, GW, K, Pa, S, SE, W, WH; > *B. frondosa* var. *frondosa* – F, Z; > *B. frondosa* var. *anomala* Porter – Z]

Bidens laevis (Linnaeus) Britton, Sterns, & Poggenburg, Showy Bur-marigold. Marshes, stream banks, ditches. August-November. ME, NY, IN, MO, NV, and CA southward. [= RAB, C, F, FNA, G, GW, K, Pa, SE, W, WH, Z; > *B. laevis* – S; > *B. nashii* Small – S]

Bidens mitis (Michaux) Sherff, Coastal Plain Tickseed-sunflower. Brackish marshes, fresh marshes, bogs (inland). July-October. NJ south to FL, west to TX, primarily Coastal Plain, rare and scattered inland. [= RAB, C, F, FNA, G, GW, K, SE, W, WH, Z; > *B. mitis* var. *leptophylla* (Nuttall) Small – S; > *B. mitis* var. *mitis* – S]

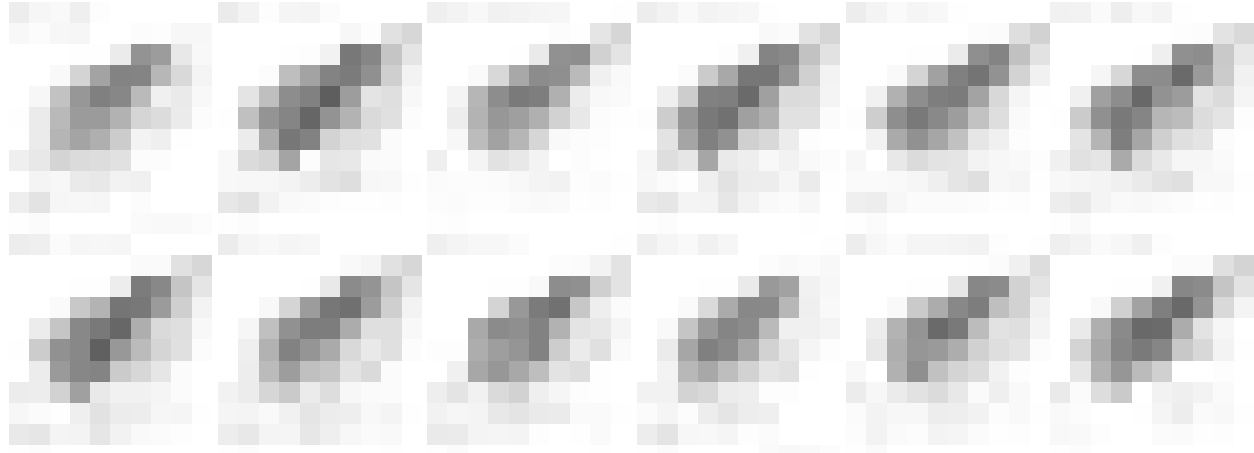
* *Bidens pilosa* Linnaeus. Waste areas near wool-combing mill, ballast, other disturbed areas; native of tropical America. Reported for NC (Kartesz 1999), perhaps based on confusion with *B. alba*; known from ballast in se. PA (Rhoads & Klein 1993). [= K, WH; > *B. pilosa* – FNA; > *B. pilosa* var. *pilosa* – Z; > *B. pilosa* Linnaeus var. *bimucronata* (Turczaninov) Schultz ‘Bipontinus’ – Z]

* *Bidens polylepis* Blake, Ozark Tickseed-sunflower. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): marshes, wet meadows, bogs, ditches; uncommon (common in DE Coastal Plain). August-October. NJ, QC, and CO south to SC, AL, TX, and NM. [= RAB, C, FNA, G, GW, Pa, SE, W; > *B. polylepis* var. *polylepis* – F, Z; > *B. polylepis* var. *retrorsa* Sherff – F, Z; < *B. aristosa* – K]

Bidens trichosperma (Michaux) Britton, Northern Tickseed-sunflower. Tidal marshes, other marshes. August-October. QC, MN, and SD south to GA, LA, and NE. [= FNA, Pa; = *B. coronata* (Linnaeus) Britton – RAB, C, G, GW, K, S, SE (name invalid); > *B. coronata* var. *coronata* – F, Z; > *B. coronata* var. *brachyodonta* Fernald – F; > *B. coronata* var. *trichosperma* (Michaux) Fernald – F]

* *Bidens tripartita* Linnaeus. Eurasian; not known to be in our area. {combined distribution of *comosa*, *connata*, and *tripartita*: Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): marshes, swamps} [*> B. tripartita* – F, G, W, Z; *< B. comosa* (A. Gray) Wiegand – C, F, G, S; *< B. tripartita* – FNA, K; *< B. tripartita* – RAB, GW (also see *B. connata* and *B. comosa*)] {not keyed; not mapped}

Bidens vulgata Greene. Tall Beggar-ticks. Fields, marshes, wet places. August-October. QC and BC south to GA, LA, and CA. [= RAB, C, FNA, G, GW, K, Pa, S, SE, W; *> B. vulgata* var. *vulgata* – F, Z]



***Bigelovia* A.P. de Candolle 1836 (Rayless-goldenrod)**

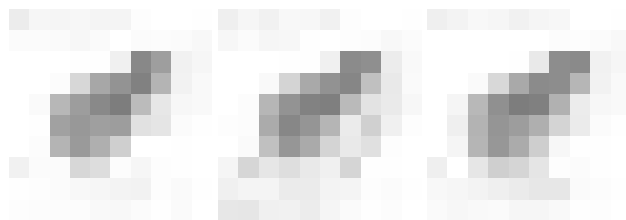
A genus of 2 species (one with 2 varieties), herbs, of se. North America. References: Nesom in FNA (2006b); Anderson (1970)=Z; Cronquist (1980)=SE; Nesom (2000b).

- 1 Basal leaves many, 1-2 mm wide; plants strongly rhizomatous and colonial; [of dry clayey or rocky places]***B. nuttallii***
- 1 Basal leaves few, 2-14 mm wide; plants caespitose, or weakly rhizomatous; [of wet to mesic pine savannas and flatwoods].
 - 2 Leaves mostly > 10 cm long, 2-4 mm wide; involucre 6-7.5 mm high.....***B. nudata* var. *australis***
 - 2 Leaves mostly < 10 cm long, 4-14 mm wide; involucre 4.5-6 mm high.....***B. nudata* var. *nudata***

***Bigelovia nudata* (Michaux) A.P. de Candolle var. *australis* (L.C. Anderson) Shinners.** Mesic pine flatwoods. Ne. FL (Bradford County) south to s. FL. [= FNA, SE; = *B. nudata* ssp. *australis* L.C. Anderson – GW, K, WH, Z; *< Chondrophora nudata* (Michaux) Britton – S]

***Bigelovia nudata* (Michaux) A.P. de Candolle var. *nudata*, Rayless-goldenrod.** Savannas, pine flatwoods, pocosin edges. August-October. E. NC south to n. FL and west to LA. [= FNA, SE; = *B. nudata* ssp. *nudata* – GW, K, WH, Z; *< Chondrophora nudata* (Michaux) Britton – RAB, S]

***Bigelovia nuttallii* (Michaux) A.P. de Candolle.** Prairies, sandstone glades, granite flatrocks, Altamaha Grit glades, and roadbanks. September-October. W. LA west to e. TX; disjunct eastward in Mountains of ne. AL, Piedmont of c. GA, and Coastal Plain of s. AL, ec. GA (Jones & Coile 1988, Bridges & Orzell 1989), Panhandle FL, and wc. peninsular FL. [= FNA, GW, K, SE, WH, Z; = *Chondrophora virgata* (Nuttall) Greene – S, misapplied]



***Boltonia* L'Héritier 1789 (Doll's-daisy)**
(contributed by John F. Townsend and Alan S. Weakley)

A genus of about 6-7 species, herbs, of e. and c. North America. References: Karaman-Castro & Urbatsch in FNA (2006b); Townsend & Karaman-Castro (2006)=X; Morgan (1966)=Z; Anderson (1987)=Y; Cronquist (1980)=SE; Nesom (2000b).

- 1 Achenes with pappus reduced to a short ring of bristles to 0.15 mm long or with occasional slender awns to 0.6 mm; achene wings lacking or up to 0.1 mm wide; faces of achenes glabrous.
- 2 Phyllaries 0.2-0.5 mm wide, whitened throughout or with greenish tip, midrib relatively prominent (25-35% phyllary width); heads 4.3-6.1 mm wide, peduncles 0.25-0.5 mm in diameter; ray corollas white fading to pinkish in age; bracteal leaves narrowly oblanceolate to linear; [of Coastal Plain and Piedmont of VA southward].....***B. caroliniana***

- 2 Phyllaries 0.4-0.9 mm wide, whitened in lower 1/3 to 1/2 only, distal portion green, midrib relatively narrow (8-14% phyllary width); heads 6-11.5 mm wide, peduncles 0.5-1.1 mm in diameter; ray corollas lilac or pinkish (-white); bracteal leaves oblanceolate to oblong; [of Mountains of VA (Augusta County) northward] ***B. montana***
- 1 Achenes with two distinct pappus awns in addition to a shorter ring of bristles, the awns mostly 0.3-1.8 mm long; achene wings obvious, mostly 0.2-0.5 mm wide; faces of achenes pubescent.
- 3 Phyllaries spatulate, oblanceolate, or linear-oblanceolate, apices cuspidate, pappus awns 2/3 or more as long as the achenes; inflorescence diffusely branched, with numerous heads.
 - 4 Phyllaries spatulate to obovate-spatulate, (2-) 2.5-6 mm wide, membranaceous margins broad ***B. asteroides* var. *latisquama***
 - 4 Phyllaries oblanceolate to linear-oblanceolate, 1-2.5 (-3) mm wide, membranaceous margins narrow ***B. asteroides* var. *recognita***
- 3 Phyllaries linear-subulate to lanceolate; inflorescence various.
 - 5 Inflorescence subulate-bracteate.
 - 6 Phyllaries subulate; peduncles filiform ***B. diffusa* var. *diffusa***
 - 6 Phyllaries linear-oblong; peduncles thick ***B. diffusa* var. *interior***
 - 5 Inflorescence more or less leafy-bracteate.
 - 7 Inflorescence diffusely branched, heads relatively numerous, phyllaries (0.2-) 0.3-0.4 (-0.5) mm wide, (1.3-) 1.4-1.8 (-2.1) mm long, pappus awns 0.3-0.8 mm long ***B. apalachicolensis***
 - 7 Inflorescence with loosely ascending branches, heads relatively few, phyllaries (0.5-) 0.7-0.9 (-1.1) mm wide, (1.5-) 2.1-2.4 (-3.5) mm long, pappus awns (0.2-) 0.8-1.1 (-1.3) mm long.
 - 8 Plants reproducing vegetatively by basal offsets, culms ascending, leaves elliptic to obovate with rounded or blunt apices, held at various angles from culm and inflorescence branches, plants with weak apical dominance; [of the Susquehanna River of MD and PA] ***B. asteroides* var. *asteroides***
 - 8 Plants reproducing vegetatively by elongate stolons, culms more strictly erect, leaves lanceolate with acute apices, the leaves oriented at an acute angle to the culm and inflorescence branches, plants with relatively strong apical dominance; [more widespread in our area] ***B. asteroides* var. *glastifolia***

Boltonia apalachicolensis L.C. Anderson, Apalachicola Doll's-daisy. Floodplain forests. August-October. Panhandle FL, s. MS, west to LA. [= FNA, K, WH; < *Boltonia* sp. - GW]

Boltonia asteroides (Linnaeus) L'Héritier var. ***asteroides***, Susquehanna Doll's-daisy. Riverbanks. Along the Susquehanna River, MD and PA. [= Y; < *B. asteroides* var. *asteroides* - C, FNA, G, K, SE, X, Z; = *B. asteroides* var. *asteroides* - F; < *B. asteroides* - Pa]

Boltonia asteroides (Linnaeus) L'Héritier var. ***glastifolia*** (Hill) Fernald, Eastern Doll's-daisy. Marshes, ditches. August-October. NJ south to Panhandle FL, west to MS and LA, mostly on the Coastal Plain, but with a few disjunct occurrences inland, such as Henderson County, NC. [= F; < *B. asteroides* - RAB, W, WH, Y; < *B. asteroides* var. *asteroides* - C, FNA, G, K, SE, X, Z; < *Boltonia* sp. - GW]

Boltonia asteroides (Linnaeus) L'Héritier var. ***recognita*** (Fernald & Griscom) Cronquist. MI, OH, KY, TN west to SK and OK. [= C, FNA, G, K; = *Boltonia recognita* (Fernald & Griscom) G.N. Jones] {synonymy incomplete}

* ***Boltonia asteroides*** (Linnaeus) L'Héritier var. ***latisquama*** (A. Gray) Cronquist, Midwestern Doll's-daisy. Ditches; native of mw. United States. August-October. WI west to ND, south to MS and OK; disjunct (presumably introduced) in NC and se. VA. [= C, FNA, G, K, SE, Z; > *B. latisquama* var. *latisquama* - F; > *B. latisquama* var. *recognita* Fernald & Griscom - F; < *Boltonia* sp. - GW]

Boltonia caroliniana (Walter) Fernald, Carolina Doll's-daisy. Bottomlands, ditches, roadsides, prairies. August-October. Se. VA south to s. SC (and GA according to Kartesz 1999), primarily on the Coastal Plain and Piedmont. [= C, FNA, G, K, SE, X, Y; < *B. caroliniana* - RAB (also see *B. diffusa* var. *diffusa*); > *B. caroliniana* - F; > *B. ravenelii* Fernald & Griscom - F; < *Boltonia* sp. - GW; = *B. diffusa* var. *caroliniana* - Z]

Boltonia diffusa Elliott var. ***diffusa***, Southern Doll's-daisy. Clay-based Carolina bays, roadsides, powerline rights-of-way, and other artificially open areas. August-October. Se. SC south to s. FL, west to e. TX, inland in the interior to c. TN, s. IL, s. MO, AR, and se. OK; disjunct in the Bahamas (Mangrove Cay of Andros Island). See Sorrie & LeBlond (2008) for comments on distribution and nativity. [= FNA, K, Z; < *B. caroliniana* - RAB; < *B. diffusa* - C, G, SE, WH, Y; < *Boltonia* sp. - GW]

Boltonia diffusa Elliott var. ***interior*** Fernald & Griscom. KY and TN west to IL, OK, and LA. [= FNA, K; < *B. diffusa* - C; < *Boltonia* sp. - GW] {synonymy incomplete}

Boltonia montana J.F. Townsend & V. Karaman-Castro, Valley Doll's-daisy. Sinkhole ponds. August-October. Augusta Co. VA and Ridge and Valley wetlands in NJ. See Townsend & Karaman-Castro (2006) for detailed information. [= X; < *B. asteroides* (Linnaeus) L'Héritier var. *asteroides* - FNA; < *Boltonia* sp. - GW]

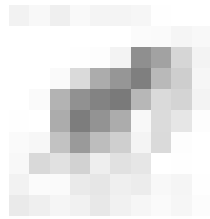




Borrichia Adanson 1763 (Seaside Oxeye)

A genus of 2 species, shrubs, of se. United States and West Indies. References: Semple in FNA (2006c); Cronquist (1980)=SE.

Borrichia frutescens (Linnaeus) A.P. de Candolle, Seaside Oxeye. Salt and brackish marshes. May-September. DC and e. VA south to s. FL, west to TX and Mexico; also in Bermuda. This species often forms nearly pure stands of many hectares, conspicuous from the fleshy, gray leaves. [= RAB, C, F, FNA, G, K, SE, WH]



Brickellia Elliott 1823 (False-boneset)

A genus of about 100-110 species, herbs and shrubs, primarily of sw. North America and Mexico south into Central America. *Kuhnia* appears to be a part of *Brickellia* (King & Robinson 1987; Shinnars 1971). References: Scott in FNA (2006c); Cronquist (1980)=SE; Shinnars (1971)=Z; Shinnars (1946)=Y; Turner (1989)=X.

- 1 Leaves rounded at base; upper stem leaves reduced in size but similar in shape to the lower leaves; pappus purplish, of ca. 40 bristles; [of s. GA south] **B. cordifolia**
- 1 Leaves cuneate at base; upper stem leaves (at least) linear-lanceolate; pappus whitish, of 20-25 bristles; [collectively widespread in our area].
 - 2 Heads 9-15 mm high, with mostly 15-35 florets; [midwestern, east to KY] **B. eupatorioides** var. **corymbulosa**
 - 2 Heads 7-11 mm high, with mostly 6-15 florets; [widespread in our area] **B. eupatorioides** var. **eupatorioides**

Brickellia cordifolia Elliott, Flyr's False-boneset. Mesic pine-hardwood or oak-hickory woods of upland hammocks. Late August-late October. Sw. GA (Jones & Coile 1988; Carter, Baker, & Morris 2009) and AL south to Panhandle FL and n. peninsular FL. [= FNA, K, SE, WH; = *Coleosanthus cordifolius* (Elliott) Kuntze – S]

Brickellia eupatorioides (Linnaeus) Shinnars var. **corymbulosa** (Torrey & Gray) Shinnars, Midwestern False-boneset. Dry slopes and woodlands. MI west to to MT, south to KY, AR, TX, and NM. [= K2] {investigate; add synonymy; add to key}

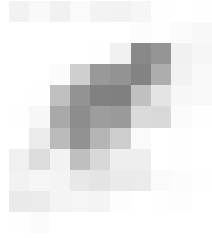
Brickellia eupatorioides (Linnaeus) Shinnars var. **eupatorioides**, Eastern False-boneset. Dry slopes, shale barrens, dry woodlands, thickets. June-October. NJ west to IN, south to c. peninsular FL and se. TX. In addition to var. *eupatorioides*, *B. eupatorioides* includes several other varieties, of more southern or western distribution. Var. *floridana* (R.W. Long) B.L. Turner [= *B. mosieri* Small] has all leaves linear and is apparently restricted to s. FL; previous references to its occurrence farther north (as by SE) are now interpreted as being based on narrow-leaved forms of *B. eupatorioides* var. *eupatorioides*. Var. *texana* (Shinnars) Shinnars [= var. *ozarkana* (Shinnars) Shinnars] has the outer phyllaries prolonged into setae, nearly or fully as long as the inner phyllaries, and should be considered a possibility for our area, in dry open habitats with prairie or midwestern affinities; it is known from as far eastward as AR, MO, and s. IL. [= FNA, K1, K2, X, Z; < *Kuhnia eupatorioides* Linnaeus – RAB, S, W; = *Kuhnia eupatorioides* var. *eupatorioides* – C, F, G, SE; < *Brickellia eupatorioides* – Pa, WH; = *Kuhnia eupatorioides* var. *pyramidalis* Rafinesque – Y]



Brintonia Greene 1895 (Brintonia)

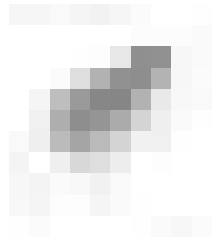
A monotypic genus of the East Gulf Coastal Plain of the Southeastern United States, though sometimes combined with *Solidago*.
References: Semple in FNA (2006b); Nesom (1993).

Brintonia discoidea (Elliott) Greene, Brintonia, Rayless Mock-goldenrod. Rich bluff forests. August-October. Sw. GA and Panhandle FL west to LA. [= FNA, S, SE, WH; = *Solidago discoidea* Elliott – K]



Calotis R. Browne 1820

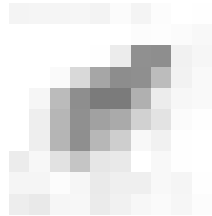
* ***Calotis cuneifolia*** R. Browne. Waste areas near wool-combing mill; native of Australia. Reported by Nesom (2004d). [= K]



Calyptocarpus Lessing 1832 (Straggler-daisy, Lawnflower)

A genus of 3 species, herbs, of sw. North America south to Central America. References: Strother in FNA (2006c); Sherff & Alexander (1955)=Z; Cronquist (1980)=SE.

* ***Calyptocarpus vialis*** Lessing, Straggler-daisy, Lawnflower. Disturbed areas, lawns; native of tropical America. [= FNA, K, S, SE, WH, Z]



Carduus Linnaeus 1753 (Plumeless Thistle)

A genus of about 90 species, herbs, of temperate Old World. References: Keil in FNA (2006a); Cronquist (1980)=SE. [also see *Cirsium*]

- 1 Phyllaries 2-8 mm wide; heads mostly nodding (declined at least slightly from the vertical).....***C. nutans***
- 1 Phyllaries 1-2 mm wide; heads erect.
 - 2 Involucres cylindrical or narrowly ellipsoid.....***C. pycnocephalus* ssp. *pycnocephalus***
 - 2 Involucres spherical or hemispherical.
 - 3 Involucre 14-20 mm high, 25-35 mm across (excluding the flowers); leaves glabrate to glabrous beneath; plants very spiny; stem tough.***C. acanthoides* ssp. *acanthoides***
 - 3 Involucre 12-17 mm high, 15-20 (-25) mm across (excluding the flowers); leaves cottony-tomentose beneath, at least when young; plants not very spiny; stem brittle***C. crispus***

* ***Carduus acanthoides*** Linnaeus ssp. *acanthoides*, Plumeless Thistle. Disturbed areas, pastures; native of Eurasia. June-October. [= FNA; < *C. acanthoides* – RAB, C, F, G, K, Pa, SE, W]

* ***Carduus crispus*** Linnaeus, Welled Thistle. Disturbed areas, naturalized around large ports; native of Eurasia. June-September. [= C, F, FNA, G, K, SE]

- * *Carduus nutans* Linnaeus, Musk Thistle, Nodding Thistle. Fields, roadsides, disturbed areas; native of Eurasia. Late May–November. *C. nutans* in its native range consists of a complex of taxa variously treated at specific, subspecific, and varietal rank; the application of these taxa to North American material is problematic and unresolved (see FNA for discussion). [= RAB, C, F, FNA, G, Pa, SE, W; > *Carduus nutans* Linnaeus ssp. *macrolepis* (Petermann) Kazmi – K]
- * *Carduus pycnocephalus* Linnaeus ssp. *pycnocephalus*, Italian Plumeless-thistle. Waste areas around wool-combing mill; native of n. Africa and w. Asia. Reported by Nesom (2004d). Scattered other occurrences in e. North America, including old ballast collections (FNA). [= FNA; < *C. pycnocephalus* – K]
- * *Carduus tenuiflorus* W. Curtis. Known from ballast collections from se. PA from 1877–1879 (Rhoads & Klein 1993) and from NJ (Kartesz 1999). [= FNA, K] {not keyed; not mapped}



Carphephorus Cassini 1816

A genus of 4 species, herbs, endemic to the Southeastern Coastal Plain of North America. The merger of *Trilisa* and *Litrisa* into *Carphephorus* has been questioned (Schmidt & Schilling 2000) and Schilling (2011) provides evidence that both *Trilisa* and *Litrisa* should be maintained as separate genera. The only species of this complex not occurring in our area is *Litrisa carnosa* Small (of c. peninsular FL). References: Nesom in FNA (2006c); Schilling (2011)=V; Correa & Wilbur (1969)=Z; DeLaney, Bissett, & Weidenhamer (1999)=Y; Orzell & Bridges (2002)=X; Cronquist (1980)=SE.

Identification notes: *Trilisa* can be distinguished from *Carphephorus* by its smaller heads (involucres 3.5–6 mm high vs. 6–15 mm high) and fewer phyllaries (6–12 vs. 15–40). When vegetative, *Trilisa* lacks shining resin dots on the leaves, while *Carphephorus* has numerous resin dots.

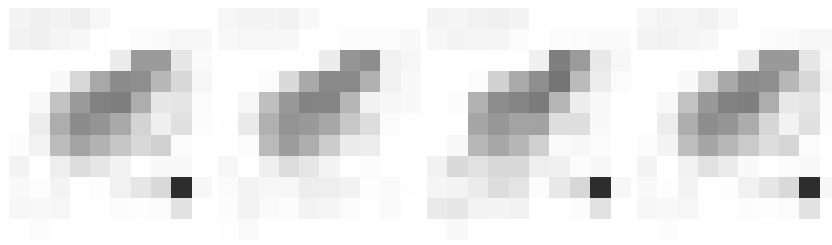
- 1 Stem glabrous or nearly so, the pubescence (if present) short and appressed; surfaces of the basal leaves glabrous; inflorescence corymbiform.
 - 2 Stem leaves few, most of the stem exposed; basal leaves 4–20 cm long, 0.5–2.5 cm wide, dull, minutely punctate-pitted, fairly thick in texture, but not succulent; stems 1–5 dm tall, (1–) 2–5 per plant; [se. VA south to e. GA] *C. bellidifolius*
 - 2 Stem leaves numerous, densely clothing the stem at least below; basal leaves 9–50 cm long, 2–10 cm wide, shiny, succulent, not glandular-punctate; stems 6–20 dm tall, 1 per plant; [se. NC south to FL, west to e. LA].....[*Trilisa odoratissima*]
- 1 Stem conspicuously spreading hirsute, at least on the lower part of the stem; surfaces of the basal leaves conspicuously pubescent to glabrous; inflorescence corymbiform or thyrsoid-paniculate.
 - 3 Leaves linear, the widest 1–3 mm wide; [sw. GA west through the East Gulf Coastal Plain].....*C. pseudoliatris*
 - 3 Leaves oblanceolate, the widest 7–40 mm wide; [collectively widespread in the Coastal Plain of our area].
 - 4 Inflorescence thyrsoid-paniculate; florets 4–10 per head; basal leaves glabrous, minutely and inconspicuously punctate, lacking resin droplets; phyllaries in 1–2 (–3) series, scarcely overlapping[*Trilisa paniculata*]
 - 4 Inflorescence corymbiform; florets 15–30 per head; leaves generally conspicuously pubescent (sometimes glabrate or with a few long hairs on the upper surface), not punctate, copiously beset with resin droplets; phyllaries in 3–6 series, closely imbricate.
 - 5 Phyllaries glabrous on the back; phyllaries subacute to rounded, entire to erose; phyllaries mostly 15–20..... *C. corymbosus*
 - 5 Phyllaries viscid-pubescent on the back; phyllaries acute to subacute, entire and often callus-tipped; phyllaries 20–40 *C. tomentosus*

Carphephorus bellidifolius (Michaux) Torrey & A. Gray, Sandhill Chaffhead. Xeric sandy forests and woodlands, primarily in sandhills. August–October. Se. VA to extreme e. GA. The leaf apices are generally blunt, giving the leaves a nearly spatulate shape. Although often occurring with other species of *Carphephorus*, *C. bellidifolius* ranges into drier habitats than its congeners. [= RAB, C, F, FNA, G, K, S, SE, V, Z]

Carphephorus corymbosus (Nuttall) Torrey & A. Gray. Wet flatwoods. August–October. Se. SC south to s. FL. This species was reported as far north as NC by Small (1933); Correa & Wilbur (1969) considered the northern limit of the species to be e. GA, but it is now known from Jasper County, SC. [= RAB, FNA, K, S, SE, V, WH, Y, Z]

Carphephorus pseudoliatris Cassini, Lavender Lady. Seepage bogs, savannas, wet to moist pinelands. Sw. GA and FL Panhandle west to e. LA. [= FNA, GW, K, S, V, WH, Y, Z; = *C. pseudo-liatris* – SE, orthographic variant]

Carphephorus tomentosus (Michaux) Torrey & A. Gray. Savannas, flatwoods, and sandhills. August–October. Se. VA south to s. GA. The specific epithet is somewhat misleading; *C. tomentosus* is highly variable in its pubescence, ranging from glabrate to densely hirsute. [= RAB, C, FNA, G, GW, K, S, SE, V, Z; > *C. tomentosus* var. *tomentosus* – F; > *C. tomentosus* var. *walteri* (Elliott) Fernald – F]



Carthamus Linnaeus 1753 (Distaff-thistle)

A genus of 14 species, annual and perennial herbs, of the Mediterranean region. Closely related to *Centaurea*, and perhaps to be included there. References: Keil in FNA (2006a).

* *Carthamus creticus* Linnaeus, Smooth Distaff-thistle. Waste area around wool-combing mill, ballast, other disturbed areas; native of s. Europe and n. Africa. Reported by Nesom (2004d) for SC, as *C. baeticus*. [= FNA; ? *Carthamus lanatus* Linnaeus ssp. *baeticus* (Boissier & Reuter) Nyman – K; ? *Carthamus baeticus* Boissier & Reuter; = *Centaurea cretica* (Linnaeus) Sprengel]



Centaurea Linnaeus 1753 (Star-thistle, Knapweed)

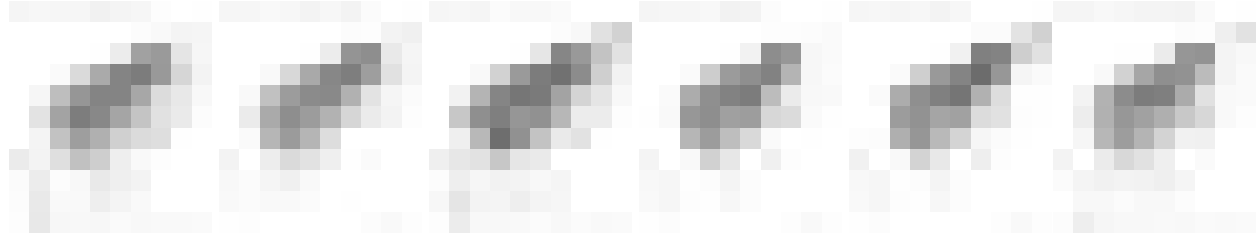
A genus of about 500 species, herbs, native of Eurasia and n. Africa. References: Keil & Ochsmann in FNA (2006a); Cronquist (1980)=SE. Key adapted from C, SE, and FNA. [also see *Acroptilon*, *Carthamus*, and *Plectocephalus*]

- 1 Phyllaries evidently spine-tipped.
 - 2 Leaf bases not decurrent on the stem, the stem merely angled; pappus absent; corollas purple
 - 3 Central spines of the principal phyllaries 10-25 mm long.....*C. calcitrapa*
 - 3 Central spines of the principal phyllaries 1-3 mm long..... *C. diffusa*
 - 2 Leaf bases decurrent on the stem as wings (only shortly so in *C. benedicta*); pappus present in at least the central flowers in the head; corollas yellow.
 - 4 Heads sessile, closely subtended and partially concealed by large foliar bracts..... *C. benedicta*
 - 4 Heads obviously pedunculate, lacking large foliar bracts subtending the head.
 - 5 Larger spines of the middle and outer phyllaries 5-9 mm long; marginal and central flowers of the head with pappus*C. melitensis*
 - 5 Larger spines of the middle and outer phyllaries 11-22 mm long; marginal flowers of the head lacking pappus*C. solstitialis*
- 1 Phyllaries not spine-tipped.
 - 6 Plant an annual; flowers pale to medium blue, flowering April-June *C. cyanus*
 - 6 Plant a perennial; flowers pink to purple, flowering June-October.
 - 7 Phyllary appendages tapering to long, often recurved, pectinately dissected, filiform tips *C. phrygia*
 - 7 Phyllary appendages obtuse to acute, erect or ascending.
 - 8 Involucres 10-13 mm high..... *C. stoebe* ssp. *micranthos*
 - 8 Involucres 15-25 mm high.
 - 9 Phyllary appendages evidently decurrent along phyllary margins.....[*C. scabiosa*]
 - 9 Phyllary appendages not or only slightly decurrent along phyllary margins.
 - 10 Phyllary appendages roundish (seldom triangular), scarious, light to dark brown, undivided to irregularly lacerate..... *C. jacea*
 - 10 Phyllary appendages more-or-less triangular, brown to black, more-or-less wholly pectinate-margined.
 - 11 Heads discoid (the peripheral florets not expanded and showy); pappus blackish, < 1 mm long; green parts of phyllaries nearly or completely covered by black appendages, the involucres thus appearing totally black *C. nigra*
 - 11 Heads radiate (the peripheral florets expanded and showy); pappus absent or rudimentary (when present usually not black); green part of phyllaries sometimes evident, or the appendages light to dark brown.
 - 12 Heads relatively broad, the pressed involucres usually as wide as or wider than long; green parts of phyllaries usually covered by brown, variously pectinate fimbriate appendages, the involucres thus light to dark brown *C. xmoncktonii*
 - 12 Heads relatively narrow, the pressed involucres usually longer than wide; green parts of phyllaries not fully covered by black appendages, the involucres black and green *C. nigrescens*

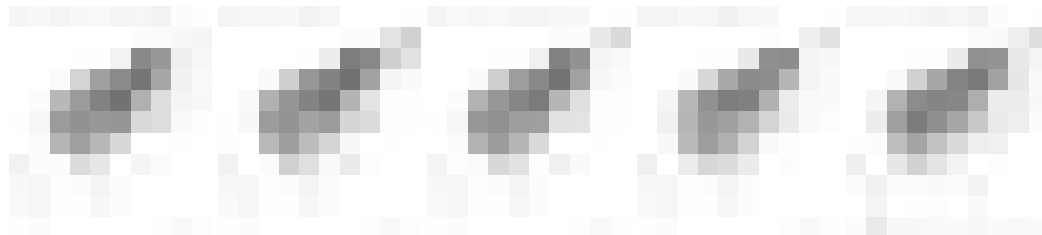
* *Centaurea benedicta* (Linnaeus) Linnaeus, Blessed-thistle. Fields, roadsides, disturbed areas; native of Mediterranean Europe. Late March-June. [= RAB, FNA; = *Cnicus benedictus* Linnaeus – C, F, G, K, S, SE, W, WH]

* *Centaurea calcitrapa* Linnaeus, Purple Star-thistle, Caltraps. Roadsides, disturbed areas; native of Europe. May-September. [= C, F, FNA, G, K, Pa, S, SE]

- * *Centaurea cyanus* Linnaeus, Cornflower, Bachelor's-buttons. Roadsides, disturbed areas; native of Mediterranean Europe. April-August. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WH]
- * *Centaurea diffusa* Lamarck, Tumble Knapweed. Roadsides, disturbed areas; native of Europe. Naturalized in Davidson County, TN (Chester, Wofford, & Kral 1997); also in KY (FNA). [= C, F, FNA, G, K; = *Acosta diffusa* (Lamarck) Soják]
- * *Centaurea jacea* Linnaeus, Brown Knapweed. Roadsides, disturbed areas; native of Europe. June-September. This species is increasing rapidly in the VA Ridge and Valley. Reported for Alleghany County, NC (Poindexter, Weakley, & Denslow 2011). [= C, F, FNA, G, K, Pa, SE; = *Jacea pratensis* Lamarck]
- * *Centaurea melitensis* Linnaeus, Maltese Star-thistle. Waste areas near wool-combing mill, roadsides, disturbed areas; native of Mediterranean Europe. June-September. [= C, F, FNA, G, K, S, SE]



- * *Centaurea ×moncktonii* C.E. Britton, Meadow Knapweed. Roadsides, disturbed areas; native of Europe. July-October. Poindexter, Weakley, & Denslow (2011) report its naturalization in Alleghany Co. NC. [= FNA; = *C. ×pratensis* Thuillier – C; ? *C. nigra* var. *radiata* A.P. de Candolle – F; ? *C. debeauxii* Godron & Grenier ssp. *thuillieri* Dostál]
- * *Centaurea nigra* Linnaeus, Black Knapweed, Spanish-buttons. Roadsides, disturbed areas; native of Europe. July-October. [= C, F, FNA, G, K, Pa, SE]
- * *Centaurea nigrescens* Willdenow, Tyrol Knapweed, Short-fringed Knapweed. Roadsides, disturbed areas; native of Europe. July-October. This species is increasing rapidly in the n. VA Piedmont. *C. transalpina* Schleicher ex de Candolle was also reported for VA by Kartesz (1999). Poindexter, Weakley, & Denslow (2011) report the naturalization of *C. nigrescens* in Alleghany Co. NC. [= FNA; = *C. dubia* Suter – C, SE, W (not a valid name); > *C. vochinensis* Bernhardt ex Reichenbach – F; > *C. dubia* ssp. *vochinensis* (Bernhardt ex Reichenbach) Hayek – G; > *C. nigrescens* – K; > *C. transalpina* Schleicher ex de Candolle – F, K]
- * *Centaurea phrygia* Linnaeus, Wig Knapweed. {VA}. Reported for VA in FNA. [= FNA, K; > *Centaurea austriaca* Willdenow]
- * *Centaurea scabiosa* Linnaeus, Greater Knapweed, Hardheads. Naturalized in KY, PA, NJ (FNA), MD (Kartesz 1999), and other states in e. North America. [= FNA, C, F, G, K] {not yet mapped}
- * *Centaurea solstitialis* Linnaeus, Barnaby's-thistle, Yellow Star-thistle. Roadsides, disturbed areas; native of Mediterranean Europe. June-October. First reported for South Carolina by Hill & Horn (1997). [= RAB, C, F, FNA, G, K, Pa, S, SE, WV]



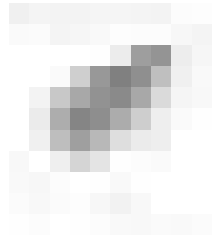
- * *Centaurea stoebe* Linnaeus ssp. *micranthos* (S.G. Gmelin ex Gugler) Hayek, Spotted Knapweed, Bushy Knapweed. Roadsides, disturbed areas; native of Europe. Late June-November. [= FNA, Pa, WH; = *Centaurea biebersteinii* A.P. de Candolle – K; = *C. maculosa* Lamarck – RAB, C, F, G, SE, W, misapplied]



Chaetopappa A.P. de Candolle 1836 (Least-daisy)

A genus of 11 species, annual or perennial herbs, of sc. and sw. United States and n. Mexico. References: Nesom in FNA (2006b).

- * *Chaetopappa asteroides* (Nuttall) A.P. de Candolle var. *asteroides*, Tiny Lazy-daisy. Waste areas near wool-combing mills; native of sc. United States. Reported by Nesom (2004d). [= FNA, K, SE]



Chamaemelum P. Miller 1754 (Chamomile)

A genus of 2 species, herbs, of the Mediterranean region. References: Cronquist (1980)=SE. [also see *Cladanthus*]

- 1 Rays white with a yellow base; plant an annual.....[see *Cladanthus mixtus*]
- 1 Rays white; plant a perennial.....*C. nobile*

* *Chamaemelum nobile* (Linnaeus) Allioni, Garden Chamomile. Persistent from cultivation in gardens; native of Europe. [= FNA, K; = *Anthemis nobilis* Linnaeus – C, F, G, S, SE]

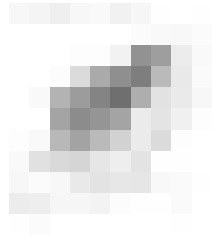


Chaptalia Ventenat 1802 (Sunbonnets)

A genus of about 60 species, herbs, of warm temperate, subtropical, and tropical America. The remainder of the genus is distributed in the West Indies, Central America, and South America. References: Nesom in FNA (2006a); Vuilleumier (1969)=Z; Nesom (1995a)=Y; Cronquist (1980)=SE.

Identification notes: The basal leaves are distinctive, the undersurface permanently and tightly white floccose, the upper surface floccose when young but glabrate in age, and the margins with obscure denticulations.

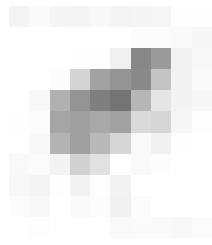
Chaptalia tomentosa Ventenat, Sunbonnets, Pineland Daisy, Night-nodding Bog-dandelion, Woolly Sunbonnets. Savannas, sandhill seeps, pine flatwoods. February-May. A Southeastern Coastal Plain endemic: e. NC south s. FL and west to e. TX. [= RAB, FNA, GW, K, S, SE, WH, Y, Z]



Chevreulia Cassini 1817

A genus of...

* *Chevreulia sarmentosa* (Persoon) S.F. Blake. Waste area near wool-combing mill; native of s. South America. Reported for SC by Nesom (2004d).



***Chondrilla* Linnaeus 1753 (Skeleton-weed)**

A genus of about 25 species, herbs, of temperate Eurasia. References: Gottlieb in FNA (2006a); Cronquist (1980)=SE.

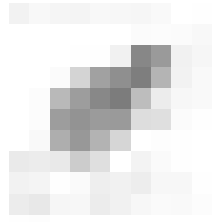
* ***Chondrilla juncea*** Linnaeus, Skeleton-weed, Gum-succory. Cultivated fields, disturbed areas, roadsides; native of Eurasia. June-September. [= C, F, FNA, G, K, Pa, SE]



***Chromolaena* A.P. de Candolle 1836**

A genus of about 165 species, perennial herbs and shrubs, of s. North America, Central America, and South America. References: Nesom in FNA (2006c).

Chromolaena ivifolia (Linnaeus) King & Robinson, Ivy-leaf Thoroughwort. Prairies and fields. August-November. S. FL, Panhandle FL, s. AL, s. MS, TX; West Indies, Mexico, Central America, South America (Woods, Diamond, & Searcy 2003; Kartesz 1999, Nesom in FNA 2006c). [= FNA, K, WH; = *Osmia ivaefolia* (Linnaeus) Schultz 'Bipontinus' – S; = *Eupatorium ivaefolium* – SE, orthographic variant]



***Chrysanthemum* Linnaeus 1753 (Chrysanthemum)**

If circumscribed narrowly, a genus of 3 species, herbs, of n. Africa and Europe. References: Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. [also see *Glebionis*, *Leucanthemum*, and *Tanacetum*]

* ***Chrysanthemum indicum*** Linnaeus, Garden Chrysanthemum, is persistent or perhaps naturalized as far south as se. PA (Rhoads & Klein 1993). [= *Dendranthema ×grandiflorum* Kitam. – K; ? *Dendranthema morifolium* (Ramat.) Tzvelev; ? *Chrysanthemum morifolium* Ramat.; *Dendranthema indicum* × *japonicum*]

***Chrysogonum* Linnaeus 1753 (Green-and-gold)**

A genus of 1 species (with varieties), herbs, of se. North America. References: Nesom in FNA (2006c); Nesom (2001b)=Z; Cronquist (1980)=SE. Key based on Nesom (2001b).

- 1 Plants occurring individually, not producing stolons; earliest flowering stems leafless, later flowering stems leafy; leafy flowering stems mostly 15-35 (-50) cm high; [of e. VA, sc. PA, and se. OH south to se. NC, nc. SC, nw. NC, and sw. VA]..... ***C. virginianum* var. *virginianum***
- 1 Plants colonial, forming mats by stolons; flowering stems leafless or leafy; leafy flowering stems (if present) 15-25 cm high; [of ne. SC, sc. NC, nw. NC, ne. TN, and se. KY southward].

- 2 Earliest flowering stems leafless, mostly 2-10 cm high; later flowering stems leafy, 15-25 cm high; longest stolon internodes 2-6 cm long; [of ne. SC, sc. NC, nw. NC, sw. VA, ne. TN, and se. KY south to e. GA, c. GA, and ec. AL]*C. virginianum* var. *brevistolon*
- 2 Earliest flowering stems leafless, 2-10 cm high; later flowering stems leafless as well, 2-10 cm high; longest stolon internodes 12-60 cm long; [of sc. and sw. GA west to e. LA] *C. virginianum* var. *australe*

Chrysogonum virginianum Linnaeus var. *australe* (Alexander ex Small) H.E. Ahles, Gulf Coast Green-and-gold. Moist to fairly dry woodlands and forests. Late March-early June. Sc. and sw. GA west to e. LA. [= FNA, WH, Z; < *C. virginianum* var. *australe* – RAB, K, SE, W (also see var. *brevistolon*); < *C. australe* Alexander ex Small – S (also see var. *brevistolon*)]

Chrysogonum virginianum Linnaeus var. *brevistolon* G.L. Nesom, Carolina Green-and-gold. Moist to fairly dry woodlands and forests. Late March-early June. Ne. SC, sc. NC, nw. NC, sw. VA, ne. TN, and se. KY south to e. GA, c. GA, and ec. AL. [= FNA, Z; < *C. virginianum* var. *australe* – RAB, K, SE, W; < *C. australe* Alexander ex Small – S]

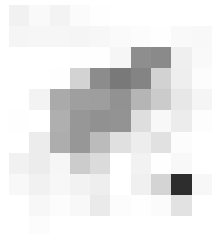
Chrysogonum virginianum Linnaeus var. *virginianum*, Northern Green-and-gold, Virginia Green-and-gold. Moist to fairly dry woodlands and forests. Late March-early June. E. VA, sc. PA, and se. OH south to se. NC, nc. SC, nw. NC, and sw. VA. [= RAB, C, FNA, K, Pa, SE, W, Z; = *C. virginianum* – S]



***Chrysoma* Nuttall 1834 (Woody Goldenrod)**

A monotypic genus, a shrub, of se. North America. References: Nesom in FNA (2006b); Nesom (2000b); Cronquist (1980)=SE.

Chrysoma pauciflosculosa (Michaux) Greene, Woody Goldenrod. Coastal dunes, xeric sands of very barren, open, white-sand sandhills, fluvial dunes, and less commonly in driest habitats in the fall-line Sandhills. Late July-October. S. NC south to n. FL and west to s. MS. *Chrysoma* has a growth habit unlike any other shrub in our flora. From a trunk-like base, numerous branches ascend, forming a flat-topped shrub 3-5 dm tall. Each branch has a cluster of evergreen leaves restricted to its terminal few cm, the internodes very short (a few mm at most). In summer, some of the woody branches produce terminal, deciduous, flowering branches, which elongate rapidly, the leaves widely spaced, reaching a height of a meter or more. Following flowering and fruiting, the deciduous branches die back to the summit of the woody branches. The leaves are gray-green, rather thick-textured, and finely reticulate, the reticulations giving an appearance rather like anole skin. The midrib is prominent below, almost invisible on the upper surface. Godfrey (1988) has an excellent drawing and description of this distinctive shrub. [= FNA, K, S, SE, WH; = *Solidago pauciflosculosa* Michaux – RAB; = *Chrysoma solidaginoides* Nuttall]



***Chrysopsis* (Nuttall) Elliott 1823 (Golden-aster)**

A genus of about 10 species, herbs, of se. North America, Mexico, and the Bahamas. This remains a difficult and rather poorly understood group. The appropriate taxonomic status of many of the entities remains unclear; for the moment, I am recognizing a number of entities at the specific level that should perhaps be recognized at lower taxonomic levels; in some cases, the appropriate nomenclatural combinations are not already available. References: Semple in FNA (2006b); Semple (1981)=Z; Harms (1974)=Y; Semple (1996)=X; Cronquist (1980)=SE; Nesom (2000b); DeLaney, Wunderlin, & Semple (2003). Key adapted from Semple (1981). [also see *Heterotheca* and *Pityopsis*]

- 1 Stem, leaves, and phyllaries sparsely to densely pubescent with spreading non-glandular hairs as well as having minutely glandular pubescence; annuals with taproots; [section *Bradburia*].....*C. pilosa*
- 1 Stems, leaves, and phyllaries various but lacking spreading non-glandular hairs; biennials or perennials, either fibrous-rooted or with a mostly short and quickly disintegrating taproot; [section *Chrysopsis*].
- 2 Peduncles and phyllaries glabrous or the outer phyllaries basally with a few stipitate glands; achenes usually with raised yellow-red translucent ribs.
- 3 Stems erect; leaf margins serrate-ciliate, the surfaces sparsely pubescent to glabrous; all phyllaries glabrous *C. hyssopifolia*

- 3 Stems decumbent to ascending; leaf margins entire, either eciliate and glabrous, or sometimes ciliate with glabrate to sparsely woolly surfaces; phyllaries either glabrous and glandular punctate or the outer basally stipitate-glandular.
- 4 Stem leaves glabrous and eciliate (but rosette leaves densely woolly), lower stem leaves absent at flowering; outer phyllaries with a few stipitate glands basally, the involucre otherwise glabrous.....*C. cruiseana*
- 4 Stem leaves eciliate or ciliate, the surfaces glabrate to sparsely woolly, the hairs often only or mostly near the margin, lower stem leaves usually present at flowering; phyllaries glabrous, glandular-punctate.....*C. trichophylla*
{Add *linearifolia* under 2a}
- 2 Peduncles and phyllaries evidently stipitate-glandular or woolly-hairy, or both; achenes with or without raised yellow-red translucent ribs.
- 5 Upper stem leaves woolly-hairy; not stipitate-glandular; peduncles and involucre sparsely pubescent to woolly, sometimes stipitate-glandular as well.
- 6 Stems decumbent; inflorescence loosely corymbose-cymose, buds not nodding; peduncles stipitate-glandular or not, ligules 7-12 mm long; achenes sparsely to moderately strigose, usually with raised yellow-red translucent ribs; [of se. VA to FL]*C. gossypina*
- 6 Stems decumbent to ascending; inflorescence corymbose, buds nodding; peduncles densely stipitate-glandular, ligules 10-15 mm long; achenes densely strigose, lacking raised yellow-red translucent ribs; [of barrier islands of w. FL Panhandle].....*C. godfreyi*
- 5 Upper stem leaves arachnoid to glabrate or densely stipitate-glandular; peduncles and involucre stipitate-glandular but otherwise glabrous.
- 7 Upper stem leaves lacking stipitate glands, either arachnoid to glabrate, or woolly*C. mariana*
- 7 Upper stem leaves densely stipitate-glandular, not woolly.
- 8 Stems decumbent to ascending; leaves lanceolate; inflorescence compactly corymbose; involucre 9-12 mm long; phyllaries acute to attenuate; ligules 10-15 mm long*C. godfreyi*
- 8 Stems erect; leaves linear-elliptic; inflorescence open flat-topped corymbose; involucre 6-9 mm long; phyllaries obtuse; ligules 6-8 mm long.....*C. scabrella*
{Add *lanuginosa* & *latisquamea* under 2b}

Chrysopsis cruiseana Dress. Coastal sand dunes. October-December. FL Panhandle and s. AL. [= *Chrysopsis gossypina* (Michaux) Elliott ssp. *cruiseana* (Dress) Semple – FNA, K, WH, Z] {add synonymy}

Chrysopsis godfreyi Semple. Coastal sand dunes. November-December. FL Panhandle and s. AL. Plants with densely stipitate-glandular, non-woolly upper stem leaves have been treated as forma *viridis* (Semple 1981). [= FNA, K, WH, Z] {add synonymy}

Chrysopsis gossypina (Michaux) Elliott, Cottonleaf Golden-aster. Sandhills, coastal dunes, other dry sandy places. September-October. Se. VA south to c. peninsular FL and sw. GA. [< *Chrysopsis gossypina* ssp. *gossypina* – FNA, K, WH, Z; < *Heterotheca gossypina* (Michaux) Shinnery – RAB (also see *C. pilosa*); < *C. gossypina* – C, G, SE; > *C. longii* Fernald – F; >> *C. arenicola* Alexander – S; > *C. decumbens* Chapman – S; > *C. pilosa* – S, misapplied; < *Heterotheca gossypina* (Michaux) Shinnery – Y]

Chrysopsis hyssopifolia Nuttall. Dry sands. October-December. N. FL peninsula west to FL Panhandle, s. AL, s. MS, and se. LA. [= SE; = *Chrysopsis gossypina* (Michaux) Elliott ssp. *hyssopifolia* (Nuttall) Semple – FNA, K, WH, Z; > *Chrysopsis hyssopifolia* – S; > *Chrysopsis gigantea* Small – S; = *Heterotheca hyssopifolia* (Nuttall) Harms – Y]

Chrysopsis lanuginosa Small, Lynn Haven Goldenaster. Dry pineland. Endemic to FL Panhandle. [= FNA, K, WH; < *Chrysopsis scabrella* Torrey & A. Gray – SE] {not yet keyed; synonymy incomplete}

Chrysopsis latisquamea Pollard. Sandhills. Ne. FL south to c. peninsular FL. [= FNA, K, SE, WH; = *Heterotheca latisquamea* (Pollard) V.L. Harms] {not yet keyed; synonymy incomplete}

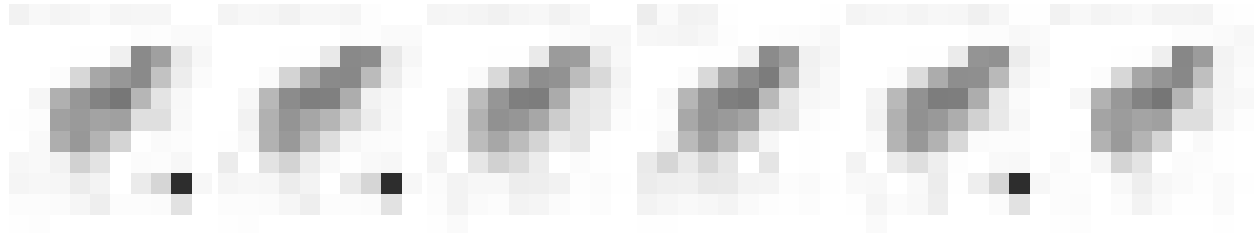
Chrysopsis linearifolia Semple. Scrub, sandhills. Endemic to FL Panhandle. [= *Chrysopsis linearifolia* ssp. *linearifolia* – FNA, K, WH] {not yet keyed; synonymy incomplete}

Chrysopsis mariana (Linnaeus) Elliott, Maryland Golden-aster. Dry forests and woodlands, roadsides, other dry habitats. Late June-October. Se. NY west to se. OH, c. KY, w. TN, south to c. peninsular FL and se. TX. [= C, FNA, G, K, Pa, S, SE, W, WH, Z; = *Heterotheca mariana* (Linnaeus) Shinnery – RAB, Y; > *Chrysopsis mariana* var. *mariana* – F; > *C. mariana* var. *macradenia* Fernald – F]

* ***Chrysopsis pilosa*** Nuttall. Sandy roadsides; introduced from a primary, native range from s. MO and se. KS, south to TX. See Anderson (2007) for FL record. [= F, G, K, SE, Z; < *Heterotheca gossypina* (Michaux) Shinnery – RAB; = *Heterotheca pilosa* (Nuttall) Shinnery – Y; = *Bradburia pilosa* (Nuttall) Semple – FNA, X]

* ***Chrysopsis scabrella*** Torrey & A. Gray. Sandy roadsides; presumably introduced from FL (but possibly native and disjunct). [= FNA, K, SE, S, WH, Z; < *Chrysopsis scabrella* – SE; = *Heterotheca scabrella* (Torrey & A. Gray) Harms – Y]

Chrysopsis trichophylla (Nuttall) Elliott. Sandhills, sandy roadsides, coastal dunes. The taxon treated by many authors as *C. trichophylla* was reduced to a form by Semple (1981), as *C. gossypina* ssp. *gossypina* f. *trichophylla* (Nuttall) Semple. He suggests, though, that varietal status may be warranted. Plants in SC previously identified as *C. cruiseana* are referable to *C. trichophylla*. [= SE; = *Heterotheca trichophylla* (Nuttall) Shinnery – RAB; < *Chrysopsis gossypina* ssp. *gossypina* – FNA, K, Z; < *C. gossypina* – C, G; > *C. trichophylla* – S; >> *C. arenicola* Alexander – S; >> *C. pilosa* – S, misapplied; < *Heterotheca gossypina* (Michaux) Shinnery – Y]





Cichorium Linnaeus 1753 (Chicory)

A genus of 7 species, herbs, of Europe and n. Africa. References: Strother in FNA (2006a); Cronquist (1980)=SE; Kiers (1999)=Z.

* *Cichorium intybus* Linnaeus, Chicory, Succory, Blue-sailors. Roadsides, fencerows, vacant lots, disturbed areas; native of Europe. Late May-November. The dried roasted root is used as a flavoring or substitute for coffee. See Anderson (2007) for FL record. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WH, Z]



Cirsium P. Miller 1754 (Thistle)

A genus of about 250 species, herbs, north temperate. References: Keil in FNA (2006a); Cronquist (1980)=SE. Key adapted in part from SE.

- 1 Plant colonial from creeping rhizomes; heads 13-20 (-25) mm high; phyllaries all lacking spine tips, or the outermost tipped with spines < 1 mm long; plant perennial; [alien weeds, generally in altered habitats]..... *C. arvense*
- 1 Plant not colonial; heads 25-50 mm high (as small as 15-25 mm in *C. carolinianum*, *C. nuttallii*, *C. muticum*, and *C. virginianum*); phyllaries mostly spine-tipped, with at least some of the spines > 1 mm long (except sometimes mostly or entirely spine free in *C. muticum*); plant biennial (to weakly perennial); [native (except *C. vulgare*), in natural or some species also in disturbed habitats].
 - 2 Leaves decurrent onto the stem below, the decurrency extending as a wing at least several cm down the stem, and often to the leaf below; leaves scabrous-hispid above; phyllaries lacking a glutinous dorsal ridge; [alien weed] *C. vulgare*
 - 2 Leaves not decurrent as a conspicuous wing, or the decurrency extending < 1 cm (sometimes more decurrent in *C. lecontei*); leaves not scabrous-hispid above; [native, sometimes in disturbed habitats].
 - 3 Phyllaries lacking spine tips (the outermost sometimes with a weak spine-tip to 0.5 mm long); leaves deeply lobed, to 55 cm long and 20 cm wide *C. muticum*
 - 3 Phyllaries (at least the outer and middle) with well-developed spine-tips > 1 mm long; leaves lobed or merely toothed, generally < 30 cm long and < 10 cm wide (except in *C. altissimum*).
 - 4 Heads immediately subtended by several spiny-toothed leaves (appearing as a leafy involucre); flowers yellow, white, or purple.
 - 5 Involucres more-or-less densely tomentose; stems densely tomentose; [of the Coastal Plain and Piedmont] *C. horridulum* var. *horridulum*
 - 5 Involucres glabrous; stems glabrous or sparsely tomentose; [of the Coastal Plain].
 - 6 Leaves shallowly to deeply pinnatifid; main spines of the leaves 10-30 mm long; [of s. AL and Panhandle FL westward]..... [*C. horridulum* var. *megacanthum*]
 - 6 Leaves spinose-dentate to shallowly pinnatifid; main spines mostly 5-10 mm long; [widespread in the Coastal Plain]..... *C. horridulum* var. *vittatum*
- 4 Heads pedunculate (rarely with 1 or 2 reduced leaves below); flowers pink, purple, lavender, or white.
 - 7 Lower surface of the leaves densely white-tomentose beneath, this persistent and entirely obscuring the green surface.
 - 8 Heads 15-25 mm high; plants 4-15 dm tall; larger leaves < 5 cm wide.
 - 9 Cauline leaves mostly 10-25; plants flowering April-June; [of dry soils of the Piedmont].....*C. carolinianum*
 - 9 Cauline leaves mostly 30-70; plants flowering August-October; [of moist to dry soils of the Coastal Plain (and rarely the lower Piedmont in association with other Coastal Plain species, such as *Pinus palustris*)]*C. virginianum*
 - 8 Heads 25-35 mm high; plants 10-40 dm tall; larger leaves usually > 5 cm wide.
 - 10 Leaves toothed or shallowly lobed*C. altissimum*
 - 10 Leaves deeply pinnatifid*C. discolor*
 - 7 Lower surface of the leaves thinly and loosely white-tomentose beneath, this sloughing off in age, the green surface visible through the tomentum except on very small, young leaves.
 - 11 Heads 15-25 mm high; plants 5-35 dm tall, usually much branched and with numerous heads.....*C. nuttallii*
 - 11 Heads 25-50 mm high; plants 2-10 dm tall, usually strict or few-branched and with 1 or a few heads.
 - 12 Heads on well-developed peduncles; [of moist to wet pinelands of the Coastal Plain from NC and SC south]..... *C. lecontei*

- 12 Heads on short peduncles; [of various habitats, mostly inland from the Coastal Plain, or of dry pinelands of the Coastal Plain].
- 13 Plants generally with well-developed, persistent basal leaves; cauline leaves with internodes usually > 2 cm; [of various habitats, mostly inland from the Coastal Plain]..... *C. pumilum*
- 13 Plants lacking well-developed basal leaves; cauline leaves with internodes mostly 0.5-2 cm long; [of dry pinelands of the Coastal Plain]..... *C. repandum*

Cirsium altissimum (Linnaeus) Hill, Tall Thistle. Pastures, woodlands, thickets. September-November. MA west to ND, south to Panhandle FL (Jackson County) and TX. [= C, F, FNA, G, K, Pa, S, SE, W, WH; = *Carduus altissimus* Linnaeus – RAB]

* *Cirsium arvense* (Linnaeus) Scopoli, Canada Thistle, Field Thistle. Pastures, disturbed areas; native of Europe. July-November. Two varieties are often recognized: var. *arvense*, with leaves shallowly undulate-lobed and with only a few fine marginal prickles, and var. *horridum*, with leaves strongly sinuate-pinnatifid and with numerous well-developed marginal prickles. [= FNA, K, Pa, S, W; = *Carduus arvensis* (Linnaeus) Robson – RAB; > *C. arvense* var. *arvense* – C, G, SE; > *Cirsium arvense* (Linnaeus) Scopoli var. *horridum* Wimmer & Gräbner – C, G, SE; > *Cirsium arvense* var. *mite* Wimmer & Gräbner – F; > *Cirsium arvense* var. *arvense* – F, misapplied; = *Breca arvense* (Linnaeus) Lessing]

Cirsium carolinianum (Walter) Fernald & Schubert, Carolina Thistle, Spring Thistle. Prairies, open woodlands over mafic, ultramafic, or calcareous rocks. April-June (-July). N. VA west to s. OH and MO, south to w. SC, n. GA, AL, and TX. In our area, *C. carolinianum* seems to be restricted to prairies and woodlands (or maintained powerline or road rights-of-way) over circumneutral rocks and soils, in situations which were oak savannas or even prairies prior to fire suppression. [= C, F, FNA, G, K, SE, W; = *Carduus carolinianus* Walter – RAB; > *Cirsium flaccidum* Small – S; > *Cirsium virginianum* – S, misapplied]

Cirsium discolor (Muhlenberg ex Willdenow) Sprengel, Field Thistle. Pastures, woodlands, thickets. August-November. QC west to MB, south to NC, MS, LA, and KS. [= C, F, FNA, G, K, Pa, S, SE, W; = *Carduus discolor* (Muhlenberg ex Willdenow) Nuttall – RAB]

Cirsium horridulum Michaux var. *horridulum*, Common Yellow Thistle. Roadsides, woodlands, pine savannas. Late March-early June. ME south to FL, west to TX, mostly on the Coastal Plain and adjacent provinces; also Mexico. [= C, K, Pa, SE; = *Carduus spinosissimus* Walter – RAB; < *Cirsium horridulum* – F, G, WH; < *Cirsium horridulum* complex – GW; = *Cirsium horridulum* – S]

Cirsium horridulum Michaux var. *megacanthum* (Nuttall) D.J. Keil, Bigspine Thistle. Moist ground. AL and Panhandle FL west to TX and OK. [= FNA; < *Cirsium horridulum* complex – GW; < *Cirsium horridulum* var. *vittatum* – K, SE; > *Cirsium vittatum* – S; < *Cirsium horridulum* – WH]

Cirsium horridulum Michaux var. *vittatum* (Small) R.W. Long, Southern Yellow Thistle. Wet pine savannas. May-July. Se. NC south to s. peninsular FL and Panhandle FL. [= *Carduus smallii* (Britton) H.E. Ahles – RAB; < *Cirsium horridulum* complex – GW; < *Cirsium horridulum* var. *vittatum* – K, SE; > *Cirsium smallii* Britton – S; > *Cirsium vittatum* Small – S; < *Cirsium horridulum* – WH]

Cirsium lecontei Torrey & A. Gray, LeConte's Thistle. Wet pine savannas, bogs. June-August. E. NC south to Panhandle FL, west to LA. [= FNA, GW, K, S, SE, WH; = *Carduus lecontei* (Torrey & A. Gray) Pollard – RAB]

Cirsium muticum Michaux, Swamp Thistle. Swamps, wet thickets, woodlands, seepage slopes, wet prairies, meadows. August-November. NL (Newfoundland) west to SK, south to DE, NC, TN, and MO, and less commonly south to FL, AL (Diamond & Woods 2009), and TX. [= C, FNA, G, GW, K, Pa, S, SE, W, WH; = *Carduus muticus* (Michaux) Persoon – RAB; > *Cirsium muticum* var. *muticum* – F]

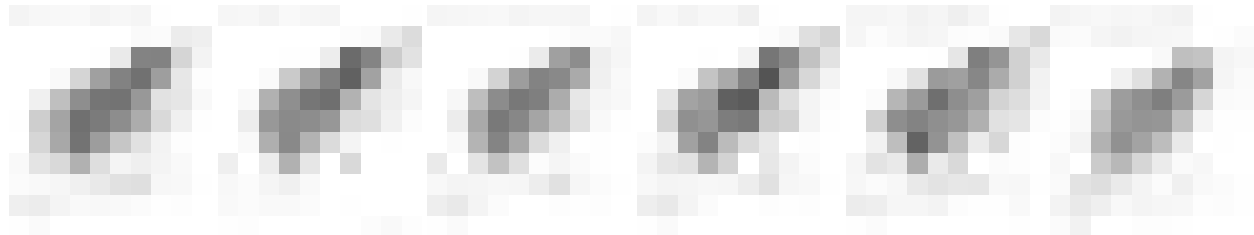
Cirsium nuttallii A.P. de Candolle, Coastal Tall Thistle. Pine savannas, roadsides, pastures. June-August. Se. VA south to FL, west to LA; reported for the first time from NC (Krings, Westbrooks, & Lloyd 2002). [= C, F, FNA, G, GW, K, S, SE, WH; = *Carduus nuttallii* (A.P. de Candolle) Pollard – RAB]

Cirsium pumilum (Nuttall) Sprengel, Pasture Thistle. Pastures, thickets, and woodlands, perhaps especially over mafic rocks. Late May-July. S. ME west to w. NY, south to DE, and w. NC. [= C, F, G, K, Pa, SE, W; = *Carduus pumilus* Nuttall – RAB; = *Cirsium pumilum* var. *pumilum* – FNA; = *Cirsium odoratum* (Muhlenberg ex W. Bart.) Petrak – S]

Cirsium repandum Michaux, Sandhill Thistle. Sandhills, other dry sandy habitats. May-July. Se. VA south to e. GA, nearly endemic to the Carolinas. Similar in distribution to *Vaccinium crassifolium*, *Carphephorus bellidifolius*, and *Baptisia cinerea*, which are all locally abundant endemic indicators of Carolina pinelands. [= C, FNA, G, K, S, SE; = *Carduus repandum* (Michaux) Persoon – RAB]

Cirsium virginianum (Linnaeus) Michaux, Virginia Thistle. Moist to fairly dry pine savannas, bogs. August-October. S. NJ south to ne. FL, on the Coastal Plain. [= C, F, FNA, G, GW, K, SE, WH; = *Carduus virginianus* Linnaeus – RAB; = *Cirsium revolutum* (Small) Petrak – S]

* *Cirsium vulgare* (Savi) Tenore, Bull Thistle. Meadows, pastures, and disturbed areas; native of Europe. Late June-November. [= C, F, FNA, G, K, Pa, SE, W, WH; < *Carduus lanceolatus* Linnaeus – RAB; < *Cirsium lanceolatum* (Linnaeus) Scopoli – S, misapplied]





Cladanthus Cassini 1816

A genus of about 5 species, herbs, of the Mediterranean region. References: Watson in FNA (2006a).

* **Cladanthus mixtus** (Linnaeus) Chevallier. Disturbed areas; native of Europe. June. [= FNA; = *Anthemis mixta* Linnaeus – C, F, G, SE; = *Chamaemelum mixtum* (Linnaeus) Allioni – K, WH; = *Ormenis mixta* (Linnaeus) Dumortier – S]



Conoclinium A.P. de Candolle 1836 (Mistflower)

A genus of 4 species, of e. and c. North America extending into Mexico. References: Patterson & Nesom in FNA (2006c); Schmidt & Schilling (2000).

Conoclinium coelestinum (Linnaeus) A.P. de Candolle, Mistflower, Ageratum. Moist to wet disturbed areas, especially ditches, probably more common than formerly. Late July-October. NJ west to IL, c. MO, se. KS, and OK, south to s. FL and c. TX; also in Cuba, and scattered farther north (as in NY, n. OH, and n. IN) probably as escapes from cultivation. See Wooten & Clewell (1971) for further discussion of this species. [= FNA, K, WH; = *Eupatorium coelestinum* Linnaeus – RAB, C, F, G, SE, W, WV; = *Conoclinium coelestinum* – Pa, misspelling]



Conyza Lessing 1832 (Horseweed)

A genus of about 60 species, herbs, shrubs, and trees, of temperate, subtropical, and tropical regions. Recent molecular studies have indicated the likely polyphyly of *Conyza* and its close relationship with *Erigeron*; the ultimate circumscription of these genera is in doubt (Nesom 2000b, Noyes 2000). References: Strother in FNA (2006b); Cronquist (1980)=SE; Nesom (2000b). Key based in part on SE.

- 1 Plants diffusely branched from the base and throughout; plants 1-2.5 (-3) dm tall[*C. ramosissima*]
- 1 Plants with a well-developed central axis, sparingly branched (unless mowed or otherwise injured); plants 1-15 dm tall.
 - 2 Involucre 4-6 mm high, densely pubescent; pistillate flowers (50-) 70-200 or more per head *C. bonariensis*
 - 2 Involucre 3-4 mm high, glabrous or very sparsely pubescent; pistillate flowers mostly 25-45 per head.

- 3 Stem coarsely spreading-hirsute; leaves ciliate, the larger generally with a few to many coarse teeth; phyllaries green-tipped*C. canadensis* var. *canadensis*
- 3 Stem glabrous or with widely scattered, appressed hairs; leaves with a few cilia toward the base, generally entire; phyllaries purple-tipped.....*C. canadensis* var. *pusilla*

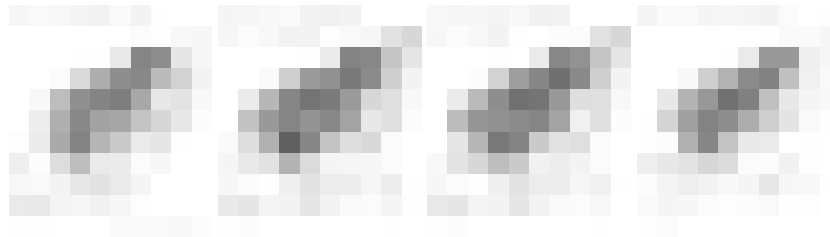
* *Conyza bonariensis* (Linnaeus) Cronquist, South American Horseweed. Fields, disturbed areas; apparently native of South America. April-October. Se. VA south into the tropics. [= C, FNA, K, SE, WH; = *Erigeron bonariensis* Linnaeus – RAB, F; = *Conyza floribunda* Kunth – G, misapplied; > *Leptilon bonariense* (Linnaeus) Small – S; > *Leptilon linifolium* (Willdenow) Small – S]

Conyza canadensis (Linnaeus) Cronquist var. *canadensis*, Common Horseweed. Old fields, disturbed areas, gardens. July-November. S. Canada south through nearly all of the United States to tropical America. [= C, G, K, Pa, SE, W, WH; = *Erigeron canadensis* Linnaeus var. *canadensis* – RAB; < *C. canadensis* – FNA; = *Erigeron canadensis* – F; = *Leptilon canadense* (Linnaeus) Britton – S; < *Erigeron canadensis* – WV]

Conyza canadensis (Linnaeus) Cronquist var. *pusilla* (Nuttall) Cronquist, Southern Horseweed. Dunes, old fields, disturbed areas. (May-) July-December. Se. MA and CT west to s. IN, south to FL and TX, and south into tropical America. [= C, G, K, Pa, SE, W, WH; = *Erigeron canadensis* Linnaeus var. *pusillus* (Nuttall) Boivin – RAB; < *C. canadensis* – FNA; = *Erigeron pusillus* Nuttall – F; = *Leptilon pusillum* (Nuttall) Britton – S; = *Conyza parva* Cronquist]

* *Conyza floribunda* Kunth. Reported as introduced in GA, AL, and MS by Kartesz (1999), probably on the basis of confusion with *C. bonariensis*. [= FNA, K] {rejected; not keyed; not mapped}

Conyza ramosissima Cronquist. Weedy situations. OH west to MN, south to KY, ec. TN (Chester, Wofford, & Kral 1997), ne. AL, LA, and TX. [= C, FNA, G, K, SE; = *Erigeron divaricatus* Michaux – F; = *Leptilon divaricatum* (Michaux) Rafinesque – S]



Coreopsis Linnaeus 1753 (Coreopsis, Tickseed)
[contributed by Alan S. Weakley and Bruce A. Sorrie]

A genus of about 50 species, herbs, of America. Recent molecular studies suggest that the relationship between *Bidens* and *Coreopsis* (as traditionally circumscribed) is complex, and that changes in taxonomy will be needed to more accurately reflect relationships (Kim et al. 1999; Crawford & Mort 2005). References: Strother in FNA (2006c); Smith (1976)=Z; Sherff & Alexander (1955)=Y; Cronquist (1980)=SE. Key adapted from Y and Z.

- 1 Disk flowers with 4 corolla lobes and 4 anthers; ray flowers usually apically 3-lobed.
- 2 Leaves pinnately or bipinnately lobed into linear segments or narrowly lanceolate segments; [section *Calliopsis*].....*C. tinctoria* var. *tinctoria*
- 2 Leaves simple or with 1-2 auriculate lobes at the base; [section *Eublepharis*].
- 3 All of the major cauline leaves opposite (except in *C. linifolia* the lowermost few leaves may be alternate).
- 4 Ray flowers pink (white); plant rhizomatous.....*C. rosea*
- 4 Ray flowers yellow; plant fibrous-rooted.
- 5 Leaf blades ovate (to elliptical), very gradually reduced upward, margins ciliate, surfaces lacking tiny dark dots; achenes about 5 mm long; [se. SC south to Panhandle FL].....*C. integrifolia*
- 5 Leaf blades linear-oblong to linear, rapidly reduced upward, margins glabrous, surfaces with numerous tiny dark dots (easiest to see on undersurface); achenes < 2.5 mm long; [se. VA south to ne. and Panhandle FL, west to e. TX].....*C. linifolia*
- 3 All of the major cauline leaves alternate.
- 6 Ray flowers pink; leaves juncoide (linear-terete) *C. nudata*
- 6 Ray flowers yellow; leaves with an expanded blade.
- 7 Outer phyllaries deltoid and very short, less than 0.3× as long as the inner phyllaries; flowering late September-January; [endemic to FL].....*C. floridana*
- 7 Outer phyllaries lanceolate, 0.4-0.8× as long as the inner phyllaries; flowering early May-early November; [collectively widespread].
- 8 Basal/lower leaves (at least 4 nodes) absent at anthesis; mid-cauline leaves broadly (to narrowly) elliptical; achene awns average 0.85 mm; flowering September-October; [swamp forests and streamside openings, fresh-tidal creek margins]; [from se. NC south to n. FL]
- 9 Leaves 4-15 cm long, 10-45 mm wide, the blades broadly to narrowly elliptical, 5-15× as long as wide; achene awns 0.7-1.0 mm long*C. palustris*
- 9 Leaves 8-15+ cm long, 2-7 mm wide, the blades linear to linear-oblong, 20-50× as long as wide; achene awns 0.2-0.4 mm long *C. species 1*
- 8 Basal/lower leaves present at anthesis; leaves rapidly reduced upward such that mid-cauline leaves are narrow or slender; achene awns various; flowering early May-early November; [wet savannas, seepage slopes, pitcher-plant bogs, streamhead ecotones, pocosin ecotones]; [collectively more widespread].

- 10 Leaves (at least one major leaf per plant) with 1-few slender auricles near base (rarely no auricled leaves present or at least readily visible); achene wing broad, >3/4 width of achene body; achene awns averaging 0.5 mm; leaf texture firm but not thick and leathery; flowering early May-early July; [se. VA south to e. GA].....*C. falcata*
- 10 Leaves without auricles; achene wing narrow, < 1/2 the width of the achene body; achene awns averaging 1.5 mm long; leaf texture thick and leathery; flowering mid August-early November; [se. NC south to c. FL and west to s. MS; also rarely inland in GA, NC, SC, off the Coastal Plain].....*C. gladiata*
- 1 Disk flowers with 5 corolla lobes and 5 anthers; ray flowers apically entire, or with (2-) 4-5 teeth.
- 11 All of the leaves simple or the plant with a mixture of simple leaves and leaves with 1-2 (-4) basal auricles or leaflets, these distinctly smaller than the terminal lobe or leaflet.
 - 12 Leaves all simple, 4-12 cm wide, the margins coarsely serrate (some of the lower leaves sometimes pinnately lacerate basally); [section *Silphidium*]*C. latifolia*
 - 12 Leaves simple, usually (but not always) some of the leaves on a plant with basal auricles or lobes, the leaf blades (or terminal leaflets) 0.5-3.5 cm wide, the margins entire; [section *Coreopsis*].
 - 13 Stems with 1-5 (-8) nodes between the first node > 1 cm above the basal leaves and the first head.
 - 14 Plants spreading by elongate stolons; leaf blades (or terminal leaflets) 1-2.2× as long as wide*C. auriculata*
 - 14 Plants lacking stolons; leaf blades (or terminal leaflets) > 3× as long as wide (basal leaves sometimes broader)*C. lanceolata*
 - 13 Stems with (5-) 6-12 nodes between the first node > 1 cm above the basal leaves and the first head.
 - 15 Leaf blades (or terminal leaflets) more or less broadly elliptical, ca. 1.5-4 cm wide, acute; stem (and often also the leaves) rather densely hairy (to glabrate)..... *C. pubescens* var. *pubescens*
 - 15 Leaf blades (or terminal leaflets) narrowly elliptical to oblanceolate, ca. 0.6-2 cm wide, acuminate; stem and leaves glabrous*C. pubescens* var. *robusta*
 - 11 Most or all of the leaves deeply lobed or dissected into distinct leaflets or divisions, the leaflets or divisions 3-20 or more, if only 3, then the lateral leaflets nearly or fully as large and well-developed as the terminal.
 - 16 Leaves sessile or with a short subpetiolar base < 2 mm long, the initial division of the leaves palmate into 3 leaflets (these sometimes further divided), giving the 2 opposite leaves the superficial appearance of a whorl of 6 leaves; [section *Gyrophyllum*].
 - 17 Leaves palmately 3-foliolate (rarely simple or 3-foliolate with the middle leaflet 2- or 3-lobed), the total number of leaflets or divisions thus 3 (-5), the middle leaflet of median leaves 5-30 mm wide.
 - 18 Leaf blades rather densely short-pubescent; outer phyllaries rather densely short-pubescent; middle leaflet of median leaves 10-30 mm wide; leaflets herbaceous *C. major* var. *major*
 - 18 Leaf blades slightly short-pubescent to glabrous; outer phyllaries slightly short-pubescent to glabrous; middle leaflet of median leaves 5-10 (-12) mm wide; leaflets subcoriaceous and stiff..... *C. major* var. *rigida*
 - 17 Leaves palmately compound, the leaflets simple to lobed or pinnatifid, the total number of leaflets or divisions (3-) 5-25, the middle leaflet of median leaves 0.5-7 mm wide.
 - 19 Leaflets usually lobed (rarely simple), the total number of leaflets or divisions (3-) 5-11 (-15) per leaf, the segments of median leaves (1.5-) 2-7 (-9) mm wide.....*C. delphinifolia*
 - 19 Leaflets pinnatifid, the total number of leaflets or divisions 11-25 or more per leaf, the segments of median leaves 0.2-1.2 mm wide *C. verticillata*
 - 16 Leaves, at least the lower, distinctly petioled on petioles 5-50 mm or more long.
 - 20 Ray flowers not toothed terminally (or rarely with a few with inconspicuous and irregular teeth); mid-cauline leaves palmately 3-foliolate, the terminal leaflet sometimes again 3-5-foliolate (sometimes giving an appearance of a pinnately 5-7-foliolate leaf), the leaflets 6-35 mm wide, 3-15× as long as wide; [section *Gyrophyllum*] *C. tripteris*
 - 20 Ray flowers apically with (2-) 4-5 teeth; mid-cauline leaves pinnately 5-11-foliolate, the leaflets either 3-15 mm wide and about 1-3× as long as wide, or 0.5-2 mm wide and > 20× as long as wide; [section *Coreopsis*].
 - 21 Disk flowers reddish; ray flowers usually with a basal red mark; leaflets of mid-cauline leaves 3-15 mm wide and about 1-3× as long as wide*C. basalis*
 - 21 Disk flowers yellow; ray flowers yellow; leaflets of mid-cauline leaves 0.5-6 (-10) mm wide and > 10× as long as wide.
 - 22 Achene wings fimbriate; [of granitic outcrops of the Piedmont of GA and AL].....*C. grandiflora* var. *saxicola*
 - 22 Achene wings entire; [collectively more widespread].
 - 23 Divisions of the midstem and upper cauline leaves with 1-3 divisions; plants reclining; flowering late June-July; [of dolomite glades in c. AL].....[*C. grandiflora* var. *inclinata*]
 - 23 Divisions of the midstem and upper cauline leaves with > 5 divisions; plants erect; flowering May-late June; [of granite outcrops and disturbed areas].
 - 24 Larger divisions of midstem and upper stem leaves 2-6 (-10) mm wide..... *C. grandiflora* var. *grandiflora*
 - 24 Larger divisions of midstem and upper stem leaves 0.5-1.5 mm wide.....*C. grandiflora* var. *harveyana*

Coreopsis auriculata Linnaeus, Lobed Coreopsis. Moist slopes and woodlands. April-June. C. and ne. VA, s. WV, and KY south to MS, AL, and GA. [= RAB, C, F, FNA, G, K, S, SE, W, WV, Y, Z]

* *Coreopsis basalis* (A. Dietrich) Blake, Texas Coreopsis. Sandy roadsides and fields; native of farther west. May-July. Probably native only to e. TX, now distributed across the Coastal Plain from TX east to FL and north to NC. [= RAB, C, F, FNA, G, K, SE, WH, Z; > *C. basalis* var. *basalis* - Y]

Coreopsis delphinifolia Lamarck, Larkspur Coreopsis. Dry woodlands. May-July. The species ranges from e. VA and s. NC south to c. GA, and se. TN (Polk County) (Chester, Wofford, & Kral 1997), and reputedly AL. Smith (1976) indicates that the species is an allopolyploid derivative (at 4x, 6x, and 8x) of *C. major*, *C. tripteris*, and *C. verticillata*. Its range extends south well beyond the range of *C. verticillata*. [= FNA, K; < *C. major* var. *stellata* - RAB; = *C. delphinifolia* - F, G, S, SE (an orthographic variant); > *C. delphinifolia* var. *delphinifolia* - Y; > *C. delphinifolia* var. *chloodea* Sherff - Y; > *C. major* Walter var. *linearis* Small - Y; = *C. delphinifolia* - Z]

Coreopsis falcata Boynton, Pool Coreopsis. Peat bogs, very wet savannas, ditches and borrow pits in savannas. Early May-early July (rarely later, perhaps in response to growing season fire). The species is endemic to the Coastal Plain of se. VA (City of Chesapeake), e. NC, e. SC, and e. GA; disjunct in Oconee County, SC. First reported for VA by Wieboldt et al. (1998). *C. falcata* should not be included (as by Cronquist in C and SE) in *C. gladiata*; the two species are distinctive in ecological

preferences, morphology, phenology, and distribution. [= RAB, GW, K, S, Y, Z; < *C. gladiata* var. *gladiata* – C, SE; < *C. gladiata* – FNA, WH]

Coreopsis floridana E.B. Smith, Florida Coreopsis. Cp (FL): wet pine flatwoods; uncommon. Late September-January (-February). Panhandle FL south to s. FL (absent from ne. FL). [= FNA, GW, K, WH, Z]

Coreopsis gladiata Walter, Swamp Coreopsis. Swamp forests. Mid-August-early November. Se. NC south to c. FL and west to s. MS; scattered inland as a disjunct in montane (and sometimes uppermost piedmontane) NC, SC, and GA. See *C. helianthoides* and *C. linifolia* for further discussion of the taxonomy of this group of species. [= RAB, S, Z; < *C. gladiata* var. *gladiata* – C, G, SE (also see *C. falcata*); < *C. gladiata* – FNA, GW, K, WH (also see *C. helianthoides*); > *C. gladiata* – Y; > *C. longifolia* Small var. *longifolia* – Y; > *C. longifolia* Small var. *godfreyi* Sherff – Y]

Coreopsis grandiflora Hogg ex Sweet var. *grandiflora*, Large-flowered Coreopsis. In thin soils of rock outcrops, especially granitic flatrocks. Late May-late June. Var. *grandiflora* ranges from c. GA and w. SC west to e. TX and e. OK, very scattered in distribution; it differs from var. *harveyana* in having the leaf divisions 2-6 mm wide (vs. 0.5-2 mm wide). [= F, K, Z; < *C. grandiflora* – RAB, FNA, G, S, W; < *C. grandiflora* var. *grandiflora* – C, SE (also see var. *harveyana*); > *C. grandiflora* var. *grandiflora* – Y; > *C. grandiflora* var. *pilosa* Sherff – Y]

* ***Coreopsis grandiflora*** Hogg ex Sweet var. *harveyana* (A. Gray) Sherff, Large-flowered Coreopsis. Disturbed areas; native of farther west. Late May-late June. As treated by Smith (1976), the species consists of 4 varieties. Var. *harveyana* is the most abundant variety, probably originally endemic to AR, n. LA, ne. TX, OK, e. KS, and s. and c. MO, but now scattered eastward to IN, NC, and SC. Var. *longipes* (Hooker) Torrey & Gray is endemic to e. TX. See Crawford & Smith (1984) for additional discussion of the varieties. [= F, K, Y, Z; < *C. grandiflora* – RAB, FNA, G, S, W, WH, WV; < *C. grandiflora* var. *grandiflora* – C, SE]

Coreopsis grandiflora Hogg ex Sweet var. *inclinata* J. Allison, Ketona Tickseed, Ketona Coreopsis. Dolomite glades. Endemic to dolomitic Ketona glades of c. AL (Allison & Stevens 2001). [< *C. grandiflora* – FNA]

Coreopsis grandiflora Hogg ex Sweet var. *saxicola* (Alexander) E.B. Smith, Stone Mountain Coreopsis. Granitic outcrops. As interpreted by Smith (1976) and Cronquist (1980), this variety is endemic to granite outcrops in c. GA and ec. AL and to sandstone outcrops in nc. AR; the AR plants, differing in morphology, phenology, karyotype, and distribution, may well warrant separate status. [= K, SE, Z; < *C. grandiflora* Hogg ex Sweet – FNA; = *C. saxicola* Alexander – S; > *C. saxicola* var. *saxicola* – Y; > *C. saxicola* var. *duncanii* Sherff – Y]

Coreopsis integrifolia Poiret, Chipola Dye-flower. Banks and floodplains of small blackwater streams (especially over limestone), edges of swamp forests bordering longleaf pinelands or bordering brackish marshes. Mid August-early November. Se. SC south to FL Panhandle, apparently uncommon throughout its range. It is related to *C. helianthoides* and *C. linifolia*; the leaves are cauline and opposite, the petioles are ciliate. [= FNA, GW, K, S, SE, WH, Y, Z]

Coreopsis lanceolata Linnaeus, Longstalk Coreopsis. Disturbed areas. April-June. S. MA, MI and WI south to c. peninsular FL, e. TX, and NM. Often spread from cultivation, its original range obscure. [= RAB, C, FNA, K, Pa, SE, W, WH, WV, Z; > *C. lanceolata* var. *lanceolata* – Y; > *C. lanceolata* var. *villosa* Michaux – F, G, Y; > *C. heterogyna* Fernald – F; > *C. lanceolata* – S; > *C. crassifolia* Aiton – S]

Coreopsis latifolia Michaux, Broadleaf Coreopsis. In rich, moist, cove forests and slopes at medium elevations, primarily from 500 m in the Blue Ridge Escarpment to nearly 1500 m, often locally abundant. (July-) August-September. A Southern Appalachian endemic: sw. NC and se. TN (Polk County) (Chester, Wofford, & Kral 1997) south into nw. SC and ne. GA. This species is treated by Smith (1976) in a monotypic section (section *Silphidium*) of *Coreopsis*, and, indeed, it does not closely resemble our other species. Smith (1976) considered it a primitive species, with its closest relatives in Mexico, and all of his attempts to hybridize it with other Southeastern *Coreopsis* failed. Flowering appears to be triggered by canopy tree-fall light gaps. It often occurs with *Helianthus glaucophyllus*. [= RAB, FNA, K, S, SE, W, Y, Z; = *Leiodon latifolius* (Michaux) Shuttleworth]

Coreopsis leavenworthii Torrey & Gray. {habitats} AL and FL. [= FNA, K; > *C. leavenworthii* vars. – Y] {not yet keyed; synonymy incomplete}

Coreopsis linifolia Nuttall, Savanna Coreopsis. Savannas, sandhill seeps, sandhill-pocosin ecotones. Early July-late October. Se. VA south to ne. and Panhandle FL, west to e. TX. Basal rosettes of this species are abundant in wet savannas and can be distinguished readily by the distinctive leaves: very long-petiolate, about 1 cm across, the pinnate venation very neat (the main lateral veins straight and parallel to the other laterals on the same side of the leaf), with small dark dots when backlit, and very thick (ca. 1 mm) and stiff in texture. The proper taxonomic treatment of this taxon and its relatives remains unclear. Smith (1976) interpreted *C. linifolia* to range from se. VA south and west along the Coastal Plain to e. TX (with a few inland disjunctions) and to consist of two chromosome races, a diploid Gulf Coast race (w. FL to se. TX) and a tetraploid Atlantic Coast race (s. GA to se. VA), "not differing sufficiently morphologically to justify nomenclatural recognition." Fernald, however, named *C. oniscicarpa* (the tetraploid) based on morphologic characters. Given the existence of morphologic characters, the failure of Smith's attempted hybridizations of the two "races," his speculation that the tetraploid could be an allotetraploid (though likely an autotetraploid), and the allopatric ranges of the two races, specific recognition is plausible. Further study is needed. Cronquist (in C, G, SE) does not recognize *C. oniscicarpa* as distinct from *C. linifolia*, and reduces *C. linifolia* (*sensu lato*) to a variety of *C. gladiata*, also including *C. falcata* in the typical variety of *C. gladiata*. The abundant morphologic, phenologic, and ecologic differences between *C. gladiata*, *C. linifolia*, and *C. falcata* render such an approach undesirable. [= GW, K, W, Y, Z; = *C. angustifolia* Aiton – RAB, possibly misapplied; = *C. gladiata* var. *linifolia* (Nuttall) Cronquist – C, G, SE; > *C. oniscicarpa* Fernald var. *oniscicarpa* – F; > *C. oniscicarpa* var. *simulans* Fernald – F; < *C. gladiata* – FNA]

Coreopsis major Walter var. *major*, Woodland Coreopsis. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): woodlands; common (rare in GA, NC, SC, VA). May-July. W. VA, s. OH, and KY south to SC, GA, w. FL, s. AL, and s. MS. How to treat the "*Coreopsis major* complex" (here including *C. major* var. *major*, *C. major* var. *rigida*, *C. delphinifolia*, and *C. verticillata*) is not clear. The group apparently includes diploids and a variety of allopolyploids and autopolyploids (at various ploidies) variously derived from *C. major* var. *major* and *C. verticillata*. [= RAB, C, F, G, SE, W, Y; < *C. major* – FNA, K, S, WH, Z]

Coreopsis major Walter var. *rigida* (Nuttall) F.E. Boynton, Stiffleaf Coreopsis. Mt (GA, NC, SC, WV), Pd (GA, NC, SC), Cp (GA, NC, SC), {VA}: dry woodlands and forests; common (rare in WV). June-August. VA, WV, and KY south to w. FL, s. AL, s. MS, and se. LA. The recognition of varieties is problematic and controversial. [= C, SE, Y; >> C. *major* var. *stellata* (Nuttall) B.L. Robinson – RAB, WV; > C. *major* var. *stellata* – F, G, Y; > C. *major* var. *rigida* – F, Y; < C. *major* – FNA, K, S, WH, Z]

Coreopsis nudata Nuttall. Seasonally flooded pineland depressions, either herbaceous-dominated or under a canopy of *Taxodium ascendens*. E. GA (in close proximity to SC) south to ne. FL and Panhandle FL, west to e. LA. [= FNA, GW, K, S, SE, WH, Y, Z]

Coreopsis palustris Sorrie, Beadle's Coreopsis. Swamp forests, swamp edges, borrow pits; rare. September-October. Se. NC south to ne. FL (records outside this area, so far as is known, all represent misidentifications. The validity of this taxon has been controversial, and its nomenclature also difficult; see Weakley et al. (2011). Smith (1976) includes it in *C. gladiata*, considering it merely a pubescent form. Cronquist (in SE) regards it as distinct at the species level, despite his serious over-lumping of all its close relatives into a single species with two varieties: *C. gladiata* var. *gladiata* (including *C. falcata* and *C. gladiata*), and var. *linifolia* (including *C. oniscicarpa* and *C. linifolia*). [= *C. helianthoides* Beadle – RAB, S, SE, Y, Z, misapplied (the type actually belonging to *C. gladiata*); < *H. gladiata* – FNA, GW, K, WH]

Coreopsis pubescens Elliott var. *debilis* (Sherff) E.B. Smith. {habitat}. C. TN south through AL and ne. MS to w. FL, s. AL, s. MS, and se. LA; it has very narrow leaf blades or terminal leaflets. [= GW, K, Z; < *C. pubescens* – FNA, S, SE; > *C. corninsularis* Sherff – Y; > *C. debilis* Sherff – Y] {not yet keyed}

Coreopsis pubescens Elliott var. *pubescens*, Common Hairy Coreopsis. Forests, woodlands, and rock outcrops. July-September. The species as a whole is largely centered in the Southern Appalachians and Ozarks-Ouachitas, with scattered outlying occurrences; var. *pubescens* has essentially the range of the species, from s. VA, s. KY, s. IL, and s. MO south to nw. FL, MS, and LA. Var. *robusta*, of the Southern Appalachians, is discussed below. [= F, GW, K, Y, Z; < *C. pubescens* – RAB, C, FNA, G, S, SE, W, WH, WV]

Coreopsis pubescens Elliott var. *robusta* Gray ex Eames, Mountain Hairy Coreopsis. Rocky slopes, glades, edges of rock outcrops. July-September. Var. *robusta* is a Southern Appalachian endemic, known from sw. VA, w. NC, nw. SC, n. GA, e. TN, and c. AL. [= F, GW, K, Y, Z; < *C. pubescens* – RAB, C, FNA, G, S, SE, W, WV]

Coreopsis pulchra F.E. Boynton, Lookout Mountain Coreopsis. Nw. GA and ne. AL. [= FNA, K, S, SE, Y, Z] {not yet keyed}

Coreopsis rosea Nuttall. Upland depression ponds in the Inner Coastal Plain, drawdown zones on banks of blackwater rivers in the Outer Coastal Plain. July-September. Coastal Plain of s. NS, MA, RI, NY (Long Island), NJ, PA (Rhoads & Block 2007), DE, MD, e. SC, and e. GA, where it occurs on shores with fluctuating water levels, primarily on Coastal Plain pond shores, but also on river banks. It occurs in Horry County, SC, in the drawdown zone on the banks of the Waccamaw River; it should be sought in NC. The only other pink-rayed species in our flora is *C. nudata*, which ranges in the Coastal Plain from GA west to e. LA and has terete "juncoid" leaves. [= FNA, GW, K, Pa, S, SE, Y, Z]

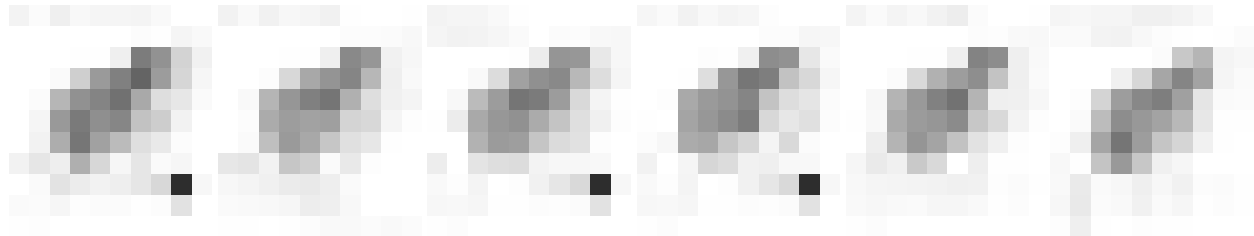
Coreopsis species 1. Calcareously influenced acid savannas. September-October. Known from a single site on the Onslow-Pender county line, where growing with *Thalictrum cooleyi*, *Allium species 1*, and *Scleria species 1*.

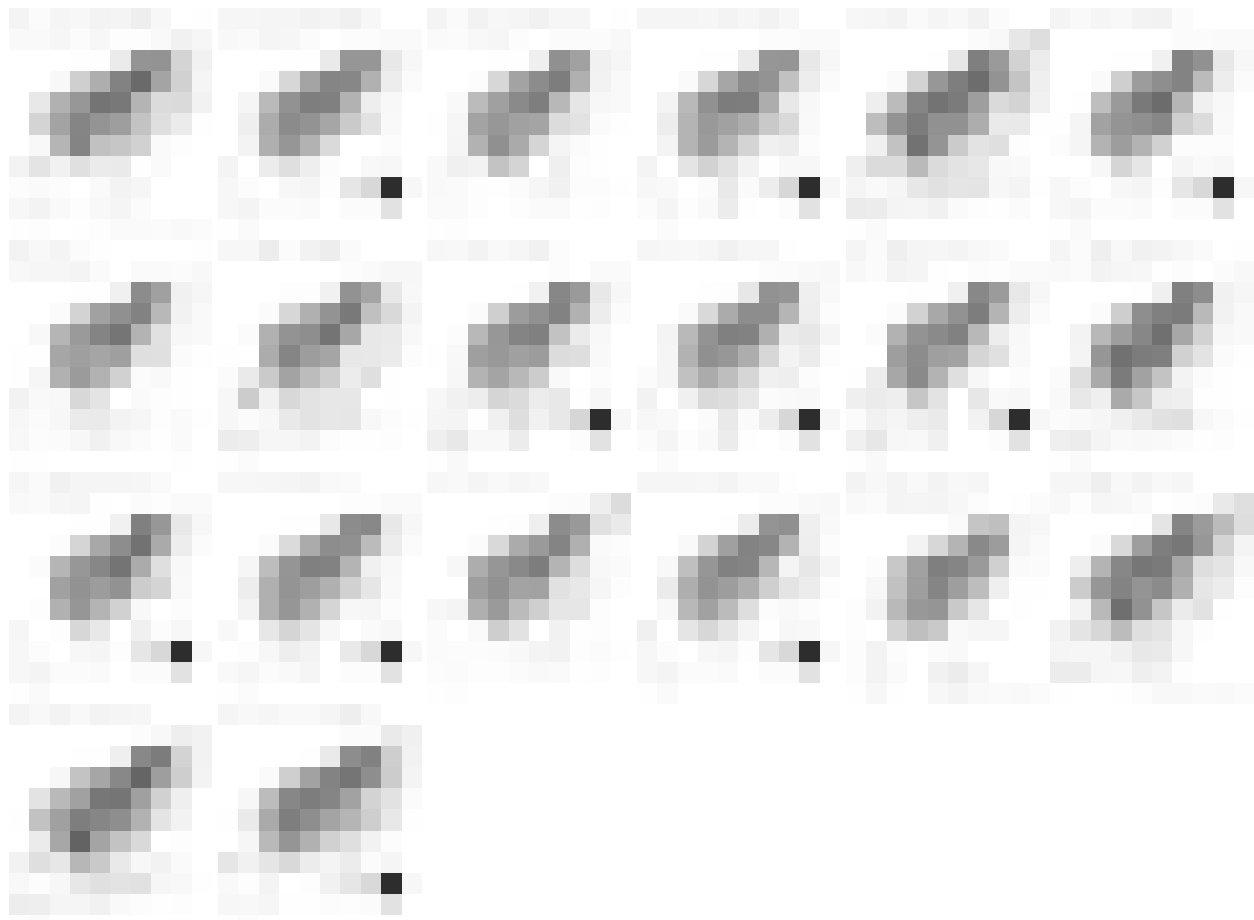
Coreopsis tinctoria Nuttall var. *atkinsoniana* (Douglas ex Lindley) H.M. Parker ex E.B. Smith. Roadsides; apparently introduced eastward in nw. GA from a distribution in w. North America. [= K; < *C. tinctoria* – FNA, SE; = *C. atkinsoniana* Douglas ex Lindley – Y] {not yet keyed; synonymy incomplete}

* *Coreopsis tinctoria* Nuttall var. *tinctoria*, Calliopsis, Plains Coreopsis. Roadsides and other disturbed places; probably introduced from farther west. Var. *tinctoria* was apparently widespread in the Great Plains, now distributed nearly throughout North America. Var. *similis* (Boynton) H.M. Parker ex E.B. Smith is endemic to s. TX and adjacent Tamaulipas and Nuevo León. [= C, K, Z; < *C. tinctoria* – FNA, G, GW, Pa, SE, W, WH, WV; > *C. tinctoria* – RAB, S; > *C. cardaminefolia* (A.P. de Candolle) Torrey & A. Gray – RAB, S, Y; > *C. tinctoria* var. *tinctoria* – Y; > *C. stenophylla* Boynton – Y]

Coreopsis tripteris Linnaeus, Tall Coreopsis. Rich, moist woodlands and woodland borders, primarily over calcareous or mafic rocks or on nutrient-rich alluvium. July-early September. MA, s. ON, and WI south to Panhandle FL and TX. [= RAB, C, FNA, G, GW, K, Pa, S, SE, W, WH, WV, Z; > *C. tripteris* var. *deamii* Standley – F; > *C. tripteris* var. *smithii* Sherff – F, Y; > *C. tripteris* var. *tripertis* – F, Y]

Coreopsis verticillata Linnaeus, Threadleaf Coreopsis. Dry sandy, rocky, or clayey woodlands and woodland borders. May-July. Smith (1976) indicates that the species consists of two chromosome races, a diploid, ranging in the Piedmont and Mountains from c. SC and NC north to ne. WV, and s. MD, and an allotetraploid, limited to the Coastal Plain of ne. NC and se. VA. The finely-divided leaves are attractive and the plant is cultivated horticulturally; scattered occurrences outside the ranges indicated above are escapes from cultivation. [= RAB, C, F, FNA, G, K, S, SE, W, WV, Y, Z]





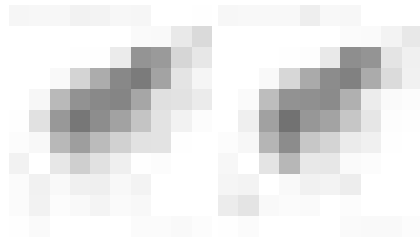
Cosmos Cavanilles 1791 (Cosmos)

A genus of about 26 species, of tropical, subtropical, and warm temperate America. References: Kiger in FNA (2006c); Cronquist (1980)=SE; Sherff & Alexander (1955)=Z.

- 1 Rays pink or white; ultimate leaf segments mostly ca. 1 mm wide or less..... *C. bipinnatus*
- 1 Rays orange, yellow, or red; ultimate leaf segments mostly > 2 mm wide *C. sulphureus*

* *Cosmos bipinnatus* Cavanilles, Common Cosmos. Garden edges, roadsides, disturbed areas, commonly cultivated, sometimes escaped; native of Mexico. August-November. [= RAB, C, F, FNA, G, K, Pa, S, SE, WV; > *C. bipinnatus* var. *bipinnatus* – Z]

* *Cosmos sulphureus* Cavanilles, Orange Cosmos. Garden edges, roadsides, disturbed areas; commonly cultivated, rarely escaped, native of tropical America. August-November. [= C, F, FNA, G, K, Pa, S, SE; > *C. sulphureus* var. *sulphureus* – Z]



Cota J. Gay ex Gussone 1845 (Golden Marguerite)

A genus of ca. 40 species, herbs, of Europe, sw. Asia, and Africa. References: Watson in FNA (2006a).

* *Cota tinctoria* (Linnaeus) J. Gay ex Gussone, Yellow Chamomile, Golden Marguerite. Disturbed areas, roadsides; native of Europe. June-September. [= FNA, Pa; = *Anthemis tinctoria* Linnaeus – C, F, G, K, WV, Z]



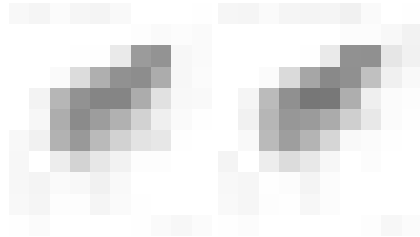
Cotula Linnaeus 1753 (Brassbuttons)

A genus of about 55 species, annual and perennial herbs, of the Old World, mainly southern hemisphere. References: Watson in FNA (2006a).

- 1 Stems hairy; leaf blades 2-3× pinnately lobed; annual.....*C. australis*
- 1 Stems glabrous; leaf blades entire or with a few teeth or lobes; perennial.....*C. coronopifolia*

* **Cotula australis** (Sieber) Hooker f. Waste area around wool-combing mill; native of Australia and New Zealand. Reported for SC by Nesom (2004d). [= FNA, K]

* **Cotula coronopifolia** Linnaeus, Brassbuttons. MD. Native of Old World. [= FNA]



Crepis Linnaeus 1753 (Hawksbeard)

A genus of about 200 species, herbs, of the Northern Hemisphere, South America, and southern Africa. References: Bogler in FNA (2006a); Cronquist (1980)=SE. Key adapted from C and SE. [also see *Youngia*]

- 1 Cypselas (at least the inner in the head) with a distinct narrow beak
 - 2 Cypselas dimorphic, the inner beaked.....[*C. foetida*]
 - 2 Cypselas monomorphic, all beaked.
 - 3 Stems coarsely setose, the setae yellowish; bractlets subtending the phyllaries 10-14, not reflexed.....[*C. setosa*]
 - 3 Stems glabrate, hispid, or tomentose, if sparsely setose the setae blackish; bractlets subtending the phyllaries 5-12, reflexed.....*C. vesicaria* ssp. *taraxacifolia*
- 1 Cypselas narrowed toward the summit, but not distinctly beaked.
 - 4 Stems (at least toward the base) hispid and viscid with stipitate glands; phyllaries glabrous on both the inner and outer surfaces; cypselas 4-6 mm long.....*C. pulchra*
 - 4 Stems variously pubescent, but not viscid with stipitate glands; phyllaries variously pubescent on one or both surfaces; cypselas 1.5-7 mm long.
 - 5 Inner surface of the inner phyllaries glabrous; outer surface stipitate-glandular and with 2 rows of black setae; cypselas 1.5-2.5 mm long.....*C. capillaris*
 - 5 Inner surface of the inner phyllaries pubescent with appressed, shining, white hairs 0.1-0.2 mm long; outer surface of phyllaries tomentose, hispidulous, or canescent, but the hairs not glandular and without setae; cypselas 3-7 mm long.
 - 6 Cypselas 4-7 mm long, yellowish- or reddish-brown, with 13-20 ribs; pappus 5-7 mm long; biennial.....*C. biennis*
 - 6 Cypselas 3-4 mm long, reddish- or purplish-brown, with 10 ribs; pappus 4-5 mm long; annual.....*C. tectorum*

* **Crepis biennis** Linnaeus, Rough Hawkbeard. Disturbed areas; native of Europe. June-August. [= FNA, K]

* **Crepis capillaris** (Linnaeus) Wallroth, Smooth Hawkbeard. Pastures, roadsides, disturbed areas; native of Europe. May-November. [= RAB, C, F, FNA, G, K, Pa, SE, W, WV]

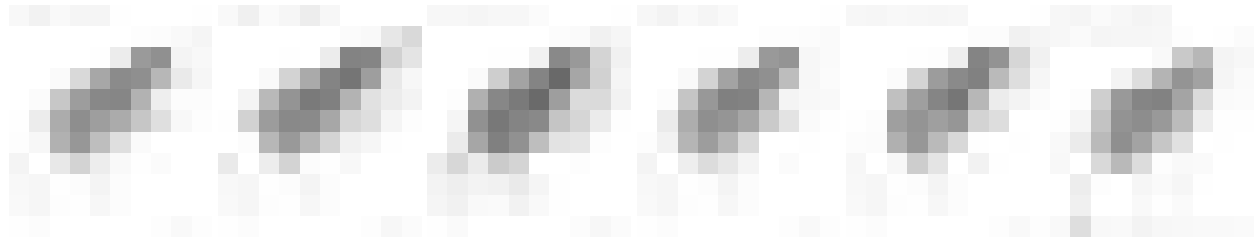
* **Crepis foetida** Linnaeus, Stinking Hawkbeard. Native of Eurasia. April-September. Reported for NC (Kartesz (2010). [= FNA, K] documentation uncertain; rejected; not mapped)

* **Crepis pulchra** Linnaeus, Smallflower Hawkbeard. Roadsides, fields, disturbed areas; native of Eurasia. Late April-July. [= RAB, C, F, FNA, G, K, SE, W, WH, WV]

* **Crepis setosa** Haller f., Bristly Hawkbeard. Disturbed areas; native of Europe. Reported for Polk County, TN by Chester, Wofford, & Kral (1997) and from s. PA by Rhoads & Klein (1993). [= C, FNA, K, Pa]

* **Crepis tectorum** Linnaeus. Disturbed areas, perhaps not established; native of Europe. June-July. [= C, F, FNA, G, K, Pa, S]

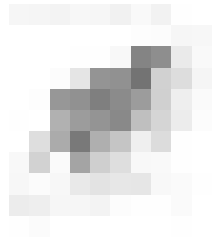
* **Crepis vesicaria** Linnaeus ssp. *taraxacifolia* (Thuillier) Thellung. Lawns; native of Mediterranean and w. Europe. Late May-July. [= RAB, C, FNA, K, SE; < *C. vesicaria* – Pa; ? *C. vesicaria* Linnaeus ssp. *haenseleri* (Boiss. ex A.P. de Candolle) P.D. Sell]



Croptilon Rafinesque 1837 (Scratch-daisy)

A genus of 3 species, herbs, of s. North America. References: Smith (1981); Correll & Johnston (1970); Cronquist (1980)=SE; Nesom (2000b).

Croptilon divaricatum (Nuttall) Rafinesque, Scratch-daisy. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandy soils of fields, roadsides, and sandhill woodlands; common (rare in VA). August-November. Se. VA south to c. peninsular FL and west to c. TX, inland to se. OK and s. AR. [= FNA, K; = *Haplopappus divaricatus* (Nuttall) A. Gray – RAB, C, F, G, SE, W; = *Isopappus divaricatus* (Nuttall) Torrey & Gray – S]



Cyclachaena Fresenius 1838

A monotypic genus, a perennial herb, of North America. References: Strother in FNA (2006c).

* *Cyclachaena xanthiifolia* (Nuttall) Fresenius, Big Marsh-elder. Disturbed areas, waste areas near wool-combing mills; native of w. North America. August-October. See Nesom (2004d). [= FNA, Pa; = *Iva xanthiifolia* Nuttall – C, F, G, K, SE, orthographic variant; = *I. xanthiifolia* Nuttall]



Diaperia Nuttall 1840 (Dwarf Cudweed)

A genus of 3 species, annual herbs, of c. United States and n. Mexico. References: Morefield in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE; Anderberg (1991)=Y. Key based closely on FNA.

- 1 Heads ellipsoid to cylindrical, 3.5-4.5 mm high, 2-3× as high as wide; capitular leaves visible between and surpassing the heads; cypselas 0.9-1.2 mm long *D. prolifera* var. *prolifera*
- 1 Heads campanulate to spherical, 2-3.3 mm high, about 1× as high as wide; capitular leaves more-or-less hidden between and surpassed by the heads; cypselas 0.7-0.9 mm long.
 - 2 Pistillate paleas individually visible through thin, silky pubescence; heads spherical, the largest 2.5-3.3 mm high *D. verna* var. *drummondii*
 - 2 Pistillate paleas collectively hidden by dense woolly pubescence; heads campanulate the largest 2.0-2.5 mm long *D. verna* var. *verna*

Diaperia prolifera (Nuttall ex de Candolle) Nuttall var. *prolifera*, Cotton-rose, Bighead Pygmy-cudweed. Disturbed areas, waste areas around wool-combing mill; introduced from farther south and west (Nesom 2004d). May-June. MO west to MT, south to LA and TX; disjunct eastward in the Black Belt prairies of AL and MS. [= FNA; < *Filago prolifera* (Nuttall ex A.P. de Candolle) Britton – Y, Z; < *Evax prolifera* Nuttall ex A.P. de Candolle – K, SE]

Diaperia verna (Rafinesque) Morefield var. *drummondii*, Gulf Coast Rabbit-tobacco. Dunes, beaches, disturbed sandy soils. AL west to TX. Mid February-mid May. [= FNA; = *Evax verna* Rafinesque var. *drummondii* (Torrey & A> Gray) Kartesz & Gandhi – K]

* *Diaperia verna* (Rafinesque) Morefield var. *verna*, Cotton-rose, Poverty-weed. Disturbed areas, waste areas around wool-combing mill; introduced from farther south and west (Nesom 2004d). Early March-late June. [= FNA; = *Filago verna* (Rafinesque) Rafinesque – Y, Z; ? *Evax verna* Rafinesque var. *verna* – K; ? *Filagopsis nivea* Small – S; ? *E. multicaulis* A.P. de Candolle – SE]

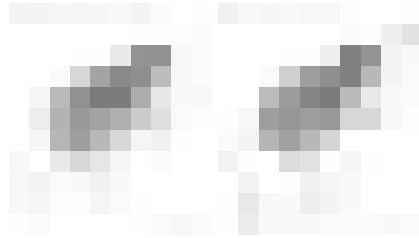


Dittrichia W. Greuter 1973

A genus of 2 species, herbs, of the Mediterranean region. References: Preston in FNA (2006a).

* *Dittrichia graveolens* (Linnaeus) W. Greuter. Waste area around wool-combing mill; native of Mediterranean Europe, but quite possibly introduced into SC by wool from Australia (Nesom 2004d). [= FNA, K] {add to synonymy}

* *Dittrichia viscosa* (Linnaeus) Greuter. Disturbed areas, on ballast; native of Mediterranean Europe. Collected as a ballast weed in Pensacola, Escambia County, FL, and elsewhere in eastern North America, in the late 1800s; it does not appear to be naturalized. [= FNA, WH; = *Cupularia viscosa* (Linnaeus) Godron & Grenier – S; = *Inula viscosa* (Linnaeus) Aiton – SE] {not keyed}



Doellingeria Nees 1832 (Flat-topped Aster)

A genus of about 7 species, herbs, of e. North America and e. Asia. This group of species has long been recognized as distinctive, sometimes given status as the genus *Doellingeria* (first by Nees in 1832), or as subgenus *Doellingeria* of *Aster*. Nesom (1993d) argues that *Doellingeria* should be separated from *Aster*, as its affinities seem to be at least as strongly to *Solidago* and its relatives, an assertion supported by molecular evidence (Noyes & Rieseberg 1999). References: Semple & Chmielewski in FNA (2006b); Nesom (1993d)=Z; Cronquist (1980)=SE; Nesom (2000b).

- 1 Disk flowers 4-14 per head; ray flowers 2-7 per head; leaves mostly 1.5-4× as long as wide; [of sandhill ecotones and streamhead pocosins of the Coastal Plain (primarily fall-line sandhills) from sc. NC southward]..... *D. sericocarpoides*
- 1 Disk flowers 16-40 per head; ray flowers 5-14 per head; leaves 2-6× as long as wide; [collectively widespread in our area].
 - 2 Plants with stems solitary or several from a crown, to 11 dm tall; leaves mostly 2-4 (-5)× as long as wide..... *D. infirma*
 - 2 Plants with stems scattered from creeping rhizomes (forming clonal patches), to 20 dm tall; leaves mostly 4-6× as long as wide..... *D. umbellata*

Doellingeria infirma (Michaux) E. Greene, Appalachian Flat-topped White Aster. Woodland borders, dry or dry-mesic woodlands, glades. Late June-September. MA west to KY, south to SC, GA, Panhandle FL (Gadsden County), AL, and wc. TN. [= FNA, K, Pa, WH, Z; = *Aster infirmus* Michaux – RAB, C, G, SE, W, WH; > *Doellingeria infirma* – S; >< *Doellingeria humilis* (Willdenow) Britton – S, in part]

Doellingeria sericocarpoides Small, Pocosin Flat-topped Aster. Sandhill ecotones and streamhead pocosins. Late July-October. Sc. NC south to ne. FL and Panhandle FL, west to AL; also in AR, OK, and TX. [= FNA, K, S, WH, Z; = *Aster sericocarpoides* (Small) K. Schumann – SE; = *A. umbellatus* P. Miller var. *brevisquamus* Fernald – RAB, misapplied; = *A. umbellatus* var. *latifolius* A. Gray – GW; >> *Doellingeria humilis* (Willdenow) Britton – S, in part, misapplied]

Doellingeria umbellata (P. Miller) Nees, Tall Flat-topped White Aster. Wet meadows, pastures, bogs, marshes, stream floodplains, roadbanks, to at least 1900 m. August-September. NL (Newfoundland) west to MN, south to e. VA, w. NC, nw. SC (P. McMillan pers.comm. 2002), n. GA, ne. AL, TN, and KY. [= Pa, S, Z; = *Aster umbellatus* P. Miller – C, G, SE, W, WH; = *A. umbellatus* var. *umbellatus* – RAB, GW; > *Doellingeria umbellata* var. *umbellata* – FNA, K]



Dracopis Cassini 1825 (Coneflower)

A monotypic genus, an annual herb, of sc. and se. North America, perhaps better included in *Rudbeckia*. References: Urbatsch & Cox in FNA (2006c).

Dracopis amplexicaulis (Vahl) Cassini. Prairies, calcareous bttomlands, dry open areas, disturbed areas, waste areas near wool-combing mill; introduced in part in our area. Native to prairie-like areas and calcareous bottomlands from GA (?) and AL west to KS and TX; reported for nc. GA (Jones & Coile 1988) and introduced in SC (Nesom 2004d). [= K, SE, WH; = *Rudbeckia amplexicaulis* Vahl – F, FNA]



Dyssodia Cavanilles 1802

A genus of 4 species, herbs, of North America south to Central America. References: Strother in FNA (2006c).

* *Dyssodia papposa* (Ventenat) A.S. Hitchcock, Dogweed. Waste areas near wool-combing mill, other disturbed areas; native of c. and sw. North America. July-October. Reported for SC by Nesom (2004d). [= FNA, K, Pa, SE; = *Boebera papposa* (Ventenat) Rydberg – S]



Echinacea Moench 1794 (Purple Coneflower)

A genus of 4-9 species, herbs, endemic to e. and c. North America. There has been considerable medicinal use of extracts from many of the species, and collection of plants from the wild to meet the demand of the herbal trade has extirpated many populations, particularly in c. United States. Foster (1991) presents a lengthy and detailed discussion of medicinal uses of *Echinacea*, along with considerable information on the biology, conservation needs, taxonomy, and nomenclatural history of the genus. Binns, Baum, & Arnason (2002) provide no rationale for their approach of recognizing the same number of taxa as McGregor, but treating them as 4 species and 10 varieties; the entities seem to be distinct at the specific level. References: Urbatsch, Neubig, and Cox in FNA (2006c); Baskin, Snyder, & Baskin (1993)=Z; Foster (1991)=Y; Cronquist (1980)=SE; Binns, Baum, and Arnason (2002)=X; McKeown (1999); Gaddy (1991); McGregor (1968).

- 1 Leaves lanceolate to ovate, the larger > 5 cm wide, the stem leaves well-developed, though smaller than the basal.
 - 2 Leaves glabrous on both sides, or scabrous above; chaffy bracts (pales) ca. 9 mm long, the awns about a fourth as long as the body of the pales and with incurved tips; rays 3.5-8 cm long, strongly drooping.....*E. laevigata*
 - 2 Leaves pubescent or scabrous on both sides; chaffy bracts (pales) 10-13 mm long, the awns about half as long as the body of the pales and with straight tips; rays 2.5-5.5 cm long, horizontal to slightly drooping.....*E. purpurea*
- 1 Leaves lanceolate to linear, the larger < 5 cm wide, stem leaves few and poorly developed, the basal leaves predominant.
 - 3 Rays curved upward, medium pink, 2.5-3.2 cm long; [endemic to calcareous glades in c. TN].....*E. tennesseensis*
 - 3 Rays horizontal to drooping, pale pink, 4-9 cm long; [widely scattered in our area].
 - 4 Fresh pollen white.....*E. pallida*

4 Fresh pollen pale to bright yellow.....*E. simulata*

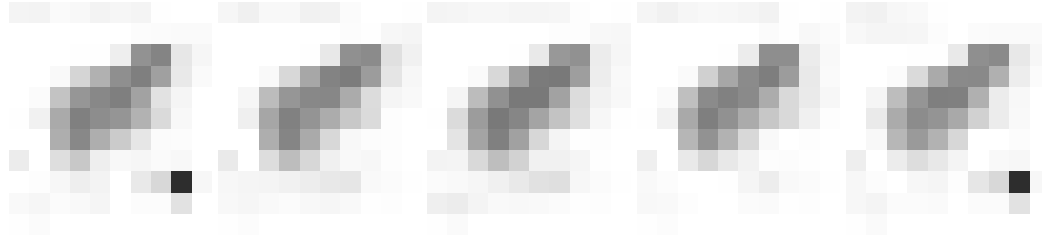
Echinacea laevigata (C.L. Boynton & Beadle) S.F. Blake, Smooth Purple Coneflower. Pd (NC, VA), Mt (GA, SC, VA), Cp (SC): open woodlands and glades over mafic or calcareous rocks, such as diabase, limestone, and dolostone, rarely in oak-pine savannas of the upper Coastal Plain over circumneutral clay sediments; rare. Late May-July. The species is an eastern sibling of *E. purpurea*. In NC, this attractive, medicinal plant is now limited to a few populations in Durham, Granville, and Rockingham counties. Extensive populations occur over Elbrook Dolomite in Montgomery, VA. Populations of this species in sandy soils of the Coastal Plain of SC have been variously interpreted as native or introduced (Nelson & Kelly 1997). [= RAB, C, F, FNA, K, Pa, S, SE, W, X, Y; = *E. purpurea* var. *laevigata* (C.L. Boynton & Beadle) Cronquist – G]

*? ***Echinacea pallida*** (Nuttall) Nuttall, Pale Purple Coneflower. Pd (GA, NC?, VA), Mt (VA), Cp (GA): roadsides; rare, perhaps introduced in part from c. US (GA Special Concern, NC Watch List). June-July. ON west to MI, WI, and NE, south to IN, LA, and TX; disjunct eastward in TN, AL, GA, SC, NC, and VA, where probably but uncertainly native). Some at least of the eastern populations considered to be *E. pallida* are actually the closely related *E. simulata*; additional work is needed to disentangle the relative distributions of these two species in our area. [= RAB, FNA, K, Y, Z; < *E. pallida* var. *pallida* – C, SE; < *E. pallida* – F, G, W; = *E. pallida* var. *pallida* – X]

Echinacea purpurea (Linnaeus) Moench, Eastern Purple Coneflower. Mt (NC, VA*, WV*), Pd (NC, VA*), Cp (FL): open woodlands, roadsides, some of the occurrences persistent or spread from cultivation; rare. OH, WI, and IA south to FL and TX; introduced more broadly as in ne. United States and ON, the exact limits of the native distribution unclear. [= RAB, C, F, FNA, K, Pa, SE, W, WH, X, Y; = *E. purpurea* var. *purpurea* – G]

Echinacea simulata R.L. McGregor, Prairie Purple Coneflower. Prairies, roadsides. June-July. IN, IL, and MO south to KY and TN; some of the more eastern disjunct populations previously considered to be *E. pallida* are actually *E. simulata*; additional work is needed to disentangle the relative distributions of these two species in our area. GA native populations (Floyd Co.) are *E. simulata*. [= FNA, K, Y, Z; < *E. pallida* var. *pallida* – C, SE; < *E. pallida* – F, G, W; = *E. pallida* (Nuttall) Nuttall var. *simulata* (McGregor) Binns, B.R. Baum, & Arnason – X]

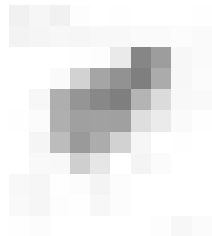
Echinacea tennesseensis (Beadle) Small, Tennessee Purple Coneflower. Calcareous glades. Endemic to the Nashville Basin of c. TN (Davidson, Rutherford, & Wilson counties) (Chester, Wofford, & Kral 1997). [= FNA, K, S, Y, Z; < *E. pallida* (Nuttall) Nuttall var. *angustifolia* (A.P. de Candolle) Cronquist – SE; = *E. pallida* (Nuttall) Nuttall var. *tennesseensis* (Beadle) Binns, B.R. Baum, & Arnason – X; = *E. angustifolia* A.P. de Candolle var. *tennesseensis* (Beadle) S.F. Blake]



***Echinops* Linnaeus (Globe-thistle)**

A genus of about 120 species, herbs, of temperate and subtropical Europe, Asia, and Africa. References: Keil in FNA (2006a).

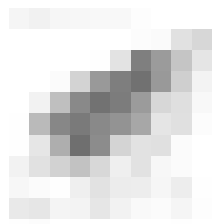
* ***Echinops sphaerocephalus*** Linnaeus, Globe-thistle. Roadsides, edges of railroad tracks, disturbed areas; native of Europe and w. Asia. July-October. Reported as introduced as far south as se. PA (Rhoads & Klein 1993) and VA (Fernald 1950; Keil in FNA 2006a). Its occurrence in VA has recently been verified (C.N. Horn, pers. comm. 2006). [= C, F, FNA, G, K, Pa, WV]



***Eclipta* Linnaeus 1753**

A genus of 4 species, herbs, of temperate, subtropical, and tropical regions. References: Strother in FNA (2006c); Cronquist (1980)=SE.

Eclipta prostrata (Linnaeus) Linnaeus, Yerba-de-tajo. Moist or wet disturbed areas, ditches, shores, disturbed bottomlands. June-November. MA west to WI, south to s. FL and TX, and southward into the tropics. [= C, FNA, K, Pa, WH; = *E. alba* (Linnaeus) Hasskarl – RAB, F, G, GW, SE, W, WV; = *Verbesina alba* Linnaeus – S]



***Elephantopus* Linnaeus 1753 (Elephant's-foot)**

A genus of about 12-30 species, of tropical, subtropical, and warm temperate regions. References: Strother in FNA (2006a); Jones (1982)=Z; Cronquist (1980)=SE.

Identification notes: The acaulescent species are easily and often confused with *Vernonia acaulis*, especially when sterile. *Vernonia* has leaves scabrous above and sparsely pilose to glabrate beneath; *Elephantopus* has leaves sparsely pilose above, densely pilose or tomentose below. *Vernonia* leaves tend to have a more acute apex, and the veins above are more strikingly differentiated in their color (white or pink) from the adjacent leaf tissue. When in flower, the presence of subtending foliose bracts below the compound glomerule of heads in *Elephantopus* (versus the absence of foliose bracts below the simple head in *Vernonia*) is diagnostic.

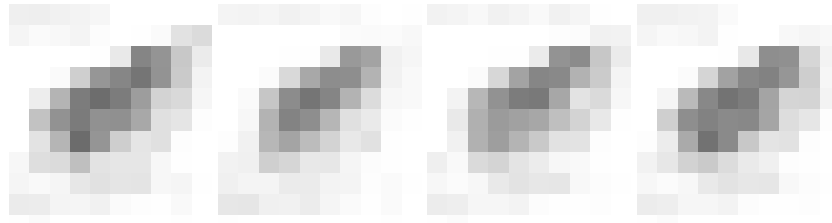
- 1 Leaves cauline, the stem with well-developed leaves over 10 cm long..... ***E. carolinianus***
- 1 Leaves basal, the stem scapose or with a few leaves much smaller than the basal, usually < 8 cm long.
 - 2 Longest phyllaries 10-13 mm long; pappus 6-8 mm long; basal leaves 5.5-10.5 cm wide, usually at least some on a plant > 7 cm wide; leaves pubescent on the midrib below with spreading or reflexed hairs; [of the Coastal Plain, Piedmont, and rarely the Mountains] ***E. tomentosus***
 - 2 Longest phyllaries 6-9 mm long; pappus 3-4.5 mm long; basal leaves 1.5-7.5 cm wide, rarely any on a plant > 7 cm wide; leaves pubescent on the midrib below with appressed or spreading hairs; [of the Coastal Plain, and rarely the lower Piedmont].
 - 3 Phyllaries densely villous with white hairs (0.3-) 0.5-1.0 mm long, the punctate glands obscured; cypselas 3-3.5 mm long; [of e. SC southward] ***E. elatus***
 - 3 Phyllaries punctate-glandular, also sparsely pubescent with hairs 0.05-0.3 (-0.5) mm long; cypselas 2.5-3.0 mm long; [widespread in our area]..... ***E. nudatus***

Elephantopus carolinianus Ruschel, Leafy Elephant's-foot. Mesic to dry forests and woodlands. August-November. NJ west to KS, south to s. FL and e. TX; West Indies. [= RAB, C, F, FNA, G, GW, K, Pa, S, SE, WH, WV, Z]

Elephantopus elatus Bertoloni, Southern Elephant's-foot. Pine flatwoods and sandhills. Late August-September. E. SC south to s. FL, west to se. LA, on the Coastal Plain. [= RAB, FNA, K, S, SE, WH, Z]

Elephantopus nudatus A. Gray, Coastal Plain Elephant's-foot. Woodlands and woodland borders, usually fairly dry. Late July-September. DE south to n. peninsular FL, west to e. TX and AR, primarily on the Coastal Plain; south into n. South America. [= RAB, C, F, FNA, G, GW, K, S, SE, WH, Z]

Elephantopus tomentosus Linnaeus, Common Elephant's-foot. Woodlands and woodland borders, usually fairly dry. August-November. MD south to Panhandle FL, west to e. TX, north in the interior to w. NC, KY, and south to Chiapas, Mexico. [= RAB, C, F, FNA, G, K, S, SE, WH, Z]



***Emilia* Cassini 1817 (Tasselflower)**

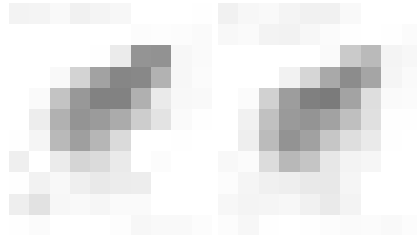
A genus of 50-100 species, of the Old World. References: Barkley in FNA (2006b); Cronquist (1980)=SE.

- 1 Leaves well-distributed along the stem, with at most few and shallow lobes; corollas salmon or red-orange; involucre 1-2 (-3)× as high as wide..... ***E. fosbergii***
- 1 Leaves mostly on the lower portion of the stem, the larger lyrate-pinnatifid; corollas lilac; involucre 3-4× as high as wide..... ***E. sonchifolia* var. *sonchifolia***

* ***Emilia fosbergii*** Nicolson, Salmon Tasselflower. Disturbed areas; native of Old World tropics. Scattered as an introduction in FL, including the Panhandle; reported for Lowndes County, GA (Carter, Baker, & Morris 2009). [= FNA, K, SE, WH]

* ***Emilia sonchifolia*** (Linnaeus) A.P. de Candolle var. *sonchifolia*, Lilac Tasselflower. Disturbed areas; native of the Old World tropics. The occurrence of this species in SC was first reported by Nelson & Kelly (1997); it is unclear how well

established *Emilia* is in the northern part of our area. See Anderson (2007) for FL Panhandle record. [= FNA, K; < *E. sonchifolia* – S, SE, WH]



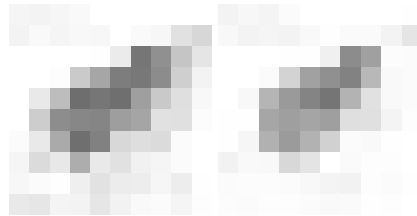
***Erechtites* Rafinesque 1817 (Fireweed)**

A genus of about 12-15 species, American and Australian. Barkley in FNA (2006a) points out that the genus name should be treated grammatically as masculine. References: Barkley in FNA (2006b); Cronquist (1980)=SE. Key based in part on C and FNA.

- 1 Denuded receptacle 5-8 mm in diameter; achenes 2-3 mm long, with 10-12 ribs.....*E. hieracifolius*
- 1 Denuded receptacle 9-12 mm in diameter; achenes 4-5 mm long, with 16-20 ribs.....*E. megalocarpus*

Erechtites hieracifolius (Linnaeus) Rafinesque ex de Candolle, Fireweed. In disturbed soil in nearly all habitats except the extremely xeric, present in most parts of the modern (beat-up) landscape at least as seedlings, liable to turn up at the smallest disturbance (such as small tree-fall tip-up mounds or campfires, even in large natural areas), most abundant in areas extensively disturbed or scarified by timber-harvest, bulldozing, or severe fire. Late July-November. NL (Newfoundland) west to SK, south to s. FL and e. TX; West Indies; tropical America. Ecologically filling something of the same role in the south as the other (unrelated) "fireweed" in the north, *Epilobium angustifolium*. The only other species in our area as adept at appearing (seemingly from nowhere) at small soil disturbances in forests are *Phytolacca americana* and the moss *Atrichum angustatum* (Brid.) BSG. [= *E. hieracifolia* var. *hieracifolia* – C, G, K, SE; < *E. hieracifolia* – RAB, GW, S, W, WV; > *E. hieracifolia* var. *hieracifolia* – F; > *E. hieracifolia* var. *intermedia* Fernald – F; > *E. hieracifolia* var. *praealta* (Rafinesque) Fernald – F; = *E. hieracifolius* var. *hieracifolius* – FNA; = *E. hieracifolia* var. *hieracifolia* – Pa; < *E. hieracifolius* – WH]

Erechtites megalocarpus (Fernald) Cronquist. Coastal marshes (brackish or salty) from MA to NJ and should additionally be sought further south. As the differences between this and *E. hieracifolius* consist of multiple, non-overlapping morphological characters, the presumption should be to treat the two as specifically distinct. [= *E. hieracifolia* var. *megalocarpa* – C, G, K; = *E. megalocarpa* Fernald – F, orthographic variant; = *E. hieracifolius* var. *megalocarpus* – FNA]



***Erigeron* Linnaeus 1753 (Daisy Fleabane)**

A genus of about 150 species, nearly cosmopolitan. References: Nesom in FNA (2006b); Cronquist (1980)=SE; Allison & Stevens (2001)=Z. Key adapted from those references. [also see *Conyza*]

- 1 Stem leaves sessile; pappus of the pistillate (ray) flowers consisting only of a few short, slender scales, < 1 mm long (visible at 20x magnification); annual or perennial (rarely biennial).
- 2 Stem leaves many, mostly toothed, the larger > 1cm wide; pubescence of the mid-stem long and spreading..... *E. annuus*
- 2 Stem leaves few, mostly entire, the larger usually < 1 cm wide; pubescence of the mid-stem usually short and appressed.
- 3 Phyllary hairs flattened, 0.5-1.2 mm long; stem hairs appressed to spreading, 0.5-1.0 mm long.....[*E. strigosus* var. *septentrionalis*]
- 3 Phyllary hairs terete, mostly 0.1-0.5 mm long; stem hairs appressed to spreading, 0.1-0.4 (-0.8) mm long.
- 4 Plants annual (rarely biennial), lacking rhizomes; [of various, often weedy, habitats].....*E. strigosus* var. *strigosus*
- 4 Plants perennial, rhizomatous; [plants of shallow soil over calcareous rock].
- 5 Basal leaves oblanceolate to narrowly obovate or spatulate, (3.2-) 3.8-15 (-21) mm wide; cauline leaves glabrous, except along the midvein and the ciliate margins; [of limestone glades and barrens of c. TN, nw. GA, and n. AL].....*E. strigosus* var. *calcicola*
- 5 Basal leaves linear-oblanceolate, 1-3.5 (-6) mm wide; cauline leaves sparsely to moderately strigillose; [of dolostone glades of c. AL (Bibb Co.)].....[*E. strigosus* var. *dolomiticola*]
- 1 Stem leaves relatively large and clasping, or small and sessile (in *E. vernus*); pappus of the pistillate (ray) flowers of elongate capillary bristles (sometimes also with scales); plants biennial or perennial.
- 6 Plants trailing or ascending, rooting at the nodes, and with stolons.....[*E. procumbens*]
- 6 Plants erect (sometimes the shoots curved at the base but ultimately vertical).
- 7 Stem leaves not clasping; basal leaves fleshy; rays 25-40, white, 0.5-1.3 mm wide; [of moist to wet habitats of the Coastal Plain].....

- 7 Stem leaves clasping; basal leaves herbaceous; rays 50-400, pink, blue, purplish, or white, either 0.3-0.5 mm wide (in *E. philadelphicus* var. *philadelphicus*, *E. quercifolius*, and *E. tenuis*) or 0.8-1.2 mm wide (in *E. pulchellus* var. *pulchellus*); [of more general distribution and habitat].....*E. vernus*
- 8 Disk corollas 4-6 mm long; rays 50-100, 0.8-1.2 mm wide.
 - 9 Stems and leaves glabrous*E. pulchellus* var. *brauniae*
 - 9 Stems and leaves densely pubescent with long hairs.....*E. pulchellus* var. *pulchellus*
- 8 Disk corollas 2.0-3.2 mm long; rays 60-400, 0.3-0.5 mm wide.
 - 10 Involucre 4-6 mm high; rays 150-400, white to deep pink, 5-10 mm long.....*E. philadelphicus* var. *philadelphicus*
 - 10 Involucre 2.5-4 mm high; rays 60-250, blue-lavender (rarely white to pink), 2.5-5 (-6) mm long.
 - 11 Pappus simple; stem spreading pubescent throughout (or appressed pubescent in the upper third only); rays 100-250.....*E. quercifolius*
 - 11 Pappus double, with short outer setae in addition to the long slender bristles; stem appressed pubescent in at least the upper half; rays 60-120.....*E. tenuis*

Erigeron annuus (Linnaeus) Persoon, Annual Fleabane. Roadsides, disturbed areas, gardens. May-October. NL (Newfoundland) west to MB, south to Panhandle FL and TX (and beyond). [= RAB, C, F, FNA, Pa, S, SE, W, WH, WV; > *E. annuus* var. *annuus* - G]

Erigeron philadelphicus Linnaeus var. *philadelphicus*, Philadelphia-daisy. Roadsides, meadows, disturbed areas. April-August. NL (Newfoundland) west to BC, south to n. FL and TX. Var. *scaturicola* Fernald, of bluffs along the James River in VA, seems to be merely an extreme form. Other varieties [var. *glaber* Henry and var. *provancheri* (Victorin & Rouss.) Boivin] may have more merit. [= FNA, K, Pa; < *E. philadelphicus* - RAB, C, G, GW, S, SE, W, WH, WV; > *E. philadelphicus* var. *philadelphicus* - F; > *E. philadelphicus* var. *scaturicola* Fernald - F]

Erigeron procumbens (Houstoun ex Miller) G.L. Nesom, Corpus Christi Fleabane. Moist to dry coastal areas, including marsh edges. S. MS (?), LA, TX, Tamaulipas, Veracruz. [= FNA, K; = *E. myrionactis* Small -S, SE]

Erigeron pulchellus Michaux var. *brauniae* Fernald. Sandy woodlands and forests, riverbanks. April-June. MD, WV, and s. OH south to KY. [= C, F, FNA, G, K, WV]

Erigeron pulchellus Michaux var. *pulchellus*, Robin's-plantain. Moist slopes, coves, limestone bluffs, trail margins, roadbanks. April-early June. ME west to MN, south to Panhandle FL (Jackson County), GA, and TX. In addition to the widespread var. *pulchellus*, and the Alleghenian var. *brauniae*, *E. pulchellus* has an additional local variety, var. *tolsteadii* Cronquist, of se. MN. [= C, F, FNA, G, K, Pa, SE, WV; < *E. pulchellus* - RAB, GW, S, W, WH]

Erigeron quercifolius Lamarck, Oak-leaved Fleabane. Sandy roadsides, disturbed areas. April-June. Se. VA south to s. FL, west to TX, north in the interior to TN; Bahamas. [= RAB, C, F, FNA, G, K, S, SE, WH]

Erigeron strigosus Muhlenberg ex Willdenow var. *calcicola* J. Allison, Cedar Glade Daisy Fleabane. Limestone glades. (April-) May-October. Central basin of TN (Allison & Stevens 2001), nw. GA (GANHP) and n. AL. [= FNA, Z]

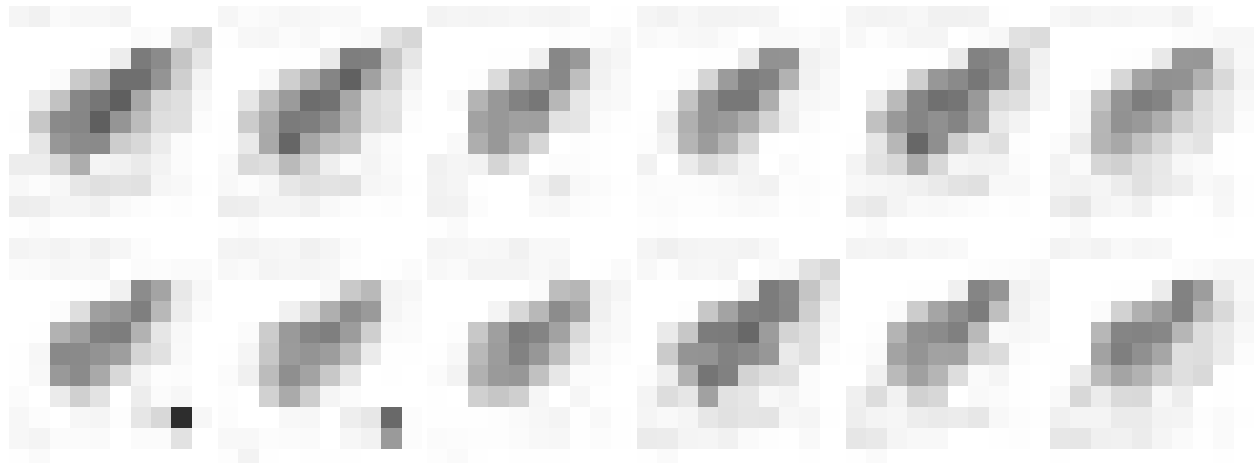
Erigeron strigosus Muhlenberg ex Willdenow var. *dolomiticola* J. Allison, Cahaba Daisy Fleabane. Calcareous Ketona glades. Endemic to Bibb County, AL (Allison & Stevens 2001). Late May-October. [= FNA, Z]

Erigeron strigosus Muhlenberg ex Willdenow var. *septentrionalis* (Fernald & Wiegand) Fernald. Roadsides, disturbed areas. Scattered in n. North America, south to NY, TN (FNA), AR, OK, WY, CA. [= C, FNA, F, G, K]

Erigeron strigosus Muhlenberg ex Willdenow var. *strigosus*, Common Rough Fleabane. Roadsides, disturbed areas; open woodlands. Late April-October. NS west to WA, south to c. peninsular FL and TX. [= FNA, Pa; < *E. strigosus* - RAB, W, WH, WV; > *E. strigosus* var. *strigosus* - C, F, G, K, SE, Z; > *E. strigosus* var. *beyrichii* - C, F, G, K, SE, Z; < *E. ramosus* (Walter) Britton, Sterns, & Poggenburg - S]

Erigeron tenuis Torrey & A. Gray, Midwestern Fleabane. Disturbed areas. FL Panhandle (Okaloosa County) and AL west to KS, OK, and TX. Reported for w. NC (Nesom 1980); but later discounted (Nesom in FNA 2006b). Mid March-May (sporadically later). [= FNA, K, SE, WH]

Erigeron vernus (Linnaeus) Torrey & A. Gray, Whitetop Fleabane. Wet savannas, seepages, interdunal swales. Late March-June. E. VA south to s. FL, west to LA. [= RAB, C, F, FNA, G, GW, K, S, SE, WH]



Eupatorium Linnaeus 1753 (Eupatorium, Thoroughwort, Dog-fennel)

A genus of about 40 species, herbs, of e. North America and Eurasia (after the exclusion of *Ageratina*, *Chromolaena*, *Conoclinium*, *Eutrochium*, *Fleischmannia*, and other genera). I have differed considerably from Cronquist's treatments, as for instance in SE, regarding the rank at which to recognize taxonomic entities in *Eupatorium*. In the Southeastern United States, *Eupatorium* is a reticulately evolved complex, including diploids, triploids, and tetraploids; derivatives of hybridization produce sterile pollen but in some cases reproduce vigorously via agamosperous production of seeds. In some cases, these entities form separate populations from their presumed parental species, with distinctive ranges and habitats and more-or-less distinctive morphology. Cronquist treats morphologically highly distinctive entities, such as *E. pinnatifidum*, as full species, while stating that they are "not long-persistent." He treats morphologically more subtle entities as varieties of one of the two presumed parental species, such as *E. album* var. *vaseyi* ("very probably derived by hybridization of *E. album* var. *album* and *E. sessilifolium*"). Other entities, difficult to distinguish morphologically from another species, he does not recognize, as for instance *E. saltuense*, included as a synonym under *E. altissimum* ("*E. saltuense* may reflect hybridization between *E. altissimum* and some other species such as *E. album*, or possibly between *E. hyssopifolium* and *E. album*").

A species concept that stresses ecological, biological, and distributional independence seems preferable. When plants of a putative hybrid occur in substantial populations, reproducing independently of one or both alleged parents, and in geographically and/or ecologically distinctive situations they should be treated as a separate species. Only field observations and studies can provide the necessary information. I have seen no evidence that *E. x pinnatifidum* (though morphologically strikingly distinctive) occurs independent of its parents; thus I treat it as a hybrid (see below). *E. vaseyi* regularly occurs without one or both of its presumed parents, forms fertile achenes, occurs in large populations, and (in NC) is distributionally more limited than its presumed parents (Sullivan 1978). Biologically, it is best treated as an allopolyploid species; its treatment as a variety leads to conceptual and nomenclatural problems (reflected in the synonymy above): of which species should it be a variety? Sullivan (1978) considered that *E. saltuense* was derived from hybridization of *E. album* and *E. lecheifolium* (= *hyssopifolium*), but found it to be a triploid, growing in association with triploid (and pollen-sterile) *E. lecheifolium*. She concluded that "the origin of *E. saltuense* through hybridization could have occurred in the ancient past when diploids of *E. lecheifolium* were more prevalent." In addition to its postulated "ancient origin," *E. saltuense* appears to occur in NC in habitats different from any of its variously alleged parents; for these reasons it seems best to treat *E. saltuense* as an allopolyploid species as well. Species in our flora believed to be of allopolyploid derivation include *E. anomalum*, *E. cordigerum*, *E. godfreyanum*, *E. linearifolium*, *E. mohrii*, *E. pubescens*, *E. saltuense*, *E. torreyanum*, and *E. vaseyi*. References: Siripun & Schilling in FNA (2006c); Schilling (2011)=Y; Cronquist (1980)=SE; Godfrey (1949). The key adapted from those references. (also see *Ageratina*, *Chromolaena*, *Conoclinium*, *Eutrochium*, *Fleischmannia*)

- 1 Leaves generally in whorls of 3-7 (very rarely all of them opposite), most of them > 2 cm wide; involucre 6.5-9 mm high, the flowers pale pink to purple.....[see *Eutrochium*]
- 1 Leaves generally opposite, sometimes in whorls of 3-4 (if so the leaves usually < 2 cm wide), or some of them alternate; involucre mostly 2-6 mm high, the flowers mostly white, rarely blue (rarely the involucre 6-11 mm high, then the flowers white).
 - 2 Leaves pinnate or pinnatifid, divided into linear or capillary segments, 0-5 mm wide **Key A**
 - 2 Leaves simple or palmately 3 (-5)-lobed, the leaves or lobes generally over 5 mm wide.
 - 3 Leaves palmately 3 (-5)-lobed *E. cannabinum*
 - 3 Leaves simple.
 - 4 Leaves long-petiolate, the petioles of larger leaves > 10 mm long.
 - 5 Leaf blades deltate or rhombic, held vertically; [of FL] *E. mikanioides*
 - 5 Leaf blades lanceolate, held horizontally; [widespread]..... *E. serotinum*
 - 4 Leaves sessile or short-petiolate, the petioles < 9 mm long.
 - 6 Florets (3-) 5 (-7) per head **Key B**
 - 6 Florets 7-14 per head.
 - 7 Leaf bases fused *E. perfoliatum*
 - 7 Leaf bases tapering to a cuneate base *E. resinosum*

Key A – leaves pinnatifid or pinnate into linear or capillary segments (Dog-fennels)

- 1 Stem glabrous throughout, or short-pubescent in the lower portion only; inflorescence paniculate, the panicle branches recurved, the heads secundly arranged *E. leptophyllum*
- 1 Stem pubescent throughout, generally conspicuously so; inflorescence paniculate, the branches not recurved, the heads not secund.
 - 2 Leaves bright green, glabrous, sparsely glandular-punctate, segments of the **basal** leaves 1-1.5 mm wide, segments of the **upper** leaves 0.2-0.5 mm wide *E. capillifolium*
 - 2 Leaves grayish-green, pubescent, densely glandular-punctate, segments of the **basal** leaves 2-5 mm wide, segments of the **upper** leaves 1-2.5 mm wide..... *E. compositifolium*

Key B – leaves simple, flowers usually 5 per head

- 1 Phyllaries acuminate to attenuate.
- 2 Larger leaves 0.2-1.3 cm wide; stems puberulent; involucre 3.5-7 mm high.

- 3 Rhizome absent to < 2 cm long; leaves usually reflexed-spreading to spreading-ascending, the larger (5-) 6-13 mm wide; leaf margins and surfaces moderately to densely strigose; involucre 5-8 mm long; pappus (3.3-) 3.9-5.0 mm long; corolla:pappus length ratio 0.63-0.89; mature achene 2.2-3.5 mm long *E. leucolepis*
- 3 Rhizome 2-20 cm long; leaves usually ascending to erect-recurved, the larger 2-4.5 mm wide; leaf margins and adaxial surface glabrous to sparsely strigose; involucre 3.5-5.5 mm long; pappus 2.7-4.1 mm long; corolla:pappus length ratio 0.83-1.00; mature achene 1.6-2.3 mm long *E. paludicola*
- 2 Larger leaves 1.5-3 (-4) cm wide; stems villous to puberulent; involucre 8-11 mm high.
- 4 Larger leaves < 6 cm long; leaves with few or no resin glands.
 - 5 Phyllaries lacking resin glands; leaf venation pinnate, with at least 2 pairs of lateral veins; [of the Coastal Plain of GA and n. FL] *E. petaloideum*
 - 5 Phyllaries (at least the outer) with resin glands; leaf venation 3-nerved from the base; of the Coastal Plain of DC, DE, NJ, and northward] *E. subvenosum*
- 4 Larger leaves > 6 cm long (and usually > 8 cm long); leaves with sparse to abundant resin glands.
 - 6 Leaves sparsely pubescent; lower stem pubescence typically appressed, the hairs < 1 mm long; phyllaries acute-acuminate to mucronate.
 - 7 Leaves with abundant resin glands *E. fernaldii*
 - 7 Leaves with sparse resin glands *E. vaseyi*
 - 6 Leaves moderately pubescent; lower stem pubescence typically spreading, the hairs 0.5-1 mm long; phyllaries (at least the inner) long-attenuate.
 - 8 Leaves lanceolate, > 3× as long as wide; inner phyllaries glandular only in the lower half; [widespread in our area] *E. alburnum*
 - 8 Leaves lance-ovate to ovate, < 3× as long as wide; inner phyllaries glandular to near the apex; [from s. MS westward in our area] *E. sullivaniae*
- 1 Phyllaries acute to obtuse.
 - 7 Leaf bases broadly cuneate, truncate, or subcordate, the leaves generally distinctly broadest near the base.
 - 8 Leaves (2.5-) 3-6 (-7)× as long as wide; plants glabrous below the inflorescence.
 - 9 Leaves subcoriaceous, the larger ones 8-18 cm long, 3-6 cm wide, averaging about 3× as long as wide *E. sessilifolium* var. *brittonianum*
 - 9 Leaves membranaceous, the larger ones 9-18 cm long, 2-4 cm wide, averaging about 5× as long as wide *E. sessilifolium* var. *sessilifolium*
 - 8 Leaves 1-3 (-3.5)× as long as wide; plants pubescent below the inflorescence.
 - 10 Leaves pinnately veined *E. godfreyanum*
 - 10 Leaves 3-veined from the base or just above it.
 - 11 Leaves averaging (1.5) 2-2.5× as long as wide, usually with a purple border; upper leaves and main inflorescence branches often alternate *E. pilosum*
 - 11 Leaves averaging 1-2× as long as wide, usually lacking a purple border; upper leaves and main inflorescence branches usually all opposite.
 - 12 Leaf base broadly rounded, cordate-clasping; leaves very densely pubescent, the pubescence often harsh; larger leaves usually 4-10 cm long; principal pair of lateral veins diverging from the midrib 2-10 mm above the base of the leaf; tothing of leaf often irregular and coarse *E. cordigerum*
 - 12 Leaf base cuneate, broadly cuneate, rounded, or cordate (but not clasping); leaves densely to sparsely pubescent; larger leaves usually 2-6 cm long; principal pair of lateral veins diverging at the base or 2-10 mm above the base of the leaf; tothing of leaf regular and relatively fine.
 - 13 Leaves mostly 1-1.5 (-1.7)× as long as wide, tending to be obtuse (the apex usually 90° or more), the teeth generally rounded (the 2 sides of each tooth usually distinctly convex-curved, the end of the tooth therefore rounded), the principal pair of lateral veins diverging directly from the base of the midrib *E. rotundifolium*
 - 13 Leaves mostly (1.2-) 1.5-2× as long as wide, tending to be acute (the apex usually 90° or less), the teeth generally rather sharp (the 2 sides of each tooth straight to gently curved, the end of the tooth therefore triangular), the principal pair of lateral veins diverging 2-10 mm above the base of the midrib.
 - 14 Leaves broadly cuneate to broadly rounded, thin in texture, the pubescence rather soft and long (and also often sparse), the leaf blade not twisted at base, not borne in a vertical plane, up to 10 cm long and 6.5 cm wide *E. pubescens*
 - 14 Leaves distinctly cuneate, firm in texture, the pubescence rather harsh and short, the leaf blade twisted at the base, thus borne in a vertical plane, up to 5.5 cm long and 3 cm wide *E. scabridum*
 - 7 Leaf bases narrowly cuneate, the leaves generally broadest near the middle or toward the tip.
 - 15 Plants from conspicuously tuberous-thickened (ca. 1 cm in diameter) horizontal rhizomes; leaves deflexed, spreading, or ascending.
 - 16 Leaves 15-30 mm wide, spreading or ascending *E. anomalum*
 - 16 Leaves 2-12 mm wide, deflexed to erect-ascending.
 - 17 Leaves erect-ascending, 2-5.5 mm wide; pappus 4.0-5.4 mm long *E. mohrii* × *paludicola*
 - 17 Leaves deflexed to spreading, 3-12 mm wide; pappus 2.5-3 mm long.
 - 18 Stems 3-6 (-7) dm tall, often erectly branching from near the base; involucre 3-4 mm high, the bracts with rounded apices *E. recurvans*
 - 18 Stems (6-) 10-15 dm tall, not branching near the base; involucre 5-7 mm high, at least some of the inner bracts with acute apices *E. mohrii*
 - 15 Plants from crowns or caudices; leaves usually spreading or ascending (not deflexed).
 - 19 Plants generally with numerous branches from at or near the base, the axillary shoots of the lower internodes elongating; leaves 2-5 cm long, oblanceolate.
 - 20 Leaves broadly oblanceolate, 5-15 mm wide, crenate or serrate in the upper half *E. glaucescens*
 - 20 Leaves narrowly oblanceolate, 3-8 mm wide, entire or remotely serrate apically *E. linearifolium*
 - 19 Plants generally simple below the middle, the axillary shoots of the lower nodes not elongating (except in response to injury of the main stem); leaves 3-12 cm long, lanceolate or linear.
 - 21 Leaves mostly 6-40× as long as wide, the larger ones usually < 10 mm wide, ranging from 1-12 mm wide, whorled or opposite (rarely alternate above).

- 22 Leaves linear to narrowly lanceolate, the principal leaves 2-7 cm long, 1-5 mm wide, 10-40× as long as wide, entire to obscurely toothed, the leaves mostly in whorls of 3 or 4*E. hyssopifolium*
- 22 Leaves lanceolate, the principal leaves 5-12 cm long, 5-10 (-12) mm wide, 6-15× as long as wide, conspicuously and divergently toothed, the leaves mostly opposite or in whorls of 3*E. torreyanum*
- 21 Leaves mostly 2.5-7× as long as wide, the larger ones > 10 mm wide, ranging from 8-30 mm wide, opposite, alternate, or whorled.
- 23 Involucre 2.5-4 mm high; leaves obtuse to acute, elliptic to elliptic-oblongate, the 2 main lateral veins separating from the midrib about 1 cm above the base; leaves commonly 3 per node*E. semiserratum*
- 23 Involucre 4.5-7 mm high; leaves acute to attenuate-acuminate, lanceolate, the 2 main lateral veins separating from the midvein at the base; leaves rarely 3 per node.
- 24 Leaves 3-5 cm long, 5-13 mm wide; leaf surfaces generally glabrous; [of AL westward]*E. lancifolium*
- 24 Leaves 5-12 cm long, 5-20 mm wide; leaf surfaces short or long puberulent; [widespread].
 - 25 Leaf surfaces glandular-punctate, densely puberulent on the surfaces and veins, the hairs fairly long and curling or twisted (as seen with at least 10× magnification); stem densely puberulent; leaves entire to serrate, the teeth varying from obscure to sharp, generally about 1 mm long (measured on the side toward the leaf apex), rarely to 3 mm long, generally forward-pointing; leaves acuminate to acute, the terminal portion not strongly attenuated, and about as likely to have teeth as the rest of the margin*E. altissimum*
 - 25 Leaf surfaces densely glandular-punctate, sparsely puberulent (mainly on the veins), the hairs short; stem sparsely puberulent; leaves serrate to pinnatifid, the teeth often 1-5 mm long (measured on the side toward the leaf apex), often salient or divergent; leaves attenuate-acuminate, the terminal 1/3 extended and generally entire*E. saltuense*

Eupatorium album Linnaeus, White-bracted Thoroughwort. Dry woodlands. Late June-September. CT, NY, OH, and TN, south to FL and LA. *E. album* is a diploid species and the most widespread member of the *Eupatorium album* complex, a group of species which have undergone extensive allopolyploid speciation. Many members of the complex have been treated as infrataxa under *E. album*, but are better separated as distinct species (Schilling 2011). Var. *glandulosum* is alleged to differ from var. *album* in having the involucre with copious dark glands (vs. glandless or nearly so). The distinction is dubious; variation seems essentially continuous in our area, with frequent intermediates, and there seems to be little correlation between morphology and habitat/range. [= Y; < *E. album* – RAB, Pa, S, WH; < *E. album* var. *album* – C, FNA, K, SE, W (also see *E. petaloideum*); > *E. album* var. *album* – F, G, WV; > *E. album* var. *glandulosum* (Michaux) A.P. de Candolle – F, G, WV]

Eupatorium altissimum Linnaeus, Tall Thoroughwort. Woodlands, old fields, woodland borders, and openings over mafic rocks (such as diabase) or calcareous rocks (such as limestone and calcareous sandstone). Late August-November. CT, NY, QC, MN, and NE, south to Panhandle FL and TX, primarily in the midwest, especially on limestone substrates, and uncommon east of the mountains. [= RAB, F, G, Pa, S, W, WV; < *E. altissimum* – C, FNA, K, SE, WH (also see *E. saltuense*)]

Eupatorium anomalum Nash, Anomalous Eupatorium. Moist savannas, moist interdune swales. August-October. *E. anomalum* is believed to be a triploid and tetraploid, apomictic derivative of the hybrid *E. mohrii* × *serotinum*. Se. VA south to c. peninsular FL and west to s. AL. Inasmuch as it is now a separate lineage (as evidenced by a distinct distribution, more-or-less recognizable morphology, and phenologic separation), treatment as a separate taxon seems warranted. [= FNA, GW, K, SE; < *E. recurvans* – RAB; < *E. anomalum* – S (also see *E. mohrii*); = *E. anomalum* – WH]

* ***Eupatorium cannabinum*** Linnaeus, Hemp-agrimony. Disturbed areas; perhaps merely a waif or garden remnant, native of Europe. July-September. The documentation for VA is an 1899 specimen from Fairfax County and a record from Westmoreland County. [= FNA, K]

Eupatorium capillifolium (Lamarck) Small, Common Dog-fennel, Yankeeweed. Disturbed soils, old fields, clearcuts. September-November. CT, PA, KY, MO, and OK south to s. FL and TX. This species, like *E. compositifolium*, is an excellent indicator of soil disturbance. [= C, F, FNA, G, GW, K, S, SE, W, WH, WV; = *E. capillifolium* var. *capillifolium* – RAB]

Eupatorium compositifolium Walter, Coastal Dog-fennel, Yankeeweed. Sandy disturbed areas; common. September-December. S. VA, KY, and OK south to s. FL and TX. This species, like *E. capillifolium*, is an excellent indicator of soil disturbance. At its northern limit, in se. VA, this species occurs on riverbanks, in the seasonally exposed drawdown zone (Fleming & Ludwig 1996). [= RAB, FNA, GW, K, S, SE, W]

Eupatorium cordigerum (Fernald) Fernald, Claspingleaf Eupatorium, Broadleaf Bushy Eupatorium. Woodlands. July-August. VA, NC, and SC west to AR and MS. This taxon is an apomictic, polyploid derivative of the hybrid *E. perfoliatum* × *rotundifolium*. [= F; > *E. rotundifolium* var. *ovatum* – RAB, G (also see *E. pubescens*); = *E. rotundifolium* var. *cordigerum* Fernald – C, K, SE; = *E. ×cordigerum* (Fernald) Fernald – FNA; < *E. rotundifolium* – GW; < *E. pubescens* – S]

Eupatorium fernaldii Godfrey, Fernald's Eupatorium. This species is an apomictic species derived from *E. perfoliatum* × *petaloideum* × *sessilifolium* (Schilling 2011). MD to w. NC and GA; perhaps more widespread. [= Y; < *E. album* Linnaeus var. *vaseyi* (Porter) Cronquist – FNA]

Eupatorium glaucescens Elliott, Wedgeleaf Eupatorium, Broadleaf Bushy Eupatorium. Sandhills, dry sandy woodlands. Late July-October. Widespread in the Southeastern Coastal Plain, ranging from se. VA south to FL and west to MS. The name *E. cuneifolium* must be rejected on nomenclatural grounds (Gandhi & Thomas 1991). [= K; < *E. cuneifolium* Willdenow – RAB, C, G, SE (also see *E. linearifolium*); ? *E. cuneifolium* var. *cuneifolium* – F; = *E. cuneifolium* – S; < *E. linearifolium* Walter – FNA, WH]

Eupatorium godfreyanum Cronquist, Godfrey's Eupatorium. Dry woodlands. July-September; August-October. NJ, MD, and WV south through VA to nc. NC and TN, reaching its greatest abundance in wc. VA. See Cronquist (1985) for additional information and illustrations. Siripun & Schilling (2006) confirmed that this species is of hybrid origin from *E. rotundifolium* and *E. sessilifolium*. [= C, FNA, K, pa; < *E. sessilifolium* var. *vaseyi* (Porter) Fernald & Griscom – RAB; < *E. sessilifolium* var. *vaseyi* (Porter) Fernald & Griscom – F; < *E. vaseyi* Porter – G; < *E. sessilifolium* – SE]

Eupatorium hyssopifolium Linnaeus, Hyssopleaf Eupatorium. Roadbanks, pastures, fields, disturbed areas, dry woodlands. Late July-October. MA south to GA and west to TN and LA. [= *E. hyssopifolium* var. *hyssopifolium* – C, FNA, G, Pa, SE, W; < *E.*

hyssopifolium – RAB, WV (rejected) (also see *E. torreyanum*); > *E. hyssopifolium* var. *hyssopifolium* – F, K; > *E. hyssopifolium* var. *calcaratatum* Fernald & Schubert – F, K; > *E. sessilifolium* – S; > *E. lecheifolium* Greene – S]

Eupatorium lancifolium (Torrey & A. Gray) Small, Lanceleaf Eupatorium. Prairies, open woodlands. AL west to s. AR and e. TX. [= FNA, GW, K, S, SE, Y; = *E. semiserratum* A.P. de Candolle var. *lancifolium* Torrey & A. Gray]

Eupatorium leptophyllum A.P. de Candolle, Limesink Dog-fennel. Limesink depression ponds (dolines) in the outer Coastal Plain and clay-based Carolina bays in the inner Coastal Plain. September–November. A Southeastern Coastal Plain endemic, ranging from se. NC south to FL and west to s. GA and s. AL; Bahamas and Cuba. [= FNA, GW, K, S, SE, WH; = *E. capillifolium* var. *leptophyllum* (A.P. de Candolle) H.E. Ahles – RAB]

Eupatorium leucolepis (A.P. de Candolle) Torrey & Gray, Savanna Eupatorium. Savannas, seepage bogs, depression ponds. August–October. Primarily of the Southeastern Coastal Plain, ranging from NY south to n. peninsular FL, Panhandle FL, and west to LA; disjunct in Coffee County, TN (Chester, Wofford, & Kral 1997). This species is often confused with members of the *E. recurvans-mohrii-anomalum* complex. The following differences are useful: *E. leucolepis* has phyllaries acuminate to attenuate (vs. acute to obtuse), leaves of the uppermost nodes below the inflorescence opposite, or rarely the uppermost 1–2 nodes subopposite (vs. leaves of the uppermost 2–15 nodes below the inflorescence alternate), and leaves generally longitudinally folded (vs. generally planar). The plants formerly called *E. leucolepis* var. *novae-angliae* Fernald and endemic to freshwater pondshores in MA and RI apparently represent a distinct allopolyploid species, *E. novae-angliae* (Fernald) V.I. Sullivan ex A. Haines & Sorrie, and should not be treated as a variety of *E. leucolepis*. [= *E. leucolepis* var. *leucolepis* – C, F, G; < *E. leucolepis* – RAB, GW, Pa, S, SE, W, WH; < *E. leucolepis* var. *leucolepis* – FNA, K]

Eupatorium linearifolium Walter, Narrowleaf Bushy Eupatorium. Sandhills. Late July–October. Se. VA south to FL and west to LA. The appropriate treatment of this taxon is unclear; it may be a derivative of the hybrid *E. cuneifolium* × *hyssopifolium*. [= F; < *E. cuneifolium* – RAB, C, G, SE; = *E. hyssopifolium* var. *linearifolium* (Walter) Fernald – K; = *E. tortifolium* Chapman – S; < *E. linearifolium* – FNA, WH]

Eupatorium mikanioides Chapman, Semaphore Thoroughwort. Saline and brackish flats, seasonally ponded freshwater wetlands, wet flatwoods. Endemic to FL, primarily in the peninsula, but also along the coast of the eastern Panhandle (Bay, Franklin, Gulf, Taylor, and Wakulla counties). July–September. [= FNA, GW, K, S, SE, WH]

Eupatorium mohrii Greene, Mohr's Eupatorium. Moist savannas, other wet habitats. August–October. Se. VA south to s. FL and west to TX. This is by far the most abundant of the *E. recurvans-anomalum-mohrii* complex in our area. Like *E. anomalum*, *E. mohrii* is believed to be a triploid and tetraploid, apomictic derivative of the hybrid *E. recurvans* × *rotundifolium*; it is more widespread than *E. recurvans* sensu stricto. Inasmuch as it is now a separate lineage (as evidenced by a distinct distribution, more-or-less recognizable morphology, and phenologic separation), treatment as a separate taxon seems warranted. [= GW; < *E. recurvans* – RAB, F, G (also see *E. anomalum* and *E. recurvans*); < *E. mohrii* – C, FNA, K, SE, W, WH (also see *E. recurvans*); < *E. anomalum* – S (also see *E. anomalum*)]

Eupatorium paludicola E.E. Schilling & LeBlond. Cypress savannas, clay-based bays, and small depressions ponds. August–September. A Cape Fear Arch endemic, ranging from the se. Coastal Plain and Sandhills of NC, to ne. Coastal Plain of SC. See LeBlond et al. (2007) and Schilling et al. (2007). [< *E. leucolepis* – RAB, GW, S, SE; < *E. leucolepis* var. *leucolepis* – FNA, K]

Eupatorium perfoliatum Linnaeus, Boneset. Marshes, swamps, bogs, wet pastures, and other wet habitats. August–October. NS west to MB, south to n. peninsular FL and TX. [= RAB, FNA, GW, Pa, W, WH, WV; = *E. perfoliatum* var. *perfoliatum* – C, F, G, K, S, SE; ? *E. cuneatum* Engelmann – S (actually a hybrid)]

Eupatorium petaloideum Britton, Showy White Eupatorium. Sandhills, scrub, dryish pinelands. GA south to FL, west to s. MS. [= FNA, S, Y; < *E. album* Linnaeus var. *album* – K, SE; < *E. album* – WH; = *E. album* var. *petaloideum* (Britton) Godfrey ex D.B. Ward]

Eupatorium pilosum Walter, Ragged Eupatorium. Savannas, bogs, other moist areas. August–October. MA south to c. peninsular FL, west to KY, c. TN, and MS. *E. pilosum* is a species distinct from *E. rotundifolium*. [= RAB, C, F, FNA, GW, K, Pa, WH, WV; = *E. verbenaefolium* Reichard – S; = *E. rotundifolium* var. *saundersii* (T.C. Porter) Cronquist – G, SE, W]

Eupatorium xpinnatifidum Elliott. E. VA south to Panhandle FL. It is variously considered a species (as by S), a species of hybrid origin (as by SE), or a hybrid (as by GW and K). The parents are variously listed as *E. capillifolium* × *perfoliatum* (as by K) or *E. capillifolium* or *compositifolium* × *perfoliatum* (as by GW and SE). I have seen the plant in Pender County, NC, where it appears to be a first-generation hybrid, growing with *E. capillifolium* and *E. perfoliatum*. Until and unless additional evidence appears that it reproduces itself and exists in independent populations I am inclined to treat it as a hybrid rather than a species of hybrid origin. It is recognizable by its pinnatifid or bipinnatifid leaves (the segments broader than in the dog-fennels) and its corymbose-paniculate inflorescence. [= FNA, K, WH; = *E. pinnatifidum* Elliott – GW, S, SE] [not keyed]

Eupatorium pubescens Muhlenberg ex Willdenow, Inland Roundleaf Eupatorium. Forests and woodlands, woodland edges, roadbanks. July–September. The distribution, abundance, and phenology of *E. pubescens* in our area need additional study. Where growing together, *E. pubescens* apparently flowers about a month earlier than *E. rotundifolium*. Primarily in the Appalachians and adjacent provinces, ranging from ME south to n. GA and n. AL. This taxon appears to be a stabilized polyploid complex originating from hybridization of *E. rotundifolium* and (perhaps) *E. sessilifolium*; in that it now functions as a more-or-less independent evolutionary lineage, with distinctive morphology, habitat, and distribution, it is here treated as a species. [= F, WV; < *E. rotundifolium* var. *ovatum* (Bigelow) Torrey – RAB (also see *E. cordigerum*); = *E. rotundifolium* var. *ovatum* (Bigelow) Torrey – C, FNA, G, K, Pa, SE, W; < *E. rotundifolium* – GW; < *E. pubescens* – S (also see *E. cordigerum*); = *E. rotundifolium* Linnaeus ssp. *ovatum* (Bigelow) Montgomery & Fairbrothers]

Eupatorium recurvans Small, Recurved Eupatorium. Longleaf pine sandhills, other dry, sandy habitats, moist savannas. August–October. Se. NC south to GA and s. FL. The diploid sexual *E. recurvans* (sensu stricto) is rare in our area; GW gives its range as se. and sc. GA and FL. *E. mohrii* is believed to be a triploid and tetraploid, apomictic derivative of the hybrid *E. recurvans* × *rotundifolium*; it is more widespread. [= GW, S; < *E. recurvans* – RAB, WH (also see *E. anomalum* and *E. mohrii*); < *E. mohrii* – C, FNA, K, SE]

Eupatorium resinotum Torrey ex A.P. de Candolle, Resinous Boneset, Pinebarren Eupatorium. Seepage bogs, beaver ponds, frequently burned streamhead pocosins, in the Sandhills and inner Coastal Plain of sc. NC. August-October. A "bimodal endemic," known from the NJ, DE (formerly), and (formerly) NY, thence disjunct to the Sandhills and upper Coastal Plain of NC and SC. [= RAB, C, FNA, G, GW, K, SE; > *E. resinotum* var. *resinotum* – F]

Eupatorium rotundifolium Linnaeus, Common Roundleaf Eupatorium. Savannas, seepage bogs, woodlands. August-October. MA, NY, IN, and OK south to s. FL and TX. [= F, S; = *E. rotundifolium* var. *rotundifolium* – RAB, C, FNA, G, K, Pa, SE, W; < *E. rotundifolium* – GW, WH (also see *E. pubescens* and *E. cordigerum*); *E. rotundifolium* Linnaeus ssp. *rotundifolium*]

Eupatorium saltuense Fernald, Tall Boneset, Pasture Eupatorium. Upland forests, woodland borders, marsh edges. August-October. Known from e. and c. VA and NC. Considered by some to be a hybrid of *E. album* and *E. altissimum*. Schilling (2011) had complicated and unclear results regarding the appropriate taxonomic treatment of *E. saltuense*, suggesting that additional research is needed to determine if it should be regarded as a species, and, if so, its origin and distribution. Reported for nc. WV by Harmon, Ford-Wertz, & Grafton (2006). [= RAB, F, G; < *E. altissimum* – C, FNA, K]

Eupatorium scabridum Elliott, Roughleaf Eupatorium. Savannas, wet pinelands. Late July-October. SC south to n. FL, west to AR, LA, and OK. This plant is believed to be an allopolyploid derivative of the hybrid *E. rotundifolium* × *semiserratum*. In some areas it apparently consists only of short-lived diploids, but in others (according to GW especially in SC, AR and LA) to occur as populations of polyploid apomicts. It resembles *E. rotundifolium*, but has cuneate leaves with a less prominent pair of lateral veins, narrower leaves, and is more likely to have 3-whorled leaves (as *E. semiserratum* often does). [= GW, S; = *E. rotundifolium* var. *scabridum* (Elliott) A. Gray – FNA, K, SE; < *E. rotundifolium* – WH]

Eupatorium semiserratum A.P. de Candolle. Swamp forests, seepage bogs, savannas, clay-based Carolina bays, other wetlands. Late July-October. Se. VA south to ne. FL, Panhandle FL, west to TX and AR; disjunct in sc. TN. This species often has 3 leaves per node; most similar species rarely or never have whorled leaves. [= RAB, C, FNA, G, GW, K, S, SE, WH; = *E. cuneifolium* var. *semiserratum* (A.P. de Candolle) Fernald & Griscom – F]

Eupatorium serotinum Michaux, Late Eupatorium. Interdune swales, fields, open forests, powerline rights-of-way, tidal marshes, disturbed areas. Late August-October. MA, NY, MI, WI, MN, and NE south to s. FL, LA, and TX. This species was apparently largely or strictly coastal in our area, but has spread inland rapidly along corridors of disturbance, somewhat similarly to *Baccharis halimifolia*. [= RAB, C, F, FNA, G, GW, K, Pa, S, SE, W, WH, WV]

Eupatorium sessilifolium Linnaeus var. *brittonianum* Porter, Britton's Eupatorium. Circumneutral soils of woodlands at moderate elevations. August; September. NH and MN, south to NJ, PA, MD, w. NC, KY, and MO. The only collection from NC known to me is from Cedar Cliff, Buncombe County, in 1897. I disagree with Cronquist's equation of this taxon with *E. godfreyanum*. [= F, K, WV; < *E. sessilifolium* var. *sessilifolium* – RAB; < *E. sessilifolium* – C, FNA, G, Pa, S, SE, W]

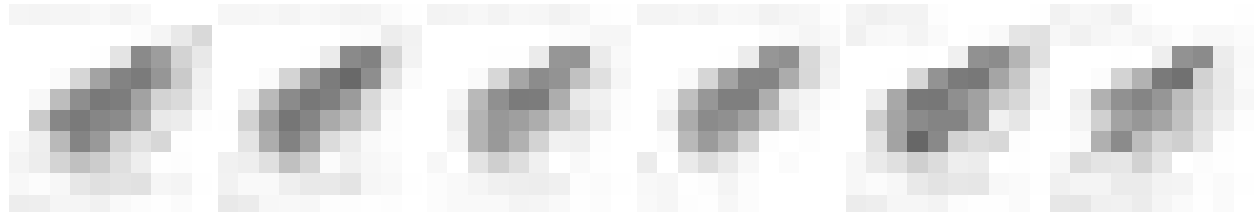
Eupatorium sessilifolium Linnaeus var. *sessilifolium*, Sessile-leaf Eupatorium. Open upland woodlands and woodland borders, especially calcareous or mafic. July-October. S. NH west to se. MN, south to n. GA, n. AL, n. MS, n. AR, and e. KS. Grubbs, Small, & Schilling (2009) discuss the genetics of *E. sessilifolium*; most of the species' distribution consists of agamospermous triploids, with sexual diploids only known from two disjunct areas of the southern Appalachians (w. VA, and w.NC-e. TN). There may be merit to the taxonomic recognition of the diploids and the triploids. [= F, K, WV; < *E. sessilifolium* var. *sessilifolium* – RAB (also see var. *brittonianum*); < *E. sessilifolium* – C, FNA, G, Pa, S, SE, W]

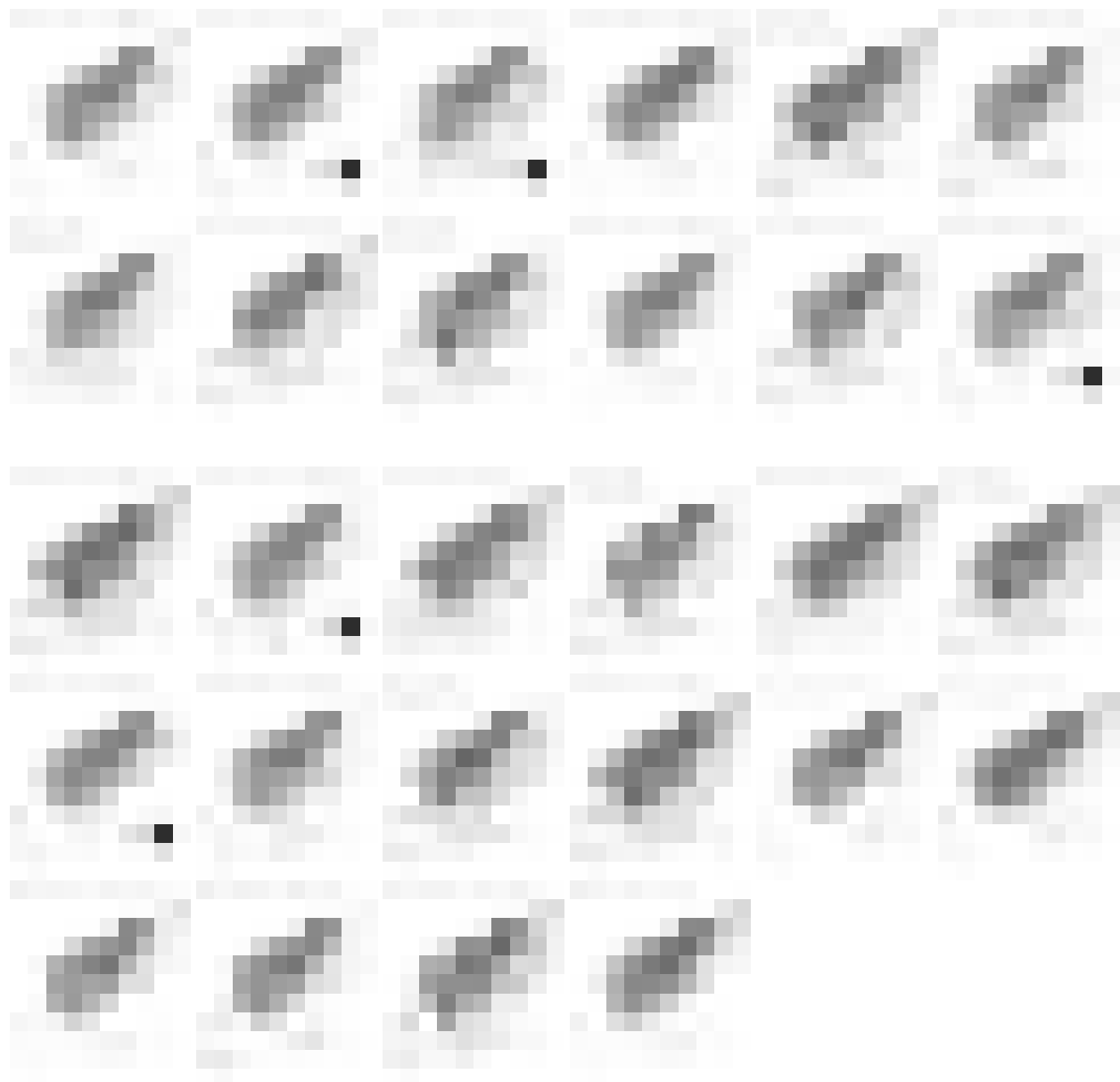
Eupatorium subvenosum (A. Gray) E.E. Schilling, Pine Barrens Eupatorium. Pine barrens, open woodlands. July-September. DC, DE, NJ, NY. *E. subvenosum* is an apomictic species derived from *E. hyssopifolium* × *petaloideum* (Schilling 2011). [= Y; = *E. album* Linnaeus var. *subvenosum* A. Gray – C, F, FNA, K, SE] {add to synonymy}

Eupatorium sullivaniae E.E. Schilling, Sullivan's Eupatorium. Pinelands. This species is an apomictic species derived from *E. album* × *lancifolium* (Schilling 2011). S. MS west to w. LA and AR (to be expected in e. TX and perhaps se. OK). [= Y; < *E. album* – S; < *E. album* var. *album* – FNA, K, SE]

Eupatorium torreyanum Short & Peter, Torrey's Eupatorium. Dry woodlands, powerline rights-of-way, roadsides, marshes. Late July-October. NY south to n. peninsular FL, Panhandle FL, and west to OH, TN, and LA. Cronquist (1980) considers this taxon a "well-marked variety", "probably originated through hybridization between *E. hyssopifolium* and some other species, but now a stable entity". The other parent is postulated by Sullivan (1978) to be *E. semiserratum*. For reasons stated in the comments before the species accounts, the taxon is here treated as a species. [= S; = *E. hyssopifolium* var. *laciniatum* Gray – C, F, FNA, G, K, SE, W, WH; < *E. hyssopifolium* – RAB, WV (rejected)]

Eupatorium vaseyi T.C. Porter, Vasey's Eupatorium. Moist to dry woodlands and openings. July-October. KY south to se. TN (Chester, Wofford, & Kral 1997), n. GA, and n. AL. This species is an apomictic species derived from *E. petaloideum* × *sessilifolium* (Schilling 2011). It has often been treated as a variety of *E. album*, but is better regarded as a species of hybrid origin. [= Y; < *E. album* var. *vaseyi* – W (also see *E. godfreyanum*); < *E. album* var. *vaseyi* (T.C. Porter) Cronquist – C, FNA, SE; = *E. album* var. *monardifolium* (Fernald) – F; < *E. vaseyi* – G; = *E. sessilifolium* var. *vaseyi* (Porter) Fernald & Griscomb – K, RAB, WV]





Eurybia (Cassini) Cassini 1820 (Wood-aster)

A genus of about 23 species, perennial herbs, of North America and n. Eurasia. References: Brouillet in FNA (2006b); Nesom (1994b)=X; Lamboy (1987)=Y; Lamboy (1992, 1988). Key based in part on SE and FNA.

- 1 Basal and lower cauline leaves both distinctly petioled and with a cordate or subcordate blade; [subgenus *Eurybia*, section *Eurybia*].
- 2 Outer phyllaries squarrose-reflexed; rhizomes short or absent, the plants not forming extensive clonal colonies; [of rich slopes and bottomlands of the lower Piedmont of NC, SC, GA, and AL].
 - 3 Involucre (10-) 11-13 mm tall; phyllaries 36-50, ovate, elliptic, or lanceolate, acute to acuminate at the apex, squarrose in life, often only the innermost squarrose in dried specimens, the reflexed portion with a distinct hyaline margin; ray florets 7-15, blue or violet; [of the lower Piedmont of GA and AL] *E. jonesiae*
 - 3 Involucre 7-10 (-12) mm high; phyllaries 46-75 (-90), oblong-lanceolate, acute, obtuse, or rounded at the apex, squarrose in life, generally remaining so in dried specimens, the reflexed portion herbaceous with a narrow hyaline margin or none at all; ray florets (7-) 16-20 (-30), white or lavender; [of the lower Piedmont of s. NC and SC] *E. mirabilis*
- 2 Outer phyllaries appressed (or slightly and irregularly spreading); rhizomes long, the plants forming extensive clonal colonies; [of various habitats and distribution].
 - 4 Ray flowers purplish or bluish; branches of the inflorescence glandular-pubescent *E. macrophylla*
 - 4 Ray flowers white; branches of the inflorescence not glandular-pubescent.
 - 5 Plants with basal leaves on well-developed shoots separate from the flowering shoots; larger leaves with 15-30 teeth per side..... *E. schreberi*

- 5 Plants without basal leaves on well-developed shoots separate from the flowering shoots; larger leaves with 5-20 teeth per side.
- 6 Longest peduncle in inflorescence > 1.5 cm long; involucre 6.5-9 (-10) mm tall; ray florets (8-) 12-16 (-20), the ray portion (10-) 17-18 (-20) mm long; disc florets (12-) 17-26; [mostly of high mountain forests, primarily over 1200 m in elevation].....*E. chlorolepis*
- 6 Longest peduncle in inflorescence < 1.5 cm long; involucre (3.5-) 4.2-6 (-7.5) mm tall; ray florets 5-10 (-12), the ray portion (5-) 10-15 mm long; disc florets 12-19 (-25); [mostly of lower elevation forests, primarily below 1200 m in elevation].....*E. divaricata*
- 1 Basal and lower cauline leaves not as above.
- 7 Leaves linear, up to about 10 mm wide; leaves strongly basally disposed.
- 8 Inflorescence flat-topped (corymbiform); [subgenus *Heleastrum*, section *Heleastrum*].
- 9 Pappus fine, the bristles not thickened above; ray florets 8-15 (-25); [of the Piedmont and low Mountains of GA, SC, and possibly sw. NC].....*E. avita*
- 9 Pappus coarse, the larger bristles thickened above (clavellate-flattened); ray flowers 15-35; [of the Coastal Plain, of ne. NC south to ne. FL].....*E. paludosa*
- 8 Inflorescence elongate (spike-like or raceme-like).
- 10 Stem spreading-hairy throughout; ray florets 25-60, white or pinkish; disc florets; [endemic of FL Panhandle and adjacent sw. GA]; [subgenus *Heleastrum*, section *Eryngiifolia*].....*E. eryngiifolia*
- 10 Lower stem glabrous, upper stem variously hairy; ray florets 8-30, deep lavender or purple; [collectively widespread]
- 11 Upper stem strigillose; phyllaries 48-64; ray florets 15-30; disc florets (40-) 52-80+; [widespread]; [subgenus *Heleastrum*, section *Heleastrum*].....*E. hemisphaerica*
- 11 Upper stem villous to glabrescent; phyllaries 20-40; ray florets 8-17; disc florets 18-30; [endemic of FL Panhandle]; [subgenus *Heleastrum*, section *Eryngiifolia*].....*E. spinulosa*
- 7 Leaves broader, the largest on a plant over 15 m wide; leaves somewhat basally disposed, the lowermost sometimes withering before flowering.
- 12 Leaves obviously veined beneath, usually toothed, hairy on the undersurface; [subgenus *Eurybia*, section *Radulini*].
- 13 Larger leaves < 2.5 (-3.6) cm wide; rays purple; [of w. VA, WV, northward].....*E. radula*
- 13 Larger leaves > 4.0 cm wide; rays white to pale purple; [of the Cumberland Plateau of KY and n. TN].....*E. saxicastellii*
- 12 Leaves very obscurely veined beneath, entire or nearly so, glabrous on the undersurface; [subgenus *Eurybia*, section *Calliastrum*].
- 14 Ray florets 9-14; rays 5-15 mm long.....*E. compacta*
- 14 Ray florets 15-35; rays 10-25 mm long.
- 15 Phyllaries glandular-pubescent on the back and also glandular-ciliate; involucre 8-16 mm high.....*E. spectabilis*
- 15 Phyllaries slightly or not at all glandular-pubescent on the back (sometimes glandular-ciliate); involucre 7-12 mm high.....*E. surculosa*

Eurybia avita (Alexander) G.L. Nesom, Alexander's Rock Aster. In shallow soils on granitic flatrocks and granitic domes where moist from seasonal seepage. Upper Piedmont endemic: w. SC (or sw NC?) to wc. GA. A diploid species (2n=18). [= FNA, K, X; = *Aster avitus* Alexander - SE, W]

Eurybia chlorolepis (E.S. Burgess) G.L. Nesom, Blue Ridge White Heart-leaved Aster. Northern hardwood forests, spruce-fir forests. August-October. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. SC and n. GA (Lamboy 1992); also reported for scattered locations in WV (Harmon, Ford-Werntz, & Grafton 2006). Lamboy (1992) has shown that *Eurybia chlorolepis* is a species distinct from *Eurybia divaricata*. *E. chlorolepis* is tetraploid (2n=36) and hexaploid (2n=54); *E. divaricatus* is diploid (2n=18). [= FNA, K, X; = *Aster chlorolepis* E.S. Burgess - G, S, Y; = *A. divaricatus* Linnaeus var. *chlorolepis* (E.S. Burgess) H.E. Ahles - RAB, C, SE, W; < *A. divaricatus* - F, WV]

Eurybia compacta G.L. Nesom, Slender Aster. Pine savannas. Late July-October. An Atlantic Coastal Plain endemic: NJ to e. GA. A diploid species (2n=18). [= FNA, K, X; = *Aster gracilis* Nuttall - RAB, C, F, G, S, SE]

Eurybia divaricata (Linnaeus) G.L. Nesom, Common White Heart-leaved Aster. Moist to fairly dry forests and woodlands. August-October. N. NH west to s. ON, sw. QC, and n. OH, south to e. NC, c. SC, n. GA, and c. AL. The many species described by Burgess and here treated as synonyms may deserve further assessment; see S for details. A diploid species (2n=18). [= FNA, K, Pa, X; = *Aster divaricatus* Linnaeus - G, Y; = *A. divaricatus* var. *divaricatus* - RAB, C, SE, W; < *A. divaricatus* - F, WV (also see *Eurybia chlorolepis*); > *A. boykinii* E.S. Burgess - S; > *A. castaneus* E.S. Burgess - S; > *A. divaricatus* - S; > *A. excavatus* E.S. Burgess - S; > *A. flexilis* E.S. Burgess - S; > *A. stillettiformis* E.S. Burgess - S; > *A. tenebrosus* E.S. Burgess - S]

Eurybia eryngiifolia (Torrey & A. Gray) G.L. Nesom, Eryngo-leaved Aster. Pine savannas. East Gulf Coastal Plain endemic: sw. GA and Panhandle FL west to AL. [= FNA, K, WH, X; = *Aster eryngiifolius* Torrey & A. Gray - S, SE]

Eurybia hemisphaerica (Alexander) G.L. Nesom, Prairie Grass-leaved Aster. Glades, barrens, rocky woodlands. E. TN west to MO, south to nw. GA, se. GA, and FL Panhandle. Apparently diploid (2n=18) and tetraploid (2n=36). [= FNA, K, WH, X; = *Aster hemisphaericus* Alexander - C, F, SE; = *A. paludosus* Aiton ssp. *hemisphaericus* (Alexander) Cronquist - G; = *A. hemisphaericus* - W, orthographic variant]

Eurybia jonesiae (Lamboy) G.L. Nesom, Piedmont Big-leaved Aster. Moist forests. August-October. Endemic to the Piedmont: e. GA west to e. AL (Lee Co.). A hexaploid species (2n=54). [= FNA, K, X; = *Aster jonesiae* Lamboy; = *A. commixtus* (Nees) Kuntze - S, misapplied; < *A. commixtus* (Nees) Kuntze - SE, misapplied]

Eurybia macrophylla (Linnaeus) Cassini, Big-leaved Aster. Moist to dryish forests, in NC mostly at moderate to high elevations, particularly in red oak forests on ridgetops. Late July-September. NB and QC west to MN, south to PA, MD, VA, NC, ne. GA, e. TN, and IN. *Aster macrophyllus* var. *ianthinus* [= *Aster multiformis*] is sometimes recognized. It is alleged to differ in having the stipitate glands of the pedicels with minute heads (vs. broadly capitate), the leaves thin in texture and only slightly scabrous (vs. thick in texture and strongly scabrous). Many other varieties have been recognized by Fernald (1950); see F for a key. *E. macrophylla* is octoploid (2n=72). [= FNA, K, Pa, X; = *Aster macrophyllus* Linnaeus - RAB, C, G, SE, W, Y; > *Aster macrophyllus* var. *macrophyllus* - F, WV; > *A. macrophyllus* var. *ianthinus* (E.S. Burgess) Fernald - F, WV; > *A. macrophyllus* var. *pinguifolius* E.S. Burgess - F; > *A. macrophyllus* var. *pinguifolius* E.S. Burgess - WV, misspelling; > *A. macrophyllus* var. *excelsior* E.S. Burgess - F, WV;

> *A. macrophyllus* var. *velutinus* E.S. Burgess – F, WV; > *A. macrophyllus* var. *sejunctus* E.S. Burgess – F; > *A. macrophyllus* var. *apricensis* E.S. Burgess – F; > *A. macrophyllus* – S; > *A. multiformis* E.S. Burgess – S; > *A. riciniatus* E.S. Burgess – S]

Eurybia mirabilis (Torrey & A. Gray) G.L. Nesom, Piedmont Aster. Nutrient-rich bottomlands and moist slopes in the lower Piedmont. July-September. Endemic to the lower Piedmont of NC and SC. A diploid species (2n=18). [= FNA, K, X; = *Aster mirabilis* Torrey & A. Gray – S; < *A. commixtus* (Nees) Kuntze – RAB, SE, misapplied]

Eurybia paludosa (Aiton) G.L. Nesom, Savannah Grass-leaved Aster. Wet savannas, sandhill / pocosin ectones. July-October. An Atlantic Coastal Plain endemic: ne. NC south to se. GA and ne. FL (Nassau County). A tetraploid species (2n=36). [= FNA, K, WH, X; = *Aster paludosus* Aiton – RAB, C, GW, SE; = *A. paludosus* ssp. *paludosus* – G]

Eurybia radula (Aiton) G.L. Nesom, Low Rough Aster. Circumneutral to calcareous wet meadows, possibly stream banks. July-September. NL (Newfoundland) and NL (Labrador) south to DE (historically), MD, WV, and w. VA. A diploid species (2n=18). [= FNA, K, Pa, X; = *Aster radula* Aiton – C, G, SE, W, WV; > *A. radula* var. *radula* – F]

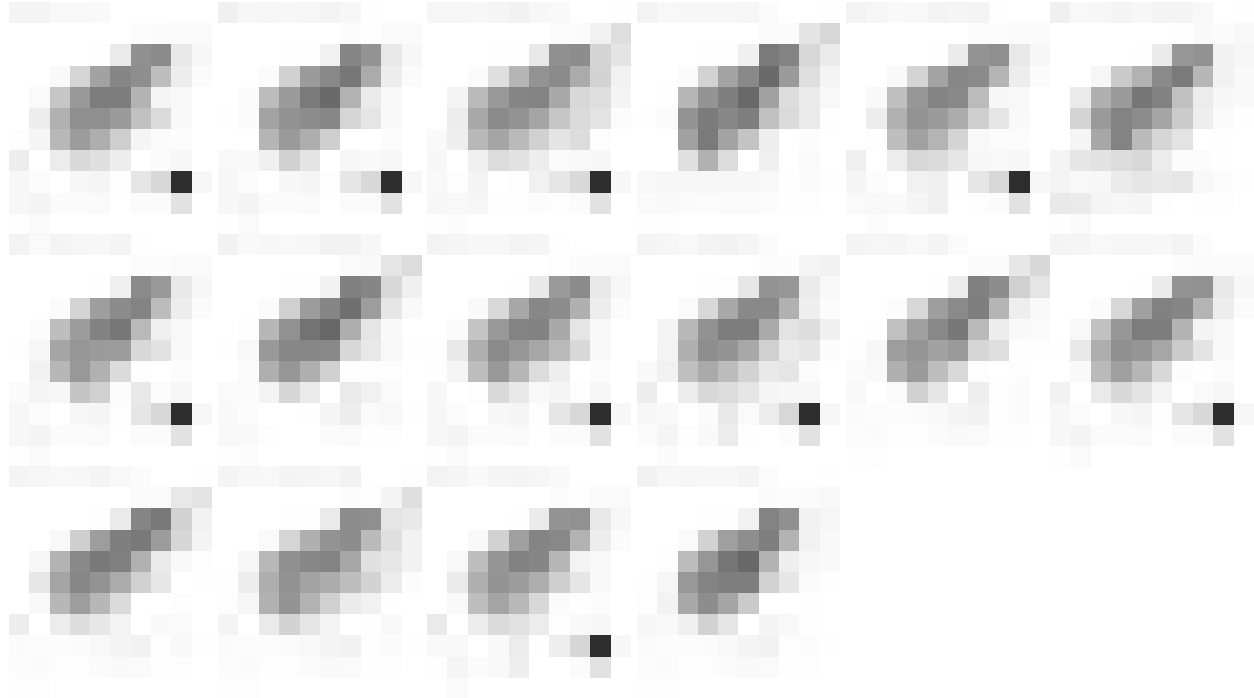
Eurybia saxicastellii (J.J.N. Campbell & Medley) G.L. Nesom, Rockcastle Wood-aster. Boulder/cobble bars along the Rockcastle River. Endemic to the Cumberland Plateau region of KY and n. TN (Scott County, TN) (Chester, Wofford, & Kral 1997). A hexaploid species (2n=54). [= K, X; = *Aster saxicastellii* J.J.N. Campbell & Medley – C; = *E. saxicastelli* – FNA, orthographic variant]

Eurybia schreberi (Nees) Nees, Schreber's Aster. Mesic forests and seepage slopes. Late June-October. NH west to WI, south to DE, MD, sc. and w. VA, ne. TN (Chester, Wofford, & Kral 1997), AL, and KY. *E. schreberi* is hexaploid (2n=54). [= FNA, K, Pa, X; = *Aster schreberi* Nees – C, G, SE, W, Y; > *A. schreberi* – F; > *A. glomeratus* (Bernhart ex Nees) E.S. Burgess – F]

Eurybia spectabilis (Aiton) G.L. Nesom, Low Showy Aster. Pine barrens, dry road banks. August-October. Coastal Plain (and rarely adjacent provinces) from MA south to SC; disjunct in AL. An octoploid species (2n=72). [= FNA, K, Pa, X; = *Aster spectabilis* Aiton – RAB, C, SE; > *A. spectabilis* Aiton var. *cinerascens* Blake – G; > *A. spectabilis* Aiton var. *spectabilis* – F, G; > *A. spectabilis* var. *suffultus* Fernald – F, G; > *A. smallii* Alexander – S; > *A. spectabilis* – S]

Eurybia spinulosa (Chapman) G.L. Nesom, Apalachicola Aster. Longleaf pine savannas. Endemic to Panhandle FL (Bay, Calhoun, Gulf, and Franklin counties). May-July. [= FNA, K, WH, X; = *Aster spinulosus* Chapman – GW, S, SE]

Eurybia surculosa (Michaux) G.L. Nesom, Creeping Aster. Rock outcrops, glades, rocky woodlands. Late August-October. A Southern Appalachian endemic: se. KY and w. VA south to w. NC, e. TN, nw. SC, and n. GA. Alleged occurrences of *E. surculosa* on the Coastal Plain in se. SC and e. GA are based on misidentifications of *E. compacta*. A tetraploid species (2n=36). [= FNA, K, X; = *Aster surculosus* Michaux – RAB, C, F, G, S, SE, W]



Euthamia (Nuttall) Cassini 1825 (Flat-topped Goldenrod)

A genus of about 8-10 species, herbs, of North America. There are a number of serious problems remaining in our knowledge of *Euthamia*. References: Sorrie (in prep.)=V; Haines in FNA (2006b); Sieren (1981)=Z; Taylor & Taylor (1983)=Y; Johnson (1995)=X; Cronquist (1980)=SE.

- 1 Leaves with numerous slightly raised, pale, translucent, blister-like pustules; leaves transmit light when held up; plant glabrous *E. leptcephala*
- 1 Leaves without pale pustules, or if present then leaves opaque and do not transmit light; plants glabrate to pubescent.
- 2 Major veins on leaf underside 3-5 (if 3 then all 3 veins bold), leaves 5-12 mm wide; heads with 20-50 flowers.

- 3 Leaves 3-6 (-8) mm wide, punctae on leaf upperside bold, flower heads 10-20 flowered.....[*E. gymnospermoides*]
- 3 Leaves 5-12 mm wide, punctae on leaf upperside obscure or not bold, flower heads 20-50 flowered.
- 4 Leaf undersides, upper stems, and branches glabrate, often with villous hairs on midrib of leaf underside.....
.....*E. graminifolia* var. *graminifolia*
- 4 Leaf undersides, upper stems, and branches copiously to moderately short villous.....*E. graminifolia* var. *nuttallii*
- 2 Major veins on leaf underside 1-3 (-5) (if 3 or 5 then only the midvein bold), leaves <6 mm wide (-8 mm wide in *E. gymnospermoides*); heads with 10-20 flowers.
- 5 Leaves < 3 mm wide; major veins 1 (-3), nearly always with axillary fascicles (rarely without); [of Coastal Plain and lower Piedmont from se LA eastward]*E. caroliniana*
- 5 Leaves >3 mm wide, main veins 3 (-5), without axillary fascicles.
- 6 Upper surface of leaves glabrous, inflorescence branches glabrous or glabrate; [of midwestern interior].....*E. gymnospermoides*
- 6 Upper surface of leaves with line of very short, scabridulous hairs on midvein near base, and often also beyond midleaf; [of outer Coastal Plain] *E. hirtipes*

Euthamia caroliniana (Linnaeus) Greene ex Porter & Britton. Pine savannas, moist forests, ditches, pastures, disturbed areas. September-December. S. ME south to s. FL and west to se. LA, mainly on the Coastal Plain, extending somewhat into the Piedmont in places (reports from farther north or farther west are based on misidentifications or on broader circumscriptions of the taxon). [= FNA, K, Pa, WH, V, X; > *Solidago microcephala* (Nuttall) Bush – RAB, F, G; >> *Solidago tenuifolia* Pursh – RAB; > *E. tenuifolia* (Pursh) Nuttall var. *microcephala* Nuttall – C; > *E. tenuifolia* var. *tenuifolia* – C; > *Solidago tenuifolia* var. *tenuifolia* – F; > *Solidago tenuifolia* – G; < *E. tenuifolia* – GW (also see *E. hirtipes*); > *E. minor* (Michaux) Greene – GW, SE; = *E. minor* – S; > *E. tenuifolia* (Pursh) Nuttall – SE; = *E. tenuifolia* – W, Z]

Euthamia graminifolia (Linnaeus) Nuttall var. ***graminifolia***. Moist to dry weedy situations, riverbanks, bottomlands, bog margins. August-September. NL (Newfoundland) and ND south to MD, c. VA, WV, n. KY, TN, and e. IA; a SC Coastal Plain report (Hill & Horn 1997) is probably an introduction. Also introduced on the Gulf Coast (LA and MS?). [= C, V, X, Y, Z; < *E. graminifolia* – FNA, Pa, S, SE, W; < *Solidago graminifolia* (Linnaeus) Salisbury – RAB; > *Solidago graminifolia* var. *polycephala* Fernald – F; > *S. graminifolia* var. *graminifolia* – F, G; < *E. graminifolia* var. *graminifolia* – K]

Euthamia graminifolia (Linnaeus) Nuttall var. ***nuttallii*** (Greene) W. Stone. Moist to dry weedy situations, riverbanks, bottomlands, bog margins. August-September. NL (Newfoundland) south to se. VA, w.NC, KY, nw. TN and MO. Also introduced on the Gulf Coast (LA and MS?). [= C, V, X, Y, Z; < *E. graminifolia* – FNA, Pa, S, SE, W; < *Solidago graminifolia* (Linnaeus) Salisbury – RAB; = *S. graminifolia* var. *nuttallii* (Greene) Fernald – F, G; < *E. graminifolia* var. *graminifolia* – K]

Euthamia gymnospermoides Greene, Texas Goldentop. Prairies, roadsides, and light woodlands. MI, nw. MN, and e. ND south to c. IN, sw. KY (Graves Co), w. TN (Hardeman, Lawrence counties), ec. and c. AR, ne. TX, w. OK, and e. CO.; disjunct in Coffee Co. TN. [= FNA, K, SE, V, Z; < *Solidago gymnospermoides* (Greene) Fernald – F, G]

Euthamia hirtipes (Fernald) Sieren, Marsh Flat-topped Goldenrod. Brackish marshes, salt marshes, marsh edges, wet hammocks. September-December. S. NJ and DE south to c. peninsular FL, west to s. AL. *E. hirtipes* has been variously treated: considered by Fernald to be a hybrid of "*minor*" and "*graminifolia* var. *nuttallii*," by Sieren to be a species endemic to NC, SC, and VA, by Taylor and Taylor (1983) to be a variety of *E. graminifolia* ranging from se. VA south to FL and west to LA, and by GW to be equivalent to *E. tenuifolia*. [= V, Z; < *Solidago tenuifolia* Pursh – RAB; < *Euthamia graminifolia* – FNA; = *Euthamia ×hirtipes* (Fernald) Sieren (pro sp.) – C; > *Solidago ×hirtipes* Fernald – F; >> *Solidago gymnospermoides* (Greene) Fernald – F, G, misapplied as to our plants; >> *Solidago leptoccephala* Torrey & A. Gray – F, misapplied as to our plants; < *E. tenuifolia* – GW; = *E. graminifolia* (Linnaeus) Nuttall var. *hirtipes* (Fernald) C. & J. Taylor – K, WH, X, Y]

Euthamia leptoccephala (Torrey & A. Gray) Greene. Fields, pastures, roadsides, prairies, savannas. KY, IL, MO, and OK south to nw. GA (Floyd and Heard counties), AL, and TX. [= C, FNA, GW, K, S, SE, V, Z; = *Solidago leptoccephala* Torrey & A. Gray – F, G]



***Eutrochium* Rafinesque 1838 (Joe-pye-weed)**

The separation of *Eutrochium* (*Eupatoriadelphus*) from *Eupatorium* has been supported by Schmidt & Schilling (2000). Lamont (2004) makes the necessary combinations under the oldest available generic name, *Eutrochium* Rafinesque. References: Lamont in FNA (2006c); Lamont (2004)=X; Schmidt & Schilling (2000)=Y; Lamont (1995)=Z.

- 1 Florets (4-) 6-9 (-12) per head; leaves more or less 3-nerved from the base, rather abruptly contracted to the short petiole, thick in texture, 5-12 (-15) cm long, strongly resin-dotted beneath; leaves in whorls of (2-) avg. 3-4 (-5); stem generally purple-speckled (sometimes uniformly purple); [primarily of the Coastal Plain] *E. dubium*
- 1 Florets **either** (8-) 9-22 **or** 4-7 per head; leaves generally pinnately veined (rarely with a tendency to be 3-nerved), usually cuneate and less abruptly contracted to the petiole, thick or thin in texture, 6-35 cm long, weakly or not at all resin-dotted beneath (except often strongly resin-dotted in *E. maculatum*); leaves in whorls of (2-) 3-7; stem purple-speckled, purple at the nodes, purple throughout, or green; [collectively widespread in our area].

- 2 Florets (8-) 9-22 per head; leaves mostly in whorls of (3-) avg. 4-5 (-6), 6-20 cm long; inflorescence more or less flat-topped; stem usually speckled with purple (rarely evenly purplish).....*E. maculatum* var. *maculatum*
- 2 Florets 4-7 per head; leaves in whorls of (2-) 3-7, 8-35 cm long; inflorescence rounded; stem usually purple throughout, purple at the nodes, or lacking purplish pigment.
- 3 Stem hollow (with a large central cavity), purple throughout, strongly glaucous when fresh; flowers bright pink-purple; leaves in whorls of (3-) avg. 5 (-7); leaves mostly 3.5-5.5× as long as broad.....*E. fistulosum*
- 3 Stem solid (rarely with a slender central cavity), dark purple at the nodes or greenish purple throughout, not glaucous or only slightly so when fresh; flowers pale pink-purple; leaves in whorls of (2-) avg. 3-4 (-5); leaves mostly 2-4× as long as broad.
- 4 Stem persistently glandular-pubescent throughout; lower surface of leaves glandular-pubescent; leaves mostly 2-2.5× as long as wide; stem greenish-purple (or evenly purple); [of the Mountains].....*E. steelei*
- 4 Stem glandular-puberulent in the inflorescence, glabrous below the inflorescence; lower surface of leaves with few, sessile resin dots; leaves mostly 2.5-4× as long as broad; stem greenish, often dark purple at the nodes, particularly when sun-grown; [widespread in our area]*E. purpureum* var. *purpureum*

Eutrochium dubium (Willdenow ex Poiret) E.E. Lamont, Three-nerved Joe-pye-weed. Swamp forests, pocosins, other wet, acidic habitats. July-October. NS, s. ME, and NH south to se. SC, on or near the Coastal Plain. Reported as adventive in West Virginia (Harmon, Ford-Werntz, & Grafton 2006). [= FNA, Pa, X; = *Eupatoriadelphus dubius* (Willdenow ex Poiret) King & H.E. Robinson – GW, Y; = *Eupatorium dubium* Willdenow ex Poiret – RAB, C, F, G, K, SE, W, Z; = *Eupatorium purpureum* – S, misapplied]

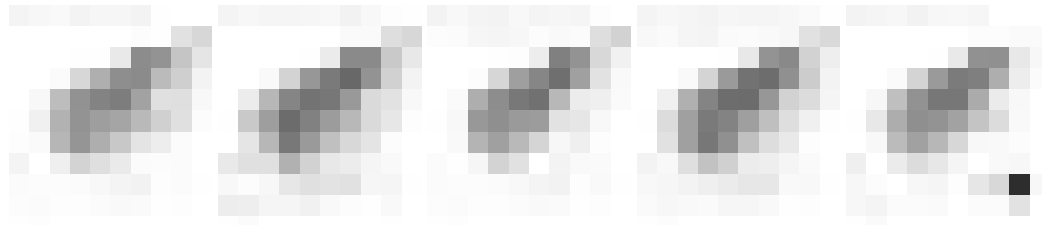
Eutrochium fistulosum (Barratt) E.E. Lamont, Hollow-stem Joe-pye-weed. Moist forests, marshes, ditches. July-October. S. ME, NY, IL, and MO, south to c. peninsular FL, Panhandle FL, and e. TX. [= FNA, Pa, X; = *Eupatoriadelphus fistulosus* (Barratt) King & H.E. Robinson – GW, Y; = *Eupatorium fistulosum* Barratt – RAB, C, F, G, K, SE, W, WH, WV, Z; = *Eupatorium maculatum* – S, misapplied]

Eutrochium maculatum (Linnaeus) E.E. Lamont var. *maculatum*, Spotted Joe-pye-weed. Marl fens, wet calcareous meadows, cove forests, grassy balds. Late July-October. The species is widespread across n. North America. NL (Newfoundland), ME, QC, ON, and MN, south to PA, OH, n. KY, c. IL, and c. IA, and in the Mountains south to e. WV, w. VA, and w. NC. Var. *bruneri* (A. Gray) E.E. Lamont is more western; var. *foliosum* (Fernald) E.E. Lamont, is more northern. Further investigation is needed of the peculiar and implausible change in habitat of this species, from calcareous wetlands in c. VA northward, to mesic high elevation slopes and forests (in acidic to very acidic soils) from sw. VA southward. Such a change is suggestive of the presence of an unrecognized, cryptic taxon in the Southern Appalachians. [= FNA, X; = *Eupatorium maculatum* Linnaeus var. *maculatum* – F, G, K, SE; < *Eupatorium maculatum* – RAB, W, WV; = *Eupatorium maculatum* ssp. *maculatum* var. *maculatum* – C, Z; > *Eutrochium maculatum* – Pa; < *Eupatoriadelphus maculatus* – Y]

Eutrochium purpureum (Linnaeus) E.E. Lamont var. *carolinianum* Sorrie, Carolina Joe-Pye-weed. Dry forests, woodlands, oak savannas, and roadsides. See Sorrie (2010) for additional detail. [< *Eutrochium purpureum* var. *purpureum* – FNA, X; < *Eupatorium purpureum* Linnaeus var. *purpureum* – K, Z; < *E. purpureum* – RAB, C, F, SE, W, WH; < *Eupatorium purpureum* var. *purpureum* – G, WV; < *Eupatorium trifoliatum* Linnaeus – S]{not yet keyed}

Eutrochium purpureum (Linnaeus) E.E. Lamont var. *purpureum*, Purple-node Joe-pye-weed. Upland, usually mesic forests. July-October. NH west to se. MN, IA, and e. NE, south to SC, GA, Panhandle FL, n. LA, and e. OK; var. *holzingeri* (Rydberg) E.E. Lamont, differing in having the lower leaf surface densely and persistently pubescent (vs. glabrous or nearly so) is found in the Midwest (Lamont 1990). *Eupatorium purpureum* var. *amoenum* is smaller, more slender, with narrower leaves which are nearly glabrous below; it is probably only a form. [< *Eutrochium purpureum* var. *purpureum* – FNA, X; < *Eupatorium purpureum* Linnaeus var. *purpureum* – K, Z; < *Eupatorium purpureum* – RAB, C, F, SE, W, WH; > *Eupatorium purpureum* var. *amoenum* (Pursh) Gray – G, WV; < *Eupatorium purpureum* var. *purpureum* – G, WV; < *Eutrochium purpureum* – Pa; < *Eupatorium trifoliatum* Linnaeus – S]

Eutrochium steelei (E.E. Lamont) E.E. Lamont, Appalachian Joe-pye-weed, Steele's Joe-pye-weed. Cove hardwood and northern hardwood forests, up to at least 1600 m. July-October. A Southern Appalachian endemic: e. KY and w. VA south w. NC and e. TN. [= FNA, X; = *Eupatoriadelphus steelei* (E. Lamont) G.J. Schmidt & Schilling – Y; = *Eupatorium steelei* E.E. Lamont – Z]



***Facelis* Cassini 1819**

A genus of 3 species, herbs, of South America. References: Nesom in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE; Anderberg (1991)=Y.

* ***Facelis retusa*** (Lamarck) Schultz ‘Bipontinus’, Trampweed. Fields, roadsides, lawns, disturbed areas; native of s. South America. Late April-June. [= RAB, FNA, K, SE, WH, Y, Z; ? *F. apiculata* Cassini – S]



Filago Linnaeus 1753 (Cotton-rose, Herba Impia, Rabbit-tobacco)

A genus of about 40 species, herbs, of Eurasia, North America, and n. Africa. Arriagada (1998) favors the inclusion of *Evax* in *Filago*. References: Morefield in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE; Anderberg (1991)=Y.

- 1 Inner flowers of the head with a well-developed capillary pappus; heads woolly, but not so densely and completely as to hide the phyllaries ... *F. vulgaris*
- 1 All flowers of the head lacking a pappus of capillary bristles; heads completely surrounded by wool, the phyllaries hidden [see *Diaperia*]

* ***Filago vulgaris*** Lamarck, Herba Impia. Disturbed areas; native of Europe. May-September. [= FNA, K, Pa, Y; = *F. germanica* – RAB, C, F, G, SE, WV, Z, misapplied; = *Gifola germanica* Dumortier – S]



Flaveria de Jussieu 1789

A genus of about 21 species, herbs and subshrubs, subcosmopolitan in tropical and subtropical areas. References: Yarborough & Powell in FNA (2006c); Cronquist (1980)=SE.

- 1 Heads borne in axillary glomerules; disc florets 0-1 (-2) *F. trinervia*
- 1 Heads borne in terminal arrays; disc florets (2-) 3-8.
 - 2 Lower leaves petiolate, 10-25 (-70) mm wide; annual; cypselas 2.0-2.5+ mm long *F. bidentis*
 - 2 Lower leaves sessile, 1-4 (-15) mm wide; perennial; cypselas 1.2-1.8 mm long *F. linearis*

* ***Flaveria bidentis*** (Linnaeus) Kuntze. Disturbed areas; native of tropical America. FL Panhandle, s. FL, AL, GA. [= FNA, K, S, SE, WH]

Flaveria linearis Lagasca y Segura, Narrowleaf Yellowtops. Beaches, marshes, hammocks, pinelands. Native in peninsular and Panhandle FL. [= FNA, GW, K, S, WH; < *F. linearis* – SE]

* ***Flaveria trinervia*** (Sprengel) C. Mohr, Clustered Yellowtops. Waste areas around wool-combing mill, ore piles, seaport ballast, probably only a waif; native of sw. United States south into Central America, South America, and the West Indies (Nesom 2004d). March-December. Also known from ballast at Mobile, AL (Cronquist 1980). [= FNA, K, S, SE, WH]



Fleischmannia Schultz 'Bipontinus' 1850

A genus of about 80 species of s. North America, south through Central America to w. (Andean) South America. References: Nesom in FNA (2006c); Wooten & Clewell (1971)=Z; Schultz & Schilling (2000).

Fleischmannia incarnata (Walter) King & H.E. Robinson, Pink Thoroughwort, Pink Eupatorium. Nutrient-rich, moist to dry, forests and woodlands over diabase, limestone, coquina limestone, or other basic rocks, or on rich alluvium. Late August-October. Se. VA west to WV, s. OH, s. IN, s. IL, s. MO, and e. OK, south to w. peninsular FL, Panhandle FL, s. TX, and e.

Mexico, the distribution fragmented. See Wooten & Clewell (1971) for further information about this species. [= FNA, K, WH, Z; = *Eupatorium incarnatum* Walter – RAB, C, F, G, S, SE, W, WV]



***Gaillardia* Fougereux 1786 (Blanket-flower, Gaillardia, Fire-wheels)**

A genus of about 15-30 species, herbs, of temperate North America and South America. References: Strother in FNA (2006c); Cronquist (1980)=SE; Turner & Whalen (1975)=Z; Turner et al. (2003)=Y.

- 1 Receptacle naked, lacking well-developed setae (if setae present, < 1 mm long)*G. aestivalis* var. *aestivalis*
- 1 Receptacle with well-developed setae 2-3 mm long.
 - 2 Leaves fleshy; perennial or annual, strongly branching, the secondary branches spreading and therefore forming compact, rounded "bushes" *G. pulchella* var. *drummondii*
 - 2 Leaves herbaceous; annual, with secondary branches ascending *G. pulchella* var. *pulchella*

Gaillardia aestivalis (Walter) H. Rock var. *aestivalis*, Sandhills Gaillardia. Sandhills, disturbed sandy soils. July-October. Sc. NC south to c. peninsular FL, west to TX. The occurrence in nw. GA reported in Jones & Coile (1988) is odd. [= K, SE; < *G. aestivalis* – RAB, FNA; = *G. lanceolata* Michaux var. *lanceolata* – G; < *G. lanceolata* – S]

Gaillardia pulchella Fougereux var. *drummondii* (Hooker) B.L. Turner, Beach Blanket-flower. Sandy flats behind the dunes. April-December. Ne. NC south to FL, west to TX. [= Y; = *G. pulchella* Fougereux var. *picta* (Sweet) A. Gray – K, Z; < *G. pulchella* – RAB, C, F, FNA, G, SE, WH; = *G. picta* Sweet – S]

* ***Gaillardia pulchella*** Fougereux var. *pulchella*, Common Blanket-flower. Disturbed areas, persistent after cultivation; rare, introduced from farther south and west. April-September. [= K, Y, Z; < *G. pulchella* – RAB, C, F, FNA, G, SE, WH; = *G. drummondii* (Hooker) A.P. de Candolle – S, misapplied]



***Galinsoga* Ruiz & Pavón 1794 (Peruvian-daisy, Quickweed)**

A genus of about 13 species, herbs, of temperate and subtropical Central America and South America. References: Canne-Hilliker in FNA (2006c); Cronquist (1980)=SE.

- 1 Rays 0-1.5 (-2) mm long, lacking pappus scales (or with vestigial scales); outer phyllaries 2-4, with scarious margins; inner paleae deeply 3-lobed; pappus scales of the disc florets not awn-tipped; stem usually glabrous or sparsely pubescent with appressed (rarely spreading) hairs; gland-tipped hairs of the peduncles < 0.5 mm long; teeth of leaf margin obscure, broadly rounded or reduced to thickened bumps*G. parviflora* var. *parviflora*
- 1 Rays 2-3 mm long, with pappus scales about as long as the corolla tube; outer phyllaries 1-2, with green herbaceous margins; inner paleae usually entire; pappus scales of the disc florets awn-tipped; stem usually moderately pubescent with long, spreading hairs; gland-tipped hairs of the peduncles > 0.5 mm long; teeth of leaf margins usually well developed, acute *G. quadriradiata*

* ***Galinsoga parviflora*** Cavanilles var. *parviflora*, Lesser Peruvian-daisy. Mt (NC, SC, VA, WV), Pd (VA), Cp (VA): disturbed areas, roadsides, barnyards; uncommon (rare in WV), native of Central and South America. May-November. [= FNA, Pa; < *G. parviflora* – C, F, G, K, S, SE, W, WV]

* ***Galinsoga quadriradiata*** Ruiz & Pavón, Common Peruvian-daisy, Devil's-delight, Raceweed, Quickweed. Disturbed areas, roadsides, barnyards; native of Central and South America. May-November. A serious weed, especially in the cooler climates of the Mountains; Small (1933) described it as "a particularly pestiferous weed of such rapid growth and seeding as to make eradication extremely difficult." Fortunately, it does not seem especially prone to invade undisturbed natural areas. [= C, K, Pa, SE, W; > *G. ciliata* (Rafinesque) Blake – RAB, F, G, S, WV; > *G. caracasana* (A.P. de Candolle) Schultz 'Bipontinus' – F, G; > *G. bicolorata* St. John & White – F, G]



Gamochaeta Weddell 1856 (Cudweed, Everlasting)

A genus of about 50-80 species, herbs, subcosmopolitan, but primarily in South America. *Gamochaeta* is more closely related to other genera than it is to *Gnaphalium*. References: Nesom in FNA (2006a); Nesom (1990)=Z; Arriagada (1998)=Y; Nesom (2004b, 2004c)=X; Cronquist (1980)=SE; Pruski & Nesom (2004). Key based closely on FNA.

- 1 Leaves concolored or weakly bicolored (abaxial and adaxial faces more or less equally greenish to gray-greenish, indument usually loosely tomentose or arachnose, sometimes subpannose).
 - 2 Blades of basal and lower cauline leaves 4-16 mm wide; bracts among the inflorescence heads spatulate to oblanceolate, the lowermost (at least) surpassing the heads *G. pensylvanica*
 - 2 Blades of basal and lower cauline leaves 2-6 (10) mm wide; bracts among the inflorescence heads linear, oblanceolate, or oblong, surpassing the heads or not.
 - 3 Involucres 2.5-3 mm high, seated in tomentum; capitulescence initially cylindric and uninterrupted, at least distally, the main axis obscured by clustered heads; phyllaries in 3-4 (-5) series, the outer and middle ovate-lanceolate with narrowly to broadly acute apices, the outer 1/3-1/2 as long as the inner, none with purplish color; flowering May-July *G. antillana*
 - 3 Involucres 3-3.5 mm high, lightly arachnose only at the base if at all; capitulescence interrupted at least distally, the main axis visible up to the terminal heads; phyllaries in 5-7 series, the outer and middle ovate-triangular with sharply acute-acuminate apices, the outer 1/2-2/3 as long as the inner, at least the innermost commonly tinged with purple at the stereome-lamina junction; flowering (February-) March-May (sometimes later because of moisture or disturbance) *G. calviceps*
- 1 Leaves strongly to weakly bicolored with greenish glabrescent upper surfaces; leaves spatulate-obovate to oblanceolate; basal leaves present at flowering.
 - 4 Basal and proximal cauline leaves usually withering before anthesis (clusters of smaller leaves usually present in cauline axils); stems erect or ascending; plants (30-) 50-85 cm; apices of inner phyllaries acute-acuminate; flowering mostly July-August *G. simplicicaulis*
 - 4 Basal and proximal cauline leaves present or not at anthesis; stems erect to decumbent-ascending; plants mostly 10-50 cm; apices of inner phyllaries acute to obtuse, rounded, or blunt; flowering mostly April-June (-July in *G. calviceps*).
 - 5 Upper leaf surfaces glabrous or glabrate; involucres 2.5-3.0 mm high, more-or-less purplish, the bases glabrous; outer phyllaries elliptic-obovate to broadly ovate-elliptic, apices rounded to obtuse; bisexual florets 2-3 *G. coarctata*
 - 5 Upper leaf surfaces sparsely arachnose (hairs persistent, evident at 10x magnification); involucres 3.0-4.5(-5) mm high, sometimes purplish, bases (imbedded in tomentum) often sparsely arachnose on the lower 1/5-1/2; outer phyllaries ovate, ovate-triangular, or ovate-lanceolate, apices acute to acuminate; bisexual florets 2-6.
 - 6 Stems not pannose (indument whitish, like closely appressed, polished cloth, hairs usually not individually evident); involucres 3.0-3.5(-4.0) mm high; apices of inner phyllaries acute to acute-acuminate; bisexual florets 2-4; cypselae purple *G. chionesthes*
 - 6 Stems usually ± pannose or pannose-tomentose (hairs individually evident, longitudinally arranged); involucres 3.0-4.5 mm high; apices of inner phyllaries acute, obtuse, or truncate-rounded, sometimes apiculate; bisexual florets 3-6; cypselae tan to brownish.
 - 7 Blades of cauline leaves oblanceolate to oblanceolate-oblong or oblanceolate-obovate; involucres 3.0-3.5 mm high; laminae of inner phyllaries elliptic-oblong to oblong, apices truncate-rounded or obtuse and apiculate; bisexual florets (3-) 4-6; plants usually fibrous-rooted, rarely taprooted *G. argyrinea*
 - 7 Blades of cauline leaves oblanceolate to spatulate (basal cells of hairs on adaxial faces persistent, expanded, glassy); involucres 4.0-4.5 mm high; laminae of inner phyllaries triangular, apices acute (not apiculate); bisexual florets 3-4; plants fibrous-rooted or taprooted *G. purpurea*

Gamochaeta antillana (Urban) Anderberg, Caribbean Everlasting. Disturbed areas, fields, lawns. March-July. VA south to s. FL, west to AR and TX; Cuba; South America; Europe (introduced); New Zealand (introduced). [= FNA, WH, X; < *Gamochaeta falcata* (Lamarck) Cabrera – K, Z; < *Gnaphalium purpureum* Linnaeus var. *falcatum* (Lamarck) Torrey & A. Gray – RAB, C, G, SE; < *Gnaphalium calviceps* Fernald – F; < *Gnaphalium falcatum* Lamarck – S; < *Gnaphalium purpureum* Linnaeus – W]

* *Gamochaeta argentina* Cabrera. Waste areas near wool-combing mill, perhaps merely a waif; native of Argentina and Uruguay. See Nesom (2004d). [= FNA] {not yet keyed}

Gamochaeta argyrinea G.L. Nesom. Disturbed areas, roadsides, fields, lawns. March-July. DE, MD, WV, KY, s. MO, se. KS, south to Panhandle FL and e. TX. [= FNA, WH, X; < *Gamochaeta purpurea* (Linnaeus) Cabrera – K, Y, Z; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – RAB, C, G, SE; < *Gnaphalium purpureum* Linnaeus – F, S, W]

Gamochaeta calviceps (Fernald) Cabrera. Disturbed areas, roadsides. March-July. VA south to FL, west to TX; South America, California (introduced); Europe (introduced), New Zealand (introduced). [= FNA, X; < *Gamochaeta falcata* (Lamarck) Cabrera – K, Z; < *Gnaphalium purpureum* Linnaeus var. *falcatum* (Lamarck) Torrey & A. Gray – RAB, C, G, SE; < *Gnaphalium calviceps* Fernald – F; < *Gnaphalium falcatum* Lamarck – S; < *Gnaphalium purpureum* Linnaeus – W]

* *Gamochaeta chionesthes* G.L. Nesom. Roadsides, disturbed areas; apparently introduced from South America. March-July. [= FNA, WH, X; < *Gamochaeta purpurea* (Linnaeus) Cabrera – K, Y, Z; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – RAB, C, G, SE; < *Gnaphalium purpureum* Linnaeus – F, S, W]

* ***Gamochaeta coarctata*** (Willdenow) Kerguelen. Sandy roadsides, disturbed areas; native of South America. March-July. [= FNA, WH, X; < *Gamochaeta americana* (P. Miller) Weddell – K, Y, Z, misapplied; < *Gnaphalium purpureum* Linnaeus var. *americanum* (P. Miller) Klatt – RAB, misapplied]

* ***Gamochaeta pensylvanica*** (Willdenow) Cabrera, Pennsylvania Everlasting. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA?, NC): fields, roadsides, pastures, disturbed areas; common, probably native of South America. March-July. PA south to s. FL, west to TX, mostly on the Coastal Plain, and widespread in South America and elsewhere. [= FNA, K, WH, X, Z; >> < *Gnaphalium purpureum* Linnaeus var. *spathulatum* (Lamarck) Baker – RAB; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – C, G, SE; > *Gnaphalium peregrinum* Fernald – F; >> < *Gnaphalium spathulatum* Lamarck – S; < *Gnaphalium purpureum* Linnaeus – W]

Gamochaeta purpurea (Linnaeus) Cabrera, Spoonleaf Purple Everlasting. Fields, roadsides, pastures, disturbed areas. Late March-September. ME west to MI, south to s. FL and e. TX; apparently disjunct in CA and OR, adventive in w. US, Mexico, South America, and elsewhere. [= FNA, WH, X; < *Gamochaeta purpurea* (Linnaeus) Cabrera – K, Y, Z; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – RAB, C, G, SE; < *Gnaphalium purpureum* Linnaeus – F, S, W, WV; = *Gamochaeta purpurea* var. *purpurea* – Pa]

* ***Gamochaeta simplicicaulis*** (Willdenow ex Sprengel) Cabrera. Disturbed areas, roadsides; apparently native of South America. Late June-August. See Nesom (1999, 2000d, 2004b) for additional information. [= FNA, WH, X]



Garberia A. Gray 1879 (*Garberia*)

A monotypic genus, a shrub, of peninsular FL. References: Lamont in FNA (2006c).

Garberia heterophylla (W. Bartram) Merrill & F. Harper, *Garberia*. Florida scrub. October-December. Endemic from ne. FL south to s. peninsular FL. [= FNA, WH; = *G. fruticosa* (Nuttall) A. Gray – S, SE]



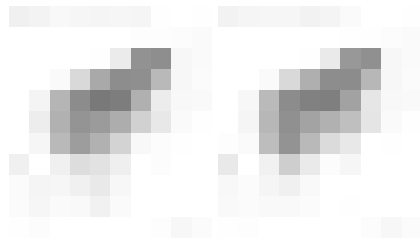
Glebionis Cassini 1826 (*Chrysanthemum*)

A genus of 2 species, annuals, native of Eurasia and n. Africa. References: Strother in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z.

- 1 Leaf blades 2-3-pinnate; rays pale yellow, 15-25 mm long***G. coronaria***
- 1 Leaf blades not lobed or coarsely 1-pinnate; rays golden yellow, 8-20 mm long..... ***G. segetum***

* ***Glebionis coronaria*** (Linnaeus) Cassini ex Spach, Garland Chrysanthemum, Crown-daisy. Disturbed areas; native of Eurasia, cultivated and escapes and occurs as waifs in our area. [= FNA, WH; = *Chrysanthemum coronarium* Linnaeus – K, Z]

* ***Glebionis segetum*** (Linnaeus) Fourreau, Corn Marigold, Corn Chrysanthemum. Disturbed areas, trash heaps, field edges; commonly cultivated, rarely escaped, persistent, or as a waif; native of Eurasia. April-May. [= FNA; = *Chrysanthemum segetum* Linnaeus – RAB, C, F, G, K, S, SE]



Gnaphalium Linnaeus 1753 (Cudweed, Rabbit Tobacco)

A genus of about 40 species (as recircumscribed more narrowly), distributed on most continents. References: Nesom in FNA (2006a); Anderberg (1991)=Z. [also see *Gamochoaeta* and *Pseudognaphalium*]

- 1 Involucre 2-3 mm high; plants to 2.5 dm tall; inflorescence of many, small, axillary and terminal clusters overtopped by subtending leaves.....*Gn. uliginosum*
- 1 Involucre 4-7 mm high; plants generally well over 2.5 dm tall; inflorescence terminal, usually elongate [see *Pseudognaphalium*]

Gnaphalium uliginosum Linnaeus, Low Cudweed. High elevation openings, especially in ruts or mud-puddles, rocky places; sometimes considered introduced in North America. July-October. NL (Newfoundland) west to BC, south to VA, WV, OH, IN, MN, CO, UT, and OR; also Europe. [= C, F, FNA, G, K, Pa, S, SE, WV, Z]



Grindelia Willdenow 1807 (Gum-plant, Tarweed, Rosinweed, Gumweed)

A genus of about 55 species, herbs and shrubs, of w. North America and South America. References: Strother & Wetter in FNA (2006b); Cronquist (1980)=SE.

- 1 Phyllaries loose (but not squarrose), only slightly imbricate.....*G. lanceolata* var. *lanceolata*
- 1 Phyllaries squarrose-reflexed, strongly imbricate*G. squarrosa* var. *squarrosa*

* **Grindelia lanceolata** Nuttall var. *lanceolata*. Limestone barrens, also disturbed areas, waste areas around wool-combing mill. IL and MO south to TX; disjunct eastward in KY, TN, AL, and MS, and also a rare introduction farther east. [= C, K; < *G. lanceolata* – F, FNA, G, SE]

* **Grindelia squarrosa** (Pursh) Dunal var. *squarrosa*, Curly-top Gumweed. Disturbed areas; introduced from farther west. Other varieties are also adventive eastward, and might be expected in our area. [= C, F, G, K, SE; < *G. squarrosa* – FNA, Pa]



Guizotia Cassini in Cuvier 1829 (Niger-seed)

A genus of 6 species, herbs, of Africa. References: Strother in FNA (2006c); Sherff & Alexander (1955)=Z.

* **Guizotia abyssinica** (Linnaeus f.) Cassini, Niger-seed, Niger-thistle, Ramtilla. Disturbed areas; native of Africa. September-October. [= C, F, G, K; = *G. abyssinica* – FNA, Z, orthographic variant]



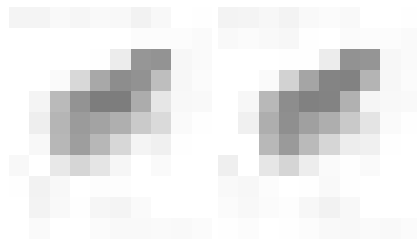
Gutierrezia Lagasca y Segura 1816

A genus of 28 species, annual and perennial herbs and subshrubs, of w. North America and w. South America. References: Nesom in FNA (2006b).

- 1 Subshrub; stems minutely hispidulous; ray florets 2-8; disc florets 2-9.....*G. sarothrae*
- 1 Annual; stems glabrous; ray florets 5-23; disc florets 7-13..... *G. texana* var. *texana*

* *Gutierrezia sarothrae* (Pursh) Britton & Rusby, Kindlingweed. Waste areas around wool-combing mill, perhaps merely a waif; native of w. North America. See Nesom (2004d). [= FNA, K; = *Xanthocephalum sarothrae* (Pursh) Shinnery]

* *Gutierrezia texana* (A.P. de Candolle) Torrey & A. Gray var. *texana*, Texas Snakeweed Waste areas around wool-combing mill, perhaps merely a waif; native of sc. North America. See Nesom (2004d). [= FNA, K; = *Xanthocephalum texanum* (A.P. de Candolle) Shinnery]



Hartwrightia A. Gray ex S. Watson 1888 (Hartwrightia)

A monotypic genus, a perennial herb, of se. United States (FL and GA). References: Nesom in FNA (2006c).

Hartwrightia floridana A. Gray ex S. Watson, Hartwrightia. Seepages and wet pinelands. July-September. Se. GA south to c. peninsular FL. [= FNA, K, S, SE, WH]



Helenium Linnaeus 1753 (Sneezeweed, Bitterweed)

A genus of about 32-40 species, herbs, of America. References: Bierner (1989)=Y; Bierner (1972)=Z; Rock (1957); Knox (1987); Rydberg (1915); Cronquist (1980)=SE.

- 1 Stem leaves very numerous, 0.5-2 (-4) mm wide, not decurrent on the stem or branches; plant a taprooted annual; [section *Amarum*].
 - 2 Disc corollas yellow, the lobes yellow or yellow-brown; lower and basal leaves usually withered at anthesis; lower leaves usually entire (rarely toothed); basal leaves entire to toothed (rarely pinnatifid)*H. amarum* var. *amarum*
 - 2 Disc corollas yellow, the lobes (and sometimes also the upper portion of the corolla tube) purple; lower and basal leaves often persistent; lower leaves linear to ovate, entire, toothed, lobed or pinnatifid; basal leaves pinnatifid*H. amarum* var. *badium*
- 1 Stem leaves few to numerous, at least the larger > 4 mm wide, decurrent on the stems and branches; plant a fibrous-rooted perennial or a taprooted annual.
 - 3 Ray flowers bearing a pistil and style, fertile.
 - 4 Plant a fibrous-rooted perennial; [native species, collectively widespread and common]; [section *Helenium*].
 - 5 Leaves not basally disposed, the basal leaves usually absent at flowering (if present, mostly < 2 cm long), the stem leaves not progressively reduced upward; pappus scales brownish, 0.3-1.2 mm long (usually < 1 mm long); upper cauline leaves serrate (rarely

- entire), mostly oblanceolate, usually broadest near the midpoint or beyond it, with conspicuous lateral veins apparent on the lower surface.....*H. autumnale*
- 5 Leaves basally disposed, the basal rosette usually present at flowering, the basal leaves > 4 cm long, larger than the progressively smaller stem leaves; pappus scales white-hyaline, 0.9-1.9 mm long (usually > 1 mm long); upper cauline leaves entire, lanceolate, usually broadest at or near the base and rather evenly tapered to the apex, lacking conspicuous lateral veins*H. virginicum*
- 4 Plant a tap-rooted annual or biennial; [alien species, rare waifs of wool-combing mills]; [section *Tetrodus*].
 - 6 Disc corollas 4-lobed; heads 7-11 (-14) mm high, 6-11 wide (excluding the ray flowers) *H. quadridentatum*
 - 6 Disc corollas 5-lobed; heads 4-8 mm high, 4-8 mm wide (excluding the ray flowers).
 - 7 Upper leaves entire*H. elegans* var. *elegans*
 - 7 Upper leaves serrate*H. microcephalum* var. *microcephalum*
- 3 Ray flowers lacking a pistil and style, sterile; [section *Leptopoda*].
 - 8 Disc flowers with lobes brown, red, or purple.
 - 9 Disc flowers 5-lobed and with 5 stamens *H. brevifolium*
 - 9 Disc flowers predominately 4-lobed and with 4 stamens.....*H. flexuosum*
 - 8 Disc flowers with lobes yellow.
 - 10 Pappus scales deeply lacerate [*H. drummondii*]
 - 10 Pappus scales entire or slightly lacerate.
 - 11 Midstem leaves barely decurrent on the stem, the decurrency < 0.5 cm; basal leaves often pinnatifid (less commonly merely dentate, repand, or entire), the lower portion of the leaf not contracted so as to be petiolate in form; achene pubescent on the ribs; peduncle pubescent; basal leaves (3.0-) 4.5-8.0 (-19.0) cm long, 0.3-1.1 cm wide, averaging ca. 7-10× as long as wide *H. pinnatifidum*
 - 11 Midstem leaves decurrent on the stem, the decurrency > 2 cm, and usually extending to the next leaf down; basal leaves usually repand or entire (rarely somewhat lobed or pinnatifid), the lower portion narrowed into a petiolate form which enlarges at its base to more-or-less clasp the stem; achene glabrous, or pubescent on the ribs; peduncle pubescent or glabrous; basal leaves averaging narrower or broader in shape (see below).
 - 12 Peduncle pubescent to tomentose or lanose between the uppermost leaf and the head; achene pubescent on the ribs; heads 1-4 per plant; basal leaves (2.5-) 4.0-10.5 (-18.0) cm long, (0.8-) 1.2-2.0 (-2.5) cm wide, averaging ca. 4-6× as long as wide..... *H. brevifolium*
 - 12 Peduncle glabrous or glabrate between the uppermost leaf and the head; achene glabrous; heads 1 per plant; basal leaves (3.0-) 6.5-17.0 (-25.0) cm long, (0.4-) 0.6-1.0 (-1.5) cm wide, averaging ca. 10-15× as long as wide..... *H. vernale*

* *Helenium amarum* (Rafinesque) H. Rock var. *amarum*, Bitterweed. Roadsides, overgrazed pastures, urban areas; apparently introduced from farther west. May-December. Now widespread in e. North America. Bierner (1989) discusses the taxonomy of section *Amarum*, consisting only of the 2 varieties of *H. amarum*. Var. *amarum* is widespread; var. *badium* (A. Gray ex S. Watson) Waterfall, distinguished in part by its purple disk flowers, occurs in OK, TX, and Mexico. The plant has a very bitter taste and is generally avoided by grazing animals, a point noted by Rafinesque in his original description (in 1817): "the whole plant is odoriferous and intensely bitter, it gives an abominable taste to the milk of the cows that feed on it in summer." Overgrazed areas come to be dominated by *H. amarum*. In areas where it is frequently mowed, *H. amarum* appears to evolve a genotype capable of flowering and fruiting when only a few cm tall. [= C, FNA, K, Pa, Y; = *H. tenuifolium* Nuttall - F, S; = *H. amarum* - RAB, G, W, Z; < *H. amarum* - SE, WH]

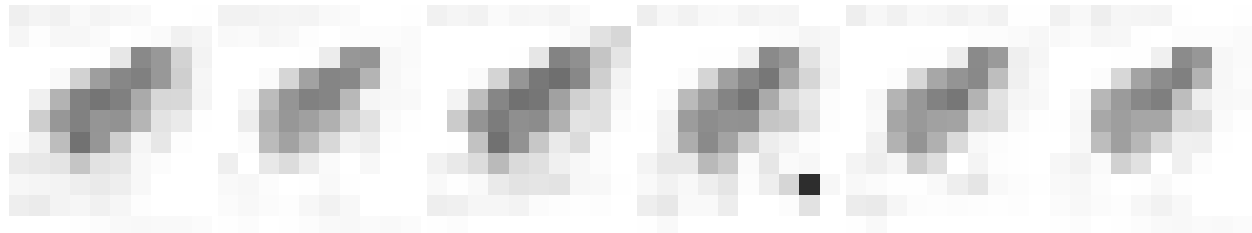
* *Helenium amarum* (Rafinesque) H. Rock var. *badium* (A. Gray ex S. Watson) Waterfall. Waste areas around wool-combing mill, perhaps only a waif; native of OK and TX. May-June. See Nesom (2004d). [= FNA, K, Y; < *H. amarum* - SE; = *H. badium* (A. Gray ex S. Watson) Greene - Z]

Helenium autumnale Linnaeus, Common Sneezeweed. Moist pastures, forests, woodlands, forest edges. September-October. QC west to BC, south to n. peninsular FL, TX, and CA. Like *H. amarum*, *H. autumnale* is bitter and unpalatable to grazing animals, becoming more abundant in pastures. [= RAB, FNA, Pa, WH; > *H. autumnale* var. *autumnale* - C, F, G, K, SE, WV; > *H. autumnale* var. *parviflorum* (Nuttall) Fernald - F, K, WV; > *H. latifolium* P. Miller - S; > *H. parviflorum* Nuttall - S; < *H. autumnale* - GW, W (also see *H. virginicum*)]

Helenium brevifolium (Nuttall) A. Wood. Seepage bogs. May-June. *H. brevifolium* has a peculiar distribution, reaching its greatest abundance on the Gulf Coastal Plain, from Panhandle FL west to e. LA, and occurring at widely scattered disjunct sites in c. and n. AL, wc. GA, c. and w. NC, ec. TN (Chester, Wofford, & Kral 1997), and sw. and se. VA. [= RAB, C, FNA, G, GW, K, SE, W, WH, Z; > *H. brevifolium* - F, S; > *H. curtisii* A. Gray - F, S]

Helenium drummondii H. Rock, Fringed Sneezeweed. Ditches. MS west to TX. Reported for e, LA and MS (Kartesz 2010). [= FNA, K2, SE]

* *Helenium elegans* A.P. de Candolle var. *elegans*. Waste areas around wool-combing mill, perhaps only a waif; native of LA, OK, and TX. May. See Nesom (2004d). [= FNA, K, Z]



Helenium flexuosum Rafinesque, Southern Sneezweed. Moist pastures, moist forests, riverbanks. May-August. S. ME west to MN, south to c. peninsular FL and TX. [= RAB, C, FNA, G, GW, K, Pa, SE, W, WH, WV, Z; > *H. nudiflorum* Nuttall – F, S; > *H. polyphyllum* Small – S]

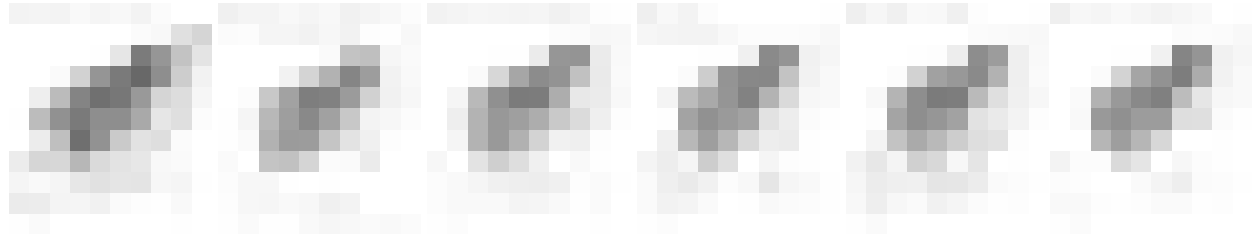
* ***Helenium microcephalum*** A.P. de Candolle var. ***microcephalum***. Waste areas around wool-combing mills, perhaps only a waif; native of OK, TX, NM, and CO. May-July. See Nesom (2004d). [= FNA, K, Z]

Helenium pinnatifidum (Nuttall) Rydberg. Wet savannas and adjacent ditches. April-May. A Southeastern Coastal Plain endemic: se. NC south to s. FL, west to Panhandle FL, sw. GA, and s. AL. [= RAB, FNA, GW, K, SE, WH, Z; = *H. vernale* – S, misapplied]

Helenium quadridentatum Labill. Moist soils of pond edges, streambanks, and ditches. AL west to TX, south to MX and Central America; Cuba. The occurrence in SC reported by Rydberg (1915), Small (1933), and Kartesz (1999) is likely an introduction. [= FNA, K, S, SE, Z]

Helenium vernale Walter. Wet savannas and adjacent ditches. April-May. A Southeastern Coastal Plain endemic: se. NC south to ne. FL, Panhandle FL, and west to e. LA. [= RAB, FNA, GW, K, SE, WH, Z; = *Helenium helenium* (Nuttall) Small – S]

Helenium virginicum S.F. Blake, Virginia Sneezweed. Seasonal sinkhole ponds and clearings where such ponds once occurred. July-September. *H. virginicum* is bimodally endemic in VA (Augusta and Rockingham counties, VA, where a series of sinkhole ponds (dolines) on acid colluvium support numerous Coastal Plain disjuncts) and MO (Ozarkian highlands). See Knox (1987) for a comparison of this narrow endemic and *H. autumnale*. Knox (1997) presents a study of the demography and habitat of *H. virginicum*. [= C, F, FNA, G, K, SE; < *H. autumnale* – GW, W]



***Helianthus* Linnaeus 1753 (Sunflower)**

A genus of about 50 species, herbs, of North America. References: Schilling in FNA (2006c); Heiser *et al.* (1969); Cronquist (1980)=SE; Schilling *et al.* (1998). Key adapted from FNA, SE, RAB, and Heiser *et al.* (1969).

- 1 Leaves basally disposed, the plants scapose to subscapose, the stem leaves relatively few (with 2-8 nodes below the inflorescence), those on the upper stem opposite or alternate, strongly reduced upward in size as compared to the persistent basal leaves; [section *Atrorubentes*] **Key A**
- 1 Leaves cauline, plants leafy the length of the stem, the stem leaves many (with 10 or more nodes below the inflorescence), basal leaves lacking (at least at anthesis).
 - 2 Plant a tap-rooted annual (rarely surviving a second year) **Key B**
 - 2 Plant a perennial from crown buds or rhizomes, the roots sometimes tuberous-thickened; [section *Atrorubentes*].
 - 3 Disk flowers red or purple (at least in part) **Key C**
 - 3 Disk flowers yellow **Key D**

Key A – sunflowers with basally disposed leaves

- 1 Disk flowers yellow.
 - 2 Basal leaves 13-30 cm long, 0.7-2.0 cm wide; leaves 10-20× as long as wide, glabrous ***H. longifolius***
 - 2 Basal leaves 6-15 cm long, 2-8 cm wide; leaves 1.5-5× as long as wide, scabrous or hirsute (rarely glabrous) ***H. occidentalis ssp. occidentalis***
- 1 Disk flowers red or purple (at least in part).
 - 3 Basal leaves 6-20 cm long; lower several pairs of stem leaves up to 1/2 as long and wide as the basal leaves.
 - 4 Trichomes on the leaf abaxial midrib > 1 mm long; lower stem with a few pairs of leaves (< 8 nodes below the capitulescence), these strongly reduced upward; leaf blades (1.3-) 1.7-2.5 (-3)× as long as wide; petiole often > 1/3 as long as the blade, broadly winged toward the blade; plants to 2 m tall; nonflowering stems usually absent; [widespread in our area] ***H. atrorubens***
 - 4 Trichomes on the leaf abaxial midrib < 1 mm long; lower stem leafy, often to above the middle (> 8 nodes below the capitulescence); leaf blades 1-1.7 (-2)× as long as wide; petiole usually < 1/3 as long as the blade, narrowly winged toward the blade; plants to 3 m tall; nonflowering stems usually present; [west of our area] ***H. silphioides***
 - 3 Basal leaves 4-15 cm long; lower several pairs of stem leaves often < 1/2 as long and wide as the basal leaves.
 - 5 Basal leaves (1.6-) 2-5× as long as wide; ray flowers present, typically 1.5-3.5 cm long; [of wet savannas and bogs] ***H. heterophyllum***
 - 5 Basal leaves 1-1.5× as long as wide; ray flowers none, or present but < 1 cm long; [of dry savannas and sandhills] ***H. radula***

Key B – annual sunflowers

- 1 Disk flowers yellow.

- 2 Leaves ovate, 10-40 cm long, 5-25 cm wide, toothed, the base often cordate or subcordate; disc corollas 5-8 mm long; stems 10-30 dm tall; [section *Helianthus*] *H. annuus*
- 2 Leaves 5-10 cm long, 0.2-1.0 cm wide, entire or nearly so, the base cuneate; disc corollas 2.8-3.5 mm long; stems 4-10 dm tall; [section *Porteri*]..... *H. porteri*
- 1 Disk flowers red or purple (at least in part).
 - 3 Leaves, stems and phyllaries densely covered with soft, silvery-white pubescence; [section *Helianthus*] *H. argophyllus*
 - 3 Leaves, stems, and phyllaries nearly glabrous to scabrous or hirsute.
 - 4 Style branches yellow; [section *Agrestes*]..... *H. agrestis*
 - 4 Style branches red; [section *Helianthus*].
 - 5 Phyllaries ovate to ovate-oblong, > 4 mm wide, abruptly contracted to an acuminate tip, the margins strongly ciliate; leaves 5-25 cm wide; disk (2-) 3-30 cm wide; plants (0.5-) 1-3 m tall *H. annuus*
 - 5 Phyllaries lanceolate, gradually tapering to an acuminate tip, the margins not ciliate or weakly so; leaves 1.5-9 cm wide; disk 1-2.5 cm wide; plants 0.4- 1 (-1.5) m tall.
 - 6 Tips of the receptacular bracts in the center of the head conspicuously white-bearded; stems normally not mottled..... *H. petiolaris* var. *petiolaris*
 - 6 Tips of the receptacular bracts in the center of the head not bearded; stems normally mottled with purple.
 - 7 Peduncles 25-50 cm long; leaves usually shallowly but regularly serrate; ligules usually > 2 cm long *H. debilis* ssp. *cucumerifolius*
 - 7 Peduncles usually < 25 cm long; leaf usually deeply irregularly serrate; ligules usually < 2 cm long *H. debilis* ssp. *tardiflorus*

Key C – perennial sunflowers with leafy stems and red disk flowers

- 1 Leaf blades long and narrow, linear or lanceolate and usually > 10× as long as wide.
 - 2 Stems glabrous and glaucous; leaf margins not revolute [*H. salicifolius*]
 - 2 Stems pubescent; leaf margins often revolute.
 - 3 Plants short, < 1.5 m tall; leaves < 1 cm wide; rhizomes lacking or poorly developed *H. angustifolius*
 - 3 Plants robust, > 1.5 m tall; leaves > 1 cm wide; rhizomes well developed *H. simulans*
- 1 Leaf blades shorter and broader, lanceolate, lance-ovate, deltoid, deltoid-ovate and usually < 5× as long as wide.
 - 4 Phyllaries 1.5-3 mm broad, lanceolate *H. floridanus*
 - 4 Phyllaries 3-5 mm broad, oblong, ovate, or obovate.
 - 5 Abaxial surfaces of leaves and ligules lacking sessile glandular trichomes; leaves usually broadly ovate to orbicular and with a petiole > 1 cm long *H. silphoides*
 - 5 Abaxial surfaces of leaves and ligules with sessile glandular trichomes; leaves usually lanceolate to lance-ovate or rhombic-ovate and with a petiole usually < 1 cm long.
 - 6 Phyllaries oblong-lanceolate, apex acuminate, abaxially usually pubescent..... *H. laetiflorus*
 - 6 Phyllaries elliptical to oblong-ovate, apex acute, abaxially glabrate..... *H. pauciflorus* ssp. *pauciflorus*

Key D – perennial sunflowers with leafy stems and yellow disk flowers

- 1 Stems below the capitulescence glabrous or nearly so, sometimes glaucous.
 - 2 Leaves whorled at principal nodes, either alternate or opposite at other nodes *H. verticillatus*
 - 2 Leaves either alternate or opposite (or both), never whorled.
 - 3 Leaves grayish-green or bluish green in color, sessile, and glabrous and glaucous on the undersurface.
 - 4 Rays 10-14; leaves strumose adaxially, rough to the touch; phyllaries 3.5-4.5 mm wide *H. eggertii*
 - 4 Rays 5-10; leaves glabrous or glabrate adaxially, smooth or only slightly rough to the touch; phyllaries 2-3 mm wide *H. laevigatus*
 - 3 Leaves light to dark green, sometimes whitish abaxially, but not grayish or bluish green in color; leaves sessile or petiolate, glabrous or pubescent.
 - 5 Leaves linear-lanceolate, with only a single main vein..... *H. smithii*
 - 5 Leaves linear-lanceolate to lanceolate, lance-ovate, or ovate, triplinerved at base.
 - 6 Rays few, usually 5 or 8; heads small, the involucre 9 mm broad or less.
 - 7 Leaves abaxially whitish in color and glabrous and glaucous, lacking sessile glandular trichomes ("resin dots") *H. glaucophyllus*
 - 7 Leaves abaxially greenish in color, usually tomentulose (sometimes glabrate), with abundant sessile glandular trichomes *H. microcephalus*
 - 6 Rays usually 10 or more in larger heads; heads larger, the involucre usually > 9 mm broad.
 - 8 Leaves sessile, rounded to cordate at base, and trinerved, with the 2 lateral veins diverging from the midrib at the very base of the leaf *H. divaricatus*
 - 8 Leaves sessile to petiolate, but narrowing gradually to base and triplinerved, the 2 lateral veins diverging from the midrib above the base of the blade.
 - 9 Anther appendages yellow.
 - 10 Leaf blade lanceolate to lance-ovate, sessile to petiolate but the petiole usually < ¼ as long as the blade; phyllaries not conspicuously graduated and imbricate, usually loose and spreading *H. grosseserratus*
 - 10 Leaf blade ovate to elliptic, with a distinct petiole usually > 2 cm long and ½ as long as blade or longer; phyllaries conspicuously graduated and imbricate, usually appressed, not exceeding disk *H. occidentalis* ssp. *occidentalis*
 - 9 Anther appendages dark or reddish-brown.
 - 11 Plants producing abundant tubers; leaves sessile, the petioles < 1 cm long; [endemic to the Piedmont of NC and SC] ... *H. schweinitzii*

- 11 Plants rhizomatous, but not producing tubers; leaves petiolate, the petioles 1-5 cm long; [collectively widespread in our area].
 - 12 Phyllaries equal to or slightly exceeding disk, apex acute; leaves moderately serrate to entire, with a petiole 1-3 cm long, and abaxially with usually abundant subsessile glandular trichomes ("resin dots").....*H. strumosus*
 - 12 Longer phyllaries usually exceeding disk by ½ their length or more, apex acuminate; larger leaves moderately to conspicuously serrate, with a petiole 2-5 cm long, and abaxially with usually relatively few subsessile glandular trichomes.....*H. decapetalus*
- 1 Stems pubescent throughout, not glaucous.
 - 13 Leaves sessile and cordate, mostly or all opposite.....*H. mollis*
 - 13 Leaves petiolate or sessile, but not cordate, and alternate or opposite.
 - 14 Phyllaries attenuate, conspicuously exceeding the disk in length and reflexed, apically with numerous subsessile glandular trichomes ("resin dots"); leaf bases often convex, the basically ovate or lance-ovate blade joined to a broadly winged and gradually narrowed petiole*H. resinosus*
 - 14 Phyllaries acute to attenuate, but not reflexed, subsessile glandular trichomes present or absent; leaf bases usually attenuate to truncate or rounded, the blade lance-linear or lanceolate, or if ovate or lance-ovate either sessile or with a petiole that is at most narrowly winged.
 - 15 Leaves conduplicate and entire, usually with only a single prominent main vein; inflorescence when well developed spiciform or racemose*H. maximilianii*
 - 15 Leaves not conduplicate, entire or serrate, triplinerved (with a prominent lateral pair of veins near the base); inflorescence not spiciform or racemose.
 - 16 Phyllaries conspicuously graduated and imbricate, usually appressed.
 - 17 Leaf blades lanceolate to ovate, petiole 1-5 cm long and usually < ½ as long as blade; anther appendages with dark pigment; cypselas 4-5 mm, usually sterile.....*H. laetiflorus*
 - 17 Leaf blades ovate to elliptic, petiole distinct, > 2 cm and usually > ½ as long as the blade; anther appendages yellow; cypselas 3-4 mm long, fertile*H. occidentalis ssp. occidentalis*
 - 16 Phyllaries not conspicuously graduated and imbricate, usually loose or spreading.
 - 18 Leaves with a prominent petiole > 2 cm long, blades lance-ovate to ovate and > 5 cm broad; cypselas 5-7 mm long; tubers produced late in growing season*H. tuberosus*
 - 18 Leaves sessile or with a short petiole usually < 2 cm long; blades linear to lanceolate, < 4.5 cm broad; cypselas 3-5 cm long; tubers present or absent.
 - 19 Leaves truncate to broadly rounded at base, shortly but distinctly petiolate*H. hirsutus*
 - 19 Leaves cuneate, gradually narrowing to base, sessile to petiolate.
 - 20 Ligules lacking subsessile glandular trichomes; leaves not strongly revolute.....*H. giganteus*
 - 20 Ligules abaxially with subsessile glandular trichomes ("resin dots"); leaves usually revolute.
 - 21 Heads relatively small, the discs usually < 15 mm across; tubers present*H. schweinitzii*
 - 21 Heads larger, the discs (at least the larger) > 15 mm across; tubers absent.
 - 22 Leaves conspicuously undulate; ovate to elliptical to lanceolate, occasionally linear (if so, usually < 10 cm long), usually < 5× as long as wide; heads 1-6 per plant; outer phyllaries acute to obtuse.....*H. floridanus*
 - 22 Leaves not conspicuously undulate; linear to lanceolate, > 5× as long as broad (and also 8-16 cm long); heads 3-16 per plant; outer phyllaries acuminate to acute.
 - 23 Plants short, < 1.5 m tall; leaves < 1 cm wide; rhizomes lacking or poorly developed.....*H. angustifolius*
 - 23 Plants robust, > 1.5 m tall; leaves > 1 cm wide; rhizomes well developed.....*H. simulans*

Helianthus agrestis Pollard, Southeastern Sunflower. Mucky areas in pine flatwoods. August-December. S. GA south to s. FL. [= FNA, GW, K, S, SE, WH]

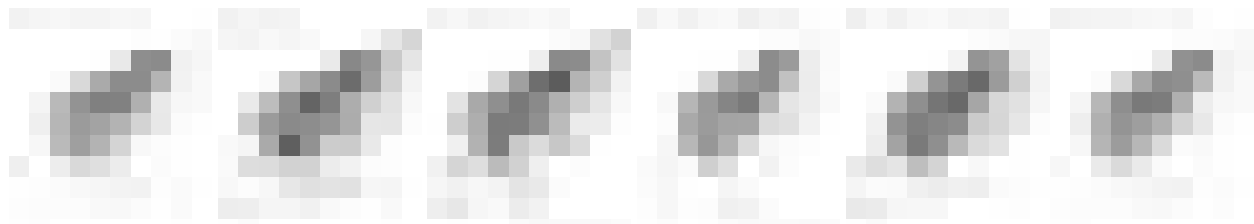
Helianthus angustifolius Linnaeus, Narrowleaf Sunflower. Savannas, ditches, marshes, other wet habitats. (July-) September-October (-frost). Primarily Coastal Plain, from Long Island, NY south to c. peninsular FL and west to TX, irregularly inland to OH, IN, and MO. This plant is very showy when in flower on roadsides, especially in October. [= RAB, C, FNA, G, GW, K, Pa, S, SE, W, WH, WV; > *H. angustifolius* var. *angustifolius* – F; > *H. angustifolius* var. *planifolius* Fernald – F]

* *Helianthus annuus* Linnaeus, Common Sunflower. Disturbed areas, often cultivated in gardens, sometimes cultivated in fields; native of the Plains states. June-October. This is the common cultivated sunflower grown for its flowers, seeds, and oil. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WH, WV]

* *Helianthus argophyllus* Torrey & A. Gray, Silverleaf Sunflower. Dunes and disturbed sandy soil on a barrier island; native of TX. July-October. Native to s. TX. Heiser *et al.* (1969) noted a collection from NC, but stated their uncertainty as to its establishment. *H. argophyllus* is well-established near Captain Charlie's on Bald Head Island, Brunswick County, where it has apparently persisted and spread over the last 30 years (at least). [= F, FNA, K, S, SE, WH]

Helianthus atrorubens Linnaeus, Appalachian Sunflower. Dry soils of rocky, sandy, or clayey woodlands and roadbanks. Late July-October. N. VA west to w. TN, and south to c. GA, Panhandle FL, AL, and se. LA. Related to the Ozarkean *H. silphoides* Nuttall. [= RAB, C, FNA, K, SE, W; > *H. atrorubens* var. *alsodes* Fernald – F; > *H. atrorubens* var. *atorubens* – F; = *H. atrorubens* var. *atorubens* – G; < *H. atrorubens* – S (also see *H. silphoides* Nuttall)]

Helianthus carnosus Small, Flatwoods Sunflower. Wet flatwoods, wet prairies; rare. September-November. Endemic to ne. FL (including Clay County in our area). [= FNA, K, S, SE, WH] {not yet keyed}



Helianthus debilis* Nuttall ssp. *cucumerifolius (Torrey & A. Gray) Heiser, Cucumber-leaf Sunflower. Sandy soils of fields and roadsides. May-August. Sw. GA and FL west to c. TX. [= FNA, K; = *H. debilis* var. *cucumerifolius* (Torrey & A. Gray) A. Gray – RAB, C, F, WV; = *H. cucumerifolius* Torrey & A. Gray – G, S; = *H. debilis* ssp. *cucumerifolius* (Torrey & A. Gray) Heiser var. *cucumerifolius* (Torrey & A. Gray) A. Gray – SE; < *H. debilis* ssp. *cucumerifolius* – WH]

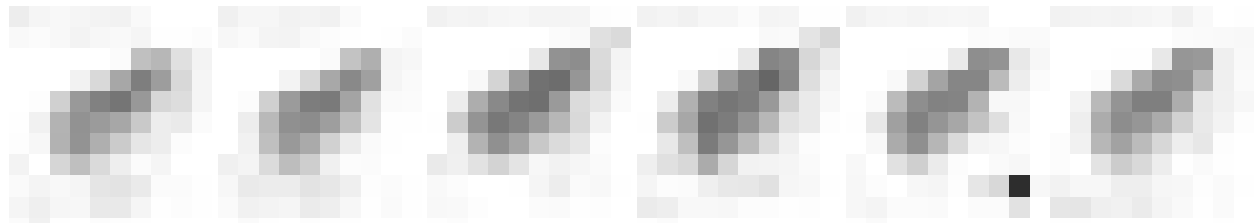
Helianthus debilis* Nuttall ssp. *tardiflorus Heiser. Sandy beaches, dry pinelands. March-September. GA, FL, AL, and MS. [= FNA, K; < *H. debilis* – S; = *H. debilis* ssp. *cucumerifolius* (Torrey & Gray) Heiser var. *tardiflorus* (Heiser) Cronquist – SE; < *H. debilis* ssp. *cucumerifolius* – WH]

Helianthus decapetalus Linnaeus, Forest Sunflower. Mesic woodlands and forests. July-October. ME and QC west to WI and IA, south to GA and MO. [= RAB, C, FNA, G, K, Pa, S, SE, W; > *H. decapetalus* – F, WV; > *H. trachelifolius* P. Miller – F, WV]

Helianthus divaricatus Linnaeus, Spreading Sunflower. Mesic to dry woodlands and forests, forest edges. June-August. ME, QC, ON, and IA south to Panhandle FL, LA, and OK. [= RAB, C, FNA, G, K, Pa, S, SE, W, WH, WV; > *H. divaricatus* var. *angustifolius* Kuntze – F; > *H. divaricatus* var. *divaricatus* – F]

Helianthus eggertii Small, Eggert's Sunflower. Limestone and diabase barrens. Sc. KY, c. TN, and n. AL; apparently disjunct in nc. SC (P. McMillan, pers. comm. 2003, specimen at CLEMS). [= FNA, K, S, SE]

Helianthus flordanus A. Gray ex Chapman, Florida Sunflower. Wet savannas and pocosin edges. September-October. A Southeastern Coastal Plain species: se. NC south to c. peninsular FL, and west to se LA. [= RAB, FNA, GW, K, S, SE, WH]



Helianthus giganteus Linnaeus, Tuberous Sunflower, Swamp Sunflower. Bog edges, moist thickets, ditches. Late July-October. NB and ME west to MN, south to n. SC, n. GA, e. and c. TN, c. KY, n. IN, n. IL, and WI. [= RAB, C, F, FNA, G, GW, K, Pa, S, SE, W, WV; > *H. giganteus* – S; > *H. alienus* E.E. Watson – S; > *H. validus* E.E. Watson – S]

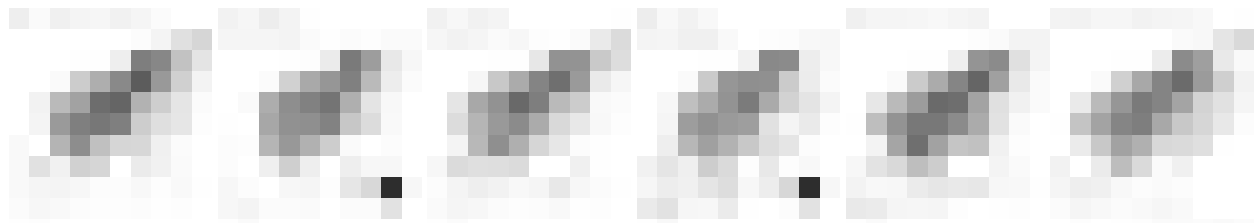
Helianthus glaucophyllus D.M. Smith, Whiteleaf Sunflower. Moist forests, woodlands, and woodland edges, at medium elevations, mostly from 1000-1500 m (but sometimes lower), generally flowering only when in a canopy gap (as caused by a tree-fall) or along banks of narrow roads. July-September. A narrow Southern Appalachian endemic: w. NC, nw. SC, and ne. TN (Chester, Wofford, & Kral 1997). First reported for SC by Hill & Horn (1997). [= RAB, FNA, K, SE, W]

* ***Helianthus grosseserratus*** Martens, Sawtooth Sunflower. Disturbed areas; introduced from farther west. The original range of this species was apparently centered in OH, IN, IL, IA, and MO, but its exact extent is obscured by its subsequent spread. Reported for NC by Matthews & Mellichamp (1989). [= C, F, FNA, G, K, Pa, W, WV; = *H. grosse-serratus* – S, SE, orthographic variant]

Helianthus heterophyllus Nuttall, Savanna Sunflower. Wet savannas, seepage bogs. August-October. A Southeastern Coastal Plain endemic: se. NC south to Panhandle FL and west to se. LA. [= RAB, FNA, GW, K, S, SE, WH]

Helianthus hirsutus Rafinesque, Hairy Sunflower. Woodlands and other sunny or semi-sunny habitats. July-October. PA and MN, south to n. FL and TX. [= RAB, C, FNA, G, K, Pa, S, SE, W, WH, WV; > *H. hirsutus* var. *hirsutus* – F; > *H. hirsutus* var. *trachyphyllus* Torrey & Gray – F; > *H. hirsutus* var. *stenophyllus* Torrey & Gray – F]

* ***Helianthus laetiflorus*** Persoon. Disturbed areas; introduced from farther west. Late July-September. Widely scattered in e. and c. North America, believed to be a derivative of the hybrid of *H. pauciflorus* Nuttall ssp. *subrhomboideus* (Rydberg) O. Spring & E. Schilling and *H. tuberosus*. [= RAB, G, Pa, S, SE, WV; = *H. ×laetiflorus* Persoon (pro sp.) – C, FNA, K; = *H. laetiflorus* var. *laetiflorus* – F]



Helianthus laevigatus Torrey & A. Gray, Shale-barren Sunflower, Smooth Sunflower. On dry, rocky or shaly soils, on roadbanks, powerline rights-of-way, open woodlands, in the Carolinas nearly limited to the Carolina Slate Belt. August-October. The primary range of *H. laevigatus* is in the mountains of c. and w. VA and e. WV, from whence it is disjunct to a few areas in the Piedmont of NC and SC, most notably the Carolina Slate Belt in Montgomery and Stanly counties, NC. [= RAB, C, F, FNA, G, K, SE, W, WV; > *H. laevigatus* – S; > *H. reindutus* (Steele) E.E. Watson – S]

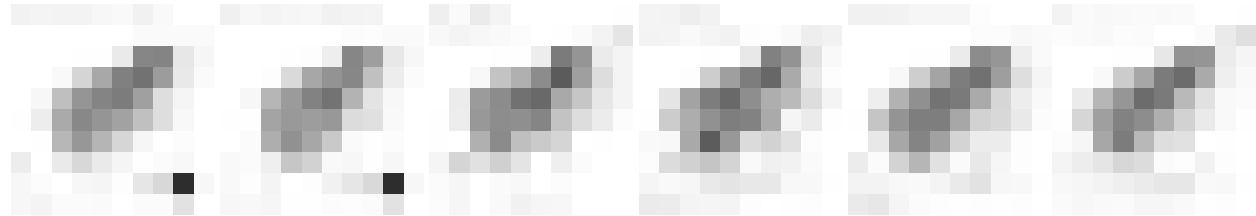
Helianthus longifolius Pursh, Longleaf Sunflower. Sandstone and granite glades and woodlands, loamy to xeric longleaf pine sandhills. August-October. This species is apparently rare, occurring in ne. AL, n. GA (introduced in sw. NC). [= RAB, FNA, K, S, SE]

* *Helianthus maximilianii* Schröder, Maximilian Sunflower. Moist roadsides and disturbed areas; introduced from farther west. September-October. MI and MB west to BC and south to TX; introduced in the East. [= C, SE, W; = *H. maximiliani* – RAB, F, FNA, G, K, Pa, S, orthographic variant]

Helianthus microcephalus Torrey & A. Gray, Small-headed Sunflower. Dry woodlands and roadbanks. July-October. NJ west to MN, south to Panhandle FL and se. LA. [= RAB, F, FNA, G, K, Pa, S, W, WH, WV; < *H. microcephalus* – C, SE]

Helianthus mollis Lamarck, Ashy Sunflower, Gray Sunflower. Calcareous prairies and barrens, disturbed places. July-September. Apparently native of the Midwest, centered in IN, IL, MO, AR, c. TN, and w. KY, its original distribution obscured by its subsequent spread. Native in nw. GA. [= RAB, C, FNA, G, K, Pa, S, SE, W; > *H. mollis* var. *cordatus* S. Watson – F; > *H. mollis* var. *mollis* – F]

Helianthus occidentalis Riddell *ssp. occidentalis*, Naked-stem Sunflower. Rocky or sandy flood-scoured riversides, dry hammocks (in FL). July-October. MD and DC west to MN, and south to w. NC, n. GA, Panhandle FL, and TX. *Ssp. occidentalis* occupies most of the range of the species. *Ssp. plantagineus* (Torrey & Gray) Shinnery occurs in sw. LA, se. TX, and AR. Var. *dowellianus* Torrey & Gray, of uncertain status (if valid, then usually treated as a variety under *ssp. occidentalis*), occurs in the Appalachian portion of the range. The species has been collected only twice in NC, the type collection of *H. dowellianus* M.A. Curtis, from "near Franklin, Macon Co.," and in 1897, near Asheville, Buncombe County ("sandy bottoms along the French Broad River near Biltmore"). GAHP reports *H. occidentalis* as a rare species in the state, from "limestone glades and barrens, rocky or cherty soils" (GAHP 2003); it is uncertain what variety is represented. [= FNA, K; > *H. occidentalis* Riddell var. *dowellianus* (M.A. Curtis) Torrey & A. Gray – C, F, SE; = *H. occidentalis* – RAB, G, S, W, WH; = *H. occidentalis* var. *occidentalis* – Pa; > *H. occidentalis* – WV; > *H. dowellianus* M.A. Curtis – WV]



* *Helianthus pauciflorus* Nuttall *ssp. pauciflorus*, Stiff Sunflower. Prairies, disturbed areas. July-September. ON and MI west to SD and SK, south to w. KY, n. MS, and TX. Reported for VA by Fernald (1950) under the name *H. laetiflorus* var. *rigidus* and for nc. GA by Jones & Coile (1988) under the name *H. rigidus*. [= FNA, K; = *H. pauciflorus* var. *pauciflorus* – C; > *H. laetiflorus* var. *rigidus* (Cassini) Fernald – F; > *H. rigidus* (Cassini) Desfontaines – S; ? *H. rigidus* var. *rigidus* – SE]

* *Helianthus petiolaris* Nuttall *ssp. petiolaris*, Plains Sunflower. Disturbed areas in sandy soil; native of the Great Plains. May-August. [= FNA, K; < *H. petiolaris* – RAB, F, G, S; = *H. petiolaris* var. *petiolaris* – C, Pa, SE]

Helianthus porteri (A. Gray) Pruski, Confederate Daisy. In shallow soils over granite on low-elevation granite domes or flatrocks. August-September. A Piedmont endemic: nw. SC south to GA and ec. AL. The species has often been treated in *Viguiera*; see Pruski (1998) and Schilling et al. (1998) for discussion of the reasons for treating this species in *Helianthus*. It is well-established at two sites in NC, on Rocky Face Mountain (Alexander County, NC) and Mitchell Mill Flatrock (Wake County, NC), where it was introduced with soil blocks of *Diamorpha smallii* as part of an ecological experiment (Mellinger 1972; McCormick & Platt 1964); it is now aggressively weedy at these sites. [= FNA, K; = *Viguiera porteri* (A. Gray) Blake – S, SE]

Helianthus radula (Pursh) Torrey & A. Gray, Roundleaf Sunflower, Rayless Sunflower. Sandhills, dryish savannas, and dry pine flatwoods. Late August-October. S. SC south to s. peninsular FL and west to se. LA. It is readily distinguishable from all other species by its rosette of orbicular to nearly round leaves, borne flat against the ground. [= RAB, FNA, GW, K, S, SE, WH]

Helianthus resinosus Small, Resinous Sunflower. Woodlands, thickets, roadsides. June-October. Nc. and w. NC south to Panhandle FL and west to MS. Listed for VA by F; documentation unknown. [= FNA, K, S, SE, W, WH; = *H. tomentosus* Michaux – RAB, F, S, misapplied]

* *Helianthus salicifolius* A. Dietrich. Reported for MD by Kartesz (1999); not in our area in FNA or Kartesz (2010). [= C, F, FNA, G, K, SE] {rejected for our area; not keyed; not mapped}

Helianthus schweinitzii Torrey & A. Gray, Schweinitz's Sunflower. Clayey soils of woodlands and roadsides, in areas formerly with post oak-blackjack oak savannas, xeric oak-pine woodlands, or "Piedmont prairies," now primarily on mowed road or powerline rights-of-way. Late August-October. Piedmont of nw. NC and nc. SC, primarily within 100 km of Charlotte, NC. Some earlier reports (as in Heiser et al. 1969) of occurrences in se. NC, e. SC, and c. SC are based on misidentifications. See Matthews, Barden, & Matthews (1997) for an informative discussion about this species. [= RAB, FNA, K, S, SE]



Helianthus silphioides Nuttall. Woodland edges. August-October. S. KY, s. IL, and s. MO south to AL, MS, LA, and e. OK. [= C, F, FNA, K, SE; = *H. atrorubens* Linnaeus var. *pubescens* Kuntze – G; < *H. atrorubens* – S]

Helianthus simulans E. Watson. Wet soils, ditches, roadsides. October-November. Native from SC south to c. peninsular FL, FL Panhandle, and west to LA; now spread more widely by horticultural use. [= FNA, GW, K, S, SE, WH]

Helianthus smithii Heiser, Smith's Sunflower. Dry forests and woodlands. August-September. Known from n. GA, e. AL, and se. TN. It has small heads (like *H. microcephalus*, *H. laevigatus*, *H. schweinitzii*), the leaves narrowly lanceolate and subsessile (like *H. schweinitzii* or *H. laevigatus*), the leaves resin-dotted below (like *H. microcephalus*), but nearly glabrous. It may be a hybrid derivative of *H. microcephalus* and *H. strumosus*. [= FNA, K; < *H. microcephalus* – C, SE]

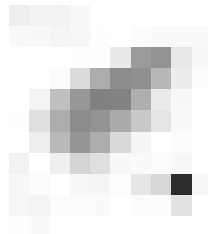
Helianthus species 1. Endemic to the Sequatchie Valley of Maion County, TN, and Jackson County, AL, known from 3 current populations. It is allied to *H. microcephalus* but with pubescence similar to *H. mollis* (D. Estes, pers. comm., 2012). {not yet keyed}

Helianthus strumosus Linnaeus, Roughleaf Sunflower. Woodlands and roadsides. Late July-September. ME, MN, and KA south to ne. FL, Panhandle FL, and TX. [= RAB, C, F, FNA, G, K, Pa, SE, W, WH, WV; > *H. strumosus* – S; > *H. montanus* E.E. Watson – S; > *H. saxicolus* – S]

* ***Helianthus tuberosus*** Linnaeus, Jerusalem Artichoke. Native in rich bottomlands and along streams, disturbed areas, cultivated in gardens for the edible tubers; native of farther west. July-October. [= RAB, C, FNA, K, Pa, S, SE, W, WH; > *H. tuberosus* var. *tuberosus* – F, G]



Helianthus verticillatus Small, Whorled Sunflower. Seasonally wet to moist calcareous prairies. August-October. Nw. GA, ne. AL, and w. TN. This taxon is a species, not a hybrid; its morphological characteristics alone (with its unique whorled leaves) make hybrid status implausible. See Matthews et al. (2002) for additional information. [= FNA, S; = *H. ×verticillatus* E.E. Watson (pro sp.) – K; = "a hybrid of *H. angustifolius* with either *H. eggertii* or *H. grosseserratus*" – C, SE]



Heliomeris Nuttall 1848 (Golden-eye)

A genus of 4-5 species, annuals and perennials, of sw. United States and Mexico. References: Schilling in FNA (2006c).

* ***Heliomeris multiflora*** (Nuttall) Blake var. *multiflora*, Golden-eye. Waste areas around wool-combing mill, perhaps only a waif; native of western United States and Mexico. May. [= FNA, K; = *Viguiera multiflora* (Nuttall) Blake]



Heliopsis Persoon 1807 (Sunflower-everlasting, Oxeye)

A genus of about 18 species, herbs, of America. References: Smith in FNA (2006c); Fisher (1957)=Z; Cronquist (1980)=SE. Key adapted in part from Z.

- 1 Plants 3-8 dm tall; larger leaves on a plant generally 3-8 cm long; heads 1 (-3) per plant; rays 6-10 (-13) per head; rays 1-2 (-2.4) cm long; [of the Coastal Plain].....**H. helianthoides** var. **gracilis**
- 1 Plants (4-) 8-15 dm tall; larger leaves on a plant generally 7-15 cm long; heads (1-) 3-8 per plant; rays (8-) 10-16 per head; rays (1.5-) 2-4 cm long; [widespread in our area, rare in the Coastal Plain].
 - 2 Leaves smooth on both sides (or sometimes sparsely pubescent below and slightly scabrous above); leaves (4.0-) 4.5-6.0 (-12) cm wide; stem glabrous and glaucous below, slightly pubescent above, the hairs generally all slender and ascending**H. helianthoides** var. **helianthoides**
 - 2 Leaves moderately to densely scabrous on both sides; leaves 2.0-3.5 (-5.0) cm wide; stem also scabrous with short, broad-based hairs**H. helianthoides** var. **scabra**

Heliopsis helianthoides (Linnaeus) Sweet var. **gracilis** (Nuttall) Gandhi & Thomas, Smooth Oxeye, Pineywoods Oxeye, Coastal Plain Sunflower-everlasting, Coastal Plain Oxeye. Moist calcareous forests. April-July; May-July. A Southeastern Coastal Plain endemic: se. SC (Berkeley, Dorchester, and Charleston counties) south to GA (Jones & Coile 1988) and Panhandle FL, and west to LA (Thomas & Allen 1996). [= K, WH; = *H. minor* (Hooker) C. Mohr - S; = *H. gracilis* Nuttall - FNA, SE, Z]

Heliopsis helianthoides (Linnaeus) Sweet var. **helianthoides**, Eastern Sunflower-everlasting, Eastern Oxeye. Forests, woodlands, woodland borders. May-October. VT, ON, and WI south to GA and LA. [= C, G, FNA, K, Pa, SE; < *H. helianthoides* - RAB, W; > *H. helianthoides* var. *helianthoides* - F; > *H. helianthoides* var. *solidaginoides* (Linnaeus) Fernald - F; = *H. helianthoides* - S, WV; = *H. helianthoides* ssp. *helianthoides* - Z]

Heliopsis helianthoides (Linnaeus) Sweet var. **scabra** (Dunal) Fernald, Western Sunflower-everlasting, Rough Oxeye, Western Oxeye. Dry, open forests and woodlands, woodland borders. May-October. NL (Newfoundland) and SK south to VA, WV, KY, GA, LA, TX, and NM. FNA mentions frequent intergradation, and some plants in our area best considered var. *scabra* do not seem to be "pure." [= C, F, FNA, G, K, SE; = *H. scabra* Dunal - S, WV; = *H. helianthoides* ssp. *scabra* (Dunal) Fisher - Z]



Helminthotheca Zinn 1757 (Oxtongue)

A genus of 4 species, herbs, of Europe. References: Strother in FNA (2006a).

* **Helminthotheca echioides** (Linnaeus) Holub, Bristly Oxtongue. Disturbed areas; native of Europe. July-October. [= FNA, Pa; = *Picris echioides* Linnaeus - C, F, G, K, SE]



Heterotheca Cassini 1817 (Camphorweed, Golden-aster)

A genus of about 28 species, herbs, of North America. References: Semple in FNA (2006b); Wagenknecht (1960)=Z; Semple (1996)=Y; Gandhi & Thomas (1989)=X; Semple (2004)= Q; Cronquist (1980)=SE; Semple (1983). Key adapted in part from Z and X. [also see *Chrysopsis* and *Pityopsis*]

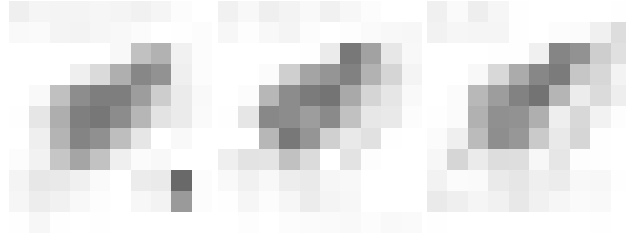
- 1 Ray flowers with pappus; perennial, from creeping rhizomes; upper and lower leaves cuneate to a sessile base**H. camporum** var. **glandulissimum**
- 1 Ray flowers without pappus; annual or biennial, taprooted; upper leaves rounded to clasping at the sessile base, lower leaves (deciduous by late in the season) petiolate.
 - 2 Plants erect, 0.5-2 m tall; leaves hirsute-pilose on both sides or scabrous above; phyllaries moderately hirsute and glandular on the back; [of a variety of weedy habitats, mainly inland]**H. latifolia** var. **latifolia**

- 2 Plants erect or decumbent, 0.3-1 m tall; leaves scabrous on both sides or only beneath; phyllaries densely hirsute and glandular on the back; [of coastal dunes].....*H. subaxillaris*

* *Heterotheca camporum* (Greene) Shinnars var. *glandulissima* Semple, Nashville Camphorweed. Roadsides, disturbed areas. [= FNA; = *H. camporum* var. *glandulissimum* – K, Y, orthographic variant; = *Chrysopsis camporum* Greene var. *glandulissima* (Semple) Cronquist – C; < *Chrysopsis camporum* – F, SE, W; < *Chrysopsis villosa* (Pursh) Nuttall var. *camporum* (Greene) Cronquist – G]

* *Heterotheca latifolia* Buckley var. *latifolia*, Common Camphorweed. Roadsides, disturbed areas; native of the sc. United States and adjacent Mexico. August-October. [= Y, Z; = *H. subaxillaris* (Lamarck) Britton & Rusby var. *latifolia* (Buckley) Gandhi & Thomas – X; < *H. subaxillaris* – RAB, C, F, G, K, Pa, S, SE, W, WH; = *H. subaxillaris* (Lamarck) Britton & Rusby ssp. *latifolia* (Buckley) Semple – FNA, Q]

Heterotheca subaxillaris (Lamarck) Britton & Rusby, Dune Camphorweed. Coastal dunes and sand-flats. July-October (-December). NJ south to FL, west to TX and Mexico, along the coast. This taxon is apparently native in our area, and is a conspicuous component of the flora of ocean dunes. [= Y; = *H. subaxillaris* (Lamarck) Britton & Rusby var. *subaxillaris* – X, Z; < *H. subaxillaris* – RAB, C, F, G, K, Pa, S, SE, WH (also see *H. latifolia*); = *H. subaxillaris* ssp. *subaxillaris* – FNA, Q]



***Hieracium* Linnaeus 1753 (Hawkweed, King-devil)**

A genus of 250-1000 species, herbs, primarily temperate. *Hieracium* is a complicated genus, with many apomictic races sometimes recognized as taxa. Sometimes separated into *Hieracium* and *Pilosella*, an approach increasingly supported by molecular and morphological evidence, and becoming the dominant approach in Europe (Bräutigam & Greuter (2007). References: Strother in FNA (2006a); Cronquist (1980)=SE. Key adapted from C.

Identification notes: Many of our species hybridize, and some of the species listed above are apparently hybrid derivatives. I prefer to treat taxa such as *H. marianum* as species (even if hybridization-derived) because they regularly occur independently of the parental taxa. Other hybrids of native species known in our area include: *H. gronovii* × *H. paniculatum* [*H. ×alleghaniense* Britton (pro sp.)], *H. gronovii* × *H. venosum*, *H. paniculatum* × *H. scabrum*, *H. paniculatum* × *H. venosum* [*H. ×scribneri* Small (pro sp.); *H. scribneri* – K], *H. scabrum* × *H. venosum*.

- 1 Leaves primarily cauline, the largest leaves definitely on the stem, basal leaves usually absent; [*Hieracium* s.s.].
 - 2 Florets 8-20 (-30) per head; leaves nearly glabrous, or with a few long hairs on the lower surface; upper stem glabrous.....*H. paniculatum*
 - 2 Florets 30-110 per head; leaves setose, with long hairs on the upper and lower surfaces; upper stem stipitate-glandular, stellate-pubescent, or glabrous.
 - 3 Leaves with entire margins, rounded to obtuse at the tip; [widespread in our area]*H. scabrum*
 - 3 Leaves with toothed to lacinate margins, acute to obtuse at the tip; [disjunct at high elevations in WV].....*H. umbellatum*
- 1 Leaves primarily basal, the largest leaves basal, leaves in some species extending onto the lower portion of the stem.
 - 4 Plants stoloniferous; [aliens of weedy habitats, especially pastures, roadsides, and lawns]; [*Pilosella*].
 - 5 Heads 1 (-3) per plant*H. pilosella*
 - 5 Heads (1-) 2-many per plant.
 - 6 Heads (1-) 2-6 per plant, leaves nearly glabrous on the upper surface.....*H. flagellare*
 - 6 Heads (3-) 5-50 per plant; leaves nearly glabrous or distinctly long-pubescent on the upper surface.
 - 7 Flowers deep orange*H. aurantiacum*
 - 7 Flowers yellow.
 - 8 Leaves not glaucous; leaves hairy on the upper surface.....*H. caespitosum*
 - 8 Leaves glaucous; leaves glabrous (or nearly so) on the upper surface*H. floribundum*
 - 4 Plants not stoloniferous; [primarily natives (except *H. caespitosum* and *H. piloselloides*), of various (mostly dry) habitats].
 - 9 Cypselas 1.5-2 mm long, truncate at the tip; basal leaves mostly 5-12× as long as wide (the petiole included); well-developed basal leaves rarely over 3 cm wide; [alien]; [*Pilosella*].
 - 10 Leaves and stem not glaucous; leaves hairy on the upper surface.....*H. caespitosum*
 - 10 Leaves and stem glaucous; leaves sparsely hairy to nearly glabrous on the upper surface*H. piloselloides*
 - 9 Cypselas 2-4 mm long, usually distinctly narrowed to the tip (except *H. scabrum*); basal leaves mostly 1.5-5× as long as wide (the petiole included); well-developed basal leaves often over 3 cm wide; [native]; [*Hieracium* s.s.].
 - 11 Leaves purple-veined (when fresh).
 - 12 Lower stem strongly pilose; leaves weakly purple-veined*H. marianum*
 - 12 Lower stem glabrous or nearly so; leaves strongly purple-veined.....*H. venosum*
 - 11 Leaves not purple-veined.
 - 13 Inflorescence a narrow panicle.
 - 14 Cypselas truncate, broadest at the tip; flowers 40-100 per head.....*H. scabrum*
 - 14 Cypselas narrowed to the tip; flowers 20-40 per head
 - 15 Hairs of the lower stem 1-4 mm long; inflorescence 2-4× as long as wide; [widespread in our area]*H. gronovii*
 - 15 Hairs of the lower stem 6-15 mm long; inflorescence 4-7× as long as wide; [of KY and TN westward]*H. longipilum*

- 13 Inflorescence corymbiform.
- 16 Cypselas 2-3 mm long, truncate, broadest at the tip; flowers 40-100 per head *H. scabrum*
- 16 Cypselas 2.2-5 mm long, at least the longer achenes narrowed to the tip; flowers 15-40 per head.
- 17 Stem with several well-developed leaves slightly smaller than the basal leaves; inflorescence corymbiform or tending toward paniculate.
- 18 Involucre mostly 6-9 mm high; inflorescence generally elongate and cylindric (appearing corymbiform in depauperate individuals); achenes 2.5-4 mm long; corollas 8-9 mm long..... *H. gronovii*
- 18 Involucre mostly 8-11 mm high; inflorescence broadly corymbiform; achenes 3.5-5 mm long; corollas 10-13 mm long *H. megacephalon*
- 17 Stem leafless, or with only a few leaves distinctly smaller than the basal leaves; inflorescence strongly corymbiform.
- 19 Involucre glabrous or with short stipitate glands, but lacking long setae (either gland-tipped or glandless) *H. marianum*
- 19 Involucre with long setae (either gland-tipped or glandless).
- 20 Involucral setae gland-tipped; [of the Coastal Plain] *H. megacephalon*
- 20 Involucral setae not gland-tipped (but with shorter gland-tipped hairs); [of the Mountains (and Piedmont?) of VA] *H. trillii*

* *Hieracium aurantiacum* Linnaeus, Orange Hawkweed, Devil's-paintbrush, Orange King-devil, Fox-and-cubs. Pastures, roadsides; native of Europe. May-August. [= RAB, F, FNA, G, K, Pa, SE, W, WH, WV; = *Pilosella aurantiaca* (Linnaeus) F. Schultz & Schultz 'Bipontinus']

* *Hieracium caespitosum* Dumortier, Yellow King-devil, Yellow Fox-and-cubs. Pastures, fields, roadsides, grassy balds; native of Europe. May-October. [= C, FNA, K, Pa, SE, W; ? *H. pratense* Tausch – RAB, F, G, WV; = *Pilosella caespitosa* (Dumortier) Sell & C. West]

* *Hieracium flagellare* Willdenow, Whiplash Hawkweed. Roadsides; native of Europe. May-October. Considered to derive from hybridization between *H. caespitosum* Dumortier and *H. pilosella* Linnaeus. [= C, F, FNA, Pa, SE; = *H. xflagellare* Willdenow (pro sp.) var. *flagellare* – K; = *Pilosella flagellaris* (Willdenow) Sell & C. West]

* *Hieracium floribundum* Wimmer & Grabowski, Glaucous Hawkweed. Roadsides, pastures; native of Europe. Considered to derive from hybridization between *H. caespitosum* Dumortier and *H. lactucella* Wallroth. [= C, F, G; = *H. xfloribundum* Wimmer & Grabowski (pro sp.) – K; = *Pilosella floribunda* (Wimmer & Grabowski) Arvet-Touvet]

Hieracium gronovii Linnaeus, Beaked Hawkweed. Sandhills, dry forests, woodland margins, roadsides. July-November. MA west to s. ON and KS, south to c. peninsular FL and TX. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WH, WV]

* *Hieracium lachenalii* K.C. Gmelin, European Hawkweed. Pd (DE), Mt (WV): disturbed areas; uncommon, native of Europe. June-September. [= C, K, Pa; ? *H. vulgatum* Fr. – FNA, F, G] {not yet keyed}

Hieracium longipilum Torrey. Dry forests, woodlands. ON, OH, KY, and TN west to MN, NE, KS, OK, and TX. [= C, F, FNA, G, K, SE]

Hieracium marianum Willdenow, Maryland Hawkweed. Dry forests, woodland margins, roadsides. May-November. NH west to OH, south to FL and MS. Considered to derive from hybridization between *H. gronovii* Linnaeus and *H. venosum* Linnaeus. There is apparently no definite report from VA. [= F, K, S, WV; = *H. xmarianum* Willdenow (pro sp.) – RAB, C, SE]

Hieracium megacephalon Nash, Bigheaded Hawkweed. Dry sandy soils of pinelands and hammocks. S. GA south to s. FL. [= K, WH; = *Hieracium megacephalum* Nash – FNA, SE, orthographic variant; > *H. megacephalon* – S; > *H. argyraeum* Small – S]

Hieracium paniculatum Linnaeus, Leafy Hawkweed. Dry to mesic forests, especially along dirt roads. July-October. NS and QC west to MN, south to w. NC, n. GA, and OH. The leafy stem and lack of basal leaves of *H. paniculatum* readily distinguish it from our other species of *Hieracium*. In fact, it often puzzles the inexperienced botanist, who may overlook the possibility that this plant is a *Hieracium*! The milky sap and obscure teeth on the leaves are good corroborative characters. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV]

* *Hieracium pilosella* Linnaeus, Mouse-ear Hawkweed. Pastures, roadsides, disturbed areas; native of Europe. May-July. [= RAB, C, FNA, G, Pa, SE, W; > *H. pilosella* var. *pilosella* – F, K, WV; = *Pilosella officinarum* F. Schultz & Schultz 'Bipontinus']

* *Hieracium piloselloides* Villars, Glaucous King-devil. Fields, pastures, roadsides, native of Europe. May-September. [= C, FNA, Pa; ? *H. florentinum* Allioni – RAB, G, SE, W; > *H. florentinum* – F; > *H. piloselloides* – K; > *Hieracium praealtum* (Villars) ex Gochnat var. *decipiens* W.D.J. Koch – F, K; = *Pilosella piloselloides* (Villars) Soják]

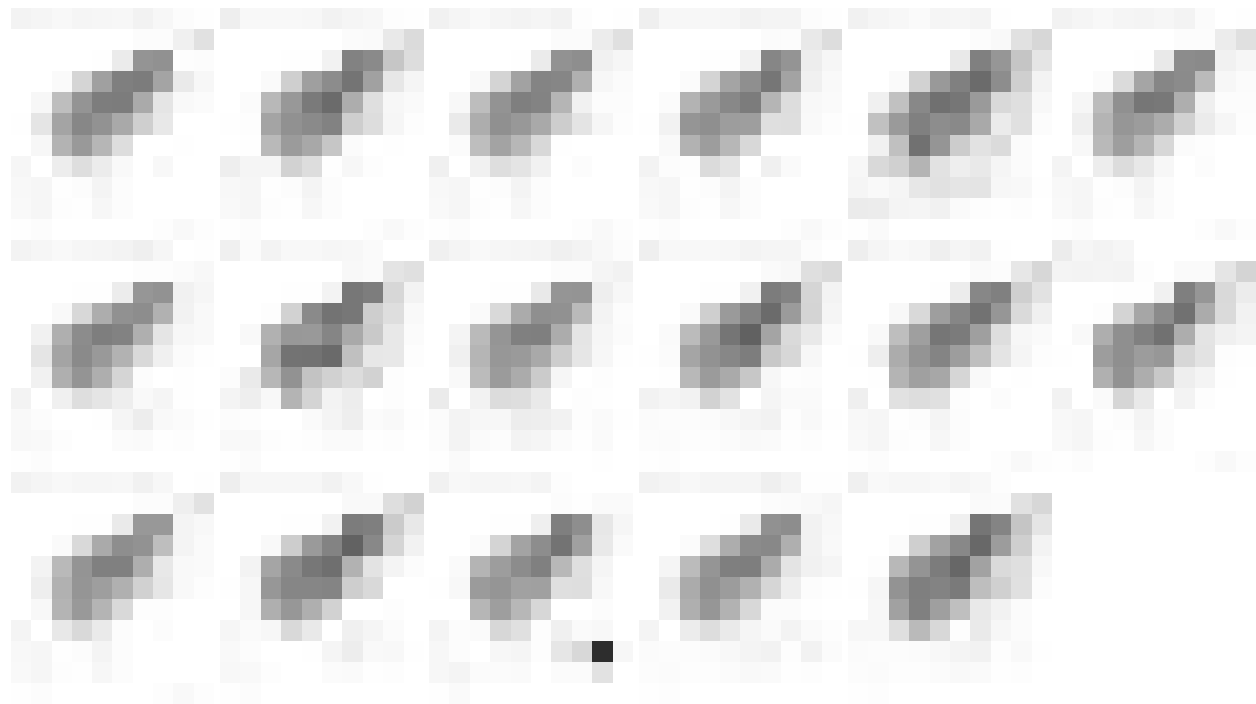
* *Hieracium sabaudum* Linnaeus. Disturbed areas; native of Europe. August-October. Naturalized south to PA and Coastal Plain of NJ. [= C, F, FNA, G, K, Pa] {not yet keyed}

Hieracium scabrum Michaux, Rough Hawkweed. Dry forests, woodland margins, roadsides. July-November. NS and QC west to MN, south to VA, n. GA, KY, and MO. [= RAB, C, FNA, G, Pa, S, SE, W, WV; > *H. scabrum* var. *scabrum* – F, K]

Hieracium trillii Greene, Shale-barren Hawkweed. Shale barrens and dry shaley woodlands, other xeric woodlands. May-August. Sc. PA south to w. VA and e. WV. [= C, F, FNA, G, Pa, SE, W; = *H. greenii* Porter & Britton – K, S, WV, a preoccupied name]

Hieracium umbellatum Linnaeus, Northern Hawkweed. Rocky areas. Circumboreal, south in North America to PA, WV (Spruce Knob), IN, MO, CO, and OR. [= C, FNA, K, Pa; > *H. canadense* Michaux var. *fasciculatum* (Pursh) Fernald – F, G; > *H. canadense* var. *hirtirameum* Fernald – F, G]

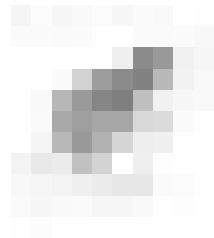
Hieracium venosum Linnaeus, Veiny Hawkweed. Dry forests, woodland margins, roadsides. April-September. NY west to MI, south to GA, AL, and TN; apparently disjunct in FL. [= RAB, C, FNA, G, Pa, S, SE, W, WV; > *H. venosum* var. *venosum* – F, K; > *H. venosum* var. *nudicaule* (Michaux) Farwell – F, K]



Hymenopappus L'Héritier 1788 (Woolly-white)

A genus of about 11-14 species, herbs, of s. North America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

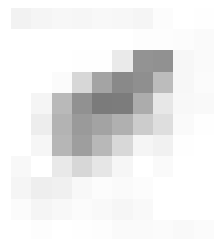
Hymenopappus scabiosaeus L'Héritier var. *scabiosaeus*. Turkey oak sandhills and adjacent sandy fields. Sc. SC south to n. peninsular FL, west to AR, MO, and OK, and north in the interior to n. IN, c. and s. IL, and se. MO. Var. *corymbosus* (Torrey & A. Gray) B.L. Turner is distributed in the s. Great Plains and adjacent areas, from NE south to TX and Coahuila. [= C, FNA, K, SE; < *H. scabiosaeus* – RAB, F, G, S, WH]



Hymenoxys Cassini 1825

A genus of about 25 species, herbs, of w. North America, south through Central America to South America. References: Bierner in FNA (2006c).

* *Hymenoxys odorata* A.P. de Candolle. Waste areas around wool-combing mill, other disturbed ground, perhaps only a waif; native of sw. United States. See Nesom (2004d). [= K; = *Picradenia odorata* (A.P. de Candolle) Britton]

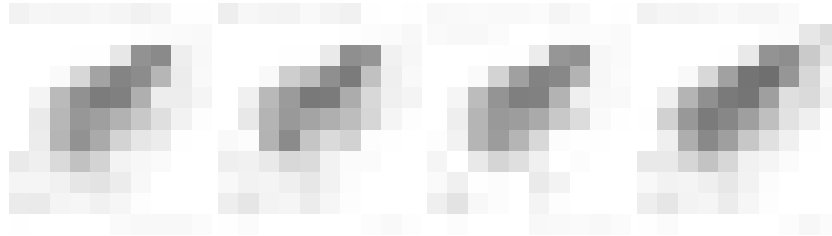


Hypochoeris Linnaeus 1753 (Cat's-ear)

A genus of about 60 species, herbs, of South America, Europe, Asia, and n. Africa. The controversial spelling of the genus name is now resolved in favor of *Hypochaeris*. References: Bogler in FNA (2006a); Cronquist (1980)=SE.

- 1 Stem with at least a few well-developed leaves, clasping and similar to the basal; pappus of one length, all long and plumose.
 - 2 Flowers yellow; middle and outer phyllaries hispid; heads usually 5-8 mm across at anthesis, the involucre campanulate *H. chillensis*
 - 2 Flowers white; middle and outer phyllaries glabrous or puberulent; heads usually 2-4 mm wide at anthesis, the involucre cylindrical *H. microcephala* var. *albiflora*
- 1 Stem naked, or only with few and very small bracts; pappus of two lengths, the outer short and barbellate, the inner long and plumose.
 - 3 Plants glabrous or apparently so; plants mostly annual *H. glabra*
 - 3 Plants conspicuously pubescent, as on the hispid leaves; plants mostly perennial..... *H. radicata*

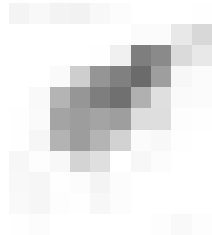
- * *Hypochaeris chillensis* (Kunth) Britton, Brazilian Cat's-ear. Roadsides, fields, other disturbed places; native of South America. Late April-July. More common in the NC Coastal Plain than shown in RAB (common in Duplin, Sampson, and Wayne cos.) (A.J. Bullard, pers. comm. 2003). [= FNA; ? *Hypochaeris brasiliensis* (Less.) Grisebach var. *tweediei* (Hooker & Arnott) Baker – K, SE, WH; ? *Hypochaeris elata* (Weddell) Grisebach – RAB, misapplied]
- * *Hypochaeris glabra* Linnaeus, Smooth Cat's-ear. Roadsides, fields, disturbed areas; native of Europe. Late March-July. [= FNA, K, S, WH; = *Hypochaeris glabra* – RAB, C, SE, WV, orthographic variant]
- * *Hypochaeris microcephala* (Schultz 'Bipontinus') Cabrera var. *albiflora* (Kuntze) Cabrera, White-flowered Cat's-ear. Disturbed areas; native of South America. This species has been found as a naturalized introduction at Fort Pulaski (Chatham County, GA) (T. Govus, pers. comm. 2006) and in Camden County, GA (Carter, Baker, & Morris 2009). [= FNA, K, SE]
- * *Hypochaeris radicata* Linnaeus, Spotted Cat's-ear. Roadsides, fields, disturbed areas; native of Eurasia. April-October. [= FNA, G, K, Pa, S, WH; = *Hypochaeris radicata* – RAB, C, F, SE, WV, orthographic variant]



Inula Linnaeus 1753 (Elecampane)

A genus of about 90-100 species, of temperate and subtropical Old World. References: Arriagada (1998)=Z; Cronquist (1980)=SE.

- * *Inula helenium* Linnaeus, Elecampane. Damp pastures, roadsides, other disturbed areas; native of Europe. May-September. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV, Z]



Ionactis Greene 1897 (Stiff-leaved Aster)

A genus of 5 species, herbs, of North America. *Ionactis* has usually been included in *Aster*, but differs in many characters and is more closely related to *Heterotheca* (Nesom & Leary 1992). References: Nesom in FNA (2006b); Nesom & Leary (1992)=Z; Cronquist (1980)=SE.

- * *Ionactis linariifolia* (Linnaeus) Greene, Stiff-leaved Aster. Dry savannas, sandhills, pine flatwoods, prairie-like openings, glades, and barrens, high elevation rock outcrops and glades, to at least 1450 m, dry roadbanks, woodland edges, rocky woodlands. August-November. ME and QC west to WI, south to ne. FL, Panhandle FL, and TX. There appears to be substantial variation in *I. linariifolia*, with montane (and northern) populations having considerably longer and broader leaves than Coastal Plain (and southern) populations; additional study is needed. [= FNA, Pa, WH, Z; = *I. linariifolius* – K, S, orthographic variant; = *Aster linariifolius* Linnaeus – RAB, C, G, SE, W, WV]



Iva Linnaeus 1753 (Marsh-elder)

A genus of about 9 species, shrubs and herbs, of North America and the West Indies, as circumscribed more narrowly by recent authors. References: Turner (2009a)=Z; Cronquist (1980)=SE; Jackson (1960)=Y; Strother in FNA (2006c).

- 1 Plants perennial, fleshy, glabrous (or strigillose on the leaf faces); [mostly of maritime situations, such as brackish marshes, marsh edges, or ocean dunes]; [section *Iva*].
 - 2 Outer phyllaries united; [rare waif of disturbed areas and beaches] *I. axillaris*
 - 2 Outer phyllaries distinct; [collectively common and widespread natives of the outer Coastal Plain].
 - 3 Leaves 1.5-4.5 (-6.0) cm long, 0.4-1.0 (-1.5) cm wide, 1-3 mm thick when fresh, mostly untoothed; involucre 4-7 mm high; leaves alternate from midstem upward; [mostly of dunes and the upper beach] *I. imbricata*
 - 3 Leaves 4-10 cm long, 0.7-4.0 cm wide, 0.5-1 mm thick when fresh, usually toothed; involucre 2-4 mm high; leaves opposite (alternate above or in the inflorescence); [mostly of marshes, marsh edges, and wet hammocks].
 - 4 Larger leaves 4-7 (-8.5) cm long, 0.7-1.5 (-2.1) cm wide, 4-10× as long as wide, subtire or with 1-8 (rarely more) teeth on each side; [of NJ southward] *I. frutescens* var. *frutescens*
 - 4 Larger leaves 6-10 cm long, 2.0-4.0 cm wide, 1.5-4× as long as wide, usually with 8-17 teeth on each side; [of n. NC northward]..... *I. frutescens* var. *oraria*
- 1 Plants annual (perennial in *I. asperifolia*), not fleshy, more-or-less pubescent (at least in the inflorescence); [of mainly inland wetlands or disturbed areas].
 - 5 Leaves 20-70 mm wide, ovate; staminate flowers usually 8-16 (-20) per head; [mostly of disturbed ground]; [section *Iva*] *I. annua*
 - 5 Leaves 0.5-8 mm wide, linear; staminate flowers 1-9 per head; [section *Linearbractea*].
 - 6 Involucre 1.5-2 mm high; outer phyllaries distinct, glandular-punctate; leaves 0.5-3 mm wide; pistillate flowers 3 per head *I. microcephala*
 - 6 Involucre 2.5-3 mm high; outer phyllaries connate, not glandular-punctate; leaves 1-8 mm wide; pistillate flowers 1 (-2) per head
 - 7 Plants annuals, erect, 5-12 dm tall; staminate flowers 1-5 per head..... *I. angustifolia*
 - 7 Plants perennials, decumbent, rooting at the nodes, 2-5 dm tall; staminate flowers 3-9 per head..... *I. asperifolia*

Iva angustifolia Nuttall ex deCandolle, Narrowleaf Marsh-elder. Wet disturbed areas. August-September. Native of sw. United States and Mexico, eastward to Livingston Parish, LA. See *I. asperifolia* above for taxonomic comments. [= Y; < *I. angustifolia* – FNA, K, SE; = *I. asperifolia* Lessing var. *angustifolia* (Lessing) B.L. Turner – Z]

Iva annua Linnaeus, Sumpweed, Rough Marsh-elder. Fields, disturbed places; rare, in the eastern and inland part of area probably introduced (by native Americans) from farther west. September-November. PA, ND, and CO south to FL, NM, and Mexico (the original distribution uncertain). This species was apparently an important crop of native Americans. The so-called var. *macrocarpa* (Blake) R.C. Jackson, known only from archeological remains and presumed extinct, is almost certainly a cultivated form, selected for its large seeds. [= RAB, C, FNA, GW, Pa, SE, W, WH; = *I. ciliata* Willdenow – F; > *I. ciliata* Willdenow var. *ciliata* – G; > *I. ciliata* var. *macrocarpa* Blake – G; > *I. annua* var. *annua* – K, Y; > *I. annua* var. *caudata* (Small) R.C. Jackson – K, Y; > *I. annua* var. *macrocarpa* (Blake) R.C. Jackson – K, Y; > *I. ciliata* – S; > *I. caudata* Small – S]

* *Iva asperifolia* Lessing, Narrowleaf Marsh-elder. Wet disturbed areas; native of sw. United States and Mexico. August-September. Perhaps *I. asperifolia* and *I. angustifolia* are best treated as only varietally distinct, as done by Turner (2009). [= S, Y; < *I. angustifolia* Nuttall ex deCandolle – FNA, K, SE, WH; = *Iva asperifolia* var. *asperifolia* – Z]

* *Iva axillaris* Pursh, Deer-root. Waste areas around wool-combing mill, perhaps only a waif; native of w. United States. May-October. See Nesom (2004d). [= FNA, K, Y]

Iva frutescens Linnaeus var. *frutescens*, Southern Maritime Marsh-elder. Brackish marshes and marsh edges, normally on the back side of barrier islands. Late August-November. NJ south to s. FL, west to TX. See *I. frutescens* var. *oraria* for discussion of the two taxa. [= C, F, G, SE; = *I. frutescens* ssp. *frutescens* – GW, K, Y; < *I. frutescens* – RAB, FNA, Pa, S, WH]

Iva frutescens Linnaeus var. *oraria* (Bartlett) Fernald & Griscom, Northern Maritime Marsh-elder. Brackish marshes and marsh edges, normally on the back side of barrier islands. Late August-November. NS south to Dare County, NC. The two varieties are morphologically distinct, except in the zone of overlap (NJ south to Dare County, NC), where intermediates will be encountered. Even in the zone of overlap, though, most plants are readily identified to variety. There might be some merit in considering these taxa species, with limited hybridization in a small portion of their total distributions. [= C, F, G, SE; = *I. frutescens* ssp. *oraria* (Bartlett) R.C. Jackson – K, Y; < *I. frutescens* – RAB, FNA, Pa, S; = *I. oraria* Bartlett]

Iva imbricata Walter, Dune Marsh-elder. Dunes, upper beach, island-end flats. Late August-November. Se. VA south to s. FL, west to LA; Bahamas and Cuba. This plant is often the most oceanward perennial plant, often the first perennial to colonize the upper beach or incipient dunes on island-end flats, where it occurs with such upper beach annuals as *Euphorbia polygonifolia*, *Euphorbia bombensis*, *Cakile edentula*, and *Amaranthus pumilus*. [= RAB, C, F, FNA, G, K, S, SE, WH, Y]

Iva microcephala Nuttall, Small-headed Marsh-elder. Wet pine flatwoods, flatwood ponds, clay-based Carolina bays. September-October. C. NC south to s. FL, west to se. AL. A seed-banking annual, locally abundant some years and absent

others depending on the variable hydrologic conditions of Carolina bays and other seasonally flooded wetlands. [= RAB, FNA, GW, K, S, SE, WH, Y]



***Ixeris* (Cassini) Cassini 1822**

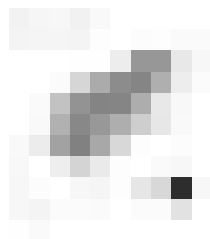
A genus of ca. 20 species, herbs, of e. and se. Asia. References: Strother in FNA (2006a).

* ***Ixeris stolonifera*** A. Gray, Creeping Lettuce. Established as a weed in lawns, gardens, and plant nurseries in se. PA (Rhoads & Klein 1993) NY (Long Island), and DE (Cronquist 1980). Native of Japan. June-September. [= C, FNA, K, Pa, SE; = *Lactuca stolonifera* (A. Gray) Bentham ex Maximowicz – F]

***Jamesianthus* Blake & Sherff 1940 (Warbonnet)**

A monotypic genus, a perennial herb, endemic to c. AL and wc. GA. References: Strother in FNA (2006c).

Jamesianthus alabamensis Blake & Sherff, Alabama Warbonnet. Streambanks over limestone or other calcareous rocks. Endemic to stream banks in c. AL and wc. GA. The opposite leaves are squared off at the base in a distinctive manner. [= FNA, K, SE]



***Krigia* Schreber 1791 (Cynthia, Dwarf-dandelion)**

A genus of 7 species, herbs, of (mainly e.) North America. References: Chambers & O’Kennon in FNA (2006a); Kim & Turner (1992)=Z; Cronquist (1980)=SE; Chambers (2004)=Y.

- 1 Phyllaries erect in fruit, 2-4× as long as wide; pappus absent (or represented by minute scales or bristles < 2 mm long); plant a leafy-stemmed winter annual.
 - 2 Phyllary midveins evident but not forming curved keels; cypselae fusiform, ca. 2× as long as broad.....***K. cespitosa***
 - 2 Phyllary midveins becoming prominent and curving inward at bases to form keels; cypselae obovoid, ca. 1.5× as long as broad**[*K. wrightii*]**
- 1 Phyllaries reflexed in fruit, 3-8× as long as broad; pappus present, consisting of 5 or more scales and 5 or more bristles (the bristles > 4 mm long); plant a scapose, subscapose, or leafy-stemmed perennial or a scapose or subscapose winter annual.
 - 3 Pappus of 5 scales and 5 bristles; plant a winter annual; stem leafless or leafy at the base only.....***K. virginica***
 - 3 Pappus of 15-40 scales and 15-40 bristles; plant a perennial; stem leafless, leafy at the base only, or with many leaves extending up the stem.
 - 4 Stems leafless, the peduncles terminal; perennial from ovoid tubers, with long slender stolons which form new plants or tubers; pappus bristles (5.0-) 5.3-7.7 (-10.0) mm long.....***K. dandelion***
 - 4 Stems leafy, at least at the base, the peduncles axillary; perennials from stout creeping rhizomes or short caudices, not bearing tubers; pappus bristles 4.0-7.0 mm long.

- 5 Peduncles usually 1 per leaf axil; leaves linear-lanceolate, the larger 1-12 mm wide; perennial from an underground rhizome (to 5 mm in diameter), larger plants with an extensive rootmat and multiple stems..... *K. montana*
- 5 Peduncles usually 2 per leaf axil; leaves oblanceolate, the larger 15-45 mm wide; solitary-stemmed perennial from a short caudex..... *K. biflora* var. *biflora*

Krigia biflora (Walter) S.F. Blake var. *biflora*, Orange Dwarf-dandelion. Rich, moist forests. May-October. Var. *biflora* ranges from MA s. ON and MN south to GA, AL, MS, AR, and e. OK; the smaller var. *viridis* (Standley) Kim occurs in CO, AZ, and NM. The natural hexaploid hybrid *Krigia ×shinnersiana* K.L. Chambers [*K. biflora* × *montana*] is documented from the Craggy Mountains, Buncombe County, NC (Chambers 2004; Kim & Turner 1992). [= K, Z; < *K. biflora* – RAB, C, F, FNA, G, Pa, SE, W, WV; = *Cynthia virginica* (Linnaeus) D. Don – S]

Krigia cespitosa (Rafinesque) K.L. Chambers, Opposite-leaf Dwarf-dandelion. Fields, roadsides, disturbed places. Late March-early June. Se. VA and NE south to c. peninsular FL and TX. *K. gracilis* (A.P. de Candolle) Shinners occurs in TX, OK, and LA; it is sometimes treated as *K. cespitosa* var. *gracilis* (A.P. de Candolle) K.L. Chambers, but is better considered as a species, as it is sympatric and generally distinct. [= *K. cespitosa* (Rafinesque) K.L. Chambers var. *cespitosa* – FNA, Y; < *K. cespitosa* – GW, WH, Z; = *K. oppositifolia* Rafinesque – RAB, C, G, SE, W; = *Serinia oppositifolia* (Rafinesque) Kuntze – F, S; < *K. caespitosa* – K, orthographic variant]

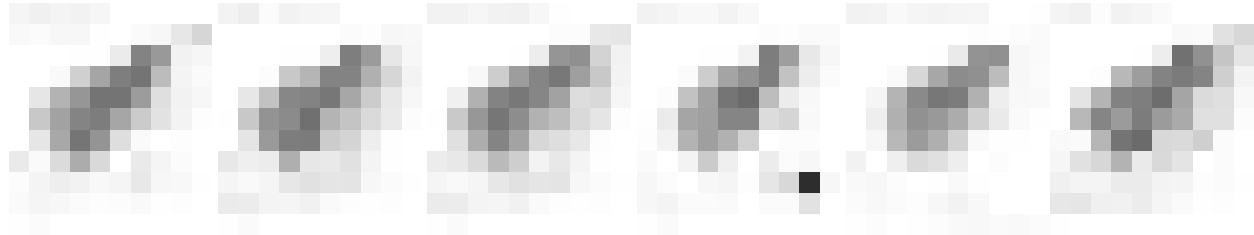
Krigia dandelion (Linnaeus) Nuttall, Colonial Dwarf-dandelion. Woodlands, roadsides, disturbed areas. April-May. NJ, IL, and KA, south to Panhandle FL and ne. TX. [= RAB, C, F, FNA, G, GW, K, SE, W, Z; = *Cynthia dandelion* (Linnaeus) A.P. de Candolle – S]

Krigia montana (Michaux) Nuttall, Mountain Dwarf-dandelion. Cliffs and rock outcrops at medium to high elevations. May-September. A Southern Appalachian endemic: w. NC, e. TN, nw. SC, and ne. GA. The natural hexaploid hybrid *Krigia ×shinnersiana* K.L. Chambers [*K. biflora* × *montana*] is documented from the Craggy Mountains, Buncombe County, NC (Chambers 2004; Kim & Turner 1992). [= RAB, FNA, K, SE, W, Z; = *Cynthia montana* (Michaux) Standley – S]

Krigia occidentalis Nuttall. {GA}. March-May. MO and KS south to LA and TX; disjunct eastward in GA. [= FNA, K] {not yet keyed; add to synonymy}

Krigia virginica (Linnaeus) Willdenow, Virginia Dwarf-dandelion. Rocky woodlands, roadsides, disturbed areas. Late March-July. ME west to MN, south to c. peninsular FL and c. TX. [= RAB, C, F, FNA, G, GW, K, Pa, S, SE, W, WH, Z]

Krigia wrightii (A. Gray) K.L. Chambers ex K.J. Kim, Wright’s Dwarf-dandelion. AR and OK south to LA and TX. [= FNA]



Lactuca Linnaeus 1753 (Lettuce)

A genus of about 75 species, herbs, nearly cosmopolitan (especially north temperate). References: Strother in FNA (2006a); Cronquist (1980)=SE; McVaugh (1972). [also see *Ixeris*]

Identification notes: Most species are highly variable in leaf lobing.

- 1 Achene beaks stout and short, 0.1-0.5 (-1.0) mm long (< ½ as long as the body of the achene); rays blue to violet (rarely yellow or white).
- 2 Pappus tawny; flowers mostly 20-30 per head *L. biennis*
- 2 Pappus bright white; flowers mostly 10-15 per head..... *L. floridana*
- 1 Achene beaks filiform and long, 1-4 mm long (> ½ as long as the body of the achene); rays yellow or blue (sometimes white or drying bluish).
- 3 Each face of the achene with (3-) 5-9 nerves; stems typically white or pale green; rays yellow (sometimes drying blue); [aliens].
- 4 Unlobed cauline leaves lanceolate to linear *L. saligna*
- 4 Unlobed cauline leaves oblong, obovate, or spatulate.
- 5 Phyllaries usually erect in fruit; midribs of leaves usually smooth *L. sativa*
- 5 Phyllaries usually reflexed in fruit; midribs of leaves prickly setose *L. serriola*
- 3 Each face of the achene with 1 (-3) nerves; stems typically medium to dark green or reddish; rays yellow or blue; [natives, though often weedy].
- 6 Unlobed leaves and lobes of lobed leaves narrow, usually < 1 cm wide; leaves basally disposed, the basal and lower-stem leaves the largest and most persistent; plants 3-12 dm tall; [primarily of the Coastal Plain, rare elsewhere]..... *L. graminifolia* var. *graminifolia*
- 6 Unlobed leaves and lobes of lobed leaves wider, usually > 1 cm wide; leaves well-distributed on the stem; plants 3-33 dm tall; [collectively widespread].
- 7 Fruiting involucre 10-15 mm tall; achenes 2.5-3.5 mm long (excluding the beak) *L. canadensis*
- 7 Fruiting involucre 15-22 mm tall; achenes 4.5-6 mm long (excluding the beak).
- 8 Leaf margins not prickly (or barely so); flowers 13-25 per head; [widespread in our area] *L. hirsuta*
- 8 Leaf margins prickly; flowers 20-56 per head; [of KY and MS westward]..... *L. ludoviciana*

Lactuca biennis (Moench) Fernald, Tall Blue Lettuce. Pastures, roadsides, forest edges, thickets. August-November. NL (Labrador) and AK south to NC, TN, IA, CO, UT, and CA. [= RAB, C, F, FNA, G, K, Pa, SE, W, WV; > *Mulgedium spicatum* (Lamarck) Small var. *spicatum* – S; > *Mulgedium spicatum* var. *integrifolium* (Torrey & A. Gray) Small – S]

Lactuca canadensis Linnaeus, American Wild Lettuce. Fields, roadsides, disturbed ground. June-November. NS and BC south to n. peninsular FL, TX, and CA. [= RAB, C, FNA, K, Pa, SE, W, WH; > *L. canadensis* var. *canadensis* – F, G, WV; > *L. canadensis* var. *latifolia* Kuntze – F, G, WV; > *L. canadensis* var. *longifolia* (Michaux) Farwell – F, G, WV; > *L. canadensis* var. *obovata* Wiegand – F, G; > *L. canadensis* – S; > *L. sagittifolia* – S]

Lactuca floridana (Linnaeus) Gaertner, Woodland Lettuce. Mesic and dry-mesic forests. August-November. NY, MB and MN south to s. FL and TX. [= RAB, C, FNA, SE, W, WH, WV; > *L. floridana* var. *floridana* – F, G, K, Pa; > *L. floridana* var. *villosa* (Jacquin) Cronquist – F, G, K, Pa; > *Mulgedium floridanum* (Linnaeus) de Candolle – S; > *Mulgedium villosum* (Jacquin) Small – S]

Lactuca graminifolia Michaux var. ***graminifolia***, Coastal Plain Lettuce. Mesic to dry-mesic pine-oak woodlands and forests, longleaf pine sandhills, sandy fields, and sandy roadsides. April-July. E. NC south to s. FL, west to c. LA; disjunct in s. NJ. Var. *arizonica* McVaugh is distributed in mesic canyons in montane w. TX, s. CO, NM, and AZ, south into w. Mexico. Var. *mexicana* McVaugh is distributed in Tamaulipas, Veracruz, Oaxaca, Chiapas, and Guatemala. [= K; < *L. graminifolia* – RAB, F, FNA, SE, W, WH; = *L. graminifolia* – S]

Lactuca hirsuta Muhlenberg ex Nuttall, Downy Lettuce. Forests and forest edges. Late May-November. NS and ON south to n. FL and TX. [= RAB, C, FNA, Pa, S, SE, W, WV; > *L. hirsuta* var. *hirsuta* – F, G, K; > *L. hirsuta* var. *sanguinea* (Bigelow) Fernald – F, G, K]

Lactuca ludoviciana (Nuttall) Riddell, Louisiana Lettuce. Fields, roadsides, mesic forests. MB and BC, south to IN, KY, MS, LA, TX, and CA. [= C, F, FNA, G, K, S, SE]

* ***Lactuca saligna*** Linnaeus, Willowleaf Lettuce. Fields, roadsides, disturbed ground, perhaps associated with circumneutral soils; native of Europe. August-November. [= RAB, C, F, FNA, G, K, Pa, SE, W, WV]

* ***Lactuca sativa*** Linnaeus, Garden Lettuce. Cultivated throughout our area in home gardens and commercially, rarely weakly persistent, common as a cultivated plant, rare as a short-lived waif; native of Eurasia. June-October. [= F, FNA, G, K]

* ***Lactuca serriola*** Linnaeus, Prickly Lettuce. Roadsides, disturbed ground, pastures; native of Europe. June-November. [= C, FNA, K, Pa, SE, WH; = *L. scariola* Linnaeus – RAB, F, WH; > *L. serriola* var. *integrata* Gren. & Godr. – G, W; > *L. scariola* – S; > *L. virosa* – S, misapplied]

* ***Lactuca virosa*** Linnaeus, Bitter Lettuce. Disturbed areas; native of Eurasia. Reported for DC and AL (Kartesz 1999; FNA); no specimens have been seen that document this distribution. [= FNA, K] {not yet keyed}

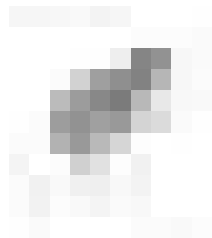


Lagascea Cavanilles 1803

A genus of 8 species, herbs and shrubs, of sw. United States, Mexico, and Central America, not pantropical by introduction.

References: Harris in FNA (2006c); Stuessy (1978)=Z.

* ***Lagascea mollis*** Cavanilles, Silkleaf. Disturbed areas (on ballast), not recently collected; native of Mexico (but now pantropical). Collected at Apalachicola, Franklin County, FL by A.W. Chapman and previously in FL by Ferdinand Rugel. [= FNA, WH, Z] {not keyed}



Lapsana Linnaeus 1753 (Nipplewort)

A monotypic genus (after the removal of most members to *Lapsanastrum*), an annual herb, of temperate Eurasia. References: Bogler in FNA (2006a); Cronquist (1980)=SE.

* **Lapsana communis** Linnaeus, Nipplewort. Fields, forests, disturbed areas; native of Europe. June-September. First reported for GA (Rabun County) by Stiles & Howel (1998). See Poindexter (2006). [= RAB, C, F, FNA, G, K, Pa, SE, W, WV]



Leontodon Linnaeus 1753 (Hawkbit)

A genus of about 30 species, herbs, primarily of temperate Eurasia. Samuel et al. (2006) show that *Leontodon* subgenus *Oporinia* should be recognized as a separate genus from *Leontodon* sensu stricto. References: Samuel et al. (2006); Bogler in FNA (2006a); Cronquist (1980)=SE. [also see *Oporinia*]

- 1 Heads (solitary-) several; scapes usually scaly-bracted above; pappus of plumose bristles[see *Oporinia*]
- 1 Head solitary; scapes usually naked; pappus type mixed, at least the outer pappus of the outer florets in each head of scales.
 - 2 Pappus type mixed on each cypsela (with the scales outward and the plumose bristles inward; phyllaries densely and coarsely hispid or hirsute.....[*L. hispidus*]
 - 2 Pappus type mixed in each head (the outer cypselas with scales, the inner cypselas with plumose bristles); phyllaries glabrate to coarsely hirsute.....*L. saxatilis* ssp. *saxatilis*

* *Leontodon hispidus* Linnaeus, Bristly Hawkbit. Scattered states in eastern North America. {GA, PA (FNA)} {MD, DC (Kartesz 1999) – investigate} [= FNA; > *Leontodon hispidus* ssp. *hispidus* – K; > *L. hirtus* Linnaeus – K] {not yet mapped}

* **Leontodon saxatilis** Lamarck ssp. *saxatilis*, Little Hawkbit. Roadsides, fields; native of Europe. July-October. [= FNA, Pa; = *Leontodon taraxacoides* (Villars) Willdenow ex Mérat ssp. *taraxacoides* – K; < *L. taraxacoides* – C, W; ? *L. nudicaulis* (Linnaeus) Banks ex Schinz & R. Keller – RAB, apparently misapplied; ? *L. leysseri* (Wallroth) G. Beck – F, G]



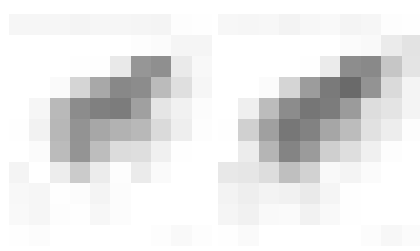
Leucanthemum P. Miller 1754 (Oxeye Daisy)

A genus of about 35 species, herbs, of Eurasia. References: Strother in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z.

- 1 Leaves larger near or slightly below mid-stem; leaves toothed only.....*L. lacustre*
- 1 Leaves larger toward the base of the plant; leaves usually at least partly lobed or pinnatisect, as well as toothed.....*L. vulgare*

* **Leucanthemum lacustre** (Brotero) Sampaio, Portuguese Daisy. Old fields, ditches, disturbed areas; native of Europe. June-July. [= FNA, K, Z; = *Chrysanthemum lacustre* Brotero – RAB, C, SE]

* **Leucanthemum vulgare** Lamarck, Oxeye Daisy, White Daisy, Common Daisy, Marguerite. Fields, roadsides, pastures, disturbed areas; native of Eurasia. April-October. [= FNA, K, Pa, Z; = *Chrysanthemum leucanthemum* Linnaeus – RAB, C, G, SE, W; > *C. leucanthemum* var. *pinnatifidum* Lecoq & Lamotte – F, WV; = *Leucanthemum leucanthemum* (Linnaeus) Rydberg – S]



Liatris Schreber 1791 (Blazing-star, Gayfeather)

A genus of 40-50 species, herbs, of e. and c. North America. References: Nesom in FNA (2006c); Gaiser (1946)=Z; Cronquist (1980)=SE; Stucky & Pyne (1990); Godfrey (1948)=Y; Stucky (1991); Stucky (1992); Mayfield (2002). Key adapted in large part from FNA.

- 1 Pappus plumose, the barbels mostly 0.5-1.0 mm long.
 - 2 Inner phyllaries with apices prolonged, loosely spreading, slightly dilated, and petaloid (white to yellow, pink, or purplish); heads 3-5 mm in diameter, with 4-6 flowers per head; corolla lobes glabrous within; [of the Coastal Plain from SC southward].
 - 3 Heads sessile; petaloid phyllary apices lavender, pink, or magenta, recurved, the petaloid portion short relative to the green phyllary bases *L. elegans* var. *elegans*
 - 3 Heads pedunculate on short peduncles; petaloid phyllary apices light yellow or cream (rarely pale lavender), divergent with tips ascending, the petaloid portion elongate relative to the green phyllary bases *L. elegans* var. *kralii*
 - 2 Inner phyllaries not prominently petaloid; heads 10-20 mm in diameter, with 10-60 flowers per head; corolla lobes coarsely hairy within; [collectively widespread].
 - 4 Outer phyllaries as long as or (more usually longer than) the inner phyllaries, spreading or reflexed, the spreading portion typically > 2 mm long..... *L. squarrosa* var. *squarrosa*
 - 4 Outer phyllaries shorter than the inner phyllaries, erect-appressed to spreading or reflexed, the spreading portion 0-2 mm long.
 - 5 Stems and leaves usually glabrous; inner phyllaries usually apically rounded to truncate, apiculate, all essentially erect and appressed, usually with a narrow hyaline border *L. cylindracea*
 - 5 Stems and leaves hirsute to hirsute-pilose; inner phyllaries apically acute-acuminate, all usually spreading to reflexed on the distal 1/3 (outer) to 1/5 (inner), usually without a hyaline border *L. hirsuta*
- 1 Pappus barbellate, the barbels 0.1-0.3 (-0.4) mm long.
 - 6 Heads mostly 1-7 (-10) in a subcorymbiform arrangement; [of Bibb Co., AL]..... *L. oligocephala*
 - 6 Heads usually > 10 in a spiciform or racemiform arrangement; [collectively widespread].
 - 7 Leaves 3-5-veined.
 - 8 Basal and lower cauline leaves (2-) 4-8 mm wide, cauline usually abruptly reduced in size at ca. midstem, continuing distally as linear, bract-like leaves; heads in a densely (- to loosely) spiciform arrangement; involucre 7-9 mm, purplish to greenish; florets 5-6 (-8) per head; [mainly of the Coastal Plain]..... *L. spicata* var. *resinosa*
 - 8 Basal and lower cauline leaves 4-10 (-20) mm wide, cauline usually gradually reduced in size distally; heads in a densely to loosely spiciform arrangement; involucre (7-) 8-11 mm, usually greenish; florets (4-) 6-8 (-12) per head; [of the Mountains and Piedmont] .. *L. spicata* var. *spicata*
 - 7 Leaves 1-veined.
 - 9 Mid and inner phyllaries either apically acute or rounded-retuse and minutely involute-cuspidate to apiculate.
 - 10 Stems hirtellous with spreading to slightly deflexed hairs or variously puberulent to hirsute.
 - 11 Stems hirsute to puberulent to pilose-puberulent or strigose-puberulent..... *L. gracilis*
 - 11 Stems hirtellous with spreading to slightly deflexed hairs.
 - 12 Heads sessile, relatively crowded in a cylindrical arrangement, rigidly ascending, appressed to the rachis and to each other, densely overlapping; [e. NC south to Panhandle FL and AL] *L. chapmanii*
 - 12 Heads sessile to short-pedunculate, in a relatively loose, spiciform, racemoid, or paniculate, commonly secund arrangement; [e. GA south through ne. FL to c. peninsular FL]..... *L. pauciflora*
 - 10 Stems glabrous.
 - 13 Phyllaries apically usually rounded-retuse and minutely involute-cuspidate to apiculate; corolla tubes glabrous within.
 - 14 Stems and basal leaves glabrous; basal leaves mostly arising from congested nodes at very base of plant, (1-) 2-6 (-9) mm wide, abruptly reduced in size distally, surfaces minutely white-dotted by stomates, not glandular-punctate *L. laevigata*
 - 14 Stems and basal leaves glabrous to very sparsely pilose, leaves usually with a few, spreading cilia near insertion; basal and lower cauline leaves arising from numerous, separated nodes on proximal part of stem, 1-2 (-2.5) mm wide and relatively even-sized, surfaces glandular-punctate *L. tenuifolia*
 - 13 Phyllaries apically acute; corolla tubes pilose within.
 - 15 Heads often in a secund arrangement; involucre 7-15 mm; phyllaries obovate; florets 3-6.
 - 16 Stems glabrous (rarely sparsely hirtellous); leaves and phyllaries sparsely or not at all gland-dotted; involucre 11-15 mm high; inner phyllaries with acute apices *L. pauciflora*
 - 16 Stems minutely puberulent-hirtellous; leaves and phyllaries gland-dotted; involucre 7-10 (-14) mm high; inner phyllaries with abruptly acuminate apices, often apiculate por mucronulate *L. secunda*
 - 15 Heads in a secund arrangement or not; involucre (6-) 7-9 mm; phyllaries ovate-triangular to generally oblong; florets 4-10 (-12).
 - 17 Heads densely arranged, on internodes 1-2 (-5) mm long, often secund; phyllary apex sharply acuminate-acute, distinctly involute, lamina relatively thin, glands consistently present and superficial at least on proximal portion; florets 4-7 (-9); basal and lower cauline leaves 2-5 mm wide, gradually reduced in length distally..... *L. cokeri*
 - 17 Heads loosely arranged, on internodes 6-15 (-20) mm long, not secund; phyllary apex sharply acute to obtuse-angled with a thickened apiculum, not markedly involute, lamina relatively thick, usually with evidently sunken punctate glands,

- without superficial glands; florets 7-10 (-12); basal and lower cauline leaves 4-9 (-12) mm wide, quickly reduced in width and length distally.....*L. virgata*
- 9 Mid and inner phyllaries apically rounded, not rounded-retuse or cuspidate to apiculate.
- 18 Stems glabrous (rarely sparsely to moderately pilose in *L. pilosa*).
 - 19 Involucres 5-7 (-9) mm; florets 4-5 (-6); corolla tubes glabrous within; pappus bristles usually about half the length of corolla tubes*L. microcephala*
 - 19 Involucres 6-10 mm; florets (6-) 7-13 (-17); corolla tubes internally pilose; pappus bristles as long as the corolla tubes (shorter in some populations of *L. helleri*).
 - 20 Stems 15-55 cm; leaves and phyllaries weakly or not at all punctate; pappus bristles 1/3-2/3 to equal the corolla tube length; montane.....*L. helleri*
 - 20 Stems 40-120 cm; leaves and phyllaries distinctly punctate-glandular to weakly punctate; pappus bristles equal the corolla tube length; coastal plain and piedmont.
 - 21 Stems glabrous; heads loosely arranged, on internodes (2-) 5-10 (-14) mm; peduncles 0-2 (-7) mm; involucres 6-8 mm; phyllaries in 3-4 (-5) series*L. elegantula*
 - 21 Stems glabrous to sparsely or moderately pilose; heads densely arranged, on internodes (1-) 2-5 (-7) mm; peduncles 0-10 (-17, -80 in proximal part of capitulescence) mm; involucres (7-) 8-10 mm, phyllaries in (3-) 4-5 (-6) series*L. pilosa*
- 18 Stems puberulent to strigose.
 - 22 Involucres 2.5-7 mm wide; florets 3-12.
 - 23 Stems and peduncles puberulent to pilose-puberulent or strigose-puberulent; heads usually on ascending peduncles 2-10(-12) mm; involucres 2.5-4(-5) mm wide; phyllaries apically rounded or obtuse to acute or acuminate; florets 3-6 (-9).....*L. gracilis*
 - 23 Stems and peduncles stiffly short-strigose with closely ascending hairs; heads on divergent, arcuate-ascending peduncles 10-25 (-30) mm; involucres 5-7 mm wide; phyllaries apically rounded to nearly flat; florets 7-12.....*L. patens*
 - 22 Involucres 13-22 (-25) mm wide or (6-) 8-15 mm wide (*L. squarrosula*); florets 11-80.
 - 24 Heads usually on peduncles usually 8-50 mm (rarely subsessile); phyllaries erect, not reflexing; florets ca. 30-80 (19-33 in *L. scariosa*); corolla tubes glabrous or pilose within.
 - 25 Leaves or leafy bracts 8-20 (-25) below the heads, cauline usually abruptly reduced above the basal; florets 19-33; [plants of the Central and Southern Appalachians].....*L. scariosa* var. *scariosa*
 - 25 Leaves or leafy bracts 20-85 below the heads, usually continuing relatively even-sized upward above the basal; florets ca. 30-80; [plants of WV and PA northward].....*L. scariosa* var. *nieuwlandii*
 - 24 Heads usually sessile, less commonly subsessile on peduncles 1-8 mm (rarely more); at least outer phyllaries usually reflexing; florets 11-26 (-30); corolla tubes pilose within.
 - 26 Phyllaries glabrous, bullate, with broad, conspicuous, often erose to lacerate or irregular, hyaline border.....*L. aspera*
 - 26 Phyllaries glabrous to puberulent or puberulent-hirtellous, essentially flat (not bullate), without hyaline border or border narrow and inconspicuous.....*L. squarrosula*

Liatris aspera Michaux, Rough Blazing-star. Prairies, barrens, glades. August-September (-October). ON and ND south to Panhandle FL and TX. [= RAB, C, FNA, G, SE, W, WH; > *Liatris aspera* var. *aspera* - F; > *Liatris aspera* Michaux var. *intermedia* (Lunell) Gaiser - F, K, WV, Y; > *Laciniaria aspera* (Michaux) Greene var. *aspera* - S; > *Liatris spherioidea* Michaux - K; > *Laciniaria aspera* (Michaux) Greene var. *spherioidea* (Michaux) Alexander - S]

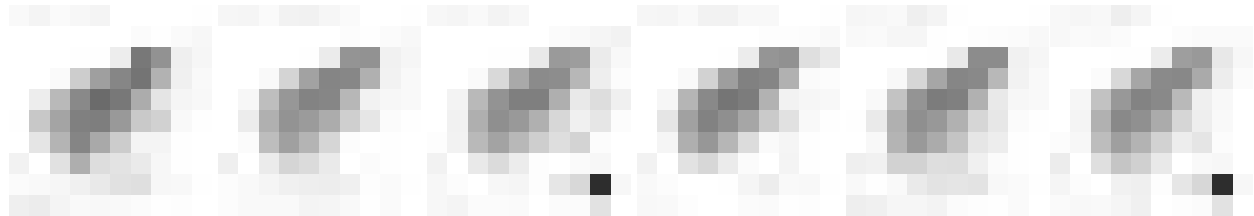
Liatris chapmanii Torrey & A. Gray, Chapman's Blazing-star. Xeric sands of scrub. August-October. Sw. GA, s. AL, south to s. FL. [= FNA, K, SE, WH; = *Laciniaria chapmanii* (Torrey & A. Gray) Kuntze - S] {synonymy incomplete}

Liatris cokeri Pyne & Stucky, Sandhills Blazing-star. Sandhills. (August-) September-October. Sc. and se. NC south to nc. SC. [= FNA; = *Liatris regimontis* (Small) K. Schumann - RAB, SE, W, Y, misapplied; > *Liatris cokeri* - K; > *Liatris regimontis* - K]

Liatris cylindracea Michaux, Barrelhead Blazing-star. Limestone glades, prairies, rarely escaped from cultivation eastward. July-September. NY, ON, and MN south to se. TN (Ridge and Valley) (Chester, Wofford, & Kral 1997), nw. GA, and c. AL (Bibb County), and OK. [= C, F, FNA, G, K, SE] {synonymy incomplete}

Liatris elegans (Walter) Michaux var. *elegans*, Common Elegant Blazing-star. Sandhills. SC south to FL, west to TX. See Mayfield (2002) for discussion of infraspecific taxa in this species. [= FNA; < *Liatris elegans* - RAB, SE, WH; < *L. elegans* var. *elegans* - K, Z; > *Liatris elegans* var. *flabellata* (Small) Gaiser - K, Z; >> *Laciniaria elegans* (Walter) Kuntze - S; > *Laciniaria flabellata* Small - S]

Liatris elegans (Walter) Michaux var. *kralii* Mayfield. Kral's Elegant Blazing-star. Sandhills. Se. SC (Allendale Co.) south to n. FL and west to s. MS. See Mayfield (2002) for discussion of infraspecific taxa in this species. [= FNA, K, WH; < *Liatris elegans* - SE, Z; < *Laciniaria elegans* (Walter) Kuntze - S]



Liatris elegantula (Greene) K. Schumann. Cp (FL, GA): sandhills, other dry woodlands; uncommon. August-October (-November). GA south to n. peninsular FL, west to MS. [= FNA, WH; = *Liatris graminifolia* Willdenow var. *elegantula* (Greene) Gaiser - Z; = *Laciniaria elegantula* Greene; < *Laciniaria graminifolia* (Willdenow) Kuntze - S; < *Liatris graminifolia* - SE] {synonymy incomplete}

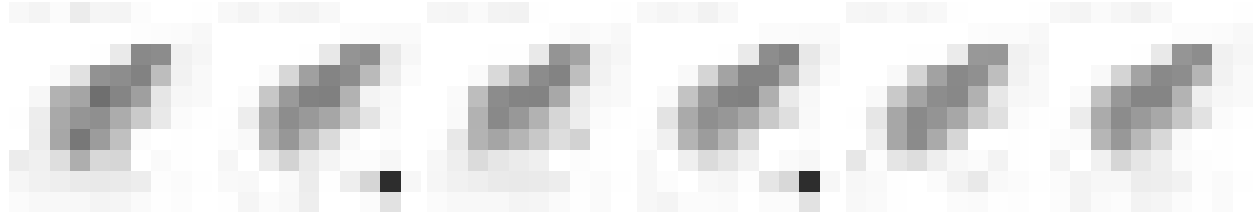
Liatris gholsonii L.C. Anderson, Gholson's Gayfeather. Mesic sandy sites. (July-) August-October (-November). Endemic to Liberty and Leon counties, FL. [= FNA, WH] {not yet keyed; add to synonymy}

Liatris gracilis Pursh, Slender Blazing-star. Sandhills, dry pine flatwoods. (July-) August-October (-November). SC south to s. FL, west to MS. [= RAB, FNA, K, SE, WH; > *Laciniaria laxa* Small – S; > *Laciniaria gracilis* (Pursh) Kuntze – S]

Liatris helleri T.C. Porter, Heller's Blazing-star. High elevation rock outcrops, sometimes on ledges of precipitous cliffs, rocky openings in heath balds, shale barrens. July-mid September. E. WV and w. VA south to w. NC. See Nesom (2005) for additional discussion. [= FNA; > *Liatris helleri* T.C. Porter – RAB, K, SE, W, Y, Z; > *Liatris turgida* Gaiser – RAB, C, F, G, K, SE, W, WV, Y, Z; > *Laciniaria helleri* (Porter) Porter ex Heller – S; > *Laciniaria pilosa* (Aiton) Heller – S, misapplied]

Liatris hirsuta Rydberg. Glades, and prairies. IA and NE south to MS, LA, and TX; disjunct eastward in nw. GA. [= FNA; < *Laciniaria squarrosa* (Linnaeus) Hill – S; = *Liatris squarrosa* (Linnaeus) Michaux var. *hirsuta* (Rydberg) Gaiser – C, F, G, K, SE, Y, Z; < *Liatris squarrosa* – W] {add to synonymy}

Liatris laevigata (Nuttall) Small, Smooth Blazing-star. Longleaf pine sandhills, scrub. August-October (-November). Se. GA (Charlton and Camden counties) (Carter, Baker, & Morris 2009) south to s. FL. [= FNA; = *Liatris tenuifolia* Nuttall var. *quadriflora* Chapman – K, SE, WH; < *Laciniaria tenuifolia* (Nuttall) Kuntze – S]



Liatris microcephala (Small) K. Schumann, Small-head Blazing-star. Outcrops of acidic rocks (sandstone, granite, gneiss). August-October. W. NC and KY south to w. SC, n. and c. GA, and n. AL. [= RAB, C, F, FNA, G, K, SE, W, Y, Z; = *Laciniaria microcephala* Small – S]

Liatris oligocephala J. Allison, Cahaba Blazing-star, Cahaba Torch. Dolomitic Ketona glades. Endemic to Bibb County, c. AL (Allison & Stevens 2001). Also see Hardig, Allison, & Schilling (2005). June-July (-August). [= FNA]

Liatris patens G.L. Nesom & Kral, Georgia Blazing-star. Longleaf pine sandhills and dry flatwoods. Late August-early November. SC south to e. Panhandle FL. See Kral & Nesom (2003) for detailed information. [= FNA, WH]

Liatris pauciflora Pursh, Few-flower Blazing-star. Xeric sands of scrub. August-October. GA (Tatnall Co.) south to c. peninsular FL; alleged by Small (1933) to extend to SC. [< *Liatris pauciflora* – K, SE (also see *L. secunda*); = *Laciniaria pauciflora* (Pursh) Kuntze – S; = *Liatris pauciflora* var. *pauciflora* – FNA, WH]

Liatris pilosa (Aiton) Willdenow. Sandhills, pine barrens, other xeric forests and woodlands, fields, roadbanks. (August-) September-October (-November). NJ, DE, and PA south to SC. [= FNA, K; < *Liatris graminifolia* Willdenow – RAB, SE, W (also see *Liatris virgata*); = *Liatris graminifolia* – C, G; > *Liatris graminifolia* var. *graminifolia* – F; > *Liatris graminifolia* var. *lasia* Fernald & Griscom – F; > *Liatris graminifolia* var. *racemosa* (A.P. de Candolle) Venard – F, WV; > *Liatris graminifolia* var. *typica* – Y, Z; > *Liatris graminifolia* var. *dubia* (Barton) A. Gray – WV, Y, Z; = *Laciniaria graminifolia* (Walter) Kuntze – S]

Liatris provincialis R.K. Godfrey. Sandhills, scrub, dunes. (August-) September-October. Endemic to FL Panhandle (Franklin and Wakulla counties). [= FNA, WH] {not yet keyed; add to synonymy}



Liatris pycnostachya Michaux var. *lasiophylla* Shinnery. [= FNA; < *Laciniaria pycnostachya* (Michaux) Kuntze – S; < *Liatris pycnostachya* – SE] {not yet keyed; add to synonymy}

Liatris pycnostachya Michaux var. *pycnostachya*. [= FNA; < *Laciniaria pycnostachya* (Michaux) Kuntze – S; < *Liatris pycnostachya* – C, F, G, SE] {not yet keyed}

Liatris scariosa (Linnaeus) Willdenow var. *scariosa*, Northern Blazing-star. Shale barrens, dry rock outcrops, roadbanks. August-September (-October). PA, MD, and WV south to NC and TN. [= C, FNA, K, SE; < *Liatris scariosa* – Pa, RAB, W; = *Liatris scariosa* – F, G; < *Laciniaria scariosa* (Linnaeus) Hill – S (also see *Liatris squarrosula*); > *Liatris scariosa* var. *scariosa* – WV, Y, Z; > *Liatris scariosa* var. *virginiana* (Lunell) Gaiser – WV, Y, Z]

Liatris scariosa (Linnaeus) Willdenow var. *nieuwlandii* (Lunell) E.G. Voss. Prairies, glades, and woodlands. August-September (-October). CT, NY, MI, and WI south to PA, WV, IN, IL, and AR. [= FNA, C, G, K, SE; < *Liatris borealis* Nuttall – F; < *Liatris scariosa* – Pa; = *Liatris novae-angliae* (Lunell) Shinnery var. *nieuwlandii* Lunell] {synonymy incomplete}

Liatris secunda Elliott, Sandhill Blazing-star. Sandhills. August-September (-October). S. NC south to w. Panhandle FL and s. AL. [= RAB, Y; < *Liatris pauciflora* Pursh – K, SE; = *Laciniaria secunda* (Elliott) Small – S; = *L. pauciflora* Pursh var. *secunda* (Elliott) D.B. Ward – FNA, WH]



Liatris spicata (Linnaeus) Willdenow var. ***resinosa*** (Nuttall) Gaiser. Bogs, wet pine savannas, seepages. (July-) August-October (-November). NJ south to s. FL, west to LA. [= RAB, F, FNA, G, K, WV, Y, Z; < *Liatris spicata* – C, SE, W, WH; < *Laciniaria spicata* (Linnaeus) Kuntze – S]

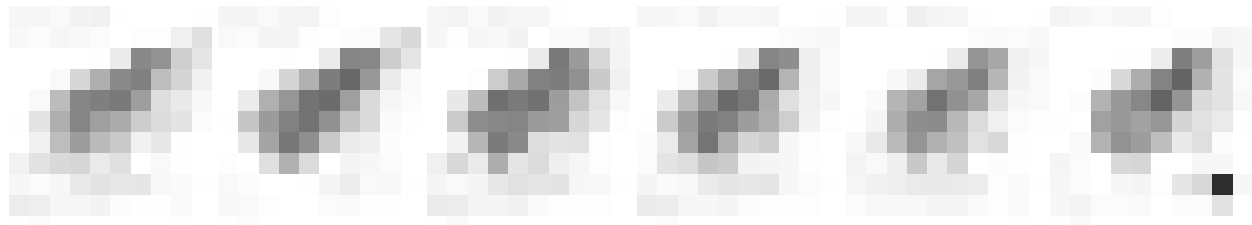
Liatris spicata (Linnaeus) Willdenow var. ***spicata***, Florist's Gayfeather. Prairies, roadsides, seepages, bogs, grassy balds. July-September. MA, ON, and MI, south to GA, AL, MS, and AR. [= RAB, F, FNA, G, K, Pa, WV; = *Liatris spicata* var. *typica* – Y, Z; < *Liatris spicata* – C, SE, W; < *Laciniaria spicata* (Linnaeus) Kuntze – S]

Liatris squarrosa (Linnaeus) Michaux var. ***squarrosa***. Dry woodlands, glades, barrens. [= C, FNA, G, K, SE; > *Liatris squarrosa* var. *squarrosa* – F; > *L. squarrosa* var. *gracilentata* Gaiser – F, Y, Z; < *Liatris squarrosa* – RAB, W, WH, WV; < *Laciniaria squarrosa* (Linnaeus) Hill – S; > *Liatris squarrosa* var. *typica* Gaiser – Y, Z]

Liatris squarrulosa Michaux. Diabase barrens, other glades and barrens, prairies, open woodlands. August-October (-November). S. WV, KY, IL, and MO south to GA, Panhandle FL, AL, and TX. Highly variable and needing additional study to determine if multiple taxa should be recognized. [= C, FNA, K, SE, W, WH; > *Liatris earlei* (Greene) Schumann – F, RAB, Y, Z; > *Liatris squarrulosa* – G; > *Liatris scabra* (Greene) K. Schumann – F, G; > *Laciniaria ruthii* Alexander – S; > *Laciniaria shortii* Alexander – S; = *Liatris scariosa* var. *squarrulosa* – Y, Z]

Liatris tenuifolia Nuttall. Longleaf pine sandhills. August-November. SC south to s. FL, west to AL. [= FNA, RAB; = *Liatris tenuifolia* Nuttall var. *tenuifolia* – K, SE, WH; < *Laciniaria tenuifolia* (Nuttall) Kuntze – S (also see *Liatris laevigata*)]

Liatris virgata Nuttall. Open woods, roadbanks. (July-) August-October (-November). {distribution}. [= FNA, K; < *Liatris graminifolia* – RAB, SE, W; > *Liatris graminifolia* var. *smallii* (Britton) Fernald & Griscom – F, Y, Z; > *Liatris regimontis* (Small) K. Schumann – C, G, Y; > *Liatris regimontis* – F, orthographic variant; > *Laciniaria regimontis* Small – S; > *Laciniaria smallii* Britton – S; > *Liatris graminifolia* var. *virgata* (Nuttall) Fernald – F]



Ligularia Cassini 1816 (*Ligularia*)

A genus of 125 species (or more), perennial herbs, natives of temperate Eurasia. References: Barkley in FNA (2006b).

* ***Ligularia dentata*** (A. Gray) H. Hara. Commonly cultivated horticulturally in ne. North America, locally established or persistent, as in MD; native of China and Japan. [= FNA, K; = *Senecio clivorum* (Maximowicz) Maximowicz – C, SE]

Lygodesmia D. Don 1829 (Rush Pink, Skeletonplant)

A genus of about 5-7 species, herbs, of w. and s. North America. References: Bogler in FNA (2006a); Tomb (1980)=Z; Cronquist (1980)=SE.

Lygodesmia aphylla (Nuttall) Torrey & A. Gray, Flowering Straws, Rose-rush. Xeric sandhills. C. GA south to s. FL and west to c. Panhandle FL. [= FNA, K, S, SE, WH, Z]



Madia Molina 1782 (Tarweed)

A genus of about 10 species, of w. North America and Chile. References: Baldwin & Strother in FNA (2006c); Cronquist (1980)=SE.

* *Madia sativa* Molina, Tarweed. Disturbed areas, scattered occurrences (perhaps only waifs) in eastern North America, (including GA, NC, PA); variously considered native of Chile or w. North America (see FNA). June. [= K; *M. capitata* Nuttall; > *M. sativa* var. *sativa* – SE; > *M. sativa* var. *congesta* Torrey & A. Gray – SE]

Marshallia Schreber 1791 (Barbara's-buttons)

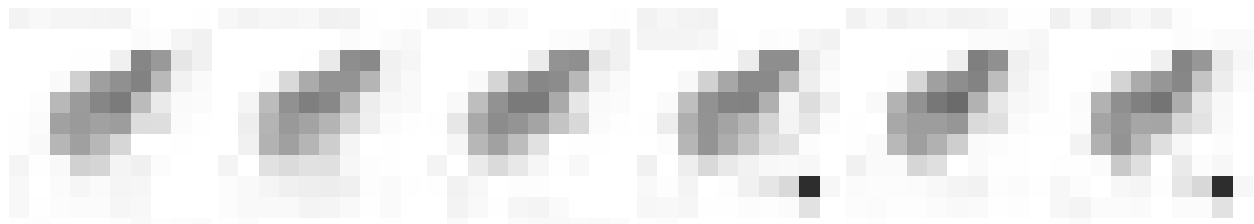
A genus of about 11 species, perennial herbs, of the se. United States. *Marshallia* ranges from sc. VA, sw. PA, WV, s. KY, s. MO, and c. OK, south to c. peninsular FL, and sw. TX. References: Channell (1957)=Z; Watson in FNA (2006c); Watson & Estes (1990)=Y; Cronquist (1980)=SE; Watson, Elisens, & Estes (1991); Watson, Jansen, & Estes (1991); Beadle & Boynton (1901)=X.

- 1 Leaves not basally disposed, the leaves all about the same size; plants glabrous throughout; plants colonial by persistent rhizomes; internodes 10-25 (and leaves 2-5× as long as wide).....*M. trinervia*
- 1 Leaves basally disposed, either all of the leaves below the midpoint of the stem, or the upper leaves markedly smaller than the lower stem and basal leaves (the basal leaves sometimes withered); plants pubescent at least below the heads; plants producing lateral offsets which are separated from the parent in less than a year; internodes 1-12 (and leaves 3-15× as long as wide) or 10-35 (and leaves 8-20× as long as wide).
- 2 Phyllaries with acuminate-subulate tips; paleae (receptacular bracts, interspersed with the flowers) with acuminate-subulate tips; plants usually with 2 or more heads; flowering late July-mid October.
- 3 Lower stem leaves (and basal leaves) erect, narrowly lanceolate to linear-lanceolate, with attenuate or long-acuminate apices, relatively thick in texture, the 2-4 lateral nerves (parallel to the midnerve) prominent; caudex with fibrous remnants of the previous year's leaves (if not burned off); phyllaries thick, ovate-attenuate; [NC, SC, and extreme e. GA].....*M. graminifolia*
- 3 Lower stem leaves (and basal leaves) spreading, oblanceolate or spatulate, with rounded or obtuse apices, relatively thin in texture, the 2 lateral nerves (parallel to the midnerve) often obscure; caudex lacking fibrous remnants of the previous year's leaves; phyllaries thin, linear-subulate; [e. GA southward and westward]*M. tenuifolia*
- 2 Phyllaries with rounded to acute apices; paleae (receptacular bracts, interspersed with the flowers) slightly to strongly broadened or clavate-thickened just below the acute to obtuse apex; plants with 1 head (or more in *M. mohrii* and *M. ramosa*); flowering in late April-July.
- 4 Heads 2-10 (-20) (rarely solitary on depauperate plants).
- 5 Leaves 6-10 cm long, 8-23 mm wide, mostly 3-10× as long as wide; heads 2-5 (-10), 22-37 mm in diameter; [sandstone, limestone, and dolostone glades of nw. GA and c. AL]*M. mohrii*
- 5 Leaves 8-20 cm long, 2-7 (-10) mm wide, mostly > 15× as long as wide; heads (2-) 4-10 (-20), 10-25 mm in diameter; [Altamaha Grit glades pinelands, and ultramafic outcrop barrens of e. GA and Panhandle FL]*M. ramosa*
- 4 Head solitary.
- 6 Leafy portion of the stem 0-20 (-30) cm long, the naked peduncle 1.5-10× (or more) as long as the leafy portion of the stem; stem leaves (if present) not reduced upward, the uppermost > 1/2 as long and wide as the largest leaves on the plant; basal leaves obovate to oblanceolate, the apex obtuse to rounded (often emarginate); outer well-developed phyllaries with obtuse to rounded apex; corollas white to very pale pink; plants flowering late April-May (-early June).
- 7 Plant with 3-10 leaves on the lower stem, extending (5-) 8-20 (-30) cm up the stem; pappus scales (0.5-) 1.0-1.5 mm long; plant (2-) 3-5 (-7) dm tall; [of the Piedmont from sc. VA southward]*M. obovata* var. *obovata*
- 7 Plant scapose (all of the leaves basal) or nearly scapose, with 1-5 leaves extending 1-5 (-10) cm up the stem; pappus scales (1.0-) 1.5-2.5 (-3.0) mm long; plant (0.5-) 1.5-3.5 (-5.0) dm tall; [of the Coastal Plain from NC southward].....*M. obovata* var. *scaposa*
- 6 Leafy portion of the stem 23-50 cm long, the naked peduncle 0.4-1.2× as long as the leafy portion of the stem; stem leaves reduced upward, the uppermost < 1/3 as long and wide as the largest leaves on the plant; basal leaves obovate to oblanceolate, the apex obtuse to acute or acuminate; outer well-developed phyllaries with acute to obtuse apex; corollas medium pink; plants flowering late June-July.
- 8 Basal and lower cauline leaves (2-) 3-13 (-20) cm long (including the petiole), (5-) 10-20 (-30) mm wide, averaging about 6× as long as wide (including the petiole), the apex obtuse to rounded; pappus scales ca. 2 mm long; plants (2-) 3-5 (-8.5) dm tall; achenes without resin-dots between the ridges; [of the Mountains]*M. grandiflora*
- 8 Basal and lower cauline leaves (8-) 15-25 (-32) cm long (including the petiole), (3-) 7-12 (-15) mm wide, averaging about 10× as long as wide (including the petiole), the apex acute to acuminate; pappus scales ca. 1.2 mm long; plants (4-) 6-9 (-10) dm tall; achenes with copious resin-dots between the ridges; [of the Piedmont].....*M. species 1*

Marshallia graminifolia (Walter) Small, Grassleaf Barbara's-buttons. Pine savannas. Late July-mid October. Ne. NC south to se. SC, and rarely to e. GA (Emanuel County) (Sorrie 1998b). Closely related to *M. tenuifolia* Rafinesque, which differs in having a well-developed horizontal rosette of thin-textured spatulate leaves, which do not leave fibrous remains (vs. with firm, ascending, linear-lanceolate basal leaves, which leave fibrous remains). [= GW, RAB, SE, Z; < *M. graminifolia* – FNA; = *M. graminifolia* var. *graminifolia* – K; > *M. laciniarioides* Small - S; > *M. williamsonii* Small – S; > *M. graminifolia* var. *graminifolia* – X; > *M. graminifolia* var. *laciniarioides* (Small) Beadle & F.E. Boynton – X; = *M. graminifolia* ssp. *graminifolia* – Y]

Marshallia grandiflora Beadle & F.E. Boynton, Appalachian Barbara's-buttons, Large-flowered Barbara's-buttons. Sandy or rocky riverbanks, bog margins, dry slopes over mafic rocks. June-August. Sw. PA south to sw. NC, e. TN (Cumberland Plateau) (Chester, Wofford, & Kral 1997), and se. KY. [= C, F, FNA, G, K, Pa, S, SE, W, WV, X, Y, Z; < *M. grandiflora* – RAB (also see *M. species 1*)]

Marshallia mohrii Beadle & F.E. Boynton, Coosa Barbara's-buttons. Sandstone, limestone, and dolostone glades, calcareous prairies. Nw. GA and n. and c. AL. It somewhat resembles *M. grandiflora*, but typically has 2-10 heads per plant (or solitary in depauperate individuals). [= FNA, K, S, SE, X, Y, Z]



Marshallia obovata (Walter) Beadle & F.W. Boynton var. *obovata*, Piedmont Barbara's-buttons, Spoon-leaved Barbara's-buttons. Clay flats, woodland borders, dry woodlands. Late April-May (-early June). Sc. VA south to se. TN (Chester, Wofford, & Kral 1997), sw. GA, Panhandle FL, and c. AL, primarily in the Piedmont. [= C, G, K, RAB, SE, Y, Z; = *M. obovata* var. *platyphylla* (M.A. Curtis) Beadle & F.E. Boynton - F, X; < *M. obovata* - FNA, S, W, WH]

Marshallia obovata (Walter) Beadle & F.W. Boynton var. *scaposa* Channell. Pine savannas. Late April-May. E. NC south to se. AL, in the Coastal Plain. [= K, RAB, SE, Y, Z; = *M. obovata* var. *obovata* - F, X, misapplied; < *M. obovata* - FNA, S]

Marshallia ramosa Beadle & F.E. Boynton, Pineland Barbara's-buttons, Southern Barbara's-buttons. Pinelands, Altamaha Grit outcrops, woodlands over ultramafic rocks. Coastal Plain from e. GA south to ne. FL and Panhandle FL. It somewhat resembles *M. graminifolia* in its linear leaves, but differs in the phyllaries acute (vs. subulate-acuminate), and flowering period (late May-June vs. July-mid-October). [= FNA, K, S, SE, WH, X, Y, Z]

Marshallia species I, Oak Barrens Barbara's-buttons. Diabase barrens and fire-maintained woodlands over greenstone. Late June-July; August-September. This species is known from three extant and one extirpated population, in Granville County, NC and Halifax Co. VA, where associated with numerous rare and disjunct taxa of prairie or barren affinities: *Solidago ptarmicoides*, *Solidago rigida* var. *glabrata*, *Symphotrichum depauperatum*, *Echinacea laevigata*, *Silphium terebinthinaceum*, *Baptisia australis* var. *aberrans*, *Linum sulcatum* var. *sulcatum*, *Carex meadii*, *Eryngium yuccifolium* var. *yuccifolium*, *Scutellaria leonardii*, *Lithospermum canescens*, and others. [< *M. grandiflora* - RAB]

Marshallia tenuifolia Rafinesque. Pine savannas. E. GA south to c. peninsular FL, west to e. TX. See *M. graminifolia* for additional discussion. [= GW, SE, WH, Z; < *M. graminifolia* - FNA; = *M. graminifolia* (Walter) Small var. *cynanthera* (Elliott) Beadle & F.E. Boynton - K, X; = *M. graminifolia* - S, misapplied; = *M. graminifolia* (Walter) Small ssp. *tenuifolia* (Rafinesque) L. Watson - Y]

Marshallia trinervia (Walter) Trelease, Colonial Barbara's-buttons, Broadleaf Barbara's-buttons. Moist rocky streambanks and in calcareous clays. July. E. SC (?), sw. NC, and sc. TN, south to s. AL and s. MS (Sorrie & Leonard 1999). Reported for VA by C; the documentation is unknown. [= C, F, FNA, G, K, RAB, S, SE, W, X, Y, Z]



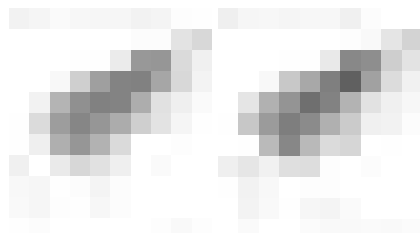
Matricaria Linnaeus 1740 (Mayweed)

A genus of about 7 species, herbs, of Eurasia and n. Africa. References: Brouillet in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. [also see *Tripleurospermum*]

- 1 Heads with evident white rays (very rarely lacking rays); plant chamomile-scented; disc flowers 5-lobed.....**M. chamomilla**
- 1 Heads discoid (lacking rays); plant pineapple-scented; disc flowers 4-lobed.....**M. discoidea**

* **Matricaria chamomilla** Linnaeus, German Chamomile, False Chamomile, Scented Mayweed. Roadsides; native of Europe. July-September. [= F, FNA, G, Pa, SE; = *Matricaria recutita* Linnaeus - C, K, Z; = *Chamomilla recutita* (Linnaeus) Rauschert]

* **Matricaria discoidea** A.P. de Candolle, Pineapple-weed, Rayless Chamomile. Barnyards, pastures, roadsides; native of w. North America. May-November. [= FNA, K, Pa, Z; = *M. matricarioides* (Lessing) T.C. Porter - C, F, G, RAB, SE, illegitimate name; ? *Lepidotheca suaveolens* (Pursh) Nuttall; ? *Chamomilla suaveolens* (Pursh) Rydberg]



Melampodium Linnaeus 1753

A genus of about 36 species, herbs, of tropical and subtropical America. References: Strother in FNA (2006c).

* *Melampodium divaricatum* (Richard) DC. Disturbed areas; native of tropical America. [= FNA, K, WH]



Melanthera Rohr 1792

A genus of about 35 species, herbs, of tropical and subtropical areas. References: Parks in FNA (2006c); Cronquist (1980)=SE; Wagner & Robinson (2001)=Z.

Melanthera nivea (Linnaeus) Small. Calcareous outcrops, sandy woodlands. June-October. E. SC south to s. FL, west to LA; also widespread in the West Indies, Mexico, Central America, and northern South America (Colombia, Ecuador, Peru, and Venezuela). [= FNA, K, SE, WH, Z; > *M. hastata* Michaux – RAB, S]



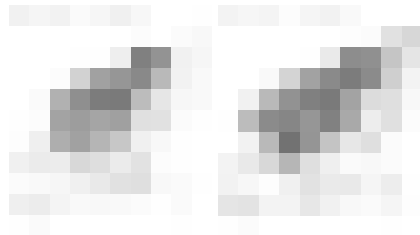
Mikania Willdenow 1803 (Climbing Hempweed)

A genus of about 430-450 species, vines, perennial herbs, and shrubs, primarily pantropical in distribution, but with extensions into temperate areas (Holmes 1995). References: Holmes in FNA (2006c); Cronquist (1980)=SE.

- 1 Involucre 6.5-8 mm; achenes 3.5-4.5 mm long; pubescence of the stems, leaves, and involucre spreading; [of se. SC southward] *M. cordifolia*
- 1 Involucre 4-5.5 (-6) mm high; achenes 1.5-2.5 (-2.7) mm long; pubescence of the stems, leaves, and involucre puberulent or nearly smooth; [widespread in our area] *M. scandens*

Mikania cordifolia (Linnaeus f.) Willdenow, Heartleaf Climbing Hempweed. Bottomland hardwood forests, mesic hammocks near the coast, margins of tidal marshes. Se. SC (Beaufort and Colleton counties) (P. McMillan, pers. comm. 2005), e. GA (Bryan & Camden counties) (Carter, Baker, & Morris 2009), south to s. FL, west to s. LA. [= K, S, SE, WH]

Mikania scandens (Linnaeus) Willdenow, Climbing Hempweed. Marshes, swamp forests, wet thickets, seepages. June-October. ME to s. ON, south to s. FL and e. TX, south into the tropics. [= C, G, GW, K, Pa, RAB, S, SE, W, WH; > *M. scandens* var. *pubescens* (Nuttall) Torrey & A. Gray – F; > *M. scandens* var. *scandens* – F]



Oclemena E.L. Greene 1903 (Aster, Nodding-aster)

A genus of 3 species, perennial herbs, of e. North America. There now appears to be strong evidence (morphologic and molecular) and something approaching a consensus for the recognition of *Oclemena* as distinct from *Aster*. It appears that *Oclemena* is most closely related to *Ionactis*, and that these two genera are more closely related to *Solidago* and *Heterotheica* than

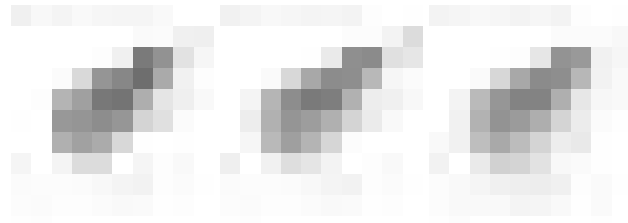
to *Aster* (in a narrower sense). References: Brouillet in FNA (2006b); Nesom (1994)=Z; Semple, Heard, & Xiang (1996)=Y; Cronquist (1980)=SE; Nesom (1997).

- 1 Leaves 30-100 or more per plant, 1-8 mm wide *O. nemoralis*
- 1 Leaves 11-30 per plant, 10-50 mm wide.
 - 2 Leaves obovate, acuminate at the tip, thin in texture; [of the Mountains] *O. acuminata*
 - 2 Leaves narrowly elliptic, acute to obtuse at the tip, coriaceous in texture; [of the Coastal Plain, from se. SC southward] *O. reticulata*

Oclemena acuminata (Michaux) Greene, Whorled Aster, Whorled Nodding-aster. Spruce-fir forests, northern hardwood forests, mountain seepages and streambanks, other cool, moist situations. July-September. NL (Newfoundland) and QC south to w. NC, ne. GA, and e. TN. [= FNA, K, Pa, Y, Z; = *Aster acuminatus* – C, F, G, RAB, SE, W, WV]

Oclemena nemoralis (Aiton) Greene, Leafy Bog Aster, Bog Nodding-aster. Peaty bogs. NL (Labrador) and ON south to nc. PA, MD, DE (formerly), and NJ. [= FNA, K, Pa, Z; = *Aster nemoralis* Aiton – C, F, G]

Oclemena reticulata (Pursh) G.L. Nesom, Pine-barren Aster. Wet pine flatwoods. Late April-early June. Se. SC south through e. GA to c. peninsular FL. [= FNA, K, WH, Z; = *Aster reticulatus* Pursh – GW, RAB, SE; = *Doellingeria reticulata* (Pursh) Greene – S]



Onopordum Linnaeus 1753 (Scotch Thistle, Cotton-thistle)

A genus of about 60 species, herbs, of the Mediterranean region and w. Asia. References: Keil in FNA (2006a); Cronquist (1980)=SE.

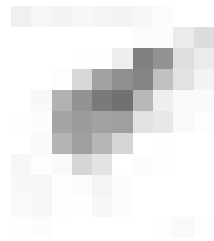
* ***Onopordum acanthium*** Linnaeus ssp. *acanthium*, Scotch Thistle, Cotton-thistle. Disturbed areas; native of Europe. July-October. [= FNA, Pa; > *O. acanthium* – C, F, G, K, S, SE, WH]



Oporinia D. Don 1829 (Fall-dandelion)

A genus of about 20 species, herbs, primarily of temperate Eurasia. Samuel et al. (2006) show that *Leontodon* subgenus *Oporinia* (including *L. autumnalis* among our species) should be recognized as a genus separate from *Leontodon* sensu stricto. References: Samuel et al. (2006); Bogler in FNA (2006a); Cronquist (1980)=SE.

* ***Oporinia autumnalis*** (Linnaeus) D. Don, Fall-dandelion. Roadsides, fields; native of Europe. June-October. [= *Leontodon autumnalis* Linnaeus – FNA, Pa, SE, WV; > *Leontodon autumnalis* Linnaeus var. *autumnalis* – C, F, G; > *L. autumnalis* ssp. *autumnalis* – K]



Nabalus Cassini 1825 (Rattlesnake-root)

A genus of about 20 species, perennial herbs, of temperate North America and e. Asia. Molecular and morphological studies suggest that *Prenanthes* includes disparate components, and North American taxa are best treated in the segregate genus *Nabalus*.

The sectional treatment of Sennikov (2000) does not appear to offer a coherent and helpful division of the genus and is not followed here. References: Bogler in FNA (2006a); Johnson (1980)=Z; Fusiak & Schilling (1984)=Y; Cronquist (1980)=SE; Sennikov (2000). Key adapted from C and SE, in part.

Identification notes: The species cannot be reliably identified in sterile condition. "Principal phyllaries" are the inner, well-developed, excluding the few smaller and poorly-developed outer phyllaries.

- 1 Principal phyllaries 12-15; florets 15-38 per head; [entering our area in WV from the north and west] *N. crepidineus*
- 1 Principal phyllaries 4-10; flowers mostly 4-19 per head; [collectively widespread in our area].
 - 2 Phyllaries evidently (though sometimes sparsely) pubescent with long coarse hairs (1.5-3 mm long).
 - 3 Inflorescence corymbiform to paniculiform, many of the branches well-developed.
 - 4 Phyllaries densely setose; leaves usually merely toothed, sinuate, or shallowly lobed *N. barbatus*
 - 4 Phyllaries sparsely setose; principal leaves usually evidently lobed *N. serpentarius*
 - 3 Inflorescence cylindrical, thyrsoid, the branches very short.
 - 5 Heads ascending or nearly erect; principal phyllaries (6-) 8 (-10); flowers (8-) 11-14 (-19) per head; [WV, KY, TN, nw. AL, MS and westward] *N. asper*
 - 5 Heads nodding; principal phyllaries 4-7 (-9); flowers 5-8 (-13) per head; [of the Southern Appalachians] *N. roanensis*
 - 2 Phyllaries glabrous or with few cilia or inconspicuous fine short pubescence at the tip.
 - 6 Principal phyllaries (4-) 5 (-6); flowers 4-6 per head *N. altissimus*
 - 6 Principal phyllaries 7-10; flowers 8-15 per head.
 - 7 Inflorescences narrow and elongate (virgate); flowers pink to purple *N. autumnalis*
 - 7 Inflorescences open, corymbiform to paniculiform, with some elongate branches; flowers white, cream, yellowish, pink, or purple.
 - 8 Pappus cinnamon-brown; corolla whitish to pinkish *N. albus*
 - 8 Pappus straw-colored to light brown; corolla pale yellow *N. trifoliolatus*

Nabalus albus (Linnaeus) Hooker, Northern Rattlesnake-root. Forests. July-November. ME west to MB, south to ne. NC, w. NC, WV, and MO. Reports of *N. albus* from the Coastal Plain of NC and perhaps VA are based on *P. alba* ssp. *pallida*, which is invalidly published; additionally, specimens attributed to this taxon appear to be better attributed to *P. trifoliolata*. [= S; = *Prenanthes alba* Linnaeus – C, F, FNA, G, K, Pa, SE, W, Z; = *P. alba* ssp. *alba* – RAB]

Nabalus altissimus (Linnaeus) Hooker, Tall Rattlesnake-root. Forests. August-November. NL (Newfoundland) west to MI, south to GA, LA, and AR. [= S; = *Prenanthes altissima* Linnaeus – FNA, G, K, Pa, RAB, W, WV, Y, Z; > *P. altissima* var. *altissima* – C, F, SE]

Nabalus asper (Michaux) Torrey & A. Gray, Rough Rattlesnake-root. Prairies, glades, and barrens. August-September. PA, OH, WI, MN, and SD south to c. TN, MS, LA, and OK. [= S; = *Prenanthes aspera* Michaux – C, F, G, K, SE]

Nabalus autumnalis (Walter) Weakley, Slender Rattlesnake-root. Pocosins, pine savannas, forest edges. September-November. NJ south to ne. FL, a Southeastern Coastal Plain endemic. [= *Prenanthes autumnalis* Walter – C, F, FNA, G, K, RAB, SE, WH, Z; = *Nabalus virgatus* (Michaux) A.P. de Candolle – S]

Nabalus barbatus (Torrey & A. Gray) A. Heller, Barbed Rattlesnake-root, Flatwoods Rattlesnake-root. Limestone glades and barrens. C. TN (Western Highland Rim) (Chester, Wofford, & Kral 1997), nw. GA, and n. AL west to se. AR, e. TX and w. LA. [= *Prenanthes barbata* (Torrey & A. Gray) Milstead – FNA, K, SE; < *Nabalus integrifolius* Cassini – S, misapplied; = *P. serpentaria* Pursh var. *barbata* Torrey & A. Gray]

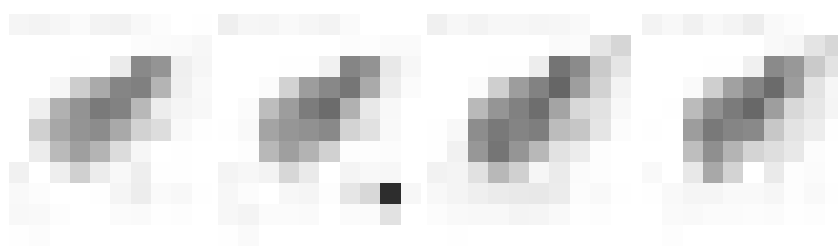


Nabalus crepidineus (Michaux) A. P. de Candolle, Midwestern Rattlesnake-root. Rich forests. August-November. A midwestern species, ranging east to NY, sw. PA, e. WV, and c. TN (Western Highland Rim) (Chester, Wofford, & Kral 1997). [= S; = *Prenanthes crepidinea* Michaux – C, F, FNA, G, K, Pa, SE, WV]

Nabalus roanensis Chickering, Roan Rattlesnake-root, Appalachian Rattlesnake-root. Mountain forests, grassy balds, at high elevations. August-October. Sw. VA south to w. NC and e. TN. Fusiak & Schilling (1984) studied *P. roanensis* and related species. Additional characters (other than those explicitly used in the key above) useful in separating *P. roanensis* from *P. altissima* are: phyllary tips usually black (vs. usually green), flowers 5-8 per head (vs. 4-6), and inflorescence usually narrow and thyrsoid (vs. usually conspicuously branched). [= *Prenanthes roanensis* (Chickering) Chickering – C, FNA, K, RAB, SE, W, Y, Z; > *P. cylindrica* (Small) Braun – G; > *Nabalus roanensis* Chickering – S; > *Nabalus cylindricus* Small – S]

Nabalus serpentarius (Pursh) Hooker, Lion's-foot, Gall-of-the-earth. Forests. August-October. MA south to GA, ne. FL, Panhandle FL, and MS. [= *Prenanthes serpentaria* Pursh – C, F, FNA, G, K, Pa, RAB, SE, W, WH, WV, Y, Z; > *Nabalus serpentarius* (Pursh) Hooker – S; >> *Nabalus integrifolius* Cassini – S (also see *Prenanthes barbata*)]

Nabalus trifoliolatus Cassini, Gall-of-the-earth. Forests. August-November. NL (Newfoundland) south to e. NC, n. GA, and TN. [= *Prenanthes trifoliolata* (Cassini) Fernald – C, FNA, G, K, Pa, SE, W, Z; > *P. trifoliolata* – RAB; > *P. alba* ssp. *pallida* Milstead – RAB, not validly published; > *P. trifoliolata* var. *trifoliolata* – F; = *Nabalus trifoliatus* – S, orthographic variant]



Packera Á. & D. Löve 1976 (Ragwort)

A genus of about 64 species, annual and perennial herbs, of subtropical, temperate, and arctic North American, with a few species in Siberia. These species have usually been considered part of *Senecio*, and have often been given informal status as "the Aureoid group". According to recent interpretations, this group warrants generic status, as *Packera* (Bremer 1994). References: Trock in FNA (2006b); Barkley (1962)=Z; Cronquist (1980)=SE; Barkley (1999)=Y; Barkley (1978)=X; Bremer (1994); Mahoney & Kowal (2008).

- 1 Plant an annual (rarely a biennial); leaf with lateral lobes broadly rounded, resembling the terminal lobe; [of wet soil of swamps and wet fields].....*P. glabella*
- 1 Plant a perennial (rarely a biennial); leaf with lateral lobes absent, or distinctly narrower than the terminal lobe; [of dry to mesic soils, but not generally as above].
 - 2 Principal leaves (especially the basal) 2-3-pinnatifid, the segments mostly 1-3 mm wide.....*P. millefolium*
 - 2 Principal leaves entire, toothed, or irregularly and raggedly 1-pinnatifid.
 - 3 Plants densely tomentose or floccose when young, remaining visibly tomentose throughout the growing season on the leaves (these appearing grayish because of the persistent tomentum); basal leaves entire, obscurely crenate, or serrate (rarely lobed).
 - 4 Basal leaves (including petioles) mostly 10-25 cm long, held in a vertical posture; [Coastal Plain and Piedmont of NC, SC, and VA, and Mountains of SC].....*P. tomentosa*
 - 4 Basal leaves (including petioles) mostly 3-10 cm long, arching or prostrate; [Mountains].
 - 5 Tomentum of leaf blades very fine and tight; [shale barrens and woodlands, w. VA and WV north to w. MD and wc. PA].....*P. antennariifolia*
 - 5 Tomentum of leaf blades coarser, looser; [calcareous, mafic, or ultramafic cliffs, barrens, and woodlands, w. VA and e. VA southward to w. NC and e. TN]*P. paupercula* var. *appalachiana*
 - 3 Plants glabrate to sparsely floccose when young, becoming glabrous to glabrate later in the growing season, though some species with some persistent floccose tomentum near the base or in the leaf axils (the leaves appearing green); basal leaves serrate or lobed.
 - 6 Basal leaves ovate, orbicular, or reniform, the blade 0.8-2× as long as wide; leaf blades cordate, truncate, or abruptly narrowed at the base.
 - 7 Basal leaves reniform, strongly cordate at the base.....*P. aurea*
 - 7 Basal leaves obovate to orbicular, truncate or abruptly narrowed at the base.....*P. obovata*
 - 6 Basal leaves oblanceolate, narrowly elliptic, the blade 2-8× as long as wide; leaf blades cuneate at the base (truncate to cordate in *P. schweinitziana*); plants usually not forming clonal patches by stolons or widely creeping rhizomes.
 - 8 Basal leaves with truncate to cordate bases (and typically oblique); [high elevation grassy balds].....*P. schweinitziana*
 - 8 Basal leaves cuneate at the base; [collectively widespread and of various habitats].
 - 9 Heads many, generally 20-100; basal leaves (including petioles) up to 30 cm long and 3.5 cm wide*P. anonyma*
 - 9 Heads few, generally 5-20; basal leaves (including petioles) up to 12 cm long and 2 cm wide*P. paupercula* var. *paupercula* and *P. crawfordii*

Packera anonyma (Wood) W.A. Weber & Á. Löve, Appalachian Ragwort, Small's Ragwort. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rock outcrops, roadsides, woodlands; hammocks, disturbed areas; common (rare in DE). May-early June. S. PA, DE, and KY, south to Panhandle FL and c. MS. [= FNA, K, Pa, WH, Y; = *Senecio anonymus* Wood – C, SE, X; = *Senecio smallii* Britton – F, G, RAB, S, WV]

Packera antennariifolia (Britton) W.A. Weber & Á. Löve, Shalebarren Ragwort. Mt (VA, WV): shale barrens and shale woodlands; rare. April-June. Sc. PA and w. MD south to w. VA and e. WV. [= FNA, K, Pa, Y; = *Senecio antennariifolius* Britton – C, F, G, SE, WV]

Packera aurea (Linnaeus) Á. & D. Löve, Golden Ragwort, Heartleaf Ragwort. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, FL, VA): moist forests, bottomlands, bogs, stream banks; common (rare in FL). Late March-June. NL (Labrador) west to MN, south to NC, ne. SC, n. GA, n. AL, and c. AR; disjunct in Panhandle FL. This species is variable, and some of the more striking variants have been named; some may well warrant formal taxonomic recognition, but additional study is needed. [= FNA, K, Pa, WH, Y; = *Senecio aureus* Linnaeus – C, G, GW, RAB, SE, WV, X; > *Senecio aureus* var. *aureus* – F; > *Senecio aureus* var. *intercurus* Fernald – F; > *Senecio aureus* var. *gracilis* (Pursh) Hooker – F; > *Senecio aureus* – S; > *Senecio gracilis* Pursh – S]

Packera crawfordii (Britton) A.M. Mahoney & R.R. Kowal ined. Mt, Cp (NC): bogs and fens; rare. NJ, PA, and s. IN south to e. NC, w. NC, and TN. [< *Senecio pauperculus* Michaux – RAB, C, G, GW, S, SE, X; = *Senecio crawfordii* (Britton) G.W. & G.R. Douglas – F; < *Packera paupercula* (Michaux) Á. & D. Löve – FNA, Pa]

Packera glabella (Poiret) C. Jeffrey, Butterweed, Smooth Ragwort, Yellowtop. Cp (FL, GA, NC, SC), Pd (GA, SC), Mt (GA, WV): swamp forests, bottomland forests, cleared areas in bottomlands, often in mucky soils; common (rare in WV). March-early June. E. NC south to s. FL, west to e. TX, north in the interior to sw. WV, OH, MO, and SD. [= FNA, K, Pa, WH, Y; = *Senecio glabellus* Poiret – C, F, G, GW, RAB, S, SE, WV, X]

Packera millefolium (Torrey & A. Gray) W.A. Weber & Á. Löve, Blue Ridge Ragwort, Yarrowleaf Ragwort. Granitic domes, cliffs, and rocky woodlands, over granite, gneiss, schist, and amphibolite, and in calcareous glades (in sw. VA). Late April-early June. Endemic to sw. NC, nw. SC, and ne. GA; disjunct in sw. VA (Lee Co.). The hybrid with *Packera anonyma* [= *Packera* × *memmingeri* (Britton) Weakley; = *Senecio* × *memmingeri* Britton (pro sp.)] occurs with the parents, and in some populations appears to be swamping out the rare *P. millefolium* (Gramling 2006). The epithet in *Packera* is often spelled “*millefolia*,” ignoring that this epithet is a noun in apposition based on the pre-Linnaean genus name *Millefolium* (for *Achillea*) (Weakley et al. 2011). [= *Senecio millefolium* Torrey & A. Gray – C, F, S, RAB, SE, X; = *Packera millefolia* – FNA, K, Y, orthographic variant]



Packera obovata (Muhlenberg ex Willdenow) W.A. Weber & Á. Löve, Roundleaf Ragwort, Running Ragwort. Nutrient rich forests and woodlands (dry or moist), usually over calcareous or mafic rocks. April-June. VT west to KS, south to Panhandle FL and TX. [= FNA, K, Pa, WH, Y; = *Senecio obovatus* Muhlenberg ex Willdenow – C, RAB, S, SE, X; > *Senecio obovatus* var. *obovatus* – F, G, WV; > *Senecio obovatus* var. *elliottii* (Torrey & A. Gray) Fernald – F, G, WV; > *Senecio obovatus* var. *rotundus* Britton – F; > *Senecio rotundus* (Britton) Small – S]

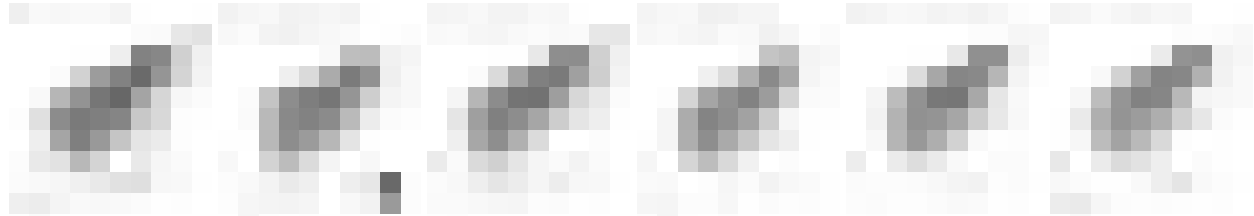
Packera paupercula (Michaux) Á. & D. Löve var. ***appalachiana*** A.M. Mahoney, Appalachian Ragwort. Glades, cliffs, barrens, over mafic, ultramafic, or calcareous rocks. April-May. E. WV and w. VA south to w. NC and e. TN. [< *Packera plattensis* (Nuttall) W.A. Weber & Á. Löve – FNA, K, Pa, Y, misapplied to our material; < *Senecio plattensis* Nuttall – C, F, G, SE, X, misapplied to our material]

Packera paupercula (Michaux) Á. & D. Löve var. ***paupercula***, Balsam Ragwort, Northern Meadow Groundsel. Thickets, meadows, glades, generally over circumneutral soils derived from calcareous or mafic rocks. April-May. NL (Labrador) west to AK, south to GA, Panhandle FL (Bay County), AL, and OR. [< *Packera paupercula* (Michaux) Á. & D. Löve – FNA, K, Pa, WH, X, Y; < *Senecio pauperculus* Michaux – C, G, GW, RAB, S, SE; > *Senecio pauperculus* var. *pauperculus* – F; > *Senecio pauperculus* var. *balsamitae* (Muhlenberg ex Willdenow) Fernald – F; > *Senecio pauperculus* var. *praelongus* (Greenman) House – F]

Packera paupercula (Michaux) Á. & D. Löve var. ***pseudotomentosa*** (Mackenzie & Bush) R.R. Kowal. {habitats}; rare. [] {not yet keyed; add to synonymy}

Packera schweinitziana (Nuttall) W.A. Weber & Á. Löve, New England Ragwort. Grassy balds (in deep soil), at high elevations, in our area generally over metagabbro or amphibolite. May-July. NS and QC south to n. NY; disjunct to a few locations in w. NC and e. TN, notably on grassy balds on Roan Mountain, Snake Mountain, Rich Mountain, and Big Bald. [= FNA, K; = *Senecio schweinitzianus* Nuttall – C, SE, X; = *Senecio robbinsii* Oakes ex Rusby – F, G, RAB, S; = *Packera schweinitzianus* – Y, orthographic variant]

Packera tampicana (de Candolle) C. Jeffery, Great Plains Ragwort. AR and KS south and east to e. LA (Florida parishes) or s. MS (SE), and south to TX and Mexico. [= FNA; = *Senecio imparipimatus* Klatt – SE] {not yet keyed}



Packera tomentosa (Michaux) C. Jeffery, Woolly Ragwort. Sandy roadsides, sandy woodlands and forests, granitic flatrocks, granitic domes. April-early June. S. NJ south to GA, west to TX, primarily on the Coastal Plain, but extending inland in the Piedmont and Mountains in thin sandy soils around rock outcrops, and as a roadside weed. [= FNA, K, Y; = *Senecio tomentosus* Michaux – C, F, G, GW, RAB, SE, X; > *Senecio tomentosus* – S; > *Senecio alabamensis* Britton – S]



A genus of about 12 species, shrubs and herbs, of s. North America. References: Strother in FNA (2006c); Turner & Morris (1976)=Z; Cronquist (1980)=SE.

- 1 Perennial suffrutescent herb or shrub, 3-15 dm tall; phyllaries unequal, the longer inner phyllaries 8-11 mm long; pappus scales of the inner cypselas 4-7 mm long; [longleaf pine sandhills and sandy scrub, of sc. GA and FL]*P. integrifolia*
- 1 Annual herb, 2-8 dm tall; phyllaries equal, 3-10 mm long; pappus scales of the inner cypselas **either** 0.3-1 **or** 2-6 mm long.
 - 2 Phyllaries 3-5 mm long; corollas 5-6 mm long; leaves 1-4 mm wide; pappus scales of the inner cypselas 0.3-1 mm long; [of calcareous prairies and glades, of MS westward].....*P. callosa*
 - 2 Phyllaries 5-8 mm long; corollas 7-10 mm long; leaves 5-20 mm wide; pappus scales of the inner cypselas 2-6 mm long; [alien in our area, of disturbed sites]*P. texana* var. *ambigua*

Palafoxia callosa (Nuttall) Torrey & A. Gray, Small Palafoxia. Blackland prairies. MO, AR, and OK south to c. TX and Coahuila; disjunct in c. MS. [= FNA, K, SE, Z]

Palafoxia integrifolia (Nuttall) Torrey & A. Gray, Coastal Plain Palafoxia. Sandhills. Sc. GA (Carter, Baker, & Morris 2009) south to s. FL. [= FNA, K, SE, WH, Z; = *Polypterus integrifolia* Nuttall – S]

* *Palafoxia texana* deCandolle var. *ambigua* (Shinners) B.L. Turner & M.I. Morris, Texas Palafoxia. Dry, disturbed areas; native of TX and Tamaulipas. [= K, WH, Z; < *P. texana* – FNA]



Panphalea Lagasca y Segura 1811

A genus of 9 species, herbs, of n. South America. Sometimes spelled *Pamphalea* (Hind in Kadereit & Jeffrey 2007). References: Pruski (2004); Hind in Kadereit & Jeffrey (2007).

* *Panphalea heterophylla* Lessing. Waste areas around wool-combing mill; perhaps merely a waif, native of South America. April. See Pruski (2004) and Nesom (2004d).



Parthenium Linnaeus 1753 (Wild Quinine)

A genus of about 16 species, herbs and shrubs, of North America and the West Indies. Mears (1975) does not seem to me to be a fully satisfactory explanation of the variation within the genus. Morphologically and ecologically, *P. auriculatum* seems worthy of specific status, and I have not followed Mears's reduction of it to varietal status. *P. integrifolium* var. *henryanum*, var. *mabryanum*, and var. *integrifolium* serve to describe real patterns of variation, but are disturbingly confluent morphologically, ecologically, and geographically. References: Mears (1975)=Z; Cronquist (1980)=SE; Strother in FNA (2006c).

- 1 Leaves pinnatifid to bipinnatifid, the primary sinuses extending 9/10 or more of the way to the midrib; leaves thin in texture; pappus of 2 petaloid scales; [alien annual]*P. hysterophorus*
- 1 Leaves toothed (pinnatifid in forms of *P. integrifolium* var. *mabryanum*, the sinuses extending up to 3/4 of the way to the midrib); leaves somewhat thick in texture; pappus of 2-3 weak awns; [native perennials].
 - 2 Stems with coarse, spreading pubescence 1-3 mm long; cauline leaves all auriculate-clasping, the upper cauline leaves sessile and auriculate-clasping, the lower cauline leaves with winged petioles, the wings expanded at the base; blades of basal leaves 11-18 (-20) cm long, 5-8 cm wide.....*P. auriculatum*
 - 2 Stems glabrous or with short, appressed pubescence <1 mm long; cauline leaves only rarely auriculate-clasping, the upper cauline leaves sessile or petiolate, the lower cauline leaves petiolate, the petioles winged or not; blades of basal leaves (4-) 6-21 (-27) cm long, (1.4-) 2-12 (-13.5) cm wide.
 - 3 Blades of basal leaves ovate-lanceolate, (4-) 6-12 (-20) cm long, (3-) 4-8 (-9.5) cm wide, never undulately lobed; heads (18-) 90-180 (-400) per inflorescence.....*P. integrifolium* var. *integrifolium*

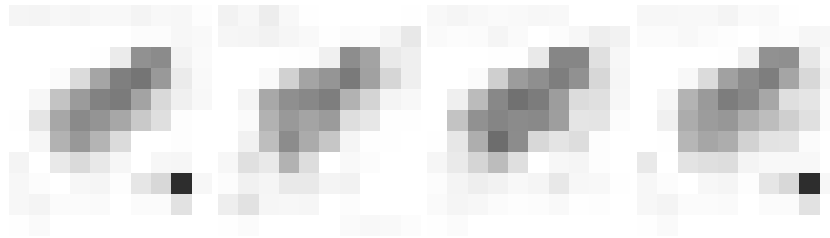
- 3 Blades of basal leaves linear-lanceolate to ovate-lanceolate, (6-) 7-12 (-13.5) cm long, (1.4-) 2-4 (-4.5) cm wide, sometimes undulately lobed throughout their length; heads (30) 40-75 (-85) per inflorescence.....*P. integrifolium* var. *mabryanum*

Parthenium auriculatum Britton, Glade Wild Quinine. In shallow, xeric, circumneutral soil of glades, barrens, and woodlands, over calcareous rocks (such as dolostone) or mafic rocks (such as diabase). Mid May-August. Ne. WV south to c. NC and n. AL, west to c. TN. As indicated by the confusion over its taxonomy, the relationships and appropriate taxonomic treatment of this taxon are unclear. It is clearly a close relative of the Ozarkian *P. hispidum* Rafinesque, and perhaps not readily distinguished from it; some, at least, of our material has creeping rhizomes and heads over 7 mm in diameter, supposed to be distinguishing features of *P. hispidum*. [= C, G, K, SE; = *P. integrifolium* var. *auriculatum* (Britton) Cornelius ex Cronquist – RAB, Z; = *P. hispidum* Raf. var. *auriculatum* (Britton) Rollins – F, WV; < *P. integrifolium* – FNA, S; < *P. hispidum* Rafinesque – W]

* *Parthenium hysterophorus* Linnaeus, Santa Maria, Feverfew. Disturbed areas; native of tropical America, including the West Indies. July-November. [= C, F, FNA, G, K, Pa, S, SE, WH]

Parthenium integrifolium Linnaeus var. *integrifolium*, Common Wild Quinine. Various dryish habitats, mainly open or sparsely wooded. Late May-August. VA west to MN, south to SC, GA, ne. MS, and nw. AR. Var. *henryanum* Mears appears to be merely a form of var. *integrifolium*. [= K; < *P. integrifolium* var. *integrifolium* – RAB; < *P. integrifolium* – C, F, FNA, G, Pa, S, SE, W, WV; > *P. integrifolium* var. *integrifolium* – Z; > *P. integrifolium* var. *henryanum* Mears – Z]

Parthenium integrifolium Linnaeus var. *mabryanum* Mears, Mabry's Wild Quinine. Sandhills and other dry soils, in forest openings or woodlands. Late May-November (blooming strongly in response to fire). Nc. SC, e. NC, and se. VA, barely extending into the e. Piedmont of NC in dry sandy soils around granitic flatrocks or in (formerly) fire-maintained communities. Var. *mabryanum* is the characteristic variety of *P. integrifolium* in the Sandhills of NC. Mears named a new species, *P. radfordii* Mears, to accommodate sinuate-lobed *Parthenium* from the fall-line sandhills of NC and SC, which he also believed to be later-blooming (August-November) than other *Parthenium*. Extensive observations in the Sandhills of NC show that "*P. radfordii*" consistently co-occurs in mixed populations with *P. integrifolium* var. *mabryanum*, and that flowering is triggered by fire. These sinuate-lobed plants are best considered a form of var. *mabryanum*. [= K; < *P. integrifolium* var. *integrifolium* – RAB; < *P. integrifolium* – C, F, FNA, G, S, SE, W; > *P. integrifolium* var. *mabryanum* – Z; > *P. radfordii* Mears – Z]



Pascalía Ortega 1797

A genus of 2 species, perennial herbs, of South America. References: Strother in FNA (2006c).

* *Pascalía glauca* Ortega, Beach Creeping Oxeye. Coastal dunes, disturbed areas; native of South America, perhaps only a waif. Reported for FL, GA, and AL. [= FNA, K, S, WH; = *Wedelia glauca* (Ortega) O. Hoffmann – SE]



Pectis Linnaeus 1759

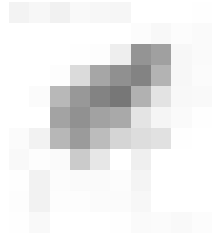
A genus of about 90 species, herbs, of s. North America, Mexico, Central America, West Indies, South America, and Pacific Islands. References: Keil in FNA (2006c).

* *Pectis prostrata* Cavanilles. Roadsides, mowed areas, other dry disturbed areas; native of tropical America (probably including s. FL). July-November. Reported for NC (Basinger, pers. comm. 2006) and GA (Carter, Baker, & Morris 2009); likely to be in AL and SC. Spreading northward along roadsides. [= FNA, WH]



Peripleura (N.T. Burbidge) G.L. Nesom 1994

* *Peripleura arida* (N.T. Burbidge) G.L. Nesom. Waste areas around wool-combing mill, perhaps only a waif; native of Australia. See Nesom (2004d). [= *Vittadinia arida* N.T. Burbidge]



Petasites P. Miller 1754 (Butterbur)

A genus of 15-18 species, perennial herbs, of Eurasia and boreal North America. References: Bayer, Bogle, & Cherniawsky in FNA (2006b).

* *Petasites hybridus* (Linnaeus) P.G. Gaertner, B. Meyer, & Scherbius, Butterbur, Butterfly-dock. Disturbed areas, frequently cultivated, rarely naturalized or persisting, native of Europe. April-May. Introduced and naturalizing south to DE, WV, and se. PA. [= C, F, FNA, G, K, Pa, SE]



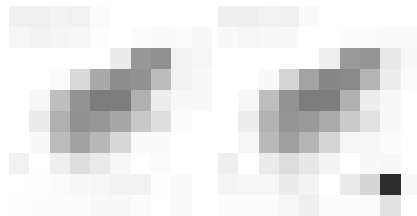
Phoebanthus S.F. Blake 1916

A genus of 2 species, perennial herbs, of the Southeastern United States (FL and AL). References: Schilling in FNA (2006c).

- 1 Leaves 3-5 mm wide; phyllaries appressed; [of ne. FL south to s. peninsular FL].....*P. grandiflorus*
- 1 Leaves 1.2 mm wide; phyllaries spreading; [of Panhandle FL and s. AL].....*P. tenuifolius*

Phoebanthus grandiflorus (Torrey & A. Gray) S.F. Blake. Sandhills. March-November. Ne. FL (Clay County) south to c. peninsular FL. [= FNA, K, SE, WH; = *P. grandiflora* – S, orthographic variant]

Phoebanthus tenuifolius (Torrey & A. Gray) S.F. Blake. Sandhills and flatwoods. May-September. Endemic to s. AL and Panhandle FL. [= FNA, K, SE, WH; = *P. tenuifolia* – S, orthographic variant]

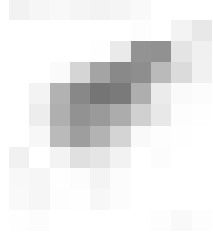


Picris Linnaeus 1753 (Bitterweed, Oxtongue)

A genus of about 40 species, of the Old World, particularly the Mediterranean region. References: Strother in FNA (2006a); Cronquist (1980)=SE. [also see *Helminthotheca*]

- 1 Phyllaries in 2 series; phyllaries 3.5-8 mm wide; inner phyllaries 12-20 mm long; plant annual or biennial..... [see *Helminthotheca echioides*]
- 1 Phyllaries imbricate; phyllaries <3 mm wide; inner phyllaries 11-13 mm long; plant biennial to perennial..... *P. hieracioides*

* *Picris hieracioides* Linnaeus, Hawkweed Oxtongue, Cat's-ear. Disturbed areas; native of Europe. May-October. [= RAB, C, F, FNA, G, Pa, SE, W; > *Picris hieracioides* Linnaeus ssp. *hieracioides* – K]



Pityopsis Nuttall 1840 (Grass-leaved Golden-aster)
(contributed by Bruce A. Sorrie)

A genus of about 8 species (and numerous infraspecific taxa), herbs, of se. North America south to Central America. *Pityopsis* is taxonomically and nomenclaturally a difficult genus. The problems include nomenclatural issues involving typification and application (and frequently misapplication) of a plethora of names at specific and varietal level, disagreement over whether to include *Pityopsis* within an inclusive *Chrysopsis*, whether then to include *Chrysopsis* within an even more inclusive *Heterotheca*, and differences in species concepts in a morphologically and cytologically diverse group. References: Semple in FNA (2006b); Semple & Bowers (1985)=Z; Ward (2004c)=Y; Cronquist (1980)=SE.

- 1 Basal leaves shorter than the stem leaves; middle and upper stem leaves similar in size to one another.
 - 2 Leaves and stem glabrate, not silky pubescent; leaves 0.8-1.5 mm wide; [of the fall line Sandhills, from sc. NC south to AL] *P. pinifolia*
 - 2 Leaves and stems silky pubescent; leaves 2-7 mm wide; [of se. TN, or of s. NJ northward, or of FL Panhandle].
 - 3 Peduncles and phyllaries moderately to densely stipitate-glandular; [plants of the Mountains of TN] [*P. ruthii*]
 - 3 Peduncles and phyllaries not stipitate-glandular (or only sparsely and minutely so); [plants of the Coastal Plain].
 - 4 Stems straight; involucre 5-8 mm high; [plants of sandy places, from s. NJ northward]..... *P. falcata*
 - 4 Stems flexuous; involucre (7-) 8-11 mm high, equaling the pappus; [plants of Panhandle FL] *P. flexuosa*
- 1 Basal leaves much longer than the stem leaves; stem leaves strongly reduced upward, the upper stem leaves much smaller than middle stem leaves.
 - 5 Heads < 10; cauline leaves few, generally 2-7; [of sw. GA westward and southward]..... *P. oligantha*
 - 5 Heads > 10; cauline leaves many; [collectively widespread in our area].
 - 6 Peduncles and upper stem densely glandular-hairy (stipitate-glandular); phyllaries densely glandular-hairy; involucre 4.5-8 mm high; lower leaves < 10 mm wide.
 - 7 All stem leaves silky pubescent; [widespread in our area]..... *P. aspera* var. *adenolepis*
 - 7 Lower leaves silky pubescent, the mid to upper stem leaves glabrate and evidently stipitate glandular along the margins; [of sc. GA south into Panhandle FL]..... *P. aspera* var. *aspera*
 - 6 Peduncles and upper stem eglandular to sparsely glandular; phyllaries eglandular, or the inner phyllaries sparsely to densely glandular, at least distally; involucre 5-14 mm high; lower leaves up to 20 mm wide.
 - 8 Involucre 8-14 mm high; disc florets > 30
 - 9 Involucre 8-12 mm high; ray florets 10-16; disc corolla throats and lobes glabrous to short pilose (never long pilose); [widespread] *P. graminifolia* var. *latifolia*
 - 9 Involucre 12-14 mm high; ray florets 13-25; disc corolla throats and lobes sometimes long-pilose; [of FL Panhandle] *P. graminifolia* var. *tracyi*
 - 8 Involucre 5-8 mm high; disc florets 15-29.
 - 10 Inner phyllaries densely stipitate-glandular, at least distally *P. graminifolia* var. *graminifolia*
 - 10 Inner phyllaries eglandular to sparsely glandular *P. graminifolia* var. *tenuifolia*

Pityopsis aspera (Shuttleworth ex Small) Small var. *adenolepis* (Fernald) Semple & Bowers. Dry woodlands, forests, and disturbed places, apparently in the NC Mountains only in the Escarpment. Late June-October. E. and c. VA south to n. FL and west to s. MS. Var. *adenolepis* includes 2 chromosome numbers (2n = 18 and 36), which "account, in part, for the range of variation in involucre, floret, and fruit size" (Semple & Bowers 1985). [= FNA, K, Z; > *Heterotheca adenolepis* (Fernald) H.E. Ahles – RAB; > *Heterotheca graminifolia* (Michaux) Shinnars – RAB, misapplied; < *Chrysopsis graminifolia* (Michaux) Elliott var. *aspera* (Shuttleworth ex Small) A. Gray – C, G, SE, W; = *Chrysopsis graminifolia* (Michaux) Elliott – F, misapplied; = *P. adenolepis* (Fernald) Semple; < *Pityopsis aspera* – S, WH; < *Heterotheca aspera* (Shuttleworth ex Small) Shinnars]

Pityopsis aspera (Shuttleworth ex Small) Small var. *aspera*. Sandhills, dry flatwoods. Sc. GA south to Panhandle FL. [= FNA, K, Z; < *Pityopsis aspera* – S, WH; < *Chrysopsis graminifolia* (Michaux) Elliott var. *aspera* (Shuttleworth ex Small) A. Gray – SE]

Pityopsis falcata (Pursh) Nuttall. Stable dunes (NJ), farther north in sandplain grasslands, coastal heathlands, pitch pine-scrub oak barrens. Se. MA south through RI, CT, and NY (Long Island) to s. NJ; found once as a rare introduction in wc. peninsular FL (Pinellas County – Wunderlin & Hansen 2003). [= FNA, K, Z; = *Chrysopsis falcata* (Pursh) Elliott – C, F, G]

Pityopsis flexuosa (Nash) Small. Sandhills. E. Panhandle FL. [= FNA, S, WH, Z; = *Chrysopsis flexuosa* Nash – SE]

Pityopsis graminifolia (Michaux) Nuttall var. *graminifolia*. Sandhills. July-October. As interpreted here, *P. graminifolia* includes 5 varieties "that intergrade and hybridize, when the ploidy level is the same" (Semple & Bowers 1985). Var. *graminifolia* ranges from se. NC south to c. peninsular FL, and west to e. LA; in our area it is known only from the outer Coastal Plain. Two of the varieties do not reach our area, being restricted to peninsular FL: var. *aequilifolia* Bowers & Semple and the hexaploid (2n = 54) var. *tracyi* (Small) Semple. [= FNA, K, Z; < *Heterotheca nervosa* (Willdenow) Shinnars var. *microcephala* (Small) Shinnars ex H.E. Ahles – RAB; < *Chrysopsis graminifolia* (Michaux) Elliott var. *graminifolia* – C; < *Pityopsis microcephala* (Small) Small – S; < *Chrysopsis graminifolia* (Michaux) Elliott var. *microcephala* (Small) Cronquist – SE; < *Pityopsis graminifolia* – WH]

Pityopsis graminifolia (Michaux) Nuttall var. *latifolia* Fernald. Sandhills, dry woodlands and forests (such as ridgetop pine/heath communities in the Mountains), roadbanks. June-October. Var. *latifolia* is the most widely distributed variety of *P. graminifolia*, ranging from DE (formerly), s. OH, and c. AR south to s. FL and e. TX; Bahamas; and in Mexico (Tamaulipas, Vera Cruz, Oaxaca, Chiapas) and Central America (Belize, Guatemala, Honduras). [= FNA, K, Z; > *Heterotheca nervosa* (Willdenow) Shinnars var. *nervosa* – RAB; > *Heterotheca correllii* (Fernald) H.E. Ahles – RAB; = *Chrysopsis graminifolia* (Michaux) Elliott var. *latifolia* Fernald – C, W; > *Chrysopsis nervosa* (Willdenow) Fernald var. *nervosa* – F; < *Chrysopsis graminifolia* (Michaux) Elliott – G; > *Chrysopsis nervosa* var. *virgata* Fernald – F; > *Chrysopsis nervosa* var. *stenolepis* Fernald – F; = *Pityopsis graminifolia* – S, misapplied; = *Chrysopsis graminifolia* (Michaux) Elliott var. *graminifolia* – SE, misapplied; < *Pityopsis graminifolia* – WH]



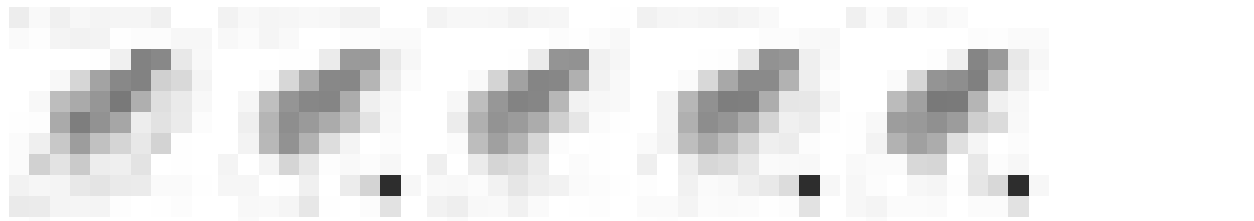
Pityopsis graminifolia (Michaux) Nuttall var. *tenuifolia* (Torrey) Semple & Bowers. Sandhills, sandy woodlands, savannas, pine flatwoods. July-October. Var. *tenuifolia* ranges from se. NC south to s. FL and west to e. TX (north inland to c. AR and e. OK); apparently disjunct in se. VA. [= FNA, K, Z; < *Heterotheca nervosa* (Willdenow) Shinnars var. *microcephala* (Small) Shinnars ex H.E. Ahles – RAB (also see *P. graminifolia* var. *graminifolia*); < *Pityopsis microcephala* (Small) Small – S (also see *P. graminifolia* var. *graminifolia*); < *Chrysopsis graminifolia* (Michaux) Elliott var. *microcephala* (Small) Cronquist – SE (also see *P. graminifolia* var. *graminifolia*); < *Pityopsis graminifolia* – WH; ? *Pityopsis nervosa* var. *nervosa* – Y]

Pityopsis graminifolia (Michaux) Nuttall var. *tracyi* (Small) Semple. Sandhills. October-December. Endemic to Panhandle FL; reports of it in n. AL are probably based on aberrant individuals of *P. graminifolia*. [= FNA, K, Z; = *P. tracyi* Small – S; < *Chrysopsis graminifolia* – SE; < *Pityopsis graminifolia* – WH; = *Pityopsis nervosa* (Willdenow) Dress var. *tracyi* (Small) D.B. Ward]

Pityopsis oligantha (Chapman ex Torrey & A. Gray) Small, Narrow-leaved Goldenaster. Wet flatwoods and pitcherplant bogs. Sw. GA and Panhandle FL west to s. AL (alleged reports from farther west seem to be in error). [= FNA, K, S, WH, Z; = *Chrysopsis oligantha* Chapman ex Torrey & A. Gray – SE; = *Heterotheca oligantha* (Chapman ex Torrey & A. Gray) Harms]

Pityopsis pinifolia (Elliott) Nuttall, Sandhill Goldenaster. Sandhills, sandy roadsides. August-October. This species is locally abundant (and often weedy) but very local in distribution, limited to (apparently) scattered counties in the Sandhills (rarely middle Coastal Plain) of s. NC, SC, GA, and c. AL. [= FNA, K, S, Z; = *Heterotheca pinifolia* (Elliott) H.E. Ahles – RAB; = *Chrysopsis pinifolia* Elliott – SE]

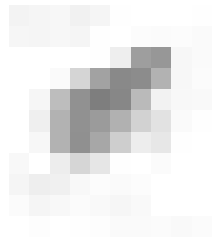
Pityopsis ruthii (Small) Small. Flood-scoured rocks along rivers. Restricted to rocks within the flood zone of the Hiwassee and Ocoee rivers, Polk County, TN; it should be sought in adjacent sw. NC. [= FNA, K, S, Z; = *Chrysopsis ruthii* Small – SE; = *Heterotheca ruthii* (Small) V.L. Harms]



Plectocephalus D. Don in R. Sweet 1830 (Basketflower)

A genus of 4 species, annual herbs, of midwestern North America, Mexico, South America, and Africa. References: Keil in FNA (2006a).

* *Plectocephalus americanus* (Nuttall) D. Don in R. Sweet, American Basketflower. Waste ground around wool-combing mills; Native of sc. North America (Nesom 2004d). [= FNA; = *Centaurea americana* Nuttall – C, F, G, K, SE]



Pluchea Cassini 1817 (Marsh-fleabane)

A genus of about 40 species, herbs and shrubs, of tropical, subtropical, and warm temperate regions. References: Nesom in FNA (2006a); Godfrey (1952)=Z, Nesom (1989, 2004a)=Y; Arriagada (1998)=X; Pruski (2005)=V; Cronquist (1980)=SE. Key based on FNA and other sources.

- 1 Stems winged by decurrent leaf bases *P. sagittalis*
- 1 Stems not winged by decurrent leaf bases.
 - 2 Leaves petiolate or narrowly cuneate at the base; [section *Pluchea*].
 - 3 Phyllaries glandular on the outer surface (the outer bracts also somewhat pubescent); inflorescence paniculiform, the lateral branches not reaching or exceeding the central branches; plants to 20 dm tall; [in freshwater habitats, widespread in the Coastal Plain and Piedmont] *P. camphorata*
 - 3 Phyllaries short-pubescent with several-celled glandular-tipped hairs; inflorescence more-or-less cymiform and flat-topped, some of the lower lateral branches elongate and reaching or exceeding the central branches; plants to 10 (-15) dm tall; [mainly in salty or brackish habitats, restricted to the outer Coastal Plain] *P. odorata*
 - 2 Leaves sessile, and either rounded, truncate, or clasping at the base; [section *Amplectifolium*].
 - 4 Leaves mostly 8-20 cm long and 3-7 cm wide; involucre 9-12 mm high; middle phyllaries 2.5-3 mm wide *P. longifolia*
 - 4 Leaves mostly 3-10 cm long and 1-3 cm wide; involucre 5-10 mm high; middle phyllaries 1-1.5 mm wide.
 - 5 Stems and leaves glandular, otherwise nearly glabrous; involucre 4-5 mm wide *P. yucatanensis*
 - 5 Stems and leaves puberulent or arachnose as well as glandular; involucre 5-12 mm wide.
 - 6 Corollas pink or purple; heads 4-6 mm high, 5-9 mm wide; phyllaries usually arachnoid and commonly also with dense, thick, viscid hairs; outer phyllaries acuminate; nutlets black, 0.5-1 mm long, densely pubescent; [flowering June-July] *P. baccharis*
 - 6 Corollas creamy white; heads 6-10 mm high, 6-12 mm wide; phyllaries thinly arachnoid, with sessile glands; outer phyllaries obtuse or obtuse-apiculate; nutlets pinkish, ca. 1 mm long, pubescent on the angles; [flowering late July-October].
 - 7 Plants 3-11 dm tall; inner phyllaries 4-6 mm long; [widespread in our area] *P. foetida* var. *foetida*
 - 7 Plants 9-25 dm tall; inner phyllaries 6-7 mm long; [of the Coastal Plain of SC southward] *P. foetida* var. *imbricata*

Pluchea baccharis (P. Miller) Pruski, Marsh Fleabane. Wet savannas, natural ponds, marshes, ditches. June-July. E. NC south to s. FL, west to se. TX; Bahamas, Cuba, Mexico, and Central America. Pruski (2005) established that *P. baccharis* is the correct name for the taxon known in recent decades as *P. rosea*. Godfrey (1952) recognized two varieties of *P. rosea*, var. *rosea* of se. United States and var. *mexicana* R.K. Godfrey of gypsum plains in San Luis Potosí, Mexico; Nesom (1989) recognized the latter taxon at the species level, *P. mexicana* (R.K. Godfrey) Nesom. [= FNA, V. WH; = *P. rosea* R.K. Godfrey – RAB, K, WH, X, Y; = *P. rosea* var. *rosea* – GW, SE]

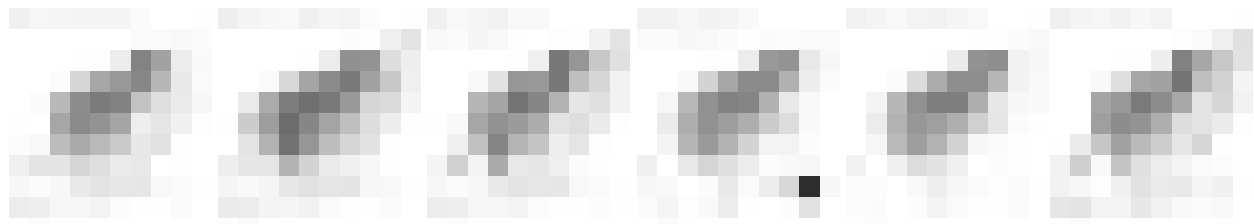
Pluchea camphorata (Linnaeus) A.P. de Candolle, Camphorweed, Camphor Pluchea. Bottomland sloughs, clay flatwoods, other freshwater wetlands. August-October. DE (formerly) and MD south to n. peninsular FL, west to TX and OK, north in the interior to s. OH and e. KS. [= RAB, C, F, FNA, G, GW, K, SE, WH, X, Y; = *P. petiolata* Cassini – S]

Pluchea foetida (Linnaeus) A.P. de Candolle var. *foetida*, Stinking Fleabane. Seasonally wet areas, ditches, various other freshwater wetlands. Late July-October. S. NJ south to s. FL, west to e. TX; West Indies (?). [= K; < *P. foetida* – RAB, C, F, FNA, G, GW, SE, WH, X, Y; > *P. foetida* – S; > *P. tenuifolia* Small – S]

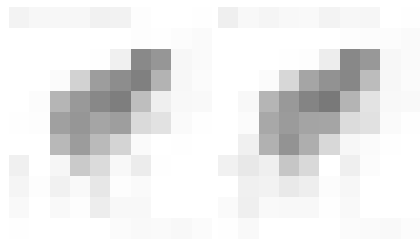
Pluchea foetida (Linnaeus) A.P. de Candolle var. *imbricata* Kearney. Freshwater wetlands. Late July-October. SC south to FL Panhandle. The validity and distribution of this taxon need additional study. [= K; < *P. foetida* – RAB, C, FNA, GW, SE, WH, X, Y; = *P. imbricata* (Kearney) Nash – S]

Pluchea longifolia Nash. Brackish and freshwater marshes and swamps, ditches, canals. Ne. FL and eastern FL Panhandle (Wakulla and Taylor counties) south to c. peninsular FL (Wunderlin & Hansen 2008). [= FNA, GW, S, WH]

Pluchea odorata (Linnaeus) Cassini, Saltmarsh Fleabane. Salt and brackish marshes. August-October. MA and MI south to s. FL and TX (mostly on the Coastal Plain), also in w. United States, Central America, and South America. Two varieties are sometimes recognized, the widespread and more robust, but small headed var. *odorata* (involucre 4-6 (-7) mm across the disk, with 6-13 (19) functionally staminate flowers; plants 2-8 (-20) dm tall; of VA southward), and the northeastern North American and less robust but large-headed var. *succulenta* (involucre 7-8 (-10) mm across the disk, with (14-) 21-34 functionally staminate flowers; plants 2-6 dm tall; of NC northward). Additional study is needed to warrant recognition of the varieties. [= GW, WH, X, Y; = *P. purpurascens* (Swartz) A.P. de Candolle – RAB; > *P. odorata* var. *odorata* – C, FNA, K, SE; > *P. odorata* (Linnaeus) Cassini var. *succulenta* (Fernald) Cronquist – C, FNA, K, Pa, SE; > *P. purpurascens* (Swartz) A.P. de Candolle var. *purpurascens* – F, G; > *P. purpurascens* (Swartz) A.P. de Candolle var. *succulenta* Fernald – F, G; > *P. camphorata* – S, misapplied]



- * *Pluchea sagittalis* (Lamarck) Cabrera, Wing-stem Camphorweed. Disturbed areas, probably only a waif, known from old collections (1891-1901) from Pensacola, FL, and Mobile, AL; native of South America. July-August. [= FNA, WH; = *P. quitoc* de Candolle – S; = *P. suaveolens* (Vell.) Kuntze – SE] {synonymy incomplete}
- * *Pluchea yucatanensis* Nesom, Yucatan Camphorweed. Brackish marshes; native of Mexico and Belize. Introduced in s. AL and s. MS. [= FNA]



***Polymnia* Linnaeus 1753**

A genus of 4 species, herbs, of e. North America. References: Estes & Beck (2011)=Y; Wells (1965)=Z; Strother in FNA (2006c); Cronquist (1980)=SE. Key based on Y. [also see *Smalanthus*]

- 1 Cypselas (4-) 5 (-6)-ribbed; stem glabrous or nearly so (except sometimes short-hairy in the inflorescence); heads 3-7 mm in diameter; disc florets 15-29; ray florets 3-6 *P. laevigata*
- 1 Cypselas 3-ribbed; stem obviously and usually densely long-pubescent (rarely glabrous or glabrescent except the upper stem); heads 6-15 mm in diameter; disc florets 26-74; ray florets 5-17.
 - 2 Leaves of the midstem and below pinnatifid, with 5-7 primary lobes; phyllaries glandular-pubescent and with abundant longer, eglandular septate hairs; [widespread] *P. canadensis*
 - 2 Leaves of the midstem and below bipinnatifid to nearly pinnate-pinnatifid, with 10-21 primary lobes; phyllaries densely glandular-puberulent and with longer, eglandular, septate hairs lacking, or few and restricted to the margins; [narrow endemic of Marion County, TN] *P. johnbeckii*

Polymnia canadensis Linnaeus, White-flowered Leafcup. Moist forests, particularly over calcareous rocks. July-October. VT and ON west to MN, south to NC, nw. GA, AL, and AR. [= C, F, FNA, G, K, Pa, RAB, SE, W, WV, Y, Z; > *P. canadensis* – S; > *P. radiata* (A. Gray) Small – S]

Polymnia johnbeckii D. Estes, John Beck’s Leafcup. Limestone boulders and outcrops. Narrow endemic of Marion County, TN. See Estes & Beck (2011) for additional information. [= Y]

Polymnia laevigata Beadle, Tennessee Leafcup. Bouldery slopes, coquina outcrops and rubble (in FL). W., c., and se. TN (Chester, Wofford, & Kral 1997), AL, Panhandle FL (Jackson County), nw. GA, and MO. [= FNA, K, S, SE, WH, Y, Z]



***Pseudognaphalium* Kirpicznikov 1950 (Rabbit-tobacco)**

A genus of about 100 species, herbs, nearly cosmopolitan, especially of American temperate regions. References: Nesom in FNA (2006a); Mahler (1975)=Z; Arriagada (1998)=Y; Cronquist (1980)=SE; Nesom (2001a)=X; Anderberg (1991). Key based, in part, on SE.

- 1 Involucre 2-3 mm high; plants 3-15 (-25) cm tall; inflorescence of many, small, axillary and terminal clusters overtopped by subtending leaves [see *Gnaphalium uliginosum*]
- 1 Involucre 3-7 mm high; plants 15-100 cm tall; inflorescence terminal, elongate, clustered, or corymbiform.
 - 2 Leaves distinctly (but shortly) decurrent 1-10 mm and adnate-auriculate on the stem.
 - 3 Upper surface of the leaves coarsely glandular-hairy; heads in corymbiform arrays *P. macounii*
 - 3 Upper surface of the leaves loosely tomentose, not glandular; heads in terminal glomerules

- 4 Involucres 3-4 mm high; bisexual florets 5-10 (corollas red-tipped); cypselae with papilliform hairs *P. luteoalbum*
- 4 Involucres 4-6 mm high; bisexual florets mostly 18-28 (corollas evenly yellowish, not red-tipped); cypselae glabrous *P. stramineum*
- 2 Leaves sessile, not decurrent or adnate-auriculate.
- 5 Stem white-woolly or arachnoid with matted white hairs, the stem surface generally obscured (sometimes glandular-pubescent at the base of the stem only) *P. obtusifolium*
- 5 Stem glandular-pubescent or glandular-puberulent, the hairs at right angles to the stem, the stem surface plainly visible.
- 6 Stems glandular-villous, the stipitate glands (0.1-) 0.3-1.0 mm high, prominently variable in height on any portion of the stem, with a stalk broadened toward the base and about equal the gland width; pistillate florets 83-107, bisexual florets 9-15; leaves mostly oblong-lanceolate, 2.5-7 cm long, 4-20 mm wide, 4-8 times longer than wide; plant 4-10 dm tall *P. helleri*
- 6 Stems glandular-puberulent, the stipitate glands 0.1-0.2 mm high, relatively even in height on any portion of the stem, with a filiform stalk of even width and narrower than the gland width; pistillate florets 47-78, bisexual florets (7-) 11-20; leaves linear to linear-lanceolate or linear-oblongate, 1.5-5.5 cm long, 1.5-10 mm wide, 6-10 times longer than wide; plant 3-7 dm tall *P. micradenium*

Pseudognaphalium helleri (Britton) A. Anderberg, Heller's Rabbit Tobacco. Dry woodlands and openings (especially over mafic rocks), sandhills. September-October. Sc. VA south to Panhandle FL, s. AL, west to AR, LA, and ne. TX. [= FNA, X; = *Gnaphalium helleri* Britton var. *helleri* - Z; < *Gnaphalium helleri* - C, G, RAB, S, SE, W (also see *P. micradenium*); = *Gnaphalium obtusifolium* var. *helleri* (Britton) Blake - F, Y; = *Pseudognaphalium helleri* (Britton) A. Anderberg ssp. *helleri* - K; < *Pseudognaphalium helleri* - WH]

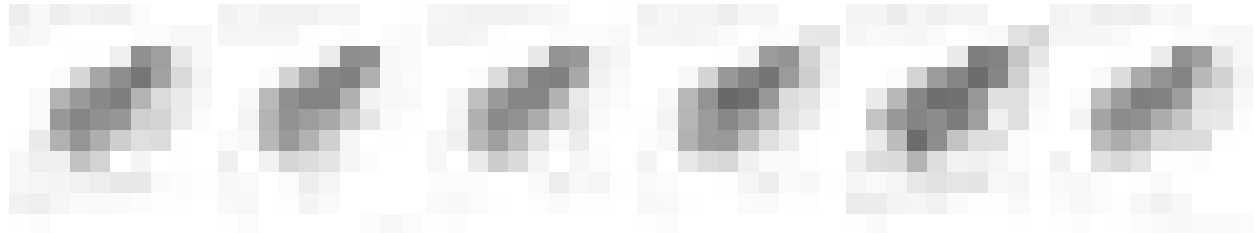
* *Pseudognaphalium luteoalbum* (Linnaeus) Hilliard & B.L. Burtt, Red-tipped Rabbit Tobacco. Mowed rights-of-way; native of Eurasia. April-June. [= FNA, K] {add synonymy}

Pseudognaphalium macounii (Greene) Kartesz, Clammy Cudweed, Winged Cudweed, Clammy Everlasting. Dry fields, pastures, and woodland edges at high elevations. July-October. QC west to BC, south to w. VA, WV, TN, and Mexico. [= FNA, K, Pa; = *Gnaphalium macounii* Greene - C, F, S, WV; < *Gnaphalium viscosum* - SE, Y, misapplied; < *Pseudognaphalium viscosum* (Kunth) W.A. Weber, misapplied]

Pseudognaphalium micradenium (Weatherby) G.L. Nesom, Small Rabbit Tobacco. Dry woodlands and openings. September-October. Se. ME west to WI, south to e. SC, c. GA, se. TN, and s. MO. Nesom (2001a) discusses the distinctiveness of this taxon and its treatment as a species, rather than variety. [= FNA, X; = *Gnaphalium helleri* Britton var. *micradenium* (Weatherby) Mahler - Z; < *Gnaphalium helleri* - C, G, RAB, S, SE, W; = *Gnaphalium obtusifolium* var. *micradenium* Weatherby - F, Y; = *Pseudognaphalium helleri* (Britton) A. Anderberg ssp. *micradenium* (Weatherby) Kartesz - K]

Pseudognaphalium obtusifolium (Linnaeus) Hilliard & Burtt, Fragrant Rabbit Tobacco. Openings, woodlands, coastal dunes, sandy pinelands, disturbed areas. August-November. NL (Newfoundland) west to ON, south to s. FL and TX. [= FNA, Pa, WH, X; = *Gnaphalium obtusifolium* Linnaeus - RAB, S, SE, W, WV; > *G. obtusifolium* var. *obtusifolium* - F; > *Gnaphalium obtusifolium* Linnaeus var. *praecox* Fernald - F; = *Gnaphalium obtusifolium* var. *obtusifolium* - C, G, Y; > *Pseudognaphalium obtusifolium* ssp. *obtusifolium* - K; > *Pseudognaphalium obtusifolium* ssp. *praecox* (Fernald) Kartesz - K; ? *Gnaphalium polycephalum* Michaux]

* *Pseudognaphalium stramineum* (Kunth) A. Anderberg. Sandy fields, roadsides, disturbed places; native of TX south through Mexico and into South America. Late May-August. [= FNA, K; = *Gnaphalium stramineum* Kunth - C; ? *G. chilense* Sprengel - RAB, SE, Y]

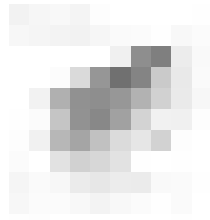


***Pterocaulon* Elliott 1823 (Blackroot)**

A genus of about 18 species, herbs, of tropical, subtropical, and warm temperate America, and of Oceania and se. Asia. References: Nesom in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE.

Identification notes: *Pterocaulon* is an unmistakable plant, the stems and leaf undersurfaces creamy-white floccose-tomentose, the leaf bases decurrent down the stem, the heads in oblong, terminal spikes, the tip nodding before anthesis.

Pterocaulon pycnostachyum (Michaux) Elliott, Blackroot, Wingstem. Sandhills, dry pinelands, pine flatwoods. May-June. Se. NC south to s. FL and west to s. AL. [= RAB, FNA, GW, K, SE, WH, Z; = *P. undulatum* (Walter) C. Mohr - S]



Pulicaria Gaertner 1791 (False-fleabane)

A genus of 100 or more species, herbs (rarely shrubs), of Europe, Asia, and Africa. References: Preston in FNA (2006a).

* *Pulicaria arabica* (Linnaeus) Cassini. Disturbed areas (on ballast); perhaps just a waif (not recently collected), native of Africa. [= FNA, SE, WH; = *Vicoa auriculata* Cassini – S (misapplied)] {not keyed}



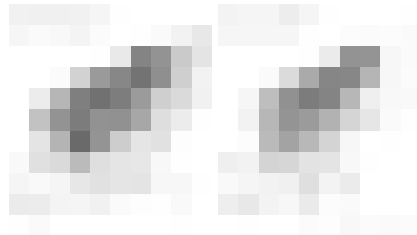
Pyrrhopappus A.P. de Candolle 1838 (False-dandelion)

A genus of 3-5 species, herbs, of sw. and se. North America. References: Strother in FNA (2006a); Cronquist (1980)=SE.

- 1 Outer phyllaries mainly 1/3-2/3 as long as the inner phyllaries; lower and middle stem usually glabrous; leaf margins usually glabrous; upper cauline leaves usually pinnately (3-) 5-7 (-9)-lobed..... *P. carolinianus*
- 1 Outer phyllaries mainly < 1/3 as long as the inner phyllaries; lower and middle stem usually sparsely to densely pilose; leaf margins usually ciliate; upper cauline leaves usually unlobed or pinnately 1-5-lobed..... *P. pauciflorus*

Pyrrhopappus carolinianus (Walter) A.P. de Candolle, False-dandelion. Dry and moist forests, roadsides, meadows, fields. March-June (and sometimes later). DE, se. PA, and MD south to c. peninsular FL, west to IL, MO, and TX; he pre-Columbian range is uncertain. [= C, F, FNA, G, K, W, WH, WV; > *P. carolinianus* var. *carolinianus* – RAB, SE; > *P. carolinianus* var. *georgianus* (Shinners) H.E. Ahles – RAB, SE; = *Sitilias caroliniana* (Walter) Rafinesque – S; > *Pyrrhopappus georgianus* Shinners]

Pyrrhopappus pauciflorus (D. Don) A.P. de Candolle, Small-flowered Desert-Chicory. Disturbed areas. (Feb.) April-May. Probably merely adventive in our area from a native distribution from TX south to Coahuila, Nuevo León, and Tamaulipas. [= FNA; < *P. pauciflorus* – K; = *Sitilias multicaulis* (A.P. de Candolle) Greene – S; = *P. multicaulis* A.P. de Candolle – SE]



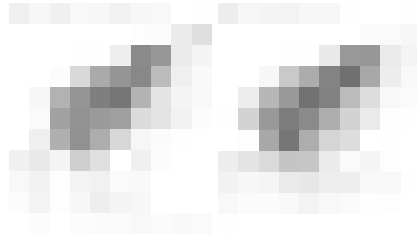
Ratibida Rafinesque 1817 (Prairie Coneflower)

A genus of about 7 species, herbs, of North America. References: Urbatsch & Cox in FNA (2006c); Richards (1968)=Z; Cronquist (1980)=SE. Key adapted from SE.

- 1 Disks columnar, 2-4.5× as long as thick; plant a tap-rooted perennial; rays < 2 (-2.5) cm long; achenes ciliate and winged, crowned by a pappus consisting of 1 or more awn-teeth..... *R. columnifera*
- 1 Disks ellipsoid-globular, 1-1.6× as long as thick; plant a fibrous-rooted perennial from a woody rhizome or caudex; rays 2.5-3.5 (-4.5) cm long; achenes smooth, lacking a pappus..... *R. pinnata*

* *Ratibida columnifera* (Nuttall) Wootton & Standley, Columnar Prairie Coneflower. Dry disturbed areas, established around nurseries or plantings, waste areas near wool-combing mills; introduced from farther west. May-August. ON west to AB, south to TX, Mexico, and AZ; introduced at scattered sites eastward, including e. NC, e. SC, and c. TN (Chester, Wofford, & Kral 1997). [= C, F, FNA, G, K, Pa, SE, WH, WV, Z; = *R. columnaris* (Sims) D. Don – S]

Ratibida pinnata (Ventnat) Barnhart, Globular Prairie Coneflower, Grey-headed Coneflower. Prairie-like glades and oak savannas over gabbro (usually in Iredeell soils) or calcareous rocks, cedar glades, calcareous (black belt or chalk) prairies, disturbed areas (naturalized from cultivation). June-August. S. ON west to MN and SD, south to w. PA, e. TN, nw. GA, Panhandle FL, MS, OK, and ne. TX (Singhurst, Mink, & Holmes 2010); disjunct in nc. SC. A characteristic plant of midwestern prairies and limestone glades, remarkably disjunct to "Piedmont prairie" remnants in SC (Nelson 1993). [= C, F, FNA, G, K, Pa, S, SE, W, WH, WV, Z]



Rudbeckia Linnaeus 1753 (Yellow Coneflower, Black-eyed Susan)

A genus of about 15 species, herbs, of North America. References: Urbatsch & Cox in FNA (2006c); Cronquist (1980)=SE; Perdue (1957)=Z. Key adapted in part from SE and FNA.

Identification notes: This treatment needs considerable additional work in the herbarium, and will likely be substantially modified.

- 1 Leaves grasslike, linear-lanceolate, > 10× as long as wide, the basal with blade 10-20 cm long and < 1 cm wide; [of Coastal Plain, of s. GA southward and westward].
 - 2 Plant with 1 head; rays red, orange, or maroon, 1.0-1.5 cm long; plant pubescent *R. graminifolia*
 - 2 Plant with several heads; rays yellow, 1.5-3.5 cm long; plant glabrous *R. mohrii*
- 1 Leaves broader, lanceolate, ovate, or pinnately-cleft, < 10× as long as wide; [collectively widespread].
 - 3 Leaves (at least some of the largest and generally more basal) 3-lobed or more divided.
 - 4 Disc flowers yellow or yellowish-green; achenes 3.5-6.0 mm long.
 - 5 Basal and lower stem leaves 1-5-lobed; plants 0.5-2 m tall.
 - 6 Heads small, the disc mostly 1.0-1.5 cm wide; rays usually 5 or 8; [of the Coastal Plain and Piedmont, VA south to FL, west to LA] *R. laciniata* var. *digitata*
 - 6 Heads larger, the disc mostly 1.5-2.0 cm wide; rays usually 8 or 13; [of high elevations of the Appalachians, VA and KY south to NC and TN] *R. laciniata* var. *humilis*
 - 5 Basal and lower stem leaves 1-2-pinnatifid, with 5-many lobes; plants 1-3 m tall.
 - 7 Achenes 3.5-4.0 mm long; pappus > 0.7 mm long; [of DE, MD, and PA northward] *R. laciniata* var. *bipinnata*
 - 7 Achenes 4.2-6.0 mm long; pappus < 0.7 mm long; [widespread in our area] *R. laciniata* var. *laciniata*
 - 4 Disc flowers purple-brown; achenes 1.9-3.5 mm long.
 - 8 Pales acute, hairy near the tip; rays 20-40 mm long *R. subtomentosa*
 - 8 Pales cuspidate, with awn-like tips ca. 1.5 mm long, glabrous; rays 8-30 mm long.
 - 9 Cauline leaves 1-3-lobed (at least some on a plant 3-lobed).
 - 10 Ray blades 8-17 mm long; discs 10-15 mm across; [widespread in our area] *R. triloba* var. *triloba*
 - 10 Ray blades 18-30 mm long; discs 15-20 mm across; [at moderate to high elevations in the Appalachians] *R. triloba* var. *rupestris*
 - 9 Cauline leaves 1-7-lobed (at least some on a plant 5-7-lobed).
 - 11 Phyllaries > 9 mm long; [of the Mountains of NC, VA, and TN] *R. triloba* var. *beadlei*
 - 11 Phyllaries < 7 mm long; [of the Coastal Plain of s. AL and Panhandle FL] *R. triloba* var. *pinnatifida*
 - 3 Leaves simple, unlobed, toothed (or not).
 - 12 Pales (bracts of the receptacle) glabrous or nearly so (except sometimes for a minutely ciliate margin).
 - 13 Pales cuspidate, with awn-like tips ca. 1.5 mm long [go to key lead 8b, above]
 - 13 Pales obtuse to acute.
 - 14 Larger leaves < 2 cm wide [*R. missouriensis*]
 - 14 Larger leaves > 2 cm wide.
 - 15 Plants 2-3 m tall; stem leaves strongly auriculate-clasping *R. auriculata*
 - 15 Plants 0.5-1.3 m tall; stem leaves petiolate or sessile, but not auriculate-clasping.
 - 16 Basal leaves with bases cuneate to broadly cuneate.
 - 17 Basal leaves with blades 2.5-3.5× as long as wide; plants villous-hirsute *R. fulgida* var. *fulgida*
 - 17 Basal leaves with blades < 2× as long as wide; plants glabrous to sparsely hairy.
 - 18 Basal leaves attenuate-cuneate at the base; rays 15-25 mm long; upper stem leaves notably reduced in size from the lower stem leaves *R. fulgida* var. *spathulata*
 - 18 Basal leaves broadly cuneate at the base; rays 20-40 mm long; upper stem leaves not typically reduced in size from the lower stem leaves *R. fulgida* var. *speciosa*
 - 16 Basal leaves with bases rounded to cordate.
 - 19 Upper stem leaves notably reduced in size from the lower stem leaves *R. fulgida* var. *sullivantii*
 - 19 Upper stem leaves not typically reduced in size from the lower stem leaves.
 - 20 Basal leaves with bases rounded; rays 20-40 mm long *R. fulgida* var. *speciosa*
 - 20 Basal leaves with bases broadly rounded to cordate; rays 10-30 mm long *R. fulgida* var. *umbrosa*
- 12 Pales densely pubescent near the tip.

- 21 Plants glabrous or with scattered inconspicuous hairs.
- 22 Stem very sparsely spreading-villous (to more conspicuously hairy, and then keyable under 21b); disc to 15 mm high *R. heliopsidis*
- 22 Stem glabrous; disc elongating in fruit, ultimately 12-60 mm high.
- 23 Leaves strongly blue-green and glaucous; flowering plants 1-2.5 m tall; largest leaves 7-16 cm wide; [cultivated in our area and rarely persisting or spreading] *R. maxima*
- 23 Leaves green; flowering plants 0.5-1.3 m tall; largest leaves < 6.5 cm wide; [native of pitcherplant bogs and wet flatwoods of e. GA and ne. FL west to s. AL] *R. nitida*
- 21 Plants conspicuously hirsute or pilose.
- 24 Plants perennials from a woody rhizome; pappus a low crown; style appendages short, blunt.
- 25 Disc 10-15 mm across; rays 6-12, mostly spreading, 15-25 mm long; leaves not folded longitudinally *R. heliopsidis*
- 25 Disc 15-25 mm across; rays 12-25, mostly reflexed, 30-50 mm long; leaves folded longitudinally.
- 26 Stem hairy only on the upper stem, the hairs ascending and < 0.5 mm long *R. grandiflora* var. *alismaefolia*
- 26 Stem hairy throughout, the hairs spreading on the lower stem, ascending on the upper stem and ca. 1.0 mm long *R. grandiflora* var. *grandiflora*
- 24 Plants annuals, biennials, or perennials from fibrous roots; pappus lacking or a low crown to 0.1 mm high; style appendages elongate, subulate (*R. hirta*) or short, acute to obtuse (*R. mollis*).
- 27 Stems and leaves softly pilose to woolly; style branches short, acute to obtuse; [plants of dry sands of the Coastal Plain of SC southward] *R. mollis*
- 27 Stems and leaves with coarse and stiffish hairs; style branches elongate, subulate; [plants collectively widespread in our area].
- 28 Stems leafy mainly toward the base, branched mainly near the middle; peduncles usually ½ the height of the plants; [of the Coastal Plain] *R. hirta* var. *angustifolia*
- 28 Stems leafy throughout, branched mainly well above the middle; peduncles < 1/3 the height of the plants; [collectively widespread].
- 29 Basal leaves broadly elliptic to ovate, 2.5-7 cm wide, mostly ca. 2× as long as wide, with coarsely serrate margins; [primarily Appalachian and westward, mostly of undisturbed habitats] *R. hirta* var. *hirta*
- 29 Basal leaves lanceolate to oblanceolate 1-2.5 (-5) cm wide, mostly 3-5× as long as wide, with entire to serrate margins; [widespread and weedy] *R. hirta* var. *pulcherrima*

Rudbeckia auriculata (Perdue) Kral, Swamp Black-eyed Susan. Pitcherplant bogs, wet roadsides and powerline rights-of-way, seepages. Sw. GA and Panhandle FL (Walton County) west to c. and s. AL. See Diamond & Boyd (2004) for detailed information. [= FNA, K, SE, WH; = *R. fulgida* Aiton var. *auriculata* Perdue]

Rudbeckia fulgida Aiton var. ***fulgida***, Common Eastern Coneflower. Dry to wet meadows. August-October. NY and IL south to FL and AL. [= C, FNA, G, K, Pa, SE; < *R. fulgida* – RAB, GW, W, WH; = *R. fulgida* Aiton – F; > *R. fulgida* – S; > *R. acuminata* C.L. Boynton & Beadle – S; > *R. foliosa* C.L. Boynton & Beadle – S; > *R. truncata* Small – S] {add to synonymy, esp. F, Z}

Rudbeckia fulgida Aiton var. ***spatulata*** (Michaux) Perdue. Cp (VA), {FL?, GA, NC, SC, VA}; bottomlands, bogs; uncommon? August-October. VA, WV, and TN south to FL and AL. [= FNA; < *R. fulgida* – RAB, WH; = *R. spatulata* Michaux – F, S; < *R. fulgida* var. *fulgida* – K]

Rudbeckia fulgida Aiton var. ***speciosa*** (Wendroth) Perdue. Moist forests and woodlands. August-October. QC and WI south to GA, AL, and AR. [= C, FNA, K, Pa, Z; < *R. fulgida* – RAB, GW, W; = *R. speciosa* Wenderoth var. *speciosa* – F; = *R. speciosa* Wenderoth – WV]

Rudbeckia fulgida Aiton var. ***sullivantii*** (C.L. Boynton & Beadle) Cronquist. Mt (WV): {habitats}; rare. August-October. NY, MI, and MO south to PA, WV, and AR. [= F, FNA, G, SE; = *R. speciosa* Wenderoth var. *sullivantii* (C.L. Boynton & Beadle) B.L. Robinson – F; < *R. fulgida* var. *speciosa* – K; = *R. sullivantii* C.L. Boynton & Beadle – S]

Rudbeckia fulgida Aiton var. ***umbrosa*** (C.L. Boynton & Beadle) Cronquist, Appalachian Coneflower. Mt (VA), {GA, NC, SC} Rich calcareous slopes, bottomlands; rare? August-October. VA, OH, IN, and MO south to GA, MS, and AR. [= FNA, G, K, SE, Z; < *R. fulgida* – RAB, GW, W; = *R. umbrosa* C.L. Boynton & Beadle – F; > *R. umbrosa* – S; > *R. chapmanii* C.L. Boynton & Beadle – S]



Rudbeckia graminifolia (Torrey & A. Gray) C.L. Boynton & Beadle. Wet savannas and "wet prairies". Endemic to the Apalachicola region, FL. [= FNA, K, S, SE, WH]

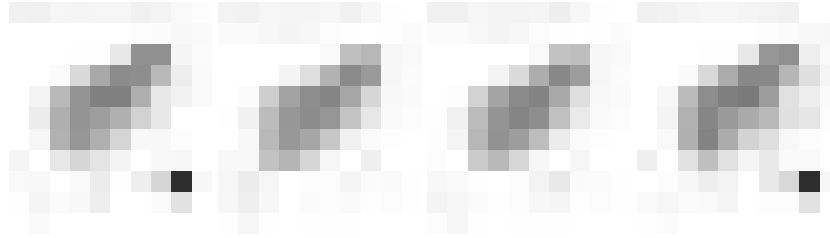
Rudbeckia grandiflora (Sweet) A.P. de Candolle var. ***alismifolia*** (Torrey & A. Gray) Cronquist. Prairies, open woodlands. MS west to AR, LA, and TX; disjunct in KY. [= K; = *R. grandiflora* var. *alismaefolia* – FNA, SE, orthographic variant; = *R. alismaefolia* Torrey & A. Gray – S]

Rudbeckia grandiflora (Sweet) A.P. de Candolle var. ***grandiflora***, Largeflower Coneflower. Limestone glades and barrens; rare. MO and KS south to LA and TX; disjunct in nw. GA. [= FNA, K, SE, Z; = *R. grandiflora* – S]

Rudbeckia heliopsidis Torrey & A. Gray, Sunfacing Coneflower, Pineywoods Coneflower. Limestone or sandstone streambanks and barrens, pinelands, roadsides. July-September. VA south to GA and AL. [= RAB, C, F, FNA, G, K, S, SE, W, Z]

Rudbeckia hirta Linnaeus var. **angustifolia** (T.V. Moore) Perdue, Coastal Plain Black-eyed Susan. Cp (FL?, GA, NC, SC): May-July. SC south to FL, west to TX. [= FNA, K, SE, Z; < *R. hirta* – RAB, WH; ? *R. divergens* T.V. Moore – S]

Rudbeckia hirta Linnaeus var. **hirta**, Woodland Black-eyed Susan. Mt (WV), {GA, NC, SC, VA}: common in WV. May-July. ME and MI south to GA and MS. [= C, FNA, K, Pa, SE, WV, Z; < *R. hirta* – RAB, G, W; > *R. hirta* var. *hirta* – F; > *R. hirta* var. *brittonii* (Small) Fernald – F; > *R. hirta* – S; > *R. amplexans* T.V. Moore – S; > *R. brittonii* Small – S; > *R. monticola* Small – S]



Rudbeckia hirta Linnaeus var. **pulcherrima** Farwell, Weedy Black-eyed Susan. Mt (WV), Cp (DE), Pd (DE), {FL, GA, NC, SC, VA}: roadsides, fields; common. May-July. NL (Newfoundland) and BC south to FL, TX, CA, and beyond. [= C, FNA, K, Pa, SE, WV; < *R. hirta* – RAB, G, W, WH; > *R. serotina* Nuttall var. *serotina* – F; > *R. serotina* var. *corymbifera* (Fernald) Fernald & Schubert – F; > *R. serotina* var. *sericea* (T.V. Moore) Fernald & Schubert – F; > *R. bicolor* Nuttall – S; > *R. longipes* T.V. Moore – S; > *R. sericea* T.V. Moore – S; > *R. hirta* var. *corymbifera* Fernald – Z; > *R. hirta* var. *pulcherrima* – Z]

Rudbeckia laciniata Linnaeus var. **bipinnata** Perdue. Streambanks, seepages. NH and NY south to DE, MD, and PA. [= FNA, K; < *R. laciniata* var. *laciniata* – C, F, G; < *R. laciniata* var. *laciniata* – Pa]

Rudbeckia laciniata Linnaeus var. **digitata** (Miller) Fiori, Coastal Plain Cutleaf Coneflower. Seepage bogs, streamsides. July-October. VA south to FL, west to LA. [= C, F, K, SE; < *R. laciniata* – RAB, GW, S, W, WH; < *R. laciniata* var. *humilis* A. Gray – FNA; < *R. laciniata* var. *laciniata* – G]

Rudbeckia laciniata Linnaeus var. **humilis** A. Gray, Blue Ridge Cutleaf Coneflower. Seeps, bog edges, brookbanks, moist forests. July-October. VA and KY south to NC. [= C, F, G, K, SE; < *R. laciniata* – RAB, GW, S, W; < *R. laciniata* var. *humilis* A. Gray – FNA]

Rudbeckia laciniata Linnaeus var. **laciniata**, Common Cutleaf Coneflower, Goldenglow. Cp (DE, FL?, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): moist forests, bottomlands, streambanks; common (uncommon in DE Coastal Plain). July-October. NB, ON, and MB south to FL and TX. [= FNA, K, SE; < *R. laciniata* – RAB, GW, S, W, WH; < *R. laciniata* var. *laciniata* – C, G; > *R. laciniata* var. *laciniata* – F, WV; > *R. laciniata* var. *hortensia* L.H. Bailey – F, misspelling > *R. laciniata* var. *hortensia* L.H. Bailey – Pa, WV; >> *R. laciniata* var. *laciniata* – Pa]

* **Rudbeckia maxima** Nuttall, Giant Coneflower. Disturbed ground; cultivated and rarely persistent, native of sc. United States (AR and OK south to LA and TX). [= F, FNA, K, S, SE]



Rudbeckia missouriensis Engelman ex C.L. Boynton & Beadle, Missouri Coneflower. KY, IL, MO, and OK south to LA and TX. [= FNA, C, F, K, S, SE; = *R. fulgida* var. *missouriensis* (Engelman) Cronquist – G]

Rudbeckia mohrii A. Gray, Mohr's Coneflower. Wet pine savannas. Ec. GA to Panhandle FL. [= FNA, K, S, SE, WH]
Rudbeckia mollis Elliott, Woolly Coneflower. Longleaf pine / turkey oak sandhills. Late August-October. SC south to n. peninsular FL, FL Panhandle, west to s. AL. [= RAB, FNA, K, S, SE, WH, Z]

Rudbeckia nitida Nuttall, St. John's Black-eyed Susan. Wet pine savannas. E. GA and ne. FL south to c. peninsular FL, west to s. AL. [= FNA, K, WH; > *R. nitida* – S; > *R. glabra* A.P. de Candolle – S; = *R. nitida* var. *nitida* – SE]

Rudbeckia subtomentosa Pursh. Moist to dry woodlands, prairies, disturbed areas. Nc. TN (Chester, Wofford, & Kral 1997). MI, IA, and OK south to TN, MS and TX; eastward as introductions or possibly disjuncts. Known for NC only from a single 1897 specimen from Hollow Rock, Orange Co. NC; probably an introduction. [= F, FNA, K, S, SE, Z]

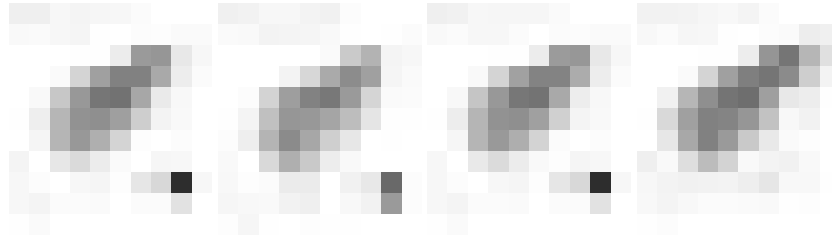


Rudbeckia triloba Linnaeus var. ***beadlei*** (Small) Fernald, Chauncey's Coneflower. Seepy mafic or limestone cliffs. July-October. A Southern Appalachian endemic: sw. VA and KY south to w. NC and TN. It is not at all clear that this taxon is distinct. [*< R. triloba* var. *beadlei* – F; *< R. triloba* var. *pinnatiloba* Torrey & A. Gray – C, FNA, G, K, SE, Z (defined broadly to include "*R. beadlei*")]; *< R. triloba* – RAB, W; = *R. beadlei* Small – S]

Rudbeckia triloba Linnaeus var. ***pinnatiloba*** Torrey & A. Gray, Pinnate-leaf Coneflower. Calcareous soils in wet savannas. S. AL and Panhandle FL. July-October. [*< R. triloba* var. *pinnatiloba* Torrey & A. Gray – C, FNA, G, K, SE, Z (defined broadly to include "*R. beadlei*")]; = *R. pinnatiloba* (Torrey & A. Gray) Beadle – S; *< R. triloba* – WH] [synonymy incomplete, etc.]

Rudbeckia triloba Linnaeus var. ***rupestris*** (Chickering) A. Gray, Blue Ridge Three-lobed Coneflower. Moist forests and rock outcrops. July-October. A Southern Appalachian endemic: KY south to NC and TN. [= F, FNA, K, SE, Z; *< R. triloba* – RAB, W; = *R. rupestris* Chickering – S]

Rudbeckia triloba Linnaeus var. ***triloba***, Common Three-lobed Coneflower. Moist forests and rock outcrops. July-October. VT, ON, MN, and NE south to GA and TX; westward in CO and UT (as introductions?). [= C, F, FNA, G, K, Pa, SE; *< R. triloba* – RAB, W, WV; = *R. triloba* – S]



Rugelia Shuttleworth ex Chapman 1860 (*Rugelia*, Rugel's Ragwort)

A monotypic genus, an herb, endemic to the Great Smoky Mountains of w. North Carolina and e. Tennessee. Treated variously as *Senecio* or *Cacalia* in most recent North American floras (see synonymy), this species is anomalous in both and is best treated as a monotypic genus (Bremer 1994). References: Barkley in FNA (2006b); Bremer (1994)=Z; Barkley (1999)=Y; Pippen (1978)=X; Cronquist (1980)=SE.

Rugelia nudicaulis Shuttleworth ex Chapman, *Rugelia*, Rugel's Ragwort, Winter-well. High elevation forests and openings, primarily in spruce-fir forests, but extending in places downslope into northern hardwood forests. June-August. The genus and species is endemic to the Great Smoky Mountains of w. NC and e. TN, all known populations within Great Smoky Mountains National Park. Where it occurs, it is usually locally abundant, often even the dominant herb. The basal rosettes are evergreen, and are conspicuous in all seasons. [= FNA, K, Y, Z; = *Senecio rugelia* Gray – RAB, S; = *Cacalia rugelia* (Gray) Barkley & Cronquist – SE, W, X]

Santolina Linnaeus 1753

A genus of about 8-18 species, shrubs, of the Mediterranean region. References: Watson in FNA (2006a).

* ***Santolina chamaecyparissus*** Linnaeus, Holy-flax, Lavender-cotton, Cypress Lavender-cotton. Disturbed areas; native of Mediterranean Europe. March-October. This species is introduced in e. and w. NC (Fox, Godfrey, & Blomquist 1952). Graetz (1973) recommended it for planting in barrier island areas of the Carolinas. [= C, K]

Sclerolepis Cassini 1816 (*Sclerolepis*)

A monotypic genus, a perennial herb, of se. North America. References: Lamont in FNA (2006c); Cronquist (1980)=SE.

Sclerolepis uniflora (Walter) Britton, Sterns, & Poggenburg, *Sclerolepis*. In shallow water (later sometimes stranded on shore by dropping water levels) of clay-based Carolina bays, natural lake shores, blackwater stream shores and swamps, in seepage wetlands including sea-level fens. May-August; July-October. NH south to c. peninsular FL, west to sw. AL (very rare north of NC); slightly disjunct in s. MS and se. LA (Sorrie & LeBlond 2008). [= RAB, C, F, FNA, G, GW, K, SE, WH]

Scolymus Linnaeus 1753 (*Golden Thistle*)

A genus of 3 species, herbs, of the Mediterranean region. References: Strother in FNA (2006a).

- 1 Stem wings and leaf blades with margins little or not whitened and thickened; pappus of several scales; plant a biennial or perennial.....*S. hispanicus*
- 1 Stem wings and leaf blades with margins white and thickened; pappus absent; plant an annual *S. maculatus*

* *Scolymus hispanicus* Linnaeus, Golden Thistle, Spanish Salsify. On ballast at seaports (at least formerly); native of Europe. AL. [= FNA, K]

* *Scolymus maculatus* Linnaeus, Golden Thistle. On ballast at seaports (formerly); native of Europe. Small (1933) states that *Scolymus* "has been found on ballast on the seacoast of N.C."; the site was likely the port of Wilmington. [= FNA, K, S]



Senecio Linnaeus 1753 (Ragwort, Groundsel)

A genus of very uncertain circumscription, if treated broadly with as many as 1500-2000 species, trees, shrubs, herbs, and vines. The trend is to divide *Senecio* into smaller, more natural genera. Most species traditionally treated as "*Senecio*" in our flora are not even part of a broadly defined core group, and have been transferred to *Packera* and *Rugelia*. *Hasteola* (*Synosma*) has been treated as a small genus of perennial herbs (consisting of *Hasteola suaveolens* and the FL peninsular endemic, *H. robertiorum* L.C. Anderson), but Pelser et al. (2007) demonstrate that *Hasteola* is deeply embedded in *Senecio* and closely related to a group of New World *Senecio*; it is so included here. References: Barkley in FNA (2006b); Pelser et al. (2007); Bremer (1994); Cronquist (1980)=SE; Barkley (1999)=Z; Barkley (1978)=Y; Anderson (1994)=X; Pippen (1978)=V. [also see *Ligularia*, *Packera*, *Rugelia*]

- 1 Leaves ovate, hastate at the base, merely toothed, 10-30 (-40) cm long, 4-20 cm wide..... *S. suaveolens*
- 1 Leaves ovate to oblanceolate, tapered at the base, pinnatifid (or at least strongly toothed), 2-10 cm long, 0.5-2 (-4) cm wide *S. vulgaris*

* *Senecio brasiliensis* (Sprengel) Lessing var. *tripartitus* (A.P. de Candolle) Baker, Hempleaf Ragwort. Disturbed areas (on ballast); rare (not collected since 1894, Pensacola, Escambia County, FL), native of South America. [= FNA, WH; = *S. cannabinaefolius* Hooker & Arnott] {not keyed}

Senecio suaveolens (Linnaeus) Elliott, Sweet Indian-plantain. Sandy bottomlands and riverbanks. MA, NY, n. OH, n. IN, c. WI and se. MN, south to n. VA, sw. VA, sw. NC, wc. TN (Chester, Wofford, & Kral 1997), and se. MO; apparently rare through much of its range. This species has not been seen in NC in recent years. [= *Hasteola suaveolens* (Linnaeus) Pojarkova – FNA, K, Pa, X; = *Cacalia suaveolens* Linnaeus – RAB, C, F, G, GW, SE, V, W, WV, Y; = *Synosma suaveolens* (Linnaeus) Rafinesque ex Britton – S]

* *Senecio viscosus* Linnaeus, Sticky Groundsel. Disturbed areas; native of Europe. July-September. [= Pa] {add to synonymy; add to key}

* *Senecio vulgaris* Linnaeus, Common Groundsel. Roadsides, fields, disturbed areas; native of Eurasia. March-June. [= RAB, C, F, FNA, G, K, S, SE, W, WH, WV, Y, Z]

Sericocarpus Nees 1832 (White-topped Aster)

A genus of 5 species, herbs, of North America. This group of species, traditionally treated as *Sericocarpus*, was transferred to *Aster* by Cronquist, a treatment followed by most (but not all) recent floristic works. It now appears, based on morphological and molecular studies, that the traditional treatment as a separate genus is far superior. Nesom (1993a) argues that a variety of characters indicate that *Sericocarpus* is more closely allied to *Solidago*, *Euthamia*, *Bigelowia*, *Chrysoma*, and *Gutierrezia* than it is to *Aster*. Noyes & Rieseberg (1999) provide strong support for this contention, based on molecular evidence. See Nesom (1993a), Jones (1980), Semple & Brouillet (1980), and Noyes & Rieseberg (1999) for further discussion about the affinities of this group. References: Semple & Leonard in FNA (2006b); Leonard, Cook, & Semple (2005)=Y; Nesom (1993a)=Z; Cronquist (1980)=SE.

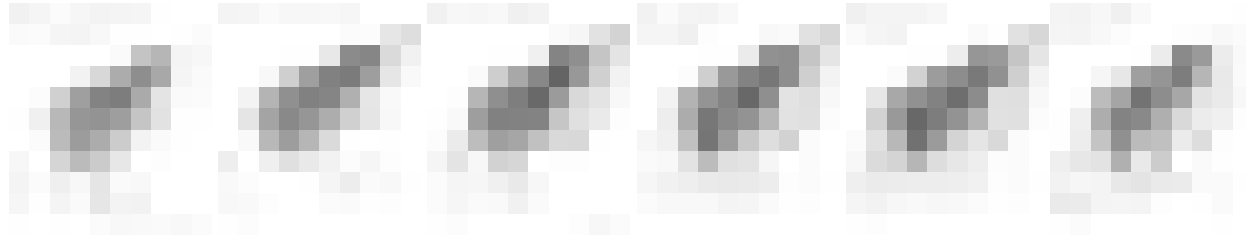
- 1 Leaves basally disposed, leaves of the basal rosette much larger than the cauline leaves; leaves (at least the basal) toothed.....*S. asteroides*
- 1 Leaves cauline, basal rosette lacking, the mid-cauline leaves the largest; leaves entire (or with 1-2 teeth in *S. tortifolius*).
- 2 Leaves (2-) 4-8 cm long, 0.2-1.2 cm wide, linear to oblanceolate, 6-12× as long as wide, not twisted at the base (the leaf blade in a more-or-less horizontal plane); leaves glabrous (but with a ciliate margin), glandular-punctate; involucre glabrous..... *S. linifolius*
- 2 Leaves 1.5-4 cm long, 0.6-1.5 (-2.0) cm wide, obovate, 1.5-4× as long as wide, twisted at the base (bringing the leaf blade into a more-or-less vertical plane); leaves puberulent, glandular-punctate, and with prominent resin globules (at 10× magnification); involucre puberulent *S. tortifolius*

Sericocarpus asteroides (Linnaeus) Britton, Sterns, & Poggenburg, Toothed White-topped Aster. Dry woodlands, thin soils around rock outcrops, sandhills, dry pinelands. June-July. S. ME and s. VT west to c. OH, south to e. SC, c. GA, w. Panhandle FL, s. AL, and s. MS. Coastal Plain populations are rhizomatous, while inland populations are not; some taxonomic distinction may be warranted (Nesom, pers. comm.). [= F, FNA, K, Pa, S, WH, WV, Y, Z; = *Aster paternus* Cronquist – RAB, C, G, SE, W]

Sericocarpus linifolius (Linnaeus) Britton, Sterns, & Poggenburg, Narrow-leaf White-topped Aster. Dry woodlands, sandhills. June-July. MA west to s. OH and s. IN, south to se. SC, c. GA, s. AL, s. MS, and e. LA (Florida parishes). [= F, FNA, K, Pa, S, WV, Y, Z; = *Aster solidagineus* Michaux – RAB, C, G, SE, W]

Sericocarpus tortifolius (Michaux) Nees, Twisted-leaf White-topped Aster. Dry to mesic sandhills. August-October. E. NC south to s. FL, west to e. LA (Florida parishes), more or less restricted to the Coastal Plain, but inland onto hard-rock

provinces in nc. GA and nc. AL. [= FNA, K, WH, Y, Z; = *Aster tortifolius* Michaux – RAB, SE, W; = *Sericocarpus bifolius* (Walter) Porter – S]



Silphium Linnaeus 1753 (Rosinweed)

A genus of 20-30 species, herbs, of e. North America. References: Sweeney (1970)=Z; Perry (1937)=Y; Clevinger in FNA (2006c); Clevinger (2004)=X; Cronquist (1980)=SE; Cruden (1962); Medley (1989); Steyermark (1951).

Identification notes: The number of ray flowers per head is a useful taxonomic character in *Silphium*; since only ray flowers are fertile, the number of ray flowers can also be determined by the number of achenes in freshly fruiting material. The key and taxonomic treatment is provisional.

- 1 Leaves basally disposed, the basal leaves large and persistent, the stem with very few to many leaves, but these definitely reduced upward in size; leaves entire to toothed, to deeply cut; plants with definite taproots (except *S. brachiatum*, *S. mohrii*, and *S. wasiotense*).
- 2 Stem relatively leafy, with 4-5 nodes or more, the stem leaves smaller than the basal, but not merely bracteal.
 - 3 Leaves deeply pinnatifid to bipinnatifid.....*S. laciniatum*
 - 3 Leaves merely nearly entire to coarsely toothed (but not pinnatifid).
 - 4 Leaves cuneate to rounded at the base; rays pale (sulphur) yellow; phyllaries acuminate, hispid..... *S. mohrii*
 - 4 Leaves subcordate, cordate, to truncate-sagittate at the base; phyllaries glabrous, obtuse to acute.
 - 5 Stem glabrous; pedicel glabrous; phyllaries acute; leaves truncate-sagittate at the base [*S. brachiatum*]
 - 5 Stem hispid; pedicel hispidulous with hairs ca. 1 mm long; phyllaries obtuse; leaves cordate to subcordate at the base [*S. wasiotense*]
- 2 Stem nearly naked, bearing only a few bracteal (very reduced) leaves.
 - 6 Heads relatively large (involucre 13-25 mm high, disk 15-25 mm wide), with 14-40 ray flowers; [of calcareous or mafic glades or woodlands].
 - 7 Principal leaves deeply pinnatifid (or, if entire, definitely lanceolate and with the base tapering to the petiole) *S. pinnatifidum*
 - 7 Principal leaves toothed (or subentire), cordate or truncate at the base (rarely abruptly narrowed) *S. terebinthinaceum*
 - 6 Heads relatively small (involucre 6-11 mm high, disk 8-15 mm wide), with 6-12 ray flowers; [of a wide range of mostly dry, often acidic habitats].
 - 8 Blades of basal leaves unlobed (or with a single obscure basal lobe on each side), reniform, usually wider than long, often > 25 cm wide; leaves usually puberulent beneath; achenes shorter than the phyllaries at maturity; [of the upper Piedmont and Mountains] *S. reniforme*
 - 8 Blades of basal leaves divided or shallowly to deeply lobed, with several lobes on each side, about as wide as long, or longer than wide, < 25 cm wide; leaves usually glabrous (or sparsely scabrous) beneath; achenes longer than (or as long as) the phyllaries at maturity; [collectively widespread].
 - 9 Involucre mostly 1.0-1.5 cm wide; achenes 6-9 mm long at maturity; achene wings < 1 mm wide, the wing tips long acute to acuminate, the sinus between the wing tips V-shaped; [of the Coastal Plain and lower Piedmont from se. VA south to extreme e. GA] *S. compositum* var. *compositum*
 - 9 Involucre mostly 1.5-3.0 cm wide; achenes 8-14 mm long at maturity; achene wings 1-2 mm wide, the wing tips either acute to acuminate or obtuse, the sinus between the wing tips either V-shaped or narrowly U-shaped.
 - 10 Achene wing tip obtuse, the sinus between the wing tips narrowly U-shaped; leaf blade usually longer than wide; petiole short, as long as or shorter than the leaf blade (midrib); [of se. SC south to c. peninsular FL and FL Panhandle] *S. compositum* var. *ovatifolium*
 - 10 Achene wing tip acute to acuminate, the sinus between the wing tips V-shaped; leaf blade usually as long as wide; petiole long, as long as or longer than the leaf blade (midrib); [of se. NC south to se. GA and FL Panhandle] *S. compositum* var. *venosum*
- 1 Leaves primarily on the stem, basal leaves usually absent or soon withering, the stem with many leaves, these similar in size; leaves entire or toothed; plants fibrous-rooted from a crown, rhizome, or caudex.
 - 11 Stem square; upper leaves connate, fused basally, the stem thus perfoliate.
 - 12 Stem spreading-hispid (rarely nearly glabrous); heads with usually ca. 8 or ca. 13 rays; hairs on lower leaf surface or veins 1-2 mm long *S. connatum*
 - 12 Stem glabrous or glabrescent; heads with usually ca. 21 or ca. 34 rays; hairs on lower leaf surface absent or < 1 mm long *S. perfoliatum*
 - 11 Stem terete; leaves not connate.
 - 13 Basal and lower cauline leaf blades cordate, sagittate, or truncate at the base, **and** on well-developed petioles *S. brachiatum*
 - 13 Basal and lower cauline leaf blades either rounded or cuneate at the base, **or** sessile.
 - 14 Stems, leaves, and phyllaries densely stipitate-glandular (in addition to the glandular pubescence).
 - 15 Plants mostly 8-15 dm tall, with usually 6 or 7 nodes below the inflorescence; glandular hairs of the stems and leaves longer than the glandular hairs; rays (8-) 12-14 (-16) per head; [of dolomite or limestone in Bibb County, c. AL] *S. glutinosum*
 - 15 Plants mostly 15-20 dm tall, with usually 9-12 nodes below the inflorescence; stems and leaves ; glandular hairs of the stems and leaves about as long as the glandular hairs; rays (17-) 19-23 (-33) per head; [of chalk in c. AL] *S. perplexum*

- 14 Stems, leaves, and phyllaries not stipitate-glandular, either smooth, scabrous, or hispid.
- 16 Leaves **both** strictly opposite throughout **and** clasping the stem.
 - 17 Ray flowers 12-22 per head; phyllary surfaces scabrous, hirsute, or hispid.....*S. integrifolium*
 - 17 Ray flowers 20-36 (or more) per head; phyllary surfaces glabrous..... *S. speciosum*
- 16 Leaves alternate, opposite, whorled, or combinations of those states (if strictly opposite then not clasping the stem).
- 18 Ray flowers 20-30 per head (or more)..... *S. radula*
- 18 Ray flowers 12-20 per head.
- 19 Leaf surfaces glabrous.
 - 20 Cauline leaves predominately in whorls of 3*S. asteriscus* var. *trifoliatum*
 - 20 Cauline leaves opposite*S. asteriscus* var. *latifolium*
- 19 Leaf surfaces scabrous to hispid.
 - 21 Basal leaves persistent at flowering*S. asteriscus* var. *simpsonii*
 - 21 Basal leaves caducous at flowering.
 - 22 Pales stipitate-glandular.....*S. asteriscus* var. *dentatum*
 - 22 Pales eglandular, scabrous to puberulent *S. asteriscus* var. *asteriscus*

Silphium asteriscus Linnaeus var. *asteriscus*. Cp (FL), {Mt, Pd, Cp (GA, NC, SC, VA)} VA, KY, and MO south to FL and TX. [= C, FNA, K1, K2; > *S. asteriscus* – RAB; > *S. dentatum* var. *gatesii* (Mohr) H.E. Ahles – RAB; = *S. asteriscus* – F, G, W; > *S. asteriscus* – S, Y; > *S. asteriscus* var. *asteriscus* – SE; > *S. asteriscus* var. *scabrum* Nuttall – SE; > *S. scaberrimum* Elliott – S; < *S. asteriscus* – WH3; > *S. gatesii* C. Mohr – Y]

Silphium asteriscus Linnaeus var. *dentatum* (Elliott) Chapman. Cp (FL, GA, SC), Pd (GA, SC), Mt (GA) {NC}: NC and TN south to FL and AL. [= FNA, K2; = *S. dentatum* var. *dentatum* – RAB; = *S. dentatum* – F, W; > *Silphium asteriscus* Linnaeus var. *angustatum* A. Gray – K1, SE; > *S. asteriscus* Linnaeus var. *laevicaule* DC – K1; > *S. dentatum* Elliott – SE; > *S. elliotii* Small – S; > *S. incisum* Greene – S; > *S. nodum* Small – S; < *S. asteriscus* – WH3; > *S. dentatum* var. *dentatum* – Y; > *S. dentatum* var. *angustatum* (A. Gray) L.M. Perry – Y]

Silphium asteriscus Linnaeus var. *latifolium* (A. Gray) J.A. Clevinger. {Cp, Pd, Mt (GA, NC, SC, VA)}: VA, WV, and KY south to GA and LA. [= FNA, K2; = *Silphium trifoliatum* Linnaeus var. *latifolium* A. Gray – C, F, G, K1; > *Silphium trifoliatum* Linnaeus var. *latifolium* A. Gray – SE, Y; = *S. laevigatum* Pursh – RAB; > *S. confertifolium* Small – S, SE, Y; > *S. glabrum* Eggert ex Small – S; < *S. trifoliatum* – W]

Silphium asteriscus Linnaeus var. *simpsonii* (Greene) J.A. Clevinger. Cp (FL, GA, SC): SC south to FL, west to MS. [= FNA, K2, X; = *S. simpsonii* Greene – K1; = *S. gracile* A. Gray – S, SE; < *S. asteriscus* – WH3; = *S. simpsonii* var. *simpsonii* – Y]

Silphium asteriscus Linnaeus var. *trifoliatum* (Linnaeus) J.A. Clevinger. Pd (NC, SC, VA), Mt, Cp (NC, VA, WV): {hábitats}; uncommon. June-September. NY, OH, and IL south to GA and AL. [= FNA, K2, Pa; = *Silphium trifoliatum* Linnaeus var. *trifoliatum* – C, G, K1, SE; = *S. trifoliatum* – RAB, WV; > *S. atropurpureum* Retz. ex Willdenow – F, Y; > *S. trifoliatum* var. *trifoliatum* – F, Y; < *S. trifoliatum* – W]

Silphium brachiatum Gattinger, Cumberland Rosinweed. Endemic to sc. and se. TN (Chester, Wofford, & Kral 1997) and n. AL. And GA? [= F, FNA, G, K1, S, SE, Y]

Silphium compositum Michaux var. *compositum*. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (NC, SC): sandhills, other xeric forests; common. May-September. VA south to GA. Perhaps worth dividing further into two taxa: *S. compositum* sensu stricto, restricted to the Coastal Plain and extreme lower Piedmont, and distributed from se VA through the Carolina Coastal Plain to extreme e. GA, a distribution very similar to those of *Carphephorus bellidifolius*, *Cirsium repandum*, and *Vaccinium crassifolium*; and *S. collinum* Greene, with less deeply lobed leaves, and distributed from se. and sc. VA, nc. NC, sw. NC and ne. AL south to sc. SC, c. GA, and ec. AL. [= K1, Y; = *C. compositum* – F; < *S. compositum* var. *compositum* – RAB; > *C. compositum* – S; > *S. orae* Small – S; < *S. compositum* – C, FNA, G, K2, SE, W; = *S. compositum* ssp. *compositum* – Z; > *S. collinum* Greene]

Silphium compositum Michaux var. *ovatifolium* Torrey & A. Gray. Cp (FL, GA, SC): sandhills; rare. May-September. Se. SC south to c. peninsular FL and FL Panhandle. [= K1; = *Silphium ovatifolium* (Torrey & A. Gray) Small – S, Y; < *S. compositum* – FNA, K2, SE, WH3; = *S. compositum* ssp. *ovatifolium* (Torrey & A. Gray) Sweeney & Fisher – Z]

Silphium compositum Michaux var. *venosum* (Small) Kartesz & Gandhi. Cp (FL, GA, NC, SC), Pd (SC): sandhills, xeric forests. May-September. Se. NC south to se. GA and FL Panhandle. [= K1; = *Silphium venosum* Small – Y; < *S. compositum* var. *compositum* – RAB; > *S. lapsuum* Small – S; > *S. venosum* Small – S; < *S. compositum* – FNA, K2, SE, WH3; = *S. compositum* ssp. *venosum* (Small) Sweeney & Fisher – Z]

Silphium connatum Linnaeus, Virginia Cup-plant. Floodplain forests and openings. June-August. VA and WV south to nw. NC. [= RAB, F, WV, Y; = *S. perfoliatum* var. *connatum* (Linnaeus) Cronquist – C, FNA, K1, K2, SE; < *S. perfoliatum* – G, W]

Silphium glutinosum J. Allison, Sticky Rosinweed. Dolomite glades. Known only from calcareous Ketona glades in Bibb County, c. AL (Allison & Stevens 2001). [= FNA, K2]

Silphium integrifolium Michaux, Prairie Rosinweed. Prairies, calcareous glades and barrens. July-September. MI, WI, and se. SD south to c. TN, se. AL, s. MS, s. LA, and OK. [= *S. integrifolium* Michaux var. *integrifolium* – C, FNA, G, K2, SE; > *S. integrifolium* var. *integrifolium* – F, K1, Y; > *S. integrifolium* var. *deamii* L.M. Perry – F, K1; > *S. integrifolium* var. *gattingeri* L.M. Perry – K1, Y]

Silphium laciniatum Linnaeus, Compass-plant. Prairies, limestone barrens, calcareous glades, also sometimes cultivated (including outside of its native distribution). July-September. S. ON, MI, WI, s. MN, and e. SD south to se. TN, s. AL, c. MS, s. LA, c. TX, and n. NM. [= C, FNA, G, K2, SE; > *S. laciniatum* var. *robinsonii* L.M. Perry – F, K1, Y]

Silphium mohrii Small, Shaggy Rosinweed. Prairies. Endemic to c., sc., and se. TN (Chester, Wofford, & Kral 1997) south to nw. GA (Jones & Coile 1988) and nc. AL. [= C, FNA, K1, K2, S, SE, Y]

Silphium perfoliatum Linnaeus, Common Cup-plant. Floodplain forests and openings, sometimes escaped from cultivation. June-August. VT, ON, and ND south to sc. NC, AL, and TX. [= RAB, F, S, WV, Y; = *S. perfoliatum* var. *perfoliatum* – C, FNA, K1, K2, Pa, SE; < *S. perfoliatum* – G, W]

Silphium perplexum J. Allison, Old Cahaba Rosinweed. Dolomitic glades and woodlands. Endemic to c. AL (Allison & Stevens 2001). [= FNA; = *S. ×perplexum* – K2]

Silphium pinnatifidum Elliott. Limestone glades and woodlands. C. and se. TN south to nw. GA and AL. [= K1, S, SE; = *S. terebinthinaceum* Jacquin var. *pinnatifidum* (Elliott) A. Gray – F, FNA, K2, Y; < *S. terebinthinaceum* – G; > *S. chickamaugense* Canby]

Silphium radula Nuttall. Mt (GA): rocky hardwood forests; rare (GA Rare). East to nw. GA (Jones & Coile 1988). Not given credence as in our area in FNA and other sources. [= K1, SE; ? *S. asperimum* Hooker – Y, misapplied; ? *S. gatesii* Mohr – Y?]

Silphium reniforme Rafinesque ex Nuttall. Dry forests. Sc. VA, e. WV, and e. TN, south to c. SC, c. GA, and e. AL. Plants with shallowly lobed leaves, with nearly the same distribution as typical *S. reniforme*, have been variously interpreted. [= S; = *S. compositum* Michaux var. *reniforme* (Rafinesque ex Nuttall) Torrey & A. Gray – RAB, F, K1, Y; < *S. compositum* – C, FNA, G, SE, W; < *S. compositum* – K2; = *S. compositum* ssp. *reniforme* (Rafinesque ex Nuttall) Sweeney & Fisher – WV, Z]

Silphium speciosum Nuttall. Prairies, calcareous glades and barrens. July-September. MO west to NE, south to OK; disjunct in c. TN. [= F, Y; = *S. integrifolium* Michaux var. *laeve* Torrey & A. Gray – C, FNA, G, K1, K2, SE]

Silphium terebinthinaceum Jacquin, Prairie-dock. Mafic or calcareous glades, barrens, woodlands, prairies, and roadsides. July-September. NY, ON, WI, and NE south to nw. GA, MS, and AR; disjunct eastward in Piedmont of NC and n. SC. *S. rumicifolium* Small refers to plants of limestone in the Ridge and Valley province of e. TN and extreme sw. VA, alleged to differ from *S. terebinthinaceum* in the leaf bases cuneate at the base (vs. cordate or truncate), smaller leaf blades (only to 15 cm long), smaller plants (to 8 dm tall vs. to 30 dm tall), and outer phyllaries broader than long (vs. longer than broad). The distinction of var. *luciae-brauniae* Steyermark, with leaf blades glabrous above vs. scabrous, is dubious and needs additional study. [= RAB, SE; = *S. terebinthinaceum* var. *terebinthaceum* – F, FNA, K2; < *S. terebinthinaceum* – G; > *S. terebinthinaceum* var. *terebinthaceum* – K1, Y; > *S. terebinthinaceum* var. *luciae-brauniae* Steyermark – K1; > *S. terebinthinaceum* – S; > *S. rumicifolium* Small – S, Y]

Silphium wasiotense M. Medley, Appalachian Rosinweed. Open forests. July-September. E. KY and ne. TN (Risk & Wyrick 1996, Chester, Wofford, & Kral 1997). [= C, FNA, K1, K2; = *S. wasiotensis*, orthographic variant]



Silybum Adanson 1763 (Milk-thistle)

A genus of 2 species, herbs, of the Mediterranean region. References: Keil in FNA (2006a); Cronquist (1980)=SE.

* ***Silybum marianum*** (Linnaeus) Gaertner, Milk-thistle, Blessed-thistle. Disturbed areas; native of Mediterranean Europe. May-July. Reported for NC by FNA; documentation unknown. [= C, F, FNA, G, K, Pa, SE; = *Mariana mariana* (Linnaeus) Hill – S]



Smallanthus Mackenzie ex Small 1933 (Bearsfoot)

A genus of about 20 species, of tropical, subtropical, and warm temperate America. Robinson (1978) describes the morphological and karyological differences warranting recognition of *Smallanthus* as a genus separate from *Polymnia*. References: Strother in FNA (2006c); Robinson (1978)=Z; Wells (1965)=Y; Cronquist (1980)=SE.

Smallanthus uvedalius (Linnaeus) Mackenzie ex Small, Bearsfoot, Leafcup. Moist forests, bottomland forests, and disturbed places. July-October. NY and IL south to c. peninsular FL and TX; possibly extending through e. Mexico and Central America to Panama, depending on circumscription. [= FNA, K, Pa, S, WH3, Z; = *Polymnia uvedalia* Linnaeus – RAB, C, SE, W, WV; > *Polymnia uvedalia* var. *uvedalia* – F, G, Y; > *Polymnia uvedalia* var. *densipilis* Blake – F, G, Y; > *Polymnia uvedalia* var. *floridana* Blake – F, Y]



Solidago Linnaeus 1753 (Goldenrod)

A genus of 90-110 species, herbs, primarily North American, but with a few species in South America, Macaronesia, and Eurasia. The placement of the flat-topped goldenrods has been controversial; they are here included in *Solidago* rather than being treated as the separate genus *Oligoneuron*. References: Semple & Cook in FNA (2006b); Nesom (1990); Cronquist (1980)=SE; Morton (1973, 1974); Zhang (1996); Cook & Semple (2004); Nesom (1993b)=Z; Heard & Semple (1988)=Y; Brouillet & Semple (1981)=X; Cronquist (1980)=SE; Braun (1942). Portions of the key adapted (in part) from various sources, especially FNA and SE. [also see *Brintonia*, *Chrysoma*, and *Euthamia*]

Identification notes: Several related genera readily mistaken for (and/or sometimes included in) *Solidago* are included here as keying “failsafes.”

- 1 Inflorescence corymbiform, flat-topped or broadly rounded and about as broad as long, or broader; [section *Ptarmicoideae*, and section *Solidago*, subsection *Multiradiatae*] **Key A**
- 1 Inflorescence a panicle, raceme, thyrs, or in axillary clusters, usually longer than broad, or with either the central branch well-developed and elongate, or with numerous branches elongate and more-or-less secund heads; [section *Solidago*].
 - 2 Leaves basally disposed, the basal and lower cauline leaves larger, petiolate, and usually persistent, the middle and upper cauline leaves smaller and less petiolate.
 - 3 Inflorescence cylindrical, of axillary clusters subtended by well-developed stem leaves, **or** a terminal thyrs or raceme, the branches not secund (unless the stem is arching and the heads become oriented to the side of the axis); [subsections *Glomeruliflorae*, *Humiles*, *Maritimae*, *Squarrosae*] **Key B**
 - 3 Inflorescence paniculiform, the major branches (at least) recurved with the heads borne secundly; [subsections *Argutae*, *Junceae*, *Maritimae*, *Nemorales*] **Key C**
 - 2 Leaves chiefly cauline, the basal and lower cauline leaves (when not early withering) the same size as or smaller than the middle and upper cauline leaves.
 - 4 Inflorescence predominantly axillary, with well-developed leaves in at least the lower part of the inflorescence; [subsections *Argutae*, *Glomeruliflorae*, *Squarrosae*, *Thyrsiflorae*] **Key D**
 - 4 Inflorescence a well-developed panicle; [subsections *Triplinervae*, *Venosae*] **Key E**

Key A – goldenrods with corymbiform inflorescences
(section *Ptarmicoideae*, and section *Solidago*, subsection *Multiradiatae*)

- 1 Plant a woody shrub; leaves with a markedly pebbled surface [see *Chrysoma*]
- 1 Plant an herb; leaves variously smooth or rugose, but not pebbled.
 - 2 Inflorescence flat-topped; disk flowers 2-12, usually fewer than the ray flowers [see *Bigelowia*]
 - 2 Inflorescence corymbose (rounded); disk flowers 17-60, more than the ray flowers.
 - 3 Rays white; leaves linear-lanceolate to linear-oblongate, the longer (10-) 15-20× as long as wide; pappus bristles slightly to strongly clavellate-thickened; [section *Ptarmicoideae*] *S. ptarmicoides*
 - 3 Rays yellow; leaves oblong, elliptic, obovate, or spatulate, 2-8× as long as wide; pappus bristles not clavellate thickened.
 - 4 Larger leaves obovate, 5-10 cm long, 1.5-4 cm wide, with prominent teeth; plants small, 0.5-4 dm tall; [of high elevation rock outcrops on Grandfather Mountain, Roan Mountain, and Hanging Rock Mountain (Avery, Watauga, and Mitchell counties), NC]; [section *Solidago*, subsection *Multiradiatae*] *S. spithamea*
 - 4 Larger leaves elliptic-oblong, 6-25 cm long, 2-10 cm wide, with small, obscure teeth; plants robust, 4-15 dm tall; [of dry, prairie-like sites at low elevations]; [section *Ptarmicoideae*]
 - 5 Larger leaves 3-6 cm wide, ca. 2-8× as long as wide, acute to obtuse, serrate to crenate with numerous teeth (sometimes the teeth very obscure), with many pinnate-netted veins; leaves, stems, and peduncles moderately to densely pubescent.
 - 6 Outer series of phyllaries glabrous on the back (glabrous to short-ciliate on the margin); leaf undersurface glabrous to somewhat hispid (0-20 hairs per mm²) (the margins and midrib beneath often more densely pubescent); stems glabrous to somewhat hispid (0-25 hairs per mm²) *S. rigida* var. *glabrata*
 - 6 Outer series of phyllaries pubescent on the back (short-ciliate on the margin); leaf undersurface hispid (7-50 hairs per mm²); stems slightly to strongly hispid (10-70 hairs per mm²) *S. rigida* var. *rigida*
 - 5 Larger leaves 0.4-1.6 cm wide, ca. 12-25× as long as wide, acuminate to acute, entire or serrate with a few salient teeth on either side, with 3+ parallel veins.

- 7 Rays 1-4 per head; cypselas 2-3 mm long; leaves acute to obtuse, rarely folded along the midvein; [of prairies and longleaf pine savannas from MS westward on the Coastal Plain] *S. nitida*
- 7 Rays 7-9 per head; cypselas 1.5-2.2 mm long; leaves acuminate, often folded along the midvein; [of wet prairies and fens of interior physiographic provinces] *S. riddellii*

**Key B – goldenrods with basally disposed leaves and elongate, non-secund inflorescences
(section *Solidago*, subsections *Glomeruliflorae*, *Humiles*, *Maritimae*, *Squarrosae*)**

- 1 Heads very large, involucre 8-13 mm high; fresh leaves noticeably thick and rubbery in texture; [subsection *Glomeruliflorae*]; [plants of high elevations of NC and TN] *S. glomerata*
- 1 Heads smaller, involucre < 8 mm high; fresh leaves not thick or rubbery in texture; [plants collectively widespread].
- 2 Phyllaries and often also vegetative parts with minute sticky glands; stem leaves petiolate; [subsection *Humiles*].
 - 3 Leaves, peduncles, and phyllaries copiously glandular; [plants of Coastal Plain sandhills] *S. kralii*
 - 3 Leaves, peduncles, and phyllaries slightly glandular; [plants of rocky glades, cliffs, barrens, and river-scoured outcrops, primarily on mafic or calcareous rocks)].
 - 4 Involucres 7-12 mm high; basal leaves 15-40 mm wide; [of n. AL, e. TN, and e. KY] *S. arenicola*
 - 4 Involucres 3-7 mm high; basal leaves (2-) 3-22 (-31) mm wide; [of sc. NC, w. VA, and n. VA northward].
 - 5 Achenes glabrous (even when young); flowering plants (3-) 4-10 (-13) dm tall; inflorescence broadly cylindrical, averaging 5-6 cm in diameter; [of rocky, flood-scoured riversides, known only from the Yadkin River in sc. NC] *S. plumosa*
 - 5 Achenes pubescent (even when mature); flowering plants 1.5-6 (-8.5) dm tall; inflorescence narrowly cylindrical, averaging 2-4 cm in diameter.
 - 6 Lower cauline leaves 7-15× as long as wide, (2.5-) 4.6-9.4 (-11.2) cm long, (2-) 3-9 (-17) mm wide, generally obscurely toothed; [of rocky, flood-scoured riversides, from e. KY, e. TN, and n. VA northward] *S. racemosa*
 - 6 Lower cauline leaves 3-8× as long as wide, (4.2-) 6.2-11.3 (-15.9) cm long, (5-) 10-22 (-31) mm wide, generally sharply toothed; [of cliffs and barrens, primarily over mafic rocks, from w. VA northward] *S. randii*
 - 2 Phyllaries and vegetative parts lacking minute sticky glands; stem leaves sessile.
 - 7 Petioles of lower stem leaves sheathing the stems; [of bog and marsh habitats, growing in soils which are permanently or at least seasonally saturated]; [subsection *Maritimae*].
 - 8 Basal leaves 0.7-8 cm wide; plants short, 4-10 (-15) dm tall, typically fairly stout; [of the Mountains and northward].
 - 9 [of seepage over sloping rock on granitic domes, of sw. NC, nw. SC, and ne. GA] *S. simulans*
 - 9 [of peaty bogs, of w. NC and e. TN northward]
 - 10 Basal leaves 0.7-2.5 cm wide; [south to PA and WV] [*S. uliginosa* var. *linoides*]
 - 10 Basal leaves 3-8 cm wide; [south to NC and TN] *S. uliginosa* var. *uliginosa*
 - 8 Basal leaves 0.7-2.5 (-5) cm wide; plants short to tall, 3-20 dm tall, typically very slender; [of the Coastal Plain and lower Piedmont and southward].
 - 11 Leaf margins smooth, entire; ray flowers 8-13 per head; disk flowers 14-25 per head; pappus (2.5-) 3.0-3.5 mm long *S. pulchra*
 - 11 Leaf margins (of the basal leaves at least) scabrous-margined, also often toothed; ray flowers 2-7 per head; disk flowers 6-16 per head; pappus (3.0-) 3.5-4.5 (-5.0) mm long.
 - 12 Leaf margins scabrous (or at least tuberculate) throughout; panicle branches often spreading-erect with recurved-secund tips; pappus 2.2-4.0 mm long *S. gracillima*
 - 12 Leaf margins tending to become smooth on the upper stem; panicle branches usually stiffly erect; pappus 4.0-4.5 (-5.0) mm long *S. stricta*
 - 7 Petioles of lower stem leaves not sheathing the stems; [of mesic or drier habitats]; [subsection *Squarrosae*].
 - 13 Phyllaries spreading or with squarrose tips *S. squarrosa*
 - 13 Phyllaries appressed.
 - 14 Phyllaries sparsely to moderately finely stipitate-glandular; [of the Outer Coastal Plain of se. NC] *S. villosicarpa*
 - 14 Phyllaries and peduncular bracts not glandular; [collectively widespread].
 - 15 Phyllaries linear-lanceolate, attenuate, tapering to pointed or minutely rounded tip.
 - 16 Stems glabrous below and to the mid-stem; rays mostly 6-9; inner phyllaries usually striate with 2 prominent secondary veins *S. roanensis*
 - 16 Stems finely hairy throughout with minute strigillose hairs; rays mostly 9-16; inner phyllaries not striate.
 - 17 Leaves 20-50 (-60) per stem; midstem leaves usually 4-5 cm long; phyllaries attenuate; [of the Mountains and Piedmont (rarely Coastal Plain), of GA northward] *S. puberula* var. *puberula*
 - 17 Leaves (20-) 50-120 per stem; midstem leaves usually 1-4 cm long; phyllaries acute to acuminate; [of the Coastal Plain from se. VA southward] *S. puberula* var. *pulverulenta*
 - 15 Phyllaries ovate to lanceolate, acute to obtuse or rounded.
 - 18 Rays white *S. bicolor*
 - 18 Rays yellow (may turn pale yellow with age).
 - 19 Leaves and stems sparsely to densely hairy with spreading to appressed hairs *S. hispida*
 - 19 Leaves and upper stems glabrous.
 - 20 Inflorescence either very narrowly thyriform and often interrupted or branches well spaced; mid cauline leaves 0.5-2.0 cm wide; [of MA to se. IN, south to GA and MI, mostly avoiding the Coastal Plain southward] *S. erecta*
 - 20 Inflorescence usually denser, broader, and crowded, sometimes more open in robust plants, or narrow in plants outside range of *S. erecta*; mid cauline leaves often > 20 mm wide; [of MA to GA, west to SD and scattered south in CO to ne. NM].
 - 21 Mid-stem leaves 0.4-1.5 (-2.0) cm wide; basal leaves 0.8-2.0 cm wide, entire or slightly serrate, present or absent at flowering *S. speciosa* var. *rigidiuscula*
 - 21 Mid-stem leaves usually > 2 cm wide; basal leaves (2.0-) 3.0-5.5 cm wide, coarsely serrate, present at flowering *S. speciosa* var. *speciosa*

**Key C – goldenrods with basally disposed leaves and elongate, secund inflorescences
(section *Solidago*, subsections *Argutae*, *Junceae*, *Maritimae*, *Nemorales*)**

- 1 Basal and lower cauline leaves petiolate with a cordate or subcordate blade and/or a cordate-clasping petiole; [subsection *Argutae*].
 - 2 Pappus > 1/2× as long as the disc corollas; rays 1-3..... *S. auriculata*
 - 2 Pappus < 1/4× as long as the disc corollas; rays 3-6..... *S. sphacelata*
- 1 Basal and lower cauline leaves with cuneate leaf blades and petioles not cordate-clasping (though leaves may have petioles which sheath the stem).
 - 3 Blades of lower leaves ovate to elliptic to oblanceolate, their bases truncate, abruptly tapering, or gradually tapering to petiole; lower leaves including petioles mostly less than 4× as long as wide (sometimes longer in *S. brachyphylla* with densely puberulent leaf surfaces and stems, and in *S. arguta* var. *boottii* and *S. arguta* var. *caroliniana* with blades sharply serrate and heads lacking phyllary-like bracts interior to ray florets); [subsection *Argutae*].
 - 4 Leaves **either** definitely scabrous **or** moderately to densely soft-villous or puberulent.
 - 5 Leaves scabrous on the upper surface.
 - 6 Involucre (2.5-) avg. 3.9 (-6.5) mm high; basal and lower cauline leaves 8-30 cm long, 4-10 cm wide, mostly 2-3× as long as wide; upper stem leaves few, somewhat reduced; disc florets averaging 11.8 per head; [of the Mountains, Interior Low Plateau, and rarely Piedmont]..... *S. patula*
 - 6 Involucre (3.5-) avg. 6.1 (-8.8) mm high; basal and lower cauline leaves 6-24 cm long, 2-6 cm wide, mostly 3-5× as long as wide; upper stem leaves many, strongly reduced; disc florets averaging 9.3 per head; [of the Coastal Plain and very rarely the lower Piedmont]..... *S. salicina*
 - 5 Leaves moderately to densely soft-villous or puberulent.
 - 7 Leaves puberulent; rays 0 (-2); flowering September-November; [of SC (NC?) south to FL and AL] *S. brachyphylla*
 - 7 Leaves soft-villous; flowering May-June; rays 7-12; [of Coastal Plain of e. NC and e. SC] *S. verna*
 - 4 Leaves **either** glabrous (or nearly so) **or** strigose or strigillose.
 - 8 Plants with slender, stoloniferous rhizomes (in addition to the main, more deeply-seated rhizomes)..... *S. tarda*
 - 8 Plants lacking slender, stoloniferous rhizomes.
 - 9 Phyllaries striate, with several nerves prominent; involucre 4.5-6 (-7) mm high *S. faucibus*
 - 9 Phyllaries not striate, only the midvein prominent; involucre 2.5-5.6 mm high.
 - 10 Basal leaves truncate at the base; leaves thick in texture *S. harrisii*
 - 10 Basal leaves cuneate to rounded at the base; leaves of normal herbaceous texture.
 - 11 Achenes glabrous *S. arguta* var. *arguta*
 - 11 Achenes strigillose, at least toward the apex.
 - 12 Leaves strigose or strigillose *S. arguta* var. *boottii*
 - 12 Leaves glabrous *S. arguta* var. *caroliniana*
 - 3 Blades of lower leaves oblanceolate to narrowly ovate, gradually tapering to petiole; lower leaves including petioles mostly more than 4× as long as wide (sometimes shorter in *S. juncea* with at least a few phyllary-like bracts interior to ray florets).
 - 13 Petiole bases of basal and lower cauline leaves not sheathing the stem; [of mesic or dry habitats].
 - 14 Stems obviously densely and loosely puberulent; [subsection *Nemorales*] *S. nemoralis* var. *nemoralis*
 - 14 Stems glabrous or nearly so; [subsection *Junceae*].
 - 15 Rhizomes thin, elongated, creeping; stem leaves usually 3-nerved; [disjunct from west to glades and barrens] *S. missouriensis* var. *fasciculata*
 - 15 Rhizomes thick, short; stem leaves not 3-nerved; [collectively of various habitats].
 - 16 Rays 7-13; disc florets 8-12..... *S. juncea*
 - 16 Rays 3-7; disc florets 5-9
 - 17 Upper stem leaves ascending to appressed, usually lacking axillary fascicles; [west of the Blue Ridge] *S. gattingeri*
 - 17 Upper stem leaves spreading or reflexed, with axillary fascicles of reduced leaves; [east of the Blue Ridge]..... *S. pinetorum*
 - 13 Petiole bases of basal and lower cauline leaves sheathing the stem; [of seasonally saturated habitats]; [subsection *Maritimae*].
 - 18 Leaves somewhat fleshy, the stem leaves reduced but not very markedly so; inflorescence almost always with lower branches strongly recurved with second heads; [of coastal or otherwise saline habitats].
 - 19 Involucres 3-4 mm high; rays 7-11; disc flowers ca. 10-16; [of MA south to FL, west to TX and beyond]..... *S. sempervirens* var. *mexicana*
 - 19 Involucres 4-7 mm high; rays 12-17; disc flowers ca. 17-22; [of VA northward] *S. sempervirens* var. *sempervirens*
 - 18 Leaves not fleshy (rarely so in *S. stricta* of near coastal situations), the stem leaves much reduced relative to the basal; inflorescence showing only relatively weak tendency to recurved branches with second heads; [of inland habitats, except rarely *S. stricta*].
 - 20 Basal leaves 0.7-2.5 (-5) cm wide; plants short to tall, 3-20 dm tall, typically very slender; [of the Coastal Plain and lower Piedmont and southward].
 - 21 Leaf margins smooth, entire; ray flowers 8-13 per head; disk flowers 14-25 per head; pappus (2.5-) 3.0-3.5 mm long; plants to 1 m tall..... *S. pulchra*
 - 21 Leaf margins (of the basal leaves at least) scabrous-margined, also often toothed; ray flowers 2-7 per head; disk flowers 6-16 per head; pappus 2.2-4.5 (-5.0) mm long; plants to 2 m tall.
 - 22 Leaf margins scabrous (or at least tuberculate) throughout; panicle branches often spreading-erect with recurved-second tips; pappus 2.2-4.0 mm long *S. gracillima*
 - 22 Leaf margins tending to become smooth on the upper stem; panicle branches usually stiffly erect; pappus 4.0-4.5 (-5.0) mm long *S. stricta*
 - 20 Basal leaves 0.7-8 cm wide; plants short, 4-10 (-15) dm tall, typically fairly stout; [of the Mountains, e. VA, and northward].
 - 23 [of seepage over sloping rock on granitic domes, of sw. NC, nw. SC, and ne. GA] *S. simulans*
 - 23 [of peaty bogs, of w. NC and e. TN northward].
 - 24 Basal leaves 0.7-2.5 cm wide; [south to PA and WV]..... *S. uliginosa* var. *linoides*
 - 24 Basal leaves 3-8 cm wide; [south to NC and TN]..... *S. uliginosa* var. *uliginosa*

**Key D – goldenrods with cauline leaves and axillary inflorescences
(section *Solidago*, subsections *Argutae*, *Glomeruliflorae*, *Squarrosae*, *Thyrsiflorae*)**

- 1 Leaves entire or obscurely few-toothed; achenes glabrous at maturity; outer phyllaries with squarrose tips (tips appressed in *S. speciosa* var. *rigidiuscula*).
- 2 Outer phyllaries appressed; [subsection *Squarrosae*]*S. speciosa* var. *rigidiuscula*
- 2 Outer phyllaries with squarrose tips.
- 3 Leaves oblanceolate-obovate, often short acuminate at the apex; mid-cauline leaves 8-14 cm long, 18-40 mm wide, the margins sharply serrate on at least the upper 2/3; [subsection *Argutae*][*S. buckleyi*]
- 3 Leaves narrowly to broadly elliptic (or less commonly slightly oblanceolate), acute at the apex; mid-cauline leaves 3-8 (-10) cm long, 8-25 mm wide, margins entire to shallowly serrate on only the upper 1/2 to 2/3; [subsection *Thyrsiflorae*]*S. petiolaris* var. *petiolaris*
- 1 Leaves generally many- and sharp-toothed; achenes persistently pubescent; outer phyllaries with appressed tips; [subsection *Glomeruliflorae*].
- 4 Stem terete, glaucous.
- 5 Lower midstem leaves narrowly lanceolate, 5-15 cm long, 0.8-3 cm wide, 5-6× as long as wide; stems strongly arching; [plants widespread in our area]*S. caesia* var. *caesia*
- 5 Lower midstem leaves broadly lanceolate to rhombic, 5-9 cm long, 1.3-2.4 cm wide, 3-4× as long as wide; stems weakly arching; [plants of the Gulf Coastal Plain of GA westward]*S. caesia* var. *zedia*
- 4 Stem striate-angled, green.
- 6 Larger leaf blades on a plant 2-6 cm long; stems with spreading white hairs; [endemic to sandstone rockhouses in the Red River Gorge in Menifee, Powell, and Wolfe counties, KY]*S. albopilosa*
- 6 Larger leaf blades on a plant 8-20 cm long; stems glabrous or sparsely pubescent; [of various dry and mesic habitats, collectively widespread in our area].
- 7 Leaves 1-3 (-3.5)× as long as wide.
- 8 Leaves (2.2-) 2.5-3 (-3.5)× as long as wide, cuneate to a sessile base; teeth of the leaf margins not notably elongate and narrow, mostly 1-2 (-3) mm long (as measured on the upper side of the teeth)*S. flaccidifolia*
- 8 Leaves 1-2.2 (-2.5)× as long as wide, abruptly contracted to a winged petiole; teeth of the leaf margins elongate and narrow, acuminate, mostly (2-) 3-8 mm long (as measured on the upper side of the teeth) *S. flexicaulis*
- 7 Leaves 3-10× as long as wide.
- 9 Involucre (5-) 5.6-7 (-8) high; phyllaries 0.7-1 mm wide, 1-nerved; stems 4-9 (-10) dm tall; ray flowers 2-4 (-6); [broadly Appalachian]*S. curtisii*
- 9 Involucre 6.4-8.5 (-9) high; phyllaries 1-1.5 mm wide, 3-10-nerved; stems 6-16 dm tall; ray flowers 5-8; [apparently restricted to high elevations in the Blue Ridge of NC and TN]*S. lancifolia*

**Key E – goldenrods with cauline leaves and well-developed paniculate inflorescences
(section *Solidago*, subsections *Nemorales*, *Triplinervae* and *Venosae*)**

- 1 Mid-stem leaves 3-nerved (obscurely so in *S. tortifolia*); leaves elliptic, lanceolate, oblanceolate, or linear.
- 2 Rays 2-6; larger leaves linear to lance-linear, 2-7 (-10) mm wide, twisted at base; plants (3-) 7-13 dm tall; [subsection *Triplinervae*]*S. tortifolia*
- 2 Rays 4-17 (-24); larger leaves 5-30 mm wide, not twisted at base; plants 5-20 dm tall.
- 3 Rays 4-10 (-11); plants 3-15 dm tall.
- 4 Rays 4-7; plants 3-9 dm tall; stems scabrous to loosely puberulent below; cauline leaves oblanceolate, 7-20 (-30) mm wide, faces slightly to strongly scabrous; involucre 3-5 mm long; ray floret laminae 2-3.5 × 0.2-0.7 mm; disc floret corolla lobes 1 mm long; pappi 3 mm long [of Piedmont and Mountains of KY, NC, SC, GA, and AL, and from IL and KS south to LA and TX]; [subsection *Nemorales*] *S. radula*
- 4 Rays 7-11; plants 5-15 dm tall; stems glabrous below; cauline leaves linear-elliptic, 6-12 mm wide, faces glabrous (or puberulent on abaxial midnerve); involucre 2-3 mm long; ray floret laminae 1-2 × 0.1-0.2 mm; disc floret corolla lobes 0.4-0.6 mm long; pappi 2-2.5 mm long [of MD and PA south to VA, and IN, KY, and TN]; [subsection *Triplinervae*]*S. rupestris*
- 3 Rays (7-) 9-17 (-24); plants (5-) 10-20 dm tall; [collectively widespread]; [subsection *Triplinervae*].
- 5 Stems glabrous and usually also glaucous*S. gigantea*
- 5 Stems pubescent (at least the upper portion).
- 6 Leaves glabrous above and below, or pubescent only on the main veins beneath; midstem leaves serrulate, with 1-10 teeth per side, the largest < 0.5 mm long; [of the Coastal Plain, from NC south to FL and AL] *S. leavenworthii*
- 6 Leaves moderately to densely pubescent across the lower surface, and scabrous to puberulent above; midstem leaves entire, serrulate, or serrate; [collectively widespread].
- 7 Mid-stem leaves entire to serrulate; involucre (2.5-) 3-4.5 mm high *S. altissima* var. *altissima*
- 7 Mid-stem leaves serrate, the teeth 3-10 per side, the largest > 1.5 mm long; involucre 1.7-2.5 (-3.0) mm high.
- 8 Lower to mid-stem glabrous or sparsely pubescent*S. canadensis* var. *canadensis*
- 8 Lower to mid-stem moderately pubescent *S. canadensis* var. *hargeri*
- 1 Mid-stem leaves reticulate-nerved; leaves generally obovate, elliptic, lanceolate, or oblanceolate (if linear, then the fresh leaves anise-scented); [subsection *Venosae*].
- 9 Stems from branched caudices or short rhizomes, lacking elongated rhizomes.
- 10 Leaves serrate; leaves not translucent-punctate; fresh leaves not anise-scented
- 11 Stem spreading-hirsute; [of the Ozarks, disjunct in MS][*S. ulmifolia* var. *palmeri*]
- 11 Stem glabrous or nearly so, except just below the inflorescence; [widespread] *S. ulmifolia* var. *ulmifolia*
- 10 Leaves entire; leaves translucent-punctate; fresh leaves anise-scented.
- 12 Main leaves ovate to lanceolate, 2-5 (-6)× as long as wide; stem pubescence general and circumferential; [of FL]*S. chapmanii*

- 12 Main leaves lanceolate to linear, (4-) 5-15× as long as wide; stem pubescence in lines decurrent down the stem from the margins of the leaf bases; [widespread].....*S. odora*
- 9 Stems from elongated creeping rhizomes.
- 13 Mid-stem leaves sessile, somewhat clasping; leaf margins nearly entire to obscurely serrulate; leaves planar..... *S. fistulosa*
- 13 Mid-stem leaves subsessile, not clasping; leaf margins strongly serrate; leaves rugose.
- 14 Involucres 4-6 mm high; broader phyllaries 0.7-1.2 mm wide; stems glabrous below the inflorescence; mid-stem leaves elliptic (widest near the middle)..... *S. latissimifolia*
- 14 Involucres (2-) 2.5-3.5 (4.5) mm high; phyllaries mostly < 0.5 mm wide; stems hairy or glabrous below the inflorescence; mid-stem leaves lanceolate to ovate (widest below the middle).
- 15 Leaves relatively thin, not very rugose, usually sharply serrate, the apices acuminate, glabrous or soft-hairy on the surfaces.
 - 16 Stems and leaves hairy*S. rugosa* var. *rugosa*
 - 16 Stems and leaves glabrous*S. rugosa* var. *sphagnophila*
- 15 Leaves relatively thick and firm, strongly rugose, usually subtire to bluntly serrate, the apices often only acute, scabrous or stiffly-hairy on the surfaces.
- 17 Inflorescences narrow, the lower lateral branches only slightly exceeding the subtending leaves; leaves sparsely pubescent; [of the Southern Appalachians]..... *S. rugosa* var. *cronquistiana*
- 17 Inflorescences broad, the lower lateral branches generally much longer than the subtending leaves; leaves moderately to densely pubescent; [collectively widespread].
- 18 Upper cauline leaves lanceolate to elliptic, not much reduced relative to leaves lower on the stem..... *S. rugosa* var. *aspera*
- 18 Upper cauline leaves ovate, much reduced relative to leaves lower on the stem*S. rugosa* var. *celtidifolia*

Solidago albopilosa E.L. Braun, Rockhouse Goldenrod, Cave Goldenrod. Sandstone rockhouses. In the Red River Gorge of e. KY (Menifee, Powell, and Wolfe counties). September. See Esselman & Crawford (1997). [= C, F, FNA, G, K, SE]

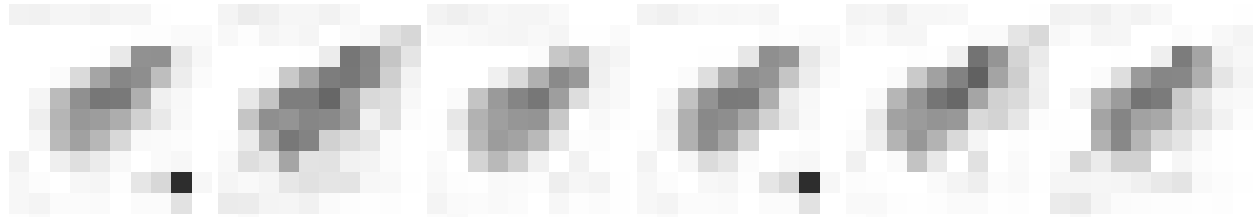
Solidago altissima Linnaeus var. *altissima*, Tall Goldenrod. Fields, roadsides, disturbed areas. August-October. NS, QC, and SK south to c. peninsular FL, TX, and Mexico; introduced in w. North America. Var. *gilvocanescens* (Rydberg) Semple, with heads smaller (mainly 2-3 mm high vs. 3-4 mm high) is mainly distributed in the Great Plains. [= FNA; = *S. altissima* – F, K, Pa, WV; = *S. canadensis* Linnaeus var. *scabra* Torrey & Gray – C, G, SE, WH3; < *S. altissima* Linnaeus – RAB, GW (including *S. canadensis* vars. and *S. rupestris*); = *S. hirsutissima* P. Miller – S; < *S. canadensis* – W; = *S. altissima* ssp. *altissima* – FNA]

Solidago altissima Linnaeus var. *gilvocanescens* (Rydberg) Semple, Great Plains Common Goldenrod. Attributed to VA by Kartesz (1999). [= *S. canadensis* Linnaeus var. *gilvocanescens* Rydberg – C, F, K; = *S. pruinosa* Greene – G; < *S. canadensis* – S, W; = *S. altissima* L. ssp. *gilvocanescens* (Rydberg) Semple – FNA] {not keyed}

Solidago arenicola B.R. Keener & Kral, Black Warrior Goldenrod. Riverside scour areas. September-October. Known from Blount County, AL (Black Warrior River) and on rivers in the Cumberland Plateau of TN and KY (notably Big South Fork of the Cumberland River). See Keener & Kral (2003) for additional information. [= FNA]

Solidago arguta Aiton var. *arguta*, Forest Goldenrod. Woodlands, woodland borders, road margins. August-October. ME and s. ON west to MO, south to NC and TN. [= Pa; = *S. arguta* ssp. *arguta* – C, SE, W; < *S. arguta* – RAB (also see *S. tarda* and *S. vaseyi*); = *S. arguta* – F, G, S; = *S. arguta* ssp. *arguta* var. *arguta* – FNA; < *S. arguta* var. *arguta* – K]

Solidago arguta Aiton var. *boottii* (Hooker) Palmer & Steyermark, Boott's Goldenrod. Dry open woodlands, dry slopes, often in sandy or rocky soils. September-October. C. SC south to s. AL, west to LA, AR, and s. MO, most common in the Ozarks. Reported for n. WV by Harmon, Ford-Werntz, & Grafton (2006), but it seems likely that this is based on different interpretations of the taxa. [= K, SE; < *S. arguta* – RAB (also see *S. tarda* and *S. vaseyi*); > *S. boottii* – F, S, WV; > *S. strigosa* – F, G, S; = *S. arguta* ssp. *caroliniana* (A. Gray) G.H. Morton var. *boottii* (Hooker) Palmer & Steyermark – FNA; > *S. boottii* var. *boottii* – G; = *S. arguta* Aiton ssp. *boottii* (Hooker) G.H. Morton]



Solidago arguta Aiton var. *caroliniana* A. Gray, Vasey's Goldenrod. Forests, woodlands, grassy balds. September-October. WV west to c. TN and s. MO, south to ne. FL, Panhandle FL, s. MS, and c. AR. [= C, K, SE, W; < *S. arguta* – RAB, WV; = *S. yadkinensis* (Porter) Small – F, S, misapplied; = *S. arguta* ssp. *caroliniana* (A. Gray) G.H. Morton var. *caroliniana* – FNA; > *S. boottii* Hooker var. *caroliniana* (A. Gray) Cronquist – G; < *S. arguta* var. *caroliniana* – WH3; ? *S. vaseyi* (A. Gray) Heller; = *S. arguta* ssp. *australis*, nomen nudum; = *S. arguta* Aiton ssp. *pseudoyadkinensis* G.H. Morton; = *S. pseudoyadkinensis*, nomen nudum; = *S. arguta* Aiton ssp. *caroliniana* (A. Gray) G.H. Morton]

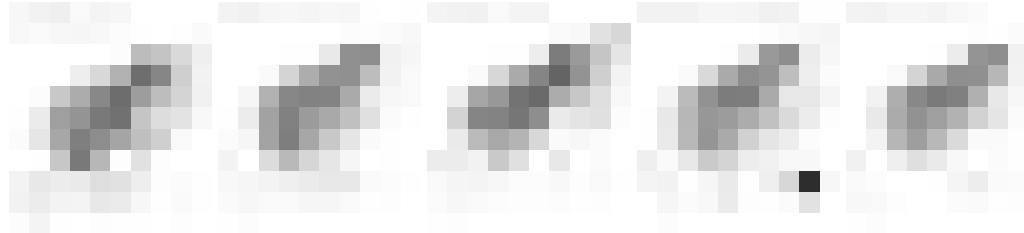
Solidago auriculata Shuttleworth ex Blake, Eared Goldenrod. Rocky forests over circumneutral rocks, bottomland forests, calcareous hammocks. August-September. Wc. SC, sc. TN (Chester, Wofford, & Kral 1997), AR, and OK south to GA, c. Panhandle FL, AL, MS, LA, and TX. [= FNA, K, SE, WH3; = *S. notabilis* Mackenzie – RAB, S]

Solidago austrina Small, Southern Goldenrod. Seepage bogs, other moist sites. [= F, G, S] {add synonymy, disentangle concept mapping re *S. gracillima*, etc.}

Solidago bicolor Linnaeus, Silverrod, White Goldenrod. Woodlands, roadbanks, pastures. August-October. NS and MB south to GA and LA. [= RAB, C, FNA, G, K, Pa, S, SE, W, WV; > *S. bicolor* var. *bicolor* – F; > *S. bicolor* var. *ovalis* – F]

Solidago brachyphylla Chapman, Dixie Goldenrod. Open woodlands, bluff forests. September-November. SC (NC?) south to ne. FL and Panhandle FL, west to s. AL (s. MS?). [= FNA, K, S, SE, WH3]

Solidago buckleyi Torrey & A. Gray, Buckley's Goldenrod. Forests, open ridgetop and bluff woodlands. September. W. KY, s. IN, s. IL, s. MO; perhaps eastward in GA and AL (these occurrences controversial as to identification). [= F, FNA, G, K, S, SE; < *S. petiolaris* – RAB]



Solidago caesia Linnaeus var. *caesia*, Axillary Goldenrod. Moist forested slopes. August-October. ME and ON south to FL and LA. [= FNA; < *S. caesia* – RAB, C, F, G, K, Pa, S, SE, W, WH3, WV]

Solidago caesia Linnaeus var. *zedia* R.E. Cook & Semple, Gulf Coast Axillary Goldenrod. Moist forests. September-October. GA and Panhandle FL west to LA and AR. [= FNA; < *S. caesia* – K, S, SE, WH3]

Solidago canadensis Linnaeus var. *canadensis*, Northern Common Goldenrod. Old fields, pastures, roadsides. August-October. NL (Newfoundland) west to MN, south to VA, OH, and IL. See Fernald (1950), p. 1408. [= C, F, FNA, K, Pa, SE; < *S. canadensis* var. *canadensis* – G; < *S. canadensis* – S, WV]

Solidago canadensis Linnaeus var. *hargerii* Fernald, Harger's Common Goldenrod. Old fields, pastures, roadsides. August-October. VT and NH west to MN, south to VA, NC, KY, OH, IL, and IA. First reported for NC by Poindexter & Murrell (2008). Likely much more common than assumed, but misrepresented due to taxonomic confusion with *S. altissima*. [= C, F, FNA, K, Pa, SE; < *S. canadensis* var. *canadensis* – G; < *S. canadensis* – S, W, WV]

Solidago chapmanii A. Gray, Chapman's Goldenrod. Sandhills and dry, open hammocks. September-October. S. GA south to s. FL and Panhandle FL. [= S; = *Solidago odora* Aiton var. *chapmanii* (A. Gray) Chapman – K, WH3; = *Solidago odora* Aiton var. *chapmanii* (A. Gray) Chapman – SE, orthographic error; = *S. odora* ssp. *chapmanii* (A. Gray) Semple – FNA]

Solidago curtisii Torrey & A. Gray, Curtis's Goldenrod. Moist forested slopes, and rarely in mafic woodlands in the Piedmont of VA. September-October. A Central and Southern Appalachian endemic: PA, WV, and MD south to n. GA and n. AL. Var. *curtisii*, with stem glabrous or slightly puberulent in the inflorescence, and var. *pubens* (M.A. Curtis) A. Gray, with stem densely puberulent, are sometimes distinguished. They do not appear to be worthy of taxonomic recognition. [= C, Pa, SE, W, WV; < *S. curtisii* var. *curtisii* – RAB (also see *S. lancifolia*); > *S. curtisii* var. *curtisii* – F, G; > *S. curtisii* var. *pubens* (M.A. Curtis) A. Gray – RAB, F, G; = *S. curtisii* var. *curtisii* – FNA; < *S. curtisii* – K (also see *S. lancifolia*); = *S. caesia* Linnaeus var. *curtisii* (Torrey & A. Gray) Wood; > *S. curtisii* – S; > *S. pubens* M.A. Curtis – S]



Solidago delicatula Small. Possibly east to AL, FL. August-October. [= FNA, SE; = *S. ulmifolia* Muhlenberg ex Willdenow var. *microphylla* A. Gray – K; < *S. ulmifolia* – S] {not keyed; not mapped}

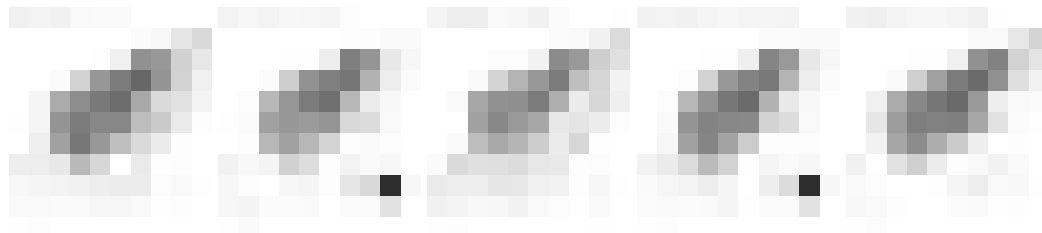
Solidago erecta Pursh. Woodlands, old fields, woodland borders, grassy balds. August-October. NY and CT south to GA, AL, and MS. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV; < *S. erecta* – FNA (also see *S. porteri*); = *S. speciosa* Nuttall var. *erecta* (Pursh) MacMillan]

Solidago faucibus Wieboldt, Gorge Goldenrod. Moist forests. Late August-October. S. WV south to sw. VA, and se. KY; disjunct in nw. SC. See Wieboldt & Semple (2003) for additional information. [= FNA]

Solidago fistulosa P. Miller, Hairy Pineywoods Goldenrod. Pocosins, swamp forests, wet savannas, wet pine flatwoods, maritime forests. August-November. NS south to s. FL, west to LA. [= RAB, C, F, FNA, G, GW, K, S, SE, WH3]

Solidago flaccidifolia Small, Appalachian Goldenrod. Moist slopes. September-October. VA and KY south to GA and ne. AL; disjunct in nc. MS. [= C, G, K, SE, W; < *S. caesia* – RAB, F; = *S. latissimifolia* – S, misapplied; = *S. curtisii* Torrey & A. Gray var. *flaccidifolia* (Small) R.E. Cook & Semple – FNA; = *S. caesia* Linnaeus var. *paniculata* A. Gray]

Solidago flexicaulis Linnaeus, Zigzag Goldenrod. Moist wooded slopes, especially over calcareous or mafic rocks. August-October. NS, ON and ND south to GA, AL, MS, and KS. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV]



Solidago gattereri Chapman, Gatterer's Goldenrod. Cedar glades. AR, MO, c. TN (Chester, Wofford, & Kral 1997). [= F, FNA, G, K, S, SE]

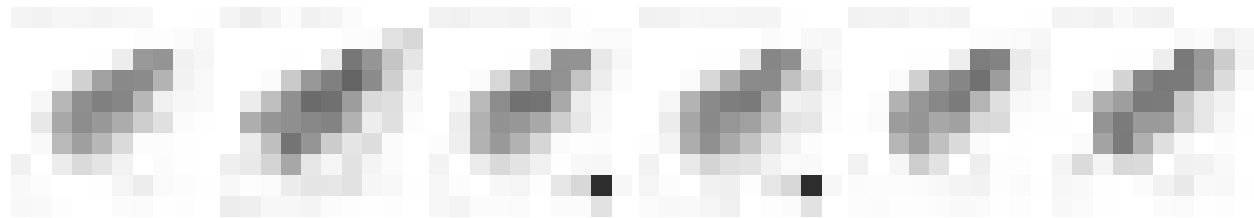
Solidago gigantea Aiton, Smooth Goldenrod. Old fields, roadsides, streamside meadows, bottomlands. August-September (-October). NS west to SK and MT, south to Panhandle FL (Liberty County), TX, and CO. [= RAB, C, GW, K, W, WH3; > *S. gigantea* var. *gigantea* - F, G, Pa, SE, WV; > *S. gigantea* Aiton var. *serotina* (Kuntze) Cronquist - G, Pa, SE; > *S. gigantea* var. *leiophylla* Fernald - F, WV; = *S. serotina* - S]

Solidago glomerata Michaux, Skunk Goldenrod. High elevation situations, including grassy balds, rock outcrops, heath balds, northern hardwood forests, and spruce-fir forests. Mid August-October. A narrow Southern Appalachian endemic, restricted to w. NC and e. TN (perhaps reaching its northern limit on Elk Knob, Watauga County, NC). The basal rosettes are evergreen, and are a conspicuous component of the winter flora at high elevations. The plants have a distinctive skunky odor, easily smelled without touching or bruising the plant. [= RAB, FNA, K, S, SE, W]

Solidago gracillima Torrey & A. Gray, Southern Bog Goldenrod, Graceful Goldenrod. Wet pine savannas, seepage bogs. August-October. E. VA south to c. Panhandle FL, west to s. AL. Several distinct entities appear to have been referred to this taxon; the number of entities, and the appropriate names to apply to them, are presently obscure. The names *S. perlonga* Fernald, *S. austrina* Small, and *S. simulans* Fernald have been synonymized under *S. gracillima* (as by Cronquist 1980). Cronquist (1980) refers material from WV and high elevation granitic domes of sw. NC (*S. simulans*) to *S. gracillima*, a treatment which is not phylogeographically or otherwise credible. The distinction between *S. gracillima* s.s and *S. austrina* may prove warranted. They are alleged to differ as follows: *S. austrina*: pappus 2.2-2.8 mm long, ray flowers 2-4, disc flowers 6-8; of the inner Coastal Plain and lower Piedmont; *S. gracillima*: pappus (3.0-) 3.5-4.0 mm long; ray flowers 3-7; disk flowers 9-13; of the Coastal Plain. [= RAB, K, W, WH3; < *S. gracillima* - C, SE (also see *S. simulans*); > *S. austrina* Small - F, G, S; > *S. perlonga* Fernald - F; = *S. stricta* Aiton ssp. *gracillima* (Torrey & A. Gray) Semple - FNA; > *S. gracillima* - S]

Solidago harrisii Steele, Shale-barren Goldenrod. Limestone, dolostone, greenstone, shale, and calcareous siltstone woodlands, barrens, and cliffs. August-September. A Central Appalachian endemic: w. MD south to e. WV and w. VA. [= F, S, W, WV; = *S. arguta* Aiton var. *harrisii* (Steele) Cronquist - C, K, Pa, SE; = *S. arguta* ssp. *arguta* var. *harrisii* - FNA; < *S. boottii* var. *boottii* - G]

Solidago hispida Muhlenberg ex Willdenow, Hairy Goldenrod. Dry rocky forests and woodland edges. August-October. NL (Labrador) west to SK, south to nw. GA, AL, AR, IA, and SD. Widespread in e. and c. TN (Chester, Wofford, & Kral 1997) and in nw. GA (Jones & Coile 1988). Also reported for NC and SC by Kartesz (1999, 2010). [= C, FNA, Pa, S, SE, W, WV; > *S. hispida* var. *hispida* - F, G, K]



Solidago juncea Aiton, Early Goldenrod. Meadows, pastures, roadbanks, woodland borders. July-September. NS west to MN, south to GA, AL, MS, and LA. [= RAB, C, FNA, Pa, S, SE, W, WV; > *S. juncea* var. *juncea* - F, G, K; > *S. juncea* var. *neobohemica* Fernald - F, K; > *S. juncea* var. *ramosa* Porter & Britton - G]

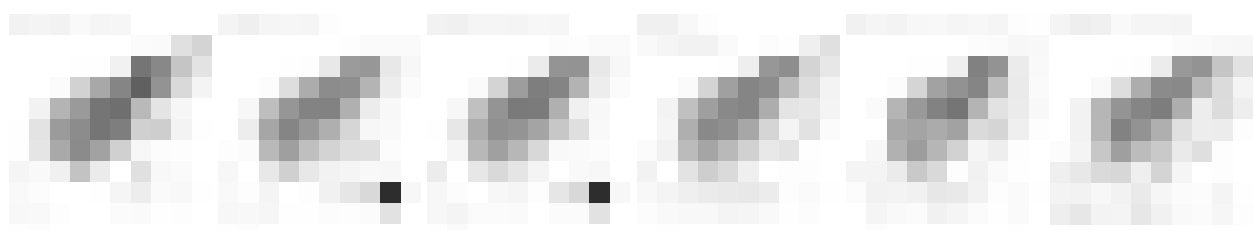
Solidago kralii Semple, Kral's Goldenrod. Longleaf pine sandhills. August-September. SC south to GA. See Semple (2003) for additional information. [= FNA]

Solidago lancifolia (Torrey & A. Gray) Chapman, Lanceleaf Goldenrod. Mountain slopes, mostly at high elevations. Late August-September. W. VA and e. WV south to w. NC and e. TN. [= C, FNA, S, SE, W; < *S. curtisii* var. *curtisii* - RAB; < *S. curtisii* - K]

Solidago latissimifolia P. Miller, Coastal Swamp Goldenrod. Pocosins, swamp forests, sandhill seepages, sandhill-pocosin ecotones. August-October. NS south c. peninsular FL, west to s. AL. [= FNA, K, WH3; = *S. elliotii* Torrey & A. Gray - RAB, C, G, GW, S, SE; > *S. elliotii* var. *ascendens* Fernald - F; > *S. elliotii* var. *pedicellata* Fernald - F]

Solidago leavenworthii Torrey & A. Gray, Leavenworth's Goldenrod. Wet pine savannas, wet pine flatwoods, pond margins, marshes. August-November. Se. NC south to s. FL, west to s. AL. [= RAB, FNA, GW, K, S, SE, WH3]

Solidago mexicana Linnaeus, Southern Seaside Goldenrod. Cp (DE?, FL, GA, NC, SC, VA): coastal dunes, dune slacks, maritime wet grasslands, tidal marshes; common (rare in VA). Late August-December (and sporadically until at least January in mild winters). E. MA south to s. FL, west and south to TX and Mexico; West Indies. Perhaps warranting distinction at specific rank from *S. sempervirens* s.s. [= S; = *S. sempervirens* var. *mexicana* (Linnaeus) Fernald - C, F, G, GW, K, SE; < *S. sempervirens* - RAB, WH3; = *S. sempervirens* ssp. *mexicana* (Linnaeus) Semple - FNA]



Solidago missouriensis Nuttall var. ***fasciculata*** Holzinger. Barrens, Coosa prairies. (July-) August-October. In nw. GA (T. Govus, pers. comm. 2009); in c. TN (Chester, Wofford, & Kral 1997). [= C, F, G, K, SE; < *S. missouriensis* – FNA; = *S. glaberrima* Martens – S]

Solidago nemoralis Aiton var. ***nemoralis***, Eastern Gray Goldenrod. Woodlands, glades, barrens, roadbanks. June-October. NS west to ND, south to Panhandle FL and TX. The more western var. *decemflora* (de Candolle) Fernald does not enter our area. [= K; > *S. nemoralis* var. *nemoralis* – C, F, G, SE, WV; > *S. nemoralis* var. *haleana* Fernald – C, F, G, SE, WV; < *S. nemoralis* – Pa, RAB, S, W, WH3; = *S. nemoralis* ssp. *nemoralis* – FNA]

Solidago nitida Torrey & A. Gray, Shiny Goldenrod. Pine savannas, prairies. (July-) August-October. MS west to s. AR, se. OK, and TX. [= FNA, SE; = *Oligoneuron nitidum* (Torrey & A. Gray) Small – K, S, Z; = *Solidago nitida* Torrey & A. Gray – FNA, SE]

Solidago odora Aiton, Licorice Goldenrod. Dry forests and woodlands, especially in dry pinelands, such as sandhills, of the Coastal Plain, inland in dry, fire-maintained sites, such as glades, barrens, and ridgetop pine-oak woodlands. July-October. NH, VT, NY, OH, and MO south to FL and TX. [= RAB, F, G, Pa, S, W, WV; = *S. odora* var. *odora* – C, K, SE, WH3; = *S. odora* ssp. *odora* – FNA]

Solidago pallescens C. Mohr. Ec. AL and wc. GA. [] {not yet keyed}

Solidago patula Muhlenberg ex Willdenow, Northern Roughleaf Goldenrod. Bogs, seepages over mafic rocks, grassy balds (as Whitetop Mountain). August-September (-October). NH, VT, NY, s. ON, MI and WI south to w. VA, w. NC, nc. GA, c. TN, w. TN, and se. MO. Nearly all Coastal Plain records represent misidentifications of *S. salicina*. Semple, Tong, & Pastolero (2012) have clarified the taxonomy, distribution, and nomenclature of this and *S. salicina*. Perhaps better treated as *S. salicina*. [= *S. patula* Muhlenberg ex Willdenow var. *patula* – RAB, C, F, G, K, SE; = *S. patula* ssp. *patula* – FNA, Pa; < *S. patula* – GW, W, WV; = *S. rigida* – S, misapplied]



Solidago petiolaris Aiton var. ***petiolaris***. Upland forests and woodlands. Late August-November. The distribution of *S. petiolaris* (in the broad sense) is peculiar, with an eastern component (NC south to ne. FL and Panhandle FL, west to AL) and a western component (IL, MO, AR, and LA west to NE, CO, and NM). The eastern component is sometimes treated as *S. petiolaris* (sensu stricto) and the western as *S. angusta* Torrey & A. Gray. Alternatively these are recognized as the varietal rank (as here), or combined entirely. Var. *angusta* (Torrey & A. Gray) A. Gray and var. *wardii* (Britton) Fernald are Ozarkian and more western (Nesom 2008). [= C, F, K, SE; < *S. petiolaris* – RAB, W, WH3 (and also see *S. buckleyi*); = *S. petiolaris* var. *petiolaris* – C, F, K, SE; = *S. petiolaris* – G; > *S. milleriana* Mackenzie – S; > *S. harperi* Mackenzie in Small – S]

Solidago pinetorum Small, Pineywoods Goldenrod. Dry woodlands, woodland borders, roadbanks, dry pinelands. July-September. N. and wc. VA south through e., c., and nw. NC to nc. SC. [= RAB, C, F, FNA, G, K, S, SE, W]

Solidago plumosa Small, Yadkin River Goldenrod. In crevices of outcrops in rocky, flood-scoured riverbanks. September. Known only from the type locality, the gorge of the Yadkin River in c. NC. Most of the population was lost by construction of two hydropower dams, one at each of the two ends of the gorge, and the flooding of the intervening area. This species is related to the more northern *S. racemosa* and the newly described and more western *S. arenicola*. [= FNA, K, S, SE]

Solidago porteri Small, Porter's Goldenrod. Upland forests. So far as known, this species is endemic to the Piedmont of GA; its taxonomic status is very uncertain. [= K, S, SE; < *S. erecta* – FNA] {not yet keyed}

Solidago ptarmicoides (Nees) Boivin, White Prairie-goldenrod, Upland White Aster. Prairie-like barrens over mafic, ultramafic, or calcareous rock, serpentine woodlands, prairies. August-October. VT and NY west to SK, south to e. TN (Rhea and Roane counties in the Ridge and Valley) (Chester, Wofford, & Kral 1997), nw. GA (Floyd County), AR, and CO; disjunct in nc. NC (Granville County, and historically in Rowan County) and nc. SC (York County). [= C, FNA, SE, W, X= *Oligoneuron album* (Nuttall) G.L. Nesom – K, Z; = *Aster ptarmicoides* (Nees) Torrey & A. Gray – F, G, S; = *Unamia alba* (Nuttall) Rydberg; > *Aster ptarmicoides* var. *georgianus* A. Gray (referring to plants of se. US); = *Solidago asteroides* Semple, superfluous name]

Solidago puberula Nuttall var. ***puberula***. Bogs, wet meadows, and wet pastures, in dry acid soils in VA and WV. August-October. NS west to ON, south to GA and TN. [= RAB, C, F, G, K, SE; = *S. puberula* ssp. *puberula* – FNA; = *S. puberula* – S; < *S. puberula* – Pa, W, WV]

Solidago puberula Nuttall var. ***pulverulenta*** (Nuttall) Chapman. Savannas, streamhead pocosins, flatwoods, swamps, seepages in pinelands, and disturbed areas. September-October. Se. VA south to Panhandle FL, west to LA. [= RAB, C, F, G, K, SE, WH3; = *S. puberula* ssp. *pulverulenta* (Nuttall) Semple – FNA; = *S. pulverulenta* Nuttall – S]

Solidago pulchra Small, Beautiful Goldenrod, Carolina Goldenrod. Wet pine savannas, seepage bogs. July-September. Endemic to a small part of the Coastal Plain of se. NC, where locally common in the few wet savannas remaining. Notable sites include Green Swamp (Brunswick County), Holly Shelter Game Land (Pender County), Camp Lejeune Marine Corps Base (Onslow County), and Croatan National Forest (Carteret County). There is no question of the distinctness of this species from *S. stricta* and *S. gracillima*. Once learned, the basal leaves are recognizable at a glance, the petiole very long (often twice as long as the leaf blade), the venation finely netted, the margins smooth and entire, the tip usually acute and prominently mucronate. Even following fire, sterile rosettes typically outnumber flowering plants 100 to 1. [= FNA, K, S, SE; < *S. stricta* – RAB, GW]

Solidago racemosa Greene, Sticky Goldenrod. Rocky, flood-scoured riversides. August-September. ME and QC south to n. VA and WV; plants in the Cumberland Plateau of KY and ne. TN (Churchill & Schell 1992; Chester, Wofford, & Kral 1997) previously attributed to *S. racemosa* appear to be a mix of true *S. racemosa* and a population perhaps best considered either as a disjunct and somewhat morphologically disparate part of the newly named *S. arenicola* or as a new taxon (Floden 2012). [= WV; = *S. simplex* Kunth ssp. *randii* (Porter) Ringius var. *racemosa* (Greene) Ringius – C, FNA, K, Pa; = *S. racemosa* Greene var. *racemosa* – F; = *S. spathulata* A.P. de Candolle ssp. *randii* (Porter) Cronquist var. *racemosa* (Greene) Cronquist – G, SE]

Solidago radula Nuttall, Rough Goldenrod. Dry woodlands over mafic rocks. August-October. IL west to KS, south to LA and TX; disjunct eastward in KY, NC, SC, GA, and AL. [= RAB, C, FNA, G, S, SE, W; > *S. radula* var. *radula* – K]

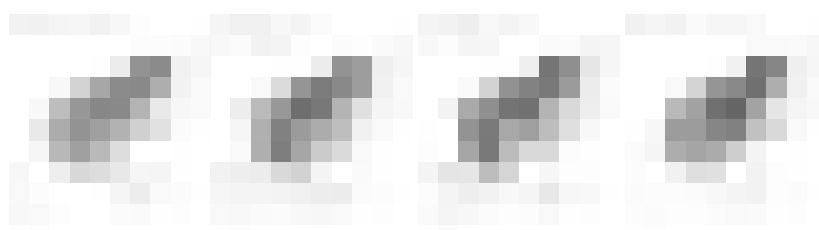
Solidago randii (Porter) Britton, Rand's Goldenrod. Cliffs and barrens, primarily over mafic (such as greenstone and hornblende) or calcareous rocks. NS west to ON and MI, south to w. VA and WV. [= WV; < *S. simplex* ssp. *randii* (Porter) Ringius var. *monticola* (Porter) Ringius – C, FNA; > *S. randii* – F; > *S. maxonii* Pollard – F; = *S. spathulata* A.P. de Candolle ssp. *randii* (Porter) Cronquist var. *randii* – G; = *S. simplex* Kunth ssp. *randii* (Porter) Ringius var. *randii* – K]

Solidago riddellii Frank ex Riddell, Riddell's Goldenrod. Wet, calcareous prairies; rare. ON and MB south to OH, IN, IL, AR, and KS; disjunct in w. VA and nw. GA. The specimen from Fort Monroe ("Fortress Monroe, Va." – Fernald 1950) is accurately identified but may be mislabeled. [= C, F, FNA, G; = *Oligoneuron riddellii* (Frank ex Riddell) Rydberg – K, Z]

Solidago rigida Linnaeus var. ***glabrata*** E.L. Braun, Southeastern Bold Goldenrod. Glades, barrens, and prairie-like areas, over mafic (such as diabase) or calcareous (such as calcareous shale) rocks, and in adjacent disturbed areas, such as roadbanks and powerline rights-of-way. Late August-October. Sc. VA, se. TN, c. OH, and e. MO south to c. SC, sw. GA, and e. TX. This taxon (variously treated as a species, subspecies, or variety) is rare and scattered throughout its range, restricted to prairie-like, barren, or glade situations. Var. *glabrata* is apparently strictly diploid. [= C, G, SE; = *Oligoneuron rigidum* (Linnaeus) Small var. *glabratum* (E.L. Braun) G.L. Nesom – K, Z; < *Solidago rigida* Linnaeus – RAB, W; = *Solidago jacksonii* (Kuntze) Fernald – F; = *Solidago rigida* ssp. *glabrata* (E.L. Braun) Heard & Semple – FNA, Y; = *Oligoneuron jacksonii* (Kuntze) Small – S]

Solidago rigida Linnaeus var. ***rigida***, Midwestern Bold Goldenrod. Glades, barrens, and prairie-like areas, over mafic or calcareous rocks. August-October. RI and MA west to NY, s. ON, MI, WI, s. MN and c. NE, south to c. VA, sc. NC, w. NC, sc. TN, c. AR, and se. TX. Var. *rigida* is generally rare and restricted to relictual prairie-like situations east of MI, IN, IL, MO, and OK. Var. *rigida* is tetraploid through most of its range, including (apparently) all of our area. A third variety, var. *humilis* T.C. Porter, is more northern and western, and also tetraploid, ranging from ON west to AB, south to MI, IN, IL, MO, OK, n. TX, and NM. [= C, G, SE; = *Oligoneuron rigidum* (Linnaeus) Small var. *rigidum* – K, Z; < *Solidago rigida* Linnaeus – RAB, Pa, W; = *Solidago rigida* – F; = *Solidago rigida* ssp. *rigida* – FNA, Y; = *Oligoneuron grandiflorus* (Rafinesque) Small – S]

Solidago roanensis Porter, Roan Mountain Goldenrod. Forests, woodlands, roadbanks. July-September. MD and WV south to AL and GA. [= RAB, C, FNA, G, K, Pa, S, SE, W; > *S. roanensis* var. *roanensis* – F; > *S. roanensis* var. *monticola* (Torrey & A. Gray) Fernald – F; > *S. roanensis* var. *monticola* – WV, misspelling]



Solidago rugosa P. Miller var. ***aspera*** (Aiton) Fernald. Fields, forests, roadsides. August-November. ME west to MI, south to FL and TX. [= F, WH3, WV; < *S. rugosa* var. *rugosa* – RAB; < *S. rugosa* ssp. *aspera* – C, G, K, SE, W; = *S. rugosa* ssp. *aspera* (Aiton) Cronquist var. *aspera* – FNA; < *S. rugosa* – GW; < *S. altissima* – S, misapplied; = *S. rugosa* ssp. *aspera* var. *aspera* – Pa]

Solidago rugosa P. Miller var. ***celtidifolia*** (Small) Fernald, Hackberry-leaf Goldenrod. Fields, forests, wetlands. September-November. VA south to FL, west to OK and TX. [= RAB, F; < *S. rugosa* ssp. *aspera* (Aiton) Cronquist – C, G, K, SE, W, WH; = *S. rugosa* ssp. *aspera* (Aiton) Cronquist var. *celtidifolia* (Small) Fernald – FNA; < *S. rugosa* – GW; = *S. celtidifolia* Small – S]

Solidago rugosa P. Miller var. ***cronquistiana*** Semple, Cronquist's Goldenrod. High elevation balds and forests. September-October. A Southern Appalachian endemic: w. NC and e. TN south to n. GA. See Semple (2003) for additional information. [= *S. rugosa* ssp. *aspera* (Aiton) Cronquist var. *cronquistiana* Semple – FNA; < *S. rugosa* var. *rugosa* – RAB; < *S. rugosa* ssp. *aspera* – K, SE, W; < *S. rugosa* – GW; < *S. altissima* – S]

Solidago rugosa P. Miller var. ***rugosa***, Wrinkle-leaf Goldenrod. Fields, forests, wetlands. August-October. NS west to ON, south to GA, AL, MS, LA, TX. [< *S. rugosa* var. *rugosa* – RAB; = *S. rugosa* ssp. *rugosa* var. *rugosa* – C, FNA, G, K, SE; > *S. rugosa* ssp. *rugosa* var. *villosa* – C, G, K, SE; > *S. rugosa* var. *rugosa* – F, WV; > *S. rugosa* var. *villosa* – F, WV; < *S. rugosa* – GW; < *S. rugosa* ssp. *rugosa* – W; = *S. rugosa* ssp. *rugosa* var. *rugosa* – Pa]

Solidago rugosa P. Miller var. ***sphagnophila*** G. Graves, Peat-loving Goldenrod. Boggy habitats. August-October. NS and ME south to SC. [= F; < *S. rugosa* var. *rugosa* – RAB; = *S. rugosa* ssp. *rugosa* var. *sphagnophila* Graves – C, FNA, G, K, Pa; < *S. rugosa* – GW; < *S. rugosa* ssp. *rugosa* – W; = *S. aestivalis* E. Bicknell]

Solidago rupestris Rafinesque, Riverbank Goldenrod, Rock Goldenrod. Crevices in rocky, flood-scoured riversides. July-September. PA, OH, and IL south to n. VA and TN. [= C, F, FNA, K, SE; < *S. altissima* – RAB; = *S. canadensis* var. *rupestris* (Rafinesque) Porter – G; < *S. canadensis* – S]



Solidago salicina Elliott, Southern Roughleaf Goldenrod. Streamhead pocosins, sandhill seepages, swamp edges. September-October. Primarily Coastal Plain: se. VA south to Panhandle FL, west to se. OK and e. TX, and somewhat disjunct in the Ozarks and Ouachitas of MO and AR, also rarely reaching the lower Piedmont. Semple, Tong, & Pastolero (2012) have clarified the taxonomy, distribution, and nomenclature of this and *S. patula*. [= S; = *S. patula* Muhlenberg ex Willdenow var. *strictula* Torrey & A. Gray – RAB, C, G, K, SE, WH3; > *S. patula* var. *strictula* – F; > *S. salicina* – F; = *S. patula* ssp. *strictula* (Torrey & A. Gray) J.C. Semple – FNA; < *S. patula* – GW; = *S. salicina* Elliott – S]

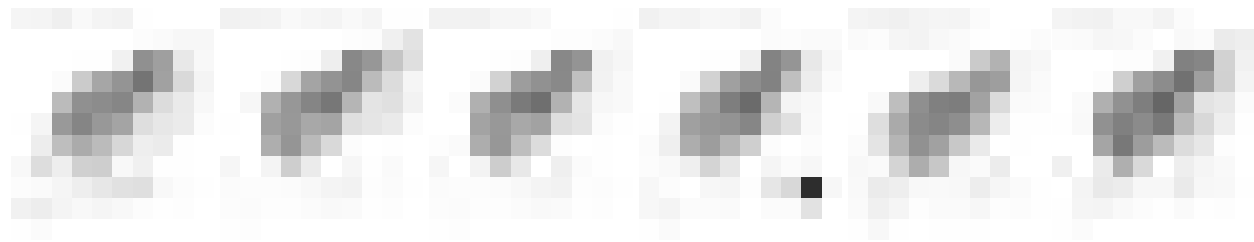
Solidago sempervirens Linnaeus, Northern Seaside Goldenrod. Coastal dunes, dune slacks, maritime wet grasslands, tidal marshes. Late August-November. NL (Newfoundland) south to se. VA along the coast (and introduced inland in saline situations such as along salted roadways). [= S; = *S. sempervirens* var. *sempervirens* – C, F, G, K, SE; = *S. sempervirens* ssp. *sempervirens* – FNA, Pa]

Solidago shortii Torrey & A. Gray. Endemic to nc. KY (Fleming, Jefferson, Nicholas, Robertson counties) and s. IN. August-October. See Smith et al. (2004) and Homoya & Abrell (2005) for additional, detailed information. [= C, F, FNA, G, K, SE] {not yet keyed}

Solidago simulans Fernald, Granite Dome Goldenrod, Cliffside Goldenrod. Mt (GA, NC, SC): in thin soil mats wetted by periodic seepage on granitic domes and lower elevation montane cedar hardwood woodlands; rare. August-September. Endemic to sw. NC, nw. SC, and ne. GA. [= K; < *S. uliginosa* – RAB, FNA; < *S. gracillima* – SE]

Solidago speciosa Nuttall var. ***rigidiuscula*** Torrey & A. Gray. Limestone barrens. (August-) September-October. ON west to ND and WY, south to TN, LA, and TX; disjunct eastward in glade habitats to nw. GA (GANHP), TN (Chester, Wofford, & Kral 1997), and KY. [= C, G, K, SE; = *S. speciosa* var. *angustata* Torrey & A. Gray – F, misapplied; = *S. speciosa* ssp. *speciosa* var. *rigidiuscula* – FNA; = *S. rigidiuscula* (Torrey & A. Gray) Porter – S] {synonymy incomplete}

Solidago speciosa Nuttall var. ***speciosa***, Showy Goldenrod. Pastures, forests, woodlands, roadbanks. September-October. NH, VT, NY, and WI south to GA, MS, LA, and OK. [= C, F, G, K, SE; < *S. speciosa* – Pa, RAB, W, WV; > *S. conferta* – S; > *S. harperi* Mackenzie – S; = *S. speciosa* ssp. *speciosa* var. *speciosa* – FNA]



Solidago sphacelata Rafinesque, Limestone Goldenrod, False Goldenrod. Rock outcrops and dry rocky forests, usually over calcareous or mafic rocks. (July-) August-September (-October). C. VA, s. WV, OH, IN, and IL south to GA, AL, and MS. [= RAB, C, F, G, K, SE, W, WV; = *Brachychaeta sphacelata* (Rafinesque) Britton – S]

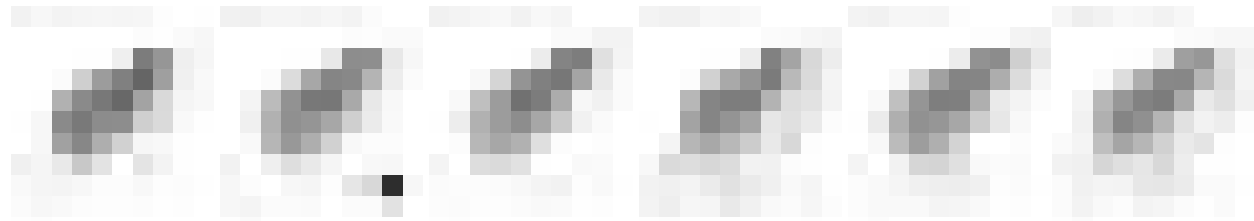
Solidago spithamea M.A. Curtis, Blue Ridge Goldenrod. In crevices of sloping to nearly vertical outcrops of high elevation rocky summits on Grandfather Mountain, Hanging Rock Mountain, and Roan Mountain. Mid August-October. Endemic to the three mountains named, the first two in NC, the third on the NC-TN border. *S. spithamea* is a very restricted endemic, apparently related most closely to *S. multiradiata* Aiton and *S. leiocarpa* de Candolle. *S. multiradiata* is an arctic-alpine species (with several recognized varieties) of n. Canada and AK, ranging south in w. North America to CA and CO. *S. cutleri* occurs in alpine situations on the higher peaks of QC, ME, NH, VT, and NY. *S. spithamea* is a part of the remarkable "pseudo-alpine" flora of high elevation rocky summits in nw. NC; it typically is found with *Liatris helleri*, *Huperzia appressa*, *Geum radiatum*, *Trichophorum caespitosum*, *Sibbaldiopsis tridentata*, *Polypodium appalachianum*, *Paronychia argyrocoma*, *Kalmia buxifolia*, *Stenanthium leimanthoides*, *Heuchera villosa* var. *villosa*, *Hydatica petiolaris*, *Solidago glomerata*, *Houstonia montana*, *Carex misera*, and *C. brunnescens*. [= RAB, FNA, K, S; = *S. spithamea* – SE, W, orthographic variant]

Solidago squarrosa Nuttall, Ragged Goldenrod, Stout Goldenrod, Squarrose Goldenrod. Upland forests. August-September. NB and ON south to DE, w. NC, OH, and s. IN. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV]

Solidago stricta Aiton, Wand Goldenrod. Pine savannas, Coastal Plain bogs, pocosins, marshes. Late August-October. NJ and DE (formerly) south to s. FL, west to TX; West Indies and s. Mexico. [= C, F, G, K, SE, WH3; < *S. stricta* – RAB, GW (also see *S. pulchra*); = *S. petiolata* P. Miller – S, misapplied; = *S. stricta* Aiton ssp. *stricta* – FNA]

Solidago tarda Mackenzie. Sandhills, other dry pinelands, xeric fluvial sand ridges, Piedmont barrens. September-October. NJ and e. PA south to e. VA, c. and s. GA, AL, and Panhandle FL, in our area primarily in the Coastal Plain; disjunct in Marion County, TN (Chester, Wofford, & Kral 1997). [= C, FNA, S, SE; < *S. arguta* – RAB; < *S. ludoviciana* – F, misapplied as to our area; < *S. arguta* var. *arguta* – K; < *S. arguta* var. *caroliniana* – WH3]

Solidago tortifolia Elliott, Leafy Pineywoods Goldenrod. Sandhills and dry pinelands. August-November. Se. VA south to s. FL, west to AR and TX. [= RAB, C, F, FNA, G, K, S, SE, WH3]



Solidago uliginosa Nuttall var. *linoides* (Torrey & A. Gray) Fernald. Bogs. NS and NL (Labrador) west to MB, south to s. PA, e. WV, OH, IN, and IL. [= K; < *S. uliginosa* – C, FNA, Pa; > *S. uliginosa* var. *linoides* – F; > *S. purshii* Porter – F, WV; > *S. uliginosa* var. *peracuta* (Fernald) Friesner – G]

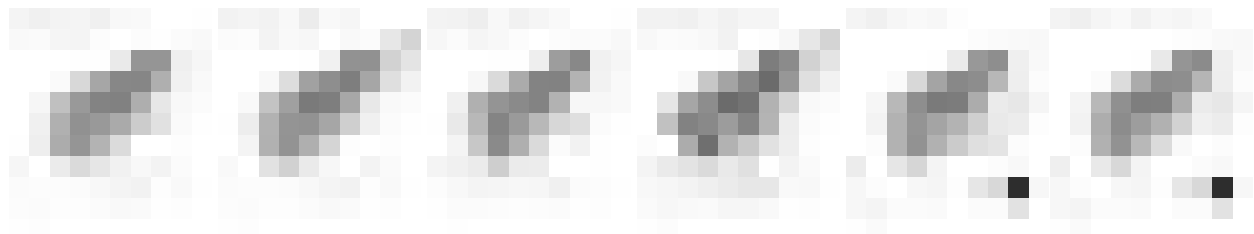
Solidago uliginosa Nuttall var. *uliginosa*, Northern Bog Goldenrod. Bogs, wet meadows, mafic fens, acidic seepage swamps. NL (Labrador) west to Keewatin, south to e. VA, w. NC, ne. TN, IL, and IA (reports from farther south need additional evaluation; most southern material formerly identified as *S. uliginosa* is actually *S. simulans* or *S. gracillima*). [= F, G, K, WV; < *S. uliginosa* – RAB, C, FNA, Pa, SE, W; < *S. uniligulata* (A.P. de Candolle) Porter – S]

Solidago ulmifolia Muhlenberg ex Willdenow var. *palmeri* Cronquist. East to MS (and AL?). [= FNA, G, K, SE; < *S. ulmifolia* – S]

Solidago ulmifolia Muhlenberg ex Willdenow var. *ulmifolia*, Elmleaf Goldenrod. Rocky forests and woodlands, especially on mafic and calcareous substrates, moist hammocks (in FL). August-October. NS, ME, ON, and MN, south to FL and TX. [= C, FNA, G, K, SE; < *S. ulmifolia* – RAB, F, Pa, S, W, WH3, WV]

Solidago verna M.A. Curtis, Spring-flowering Goldenrod. Moist pine savannas, lower slopes of sandhills, pineland roadbanks. May-June. Se. NC south to e. SC. [= RAB, FNA, K, S, SE]

Solidago villosicarpa LeBlond, Carolina Maritime Goldenrod. Dry-mesic and mesic hardwood forests (and related disturbed areas), in the outer Coastal Plain. September. Endemic to se. NC (Onslow, Pender, Brunswick, and Craven counties). See LeBlond (2000) for additional information. [= FNA]



Soliva Ruiz & Pavón 1794 (Burweed)

A genus of about 8 species, herbs, of South America. References: Watson in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. [also see *Gymnostyles*]

- 1 Achenes (1.5-) 2.5-3.0 mm long, usually winged, the wings not transversely ribbed*S. sessilis*
- 1 Achenes 1.5-2.2 mm long, winged, transversely ribbed.
- 2 Leaves mostly basal; leaf blades 3-8 (-15) cm long, 2-3× pinnatifid *S. anthemifolia*
- 2 Leaves cauline and basal; leaf blades 1-2 (-3) cm long, 1 (-2)× pinnatifid*S. stolonifera*

* **Soliva anthemifolia** (Antoine Laurent de Jussieu) Sweet. Lawns, disturbed areas; native of South America. February-April. [= FNA, SE, Z = *Gymnostyles anthemifolia* Antoine Laurent de Jussieu – K, S, WH]

* **Soliva sessilis** Ruiz & Pavón, Field Burweed, Lawn Burweed, Spurweed. Lawns, roadsides; native of South America. April-May. [= FNA, K, S, WH, Z; = *S. pterosperma* (Antoine Laurent de Jussieu) Lessing – RAB, SE]

* **Soliva stolonifera** (Brotero) Loureiro, Carpet Burweed. Lawns, roadsides, moist open areas; native of South America. March-April. [= FNA, SE, Z; = *Gymnostyles stolonifera* (Brotero) Tutin – K, WH; ? *Soliva nasturtiifolia* (Antoine Laurent de Jussieu) A.P. de Candolle – RAB, misapplied; ? *Gymnostyles nasturtiifolia* Antoine Laurent de Jussieu – S, misapplied]



Sonchus Linnaeus 1753 (Sow-thistle, Milk-thistle)

A genus of about 50-60 species, herbs and shrubs, of the Old World. References: Hyatt in FNA (2006a); Cronquist (1980)=SE.

- 1 Heads 30-50 mm across in flower, the involucre (10-) 15-20 mm high; perennials from creeping rhizomes.
- 2 Phyllaries and peduncles densely pubescent with glandular hairs; longer phyllaries 14-17 mm long..... *S. arvensis* var. *arvensis*
- 2 Phyllaries and peduncles glabrous (but with sessile glands); longer phyllaries 10-15 mm long.....*S. arvensis* var. *glabrescens*
- 1 Heads 15-25 mm across in flower, the involucre 9-13 mm high; annuals.
- 3 Leaf base auricles rounded; mature achenes not transversely rugose *S. asper*
- 3 Leaf base auricles sagittate, the two lobes on either side of the stem coming to a point; mature achenes transversely rugose*S. oleraceus*

* **Sonchus arvensis** Linnaeus var. *arvensis*, Perennial Sow-thistle. Disturbed areas; native of Europe. Naturalized south to WV (Strausbaugh & Core 1978), MD, PA, TN, KY, and MS (Kartesz 1999). [= C, F, SE; = *S. arvensis* ssp. *arvensis* – FNA, K, Pa; = *S. arvensis* – G]

* **Sonchus arvensis** Linnaeus var. *glabrescens* (Günther) Grabowski & Wimmer, Perennial Sow-thistle. Disturbed areas; native of Europe. June-November. [= C, SE, WV; < *S. arvensis* – RAB, W; = *Sonchus arvensis* ssp. *uliginosus* (Bieberstein) Nyman – FNA, K, Pa; > *S. arvensis* var. *glabrescens* – F; > *S. uliginosus* Bieberstein – F; = *S. uliginosus* – G]

* **Sonchus asper** (Linnaeus) Hill, Spinyleaf Sow-thistle, Prickly Sow-thistle. Roadsides, fields, pastures, disturbed areas; native of Europe. Late March-July. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WH, WV]

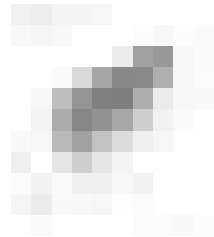
* **Sonchus oleraceus** Linnaeus, Common Sow-thistle. Roadsides, fields, pastures, disturbed areas; native of Europe. Late March-July. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WH, WV]



Sphagneticola O. Hoffmann 1900

A genus of about 4 species, perennial herbs, of tropical America and Asia. References: Strother in FNA (2006c).

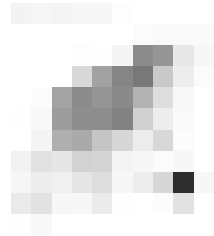
* *Sphagneticola trilobata* (Linnaeus) Pruski. Disturbed areas; native of tropical America. Naturalized in FL (including several counties in the Panhandle adjacent to GA) (Wunderlin & Hansen 2003). [= FNA, K, WH; = *Wedelia trilobata* (Linnaeus) A.S. Hitchcock – S, SE]



Stokesia L'Héritier 1789 (Stokesia, Stokes Aster)

A monotypic genus, an herb, of se. North America. References: Strother in FNA (2006a); Jones (1982)=Z; Cronquist (1980)=SE.

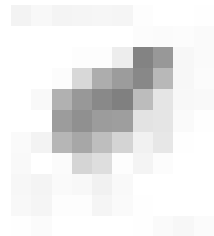
Stokesia laevis (Hill) Greene, Stokesia, Stokes Aster, Blue Stokesia. Native in pitcherplant bogs and moist pinelands of FL, GA, and SC, rather frequently grown as a garden plant and naturalized from cultivation at least in NC. Late June-August. Native from e. SC south ne. FL, FL Panhandle, west to LA. There seems no reason to question the validity and native status of the early record from SC. A unique tetraploid population found by the Atlanta Botanical Garden in Omega, GA (near Tifton) in the 1990s was distinguished by having distinct upright and long scapes, up to 1 meter in length; the original population has been destroyed, but a selection derived from it was named 'Omega Skyrocket' and introduced into the commercial trade (D. Werner, pers. comm. 2006). [= RAB, FNA, K, S, SE, WH, Z]



Stuartina Sonder 1853

A genus of 2 species, endemic to Australia.

* *Stuartina hamata* Philipson. Waste area near wool-combing mill, probably only a waif; native of Australia. See Nesom (2004d).



Symphotrichum Nees 1833 (American Aster)

A genus of about 90 species, of the Americas and e. Asia, most diverse in our area. References: Brouillet et al. FNA (2006b); Brouillet & Semple (1981); Cronquist (1980)=SE; Jones (1980a, 1980b, 1984); Jones & Young (1983); R. Jones (1983)=Z; R. Jones (1992); Lamboy (1987, 1992)=Y; Nesom (1994)=X; Nesom (2005b)=V; Nesom (1993a, 1993b, 1994, 1997); Noyes & Rieseberg (1999); Semple & Brouillet (1980a, 1980b); Semple, Chmielewski, & Lane (1989); Semple, Heard, & Xiang (1996); Sundberg (2004)=Q; Reveal & Keener (1981); Warners & Laughlin (1999); Xiang & Semple (1996). Key to subgenus *Astropolium* based on Nesom (2005b).

- 1 Basal and lower stem leaves **both** petiolate **and** with cordate blades; [subgenus *Symphotrichum*, section *Heterophylli*].....**Key A**
- 1 Basal and lower stem leaves **not both** petiolate and cordate-bladed.
 - 2 Annuals, from a taproot; [of moist, usually maritime, and usually saline habitats]; [subgenus *Astropolium*].....**Key B**
 - 2 Perennials, from a caudex, rhizome, or crown; [collectively of various habitats].
 - 3 Stem leaves fleshy, entire, linear; stems glabrous**Key C**
 - 3 Leaves not fleshy, usually toothed, stems usually variously pubescent.
 - 4 Leaves **either** very numerous on the main stem, the internodes < 1 cm long (in some species the leaves of the lower and middle main stem withered or deciduous by flowering season, the internode length then reckonable by leaf scars), the leaves clasping or sessile, **or** leaves rather numerous on main stem, the internodes < 3.5 cm long, the leaves of the main stem strongly auriculate clasping (*S. georgianum*, *S. phlogifolium*); stem leaves entire, (often scabrous-margined); rays purple, lavender, rose, or blue (or characteristically white in *S. ericoides* and very rarely also in other species); [subgenus *Virgulus*].....**Key D**
 - 4 Leaves less numerous on the main stem, the internodes averaging > 3.5 cm long, the leaves clasping, subclasping, or not clasping; stem leaves toothed (or rarely entire); rays blue, purple, lavender, pink, or white.
 - 5 Stem leaves clasping to sheathing; rays blue, purple, or lavender.....**Key E**
 - 5 Stem leaves not clasping; rays blue, purple, lavender, rose, or white.....**Key F**

Key A *Symphotrichum* with petiolate, cordate-bladed lower leaves
[of subgenus *Symphotrichum*, section *Heterophylli*]

- 1 Disc florets 35-50 (or more); ray florets (13-) 20-30; involucre (6-) 7-10 mm high; phyllary tips spreading to squarrose***S. retroflexum***
- 1 Disc florets (8-) 10-25 (-30); ray florets 8-20 (-25); involucre 3.8-7 mm high (or to 8 mm high in *S. oolentangiense*); phyllary tips appressed (or the outer phyllaries spreading).
 - 2 Cauline leaf blades sessile and cordate-clasping, or petiolate, the petiole strongly dilated to a cordate-clasping base, or both.....***S. undulatum***
 - 2 Cauline leaves not cordate clasping; [collectively widespread].
 - 3 Lower stems glabrous; upper stems sparsely hirtellous or pilose.
 - 4 Basal leaves deeply cordate; phyllaries with lanceolate diamond shaped blaze (2-3× as long as wide), purple to greenish purple***S. cordifolium***
 - 4 Basal leaves shallowly cordate to truncate; phyllaries with short diamond shaped blaze (1-1.5× as long as wide) or linear-lanceolate-shaped blaze (> 4× as long as wide), green.
 - 5 Phyllaries with short diamond shaped green blaze (1-1.5× as long as wide).....***S. lowrieianum***
 - 5 Phyllaries with linear-lanceolate-shaped green blaze (> 4× as long as wide).....***S. urophyllum***
 - 3 Lower stems glabrous to sparsely hirsute; upper stems densely hirtellous to hirsute; [mainly west of the Appalachians].
 - 6 Phyllaries with short diamond-shaped green blaze (1-1.5× as long as wide); basal and lower stem leaves mostly crenate to entire; upper stem leaves entire.
 - 7 Plants with only the basal and lower stem leaves cordate or subcordate; phyllary faces glabrous; lower disc florets (15-) 20-25 (-30).....***S. oolentangiense* var. *oolentangiense***
 - 7 Plants with nearly all basal and stem leaves cordate or subcordate; phyllary faces short-pubescent; disc florets 16-23.....***S. shortii***
 - 6 Phyllaries with elongate green blaze (> 2× as long as wide); basal and lower stem leaves serrate or crenate; upper stem leaves serrate or crenate (to entire).
 - 8 Plants 4-12 dm tall; cypselae glabrous ***S. drummondii* var. *drummondii*=*S. drummondii***
 - 8 Plants 3-8 dm tall; cypselae strigillose**[*S. drummondii* var. *texanum*]=[*S. texanum*]**

Key B – annual salt-marsh asters
[of subgenus *Astropolium*]

- 1 Heads usually dense in an elongate, pyramidal-paniculate arrangement; inner phyllaries 6-7 mm long, phyllary apices linear-acuminate, distal margins often inrolled/involute, green zone of phyllaries narrowly lanceolate, usually extending the entire length of the phyllary, chartaceous bases short or absent; pappus accrescent, 4-5.5 mm long at maturity and usually longer than coiled ray corollas; [habitats wet, saline]***S. subulatum***
- 1 Heads corymbiform to thyriform, diffusely paniculate, or secund to subsecund and paniculiform arrangements or at the tips of long, bracteate branches; inner phyllaries 4-6.5 mm long, phyllary apices acute to acuminate, distal margins inrolled/involute or not, green zone of phyllaries lanceolate to elliptic, chartaceous bases usually conspicuous; pappus not accrescent, 3.5-4 (-5) mm long at maturity, longer or shorter than ray corollas; [habitats moist to wet, rarely saline].
 - 2 Phyllary tips appressed, acute, flat, inner phyllaries with broadly lanceolate, distinctly demarcated, apical green zone, proximal 1/2 -1/3 white-chartaceous; ray floret laminae erect, often involute along the edges (curling inward lengthwise), rarely coiling back distally (if so, then only ca. 1/2 coil), usually shorter than mature pappus; disc florets (3-) 7-14.....***S. squamatum***
 - 2 Phyllary tips loose, linear-acuminate, distal margins often inrolled/involute, inner phyllaries with narrowly lanceolate, often weakly demarcated apical green zone, white-chartaceous bases short, ca. 1/3-1/2 the length of the phyllaries; ray floret laminae not involute along edges, usually coiling back distally in 1-4 or more coils, usually as long or longer than mature pappus; disc florets **either** (6-) 8-15 **or** 11-23 **or** (20-) 33-45 (-50).

- 3 Heads usually corymbiform to thyrsiform in arrangement (borne primarily on distal branches, distally clustered); inner phyllaries 4-5.5 (-6) mm long; phyllary apices acute to abruptly short-acuminate or long-acuminate, the distal margins inrolled/involute or not; ray florets in 1 (-2) series, corollas 2-3 mm long, the laminae 0.1-0.3 mm wide (dried), white to light pinkish or slightly blue, coiling back in 1-2 coils or less commonly remaining straight; disc florets (6-) 8-15; [of FL westward across the Gulf Coast]*S. expansum*
- 3 Heads diffusely paniculiform to pyramidal-paniculiform to corymbiform or second to subsecund and paniculiform; inner phyllaries 5-6.5 mm long; phyllary apices long-acuminate, the distal margins usually inrolled/involute; ray florets in 1-3 series, corollas 2-7 mm long, the laminae 0.2-0.8 mm wide (dried), white to blue or purple, coiling back in 2-5 coils; disc florets **either** 11-23 **or** (20-) 33-45 (-50).
- 4 Heads at first at ends of long, bracteate branches, then produced and maturing as axillary and nearly sessile or on very short lateral branches, commonly on one side of the main stem and appearing secund to subsecund, in paniculiform arrangements; ray florets in 2-3 series, corollas mostly 2-3.5 (-4) mm long, laminae 0.2-0.4 mm wide (dry), blue to purple, coiling back in 2-3 (-4) coils; disc florets 11-23; [e. GA southward].....*S. bahamense*
- 4 Heads often at ends of long, bracteate branches, axillary heads usually maturing on elongate lateral branches, the whole arrangement often diffusely paniculiform to pyramidal-paniculiform, or heads more distally disposed and the arrangement corymbiform to thyrsiform; ray florets in 1 series, corollas mostly 4-7 mm long, laminae 0.4-0.8 mm wide (dry), blue to white, coiling back in 3-5 coils; disc florets (20-) 33-45 (-50); [sc. United States east to AL and scattered eastward as an introduction].....*S. divaricatum*

Key C – perennial asters with linear, fleshy leaves
[of Symphyotrichum subgenera Astropolium and Chapmaniani]

- 1 Leaves basally disposed; disc florets 47-57; ray floret laminae (10-) 14-15 (-20) mm long; [of FL]; [subgenus *Chapmaniani*]*S. chapmanii*
- 1 Leaves mainly cauline, the basal and lower stem leaves typically withered by flowering season; disc florets (10-) 13-45 (-54); ray floret laminae (4.5-) 5-8.5 (-9.5) mm long; [collectively widespread]; [subgenus *Astropolium*]
- 2 Midstem leaves (1.0-) 1.5-2.7 mm wide; involucre 4.1-5.3 mm high; ray florets 10-16; disc florets (10-) 13-23; achenes 1.5-2.0 (-2.5) mm long; pappus 3.0-4.4 mm long; [of FL southward] *S. bracteatum*
- 2 Midstem leaves (1.5-) 3-6 mm wide; involucre 6-9.5 (-11) mm high; ray florets (12-) 17-25; disc florets 25-45 (-54); achenes 2.8-4.0 (-4.5) mm long; pappus 5.0-6.1 mm long; [widespread in our area] *S. tenuifolium*

Key D – perennial asters
[of Symphyotrichum subgenus Virgulus]

- 1 Mid and upper stem leaves > 8× as long as wide; phyllaries tipped with a small, white spine; rays white (to pale pink); involucre 2.5-4.5 (-5) mm high; disc florets 6-12 (-20) per head; [section *Ericoidi*] *S. ericoides* var. *ericoides*
- 1 Mid and upper stem leaves 2-7× as long as wide; phyllaries not spine-tipped; rays purple, lavender, rose, blue (rarely nearly white); involucre >5 mm high (except sometimes as short as 4 mm high in *S. adnatum* of s. GA and FL west to LA); disc florets (6-) 11-110 per head.
- 2 Disc florets yellow, cream, or white (with purplish corolla lobes), fading purple or brown; mid and upper stem leaves with bases rounded to cuneate (or slightly clasping in *S. plumosum* of FL Panhandle); phyllaries not stipitate-glandular; [section *Virgulus*].
- 3 Rays 13-15 (-36); cypselas glabrous *S. pratense*
- 3 Rays 7-12; cypselas densely strigose.
- 4 Phyllaries long-acuminate, spreading to recurved; phyllaries with woolly, tangled hairs; involucre 7-9 mm tall; [of Franklin County, FL Panhandle]*S. plumosum*
- 4 Phyllaries acute, appressed; phyllaries **either** with appressed, straight hairs (moderately to densely sericeous) **or** glabrous to sparsely pilose; involucre 5-7 mm high; [collectively widespread].
- 5 Phyllaries and upper stem leaves moderately to densely sericeous (silky-pubescent); [widespread].....*S. concolor* var. *concolor*
- 5 Phyllaries and upper stem leaves glabrous or sparsely pilose; [of the Gulf Coastal Plain]*S. concolor* var. *devestitum*
- 2 Disc florets pink, fading purple; mid and upper stem leaves with bases clasping or auriculate clasping (except cuneate, rounded, or slightly clasping in *S. grandiflorum*, *S. oblongifolium*, and *S. fontinale*); phyllaries stipitate glandular (or sometimes or always lacking stipitate glands in *S. fontinale* and *S. walteri* (of the Coastal Plain from e. NC southward), and *S. patens* var. *patentissimum* (of KY and MS westward).
- 6 Mid-stem leaves < 1.5 cm long, **either** ascending-appressed, **or** spreading, and then the apical portion abruptly deflexed; rays 5-9 (-11) mm long; [of the Coastal Plain]; [section *Patentes*].
- 7 Blades of mid-stem leaves ascending-appressed, basally decurrent; [of s. GA south to s. FL, west to se. LA]*S. adnatum*
- 7 Blades of mid-stem leaves spreading, the apical portion then abruptly deflexed, basally clasping; [of e. NC to c. peninsular FL]*S. walteri*
- 6 Mid-stem leaves > 2 cm long, spreading; rays > 9 mm long (to as short as 7 mm in *S. fontinale* of Panhandle FL); [collectively widespread].
- 8 Mid-stem leaves cuneate, rounded, or subclasping; [section *Grandiflori*].
- 9 Phyllaries appressed; phyllary faces glabrous or glabrate, lacking stipitate glands (though there may be a few stipitate glands on the phyllary margins); heads 6-7.6 mm high; [of wet pinelands and marshes of e. Panhandle FL south to s. FL]..... *S. fontinale*
- 9 Phyllaries spreading, squarrose, or reflexed; phyllary faces moderately to densely stipitate-glandular (and also often pubescent or scabrous with non-stipitate hairs); heads (5-) 7-12 (-15) mm high; [of dry habitats, of mainly inland provinces, though extending to the Coastal Plain in e. VA, e. NC, and nc. SC].
- 10 Involucres 8.5-12 (-15) mm high; lower stem leaves (often withered by flowering season) cordate-clasping; [of acidic habitats of the Coastal Plain and Piedmont of e. and c. VA south through e. and c. NC to to nc. SC] *S. grandiflorum*
- 10 Involucres (5-) 7-9 mm high; lower stem leaves (typically persisting) cuneate, rounded, or subclasping; [of calcareous habitats, south to sc. VA, w. NC, nc. AL, n. MS] *S. oblongifolium*
- 8 Mid-stem leaves clasping to auriculate-clasping.
- 11 Phyllaries with attenuate, loosely spreading tips; disc florets 50-110; ray florets (40-) 50-75 (-100); [mainly of sunny, moist to wet marshes, swamps, fens, south to GA, wc. AL, c. MS]; [section *Grandiflori*]..... *S. novae-angliae*

- 11 Phyllaries with obtuse to acute tips (the inner phyllaries sometimes acuminate, but not attenuate); disc florets 15-50; ray florets 9-24 (-30); [of sunny to semi-sunny dry sites, or of moist forests, collectively widespread, south to ne. FL, Panhandle FL, s. AL, s. MS, se. LA].
- 12 Involucres 8-10 (-12) mm high; disc florets 8-10 mm long, white with purplish lobes; heads 4-5 (-6) cm across (ray tip to ray tip), the rays 14-24 mm long; plants strongly rhizomatous, forming clonal colonies with the stems mostly scattered along the rhizome (new stems typically arising at least several cm from the old ones); achenes 2.5-4.0 mm long, pale gray-brown, the trichomes about 0.4 mm long and distributed on and between the ribs; anthers purplish; pollen white; [section *Grandiflori*] *S. georgianum*
- 12 Involucres 5.5-7.5 (-8.5) mm high (or to 12 mm high in *S. patens* var *patentissimum*, barely entering our area in w. KY and w. MS); disc florets 5.5-8 mm long, either white with purplish lobes or bright yellow; heads 3-4 (-4.5) cm across (ray tip to ray tip), the rays 10-18 (-20) mm long; plants caespitose, generally with 1 or more stems arising from caudices (the new stems arising near the old); achenes 2.0-4.0 mm long, tan, gray, brown, dark-brown, or black, the trichomes various (see below); anthers purplish or yellow; pollen white or yellow; [section *Patentes*].
- 13 Disc florets white with purplish lobes; stem leaves 7.5-12.5 (-14) cm long, thin in texture, soft-pubescent, the venation apparent, rugose-veiny and wrinkled; anthers purplish; pollen white; achenes 2.5-4.0 mm long, the trichomes concentrated on the ribs, < 0.4 mm long, appressed; [primarily of the Mountains, less commonly the Piedmont, mostly in moist, shady to semi-sunny situations] *S. phlogifolium*
- 13 Disc florets bright yellow; stem leaves (2-) 3-7 (-9) cm long, thick in texture, scabrous, the venation inconspicuous; anthers yellow; pollen yellow; achenes 2.0-3.5 mm long, the trichomes distributed on and between the ribs, mostly > 0.4 mm long, spreading; [collectively widespread in our area, mostly in dry, semi-sunny to sunny situations]
- 14 Involucres 8-12 mm high; phyllaries appressed, in 5-7 series; phyllaries obtuse, lacking stipitate glands or sparsely stipitate-glandular; [from w. KY and w. MS westward] [*S. patens* var. *patentissimum*]
- 14 Involucres 5.5-7.5 mm high; phyllaries squarrose, in 4-5 series; phyllaries acute to acuminate, sparsely to densely stipitate-glandular; [collectively widespread].
- 15 Middle phyllaries 0.7-1 mm wide; phyllary faces sparsely stipitate-glandular and densely strigillose; [from se. LA and w. MS westward] [*S. patens* var. *gracile*]
- 15 Middle phyllaries 1-1.2 mm wide; phyllary faces densely stipitate-glandular and sparsely strigillose; [widespread] *S. patens* var. *patens*

Key E

- 1 Phyllaries appressed (or in some species the outer slightly spreading); rays usually < 20 [(10-) 12-23 (-34)]; [section *Heterophylli*].
- 2 Middle stem leaves strongly clasping; involucre 3.8-5.5 mm high; disc corollas 15-22 (-25); phyllaries acute, acuminate, to attenuate; green blaze on phyllary lanceolate to elongate diamond-shaped *S. undulatum*
- 2 Middle stem with a winged, sheathing petiole; involucre (4.2-) 4.5-8 mm high; disc corollas (15-) 19-33 (-43); phyllaries acute, green blaze on phyllary diamond-shaped, about as long as wide or slightly longer.
- 3 Leaf faces scabrous *S. oolentangiense* var. *oolentangiense*
- 3 Leaf faces glabrous.
- 4 Leaves basally disposed, the largest basal and persistent; largest leaves linear, to 20 cm x 2.5 cm, avg. 10x as long as wide; leaf margins often strongly scabrous; [mainly of the Coastal Plain, of SC and GA west to AR and TX] *S. laeve* var. *purpuratum*=*S. attenuatum*
- 4 Leaves cauline, the largest on the stem; largest leaves narrowly to broadly lanceolate, avg. < 9x as long as wide; leaf margins usually only slightly scabrous; [mainly of inland provinces, of NS west to MB, south to GA, Panhandle FL, MS, LA, and OK].
- 5 Larger leaves > 5x as long as wide, rarely > 2.5 cm wide, the bases slightly clasping; [NY and KY south to GA, Panhandle FL (Jackson County), and MS] *S. laeve* var. *concinnum*=*S. concinnum*
- 5 Larger leaves < 5x as long as wide, often > 2.5 cm wide, the bases strongly clasping; [NS west to MB, south to GA, LA, and OK] *S. laeve* var. *laeve*=*S. laeve* s.s.
- 1 Phyllaries spreading to squarrose; rays usually > 20 [15-50 (-60)].
- 6
- 6

- 55. *S. elliottii* {Symp-Symp-Pun}
- 56a. *S. puniceum* var. *puniceum* {Symp-Symp-Pun}
- 56b. [*S. puniceum* var. *scabricaule*] {Symp-Symp-Pun}
- 57. *S. firmum* {Symp-Symp-Symp}
- 58. *S. rhiannon* {Symp-Symp-Pun}
- 59. *S. prenanthoides* {Symp-Symp-Pun}
- 60d. *S. novi-belgii* var. *elodes* {Symp-Symp-Symp}
- 60c. [*S. novi-belgii* var. *novi-belgii*] {Symp-Symp-Symp}

[from Warners & Laughlin (1999)]

- 1 Stems glabrous, occasionally hispidulous in lines; stem leaves with glabrous midvein on the lower surface; rays white to pale lavender; inflorescence dense, leafy; shoots arising singly from elongate rhizome; stems 3-5 mm thick (at 20 cm above soil surface) *S. firmum*
- 1 Stems densely pubescent, usually purplish; stem leaves with pubescent midvein on the lower surface; rays lavender to purple; inflorescence widely spreading; shoots often in clumps of 2-6 stems from a persistent stout caudex; stems 5-9 mm thick (at 20 cm above soil surface) *S. puniceum* var. *puniceum*

Key F

1
1

37. *S. retroflexum* {Symp-Het}

38. *S. depauperatum* {Symp-Port}

40a. *S. pilosum* var. *pilosum* {Symp-Port}

40b. *S. pilosum* var. *pringlei* {Symp-Port}

42. *S. priceae* {Symp-Port}

43. *S. dumosum* var. *dumosum* {Symp-Dum}

43. *S. dumosum* var. *gracilipes* {Symp-Dum}

43. *S. dumosum* var. *pergracile* {Symp-Dum}

43. *S. dumosum* var. *strictior* {Symp-Dum}

43. *S. dumosum* var. *subulifolium* {Symp-Dum}

44?. [*S. kralii*] {Symp-Dum}

44. *S. simmondsii* {Symp-Dum}

45. *S. racemosum* var. *racemosum* {Symp-Dum}

45. *S. racemosum* var. *subdumosum* {Symp-Dum}

48. [*S. lateriflorum* var. *angustifolium*] {Symp-Dum}

48. *S. lateriflorum* var. *horizontale* {Symp-Dum}

48. *S. lateriflorum* var. *lateriflorum* {Symp-Dum}

48. [*S. lateriflorum* var. *spatelliforme*] {Symp-Dum}

49a. *S. ontarionis* var. *ontarionis*

50c. [*S. lanceolatum* var. *interior*] {Symp-Dum}

50e. *S. lanceolatum* var. *lanceolatum* {Symp-Dum}

50d. *S. lanceolatum* var. *latifolium* {Symp-Dum}

51. *S. praealtum* var. *praealtum* {Symp-Dum}

51. *S. praealtum* var. *angustior* {Symp-Dum}

51. [*S. praealtum* var. *subasperum*] {Symp-Dum}

52. [*S. boreale*] {Symp-Dum}

55. *S. elliotii* {Symp-Symp-Pun}

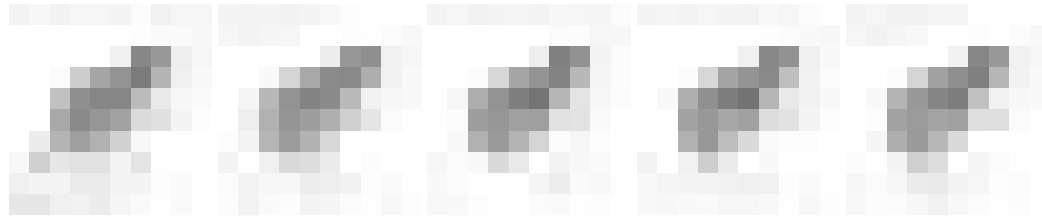
Symphotrichum adnatum (Nuttall) G.L. Nesom. Sandhills, pine flatwoods. S. GA south to s. FL, west to se. LA. [= FNA, K, WH, X; = *Aster adnatus* Nuttall – S, SE]

Symphotrichum bahamense (Britton) G.L. Nesom, Bahama Salt-marsh Aster. Salt, brackish, and fresh marshes, ditches, wet areas. October-November. E. GA and e. FL Panhandle south to s. FL; the Bahamas. [= K, V; = *S. subulatum* (Michaux) G.L. Nesom var. *elongatum* (Bossard) S.D. Sundberg – FNA, Q; < *Aster subulatus* – GW; < *A. subulatus* Michaux var. *cubensis* – SE; = *A. subulatus* Michaux var. *elongatus* Bossard]

Symphotrichum boreale (Torrey & A. Gray) Löve & Löve, Rushlike Aster, Northern Bog Aster. Calcareous wetlands. August-October. NL (Newfoundland) west to AK, south to n. NJ, ne PA, nw. PA, WV, OH, IN, IL, IA, NE, CO, ID, and WA. Reported for WV (Barbour, Fayette, Nicholas, and Randolph counties), PA, and NJ. [= FNA, K, Pa, X; = *Aster borealis* (Torrey & A. Gray) Provancher – C; ? *Aster junciformis* Rydberg – F, G]

Symphotrichum brucei (Britton ex Small) G.L. Nesom, Brace's Aster. Brackish marshes. August-December (-February). Panhandle FL south to s. FL; Bahamas; Cuba. [= K, V, WH, X; = *Aster brucei* Britton ex Small – S, SE; = *S. tenuifolium* (Linnaeus) G.L. Nesom var. *aphyllum* (R.W. Long) S.D. Sundberg – FNA, Q]

Symphotrichum chapmanii (Torrey & Gray) Semple & Brouillet, Chapman's Aster. Flatwoods and seepage bogs. Endemic to Panhandle FL and s. AL, with a few widely scattered records in the FL peninsula. [= FNA, WH; = *Eurybia chapmanii* (Torrey & Gray) G.L. Nesom – K, X; = *Aster chapmanii* Torrey & Gray – S, SE]



Symphotrichum concolor (Linnaeus) G.L. Nesom var. *concolor*, Eastern Silvery Aster. Sandhills, Piedmont woodlands, forest edges, roadbanks. September-October. MA and NY south to s. FL, west to LA, inland less commonly to TN and KY. [= FNA; < *S. concolor* (Linnaeus) G.L. Nesom – K, WH, X; < *Aster concolor* Linnaeus – RAB, C, F, G, S, SE, W; < *Virgulus concolor* (Linnaeus) Reveal & Keener; = *Symphotrichum concolor* ssp. *concolor* – Haines (2010)]

Symphotrichum concolor (Linnaeus) G.L. Nesom var. *devestitum* (S.F. Blake) Semple, Gulf Coast Silvery Aster. Savannas. Panhandle FL, maybe extending to GA, AL, and SC. See Semple (2004). [= FNA; < *Symphotrichum concolor* (Linnaeus) G.L. Nesom – K, WH, X; < *Aster concolor* Linnaeus – RAB, S, SE; < *Virgulus concolor* (Linnaeus) Reveal & Keener; = *Aster concolor* Linnaeus var. *devestitus* S.F. Blake; = *Symphotrichum concolor* ssp. *devestitum* (S.F. Blake) A. Haines – Haines (2010)]

Symphotrichum cordifolium (Linnaeus) G.L. Nesom. Rich forests, shaded roadbanks. September-October. [= K, Pa; < *Aster cordifolius* Linnaeus – RAB (also see *S. lowrieanum*); = *A. cordifolius* – C, G, S, SE, W; > *A. cordifolius* var. *cordifolius* – F, WV; > *A. cordifolius* var. *polycephalus* Porter – F; > *A. cordifolius* var. *racemiflorus* Fernald – F, WV; < *S. cordifolium* – FNA (also see *S. lowrieanum*); > *S. cordifolium* (Linnaeus) G.L. Nesom var. *cordifolium* – X; > *S. cordifolium* (Linnaeus) G.L. Nesom var. *polycephalum* (Porter) G.L. Nesom – X; > *S. cordifolium* (Linnaeus) G.L. Nesom var. *racemiflorum* (Fernald) G.L. Nesom – X]

Symphotrichum depauperatum (Fernald) G.L. Nesom, Serpentine Aster. Glades and barrens over mafic rocks (diabase) [or calcareous rocks in WV?]. Early September-October. MD and se. PA; disjunct southward in nc. NC. Reported for Hardy County, WV (Harmon, Ford-Wertz, & Grafton 2006, Strausbaugh & Core 1978). [= FNA, K, Pa, X; = *Aster depauperatus* Fernald – C, F, G, SE]

* ***Symphotrichum divaricatum*** (Nuttall) G.L. Nesom, Midwestern Salt-marsh Aster. Disturbed areas, including mowed fields, periodically flooded floodplains, waste areas near wool-combing mill; native of sc. United States and Mexico. October-November. See Nesom (2000). [= K, V, X; = *Aster exilis* Elliott – RAB, F, S, apparently misapplied; = *Symphotrichum subulatum* (Michaux) G.L. Nesom var. *parviflorum* (Nees) S.D. Sundberg – FNA, Q; < *Aster subulatus* – GW; = *Aster subulatus* Michaux var. *ligulatus* Shinnars – SE]



Symphotrichum drummondii (Lindley) G.L. Nesom var. ***drummondii***, Hairy Heart-leaved Aster. Mesic to dry forests. August-October. PA, OH, MI, WI, MN, and NE, south to MD, WV, TN, AL, MS, and LA (including the Florida Parishes). [= FNA, K, X; < *Aster drummondii* Lindley – C, G, SE; = *Aster sagittifolius* var. *drummondii* (Lindley) Shinnars – F; = *Aster drummondii* var. *drummondii*; = *Symphotrichum drummondii* (Lindley) G.L. Nesom – Pa]

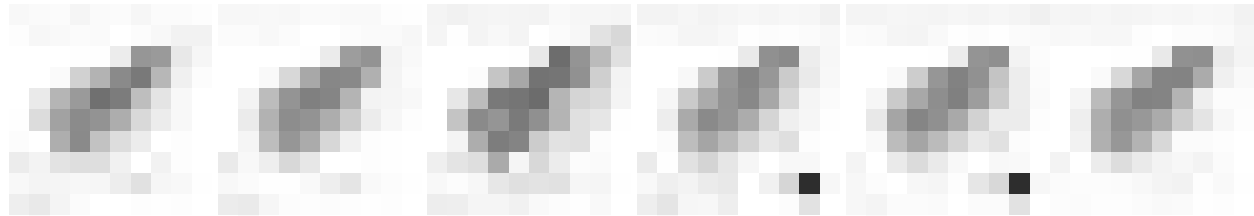
Symphotrichum drummondii (Lindley) G.L. Nesom var. ***texanum*** (E.S. Burgess) G.L. Nesom. {habitats} {east to MS, AL, and KY}. [= FNA, K; = *Aster texanus* Burgess – C, G, SE; = *Aster drummondii* Lindley var. *texanus* (E.S. Burgess) A.G. Jones; = *Symphotrichum texanum* (E.S. Burgess) Semple] {synonymy incomplete}

Symphotrichum dumosum (Linnaeus) G.L. Nesom var. ***dumosum***, Long-stalked Aster. Old fields, disturbed areas, pastures. Late August-October. NB, WV, IN, IL, OK south to FL and TX. [= K, X; < *Aster dumosus* – RAB, C, G, GW, SE, W; > *Aster dumosus* Linnaeus var. *dumosum* – F; > *A. dumosus* var. *coridifolius* (Michaux) Torrey & A. Gray – F, WV; < *S. dumosum* – FNA, WH; < *S. dumosum* – Pa; > *A. dumosum* – S; > *A. cordifolius* Michaux – S]

Symphotrichum dumosum (Linnaeus) G.L. Nesom var. ***gracilipes*** (Wiegand) G.L. Nesom. {habitats} Late August-October. SC south to FL, west to LA. [= K; < *Aster dumosus* – RAB, GW, SE; < *S. dumosum* – FNA, WH; = *A. gracilipes* (Wiegand) Alexander – S; = *Aster dumosus* Linnaeus var. *gracilipes* Wiegand]

Symphotrichum dumosum (Linnaeus) G.L. Nesom var. ***pergracile*** (Wiegand) G.L. Nesom. {habitats}. Late August-October. Endemic to NC and SC. [= K; < *Aster dumosus* – RAB, GW, SE; < *S. dumosum* – FNA; = *Aster dumosus* Linnaeus var. *pergracile* Wiegand]

Symphotrichum dumosum (Linnaeus) G.L. Nesom var. ***strictior*** (Torrey & A. Gray) G.L. Nesom. Woodlands and glades over mafic rock. Late August-October. NH, ON, and WI south to NC and MO. [= K, X; < *Aster dumosus* – RAB, C, G, GW, SE, W; = *A. dumosus* Linnaeus var. *strictior* Torrey & A. Gray – F; < *S. dumosum* – FNA]



Symphotrichum dumosum (Linnaeus) G.L. Nesom var. ***subulifolium*** (Torrey & A. Gray) G.L. Nesom. {habitats} Late August-October. ME south to FL, west to TX. [= K, X; < *Aster dumosus* – RAB, C, G, GW, SE, W; = *Aster dumosus* Linnaeus var. *subulifolius* Torrey & A. Gray – F; < *S. dumosum* – FNA, Pa, WH]

Symphotrichum elliotii (Torrey & A. Gray) G.L. Nesom, Southern Swamp Aster, Elliott's Aster. Bogs, swamps, and marshes, mainly in the outer Coastal Plain, on tree bases, hummocks, and stumps in tidal freshwater swamps, especially where salinities may occasionally exceed 5-10 ppt. Late September-November. Se. VA south to s. FL, west to LA. The Jones & Coile (1988) record for n. GA is rejected. [= FNA, K, WH, X; = *Aster elliotii* Torrey & A. Gray – RAB, C, F, G, GW, S, SE; = *Aster puniceus* Linnaeus var. *elliotii* (Torrey & A. Gray) A. G. Jones]

Symphotrichum ericoides (Linnaeus) G.L. Nesom var. ***ericoides***, Heath Aster, Squarrose White Aster. Limestone glades. ME, NL (Labrador), ON, ND, CO, AZ, south to VA, MS, TX, Nuevo León, and Coahuila. [= FNA; > *Symphotrichum ericoides* (Linnaeus) G.L. Nesom var. *ericoides* – K, X; > *Symphotrichum ericoides* (Linnaeus) G.L. Nesom var. *prostratum* (Kuntze) G.L. Nesom – K, X; > *Aster ericoides* Linnaeus var. *ericoides* – G; > *Aster ericoides* Linnaeus var. *prostratus* (Kuntze) Blake – G; = *Aster ericoides* – C, F, SE, W; = *S. ericoides* var. *ericoides* – FNA; = *Virgulus ericoides* (Linnaeus) Reveal & Keener; < *S. ericoides* – Pa]

Symphotrichum expansum (Poeppig ex Sprengel) G.L. Nesom. Pond margins, disturbed wet areas. July-November (-January). FL Panhandle and peninsula, AL, OK, UT, NV, and CA south through Mexico and Central America to n. South America; West Indies. [= K, V, X; = *S. subulatum* (Michaux) G.L. Nesom var. *parviflorum* (Nees) S.D. Sundberg - FNA, Q] {add synonymy - S}

Symphotrichum firmum (Nees) G.L. Nesom, Shining Aster. Mt (WV): {GA, NC?, VA} (NC Watch List). Peaty wetlands and seepages. Included by Nesom (1997) in *Symphotrichum puniceum* (Linnaeus) G.L. Nesom var. *puniceum*, but see Warners & Laughlin (1999) for an analysis of differences between it and *S. puniceum*. [= FNA, Pa, X; = *Aster firmus* Nees - C; < *Aster puniceus* - RAB; = *Aster puniceus* Linnaeus var. *firmus* (Nees) Torrey & A. Gray - F, WV; > *Aster puniceus* Linnaeus var. *firmus* (Nees) Torrey & A. Gray - G; > *Aster lucidulus* (A. Gray) Wiegand - G, SE, W; = *Aster puniceus* Linnaeus ssp. *firmus* (Nees) A.G. Jones; < *S. puniceum* (Linnaeus) Löve & Löve var. *puniceum* - K]

Symphotrichum fontinale (Alexander in Small) G.L. Nesom. Wet pinelands, marshes; rare. E. Panhandle FL south to s. FL. [= FNA, WH, X; = *Aster fontinalis* Alexander in Small - S, SE; = *A. patens* Aiton var. *floridanus* R.W. Long]



Symphotrichum georgianum (Alexander) G.L. Nesom, Georgia Aster. Dry, rocky woodlands, woodland borders, roadbanks, powerline rights-of-way, primarily in places that formerly would have burned and likely been post oak or blackjack oak woodlands or savannas, also in thin soils around granitic flatrocks. Early October-mid November; November-December. Sc. NC south to c. GA and west to c. AL; apparently disjunct on the Coastal Plain of sw. GA and e. Panhandle FL (Leon County). [= FNA, K, WH, X; = *Aster georgianus* Alexander - S, Z; < *Aster patens* - RAB; = *Aster patens* Aiton var. *georgianus* (Alexander) Cronquist - SE; = *Virgulus georgianus* (Alexander) Semple; = *Virgulus patens* (Aiton) Reveal & Keener var. *georgianus* (Alexander) Reveal & Keener]

Symphotrichum grandiflorum (Linnaeus) G.L. Nesom, Big-headed Aster. Dry woodlands, forest edges; roadbanks and powerline rights-of-way. Late September-November. E. and c. VA south through e. and c. NC to to nc. SC. [= FNA, K, X; = *Aster grandiflorus* Linnaeus - RAB, C, F, G, S, SE, W; = *Virgulus grandiflorus* (Linnaeus) Reveal & Keener]

Symphotrichum kralii G.L. Nesom. {habitats} East Gulf Coastal Plain of AL and FL. See Nesom (1997); the name *A. pinifolius* is illegitimate. [= K; = *Aster pinifolius* Alexander in Small - S, name illegitimate; < *S. simmondsii* (Small) G.L. Nesom - FNA, WH; < *Aster dumosus* - SE]

Symphotrichum laeve (Linnaeus) Löve & Löve var. ***concinnum*** (Willdenow) G.L. Nesom, Narrow-leaved Smooth Aster. Dry woodlands over mafic or calcareous rocks. September-October. NY and KY south to GA, Panhandle FL (Jackson County), and MS. [= FNA, K, Pa, WH, X; = *Aster concinnum* Willdenow - C, G, S, SE; < *A. laevis* - F, WV; = *A. laevis* Linnaeus var. *concinnum* (Willdenow) House - RAB, W; = *S. laeve* ssp. *concinnum* (Willdenow) Semple & Brouillet]

Symphotrichum laeve (Linnaeus) Löve & Löve var. ***laeve***, Smooth Blue Aster. Mesic hardwood forests. September-October. NS west to MB, south to GA, LA, and OK. [= FNA, K, pa, X; = *Aster laevis* Linnaeus var. *laevis* - RAB, C, G, SE, W; >> *A. laevis* - F, WV; > *A. steeleorum* Shinnars - F, WV; > *A. laevis* - S; > *A. falcidens* E.S. Burgess - SJ]

Symphotrichum laeve (Linnaeus) Löve & Löve var. ***purpuratum*** (Nees) G.L. Nesom, Gulf Coast Smooth Aster. Open dry woodlands, prairies. September-October. SC and GA west to AR and TX. [= FNA, K, X; > *Aster attenuatus* Lindley ex Hooker - G, S; > *Aster purpuratus* Nees - S; = *Aster laevis* Linnaeus var. *purpuratus* (Nees) A. G. Jones; = ***Symphotrichum attenuatum*** (Lindley) Semple]



Symphotrichum lanceolatum (Willdenow) G.L. Nesom var. ***interior*** (Wiegand) G.L. Nesom. {habitats}. NH west to MN, south to VA (Kartesz 1999), KY, AR, and OK. South at least to s. PA (Rhoads & Klein 1993). [= FNA, Pa, X; = *Aster lanceolatus* Willdenow var. *interior* (Wiegand) Semple & Chmielewski - C; = *A. simplex* Willdenow var. *interior* (Wiegand) Cronquist - F, G; ? *S. lanceolatum* (Willdenow) G.L. Nesom ssp. *lanceolatum* var. *interior* (Wiegand) G.L. Nesom - K; < *A. lanceolatus* - W; = *A. lanceolatus* ssp. *lanceolatus* var. *interior* (Wiegand) Semple & Chmielewski; = *A. lanceolatus* ssp. *interior* (Wiegand) A.G. Jones]

Symphotrichum lanceolatum (Willdenow) G.L. Nesom var. ***lanceolatum***. Moist soils. July-October. NL (Newfoundland) west to SK, south to PA (Rhoads & Klein 1993), VA (reported in FNA), NC, SC (?), TN, MS, LA, and TX. Reported for Ashe County, NC (Poindexter & Murrell 2008). [= FNA, Pa, X; < *Aster simplex* Willdenow - RAB, GW, WV; = *Aster lanceolatus* Willdenow var. *lanceolatus* - C; = *A. simplex* var. *ramosissimus* (Torrey & A. Gray) Cronquist - F, G; < *A. simplex* var. *simplex* - SE; < *A. lanceolatus* - W; = *A. lanceolatus* ssp. *lanceolatus* var. *lanceolatus*; = *A. lanceolatus* ssp. *lanceolatus*]

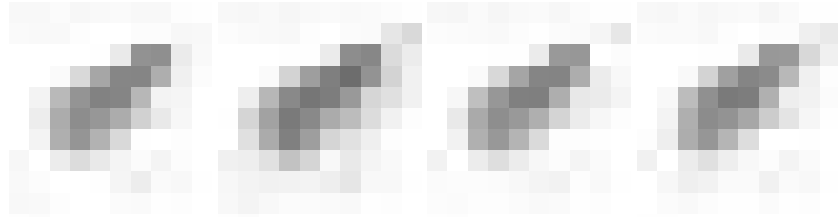
Symphotrichum lanceolatum (Willdenow) G.L. Nesom var. ***latifolium*** (Semple & Chmielewski) G.L. Nesom. Bottomlands, other moist sites. September-October. ME west to MB, south to e. Panhandle FL and TX. [= FNA, WH, X; < *Aster*

simplex Willdenow – RAB, GW; = *A. lanceolatus* Willdenow var. *simplex* (Willdenow) A. G. Jones – C; = *A. simplex* var. *simplex* – F, G; = *S. lanceolatum* (Willdenow) G.L. Nesom ssp. *lanceolatum* var. *latifolium* (Semple & Chmielewski) G.L. Nesom – K; < *A. lanceolatus* – W; *A. lanceolatus* Willdenow var. *latifolius* Semple & Chmielewski]

Symphotrichum lateriflorum (Linnaeus) Löve & Löve var. *angustifolium* (Wiegand) G.L. Nesom. {habitats} South to KY and NJ (Kartesz 1999). [= K, X; < *S. lateriflorum* – FNA] {add to synonymy}

Symphotrichum lateriflorum (Linnaeus) Löve & Löve var. *horizontale* (Desfontaines) G.L. Nesom, Goblet Aster. {habitats} September–November. ME and MN south to FL and AR. [= K, X; < *S. lateriflorum* – FNA, Pa; < *Aster lateriflorus* – C, G, GW, SE, W; = *A. lateriflorus* var. *pendulus* (Aiton) E.S. Burgess – F; *A. lateriflorus* (Linnaeus) Britton var. *horizontalis* (Desfontaines) Farwell]

Symphotrichum lateriflorum (Linnaeus) Löve & Löve var. *lateriflorum*, Starved Aster. Mt (WV), {DE?, GA, NC, SC, VA}: dry to moist areas; common in WV. September–November. NS, QC, and MB south to FL and TX. [= K; < *Aster lateriflorus* – RAB (also see *A. ontarionis*); < *A. lateriflorus* – C, G, GW, SE, W; = *A. lateriflorus* (Linnaeus) Britton var. *lateriflorus* – F; < *S. lateriflorum* – FNA, Pa; > *S. lateriflorum* var. *lateriflorum* – X; > *S. lateriflorum* var. *hirsuticaule* (Lindley ex A.P. de Candolle) G.L. Nesom – X; > *A. lateriflorus* var. *hirsuticaulis* (Lindley ex A.P. de Candolle) Porter]



Symphotrichum lateriflorum (Linnaeus) Löve & Löve var. *spatelliforme* (E.S. Burgess) G.L. Nesom. {habitats} {distribution} [= X; < *S. lateriflorum* – FNA, WH; = *Aster spatelliformis* E.S. Burgess]

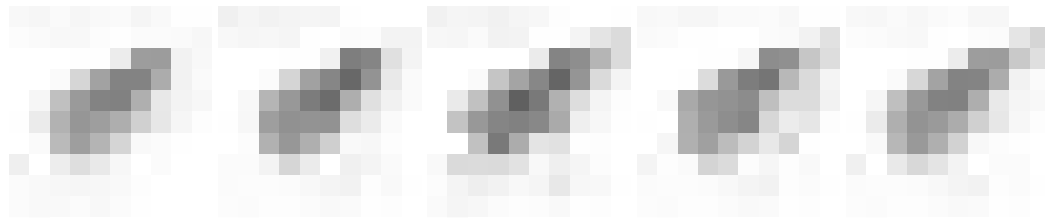
Symphotrichum longifolium (Lamarck) G.L. Nesom. Cp (SC): [= X; = *A. longifolius* Lamarck]

Symphotrichum lowrieianum (Porter) G.L. Nesom, Smooth Heart-leaved Aster. Mesic to dry-mesic forests. September–October. MA, NY, and ON, south to w. VA, w. NC, ne. GA, e. TN, and c. TN. Perhaps originating from hybridization of *S. cordifolium* and *S. laeve*. [= K, Pa, X; < *A. cordifolium* Linnaeus – RAB; = *A. lowrieianus* Porter – C, G, SE, W; > *A. lowrieianus* var. *lowrieianus* – F, WV; > *A. lowrieianus* var. *lanceolatus* Porter – F, WV; < *S. cordifolium* (Linnaeus) G.L. Nesom – FNA; > *A. lowrieianus* – S; > *A. plumarius* E.S. Burgess – S; = *A. cordifolium* ssp. *laevigatus* (Porter) A.G. Jones; = *A. cordifolium* ssp. *laevigatus* Porter]

Symphotrichum novae-angliae (Linnaeus) G.L. Nesom, New England Aster, Michaelmas-daisy. Wet meadows, bogs, prairies. September–October. NS west to MT, south to GA, wc. AL, c. MS, s. AR, OK, and NM. [= FNA, K, Pa, Z; = *Aster novae-angliae* Linnaeus – RAB, C, F, G, GW, S, SE, W, WV; = *Virgulus novae-angliae* (Linnaeus) Reveal & Keener]

Symphotrichum novi-belgii (Linnaeus) G.L. Nesom var. *elodes* (Torrey & A. Gray) G.L. Nesom, New York Aster. Wet pine savannas, marshes. Late September–November. NB south to NY, apparently disjunct southward from e. MD south to e. SC. [= FNA, K, X; < *Aster novi-belgii* – RAB, C, G, GW, SE; = *A. novi-belgii* Linnaeus var. *elodes* (Torrey & A. Gray) A. Gray – F; = *A. elodes* Torrey & A. Gray – S]

Symphotrichum novi-belgii (Linnaeus) G.L. Nesom var. *novi-belgii*, New York Aster. {habitat}. August–September. NL (Newfoundland) and NL (Labrador) south to MD and WV. [= FNA, K, Pa, X; < *Aster novi-belgii* – RAB, C, G, GW, SE; = *A. novi-belgii* Linnaeus var. *novi-belgii* – F; = *A. novi-belgii* – S]



Symphotrichum oblongifolium (Nuttall) G.L. Nesom, Eastern Aromatic Aster, Shale-barren Aster. Rock outcrops and dry woodlands over limestone, calcareous shale. Late September–October. NY, WI, MN, and MT, south to sc. VA, w. NC, nc. AL, n. MS, TX, and NM. [= FNA, K, Pa, X; > *Aster oblongifolius* Nuttall var. *angustatus* Shinnars – G, SE; > *A. oblongifolius* var. *orientis* Shinnars – WV; = *A. oblongifolius* – RAB, C, F, S, W; = *Virgulus oblongifolius* (Nuttall) Reveal & Keener]

Symphotrichum ontarionis (Wiegand) G.L. Nesom var. *ontarionis*, Bottomland Aster. Bottomlands, swamps, bogs. August–October. QC, ON, MN, and SD, south to WV, GA, AL, MS, LA, and TX. See Nesom (1997) and Brouillet & Labrecque (1997). [= FNA; < *Aster lateriflorus* – RAB; < *Aster ontarionis* Wiegand – C, F, G, SE, W; = *S. ontarione* var. *ontarione* – K, X, orthographic variant]

Symphotrichum oolentangiense (Riddell) G.L. Nesom var. *oolentangiense*. {habitat}. NY, ON, MN, and SD, south to Panhandle FL and TX. Reported for GA (Kartesz 1999) on the basis of Fernald (1950), and also reported for GA in FNA. East to sw. TN (Chester, Wofford, & Kral 1997), AL, and Panhandle FL (Wunderlin & Hansen 2008). [= K, X; < *Aster oolentangiensis* – C; = *A. azureus* Lindley var. *azureus* – F; < *A. azureus* – G, SE; < *S. oolentangiense* – FNA]

Symphotrichum patens (Aiton) G.L. Nesom var. *gracile* (Hooker) G.L. Nesom. Var. *gracile*, as defined more narrowly by Z, ranges east to se. LA, s. MS, and s. AL from a core range in LA, e. and c. TX, and OK. [= FNA, K; < *A. patens* Aiton var. *gracilis* Hooker – C, F, G, SE; = *A. patens* var. *gracilis* – Z]

Symphyotrichum patens (Aiton) G.L. Nesom var. *patens*, Common Claspig Aster. Dry woodlands, roadsides, woodland edges, clearings, roadbanks. Late August-early November; October-November. Var. *patens* ranges from VT and NY west to PA, s. OH, s. IN, s. MO, and se. KS, south to e. GA, ne. FL, Panhandle FL, s. AL, s. MS, s. LA, and sc. TX. [= FNA, K, X; > *Aster patens* Aiton var. *patens* – C, F, G, SE, WV; < *A. patens* – RAB, W; >> *A. patens* var. *gracilis* Hooker – C, F, G, SE, misapplied as to our area (now more narrowly defined and occurring only west of our area); < *S. patens* – Pa; = *A. patens* – S; = *A. patens* var. *patens* – Z; < *Virgulus patens* (Aiton) Reveal & Keener var. *patens*]

Symphyotrichum patens (Aiton) G.L. Nesom var. *patentissimum* (Lindley ex de Candolle) G.L. Nesom. Var. *patentissimum* is largely Ozarkian, east to w. KY and w. MS. [= FNA, K; = *Aster patens* Aiton var. *patentissimus* (Lindley) Torrey & A. Gray – C, F, G, SE, Z]



Symphyotrichum phlogifolium (Muhlenberg ex Willdenow) G.L. Nesom, Appalachian Claspig Aster. Mesic, nutrient-rich mixed hardwood forests. Late August-mid October. NJ and Long Island, NY west to PA, n. OH, and e. IN south to c. VA, c. NC, w. SC, n. GA, and ne. AL, primarily in the Appalachian Mountains and adjacent provinces. [= FNA, K, Pa, X; < *Aster patens* – RAB; = *A. phlogifolium* Muhlenberg ex Willdenow – S, W, Z; = *A. patens* Aiton var. *phlogifolius* (Muhlenberg ex Willdenow) Nees – C, F, G, SE, WV; = *Virgulus patens* (Aiton) Reveal & Keener var. *phlogifolius* (Muhlenberg ex Willdenow) Reveal & Keener]

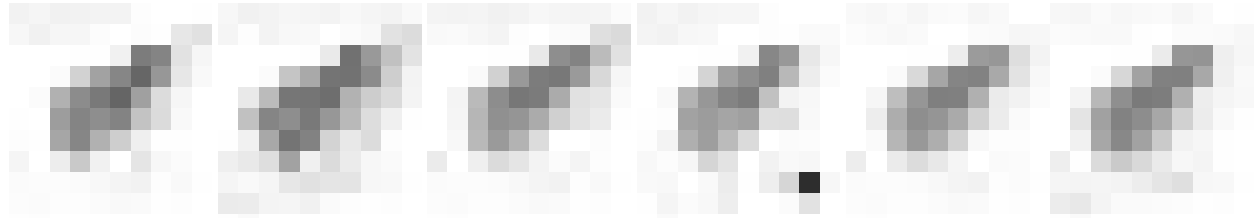
Symphyotrichum pilosum (Willdenow) G.L. Nesom var. *pilosum*. Old fields, disturbed areas, woodland borders. September-November. NB west to MN, south to Panhandle FL and TX. [= FNA, K, Pa, X; < *Aster pilosus* – RAB, W; = *A. pilosus* Willdenow var. *pilosus* – C, F, G, SE, WV; < *S. pilosum* – WH]

Symphyotrichum pilosum (Willdenow) G.L. Nesom var. *pringlei* (A. Gray) G.L. Nesom. {habitats}. September-November. NS west to MN, south to GA and TN. [= FNA, K, Pa, X; = *Aster pilosus* Willdenow var. *demotus* Blake – RAB, SE; = *Aster pilosus* var. *pringlei* A. Gray – C; > *A. pilosus* Willdenow var. *demotus* Blake – F, G, WV; > *A. pilosus* var. *pringlei* – F, G, WV]

Symphyotrichum plumosum (Small) Semp. Dry flatwoods. October-November. Endemic to c. Panhandle FL. [= FNA; < *Symphyotrichum concolor* (Linnaeus) G.L. Nesom – K; = *Aster plumosus* Small – S; = *S. concolor* (Linnaeus) G.L. Nesom var. *plumosum* (Small) Wunderlin & B.F. Hansen – WH]

Symphyotrichum praealtum (Poiret) G.L. Nesom var. *angustior* (Wiegand) G.L. Nesom, Willow Aster, Veiny Lined Aster. Fen-like calcareous wetlands. ME south to NC and TN. Abrams Creek, Frederick County, VA. Also reported for NC by Kartesz (1999). [= K, X; < *Aster praealtus* – C, GW, W; = *A. praealtus* Poiret var. *angustior* Wiegand – F; < *S. praealtum* – FNA, Pa; < *A. praealtus* var. *praealtus* – G, SE]

Symphyotrichum praealtum (Poiret) G.L. Nesom var. *praealtum*. Moist forests over limestone, wooded fens (with *Acer rubrum* and *Fraxinus nigra*). NY, MN, and SD south to Panhandle FL and TX. Reported for Giles County, VA. [= K, X; < *Aster praealtus* – C, GW, W, WV; = *A. praealtus* Poiret var. *praealtus* – F; < *A. praealtus* var. *praealtus* – G, SE; < *S. praealtum* – FNA, Pa, WH]



Symphyotrichum praealtum (Poiret) G.L. Nesom var. *subasperum* (Lindley) G.L. Nesom. {habitats} KY, IN, IL, MO, and OK south to AL and TX. [= K; < *S. praealtum* – FNA]

Symphyotrichum pratense (Rafinesque) G.L. Nesom, Barrens Silky Aster. Calcareous glades and barrens. September-October. Se. AR west to ne. TX, south to sc. LA and e. TX; disjunct at scattered localities east of the Mississippi River, as in sw. VA (Ludwig 1999), c. KY, TN (Chester, Wofford, & Kral 1997), nw. GA, sw. GA, Panhandle FL (Gadsden County), n. and c. AL, wc. MS. See Jones, Witsell, & Nesom (2008) for extensive discussion. [= FNA, K, X; < *Aster sericeus* – C, F, G, SE; = *S. sericeum* (Ventenat) G.L. Nesom var. *microphyllum* (A.P. de Candolle) Wunderlin & B.F. Hansen – WH; = *A. pratensis* Rafinesque; = *A. sericeus* Ventenat var. *microphyllum* A.P. de Candolle]

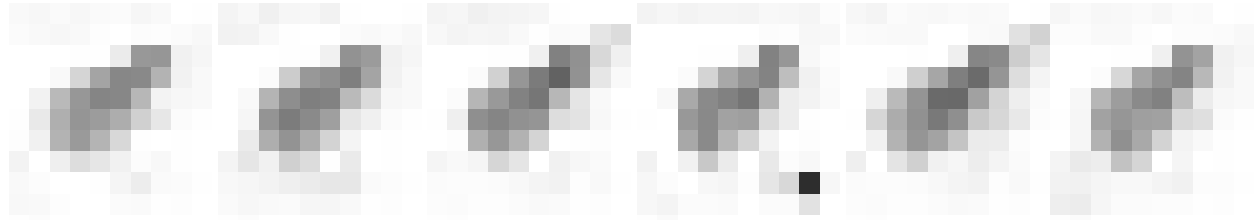
Symphyotrichum prenanthoides (Muhlenberg ex Willdenow) G.L. Nesom, Zigzag Aster. Forests, roadbanks. Late August-October. MA, NY, s. ON, and MN, south to w. NC, TN, IL, and IA. [= FNA, K, Pa, X; = *Aster prenanthoides* Muhlenberg ex Willdenow – RAB, C, F, G, S, SE, W, WV]

Symphyotrichum priceae (Britton) G.L. Nesom, Miss Price's Aster. Limestone glades. KY south through c. TN to nw. GA and n. AL. [= FNA, K, X; = *Aster pilosus* Willdenow var. *priceae* (Britton) Cronquist – C, G, SE; < *A. pilosus* var. *pringlei* – F; < *A. pilosus* – W; = *A. priceae* Britton]

Symphyotrichum puniceum (Linnaeus) Löve & Löve var. *puniceum*, Purple-stem Aster, Swamp Aster. Bogs, seeps, ditches, wet meadows. September-October. NL (Newfoundland) and NL (Labrador) west to BC, south to GA, AL, MO, and SD. Unresolved material from Grayson County mafic seeps. [= K, X; < *Aster puniceus* Linnaeus – RAB, C, GW, S, SE, W; > *A. puniceus*

var. *punicus* – F, WV; > *A. punicus* var. *compactus* Fernald – F; = *A. punicus* var. *punicus* – G; < *S. punicum* – Pa; ? *A. conduplicatus* E.S. Burgess – S]

Symphotrichum punicum (Linnaeus) Löve & Löve var. *scabricaule* (Shinners) G.L. Nesom. Pineland seepage bogs. AL, MS, LA, TX. [= FNA, K; < *Aster punicus* Linnaeus – C, GW, S, SE, W]



Symphotrichum racemosum (Elliott) G.L. Nesom var. *racemosum*, Small White Aster. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA, WV): bottomlands, marshes; common. ME south to n. FL, west to TX, and inland to OH, IN, IL, MO, and OK. [= K, X; = *Aster vimineus* Lamarck – RAB, G, GW, SE, W, misapplied; < *A. racemosus* – C; > *A. vimineus* var. *vimineus* – F, misapplied; > *A. racemosus* – F; < *S. racemosum* – FNA; < *S. racemosum* – FNA, Pa; > *A. brachypholis* Small – S]

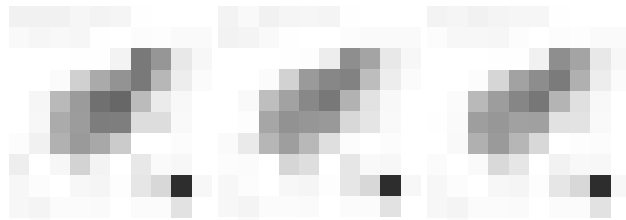
Symphotrichum racemosum (Elliott) G.L. Nesom var. *subdumosum* (Wiegand) G.L. Nesom. Mt (WV), {in e. WV and apparently through our area judging from F} [= X; < *Aster racemosus* Elliott – C; = *A. vimineus* Lamarck var. *subdumosus* Wiegand – F; < *S. racemosum* – FNA, Pa; = *A. fragilis* Willdenow var. *subdumosus* (Wiegand) A.G. Jones, misapplied]

Symphotrichum retroflexum (A.P. de Candolle) G.L. Nesom. Forests. Late August-October. W. NC and e. TN south to nw. SC and n. GA. [= FNA, K, X; = *Aster curtisii* Torrey & A. Gray – RAB, S, SE, W; = *A. retroflexus* Lindley ex A.P. de Candolle – C]

Symphotrichum rhiannon Weakley & Govus, Buck Creek Aster, Rhiannon's Aster. Ultramafic outcrop barren. October-November. Endemic (as far as is known) to the Buck Creek Serpentine Barren, Clay County, NC. Showing some similarities to *S. punicum* and *S. prenanthoides*, but unique in many characters and not seemingly intermediate. See Kauffman et al. (2004) for additional information. [= FNA]

Symphotrichum xschistosum (Steele) G.L. Nesom [*S. cordifolium* × *laeve* var. *laeve*], Millboro Aster. Shale woodlands. Endemic to VA, so far as is known. [= K, X; = *Aster xschistosus* Steele (pro sp.); = *A. schistosus* Steele]

Symphotrichum sericeum (Ventenat) G.L. Nesom, Western Silvery Aster. See Jones, Witsell, & Nesom (2008); all reports of this species east of the Mississippi River and south of the Ohio River are based on misidentifications (or a taxonomically broader application of) *S. pratense*. [= FNA, K, X; = *Aster sericeus* Ventenat – G, S; < *A. sericeus* Ventenat – C, F, SE; = *Virgulus sericeus* (Ventenat) Reveal & Keener]



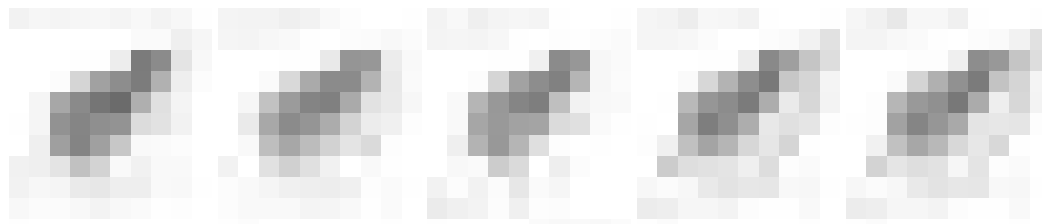
Symphotrichum shortii (Lindley) G.L. Nesom, Midwestern Blue Heart-leaved Aster, Short's Aster. Dry, rocky slopes, calcareous hammocks (in FL). PA, s. ON, and MN, south to w. NC, c. GA, Panhandle FL (Gadsden and Jackson counties), MS, and AR. The lower stem leaves are indeed reminiscent of the leaves of *Asplenium rhizophyllum* (formerly known as *Camptosorus*), explaining one of Small's names for this species. [= FNA, K, Pa, X; = *Aster shortii* Lindley – C, F, G, SE, WV; > *A. shortii* – S; > *A. camptosorus* Small – S]

Symphotrichum simmondsii (Small) G.L. Nesom. Ditches, other wet places. Se. NC south to s. FL. [= K, X; < *S. simmondsii* – FNA, WH (also see *S. kralii*); = *Aster simmondsii* Small; ? *A. pinifolius* Small]

* *Symphotrichum squamatum* (Sprengel) G.L. Nesom, South American Salt-marsh Aster. Disturbed areas (on ballast), escaped to coastal marshes and dunes; native of South America. AL (Mobile County), FL (Escambia County), LA, TX. [= K, V, WH, X; = *S. subulatum* (Linnaeus) G.L. Nesom var. *squamatum* (Sprengel) S.D. Sundberg – FNA, Q; < *Aster subulatus* Michaux var. *cubensis* – SE; ? *Aster subulatus* Michaux var. *australis* (A. Gray) Shinners]

Symphotrichum subulatum (Michaux) G.L. Nesom, Eastern Salt-marsh Aster. Tidal marshes. September-November. S. ME south to ne. FL, Panhandle FL, west to LA. See Sundberg (2004). [= K, V, WH, X; = *Aster subulatus* Michaux var. *subulatus* – C, SE; < *A. subulatus* – RAB, GW; = *S. subulatum* var. *subulatum* – FNA, Q; > *A. subulatus* var. *subulatus* – F, G; > *A. subulatus* var. *obtusifolius* Fernald – F, G; > *A. subulatus* Michaux var. *euroauster* Fernald & Griscom – F]

Symphotrichum tenuifolium (Linnaeus) G.L. Nesom, Perennial Salt-marsh Aster. Brackish marshes. July-November. ME south to c. peninsular FL, west to TX. See Sundberg (2004). [= K, V, WH, X; = *Aster tenuifolius* Linnaeus – RAB, C, G, GW, SE; = *Symphotrichum tenuifolium* var. *tenuifolium* – FNA, Q]



Symphyotrichum undulatum (Linnaeus) G.L. Nesom. Dry forests, woodlands, glades, roadbanks. August-November. NS west to s. ON, south to c. peninsular FL and LA. [= FNA, K, Pa, WH, X; = *Aster undulatus* Linnaeus – RAB, C, G, SE, W; > *A. undulatus* var. *undulatus* – F, WV; > *A. undulatus* var. *loriformis* E.S. Burgess – F, WV; > *A. undulatus* var. *diversifolius* (Michaux) A. Gray – F; > *A. asperifolius* E.S. Burgess – S; > *A. linguiformis* E.S. Burgess – S; > *A. loriformis* (E.S. Burgess) E.S. Burgess – S; > *A. mohrii* E.S. Burgess – S; > *A. claviger* E.S. Burgess – S; > *A. corrigiatus* E.S. Burgess – S; > *A. gracilescens* E.S. Burgess – S; > *A. proteus* E.S. Burgess – S; > *A. sylvestris* E.S. Burgess – S; > *A. triangularis* (E.S. Burgess) E.S. Burgess – S; > *A. truellius* E.S. Burgess – S; > *A. undulatus* – S; > *A. undulatus* Linnaeus var. *asperulus* (Torrey & A. Gray) Wood]

Symphyotrichum urophyllum (Lindley in A.P. de Candolle) G.L. Nesom, White Arrowleaf Aster. {confused} Late August-October. ME west to MN and NE, south to e. Panhandle FL, MS, and OK. [= FNA, K, Pa, WH, X; = *Aster sagittifolius* Wedemeyer ex Willdenow – RAB, C, G, S, SE, W; = *A. sagittifolius* var. *sagittifolius* – F; = *A. urophyllum* Lindley in A.P. de Candolle]

Symphyotrichum walteri (Alexander) G.L. Nesom. Savannas, sandhills, pine flatwoods. E. NC south to c. peninsular FL. [= FNA, K, WH, X; = *Aster walteri* Alexander – S, SE; = *A. squarrosus* Walter – RAB (the name preoccupied); = *Virgulus walteri* (Alexander) Reveal & Keener]



Synedrella Gaertner 1791 (Nodeweed)

A monotypic genus, an annual herb, native of tropical America. References: Strother in FNA (2006c).

* ***Synedrella nodiflora*** (Linnaeus) Gaertner, Nodeweed. Moist to wet disturbed areas (on ballast), not collected since the late 1800s; native of tropical America. January-December. [= FNA, S, SE, WH]



Tagetes Linnaeus 1753 (Marigold)

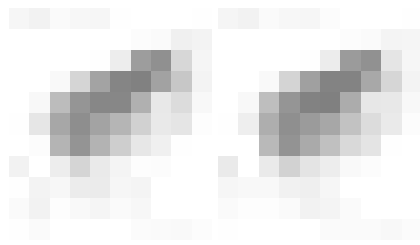
A genus of about 40-50 species, of tropical and warm temperate America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

- 1 Rays inconspicuous, ca. 1-2 mm long; [plant a well-established weed, primarily in the Coastal Plain]..... *T. minuta*
- 1 Rays showy, mostly > 10 mm long; [plant cultivated, rarely occurring as a waif].
- 2 Peduncles conspicuously swollen and hollow below the flower; involucre 15-20 mm high; achenes 7-10 mm long..... *T. erecta*
- 2 Peduncles not conspicuously swollen and hollow below the flower; involucre 10-15 mm high; achenes 4-7 mm long..... *T. patula*

* ***Tagetes erecta*** Linnaeus, Common Marigold, African Marigold, Aztec Marigold, Big Marigold. Cp (FL, GA, NC, SC, VA), Pd (NC, SC, VA), Mt (NC, SC, VA): commonly cultivated, rarely persistent or as a waif, native of Mexico. July-November. [= RAB, C, F, G, K, S, SE, WH; < *T. erecta* – FNA]

* ***Tagetes minuta*** Linnaeus, Muster John Henry. Sandy fields, pecan orchards, sandy roadsides; native of South America. Late September-November. [= RAB, C, F, FNA, G, K, S, SE, WH]

* ***Tagetes patula*** Linnaeus, French Marigold. Mt (VA), Pd (NC, SC), Cp (NC, SC, VA): commonly cultivated, rarely persistent or as a waif, native of Mexico. July-November. [= RAB, C, G, K, SE; < *T. erecta* – FNA]



Tanacetum Linnaeus 1753 (Tansy)

A genus of about 150 species, herbs, of north temperate regions, especially the Old World. References: Watson in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z.

- 1 Leaves simple, crenate (sometimes with a few basal lobes)..... *T. balsamita*
- 1 Leaves 1-3-pinnatifid.
 - 2 Rays present, white; leaf blades 4-10 cm long, 1-2-pinnate (with 3-5 pairs of primary lobes) *T. parthenium*
 - 2 Rays absent (rarely present and very small, and then yellow); leaf blades 8-20 cm long, 2-3-pinnate (with 4-20+ pairs of primary lobes)..... *T. vulgare*

* **Tanacetum balsamita** Linnaeus, Costmary. Disturbed areas, native of Mediterranean Europe. Introduced south to PA (Rhoads & Klein 1993), MD (Kartesz 1999), and DE (Kartesz 1999). August-September. [= FNA; = *Chrysanthemum balsamita* (Linnaeus) Baillon – C; = *Balsamita major* Desfontaines – K]

* **Tanacetum parthenium** (Linnaeus) Schultz ‘Bipontinus’, Feverfew. Disturbed areas; native of Europe. June-September. [= FNA, K, Pa, Z; = *Chrysanthemum parthenium* (Linnaeus) Bernhardi – RAB, C, F, G, SE, WV; = *Matricaria parthenium* Linnaeus – S]

* **Tanacetum vulgare** Linnaeus, Common Tansy, Golden-buttons. Disturbed areas; native of Eurasia. August-October. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV, Z]



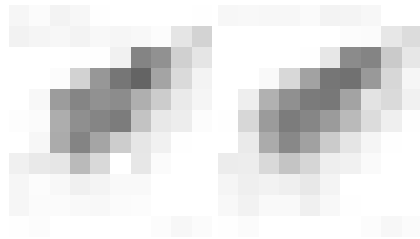
Taraxacum G.H. Weber ex Wiggers 1780 (Dandelion)

A genus of about 60 species (or as many as 2000 if apomictic microspecies are recognized), herbs, of boreal and temperate regions. There seems little utility in trying to reconcile the numerous European microspecies against our introduced material. References: Brouillet in FNA (2006a); Cronquist (1980)=SE.

- 1 Cypselas reddish or purplish at maturity; leaves usually deeply cut throughout their length, the lobes narrow *T. erythrospermum*
- 1 Cypselas brown or tan at maturity; leaves less deeply cut, particularly toward the base..... *T. officinale*

* **Taraxacum erythrospermum** Andrzejowski ex Besser, Red-seeded Dandelion. Roadsides, lawns, pastures, other disturbed sites; native of Eurasia. January-December. Brouillet in FNA explains the nomenclatural and taxonomic complexities involved with the various names applied, and the reason for retaining *T. erythrospermum* at this time. [= RAB, F, FNA, Pa, WV; > *T. laevigatum* (Willdenow) de Candolle – C, G, K, SE, W; >> *Leontodon erythrospermum* (Andrzejowski) von Eichwald – S]

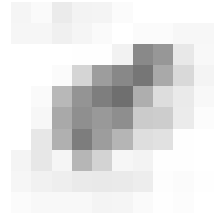
* **Taraxacum officinale** G.H. Weber ex Wiggers, Common Dandelion. Lawns, roadsides, urban areas, pastures, disturbed areas, trailsides, less commonly in a variety of less disturbed habitats; native of Eurasia. January-December. [= RAB, C, FNA, G, Pa, SE, W, WH, WV; > *T. officinale* var. *officinale* – F; > *T. officinale* ssp. *officinale* – K; = *Leontodon taraxacum* Linnaeus – S]



Tetragonotheca Linnaeus 1753 (Squarehead)

A genus of 4 species, herbs, endemic to se. North America. The other three species in the genus occur in LA, TX, and adjacent Mexico. References: Strother in FNA (2006c); Turner & Dawson (1980)=Z; Cronquist (1980)=SE.

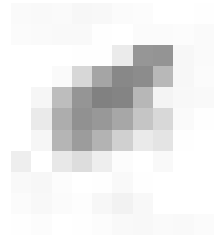
Tetragotheca helianthoides Linnaeus, Squarehead, Pineland-ginseng. Sandhills, sandy woodlands, open hammocks, roadsides. April-July. Se. VA and e. TN south to c. peninsular FL and s. MS. [= RAB, C, F, FNA, G, K, S, SE, W, WH, Z]



Tetraneuris E.L. Greene 1898 (Bitterweed)

A genus of about 9 species, herbs, of North America. References: Bierner & Turner in FNA (2006c).

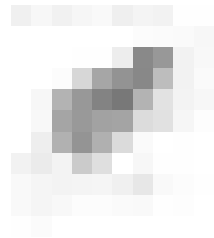
* ***Tetraneuris linearifolia*** (Hooker) Greene var. ***linearifolia***. Waste area near wool-combing mill, perhaps merely a waif; native of sc. United States. See Nesom (2004d). [= FNA, K; ? *Hymenoxys linearifolia* Hooker]



Thelesperma Lessing 1831

A genus of 10 or more species, of c. and w. North America, Mexico, and South America. References: Strother in FNA (2006c).

Thelesperma filifolium (Hooker) A. Gray. Prairies, glades, and roadsides over calcareous substrates. MO, SD, and WY south LA, TX, Nuevo León, and NM; disjunct eastward in the Black Belt of MS and on a chalk bluff in Sumter County, wc. AL (Keener (2009)). [= FNA; > *T. filifolium* var. *filifolium* – SE]



Thymophylla Lagasca y Segura 1816

A genus of about 13 species, herbs and shrubs, of sw. and sc. United States and Mexico. References: Strother in FNA (2006c).

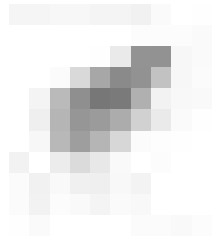
* ***Thymophylla tenuiloba*** (A.P. de Candolle) Small var. ***tenuiloba***, Dahlberg Daisy, Golden-fleece Dry, disturbed areas, waste areas near wool-combing mills; native of sc. United States. Also known as a naturalized introduction in AL and MS (Nesom 2004d, FNA). [= FNA, K; < *T. tenuiloba* – S, WH; = *Dyssodia tenuiloba* (A.P. de Candolle) B.L. Robinson var. *tenuiloba* – SE]



Tithonia Desfontaines ex Jussieu 1789 (Sunflowerweed)

A genus of about 11 species, herbs, shrubs, and rarely trees, of sw. United States, Mexico, and Central America. References: La Duke in FNA (2006c).

* ***Tithonia rotundifolia*** (Miller) S.F. Blake, Clavel de Muerto. Disturbed areas; native of Mexico. November-January. Also reported for Orleans Parish, LA. [= FNA, K, WH]



Tragopogon Linnaeus 1753 (Goat's-beard)

A genus of about 110 species, herbs, of temperate Eurasia and the Mediterranean region. References: P. Soltis in FNA (2006a); Voss (1996); Cronquist (1980)=SE.

- 1 Flowers purple; pappus brownish ***T. porrifolius***
- 1 Flowers yellow; pappus dingy white.
 - 2 Peduncle obviously swollen below the flower and fruit; margins of the phyllaries green (or pale); leaf tips straight; rays pale yellow, obviously shorter than the longest phyllaries..... ***T. dubius***
 - 2 Peduncle only slightly swollen below the flower and fruit; margins of the phyllaries reddish purple (rarely green); leaf tips more or less curled or curved; rays bright yellow, as long as or longer than the phyllaries ***T. pratensis***

* ***Tragopogon dubius*** Scopoli, Goat's-beard, Yellow Salsify. Roadsides, fields, other disturbed places; native of Europe. April-July. [= RAB, C, FNA, G, K, Pa, SE, W; ? *T. major* Jacquin – F, WV]

* ***Tragopogon porrifolius*** Linnaeus, Salsify, Vegetable-oyster, Purple Goat's-beard. Roadsides, fields; native of Europe. Late April-July. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV]

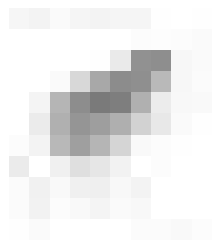
* ***Tragopogon pratensis*** Linnaeus, Showy Goat's-beard, Yellow Goat's-beard, Meadow Salsify, Jack-go-to-bed-at-noon. Roadsides, fields; native of Europe. April-August. Also reported for NC and GA in FNA. [= C, F, FNA, G, K, Pa, S, SE, W, WV]



Tridax Linnaeus 1753

A genus of about 26 species, herbs, mainly of the New World tropics. References: Strother in FNA (2006c); Powell (1965)=Z.

* ***Tridax procumbens*** Linnaeus. Disturbed areas; native of Mexico, Central America, and n. South America. January-December. [= FNA, SE, WH, S, Z]



Trilisa Cassini 1820 (Trilisa)

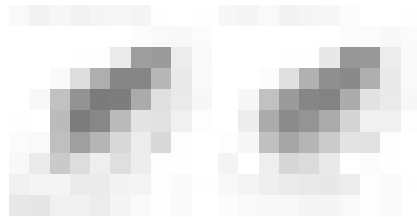
A genus of 2 species, perennial herbs, endemic to the Southeastern Coastal Plain of North America. The name is an anagram of *Liatrix*, as is *Litrisa*, of peninsular FL. Schilling (2011) shows that *Trilisa* and *Litrisa* should be separated from *Carphephorus*. References: Schilling (2011); Nesom in FNA (2006c); Schilling (2011)=V; Correa & Wilbur (1969)=Z; DeLaney, Bissett, & Weidenhamer (1999)=Y; Orzell & Bridges (2002)=X; Cronquist (1980)=SE.

Identification notes: *Trilisa* can be distinguished from *Carphephorus* by its smaller heads (involucres 3.5-6 mm high vs. 6-15 mm high), fewer phyllaries per head (6-12 vs. 15-40), and lack of shining resin dots on the leaves (*Carphephorus* has numerous resin dots).

- 1 Stem glabrous; capitulescence corymbose, the lateral branches equally or overtopping the central ones; leaves 1-6 (-11) cm wide *T. odoratissima*
- 1 Stem densely spreading-pubescent; capitulescence a cylindrical panicle; leaves (0.5-) 1-3 (-4) cm wide *T. paniculata*

Trilisa odoratissima (J.F. Gmelin) Cassini, Deer's-tongue, Vanilla-leaf. Moist to mesic savannas and flatwoods. Late July-October; September-November. Se. NC south to c. peninsular FL and west to e. LA. *T. odoratissima* has the largest leaves of our species of *Carphephorus* and *Trilisa*; its leaves are normally wider than 3 cm, and have a very wide and prominent midrib, usually purple toward the base of the leaf and white toward the tip. This species contains coumarin and gives off a pleasant vanilla odor when drying; it is gathered from the wild and used as a supplementary flavoring in cigarettes. See DeLaney, Bissett, & Weidenhamer (1999), Ward (2001), and Orzell & Bridges (2002) for discussion of a southern Florida taxon related to *T. odoratissima*, named (in *Carphephorus*) as a species, *Carphephorus subtropicanus* DeLaney, N. Bissett, & Weidenhamer, and later reduced in rank to a variety, *C. odoratissimus* var. *subtropicanus* (DeLaney, N. Bissett, & Weidenhamer) Wunderlin & B.F. Hansen. It is probably best treated at the varietal level, but the combination is not yet available in *Trilisa*. [= *Carphephorus odoratissimus* (J.F. Gmelin) Herbert var. *odoratissimus* – FNA, WH, X; < *Carphephorus odoratissimus* – GW, K, SE, Z; = *Carphephorus odoratissimus* – Y; < *Trilisa odoratissima* (J.F. Gmelin) Cassini – RAB, S; = *Trilisa odoratissima* var. *odoratissima* – V]

Trilisa paniculata (J.F. Gmelin) Cassini. Savannas and flatwoods. August-October; September-November. Se. NC south to s. FL, and west to the FL Panhandle and s. AL. The leaves of this species are reminiscent of *C. odoratissimus*, but are narrower, (0.5-) 1-3 (-4) cm wide, vs. 1-6 (-11) cm wide in *C. odoratissimus*. Sterile *C. paniculatus* can be mistaken for glabrate *C. tomentosus*, which has shorter and broader leaves. [= RAB, S, V; = *Carphephorus paniculatus* (J.F. Gmelin) Herbert – FNA, GW, K, SE, WH, Y, Z]



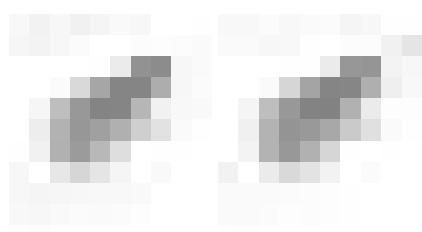
Tripleurospermum Schultz ‘Bipontinus’ 1844 (Mayweed)

A genus of about 40 species, herbs, of the northern hemisphere. References: Brouillet in FNA (2006a); Arriagada & Miller (1997)=Z.

- 1 Stem ascending or erect; achenes with resin glands > 2× as long as wide; annual *T. inodorum*
- 1 Stem procumbent (rarely ascending); achenes with resin glands 1.0-1.5× as long as wide; perennial or biennial *T. maritimum* ssp. *maritimum*

* ***Tripleurospermum inodorum*** (Linnaeus) Schultz ‘Bipontinus’, Scentless Chamomille. Disturbed areas; native of Europe. June. Introduced at scattered locations in North America, such as AL, FL, KY, MD, and PA. [= FNA; = *T. perforata* (Mérat) M. Lainz – K, Z; ? *Matricaria maritima* Linnaeus var. *agrestis* (Knaf) Wilmott – F; = *Matricaria perforata* Mérat]

* ***Tripleurospermum maritimum*** (Linnaeus) W.D.J. Koch ssp. *maritimum*, Scentless Chamomille. Disturbed areas; native of Eurasia. Introduced at scattered locations in eastern North America, such as AL, PA, NJ. [= FNA; = *Matricaria maritima* Linnaeus var. *maritima* – F; = *T. maritima* ssp. *maritima* – K, orthographic variant; ? *Chamomilla maritima* (Linnaeus) Rydberg – S]



***Tussilago* Linnaeus 1753 (Coltsfoot)**

A monotypic genus, an herb, of Eurasia and n. Africa. References: Barkley in FNA (2006b); Cronquist (1980)=SE.

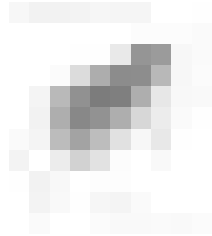
* ***Tussilago farfara*** Linnaeus, Coltsfoot. Roadsides, especially gravelly or shaly roadbanks or ditches, streamside gravel bars, disturbed ground; native of Eurasia. March-June. This species has spread rapidly southward from the Northeast, where it was introduced in North America. Fernald (1950) considered its southern limit to be "New Jersey, Pennsylvania, and Ohio". Gleason (1952) extended it to WV. Strausbaugh and Core (1978) reported that the first collection in WV was actually in 1933, "migrating southward year by year, now abundant and often conspicuous along highways, on strip-mined areas and other denuded areas, in every county of the state." First reported in NC in 1971, it is now rather common in most of the mountain counties, and is beginning to appear at scattered sites in the Piedmont. Though preferring a cool and moist climate, *Tussilago* seems likely to continue to increase in abundance and to spread into the Piedmont. [= C, F, FNA, G, K, Pa, SE, W, WV]



***Uropappus* Nuttall 1841 (Silver-puffs)**

A monotypic genus, an annual herb, of w. North America and nw. Mexico. References: Chambers in FNA (2006a).

* ***Uropappus lindleyi*** (A.P. de Candolle) Nuttall, Lindley's Silver-puff. Waste area near wool-combing mill, perhaps merely a waif; native of sw. United States. See Nesom (2004d). [= FNA, K]



***Verbesina* Linnaeus 1753 (Crownbeard, Wingstem, Frostweed)**

A genus of about 200-300 species, trees, shrubs, and herbs, of tropical, subtropical, and warm temperate America. References: Strother in FNA (2006c); Olsen (1979)=Z; Coleman (1966)=Y; Cronquist (1980)=SE.

- 1 Stem and lower leaf-surfaces grey strigose-canescens; alien annuals, 2-10 dm tall, with taproots; [section *Ximenesia*].....*V. encelioides* var. *encelioides*
- 1 Stem and lower leaf surfaces glabrous or pubescent, but not grey strigose-canescens; native perennials, 5-40 dm tall, with fibrous or fleshy-fibrous roots.
 - 2 Leaves primarily opposite (the uppermost sometimes alternate).
 - 3 Internodes winged; [collectively widespread].
 - 4 Plants 4-5 (-10) dm tall, perennating from short horizontal rhizomes; ray florets (5-) 8; disc florets 20-60+; [endemic to ne. FL and se. GA]; [section *Pterophyton*] *V. heterophylla*
 - 4 Plants 10-30 dm tall, perennating from a crown with fleshy roots; ray florets (0-) 1-3 (-5); disc florets 8-15+; [widespread]; [section *Phaethusa*] *V. occidentalis*
 - 3 Internodes not winged; [collectively of sw. GA, s. AL, and FL Panhandle]; [section *Pterophyton*].
 - 5 Ray florets (5-) 11-13, yellow; heads 3-20 *V. aristata*
 - 5 Ray florets 0; heads 1 (-3) *V. chapmanii*

- 2 Leaves primarily alternate (the lowermost sometimes opposite).
- 6 Heads few, 1-15 (-20), in a compact inflorescence; disc 7-16 mm wide at anthesis; ray florets (5-) 7-15, yellow; plants 5-12 dm tall; [section *Pterophyton*].....*V. helianthoides*
- 6 Heads numerous, 10-200 or more, in a dense to open inflorescence; disc 3-15 mm wide at anthesis; ray florets either absent, or 1-5 and white, or 2-10 and yellow; plants 10-40 dm tall.
 - 7 Ray florets 1-5, white; [section *Ochractinia*].
 - 8 Lower and middle leaves pinnately lobed or dissected; achenes of ray florets glabrous; [of the outer Coastal Plain from SC southward]*V. virginica* var. *laciniata*
 - 8 Lower and middle leaves entire, serrate, or slightly undulate; achenes of ray florets papillose or short-pubescent; [more widespread in our area].....*V. virginica* var. *virginica*
 - 7 Ray florets absent, or 2-10 and yellow; [section *Actinomeris*].
 - 9 Ray florets present, 2-10, yellow; disc florets yellow*V. alternifolia*
 - 9 Ray florets absent; disc florets white.....*V. walteri*

Verbesina alternifolia (Linnaeus) Britton ex Kearney, Common Wingstem. Alluvial forests, marshes, floodplain pastures. August-September. NY and s. ON west to IA, south to Panhandle FL and LA. [= RAB, C, FNA, G, GW, K, Pa, SE, WH, WV; = *Ridan alternifolia* (Linnaeus) Britton - S]

Verbesina aristata (Elliott) Heller, Coastal Plain Crownbeard. Longleaf pine sandhills, swamp margins, dry woodlands. Sw. GA and ne. FL west to FL Panhandle and s. AL. June-August. [= FNA, K, SE, WH; = *Pterophyton aristatum* (Elliott) Alexander - S]

Verbesina chapmanii J.R. Coleman. Bogs and wet pine flatwoods. June-August. FL Panhandle (6 county endemic). [= FNA, GW, K, SE, WH; = *Pterophyton pauciflorum* (Nuttall) Alexander - S, misplied; *V. warei* A. Gray, misapplied]

* ***Verbesina encelioides*** (Cavanilles) Bentham & Hooker f. ex A. Gray var. *encelioides*, Skunk-daisy. Fields, pastures, and disturbed areas; native of w. United States. May-October. [= C, SE; < *V. encelioides* - RAB, F, FNA, G, WH; = *V. encelioides* ssp. *encelioides* - K, Y; < *Ximenesia encelioides* Cavanilles - S]

Verbesina helianthoides Michaux, Ozark Crownbeard. Dry woodlands over mafic rocks. May-October. OH west to IA and KS, south to c. TN, nw. GA, n. AL, and nc. TX; disjunct in w. NC and e. GA. [= C, F, FNA, G, K, SE; = *Pterophyton helianthoides* (Michaux) Alexander - S]

Verbesina heterophylla (Chapman) A. Gray. Pine flatwoods. (April-) June. Ne. FL (8 counties) and se. GA (Charlton County). [= FNA, GW, K, SE, WH; = *Pterophyton heterophyllum* (Chapman) Alexander - S]

Verbesina occidentalis (Linnaeus) Walter, Southern Crownbeard. Forests, woodlands, pastures, and roadsides, especially abundant in alluvial areas or upslope over mafic or calcareous rocks. MD west to OH and MO, south to Panhandle FL and MS. [= RAB, C, F, FNA, G, GW, K, SE, WH, WV; = *Phaethusa occidentalis* (Linnaeus) Britton - S]

Verbesina virginica Linnaeus var. *laciniata* (Poiret) A. Gray, Southern Frostweed. Moist forests and thickets. September-October. E. SC (or e. NC?) south to s. FL. Olsen (1979) maps this variety as occurring in e. NC; I know of no documentation. The two varieties need additional study; specific status may be warranted. [= RAB, GW, K, SE, Z, WH; < *V. virginica* - FNA; = *Phaethusa laciniata* (Poiret) Small - S; = *V. laciniata* (Poiret) Nuttall]

Verbesina virginica Linnaeus var. *virginica*, Common Frostweed. Moist to dryish forests, especially over mafic or calcareous rocks, in Coastal Plain ravines in VA over coquina limestone. July-October. Sc. NC (e. VA?) west to e. KS, south to s. FL and c. TX. Populations of *V. virginica* from e. VA appear to be substantially disjunct from other populations of either variety. [= RAB, C, GW, K, SE, Z; < *V. virginica* - F, FNA, G, WH; = *Phaethusa virginica* (Linnaeus) Britton - S]

Verbesina walteri Shinnery, Walter's Wingstem. Floodplains, low moist forests. Late August-September. Coastal Plain of SC south to GA, west to LA; disjunct in Piedmont of NC and Ouachita Mountains of AR. [= RAB, FNA, GW, K, SE; = *Ridan paniculata* (Walter) Small - S]



Vernonia Schreber 1791 (Ironweed)

A genus of about 20 species, perennial herbs, of e. and c. North America and n. Mexico; a few species in South America. Traditionally very broadly circumscribed to include about 500 species, trees, shrubs, and herbs, of tropical, subtropical, and warm temperate regions, especially America and Africa; this broader circumscription appears increasingly indefensible. References: Strother in FNA (2006a); Jones (1982)=Z; Urbatsch (1972)=Y; Jones in Cronquist (1980)=SE. Key based on FNA and SE.

Identification notes: Hybrids are frequent between co-occurring species. Only *V. ×georgiana* is keyed separately below (because of its distinctive appearance). Others may be recognized by intermediate morphology and ecological / geographic context.

- 1 Basal rosette present, its leaves larger than those of the stem; [of xeric habitats of the Coastal Plain and (in NC southward) xeric rocky habitats of the Piedmont].
 - 2 Phyllary tips acute to rounded (sometimes minutely apiculate), the narrowest short acuminate; [from s. MS westward] *V. texana*
 - 2 Phyllary tips subulate to filiform, the broadest long-acuminate.
 - 3 Basal leaves 2-10 cm wide; stem leaves few, abruptly reduced upward in size relative to the basal..... *V. acaulis*
 - 3 Basal leaves 0.5-2.5 cm wide; stem leaves relatively many, gradually reduced upward *V. ×georgiana*
- 1 Basal rosette absent; [collectively of a wide variety of habitats].
 - 4 Phyllary tips subulate to filiform, the broadest long-acuminate.
 - 5 Involucres 11-15 mm in diameter; phyllaries (50-) 60-70+; florets 50-100+ *V. arkansana*
 - 5 Involucres 4-8 (-10) mm in diameter; phyllaries 22-46 (-60+); florets 12-45 (-65).
 - 6 Middle cauline leaves 1.2-7.5 cm wide; plants 4-35 dm tall; [of various habitats, but not typically in Coastal Plain pinelands].
 - 7 Pappus whitish to yellowish, 30 outer bristles intergrading with 30+ inner bristles; leaf blades 2.5-3.5 (-4)× as long as wide..... *V. glauca*
 - 7 Pappus brown to purple, 20 outer scales contrasting with 30-40+ inner bristles; leaf blades (3.3-) 4-6× as long as wide *V. noveboracensis*
 - 6 Middle cauline leaves 0.1-1.8 cm wide; plants 3-11 dm tall; [of Coastal Plain pinelands].
 - 8 Leaves 3-7 cm long, (5-) 10-20+ mm wide, 2.5-6× as long as wide, somewhat auriculate at the base..... *V. pulchella*
 - 8 Leaves 5-12 cm long, 2-4 (-8+) mm wide, (8-) 12-50× as long as wide, attenuate at the base.
 - 9 Tips of the inner phyllaries long-acuminate, 1.4-4.8 mm long..... *V. angustifolia* var. *scaberrima*
 - 9 Tips of the inner phyllaries acuminate, 0.1-1.0 mm long..... *V. angustifolia* var. *angustifolia*
 - 4 Phyllary tips acute to rounded (sometimes minutely apiculate), the narrowest short acuminate.
 - 10 Leaves 2-4 (-8+) mm wide, (8-) 12-50× as long as wide.
 - 11 Heads 16-19-flowered; phyllary tips acuminate *V. angustifolia* var. *angustifolia*
 - 11 Heads 8-15-flowered; phyllary tips acute *V. angustifolia* var. *mohrii*
 - 10 Leaves 5-70 mm wide, 2-9 (-17)× as long as wide.
 - 12 Undersurface of leaf glabrous or nearly so, with pits (best seen at > 10× magnification) containing awl-shaped hairs or glands *V. fasciculata* var. *fasciculata*
 - 12 Undersurface of leaves conspicuously scabrous or pubescent, lacking pits.
 - 13 Stems glabrous..... *V. flaccidifolia*
 - 13 Stems hairy.
 - 14 Leaf undersurfaces scabrous with appressed awl-shaped hairs, with few or no resin glands.
 - 15 Heads with 13-30 flowers; leaf blades linear-lanceolate, 10-30 cm long, 1.2-7.5 cm wide, 4-10× as long as wide..... *V. gigantea*
 - 15 Heads with 9-20 flowers; leaf blades elliptic to oblanceolate, 6-20 cm long, 1.2-5 cm wide, 3-5× as long as wide..... *V. ovalifolia*
 - 14 Leaf undersurfaces with curled, erect hairs, and with conspicuous resin glands.
 - 16 Heads with (15-) 20-25 (-35) florets; involucre 4-6.7 mm high, 4-7 mm across *V. baldwinii* var. *baldwinii*
 - 16 Heads with 30-55 florets; involucre (6-) 7-10 mm high, 5-9 mm across..... *V. missurica*

Vernonia acaulis (Walter) Gleason. Sandhills, dry rocky woodlands, bluffs, and barrens. Late June-August; August-October. Coastal Plain and lower Piedmont of ne. and nc. NC south to sc. GA. [= RAB, FNA, K, S, SE]

Vernonia angustifolia Michaux var. *angustifolia*. Sandhills. Late June-early September; September-October. Se. NC south to GA. [= RAB; < *V. angustifolia* – FNA, S; = *V. angustifolia* ssp. *angustifolia* – K, SE]

Vernonia angustifolia Michaux var. *mohrii* S.B. Jones. Sandhills. Sw. GA and Panhandle FL west to s. AL and s. MS. [< *V. angustifolia* Michaux – FNA, S, WH; = *V. angustifolia* ssp. *mohrii* (S.B. Jones) S.B. Jones & Faust – K, SE]

Vernonia angustifolia Michaux var. *scaberrima* (Nuttall) A. Gray. Sandhills. Late June-August; August-October. Se. SC south to se. GA. [= RAB; < *V. angustifolia* – FNA, WH; = *V. angustifolia* ssp. *scaberrima* (Nuttall) S.B. Jones & Faust – K, SE; > *V. scaberrima* Nuttall – S; > *V. recurva* Gleason – S]

* *Vernonia arkansana* A.P. de Candolle, Arkansas Ironweed. Roadsides; apparently introduced in se. NC from native range in the Ozarkian Midwest. [= C, K, SE; = *V. crinita* Rafinesque]

Vernonia baldwinii Torrey var. *baldwinii*, Western Ironweed. {habitats}. MI, KY, and LA west to NE, CO, and TX. [= C, F; < *V. baldwinii* – FNA; = *V. baldwinii* ssp. *baldwinii* – K, SE]

Vernonia fasciculata Michaux var. *fasciculata*, Smooth Ironweed. {habitats}. KY and OH west to MB and CO. [= C, F; < *V. fasciculata* – FNA; = *V. fasciculata* ssp. *fasciculata* – K]

Vernonia flaccidifolia Small. Upland deciduous forests and woodlands, woodland borders. June-September. C. and nw. GA, se. TN, and ne. and c. AL (Urbatsch 1972). [= FNA, K, S, SE, W, Y]

Vernonia ×georgiana Bartlett (pro sp.). Sandhills. Late June-early August; August-October. [= RAB, K, SE; = *V. georgiana* – S]

Vernonia gigantea (Walter) Trelease, Common Ironweed. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (GA, NC): pastures, bottomlands, streamsides; common. Late August-October; August-November. W. NY, s. MI and e. NE south to SC, FL, and TX. [= Pa, W; = *V. gigantea* (Walter) Trelease ssp. *gigantea* – K, SE, Y; = *V. altissima* Nuttall – RAB, G, WV; = *V. gigantea*

var. *gigantea* – C; > *V. altissima* var. *altissima* – F; < *V. gigantea* – FNA, WH; > *V. altissima* var. *taeniotricha* Blake – F; > *V. altissima* – S; > *V. gigantea* – S]

Vernonia glauca (Linnaeus) Willdenow, Appalachian Ironweed, Tawny Ironweed. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): pastures, bottomlands, streamsides; common (uncommon in DE Piedmont, rare in DE Coastal Plain, rare in WV). Late June-September; August-October. NJ and PA south to GA, AL, and MS. [= RAB, C, F, FNA, G, K, Pa, S, SE, W, WV]

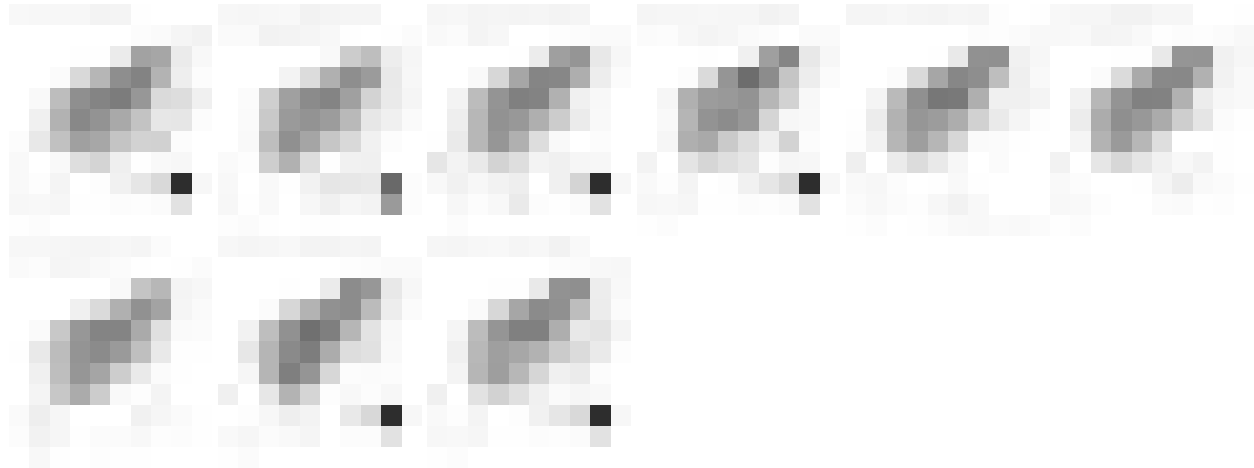
Vernonia missurica Rafinesque, Missouri Ironweed. Cp (FL), {GA}: wet hammocks, prairies, glades; rare. IN, C. TN (Chester, Wofford, & Kral 1997), GA (FNA), and Panhandle FL, west to IA, KS, OK, and TX. [= C, F, K, S, SE, WH]

Vernonia noveboracensis (Linnaeus) Michaux. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): pastures, bottomlands, streamsides; common. July-September; August-October. MA and NY south to ne. and e. Panhandle FL and AL. [= RAB, C, FNA, G, K, Pa, SE, W, WH, WV; > *V. noveboracensis* var. *noveboracensis* – F; > *V. noveboracensis* var. *tomentosa* (Walter) Britton – F; > *V. noveboracensis* – S; > *V. harperi* Gleason – S]

Vernonia ovalifolia Torrey & A. Gray, Oval-leaf Ironweed. Cp (FL, GA): rich woods, stream banks; common. Sw. GA south to Panhandle FL and c. peninsular FL. [= S; < *V. gigantea* – FNA, WH; = *Vernonia gigantea* (Walter) Trelease ssp. *ovalifolia* (Torrey & A. Gray) Urbatsch – K, SE, Y]

Vernonia pulchella Small. Cp (GA, SC): sandhills; uncommon. Se. SC (Beaufort and Jasper counties) south to se. GA. [= FNA, K, S, SE]

Vernonia texana (A. Gray) Small, Texas Ironweed. {habitats}. S. MS west to OK and TX. [= FNA, K, S, SE]



Vittadinia A. Richard 1832

* ***Vittadinia sulcata*** N. Burbidge. Cp (SC): waste area near wool-combing mill; rare, perhaps merely a waif, native of sw. Australia. See Nesom (2004d).

Xanthium Linnaeus 1753 (Cocklebur)

A genus of about 3 species, herbs, cosmopolitan (of somewhat uncertain original distribution). References: Strother in FNA (2006c); Cronquist (1980)=SE.

- 1 Leaves lanceolate, 2-5× as long as wide, cuneate at the base; leaf axil with a 1-3 cm long yellow 3-forked spine.....***X. spinosum***
- 1 Leaves ovate or orbicular, 0.8-1.5× as long as wide, cordate at the base; leaf axil lacking spines ***X. strumarium***

* ***Xanthium spinosum*** Linnaeus, Spiny Cocklebur. Mt (VA, WV), Cp (DE, NC, SC), Pd (DE, GA, VA): fields, disturbed ground; uncommon (rare in GA, NC, SC, VA, and WV), introduced, but the native distribution unknown. July-November. [= RAB, C, FNA, K, Pa, SE, WV; > *X. spinosum* var. *spinosum* – F; > *X. spinosum* var. *inerme* Bel – F; > *X. ambrosioides* Hooker & Arnott – F; = *Acanthoxanthium spinosum* (Linnaeus) Fourreau – S]

Xanthium strumarium Linnaeus, Cocklebur. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed ground, roadsides, pastures, barnyards, beaches; common. July-November. Nearly cosmopolitan, its original distribution unclear, but probably native to the New World. Various taxa have been recognized (see synonymy); it is unclear that any are usefully distinguished. The most commonly followed recent treatment is that by Cronquist, recognizing two varieties in eastern North America: var. *canadense*, with burs 2-3.5 cm long, the prickles of the bur with spreading hairs and stipitate glands toward the prickles bases, and var. *glabratum* (A.P. de Candolle) Cronquist, with burs 1.5-2 cm long, the prickles of the bur nearly glabrous or with short glandular or nonglandular puberulence toward the prickles bases. [= FNA, GW, Pa; > *X. strumarium* var. *glabratum* (A.P. de Candolle) Cronquist – RAB, C, G, K, SE, W, WH; > *X. strumarium* var. *strumarium* – RAB, misapplied; > *X. strumarium* var. *canadense* (P. Miller) Torrey & A. Gray – C, G, K, SE, W, WH; > *X. chinense* P. Miller – F; > *X. echinatum* Murray – F; > *X. italicum* Moretti – F < WV; > *X. oviforme* Wallroth – F; > *X. pennsylvanicum* Wallroth – F, WV; > *X. strumarium* – F, WV]

Youngia Cassini 1831(Youngia)

A genus of about 30-40 species, herbs, of Asia. References: Spurr in FNA (2006a); Cronquist (1980)=SE.

* **Youngia japonica** (Linnaeus) A.P. de Candolle, Asiatic Hawk's-beard, Youngia. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC): roadsides, disturbed areas, trail edges; uncommon, native of se. Asia. Spreading rapidly in our area, and now moving into minimally-disturbed natural areas. [= C, FNA, K, SE, WH; = *Crepis japonica* (Linnaeus) Bentham – RAB, F, G, S; > *Y. japonica* ssp. *japonica*]

Zinnia Linnaeus 1759 (Zinnia)

A genus of about 17 species, herbs, of sw. North America south to South America. References: Smith in FNA (2006c); Cronquist (1980)=SE.

- 1 Achenes wingless; receptacular bracts (chaff) toothed or erose on the lip**Z. peruviana**
- 1 Achenes winged; receptacular bracts (chaff) with a differentiated fimbriate lip**Z. violacea**

* **Zinnia peruviana** (Linnaeus) Linnaeus, Peruvian Zinnia. Cp (FL, GA, NC, SC): disturbed areas; rare (commonly cultivated), native of the New World tropics. May-November. [= FNA, K, SE, WH; ? *Z. pauciflora* Linnaeus – S]

* **Zinnia violacea** Cavanilles, Garden Zinnia, Elegant Zinnia. Cp (FL, GA, NC, SC): disturbed areas; rare (commonly cultivated), native of the New World tropics. May-November. [= FNA, K, WH; = *Z. elegans* Jacquin – S, SE]

405. ADOXACEAE Trautvetter 1853 (Moschatel Family) [in DIPSACALES]

A family of about 4 genera and about 165-200 species, shrubs, small trees, and herbs (here interpreted as including *Sambucus* and *Viburnum*). There now appears to be little doubt that *Sambucus* and *Viburnum* are more naturally placed in the Adoxaceae, in contrast to their traditional placement in the Caprifoliaceae (Zhang et al. 2003, Eriksson & Donoghue 1997). References: Ferguson (1966a).

- 1 Leaves pinnately compound; fruit 3-5-seeded **Sambucus**
- 1 Leaves simple; fruit 1-seeded **Viburnum**

Sambucus Linnaeus 1753 (Elderberry)

A genus of about 9 species of shrubs and small trees, north temperate and subtropical. References: Bolli (1994)=Z; Ferguson (1966a)=Y.

- 1 Inflorescence paniculate, normally longer than broad; fruits red when ripe; pith of stems and second-year branches brown; leaves with 5-7 leaflets, these never further divided; [primarily of the Mountains, extending into the Piedmont in VA]**S. racemosa** var. **pubens**
- 1 Inflorescence cymose, normally broader than long; fruits black or deep purple when ripe; pith of stems and second-year branches white; leaves with 5-11 leaflets, the lower leaflets sometimes further divided; [collectively widespread].
 - 2 Fruits purplish black, 4-6 mm in diameter; plant a shrub to small tree (usually multi-stemmed from the base); [common, widespread, and native]**S. canadensis**
 - 2 Fruits black, 6-8 mm in diameter; plant a small tree; [rare, restricted, and alien] **S. nigra**

Sambucus canadensis Linnaeus, Common Elderberry. Streambanks, thickets, marshes, moist forests, disturbed areas. Late April-July; July-August. NS west to MB, south to s. FL, TX, Mexico; West Indies. The leaflets, particularly of young shoots or stunted sprouts, are often variegated. This is one of the first woody plants to leaf out in the spring. Bolli (1994) treats this taxon as a subspecies of a very broadly defined *S. nigra*. He recognizes 6 subspecies: ssp. *nigra* in Europe, ssp. *palmensis* (Link) R. Bolli in the Canary Islands, ssp. *maderensis* (Lowe) R. Bolli in Madeira Island, ssp. *canadensis* in eastern North America, Mexico, Central America, and the West Indies, ssp. *cerulea* (Rafinesque) R. Bolli of western North America, and ssp. *peruviana* (Kunth) R. Bolli of South America. I prefer to retain these taxa at the species level, particularly as Bolli states "the geographical races, in the following defined as subspecies, turned out to be the biological units in *Sambucus*." Bolli further discusses 3 races within what is here called *S. canadensis* (his *S. nigra* ssp. *canadensis*), one from eastern North America, another from montane Mexico and Central America, and a third from subtropical se. North America and the West Indies; he considers these geographic races to represent "morphological and perhaps genetical" differences, and that "at present, all races are probably interconnected." This variation may be worthy of taxonomic recognition at the varietal level, and these "races" have formerly been considered to be species or varieties. If given varietal recognition, plants of most of our area represent *S. canadensis* var. *canadensis*, while evergreen (or tardily deciduous), bipinnate plants of FL, s. GA, s. AL, s. MS, s. LA, se. TX, and the West Indies represent *S. canadensis* var. *laciniata* A. Gray. The variation is clinal, and bipinnate leaves are seen as far north as coastal NC. [= RAB, C, GW, Pa, W, WV, Y; > *S. canadensis* var. *canadensis* – F, G; > *S. canadensis* var. *submollis* Rehder – F, G; = *S. nigra* Linnaeus ssp. *canadensis* (Linnaeus) R. Bolli – K, WH, Z; > *S. canadensis* – S; > *S. simpsonii* Rehder ex Sargent – S; > *Sambucus canadensis* Linnaeus var. *laciniata* A. Gray]

* *Sambucus nigra* Linnaeus, European Elder. Disturbed areas, uncommonly cultivated; native of Europe. Reported for Petersburg, Dinwiddie County, VA by Fernald (1941). [= C, F, G; = *S. nigra* ssp. *nigra* – K, Z]

Sambucus racemosa Linnaeus var. *pubens* (Michaux) Trautvetter & C. Meyer, Red Elderberry. Spruce-fir and northern hardwood forests, especially typical on boulderfield, talus, and other rocky situations, primarily at high elevations in the Mountains, though sometimes descending in our area (mainly in VA and northward) to low elevations (as low as 75 m). Late April-early June; late June-August. As interpreted here, *S. racemosa* is an interruptedly circumboreal species, represented in ne. North America by var. *pubens*, in n. Europe by var. *racemosa*, and in ne. Asia and nw. North America by several additional varieties. *S. racemosa* var. *pubens* ranges from NL (Newfoundland) west to BC (?), south to PA, IN, IL, and in the mountains to w. NC, e. TN, and ne. GA (Jones & Coile 1988). [= Pa; = *S. pubens* Michaux – RAB, F, G, S, W, WV; = *S. racemosa* ssp. *pubens* (Michaux) House var. *pubens* – C; < *S. pubens* Michaux ssp. *pubens* – Y; < *S. racemosa* var. *racemosa* – K, Z]

Viburnum Linnaeus 1753 (*Viburnum*)
(contributed by B.A. Sorrie & A.S. Weakley)

A genus of about 150 species of shrubs and small trees, largely temperate, and primarily in Asia and North America. There remain a number of taxonomic problems, particularly in the *Viburnum dentatum* complex; the treatment and key for that group is highly provisional. Dirr (2007) discusses the genus in detail from a horticultural perspective. References: McAttee (1956)=Z; Ferguson (1966a)=Y; Weckman et al. (2002); Winkworth & Donoghue (2005).

Identification notes: Leaves vary in shape in some taxa more than in others; we have allowed for some of this variation in the key, but readers should expect that some specimens will not key cleanly, especially rapidly-growing vegetative shoots. Petiole length of leaves varies considerably, even with those possessing “short” petioles. However, by measuring only the petioles of the first leaves below an inflorescence one reduces the chances of misidentifications greatly. Warning: even in some of the “long” petioled taxa, one may occasionally encounter unusually short petioles; therefore it is wise to examine several twigs. Density of pubescence and glandularity of leaves, petioles, and inflorescences varies more in some taxa than in others; we have allowed for some of this variation in the key, but readers should expect that some specimens will not key cleanly, especially vegetative shoots. Stipitate glands are usually very short, especially those on leaf veins; a 10× lens may not be adequate to see them clearly. It is our belief, based on thousands of specimens examined and years of fieldwork, that most *Viburnum* tend to lose pubescence, and perhaps glandularity as well, as the season progresses.

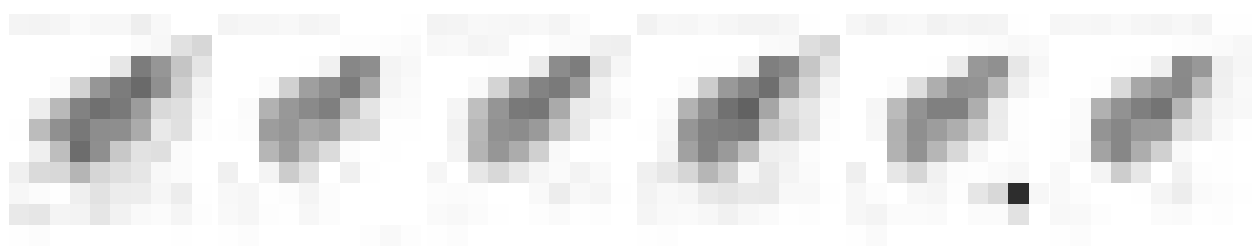
- 1 Leaves (at least the larger and better developed) palmately lobed and veined.
 - 2 Petioles lacking glands near its junction with the leaf blade; flowers all alike and fertile; twigs pubescent; fruit blue-black; [section *Lobata*] *V. acerifolium*
 - 2 Petioles with several glands near its junction with the leaf blade; marginal flowers of the inflorescence sterile and much larger than the fertile central flowers (or in cultivated forms all the flowers sterile and enlarged); twigs glabrous; fruit red; [section *Opulus*].
 - 3 Petiolar glands mostly taller than wide, stalked, rounded on the top; [native, of n. WV, PA, and NJ northward] *V. opulus* var. *americanum*
 - 3 Petiolar glands mostly wider than tall, sessile, concave on the top; [alien, sometimes planted and escaped] *V. opulus* var. *opulus*
- 1 Leaves unlobed and pinnately veined.
 - 4 Lateral veins curving and branching repeatedly through most of their length, not noticeably parallel, the lateral veins becoming obscure in the general pattern of anastomosing veins and not obviously leading to marginal teeth; [section *Lentago*].
 - 5 Leaves entire or with a crenate margin, the teeth < 5 per cm of margin.
 - 6 Leaves 2-5 cm long, obovate or spatulate, widest toward the tip; [of e. SC southward in the Coastal Plain] *V. obovatum*
 - 6 Leaves 5-12 cm long, generally elliptic or ovate, widest at or below the middle; [collectively widespread and of various habitats].
 - 7 Leaves dull to slightly shiny above; peduncle (5-) avg. 13 (-25) mm long; leaves undulate-crenulate (or rarely entire); [of Mountains and upper Piedmont] *V. cassinoides*
 - 7 Leaves shiny above (as if varnished); peduncle (20-) avg. 35 (-50) mm long; leaves entire (rarely somewhat undulate-crenate); [of Coastal Plain, Piedmont, and low elevation boggy sites in the Mountains] *V. nudum*
 - 5 Leaves serrulate, the teeth > 5 per cm of margin.
 - 8 Leaves mostly strongly acuminate at the tip; [of w. VA northward] *V. lentago*
 - 8 Leaves acute, obtuse, or rounded (rarely somewhat acuminate) at the tip; [collectively widespread in our area].
 - 9 Leaves herbaeous in texture, dull above (sun leaves slightly glossy); petioles and veins (lower surface) glabrous or slightly brown-scurfy; [widespread in our area, usually in bottomland or other mesic forests] *V. prunifolium*
 - 9 Leaves somewhat coriaceous in texture, glossy above (as if lacquered); petioles and veins (lower surface) red-scurfy; [of c. VA southward, usually in dry to dry-mesic woodlands and forests] *V. rufidulum*
 - 4 Lateral veins of the leaves nearly straight and prominently parallel for most of their length, many of them forking near the margin, the ultimate veins leading to a tooth.
 - 10 Winter buds consisting of tightly folded leaves uncovered by bud scales; plants strongly and noticeably stellate pubescent, especially on young parts and on the lower leaf surface; fruits red then turning black.
 - 11 Leaves lanceolate, 3-5× as long as wide, entire; leaf base truncate to rounded; leaf surface strongly rugose; [section *Viburnum*] *V. rhytidophyllum*
 - 11 Leaves ovate, 1-2.5× as long as wide, serrate; leaf base cordate; leaf surface planar to somewhat rugose.
 - 12 Leaves 10-25 cm long, 8-20 cm wide, deeply cordate at the base; [native, of cool, high elevation forests and bogs]; [section *Pseudotinus*] *V. lantanoides*
 - 12 Leaves 5-12 cm long, 2-6 cm wide, rounded to cordate at the base; [alien, cultivated and escaping to suburban forests]; [section *Lantana*].
 - 13 Flowers all alike and fertile *V. lantana*
 - 13 Marginal flowers of the inflorescence sterile and much larger than the fertile central flowers (or all the flowers sterile and enlarged) *V. macrocephalum*

- 10 Winter buds covered by bud scales; plants noticeably stellate-pubescent or not; fruits orange, red, or blue-black.
- 14 Leaves oblong-obovate, wider toward the tip; inflorescence paniculate, with an elongate central axis, the lowest branches opposite and with other branches above; fresh leaves malodorous; [section *Solenotinus*] *V. sieboldii*
- 14 Leaves ovate or suborbicular, widest near or below the middle; inflorescence umbelliform, the main branches all attached at the same point; fresh leaves not malodorous.
- 15 Leaves with 8-12 lateral veins on each side; marginal flowers of the inflorescence sterile and much larger than the fertile central flowers; winter buds with 2 scales; [section *Tomentosa*] *V. plicatum*
- 15 Leaves with 5-9 lateral veins on each side; flowers all alike and fertile; winter buds with > 2, imbricate scales.
- 16 Fruit orange or red; [aliens, planted and escaping]; [section *Succodontotinus*].
- 17 Leaves broadly ovate, acute, pubescent on both surfaces *V. dilatatum*
- 17 Leaves ovate or ovate-lanceolate, acuminate, glabrous except for long, somewhat appressed hairs along the veins beneath.....
..... *V. setigerum*
- 16 Fruit blue-black; [native]; [section *Odontotinus*].
- 18 Petioles short, those immediately below a cyme \leq 8 mm long.
- 19 Cymes stipitate-glandular and pilose; leaf shape broadly ovate to rotund; [endemic to two small areas: Ozark and Ouachita Mountains of s. MO-AR-e OK and n AL-sc TN-nw GA]..... *V. bracteatum*
- 19 Cymes eglandular (occasionally sparsely glandular), and lacking eglandular hairs; leaf shape ovate; [more widespread]
..... *V. rafinesqueanum*
- 18 Petioles longer, those immediately below a cyme \geq 10 mm long.
- 19 Cymes stipitate-glandular (occasionally glabrous in *V. deamii*).
- 20 Leaf bases strongly cordate; [plants usually restricted to limestone substrates].
- 21 Leaf veins eglandular; leaves glabrate beneath or pubescent in axils; bark not exfoliating *V. bracteatum*
- 21 Leaf veins stipitate-glandular; leaves tomentose abaxially (forma *molle*) to glabrate (forma *leiophyllum*); bark of stems and branches exfoliating *V. molle*
- 20 Leaf bases cuneate, truncate, or occasionally subcordate; [plants of various substrates].
- 22 Stipitate glands absent on petioles and leaf veins; stipules absent..... *V. alabamense*
- 22 Stipitate glands present on petioles and leaf veins; stipules often present.
- 23 Petioles with simple or 2-pronged hairs; leaf shape ovate to broadly ovate; plants of dry soil *V. bracteatum*
- 23 Petioles with stellate hairs and often also with simple hairs; leaf shape rotund; plants of moist-wet soils
..... *V. deamii*
- 19 Cymes eglandular (occasionally glandular in *V. dentatum* var. *dentatum* and *V. scabrellum*)
- 24 Petioles glabrous or glabrate; stellate hairs absent on leaves and petioles; hairs on leaf undersides confined to axils and a few veins; leaf shape usually ovate..... *V. recognitum*
- 24 Petioles sparsely to densely stellate pubescent; stellate hairs present on leaf underside and petiole, dense and soft to touch (*V. carolinianum*, *V. scabrellum*, most *V. venosum*) or sparse to moderate (*V. dentatum* var. *dentatum*, some *V. venosum*); leaf shape various.
- 25 Cymes not stellate pubescent (occasionally sparsely so); leaves thinner textured and with less prominent veins, sparsely to moderately stellate pubescent below; [plants relatively widespread] *V. dentatum*
- 25 Cymes stellate-pubescent; leaves thick textured and with prominent veins, moderately to densely stellate-pubescent below.
- 26 Leaf shape ovate to broadly ovate; leaf teeth 5-12 per side; upper leaf surface scabridulous with abundant simple hairs; [of the southern Atlantic and Gulf Coastal Plain] *V. scabrellum*
- 26 Leaf shape rotund; leaf teeth 10-18 per side; upper leaf surface glabrate, not scabridulous; [of the Southern Appalachian mountains or the northern Atlantic Coastal Plain].
- 27 Leaf underside densely pubescent and soft to touch (felt-like); stipular leaf bracts often present; fruits pubescent; leaf teeth 13-18 per side; [of the southern Appalachian mountains of w. NC, n. GA, and se. TN]
..... *V. carolinianum*
- 27 Leaf underside moderately to densely pubescent and somewhat soft to touch (but not felt-like); stipular leaf bracts absent; fruits glabrous; leaf teeth 10-15 per side; [of the northern Atlantic Coastal Plain of se. MA, s. RI, and Long Island, NY]..... *V. venosum*

Viburnum acerifolium Linnaeus, Mapleleaf Viburnum, Dockmackie. Mesic to dry forests and woodlands. Late April-early June; August-October. NB, ON, and WI south to Panhandle FL and TX. [= RAB, C, G, K2, Pa, S, W, WH, WV, Y; > *V. acerifolium* var. *acerifolium* - F, Z; > *V. acerifolium* Linnaeus var. *glabrescens* Rehder - F, Z; > *V. acerifolium* var. *densiflorum* (Chapman) McAtee - Z; > *V. acerifolium* var. *ovatum* (Rehder) McAtee - Z]

Viburnum alabamense (McAtee) Sorrie, Alabama Arrow-wood. Sandstone substrates. Restricted to the Lookout Mountain region of ne. AL, in Cullman, DeKalb, and Marshall Counties. Closer to *V. dentatum* than to *V. recognitum* due to hairy petioles and broad ovate-rotund leaf shape. See Weakley et al. (2011) for additional information. [< *V. recognitum* Fernald - K1; < *V. dentatum* var. *lucidum* - K2; = *V. recognitum* var. *alabamense* McAtee - Z]

Viburnum bracteatum Rehder, Limerock Arrow-wood. Calcareous forests and woodlands. Late April-early May. Se. TN south to nw. GA and ne. AL; disjunct westward in the Ozark region of s. MO, nw. AR, and e. OK. [= K2; > *V. bracteatum* Rehder - K1, S, Y, Z; > *V. ozarkense* W.W. Ashe - K1, S, Y, Z]



Viburnum carolinianum Ashe, Carolina Arrow-wood. Moist to dry forests, rock outcrops, streambanks. April; July-September. Sw. NC and adjacent GA and TN; remainder of distribution unclear at this time. [<? *V. dentatum* Linnaeus var. *deamii* (Rehder) Fernald – C, F, G; < *V. dentatum* var. *dentatum* – RAB, K1, K2; < *V. dentatum* – GW; < *V. semitomentosum* (Michaux) Rehder – S; > *V. carolinianum* Ashe var. *cismontanum* McAtee – Z; > *V. carolinianum* Ashe var. *carolinianum* – Z]

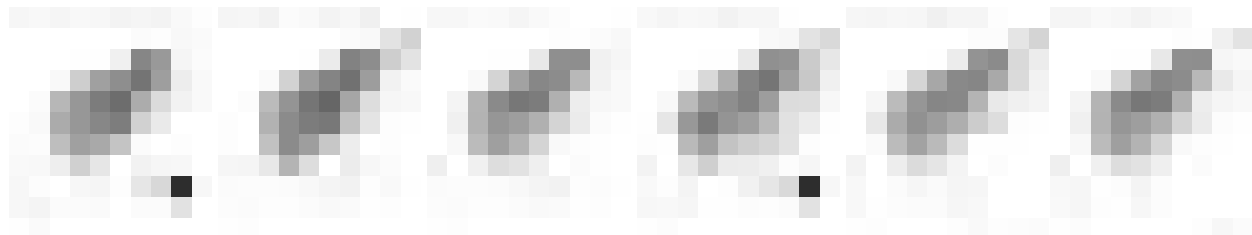
Viburnum cassinoides Linnaeus, Northern Wild Raisin, Withe-rod, Shawnee Haw. Bogs, moist forests, high elevation forests and outcrops. Late May-June; August-October. NL (Newfoundland), ON, and WI south to n. GA and AL. [= RAB, F, G, Pa, S, W, WV, Y; = *V. nudum* Linnaeus var. *cassinoides* (Linnaeus) Torrey & A. Gray – C, K1, K2; < *V. nudum* – GW; > *V. cassinoides* var. *cassinoides* – Z; > *V. cassinoides* var. *nitidum* Aiton – Z; > *V. cassinoides* var. *harbisonii* McAtee – Z]

Viburnum deamii (Rehder) Sorrie, Indiana Arrow-wood. Streamsides, floodplains, and swampy forests. S. OH, n. KY, west through s. IN and s. IL to ne. MO, primarily in the Ohio River Valley. *V. deamii* formerly was placed within *V. dentatum* as var. *deamii* (Rehder) Fernald. However, the presence of stipitate hairs on petioles and leaves, plus presence of leaf stipules, suggests a closer relationship to *V. bracteatum* than to *V. dentatum*, which lacks these features. Here we also include taxon “*indianense*”, a glabrate form which appears to intergrade too freely with taxon “*deamii*” to warrant recognition. Most records are from north of the Ohio River, but also with specimens vouchered from Ballard, Campbell, Henderson, and Rowan counties, KY. See Sorrie (2012) for additional information. [> *V. dentatum* var. *deamii* (Rehder) Fernald – C, G; > *V. dentatum* var. *indianense* (Rehder) Gleason – C, G; = *V. dentatum* L. var. *deamii* (Rehder) Fernald = F; < *V. dentatum* var. *dentatum* – K2; > *V. indianense* Rehder – Z; > *V. carolinianum* Ashe var. *deamii* (Rehder) McAtee – Z; = *V. pubescens* (Aiton) Pursh var. *deamii* Rehder; > *V. pubescens* (Aiton) Pursh var. *indianense* Rehder] {not yet keyed}

Viburnum dentatum Linnaeus, Arrow-wood. Marshes, streambanks, swamps, other moist places. Late March-April; July-September. East of the Appalachians, from Se. PA and sw. NJ south to s. SC and ne. GA, with scattered records westward to sw. NC, nc. TN, sw. VA, n. WV, and w. MD. [= Z; = *V. dentatum* var. *dentatum* – C, F, G; < *V. dentatum* var. *dentatum* – K2; < *V. dentatum* var. *dentatum* – RAB (also see *V. carolinianum*); < *V. dentatum* – GW, Pa, W, WH, WV, Y; < *V. semitomentosum* (Michaux) Rehder – S]

* ***Viburnum dilatatum*** Thunberg, Linden Viburnum. Suburban woodlands; native of e. Asia. June; October. [= C, K1, K2, Pa]

* ***Viburnum lantana*** Linnaeus, Wayfaring Tree. Widely planted, sometimes escaped or persistent; native of Eurasia. May; September. Reported as naturalized as far south as MD (Kartesz 1999), KY (Weckman et al. 2002), and VA (Steury 2011). May; September. [= C, F, G, K1, K2, Pa, Z]



Viburnum lantanoides Michaux, Hobblebush, Witch's-hobble, Tangle-legs. Spruce-fir forests, northern hardwood forests, boulderfields, primarily over 1000 m elevation. April-early June; June-July. NB and ON south to w. NC, ne. GA, e. TN, and OH. [= K1, K2, Pa, S, W, Y; = *V. alnifolium* Marshall – RAB, C, F, G, WV; = *V. grandifolium* Aiton – Z]

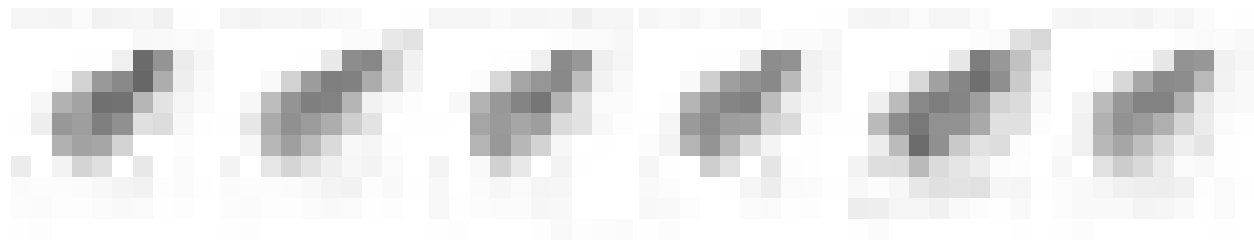
Viburnum lentago Linnaeus, Nannyberry, Sheepberry. Shrubby stream-bottoms, other wetlands and wetland margins. May; late July-August. NB and SK south to w. VA, MO, and CO. Reported in the past for NC (see Radford, Ahles, & Bell 1968), from GA (Kartesz 1999), and from AL; these reports all appear to be based on misidentifications. Also reported as naturalizing from plantings in Alexandria, VA (Steury 2011). [= RAB, C, F, G, K1, K2, Pa, S, W, WV, Y, Z]

* ***Viburnum macrocephalum*** Fortune, Chinese Snowball. Suburban areas near plantings; native of China. Reported as naturalized in the Mountains of NC (Pittillo 2003, pers. comm.). [= K2] {investigate}

Viburnum molle Michaux, Soft Arrow-wood. Limestone areas. Scattered, discontinuous range (but locally may occur in several contiguous counties) from sw. OH, nc. IN, wc. IL, and se. IA south to sc. TN, nw. AR; disjunct in sw. IA. [= C, F, G, K1, K2, Y, Z]

Viburnum nudum Linnaeus, Southern Wild Raisin, Possumhaw. Bogs, blackwater floodplains, seepages. April-May; August-October. RI, CT, and NY south to c. peninsular FL, west to TX, inland to w. NC, TN, w. KY, and AR. [= RAB, G, Pa, S, W, WH, Y, Z; = *V. nudum* var. *nudum* – C, K1, K2; > *V. nudum* var. *nudum* – F; > *V. nudum* var. *angustifolium* Torrey & A. Gray – F; < *V. nudum* – GW]

Viburnum obovatum Walter, Small-leaf Viburnum, Walter's Viburnum. Alluvial forests. March-April; September-October. E. SC south to s. FL, west to s. AL. [= RAB, GW, K1, K2, Y, Z; > *V. obovatum* – S; > *V. nashii* Small – S]



***Viburnum opulus* Linnaeus var. *americanum* Aiton**, Cranberry-tree, Highbush-cranberry. Wet forests, along streams. June. NL (Newfoundland) and BC south to s. PA (Rhoads & Klein 1993), NJ, n. WV, OH, NE, and WY. [= C, G, K1, K2; = *V. trilobum* Marshall – F, Pa, WV; = *V. opulus* var. *trilobum* (Marshall) McAtee – Z]

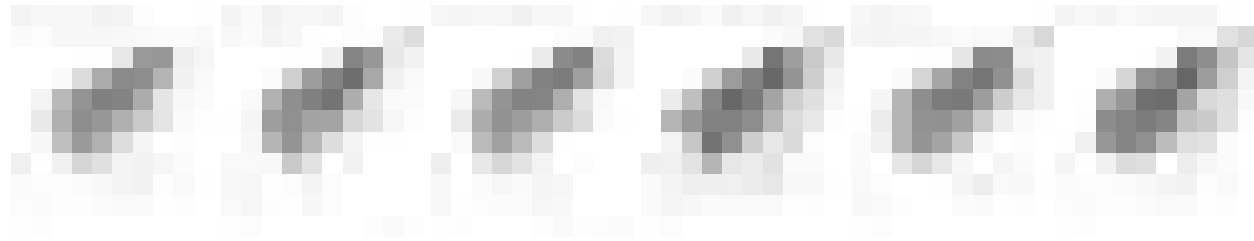
* ***Viburnum opulus* Linnaeus var. *opulus***, Guelder-rose, Snowball. Commonly cultivated, and rarely persistent or escaping; native of Europe. Well-established in KY (Weckman et al. 2002). [= C, G, K1, K2, Z; > *V. opulus* var. *opulus* – F, WV; > *V. opulus* var. *roseum* Linnaeus – F, WV; = *V. opulus* – Pa]

* ***Viburnum plicatum* Thunberg**, Japanese Snowball, Doublefile Viburnum. Suburban woodlands; native of e. Asia. Late May-early June. Reported as naturalizing in various states, including n. VA (Steury 2011), se. and sw. PA (Rhoads & Klein 1993), OH (Cooperrider 1995), MI (Voss 1996), and others. [= C, G, K1, K2, Pa, Z]

***Viburnum prunifolium* Linnaeus**, Black Haw, Nannyberry. Alluvial forests, other mesic forests. March-April; September-October. NY, MI, WI, IA, and KS south to GA, AL, MS, LA, and TX. [= RAB, C, K1, K2, Pa, S, W, WV, Y, Z; > *V. prunifolium* var. *prunifolium* – F, G]

***Viburnum rafinesqueanum* J.A. Schultes**, Downy Arrow-wood. Dry-mesic to dry woodlands and forests, especially over mafic rocks (but not at all restricted to such sites). Mid April-May; June-July. NH, QC and MB south to n. GA, AL, AR, and OK; apparently not yet recorded for SC. [= *V. rafinesquianum* – RAB, K1, K2, Pa, S, W, WV (orthographic variant); > *V. rafinesquianum* var. *rafinesquianum* – C, F, G, Y; > *V. affine* Bush ex Schneider var. *hypomalacum* Blake – Z]

***Viburnum recognitum* Fernald**, Smooth Arrow-wood. Marshes, moist forests, streambanks. Late March-May; July-September. ME, NY, and OH south to e. SC, c. GA, and ne. AL. [= F, K1, Pa, WV; = *V. dentatum* var. *lucidum* Aiton – RAB, C, G, K2; < *V. dentatum* – GW, W; = *V. dentatum* – S, misapplied; > *V. recognitum* var. *recognitum* – Z; > *V. recognitum* var. *alabamense* McAtee – Z]



***Viburnum ×rhytidophyloides* Suringar (pro sp.) [*lantana* × *rhytidophyllum*]**. Reported as escaping in Fairfax County, VA (Steury 2011). [= K2] {not yet keyed}

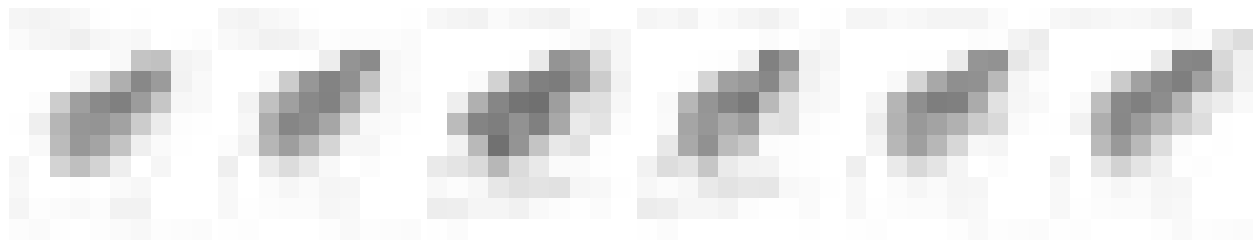
* ***Viburnum rhytidophyllum* Hemsley**, Leatherleaf Viburnum. Planted and rarely naturalizing; native of c. and w. China. First reported for NC by Pittillo & Brown (1988): “naturalized beneath hedges on the campus of Western Carolina University” (Jackson County, NC). Elsewhere escaping at least as far south as KY (Weckman et al. 2002). [= K1, K2]

***Viburnum rufidulum* Rafinesque**, Southern Black Haw. Dry woodlands, dry-mesic woodlands and forests, especially common over mafic rocks (but not at all restricted to such sites). Late March-April; September-October. C. VA, OH, IL, and KS south to n. peninsular FL and TX. [= RAB, C, F, G, K1, K2, W, WH, Y, Z; > *V. rufidulum* – S; > *V. rufotomentosum* Small]

***Viburnum scabrellum* (Torrey & A. Gray) Chapman**, Southern Arrow-wood. Streambanks, marshes, swamps, other moist sites. A Coastal Plain endemic, ranging from se. GA south to c. peninsular FL, west to e. TX; with scattered collections north to ec. GA (Richmond County), ne. AL (Cherokee County), nw. AL (Lamar County), c. MS, and n. LA. Expected in s. AR, but no specimens seen. Specimens of *V. dentatum* from s. SC show signs of hybridization. Mohr (1901) and some other 19th century authors misapplied the name *V. molle* to it. [< *V. dentatum* var. *dentatum* – RAB, K2; = *V. dentatum* var. *venosum* (Britton) Gleason – G, K1; < *V. dentatum* – GW, W, WH, Y; < *V. semitomentosum* (Michaux) Rehder – S, misapplied; > *V. scabrellum* (Torrey & Gray) Chapman var. *scabrellum* – Z; > *V. scabrellum* var. *ashei* (Bush) McAtee – Z; = *Viburnum dentatum* Linnaeus var. *scabrellum* Torrey & A. Gray – C]

* ***Viburnum setigerum* Hance**, Tea Viburnum. Suburban forests, commonly planted horticulturally; native of China. May; September. Naturalizing at Guilford Courthouse National Military Park (Greensboro, Guilford County, NC) and in Battle Park (Chapel Hill, Orange County, NC), and elsewhere in our area. Also naturalizing in KY (Weckman et al. 2002). [= K1, K2, Pa]

* ***Viburnum sieboldii* Miquel**, Siebold’s Viburnum. Suburban forests, commonly planted horticulturally; native of c. and s. Japan. May; August-early September. Naturalizing in VA (Steury 2011) and KY (Weckman et al. 2002). [= C, F, K1, K2, Pa; = *V. sieboldii* – Z, orthographic variant]



Viburnum venosum Britton. Moist places. E. MA, RI, s. Long Island, NY (and reputedly as far south as e. MD and e. VA). [= *V. dentatum* Linnaeus var. *venosum* (Britton) Gleason – C, G, K1, V2; < *V. dentatum* – GW, W, Y; < *V. semitomentosum* (Michaux) Rehder – S; = *V. scabrellum* Torrey & A. Gray var. *venosum* (Britton) McAtee – Z]

406a. DIERVILLACEAE (Rafinesque) Pyck 1998 (Bush-honeysuckle Family) [in DIPSACALES]

Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Diervilla* and *Weigela* in the Diervillaceae (Backlund & Pyck 1998), placement of *Abelia* and *Linnaea* in the Linnaeaceae (Backlund & Pyck 1998, Pyck et al. 2002), and retention of *Lonicera*, *Symphoricarpos*, and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsacaceae and Valerianaceae, as a broadly circumscribed Caprifoliaceae. References: Backlund & Pyck (1998); Pyck et al. (2002); Ferguson (1966a).

{key to genera}

Diervilla P. Miller (Bush-honeysuckle)

A genus of 3 species, shrubs, of e. North America. References: Hardin (1968)=Z; Ferguson (1966a)=Y.

- 1 Petioles 5-8 mm long; leaves ciliate on the margins; twig terete in cross-section; [of the Mountains of VA and n. NC, south to Buncombe and McDowell counties, NC].....*D. lonicera*
- 1 Petioles 0-5 mm long; leaves not ciliate; twig more-or-less square in cross-section; [of the Mountains of SC and s. NC, north to Mitchell and Yancey cos., NC].
 - 2 Branchlets, leaves, pedicels, and calyx densely pubescent; sepal lobes < 2 mm long.....*D. rivularis*
 - 2 Branchlets, leaves, pedicels, and calyx glabrous, except for hairs on the twig angles; sepal lobes 2-3 mm long.....*D. sessilifolia*

Diervilla lonicera P. Miller, Northern Bush-honeysuckle. Rock outcrops and ridges at high elevations. June-July; August-October. NL (Newfoundland) west to SK, south to w. NC, e. TN, IN, and IA. Reported for GA (GANHP). [= RAB, C, G, K, Pa, S, W, WV, Y, Z; > *D. lonicera* var. *lonicera* – F; > *D. lonicera* var. *hypomalaca* Fernald – F]

Diervilla rivularis Gattinger, Hairy Southern Bush-honeysuckle. Rock outcrops, ridges, and streambanks at moderate to high elevations. June-August; August-October. W. NC (Yancey County) and e. TN south to nw. GA (Jones & Coile 1988) and ne. AL. [= K, S, Y, Z; = *D. sessilifolia* Buckley var. *rivularis* (Gattinger) H.E. Ahles – RAB, W]

Diervilla sessilifolia Buckley, Smooth Southern Bush-honeysuckle. Rock outcrops, ridges, landslide scars, trail margins, other rocky open places, streambanks, at moderate to high elevations. June-August; August-October. Sw. NC and e. TN south to nw. SC, ne. GA, and ne. AL. [= F, K, S, Y, Z; = *D. sessilifolia* Buckley var. *sessilifolia* – RAB, W]

Weigela Thunberg (Weigela)

A genus of about 10 species, shrubs, of e. Asia.

* **Weigela floribunda** (Siebold & Zuccarini) K. Koch, Weigela. Suburban woodlands; native of Asia. This shrub is cultivated and sometimes naturalized, as in e. TN (Chester, Wofford, & Kral 1998). [= K]



406b. CAPRIFOLIACEAE A.L. de Jussieu 1789 (Honeysuckle Family) [in DIPSACALES]

As here circumscribed, a family of about 5 genera and 220 species, shrubs, trees, and less typically herbs and vines, mainly north temperate and boreal. Circumscription of the family is controversial. Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Diervilla* and *Weigela* in the Diervillaceae (Backlund & Pyck 1998), placement of *Abelia* and *Linnaea* in the Linnaeaceae (Backlund & Pyck (1998), and retention of *Lonicera*, *Symphoricarpos*, and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsacaceae and Valerianaceae, as a more broadly circumscribed Caprifoliaceae (APG III 2009). References: Backlund & Pyck (1998); Ferguson (1966a). [also see *ADOXACEAE*, *DIERVILLACEAE*, and *LINNAEACEAE*]

- 1 Erect herb *Triosteum*
- 1 Shrubs or woody lianas.
 - 2 Corolla usually > 10 mm long, bilaterally symmetrical; ovary 2-3-locular *Lonicera*
 - 2 Corolla 3-8 mm long, radially symmetrical or nearly so; ovary 4-locular *Symphoricarpos*

Lonicera Linnaeus 1753 (Honeysuckle)

A genus of about 180 species, shrubs and vines, mainly north temperate. References: Ferguson (1966a)=Z; Rehder (1903)=Y; Green (1966).

- 1 Flowers in opposite 3-flowered cymules, borne in terminal clusters subtended by connate leaves; corolla red and yellow (or yellowish-orange only); twining vine or shrub with vining tendencies (in *L. flava* the "vininess" sometimes not apparent).
 - 2 Corolla tube (20-) 30-50 mm long; corolla lobes 4-8 mm long, more or less radially symmetrical; [of a wide variety of habitats, primarily in the Piedmont and Coastal Plain]..... *L. sempervirens*
 - 2 Corolla tube 10-35 mm long; corolla lobes 8-15 mm long, unequally divided into 2 lips (4 lobes on the upper side and one lobe on the lower side); [of ridgetops, rocky slopes, granite domes, and bogs of the Mountains, or of areas to the north or west of the primary area].
 - 3 Leaves pubescent on the upper surface; [of moist forests, south to PA]..... [*L. hirsuta*]
 - 3 Leaves glabrous on the upper surface.
 - 4 Fused leaves immediately below the inflorescence glaucous on the upper surface, rounded or emarginate; [of c. TN and other areas west and north of our primary area]..... *L. reticulata*
 - 4 Fused leaves immediately below the inflorescence green on the upper surface, pointed to mucronate.
 - 5 Corolla tube 30-35 mm long; leaves gray beneath; [of soil mats on dome outcrops of s. NC, SC, and GA and westward] *L. flava*
 - 5 Corolla tube 15-25 mm long; leaves strongly white-glaucous beneath; [of rocky forests, ridgetops, and bogs of n. NC, VA, and northward]..... *L. dioica*
 - 1 Flowers in peduncled pairs in the axils of leaves, not subtended by connate leaves; corolla white to pastel pink or yellow; plant an erect shrub or (*L. japonica*) a trailing or climbing vine.
 - 6 Trailing or climbing vine; corolla 30-50 mm long; fruit black at maturity; leaves of vigorous shoots often pinnately lobed *L. japonica*
 - 6 Upright shrub; corolla 7-25 mm long; fruit red or yellow at maturity; leaves unlobed.
 - 7 Branches with solid and continuous, white pith; [native and exotic species].
 - 8 Corolla lobes 5, nearly equal; ovaries separate, divergent; [native species of cool moist forests and bogs] *L. canadensis*
 - 8 Corolla lobes fused into a 4-lobed lip and a 1-lobed lip; ovaries fused; [exotic species].
 - 9 Branches glabrous; corolla glabrous on the exterior..... *L. fragrantissima*
 - 9 Branches retrorsely hispid with reddish-brown hairs; corolla pilose on the exterior *L. standishii*
 - 7 Branches hollow between the nodes, with tannish pith; [exotic species, many of them seriously invasive and likely to be encountered in natural areas].
 - 10 Peduncles shorter than or equal to the subtending petiole; leaves ovate (broadest near the base) and distinctly long-acuminate *L. maackii*
 - 10 Peduncles longer than the subtending petiole; leaves elongate (broadest near the middle) and obtuse to acute (rarely short-acuminate).
 - 11 Leaves glabrous; peduncles 15-25 mm long *L. tatarica*
 - 11 Leaves pubescent, at least on the lower surface; peduncles 5-15 mm long.
 - 12 Corolla pink (aging to yellow), nearly glabrous on the exterior, barely bulging on one side at the base; leaves thinly pubescent beneath *L. ×bella*
 - 12 Corolla white (aging to yellow), pubescent on the exterior, distinctly bulging on one side at the base; leaves rather densely grayish-pubescent beneath.
 - 13 Bracts and sepals ciliate, not glandular; ovary lacking glands; leaf blades broadest at or below the middle *L. morrowii*
 - 13 Bracts and sepals glandular; ovary glandular; leaf blades broadest beyond the middle..... *L. xylosteum*

* *Lonicera ×bella* Zabel [*L. morrowii* × *tatarica*], Pretty Honeysuckle. Forests, woodlands, fencerows, suburban woodlands; native of Eurasia. April-May. [= RAB, C, F, K, Pa, Z; = *L. bella* – G; = *L. tatarica* × *morrowii* – Y]

Lonicera canadensis Bartram ex Marshall, American Fly-honeysuckle. Shrubby mountain bogs at high elevations, bouldery northern hardwood forests, hemlock and spruce swamps. May-June; June-July. South NS to SK, south to PA, w. NC, n. GA, OH, IN, and MN. [= RAB, C, F, G, K, Pa, W, WV, Y, Z; = *Xylosteon ciliatum* Pursh – S]

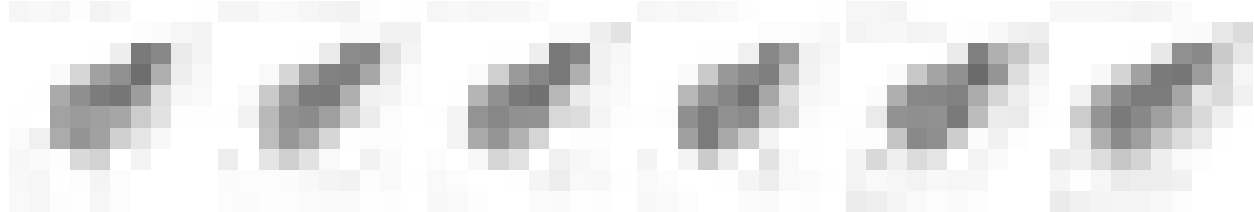
Lonicera dioica Linnaeus. Seepages, bogs, rocky woods, shrubby mountain bogs at high elevations, rocky ridgetop thickets over amphibolite. June-August; August-September. MA and QC west to WI, south to NJ, NC, and IN. Varieties or species have sometimes been maintained based on minor variation of pubescence; it is unlikely that these are taxonomically meaningful. Var. *orientalis* has the lower leaf surfaces, hypanthium, and style hairy (vs. glabrous or nearly so in var. *dioica*). [= RAB, K, W, WV; > *L. dioica* var. *dioica* – C, F, G, Pa, Z; > *L. dioica* Linnaeus var. *orientalis* Gleason – C, G, Pa; > *L. dioica* var. *glaucescens* (Rydberg) Butters – F, Pa, Z; > *L. dioica* – S, Y; > *L. glaucescens* (Rydberg) Rydberg – S, Y]

Lonicera flava Sims, Yellow Honeysuckle. In soil mats around granitic domes. April-May; July-August. W. NC, KY, and MO, south to GA and AR. [= RAB, C, G, K, W, Y; > *L. flava* – F, S; > *L. flavida* Cockerell ex Rehder – F, S; > *L. flava* var. *flava* – Z; > *L. flava* var. *flavescens* Gleason – Z]

* *Lonicera fragrantissima* Lindley & Paxton, Sweet-breath-of-spring. Forests, woodlands, old house sites; native of China. February-early April; April-May. [= RAB, K, Pa, Y, Z; = *Xylosteon fragrantissimum* (Lindley & Paxton) Small – S]

Lonicera hirsuta Eaton, Hairy Honeysuckle. QC west to MB, south to c. PA (Rhoads & Klein 1993) and MN. [= F, K, Pa, Y; > *L. hirsuta* var. *interior* Gleason – C] {rejected; keyed; not mapped}

* *Lonicera japonica* Thunberg, Japanese Honeysuckle. Nearly ubiquitous, especially common in the Piedmont and Coastal Plain and in mesic habitats; native of e. Asia. April-June; August-October. Schweitzer & Larson (1999) report on physiological characteristics that make *L. japonica* a successful invasive species. [= RAB, C, G, GW, K, Pa, W, WH, WV, Z; > *L. japonica* var. *chinensis* (P.W. Watson) Baker – F, Y; > *L. japonica* var. *japonica* – F, Y; = *Nintooa japonica* (Thunberg) Sweet – S]



* *Lonicera maackii* (Ruprecht) Maximowicz, Amur Honeysuckle. Suburban woodlands, moist forests, fencerows; native of e. Asia (Korea, China, Japan). May-June. This is one of worst “shrub-weeds”, aggressively invasive in various parts of eastern North America, as in the vicinity of DC and in calcareous substrate parts of the interior South. [= C, K, Pa, Y, Z]

* *Lonicera ×minutiflora* Zabel [of complex hybrid origin, apparently involving *L. morrowii*, *L. tatarica*, and *L. xylosteum*]. Suburban areas, disturbed areas. Known from KY and other states in e. North America (Clark et al. 2005). [= K] {not yet keyed}

* *Lonicera morrowii* A. Gray, Morrow's Honeysuckle. Forests, woodlands, old house sites, suburban woodlands; native of Japan. April-May; Late June-July. Seriously invasive in WV, MD, DC, and northward; first reported for NC by Leonard (1971b) and for SC by Hill & Horn (1997). [= C, K, Pa, W, Y; = *L. morrowi* – F, G, WV, orthographic variant]

Lonicera reticulata Rafinesque. {habitats}. NY west to WI, south to TN and AR. In nc. TN (Davidson County) (Chester, Wofford, & Kral 1997; Wofford & Chester 2002). [= K; > *L. prolifera* (G. Kirchner) Booth ex Rehder var. *prolifera* – C, G; = *L. sullivantii* A. Gray – Y; = *L. prolifera* – F, Z]

Lonicera sempervirens Linnaeus, Coral Honeysuckle. Dry forests and woodlands, maritime forests. March-July (and sporadically to November); July-September. CT to OH and OK, south to c. peninsular FL and TX; and more widely distributed as an escape from cultivation. Var. *hirsutula* has sometimes been maintained, differing from var. *sempervirens* in its ciliate leaf margins, pubescent upper leaf surfaces, sometimes glandular hypanthia and stems (vs. glabrous; it is doubtful that these distinctions are taxonomically meaningful. [= RAB, GW, Pa, W, WH, WV, Z; > *L. sempervirens* Linnaeus var. *sempervirens* – C, G, K, Y; > *L. sempervirens* Linnaeus var. *hirsutula* Rehder – C, F, G, K, Y; > *L. sempervirens* var. *sempervirens* – F; > *L. sempervirens* var. *minor* Aiton – F; = *Phenianthus sempervirens* (Linnaeus) Rafinesque – S]

* *Lonicera standishii* Jacques, Standish's Honeysuckle. Forests, woodlands, old home sites; native of China. February-early April; March-April. Locally abundant and invasive in c. NC (Uwharrie National Forest, Montgomery County, NC). Also reported from KY (Jones 2005), se. PA (Rhoads & Klein 1993), and MD (Kartesz 1999). [= F, K, Pa, Y]



* *Lonicera tatarica* Linnaeus, Tartarian Honeysuckle. Disturbed forests; native of Central Asia. May; June-July. [= C, F, G, K, Pa, WV; > *L. tatarica* var. *tatarica* – Y]

* *Lonicera xylosteum* Linnaeus, European Fly-honeysuckle. Suburban forests, disturbed forests; native of Europe and Asia. April-May; July. Establishing mainly in ne. United States, south to VA, MD (Kartesz 1999), and KY (Clark et al. 2005). [= C, F, G, K, Pa; > *L. xylosteum* var. *xylosteum* – Y]

Symphoricarpos DuRoi 1755 (Snowberry, Coralberry)

A genus of about 17 species, shrubs, of North America and e. Asia. References: Jones (1940); Ferguson (1966a)=Z.

- 1 Corolla 2-4 mm long; fruits pink to purple *S. orbiculatus*
 1 Corolla 5-9 mm long; fruits white.
 2 Style 6-8 mm long, longer than the corolla; young twigs puberulent *S. occidentalis*
 2 Style 2-3 mm long, shorter than the corolla; young twigs glabrous or puberulent.

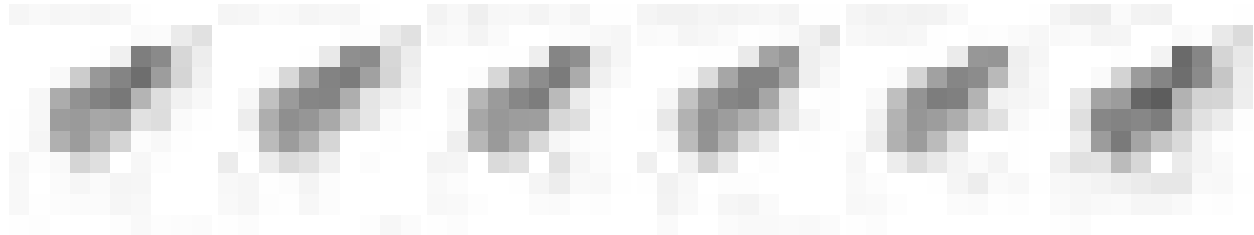
- 3 Fruit 6-10 (-12) mm in diameter; young twigs puberulent; leaves usually pubescent beneath; shrub usually < 1 m tall; [native].....
 *S. albus* var. *albus*
- 3 Fruit 12-20 mm in diameter; young twigs glabrous; leaves usually glabrous beneath; shrub usually 1-2 m tall; [introduced].....
 *S. albus* var. *laevigatus*

Symphoricarpos albus (Linnaeus) Blake var. *albus*, Common Snowberry. Limestone woodlands. June; September. QC west to s. AK, south to w. VA, WV, MI, MN, and CA; the original native distribution somewhat uncertain due to cultivation and escapes. Var. *albus* is the more eastern variety. [= C, F, G, K, Pa, Z; < *S. albus* – RAB, S, W, WV]

* *Symphoricarpos albus* (Linnaeus) Blake var. *laevigatus* (Fernald) Blake, Pacific Snowberry. Disturbed areas, sometimes in natural areas; native of w. North America. June; September. [= C, F, G, K, Pa, Z; < *S. albus* – RAB, S, W; ? *S. rivularis* Suksdorf]

* *Symphoricarpos occidentalis* Hooker, Western Snowberry, Wolfberry. Disturbed areas; bottomlands; native of w. North America. In PA, MD, KY. [= F, K, Pa]

Symphoricarpos orbiculatus Moench, Coralberry. Moist to dry forests, woodlands, thickets, pastures, and old fields, especially over mafic or calcareous rocks. Late July-September; September-November (and often persisting well into winter). CT west to IN, MN, and CO, south to Panhandle FL, TX, and Mexico; the original native distribution somewhat uncertain due to cultivation and escapes. Seemingly increasing in VA and behaving aggressively in dry woodlands and barrens over greenstone and diabase. [= RAB, C, F, G, K, W, WH, WV, Z; = *S. symphoricarpos* (Linnaeus) MacM. – S]



Triosteum Linnaeus 1753 (Horse-gentian, Feverwort)

A genus of 6 species, rather woody herbs, of e. Asia (3 species) and e. North America (3 species); the 3 North American species form one clade, the 3 Asian species another (Gould & Donoghue 2000). References: Gould & Donoghue (2000); Ferguson (1966a)=Z.

- 1 Longer (nonglandular) hairs of the stem 1.5-3 mm long; corolla greenish-yellow; leaves 1.5-6 cm wide.
- 2 Lower leaf surface glabrous or pubescent only along the main veins; leaves averaging 4× as long as wide
 *T. angustifolium* var. *angustifolium*
- 2 Lower leaf surface densely puberulent; leaves averaging 2× as long as wide.....*T. angustifolium* var. *eamesii*
- 1 Longer (nonglandular) hairs of the stem 0-1.5 mm long (or with a very few longer hairs); leaves 4-15 cm wide; corolla greenish-yellow to purple.
- 3 Most the stem hairs 1-2 mm long, mostly not gland-tipped; leaves predominantly not connate (or if 1-3 pairs connate, then only 1-2 cm wide at the joined base); style equaling or slightly shorter than the corolla (rarely exerted)*T. aurantiacum* var. *aurantiacum*
- 3 Most the stem hairs 0-0.5 mm long (sometimes with a few scattered longer hairs), gland-tipped; leaves predominantly connate-perfoliate, the joined base 3-9 cm wide); style exerted beyond the corolla*T. perfoliatum*

Triosteum angustifolium Linnaeus var. *angustifolium*, Smooth Lesser Horse-gentian. Cp (DE, Pd (DE), Mt (WV), {Pd (NC, VA), Mt (GA, VA), Cp (VA)}; distributional and habitat information needed for two varieties) (GA Rare). April-May; July-August. CT west to ON and MO, south to NC, nw. GA (Jones & Coile 1988), AL, and LA. [= C, F, G; < *T. angustifolium* – RAB, K, Pa, S, W, WV, Z]

Triosteum angustifolium Linnaeus var. *eamesii* Wiegand, Hairy Lesser Horse-gentian. {Pd (NC, VA), Mt (VA), WV?}; distributional and habitat information needed for two varieties}. April-May; July-August. CT and NJ south to NC. [= C, F, G; < *T. angustifolium* – RAB, K, Pa, S, W, Z]

Triosteum aurantiacum Bicknell var. *aurantiacum*. Mt (GA?, NC, SC, VA, WV), Pd (DE, NC, VA): woodlands and forests in circumneutral soils, particularly those over mafic or calcareous rocks; uncommon (rare in DE, GA, and NC). Late May-early June; August-October. QC west to MN, south to GA, KY, and OK; other varieties are more restricted and midwestern or northern in distribution. [= C, F, K; < *T. aurantiacum* – Pa, RAB, S, W, WV, Z; < *T. perfoliatum* Linnaeus var. *aurantiacum* (Bicknell) Wiegand – G]

Triosteum perfoliatum Linnaeus, Perfoliate Horse-gentian. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, VA): woodlands and forests in circumneutral soils, particularly those over mafic or calcareous rocks; uncommon (rare in DE). Late May-early June; August-October. MA west to MN, south to n. SC, n. GA (Jones & Coile 1988), and OK. [= RAB, C, F, K, Pa, S, W, WV, Z; = *T. perfoliatum* var. *perfoliatum* – G]

406c. LINNAEACEAE (Rafinesque) A. Backlund 1998 (Twinflower Family) [in DIPSACALES]

A family of 5 genera and about 35 species, shrubs and suffrutescent herbs. Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Diervilla* and *Weigela* in the Diervillaceae (Backlund & Pyck 1998), placement of *Abelia*, *Linnaea*, and

Kolkwitzia in the Linnaeaceae (Backlund & Pyck 1998), and retention of *Lonicera*, *Symphoricarpos*, and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsacaceae and Valerianaceae, as a very broadly circumscribed Caprifoliaceae. References: Backlund & Pyck (1998).

- 1 Trailing shrubby herb; [native]*Linnaea*
- 1 Upright shrub; [planted and persistent or weakly naturalizing].
 - 2 Sepals oblanceolate, the larger > 1 mm wide; fruit and ovaries free, not hirsute.....*Abelia*
 - 2 Sepals lanceolate to linear, < 1 mm wide; fruit and ovaries fused in pairs, densely hirsute.....*Kolkwitzia*

Abelia R. Brown, *Abelia*

A genus of about 30 species, shrubs, primarily of s. and e. Asia.

* *Abelia* \times *grandiflora* (André) Rehder [*chinensis* \times *uniflora*], *Abelia*. Suburban thickets; commonly planted in our area; sometimes persistent or rarely weakly naturalizing, the parent species native of China. Reported for AL (Diamond & Woods 2009). [= K, WH]

Kolkwitzia Graebner (Beautybush)

A monotypic genus, a shrub, of c. China.

* *Kolkwitzia amabilis*, Beautybush. Disturbed areas; planted as an ornamental shrub, rarely naturalized from plantings, native of c. China. April-May. [= K]

Linnaea Linnaeus (Twinflower)

A monotypic genus, a trailing weak shrub, circumboreal.

Linnaea borealis Linnaeus ssp. *americana* (Forbes) Hultén ex Clausen, American Twinflower. Northern hardwoods. Greenland, NL (Labrador), and AK south to WV, IN, IL, IA, NM, AZ, and CA; disjunct in e. TN. *L. borealis* is documented by an early specimen (1892) from Sevier County, TN, presumably from the Great Smoky Mountains; the TN population (not seen since) is disjunct from e. WV and w. MD. [= K; = *L. borealis* var. *longiflora* Torrey – C, G; = *L. borealis* var. *americana* (Forbes) Rehder – F; < *L. borealis* – Pa, W; = *L. americana* Forbes; = *L. borealis* ssp. *longiflora* (Torrey) Hultén]



406d. DIPSACACEAE A.L. de Jussieu 1789 (Teasel Family) [in DIPSACALES]

A family of about 11 genera and 300 species, herbs and shrubs, of Eurasia and Africa.

- 1 Stem prickly*Dipsacus*
- 1 Stem not prickly*Knautia*

Dipsacus Linnaeus (Teasel)

A genus of about 15 species, herbs, of Eurasia. *Dipsacus* begins flowering about halfway up the head, the flowers then opening sequentially toward both the base and the tip of the inflorescence. References: Ferguson (1965)=Z; Ferguson & Brizicky (1965); Stace (2010).

- 1 Principal cauline leaves lacinate-pinnatifid, cut at least halfway to the midrib; stems to 3 (-4) m tall*D. laciniatus*
- 1 Principal cauline leaves entire or toothed; stems to 2 (-3) m tall.
 - 2 Bracts on the receptacle with straight apical spines, these stiff but flexible; bracts of the involucre curved upward..... *D. fullonum*
 - 2 Bracts on the receptacle with recurved apical spines, these rigid; bracts of the involucre spreading more or less horizontally..... *D. sativus*

* *Dipsacus fullonum* Linnaeus, Wild Teasel, Common Teasel. Mt (GA, NC, VA, WV), Pd (VA), Cp (DE, VA): roadsides, pastures, disturbed areas; common (rare in DE and NC, rare in VA Coastal Plain), native of Europe. July-September; September-October. Recently discovered for GA in Floyd County (T. Govus, pers. comm. 2009). The inflorescences are frequently collected for crafts and dried arrangements. [= K, W, Z; = *D. sylvestris* Hudson – RAB, C, F, G, Pa, S, WV; = *D. fullonum* ssp. *sylvestris* (Hudson) Clapham]

* *Dipsacus laciniatus* Linnaeus, Cutleaf Teasel. Mt (VA, WV), Pd (VA): disturbed areas; uncommon, native of Europe. July-September; September-October. [= C, F, G, K, Pa, WV, Z]

* *Dipsacus sativus* (Linnaeus) Honckeny, Fuller's Teasel. Mt (VA): disturbed areas; rare, native of Europe. July-September; September-October. I am here following Ferguson (1965), Ferguson & Brizicky (1965), and Stace (2010) in their determination that *D. sativus* is the correct name to apply to this plant. The occurrence of this species in our area is implied in various sources; I have not seen specimens. The dried inflorescences were used in the past for fulling cloth (raising the nap). [= K, Pa, Z; = *D. fullonum* – C, F, G, misapplied]

***Knautia* Linnaeus**

A genus of about 60 species, herbs, of Europe, w. Asia, and n. Africa.

* *Knautia arvensis* (Linnaeus) Coulter, Blue Buttons. Mt (WV): dry areas, pastures, other disturbed areas; rare, native of Europe. June-September. Naturalized south at least to s. PA (Rhoads & Klein 1993), MD (Kartesz 1999), and WV (Harmon, Ford-Wertz, & Grafton 2006). [= C, F, G, K, Pa; = *Scabiosa arvensis* Linnaeus]

406e. VALERIANACEAE Batsch 1802 (Valerian Family) [in DIPSACALES]

A family of about 10 genera and 300-350 species, herbs (rarely shrubs), nearly cosmopolitan in distribution. References: Bell (2004); Ferguson (1965).

- 1 Stem leaves divided into 3-21 segments *Valeriana*
- 1 Stem leaves simple *Valerianella*

***Valeriana* Linnaeus 1753 (Valerian)**

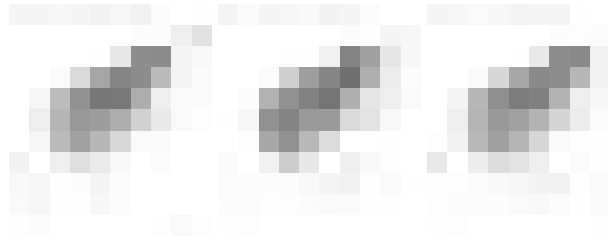
A genus of about 200 species, herbs and shrubs, of temperate North America and Eurasia, s. Africa, and Andean South America.

- 1 Corolla tube 12-16 mm long; stem leaves pinnately divided into 3-7 segments; [native, of VA and TN northward] *V. pauciflora*
- 1 Corolla tube 1.5-4 mm long; stem leaves divided **either** into 3 segments **or** into 11-21 segments.
 - 2 Upright perennial herb; stem leaves divided into 11-21 segments; corolla tube 3-4 mm long; [alien, grown as an ornamental and casually escaped] *V. officinalis*
 - 2 Scandent vine; stem leaves divided into 3 segments; corolla tube 1.5-2 mm long; [native, of FL] *V. scandens*

* *Valeriana officinalis* Linnaeus, Garden-heliotrope. Cultivated and rarely escaped; native of Europe. Sometimes cultivated in our area; it may escape or persist. May-August. [= C, F, G, K, Pa]

Valeriana pauciflora Michaux, Pink Valerian, Long-tube Valerian. Very nutrient-rich alluvium in floodplain forests. May; June. MD, se. PA, and sw. PA, west to s. IL, south to n. VA, sc. TN, KY, and MO. [= C, F, G, K, Pa, W, WV]

Valeriana scandens Linnaeus, Florida Valerian. Floodplain forests, hammocks. Ne. FL south to c. peninsular FL. [= K, S, WH]



***Valerianella* P. Miller 1754 (Corn-salad)**

A genus of about 50 species, herbs, of temperate North America, Eurasia, and n. Africa. References: Ware (1983)=Z.

Identification notes: *Valerianella* species exhibit an interesting set of fruit polymorphisms; the fruit forms in a single species are often strikingly different, and these forms were traditionally regarded as separate taxa. Ware (1983) demonstrated that they were under simple genetic control, and that different fruit forms were found in the same population. Thus, some taxa previously considered distinct are best considered mere fruit types. The fruit consists of three locules, one of which is fertile and dorsal to or more-or-less flanked by the two sterile locules. The sterile

locules may be elongate, forming (between them) a groove, or they may be expanded laterally well beyond the width of the fertile locule into flattened or bulbous wings. In *V. locusta*, there is additionally a corky mass on the side of the fertile locule opposite the two sterile locules.

- 1 Fruit greatly thickened by a corky mass on the back of the fertile locule; corolla pale blue (or white)..... *V. locusta*
- 1 Fruit lacking a corky mass on the back of the fertile locule; corolla white.
 - 2 Fertile locule much wider than the combined width of the 2 sterile locules; fruit sharply triangular in \times -section..... *V. chenopodiifolia*
 - 2 Fertile locule slightly wider or narrower than the combined width of the 2 sterile locules; fruit not sharply triangular in \times -section.
 - 3 Corolla 1.5-2 mm long, the corolla lobes 0.4-0.8 mm long..... *V. radiata*
 - 3 Corolla 3-5 mm long, the corolla lobes 1-2 mm long..... *V. umblicata*

Valerianella chenopodiifolia (Pursh) A.P. de Candolle. Moist forests, bottomlands. Late April-June. S. ON west to WI, south to MD, PA, WV, sw. VA, IN, and IL. [= K1, Pa; = *V. chenopodiifolia* – C, F, G, WV, orthographic variant]

* *Valerianella dentata* (Linnaeus) Pollich. Reported as naturalized in central TN by Kral (1981) and Chester et al. (1997), in nc. GA (Jones & Coile 1988), and in AL (Kartesz 1999). [= K1] {not yet keyed; synonymy incomplete}

* *Valerianella locusta* (Linnaeus) Laterrade, European Corn-salad. Roadsides, moist forests, bottomlands, disturbed areas; native of Europe. April-June. [= RAB, C, K1, Pa, S, WV, Z; = *V. oitoria* (Linnaeus) Pollich – F, G]

Valerianella radiata (Linnaeus) Dufresne. Moist forests, bottomlands, disturbed areas. April-May. VA, s. IL, and KS, south to n. FL, Panhandle FL, and TX. [= RAB, C, K1, S, WH, WV, Z; > *V. radiata* var. *fernaldii* Dyal – F, G; > *V. radiata* var. *radiata* – F, G]

Valerianella umblicata (Sullivant) Wood. Moist forests, bottomlands, disturbed areas. Late April-June. S. NY west to IL, south to NC and sc. TN (Chester, Wofford, & Kral 1997). Ware (1983) raises the question of whether *V. woodsiana* is a distinct taxon; further study is needed. [= Pa, Z; < *V. umblicata* – RAB, C, WV; > *V. umblicata* – F, G; > *V. patellaria* (Sullivant ex A. Gray) Wood – F, S; > *V. intermedia* Dyal – F; > *V. radiata* var. *intermedia* (Dyal) Gleason – G]

Valerianella woodsiana (Torrey & A. Gray) Walpers. Cp (NC, SC, VA), Pd (SC): bottomlands; rare. {distribution} [= K1, S, Z] {not yet keyed; add to synonymy}



410. PITTOSPORACEAE R. Brown 1814 (Pittosporum Family) [in APIALES]

A family of about 9-11 genera and 150-200 species, trees, shrubs, and vines, of tropical and warm temperate Old World. References: Judd (1996).

Pittosporum Banks ex Solander (Pittosporum)

A genus of about 100-150 species, trees and shrubs, of tropical and warm temperate Old World. References: Judd (1996)=Z.

* *Pittosporum tobira* (Thunberg) Aiton f., Japanese Pittosporum, Australian Laurel. Frequently planted on barrier islands, at least persisting and apparently naturalizing; native of Japan and China. Various cultivars are seen, including ones with variegated leaves. This species is one of the more common landscaping plants used on developed barrier islands. The revolute, obovate leaves are characteristic. [= K, WH, Z]



411. ARALIACEAE A.L. de Jussieu 1789 (Ginseng Family) [in APIALES]

A family of about 47 genera and 1325 species, trees, shrubs, vines, and rarely herbs, mainly tropical in distribution. *Hydrocotyle* is more closely related to Araliaceae than to Apiaceae, and is transferred here (Chandler & Plunkett 2003). References: Frodin & Govaerts (2003); Graham (1966); Smith (1944).

- 1 Plant a woody vine; [tribe *Schefflereae*]..... *Hedera*

- 1 Plant an herb, shrub, or tree.
 - 2 Leaves simple, peltate or cordate, roundish (if lobed, with 3-5 rounded lobes), 0.3-10 cm wide; rhizomatous, creeping herbs.....*Hydrocotyle*
 - 2 Leaves **either** compound with 3-many leaflets **or** simple and then with 5-7 pointed lobes (*Kalopanax*), > 10 cm wide; herbs, shrubs, or trees; [tribe *Aralieae*].
 - 3 Leaves simple, palmately-lobed.
 - 4 Leaves 5-7-lobed; tree.....*Kalopanax*
 - 4 Leaves >9-lobed (some of the lobes themselves sublobed); robust herb to shrub.....*Tetrapanax*
 - 3 Leaves compound.
 - 5 Leaves 2-3× compound, at least the final order of division pinnate; leaves either 1 from a subterranean stem or 2-many, alternate on an aboveground stem; inflorescence compound, consisting of (2-) 3-many umbels, either on a separate peduncle from the rhizome or in a terminal panicle or raceme of umbels; fruit purple or black.....*Aralia*
 - 5 Leaves 1× palmately compound, leaflets 3-7; leaves 3-5 in a whorl at the summit of the stem (*Panax*) or many, clustered on spur shoots (*Eleutherococcus*); inflorescence of a single, simple umbel borne terminally on the stem; fruit red to yellow (*Panax*) or black (*Eleutherococcus*).
 - 6 Plant a shrub, with prickles; fruit black.....*Eleutherococcus*
 - 6 Plant an herb, lacking prickles; fruit red or yellow.....*Panax*

Aralia Linnaeus 1753 (*Aralia*)

A genus of about 30-70 species, herbs, shrubs, vines, and trees, primarily of e. North America, e. Asia, and se. Asia. Wen (1998) has suggested that *A. nudicaulis* may need to be removed from the genus *Aralia* in order to maintain both *Aralia* and *Panax* as monophyletic genera; more recent studies remain equivocal (Wen 2011). References: Wen (2011)=U; Smith (1982)=Z; Moore, Glenn, & Ma (2009)=V; Wen et al. (1998); Wen (1993); Wen (1998); Smith (1944)=Y; Frodin & Govaerts (2003)=X.

- 1 Plant a shrub or small tree, 3-6 (-10) m tall, definitely woody; stem armed throughout with prickles, those on the stem stout, broad-based, and distributed to the summit of the stem; leaves usually armed with prickles on the axes and the main veins; [section *Dimorphanthus*]
 - 2 Inflorescence 3-6 dm long, often broader than long, lacking a well-developed main axis; main lateral veins running all the way to the teeth; petiolules 0-1 (-6) mm long; dry fruit 3.0-3.5 mm long; corolla white to off-white; [alien spreading southward from ne. United States]*A. elata*
 - 2 Inflorescence 4-12 dm long, usually longer than broad, with a well-developed central axis; main lateral veins running branching repeatedly and getting smaller before reaching the teeth; petiolules 1-7 mm long; dry fruit 4.0-5.0 mm long; corolla creamy or buttery yellow; [widespread native]*A. spinosa*
- 1 Plant an acaulescent herb or stout, suffruticose herb or slightly woody shrub, not at all to somewhat woody at the base; stem unarmed (or in *A. hispida* bristly with thin prickles on the lower stem only); leaves unarmed.
 - 3 Plant an acaulescent herb, the solitary leaf and scapose inflorescence arising from a subterranean rhizome; inflorescence a raceme of (2-) 3 (-7) umbels; [section *Nanae*].....*A. nudicaulis*
 - 3 Plant a caulescent herb, the leaves several and alternate, the inflorescence terminal on the leafy stem; inflorescence a raceme or panicle of (2-) 5-many umbels.
 - 4 Stem bristly toward its base; inflorescence a raceme or weak panicle of (2-) 5-25 umbels; [section *Dimorphanthus*]*A. hispida*
 - 4 Stem unarmed; inflorescence a compound panicle of 15-many umbels; [section *Aralia*].....*A. racemosa*

* *Aralia elata* (Miquel) Seemann, Japanese Angelica-tree. Suburban woodlands; native of Japan. Late July-August; August-September. Naturalizing in ne. North America at least as far south as NJ, DE, se. PA, MD, DC, and n. VA. See Moore, Glenn, & Ma (2009) for detailed information on this alien species and its naturalization in the northeastern United States. [= K, Pa, V]

Aralia hispida Ventenat, Bristly Sarsaparilla. Rocky woodlands, cliffs, and clearings, primarily over acidic rocks (such as quartzite, granite, and sandstone). June-August. NL (Labrador) and NL (Newfoundland) west to MB, south to w. VA, w. NC (?), WV, OH, IN, IL, and MN. This species appears to be strongly dependent on disturbance, such as fire, appearing in great numbers following fire where previously rare or apparently absent. F and Y credit this species to w. NC; the documentation is not known to me, and the species was not treated by RAB. Doug Rayner (pers. com. 2002) reports a site record of it in Polk County, NC. [= C, F, G, K, Pa, S, W, X, Y, Z]

Aralia nudicaulis Linnaeus, Wild Sarsaparilla. Upland forests and woodlands, rocky places, most typically in rather dry places, such as ridgetop forests. May-July. NL (Labrador) and NL (Newfoundland) west to BC, south to e. VA, c. NC, ne. GA, e. TN, IN, IL, MO, NE, CO, ID, and WA. [= RAB, C, F, G, K, Pa, S, U, W, X, Y, Z]

Aralia racemosa Linnaeus, Spikenard, Hungry-root. Rich woodlands, trail margins and roadsides. June-August. NB and QC west to MB, MN, and e. SD, south to nw. SC, N. GA, n. AL, n. MS, c. AR, e. KS. The related *A. bicrenata* Wootton & Standley (sometimes treated as a subspecies of *A. racemosa*) occurs in AZ, NM, TX, and n. Mexico (Wen 2011). [= RAB, C, F, G, Pa, S, W, U, X, Y, Z; = *A. racemosa* ssp. *racemosa* - K]

Aralia spinosa Linnaeus, Devil's-walking-stick, Hercules's-club, Prickly-ash. Disturbed pocosins and bottomlands, disturbed areas, moist to dry forests and woodlands. June-September. NJ west to s. IN, IL, and IA, south to c. peninsular FL and e. TX. Smith (1982) discusses the juvenile (prickly) and adult (unarmed) leaf phases of *A. spinosa*. [= RAB, C, F, G, GW, K, Pa, S, V, W, WH, X, Y, Z]



***Eleutherococcus* Maximowicz 1859 (Fiveleaf Aralia)**

A genus of about 38 species, shrubs, of e. Asia. References: Frodin & Govaerts (2003)=Z.

* ***Eleutherococcus sieboldianus*** (Makino) Koidzumi, Fiveleaf Aralia. Mt (WV): disturbed areas; rare, native to e. Asia. June. Reported as introduced and apparently naturalized in Randolph County, WV, scattered locations in PA (Rhoads & Klein 1993), OH, and n. KY (Clark et al. 2005). [= Z; < *Eleutherococcus pentaphyllus* (Siebold & Zuccarini) Nakai – K, misapplied; = *Acanthopanax sieboldianus* Makino – Pa]

***Fatsia* Decaisne & Planchon 1854 (Fatsia)**

A genus...

* ***Fatsia japonica*** (Thunberg) Decaisne & Planchon, Fatsia, Japanese Aralia. Suburban woodlands; native of Japan. [= K2] {not yet keyed; add to synonymy}

***Hedera* Linnaeus 1753 (Ivy)**

A genus of 5-15 species, vines, distributed from Mediterranean Europe west to e. Asia. References: Graham (1966)=Y; Stace (2010)=Z; Staff of the Bailey Hortorium (1976)=X; Ackerfield & Wen (2002)=Q; Frodin & Govaerts (2003)=V.

Identification notes: The leaves of *Hedera* are dimorphic, sometimes confusing observers; "juvenile" leaves (those of the sterile branches) are about as wide as long and (in *H. helix*) palmately 3-5-lobed, those of the fertile branches (less commonly seen) are obovate or elliptic.

- 1 Trichomes scale-like, 0.1-0.4 mm, those on the leaves, petioles, and young stems with rays fused basally for 1/4 to 1/2 their length; juvenile leaves orbicular, little or not at all lobed, the larger 15-25 cm wide.....***H. colchica***
- 1 Trichomes stellate, 0.5-1.0 mm, those on the leaves, petioles, and young stems with rays fused basally for < 1/8 their length; juvenile leaves slightly to deeply lobed, the larger 5-15 cm wide.
- 2 Hairs of young stems, leaves, and petioles whitish, the rays erect (at a right angle to the leaf surface); juvenile leaves usually < 8 cm wide, usually dark green and often also marbled with white, often lobed > 1/2 the way to the base; [often strongly climbing]***H. helix* var. *helix***
- 2 Hairs of young stems, leaves, and petioles yellowish-brown to rusty-brown, the rays not erect (parallel to the leaf surface); juvenile leaves often > 8 cm wide, usually medium green (rarely also marbled with white), usually lobed < 1/2 the way to the base; [usually not climbing] ..
.....***H. hibernica***

* ***Hedera colchica*** (K. Koch) K. Koch, Persian Ivy. Persistent after cultivation, perhaps not naturalized; native of the Caucasus. [= K, Q, V, X, Z]

* ***Hedera helix* Linnaeus var. *helix***, Common Ivy, English Ivy. Persistent, established, and spreading around old home sites, in suburban woodlands and waste areas; native of Europe. June-July. Var. *helix* is diploid, n = 24. Hundreds of cultivars, varying greatly in habit and leaf size, lobing, and marbling are grown; see for instance, Staff of the Bailey Hortorium (1976) for a partial listing and brief descriptions. [= X, Y; < *H. helix* – RAB, C, F, G, K, Pa, S, W, WH; = *H. helix* ssp. *helix* – Q, V, Z]

* ***Hedera hibernica*** (G. Kirchner) Carrière, Atlantic Ivy, Irish Ivy. Persistent, established, and spreading around old home sites, in suburban woodlands and waste areas; native of Europe. June-July. Var. *hibernica* is tetraploid, n = 48. [= Q, V; = *H. helix* Linnaeus var. *hibernica* G. Kirchner – X, Y; < *H. helix* – RAB, C, F, G, K, S, W; = *H. helix* ssp. *hibernica* (G. Kirchner) D. McClint. – Z]

***Hydrocotyle* Linnaeus 1753 (Water-pennywort)**

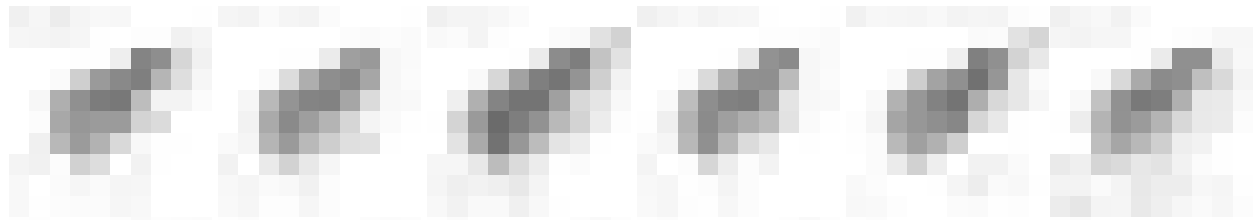
A genus of about 130 species, herbs, cosmopolitan (especially Australia). Molecular analyses have clarified that the affinities of *Hydrocotyle* lie with the Araliaceae rather than the Apiaceae (Downie et al. 1998; Chandler & Plunkett 2004). References: Mathias & Constance (1945)=MC.

- 1 Leaves peltate, lacking a sinus extending to the attachment of the petiole.
- 2 Inflorescence umbellate; leaves 1-4 (-7) cm wide***H. umbellata***
- 2 Inflorescence verticillate or umbellate-verticillate (when first developing sometimes appearing merely umbellate); leaves 1-15 cm wide.
- 3 Inflorescence compound, the main inflorescence axis with nodes which produce verticils or umbels of pedicellate flowers, the inflorescence nodes also producing branches which themselves produce verticils or umbels of flowers; leaves (1-) 4-15 cm wide.....

-*H. bonariensis*
- 3 Inflorescence verticillate, all the flowers borne sessile or on pedicels on the unbranched inflorescence axis; leaves 1-6 cm wide.
- 4 Flowers and fruits pedicellate, the pedicels 1-10 mm long.....*H. prolifera*
- 4 Flowers and fruits sessile or subsessile.....*H. verticillata*
- 1 Leaves not peltate, a sinus extending to the attachment of the petiole.
- 5 Central leaf lobe notably more distinct than the other lobes (the sinuses on either side extending 1/3 to 3/4 of the way to the petiolar attachment); stems and petioles fleshy*H. ranunculoides*
- 5 Central leaf lobe not more distinct than the other lobes (the sinuses on either side extending 1/10 to 1/4 the way to the petiolar attachment); stems and petioles filiform.
- 6 Fruiting umbels on peduncles 1-3 mm long; leaves 10-50 mm wide; [native of bogs, spray cliffs, and other wetlands]*H. americana*
- 6 Fruiting umbels on peduncles 9-24 mm long; leaves 5-30 mm wide; [alien of lawns and other disturbed habitats].
- 7 Leaves 5-lobed, 15-30 mm wide*H. bowlesioides*
- 7 Leaves 7-lobed, 5-13 mm wide*H. sibthorpioides*

Hydrocotyle americana Linnaeus, American Water-pennywort. Bogs, marshes, seepages, cliffs and ledges where wet by seepage or spray from waterfalls, sometimes roadside ditches. June-September. Widespread in ne. North America, south to w. NC, SC, e. and c. TN, and IN. [= RAB, C, F, G, GW, K, MC, Pa, S, W, WV]

Hydrocotyle bonariensis Lamarck, Dune Pennywort. Beaches, dunes, and moist sandy areas. April-September. Widespread in South and Central America, north in North America to the Southeastern Coastal Plain, se. VA to s. FL and TX. [= RAB, GW, K, MC, S, WH]



* ***Hydrocotyle bowlesioides*** Mathias & Constance. Lawns; native of Costa Rica and Panama (naturalized in South America, se. United States, and New Zealand). See Anderson (1983) for discussion of the species' occurrence in Thomasville, Thomas Co. GA. Reported for Panhandle FL (Wunderlin & Hansen 2008). [= K, MC; = *H. sibthorpioides* Lamarck var. *oedipoda* O. Degener & Greenwood]

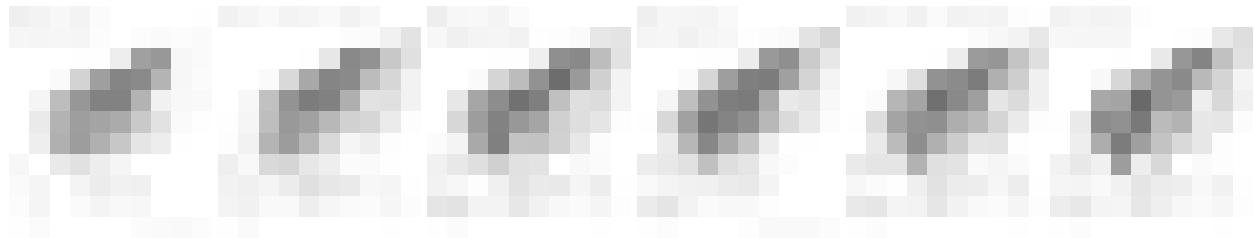
Hydrocotyle prolifera Kellogg. Swamp forests, pools. May-July. Widespread in North, Central, and South America. [= K; = *H. verticillata* Thunberg var. *triradiata* (A. Richard) Fernald – RAB, C, G, GW, MC, WH; < *H. verticillata* var. *verticillata* – F; > *H. australis* Coulter & Rose – S; > *H. canbyi* Coulter & Rose – S]

Hydrocotyle ranunculoides Linnaeus f., Swamp Water-pennywort. Stagnant to (less commonly) swiftly flowing waters of swamps pools, backwaters, blackwater streams. April-July. Widespread in North, Central, and South America. [= RAB, C, F, G, GW, K, MC, Pa, S, W, WH, WV]

* ***Hydrocotyle sibthorpioides*** Lamarck, Lawn Water-pennywort. Lawns, pond margins; native of Asia and Africa. March-September. Greatly increasing as a lawn and garden weed. [= RAB, C, F, G, K, MC, Pa, WH, WV]

Hydrocotyle umbellata Linnaeus, Marsh Water-pennywort. Moist areas. April-September. Widespread in North, Central, and South America. [= RAB, C, F, G, GW, K, MC, Pa, S, WH]

Hydrocotyle verticillata Thunberg. Swamp forests, pools. May-July. Widespread in North, Central, and South America. [= S; = *H. verticillata* var. *verticillata* – RAB, C, G, GW, K, MC, WH; < *H. verticillata* var. *verticillata* – F]



Kalopanax Miquel 1863 (Castor Aralia)

A monotypic genus, a medium-sized trees, of e. Asia. References: Frodin & Govaerts (2003)=Z.

* ***Kalopanax septemlobus*** (Thunberg ex A. Murray) Koidzumi, Castor Aralia. Disturbed, suburban areas; native of e. Asia. Introduced in ne. United States, apparently naturalizing in s. MD and n. VA (Fort Belvoir, Fairfax County) (E. Wells, pers. comm., 2006). [= K; > *K. septemlobus* ssp. *lutchuensis* (Nakai) H. Ohashi – Z; > *K. septemlobus* ssp. *septemlobus* – Z; = *Kalopanax pictum* (Thunberg) Nakai]

Panax Linnaeus 1753 (Ginseng)

Panax is a genus of ca. 14 species, herbs, 12 of e. Asia and 2 of e. North America. Wen & Zimmer (1996) and Choi & Wen (2000) studied the phylogeny of *Panax* using molecular techniques. *P. trifolius* does not appear to be closely related to any of the other species, and is a basal component of the genus. *P. quinquefolius* is most closely related to *P. ginseng* C.A. Meyer and *P. japonicus* C.A. Meyer. References: Smith (1944)=Z; Frodin & Govaerts (2003)=Y; Wen & Zimmer (1996); Choi & Wen (2000).

- 1 Leaflets (3-) 5, petiolulate, the petiolules (7-) 10-25 mm long; larger leaflets 6-15 cm long, 3.5-7 cm wide, averaging about 1.8× as long as wide, the apex acuminate; fruit bright red when ripe *P. quinquefolius*
 1 Leaflets 3 (-5), sessile or subsessile, the petiolules to 3 mm long; larger leaflets 4-8 cm long, 0.5-2.5 cm wide, averaging about 2.5× as long as wide, the apex obtuse to acute; fruit yellow-green when ripe *P. trifolius*

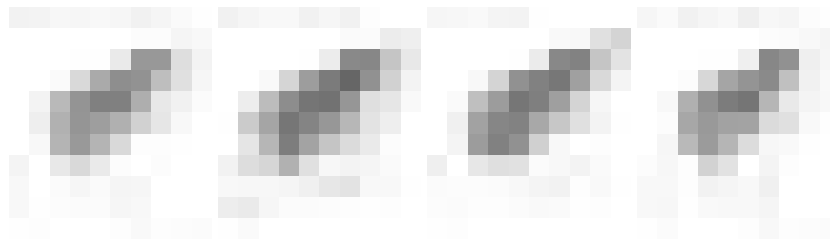
Panax quinquefolius Linnaeus, Ginseng, Sang, American Ginseng. Cove forests, mesic hardwood forests, generally in nutrient-rich forests though tending to avoid the richest coves. May-June; August-October. ME and QC west to MN and SD, south to e. VA, e. NC, nc. SC, sw. GA, s. AL, s. MS, e. LA, and OK. *P. quinquefolius* is gathered in quantity throughout its range for the herbal trade; most of the North American harvest is shipped to China, where it is prized for medicinal uses. Dried roots command prices in excess of \$1000 per kilogram; in our area, "sang" is a multimillion dollar industry. Formerly abundant and occurring in large populations, *P. quinquefolius* has been reduced in most of its range to small populations of scattered individuals, a classic example of a "predator-prey" relationship. Collection and trade in ginseng is monitored and regulated in most states. In NC, it is illegal for ginseng dealers to buy ginseng from collectors before September; this allows the plants to mature fruits prior to collection. Schlessman (1985) discusses the floral biology of *P. quinquefolius*. [= F, K, Pa, W, WV, Y, Z; = *P. quinquefolium* – RAB, C, G, S, orthographic variant]

Panax trifolius Linnaeus, Dwarf Ginseng. Cove forests, bottomland forests, other nutrient-rich forests. April-June; August-October. NS and QC west to MN, south to PA, e. VA, c. NC, nc. GA, ec. TN, IN, and IA. [= F, K, Pa, W, WV, Y, Z; = *P. trifolium* – RAB, C, G, S, orthographic variant]

Tetrapanax (K. Koch) K. Koch 1859 (Ricepaper-plant)

A monotypic genus, a robust herb or shrub, of China.

* ***Tetrapanax papyriferus*** (Hooker) K. Koch, Ricepaper-plant. Disturbed forests; native of Asia. [= K, WH; = *T. papyrifer*, orthographic variant]

**413. APIACEAE** Lindley 1836 or **UMBELLIFERAE** A.L. de Jussieu 1789 (Carrot Family) [in APIALES]

A family of about 445 genera and about 3540 species of herbs (rarely shrubs or trees), cosmopolitan, but especially north temperate. *Hydrocotyle* is more closely related to Araliaceae, and has been transferred there (Chandler & Plunkett 2004). References: Mathias & Constance (1945)=MC. [also see ARALIACEAE]

Identification notes: The Apiaceae is an easy family to recognize (with some exceptions). These are herbs, typically with a clasping petiole base and often a variously (and often highly) compound leaf, either 1-5× pinnately, palmately, pinnately-ternately, or ternately compound (less commonly simple or phyllodial). The inflorescence is typically a simple or compound umbel (sometimes subcapitate or truly modified into a head) with numerous small flowers. Subtending the inflorescence is (usually) an **involucre** of individual **bracts**. If the umbel is **compound**, **rays** support **umbellets**, each of which may be subtended by an **involucel** of individual **bractlets**. The ovary is 2-carpellate, with 2 styles at the summit, these often swollen at the base into a stylopodium capping the ovary. The fruit develops into 2 **mericarps**, united by their faces at the **commissure**; each mericarp may be terete, **flattened dorsally** (parallel to the commissure, the commissure therefore broad), or **flattened laterally** (perpendicular to the commissure, the commissure therefore narrow). Each mericarp has 5 primary **ribs**, one down the back (the **dorsal rib**), 2 near each edge near the commissure (the **lateral ribs** or **lateral wings**), and 2 in-between (the **intermediate ribs**). The ribs may be thin and filiform in ×-section, corky, or winged, and they (or the entire outer surface of the mericarp) may also be ornamented with hairs, spines, uncinuate prickles, etc.

- 1 Principal leaves **either** all simple (though sometimes palmately or pinnately lobed) **or** those that are basally disposed simple (those on the upper stem sometimes compound).....**Key A**
 1 Principal leaves all variously compound (small bracteal leaves on the upper stem sometimes reduced and simple).
 2 Leaves 1-palmately or 1-pinnately compound (all leaflets attached to the summit of the petiole or to the primary inflorescence rachis).
 3 Leaves 1-palmately compound, all of the 3-7 leaflets attached to the summit of the petiole.....**Key B**
 3 Leaves 1-pinnately compound, all of the 3-13 leaflets attached to a primary inflorescence rachis**Key C**

- 2 Leaves 2-5× compound.
- 4 Leaves 2-4× pinnately or pinnately-ternately compound, the ultimate segments consisting of relatively few (usually < 25), discreet, typically broad (elliptic, ovate, or lanceolate) leaflets.....**Key D**
- 4 Leaves 2-5× pinnately or pinnately-ternately decomposed, the ultimate segments **either** linear (and then flat or angled in ×-section) or broader, but then very many (> 50) and often imperfectly separated from one another**Key E**

Key A – Apiaceae with simple leaves

- 1 Leaves linear, lanceolate, or oblanceolate, > 4× as long as wide.
 - 2 Leaves phyllodial (hollow, septate, segmented); flowers white or purple; [plants of wetlands].
 - 3 Umbels simple; leaves spatulate, broader towards the tip, often flattened in ×-section, rounded or obtuse at the apex.....*Lilaeopsis*
 - 3 Umbels compound; leaves tapering to a pointed tip, terete in ×-section.
 - 4 Plants 1-11 dm tall, annuals, sometimes mat-forming and adventitiously perennial; fruits 1-3 mm long, with lateral ribs; rays 3-15*Harperella*
 - 4 Plants 6-24 dm tall, perennials from rhizomes or tubers; fruits 4-9 mm long, with lateral wings; rays 5-20*Tiedemannia*
 - 2 Leaves “normal” (flat, non-septate, continuous, and in some cases lobed, toothed, or spinose-margined); flowers blue, yellow, white, or whitish-green; [plants of wetlands or uplands].
 - 5 Flowers borne in involucrate heads; corolla blue or greenish-white*Eryngium*
Eryngium aquaticum var. *aquaticum*, *Eryngium aquaticum* var. *ravenelii*, *Eryngium yuccifolium* var. *synchaetum*, *Eryngium yuccifolium* var. *yuccifolium*, *Eryngium aromaticum*
 - 5 Flowers in compound umbels; corolla yellow or white.
 - 6 Stem leaves similar to the basal, all simple; corollas yellow; [alien, of disturbed areas]*Bupleurum*
Bupleurum gerardii, *Bupleurum lancifolium*, *Bupleurum odontites*
 - 6 Stem leaves palmately 3-5-foliolate with linear leaflets, differing from the simple basal leaves; corollas white; [native, of blackland prairies and associated disturbed areas, from AL and TN westward]*Cynosciadium*
Cynosciadium digitatum
 - 1 Leaves orbicular, ovate, or elliptic, < 4× as long as wide.
 - 7 Leaves orbicular, as wide as or wider than long; base peltate or cordate.
 - 8 Leaves leathery, with spinose margins; inflorescence a head; flowers blue; [rare introduction]*Eryngium maritimum*
 - 8 Leaves herbaceous or somewhat fleshy, toothed or lobed, but not spinose; inflorescence umbellate or verticillate; flowers white, greenish, or purplish; [collectively common and widespread.
 - 9 Foliage and fruits (or ovaries) stellate-pubescent or glochidiate; leaves lobed, but otherwise entire; [rare alien].....*Bowlesia incana*
 - 9 Foliage and fruits (or ovaries) glabrous; leaves toothed, sometimes also lobed; [common natives and aliens]*[see Hydrocotyle, in Araliaceae]*
 - 7 Leaves ovate or elliptic, 1.2-4× as wide as long; base cordate, peltate, or truncate.
 - 10 Leaves perfoliate; flowers yellow; [rare aliens].
 - 11*Bupleurum rotundifolium*
 - 11*Smyrniunm perfoliatum*
 - 10 Leaves cordate or truncate at the base; flowers white, green, yellow, blue, or purple;
 - 12 Flowers greenish or blue; leaves all simple (sometimes stem leaves lobed); inflorescence a head or very congested (subcapitate) umbel; [plants of wetland situations, prostrate, creeping, or erect].
 - 13 Inflorescence a very congested (subcapitate) umbel, with 4-9 flowers; leaves cordate at the base, long-petiolate, the petioles characteristically 2× as long as the leaf*Centella erecta*
 - 13 Inflorescence a head, with > 20 flowers; leaves cuneate to truncate at the base, sessile to short petiolate, the petioles < 1× as long as the leaf (except *E. prostratum*)*Eryngium*
 - 12 Flowers yellow or purple; basal leaves simple, stem leaves usually compound; Inflorescence a compound umbel; [erect plants of upland situations].
 - 14 Fruits (partly to fully mature) with thin-edged wings; flowers yellow or purple; central flower of each umbellet staminate and pedicelled; fruits all pedicelled in all umbellets*Thaspium*
 - 14 Fruits ribbed (with rounded, cordlike ribs), lacking thin-edged wings; flowers yellow; central flower of each umbellet either staminate and pedicelled, or pistillate and sessile; fruits all pedicelled in some umbellets (those with a staminate central flower), or the central fruit sessile in some umbellets (those with a pistillate central flower)*Zizia*

Key B – Apiaceae with 1-palmate leaves

- 1 Leaflets narrowly lanceolate or linear, > 8× as long as wide, entire; umbels compound and regular, the rays and pedicels each of relatively uniform lengths; leaves 3-5-foliolate.
 - 2 Fruit 2-3 mm long; leaves 1-5-foliolate; [of calcareous or rich moist to wet areas, AL and TN and westward].....*Cynosciadium*
 - 2 Fruit 3-5 mm long; leaves 1-3-foliolate; [of saturated acid wetlands, of the FL Panhandle, e. GA, e. SC, e. NC, and e. VA].....*Oxypolis*
- 1 Leaflets ovate, obovate, broadly lanceolate, or broadly oblanceolate, 1-5× as long as wide, serrate or variously incised or cleft; umbels compound and irregular, the rays and/or pedicels of widely varying lengths; leaves 3-7-foliolate.
 - 3 Rays 3-8, the involucre absent or inconspicuous; umbellets with 3-10 pedicellate perfect flowers; fruits linear-oblong, glabrous; leaves 3-foliolate, the lateral leaflets often 2-parted; corollas white*Cryptotaenia*
 - 3 Rays few, the involucre of prominent, broad, foliaceous bracts; umbellets with 3 sessile to subsessile or short-pedicellate perfect flowers and a variable number of pedicellate staminate flowers; fruits ovoid, obovoid, or subglobose, covered with uncinat bristles; leaves palmately 3-7-foliolate, the lateral sometimes 2-parted; corollas greenish-white, yellowish-green, or white.....*Sanicula*

Key C – Apiaceae with 1-pinnate leaves

- 1 Larger leaves 20-50 cm wide, 3 (-5) foliolate, many of the leaflets deeply lobed into segments often > 10 cm wide; fruits 8-15 mm long, pubescent; petioles sheathing and also strongly dilated *Heracleum*
- 1 Larger leaves 3-25 cm wide, 5-15 (or more) foliolate, the leaflets variously toothed, if also deeply lobed, the segments < 3 cm wide; fruits 1-7 mm wide; petioles sheathing, not dilated.
 - 2 Leaflets entire or with a few teeth (rarely as many as 7 on each side), these usually near the midpoint of the leaflet; fruits 4-7 mm long; corolla white..... *Oxypolis*
 - 2 Leaflets rather finely toothed (and sometimes also deeply lobed), the teeth evenly disposed along the margins; fruits 1-6 mm long; corolla white or yellow.
 - 3 Corolla yellow; fruits 5-6 mm long; longer rays in each compound umbel > 5 cm long..... *Pastinaca*
 - 3 Corolla white; fruits 1-5 mm long; longer rays in each compound umbel < 4 cm long.
 - 4 Leaflets obtuse to broadly rounded, < 1.5× as long as wide; upper leaves often dramatically more dissected (i.e., bipinnate) and with narrower leaflets or segments than the basal and lower leaves; outer flowers of the umbel asymmetric, with the outer petals larger and often bifid (raylike); [plants of disturbed upland situations].
 - 5 *Coriandrum*
 - 5 *Pimpinella*
 - 4 Leaflets acute to acuminate at the apex, > 1.5× as long as wide; upper leaves similar to the basal in shape and degree of dissection, smaller or with fewer leaflets if they differ at all; all flowers symmetric; [plants of wetlands].
 - 6 Umbels sessile or subsessile; leaf margins crenate; highly dissected submersed leaves absent..... *Helosciadium*
 - 6 Umbels on stout peduncles 4-10 cm long; leaf margins sharply serrate; highly dissected submersed leaves sometimes present *Sium*

Key D – Apiaceae with leaves 2-4× pinnately-ternately compound, the ultimate leaflets distinct and relatively broad

- 1 Leaflets entire.
 - 2 Leaflets linear (resembling winged rachises); corolla white..... *Falcaria*
 - 2 Leaflets broad, elliptic, ovate, or obovate, sparingly lobed; corolla yellow *Taenidia*
- 1 Leaflets variously serrate, dentate, and/or incised.
 - 3 Plants in flower.
 - 4 Corolla yellow, maroon, or pale creamy yellow.
 - 5 Flowers yellow, maroon, or pale creamy-yellow; central flower of each umbellet staminate and pedicelled; fruits all pedicelled in all umbellets; developing fruits subterete to slightly dorsally compressed, several or all of the ribs with thin-edged wings *Thaspium*
 - 5 Flowers yellow; central flower of each umbellet either staminate and pedicelled, or pistillate and sessile; fruits all pedicelled in some umbellets (those with a staminate central flower), or the central fruit sessile in some umbellets (those with a pistillate central flower); developing fruits laterally compressed, all of the ribs rounded and cordlike *Zizia*
 - 4 Corolla white.
 - 6 Ovary hispid or pubescent.
 - 7 Rays 16-25; leaves somewhat coriaceous; leaflet bases often cuneate or obliquely truncate; [plants of dry habitats]..... *Angelica*
 - 7 Rays 3-5; leaves thin in texture; leaflet bases rounded, subcordate, or broadly cuneate; [plants of moist forests] *Osmorhiza*
 - 6 Ovary glabrous.
 - 8 Plants 1-9 dm tall at maturity; [rarely naturalized aliens].
 - 9 Ovary (and later the fruits) laterally compressed, not winged; [plants of uplands] *Aegopodium*
 - 9 Ovary (and later the fruits) terete, the ribs corky-winged; [plants of wetlands] *Oenanthe*
 - 8 Plants 6-18 dm tall at maturity; [collectively common and widespread natives].
 - 10 Sheaths of the upper leaves dilated, > 1 cm wide when flattened; [plants of moist habitats, from GA northward in the Mountains, extending into adjacent provinces towards the northern edge of our area]..... *Angelica*
 - 10 Sheaths of the upper leaves not dilated, < 1 cm wide; [plants either of wetlands or of moist to dry forests].
 - 11 Veins of the leaflets directed to the sinuses; leaflets mostly 2.5-5× as long as wide, acuminate at the tip; [of wetlands]..... *Cicuta*
 - 11 Veins of the leaflets directed to the tips of the teeth or lobes; leaflets mostly 1.3-1.8× as long as wide, acute to obtuse at the tip; [of moist to dry forests]..... *Ligusticum*
 Add to keylead 4b: *Ammi majus*, *Angelica dentata*, *Apium graveolens* var. *dulce*, *Cicuta bolanderi*, *Cicuta mexicana*, *Imperatoria ostruthium*, *Petroselinum crispum*
 - 3 Plants in fruit.
 - 12 Fruit hispid or pubescent (regardless of winging).
 - 13 Fruits 4-6 mm long, hispid across the surfaces; rays 16-25; leaves somewhat coriaceous; leaflet bases often cuneate or obliquely truncate; [plants of dry habitats] *Angelica*
 - 13 Fruits 18-24 mm long, oblanceolate or linear, appressed-pubescent on the ribs; rays 3-5; leaves thin in texture; leaflet bases rounded, subcordate, or broadly cuneate; [plants of moist forests]..... *Osmorhiza*
 - 12 Fruit glabrous (sometimes winged or prominently ribbed as well).
 - 14 Fruits dorsally compressed (strongly to slightly) or subterete, either thin-winged or corky-winged.
 - 15 Ribs very corky; fruits 2-3 mm long; [rare aquatic or semiaquatic alien]..... *Oenanthe*
 - 15 Ribs thin-winged; fruits 3-8 mm long; [common natives of moist to submesic forests].
 - 16 Rays 12-30; fruits 4-8 mm long; plant 6-20 mm tall; sheaths of the upper leaves dilated, > 1 cm wide when flattened *Angelica*
 - 16 Rays 5-10; fruits 3-6 mm long; plant 5-10 dm tall; sheaths of the upper leaves not dilated, < 1 cm wide *Thaspium*
 - 14 Fruits laterally compressed, not winged (except thin-winged in *Ligusticum*).
 - 17 Veins of the leaflets directed to the sinuses; leaflets mostly 2.5-5× as long as wide, acuminate at the tip; [of wetlands]..... *Cicuta*
 - 17 Veins of the leaflets either directed to the tips of the teeth or lobes, or reticulating extensively and becoming obscure before reaching the margin; leaflets mostly 1.3-1.8× as long as wide, acute to obtuse at the tip; [of moist to dry forests].

- 18 Leaflet venation palmate-ternate, each leaflet with 3 (-5) main veins from the base (the central vein then with pinnate secondary veins); plants from rhizomes.....*Aegopodium*
- 18 Leaflet venation pinnate, each leaflet with a dominant central vein (it then with pinnate secondary veins); plants from a caudex, taproot, or cluster of fibrous or fleshy roots.
- 19 Lateral veins of the leaflet parallel and straight, clearly extending to the tip of each tooth; leaflet base often strongly oblique; leaflet margin entire in the lower ¼ to 1/3.....*Ligusticum*
- 19 Lateral veins of the leaflet arcing, reticulating and becoming obscure before reaching the leaflet margin; leaflet base symmetrical or slightly oblique; leaflet margin toothed to or very close to the base*Zizia*
- Add to key 3b: *Ammi majus*, *Apium graveolens* var. *dulce*, *Imperatoria ostruthium*, *Petroselinum crispum*,

- 1 Fruits subterete to slightly dorsally compressed, several or all of the ribs with thin-edged wings; flowers yellow, maroon, creamy, or white; central flower of each umbellet staminate and pedicelled; fruits all pedicelled in all umbellets*Thaspium*
- 1 Fruits laterally compressed, all of the ribs rounded and cordlike; flowers yellow; central flower of each umbellet either staminate and pedicelled, or pistillate and sessile; fruits all pedicelled in some umbellets (those with a staminate central flower), or the central fruit sessile in some umbellets (those with a pistillate central flower)*Zizia*

Key E

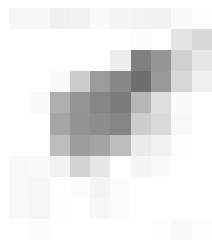
- 1 Ultimate leaf-segments linear to filiform, the margins parallel.
- 2 Corolla yellow; rays 15-40; plants 5-21 dm tall, annual, biennial, or perennial; [naturalized aromatic culinary herbs of upland situations].
- 3 Petiolar sheaths of the principal leaves 1-2.5 (-3) cm long; mericarps dorsally flattened, at least the lateral ribs thin-winged; fresh plants with dill odor; annual.....*Anethum*
- 3 Petiolar sheaths of the principal leaves 3-10 cm long; mericarps subterete or slightly laterally flattened, the ribs not winged; fresh plants with fennel odor; biennial or perennial*Foeniculum*
- 2 Corolla white; rays 5-20; plants 1-15 dm tall; annual; [native or naturalized herbs of upland or wetland situations].
- 4 Mericarps (and ovary) ornamented with pustules, spines, or sharp-pointed projections (in addition to the ribs)*Spermolepis*
- 4 Mericarps (and ovary) glabrous.
- 5 Umbels leaf-opposed; umbels simple to compound.....*Cyclospermum*
- 5 Umbels terminal or on axillary branches; umbels compound*Ptilimnium*
- 1 Ultimate leaf segments flat, ovate, elliptic, lanceolate, or irregular, the margins not neatly parallel.
- 6 Plants perennial or biennial (annual in *Daucus pusillus*), 10-30 dm tall (or as short as 3 dm tall in *Daucus* and *Conioselinum*); rays 12-60 (or 5-25 in *Conioselinum*).
- 7 Leaves ¼-½× as wide as long; mericarps (and ovaries) bristled; mericarps 3-5 mm long; rays 10-60 (or more).....*Daucus*
- 7 Leaves ½-1× as long as wide; mericarps (and ovaries) glabrous; fruits either 4-6 mm or 2-2.5 mm long; rays 5-20.
- 8 Fruits 4-6 mm long; plant from a cluster of fleshy roots; [very rare plant of high elevation mafic seepage]*Conioselinum*
- 8 Fruits 2-2.5 mm long; plant from a thickened taproot; [collectively common plant of mostly disturbed areas]*Conium*
- 6 Plants annual (perennial in *Erigenia* and sometimes *Anthriscus*), 0.5-8 (-10) dm tall; rays 1-7 (or to as many as 12 in *Anthriscus* and *Torilis*).
- 9 Plants perennial from a globose tuber; flowering February-March; [of rich forests].....*Erigenia*
- 9 Plants annual (or sometimes a short-lived perennial in *Anthriscus*) from fibrous roots; flowering April-June; [of rich forests and weedy situations].
- 10 Rays (1-) 3; mericarps 5.5-10 mm long, glabrous or pubescent with weak appressed hairs*Chaerophyllum*
- 10 Rays 3-12; mericarps 3-6 mm long, glabrous or densely bristled with hooked (uncinate) bristles.
- 11 Mericarps (and ovary) glabrous*Anthriscus*
- 11 Mericarps (and ovary) densely beset with hooked (uncinate) bristles
- 12 Ribs of the mericarp obsolete; rays 3-5.....*Anthriscus*
- 12 Ribs of the mericarp prominent (paler than the intervals); rays 5-12*Torilis*

Add to key E: *Aethusa cynapium*, *Ammi majus*, *Ammi visnaga*, *Ammoselinum butleri*, *Ammoselinum popei*, *Atrema (Bifora) americana*, *Bifora radians*, *Bifora testiculata*, *Carum carvi*, *Falcaria vulgaris*, *Oenanthe aquatic*, *Perideridia americana*, *Petroselinum crispum*, *Polytaenia nuttallii*, *Scandix pecten-veneris*, *Thaspium pinnatifidum*, *Thaspium species 1*, *Torilis nodosa*, *Trepocarpus aethusae*

Aegopodium Linnaeus 1753 (Goutweed)

A genus of 5-7 species, perennial herbs, of temperate Eurasia. References: Mathias & Constance (1945)=MC.

* *Aegopodium podagraria* Linnaeus, Goutweed. Disturbed areas; native of Europe. Late June; late July. The cultivated forms encountered in our area are usually those with white-margined or variegated leaves. [= C, F, K, MC, Pa; > *A. podagraria* var. *podagraria* – RAB, G; > *A. podagraria* var. *variegatum* L.H. Bailey – RAB, G]



Aethusa Linnaeus 1753

A monotypic genus, an annual herb, of Europe, n. Africa, and w. Asia. References: Sell & Murrell (2009)=Z; Mathias & Constance (1945)=MC.

* *Aethusa cynapium* Linnaeus, Fool's-parsley. Cp (DE), Pd (DE), Mt (WV): disturbed areas; uncommon, native of Eurasia. June-September. Introduced and naturalized in ne. United States, at least as far south as se. PA (Rhoads & Klein 1993), DE, and Pocahontas County, WV. In Europe, several subspecies are often recognized; it is not well-understood how these entities relate to material naturalized in North America and for now we treat the species broadly. [= C, F, G, K, MC, Pa, WV; > *A. cynapium* ssp. *agrestis* (Wallroth) Dostál – Z; > *A. cynapium* ssp. *cynapium* – Z; > *A. cynapium* ssp. *gigantea* (Lejeune) P.D. Sell; > *A. cynapium* ssp. *cynapioides* (M. Bieberstein) Arcangeli – Z]

Ammi Linnaeus 1753 (Bishop's-weed)

A genus of about 4-10 species, annual or biennial herbs, distributed in Mediterranean Europe. References: Mathias & Constance (1945)=MC.

- 1 Lower leaves with elliptic to narrowly elliptic segments; fruits 1.5-2 mm long; rays 15-60, not rigid and thickened at maturity; bracts not strongly reflexed in fruit *A. majus*
 1 Lower leaves with filiform segments; fruits 2-2.8 mm long; rays up to 150, rigid and thickened at maturity; bracts strongly reflexed in fruit....
 *A. visnaga*

* *Ammi majus* Linnaeus, Bullwort, Greater Ammi. Cp (FL, GA, SC): disturbed areas; rare, native of Mediterranean Europe. June. [= RAB, K, MC, S, WH]

* *Ammi visnaga* (Linnaeus) Lamarck, Bisnaga, Toothpick-plant. Cp (FL, NC): dry sandy roadsides, disturbed areas; rare, native of Mediterranean Europe. May-June. [= RAB, K, MC, S, WH]

Ammoselinum Torrey & A. Gray 1855 (Sand-parsley)

A genus of 3 species, herbs, of sc. and sw. North America and temperate s. South America. References: Nesom (2012c)=Z; Mathias & Constance (1945)=MC.

- 1 Umbels sessile (the rays arising directly from the leaf axil); fruit glabrous (or slightly roughened) *A. butleri*
 1 Umbels pedunculate; fruit roughened with well-developed teeth *A. popei*

* *Ammoselinum butleri* (Engelmann ex S. Watson) Coulter & Rose, Butler's Sand-Parsley. Pd (NC): lawns, disturbed places; rare, native of sc. United States (MO and se. KS south through AR and OK to LA and TX). March-April. Boufford (1977) reports the naturalization of this diminutive midwestern umbel on a grassy, weed-covered slope in NC, and since reported from additional southeastern states, including MS (Bryson 1991) and AL (Keener 2007). [= GW, K, MC, Z]

Ammoselinum popei Torrey & A. Gray, Pope's Sand-parsley. Ip (TN): limestone barrens; rare. KS, OK, TX, and NM south to ne. Mexico (Nuevo León); disjunct and apparently native in the Nashville Basin of c. TN. [= K, MC, Z]

Anethum Linnaeus 1753 (Dill)

A monotypic genus, an annual herb, apparently native to sw. Asia. References: Mathias & Constance (1945)=MC.

* *Anethum graveolens* Linnaeus, Dill, Dillweed. Mt (NC, VA, WV), Pd (NC, VA): roadsides, disturbed areas, abandoned garden plots; rare, native of sw. Asia. June-July. [= RAB, C, F, G, K, MC, Pa, S]

Angelica Linnaeus 1753 (Angelica)

A genus of about 60-110 species, perennial herbs of the northern hemisphere. References: Mathias & Constance (1945)=MC.

- 1 Larger leaflets 3-6 cm long, 1-2.5 cm wide, obtuse at the apex; umbels **either** densely pubescent **or** glabrous; ovary and fruit **either** pubescent **or** glabrous; [collectively widespread in our area, in dry to mesic habitats].
- 2 Umbels glabrous; ovary and fruit glabrous; leaf segments coarsely toothed *A. dentata*
- 2 Umbels pubescent; ovary and fruit hispid; leaf segments finely toothed *A. venenosa*
- 1 Larger leaflets 8-15 cm long, 4-8 cm wide, acute to acuminate at the apex; umbels glabrous or sparsely pubescent; ovary and fruit glabrous or sparsely pubescent; [restricted to the Mountains in our area, in mesic habitats]
- 3 Leaflets acute, the margin hyaline and mostly glabrous; umbels with 20-45 umbellets *A. atropurpurea*
- 3 Leaflets acuminate, the margin ciliolate; umbels with 13-25 umbellets *A. triquinata*

Angelica atropurpurea Linnaeus, Purple Angelica. Pd (DE), Mt (NC*?, WV): riverbanks, streambanks, moist roadsides; rare. May-June; July-August. S. NL (Labrador) west to WI and MN, south to NL (Newfoundland), NS, DE, MD, WV, OH, IN, IL, and ne. IA (and in the mountains to ne. TN and w. NC – the NC occurrences have sometimes been speculated to be naturalized). [= RAB, C, G, K, MC, Pa, W; > *A. atropurpurea* var. *atropurpurea* – F]

Angelica dentata (Chapman) Coulter & Rose, Sandhill Angelica. Cp (FL, GA): sandhills, flatwoods; uncommon (rare in GA). Sw. GA, sc. GA, and e. Panhandle FL. [= K, MC, S, WH]

* *Angelica lucida* Linnaeus. Native to n. North America. Reported by Harvill et al. (1992) for Warren County, VA; more information is needed to substantiate this surprising record, presumably from cultivation. [= C, G, K, MC; = *Coelopleurum lucidum* (Linnaeus) Fernald – F] [not keyed; rejected as a component of our flora]

Angelica triquinata Michaux, Mountain Angelica, Appalachian Angelica. Mt (GA, NC, VA, WV): mesic forests at moderate to high elevations, grassy balds, brookbanks; common (uncommon in WV). August-September; September-October. PA south to sw. NC, se. TN, and n. GA, a Southern and Central Appalachian endemic. The nectar is very attractive, but apparently strongly intoxicating, to yellow jackets and hornets; on the grassy balds of Roan Mountain one can see thousands of umbels of *Angelica* densely coated by lethargic bees. [= RAB, C, F, G, K, MC, Pa, W; ? *A. curtisii* Buckley – S]

Angelica venenosa (Greenway) Fernald, Hairy Angelica, Deadly Angelica. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): dry forests and woodlands, woodland borders, longleaf pine sandhills, hammocks; common (rare in DE and FL). June-August; July-September. MA west to MN, south to Panhandle FL, MS, and AR. Populations of this species in dry sandhill communities in the Fall Line Sandhills have a number of peculiar features: basal leaves often borne appressed against the ground, small leaflets, coarse and more equilateral toothed of the leaflets. These populations may be worthy of taxonomic recognition; they need further study. [= RAB, C, F, G, K, MC, Pa, W; = *A. villosa* (Walter) Britton, Sterns, & Poggenburg – S]

Anthriscus Persoon 1814 (Chervil)

A genus of about 10-20 species, herbs, of Eurasia and mountains of Africa. References: Spalik (1996)=Z; Mathias & Constance (1945)=MC.

- 1 Fruit ovoid, 2.9-3.2 mm long, hispid with hooked hairs; [section *Anthriscus*] *A. caucalis*
- 1 Fruit lanceolate or linear, 6-10 mm long, glabrous.
- 2 Beak of fruit (1-) 2-4 mm long, well-differentiated from the body; plant an annual; umbel rays pubescent; [section *Anthriscus*] *A. cerefolium*
- 2 Beak of fruit ca. 1 mm long, scarcely differentiated from the body; plant a perennial; umbel rays glabrous (or nearly so); [section *Cacosciadium*] *A. sylvestris* ssp. *sylvestris*

* *Anthriscus caucalis* Bieberstein, Bur Chervil, Bur-parsley. Mt (NC, WV), Pd (NC, SC, VA), Cp (DE, GA, NC, SC): disturbed areas; rare, native of Europe. April-May; May-June. First reported for South Carolina by Hill & Horn (1997) and for GA (Carter, Baker, & Morris 2009). [= C, K, Z; = *A. scandicina* Mansfeld – RAB, F, G, MC, illegitimate name and orthographic variant; = *A. scandicinus* Mansfeld]

* *Anthriscus cerefolium* (Linnaeus) Hoffmann, Garden Chervil. Pd (VA): cultivated in gardens, sometimes persistent or escaped; rare, native of western Mediterranean Europe. May-July. [= C, F, G, K, MC, Z]

* *Anthriscus sylvestris* (Linnaeus) Hoffmann ssp. *sylvestris*, Wild Chervil, Cow-parsley. Mt (NC, TN, VA), Pd (DE): moist disturbed areas; rare, native of Eurasia. May-July. This species has also been reported from the NC-TN state line, on Roan Mountain (Mellichamp, Matthews, & Smithka 1987, 1988); the population is actually entirely in TN. Reported for Watauga, Ashe, and Alleghany counties, NC (Poindexter, Weakley, & Denslow 2011). [= Z; < *A. sylvestris* – C, F, G, K, MC, Pa]

Apium Linnaeus 1753 (Celery)

A genus of about 20 species, herbs, of temperate and subtropical regions, mainly Southern Hemisphere. References: Ronse et al. (2010)=Z; Mathias & Constance (1945)=MC.

- 1 Involucel absent; fresh plant smelling of celery; stem solid *A. graveolens* var. *dulce*
- 1 Involucel present; fresh plant not smelling of celery; stem hollow [*Heliosciadium nodiflorum*]

* *Apium graveolens* Linnaeus var. *dulce* (P. Miller) A.P. de Candolle, Celery. Cp (FL, NC, SC), Mt (WV): disturbed areas, escaped or persisting from cultivation; rare, native of Europe. June-July; July-August. [= K; < *A. graveolens* Linnaeus – RAB, C, F, G, MC, WH, WV; < *Celeri graveolens* (Linnaeus) Britton – S; = *A. graveolens* ssp. *dulce* (P. Miller) Bertoloni]

Atrema A.P. de Candolle 1829 (American Bishop)

A monotypic genus, a perennial herb, endemic to sc. United States. References: Nesom in FNA (in prep.); Mathias & Constance (1945)=MC.

Atrema americanum A.P. de Candolle, Prairie Bishop. Blackland prairies. April-June. AR and OK south to s. TX; disjunct in AL. [= FNA; = *Bifora americana* (de Candolle) Bentham & Hooker f. – K1, K2, MC] {not keyed or mapped}

Bifora Hoffmann 1816 (Bishop)

A genus of 2-6 species, annual herbs, of Mediterranean Europe and , w. Asia (Caucasus). References: Nesom in FNA (in prep.); Mathias & Constance (1945)=MC.

* ***Bifora radians*** Bieberstein. Ballast around old ports; native of Mediterranean Europe, Asia Minor, and the Caucasus. Reported for NJ. [= FNA, K1, K2, MC] {probably not naturalized; not keyed or mapped}

* ***Bifora testiculata*** (Linnaeus) Sprengel. Disturbed areas; native of Mediterranean Europe. Reported for MD. [= FNA, K1, K2] {probably not naturalized; not keyed or mapped}

Bowlesia Ruiz & Pavón 1794 (Bowlesia)

A genus of ca. 15 species, herbs, of South America. References: Mathias & Constance (1945)=MC.

* ***Bowlesia incana*** Ruiz & Pavón. Cp (FL): open wet hammocks and bottomlands; rare, native of South America. [= GW, K, MC, WH; = *Bowlesia septentrionalis* Coulter & Rose – S]

Bupleurum Linnaeus 1753 (Hare's-ear, Thoroughwax)

A genus of about 190 species, herbs and shrubs, primarily Eurasian. References: Snogerup & Snogerup (2001)=Z; Mathias & Constance (1945)=MC.

1 Upper leaves linear, sessile; [section *Aristata*]***B. gerardii***
1 Upper leaves ovate, perfoliate; [section *Bupleurum*]***B. rotundifolium***

* ***Bupleurum gerardii*** Allioni. Mt (VA): disturbed areas over limestone; rare, native of Mediterranean Europe. Also reported for c. TN (Neves, Weakley, & Cox 2009). Snogerup & Snogerup (2001) apply narrower taxonomic concepts in this group, and would treat our material as *B. virgatum*, a segregate of *B. gerardii*. [= *B. odontites* Linnaeus – K, apparently misapplied; = *B. fontanesii* Gussone – C, G, MC, apparently misapplied; > *B. virgatum* Cavanilles – Z]

* ***Bupleurum lancifolium*** Hornemann. Reported as a waif for MD by Shetler & Orli (2000) and Reed (1964). [= K] {not keyed; not mapped}

* ***Bupleurum odontites*** Linnaeus. Reported as a waif for MD by Shetler & Orli (2000) and Reed (1964). [= K; > *B. fontanesii* Guss. ex Careul – C, G, MC] {not keyed; not mapped}

* ***Bupleurum rotundifolium*** Linnaeus, Hare's-ear, Thoroughwax. Mt (VA, WV), Pd (DE, NC, VA), Cp (DE): lawns, disturbed areas; rare, native of Eurasia. June. [= RAB, C, F, G, K, MC, Pa, S, W]

Carum Linnaeus 1753 (Caraway)

A genus of about 30 species, temperate. References: Mathias & Constance (1945)=MC.

* ***Carum carvi*** Linnaeus, Caraway. Mt (NC, VA, WV): disturbed areas, roadsides; rare, native of Eurasia. May-June. [= RAB, C, F, G, K, MC, Pa, WV]

Centella Linnaeus 1764 (Centella, Coinleaf)

A genus of about 40 species, of warm temperate and tropical regions, centered in s. Africa. References: Nesom in FNA (in prep.); Mathias & Constance (1945)=MC.

Centella asiatica (Linnaeus) Urban, Centella, Coinleaf. Cp (DE, GA, NC, SC, VA): savannas, pondshores, ditches, and a wide variety of other moist to wet habitats; common (rare in DE). June-August; July-September. S. NJ and DE south to s. FL, west to s. TX; West Indies, Mexico, Central America; Asia. [= FNA, GW, RAB; = *C. erecta* (Linnaeus f.) Fernald – C, F, G, K, MC; < *C. asiatica* (Linnaeus) Urban – FNA, GW, RAB; ? *C. repanda* (Persoon) Small – S]

Chaerophyllum Linnaeus 1753 (Chervil)

A genus of about 35 species, herbs, of north temperate areas. References: Mathias & Constance (1945)=MC.

- 1 Ribs of fruit broad, the intervals between the ribs much narrower than the ribs; pedicels somewhat club-shaped; stem and leaf surfaces mostly pilose *C. tainturieri*
- 1 Ribs of fruit narrow, the intervals between the ribs equal to or wider than the ribs; pedicels mostly uniform in shape; stem and leaf surfaces essentially glabrous.
 - 2 Fruit glabrous, 6-10 mm long, 1.5-2 mm broad..... *C. procumbens* var. *procumbens*
 - 2 Fruit densely puberulent, 4.5-6.5 mm long, 2-2.5 mm broad..... *C. procumbens* var. *shortii*

* *Chaerophyllum bulbosum* Linnaeus, Parsnip Chervil. Waif in DC; native of Europe. [= C, G, K, MC] {not keyed; not mapped}

Chaerophyllum procumbens (Linnaeus) Crantz var. *procumbens*, Common Spreading Chervil. Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA), Mt (VA, WV): alluvial forests; common (uncommon in NC, rare in DE, FL, GA, and SC). Late March-April; April-May. NY and s. ON to MI, s. WI, and e. NE, south to GA, AR, and OK. [= RAB, C, F, G, K, MC; < C. *procumbens* – GW, Pa, W, WH; = C. *procumbens* – S]

Chaerophyllum procumbens (Linnaeus) Crantz var. *shortii* Torrey & A. Gray, Short's Spreading Chervil. Mt (VA, WV), Pd (SC): nutrient-rich mountain forests, alluvial forests; rare. March-April. W. PA west to IN, south to SC, TN, and LA. The validity of this variety needs additional study. [= RAB, C, F, G, K, MC; < C. *procumbens* – GW, Pa, W; = C. *shortii* (Torrey & A. Gray Bush – S)]

Chaerophyllum tainturieri Hooker, Southern Chervil. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): roadsides, disturbed areas, fields; common (rare in DE and WV). March-April; April-May. MD west to NE, south to c. peninsular FL, TX, and AZ. Var. *tainturieri* (with fruits glabrous) and var. *dasycarpum* (with fruits pubescent) are sometimes distinguished (see synonymy). They have largely overlapping distributions, and seem unlikely to warrant taxonomic status, but need additional study. *C. texanum* Coulter & Rose is reported as a native in the Nashville Basin of TN (Chester, Wofford, & Kral 1997); it is usually now included in *C. tainturieri* (var. *tainturieri*). [= RAB, C, GW, W, WH; > C. *tainturieri* var. *tainturieri* – K; > C. *tainturieri* var. *tainturieri* – F, G, MC; > C. *tainturieri* var. *floridanum* Coulter & Rose – F; > C. *texanum* Coulter & Rose – F, G, MC; > C. *teinturieri* – S, orthographic variant; > C. *floridanum* (Coulter & Rose) Bush – S; > C. *tainturieri* var. *dasycarpum* Hooker ex S. Watson – K, MC; > C. *dasycarpum* (Hooker ex S. Watson) Nuttall ex Small – S]

* *Chaerophyllum temulem* Linnaeus, Rough Chervil. Native of Europe; introduced as a waif south to PA and NJ (Kartesz 1999). [= C, G, K, MC] {not keyed; not mapped}

Cicuta Linnaeus 1753 (Water-hemlock)

A genus of 8 species, herbs, north temperate in distribution. References: Mulligan (1980)=Z; Mathias & Constance (1945)=MC.

- 1 Flowers usually aborting (if present, the fruits 1.5-2 mm long); axils of upper leaves bearing clusters of bulbils; leaflets with narrowly linear segments, usually < 5 mm wide *C. bulbifera*
- 1 Flowers usually forming mature fruits 2-4 mm long; axils of leaves not bearing bulbils; leaflets lanceolate, usually > 6 mm wide.
 - 2 Dorsal and lateral corky ribs of the fruit much narrower than the oil tubes; fruit abruptly and unevenly constricted at the commissure..... *C. bolanderi*
 - 2 Dorsal and lateral corky ribs of the fruit equaling to slightly exceeding the width of the oil tubes; fruit restricted or not at the commissure, but not as above.
 - 3 Lateral ribs of the commissure flush against one another; leaflets lanceolate, 0.6-3 cm wide..... *C. maculata* var. *maculata*
 - 3 Lateral ribs of the commissure separated by a groove; leaflets ovate, up to 3.5-5 cm wide *C. mexicana*

Cicuta bolanderi S. Watson. Marshes, bogs, seepages, ditches, swamp forests. Scattered in distribution, from NJ, WI, and MN south to GA, TX, Mexico, and AZ. Further study is needed of the distinctiveness, distribution, and ecology of this species. [= K, MC; < C. *maculata* var. *maculata* – C, F, G; = C. *maculata* Linnaeus var. *bolanderi* (S. Watson) Mulligan – Z]

Cicuta bulbifera Linnaeus, Bulb-bearing Water-hemlock. Marshes and swamps. July-September. NL (Newfoundland) west to AK, south to MD, n. VA (?), OH, KY, IN, IL, IA, NE, MT, ID, and OR; disjunct (perhaps introduced only) in NC and FL. [= C, F, G, K, MC, Pa, Z]

Cicuta maculata Linnaeus var. *maculata*, Water-hemlock. Marshes, bogs, seepages, ditches, swamp forests. May-August; July-September. NS west to AK, south to FL, CA, and Mexico. Two other varieties are more northern or western: var. *victorinii* (Fernald) Boivin of QC and var. *angustifolia* Hooker of western North America. All parts of the plant, especially the tubers, are dangerously poisonous. [= C. *maculata* – RAB, GW, MC, S, W; < C. *maculata* var. *maculata* – C, F, G, Pa (also see var. *bolanderi*); < C. *maculata* var. *maculata* – K, Z (also see C. *mexicana*); < C. *maculata* – WH]

Cicuta mexicana Coulter & Rose, Southern Water-hemlock. Marshes, bogs, seepages, ditches, swamp forests, floating vegetation mats. May-August; July-September. Se. VA (GW), south to FL, and west to TX, south into Mexico (more inland records in our area and westward are of uncertain disposition). Though not recognized by Mulligan (1980), this taxon appears to warrant taxonomic recognition. It is a generally coarser plant than *C. maculata*. [= RAB, GW, MC; = C. *maculata* var. *curtissii* (Coulter & Rose) Fernald – F, G; < C. *maculata* var. *maculata* – K, Z; = C. *curtissii* Coulter & Rose – S; < C. *maculata* – WH]

Conioselinum Hoffmann 1819 (Hemlock-parsley)

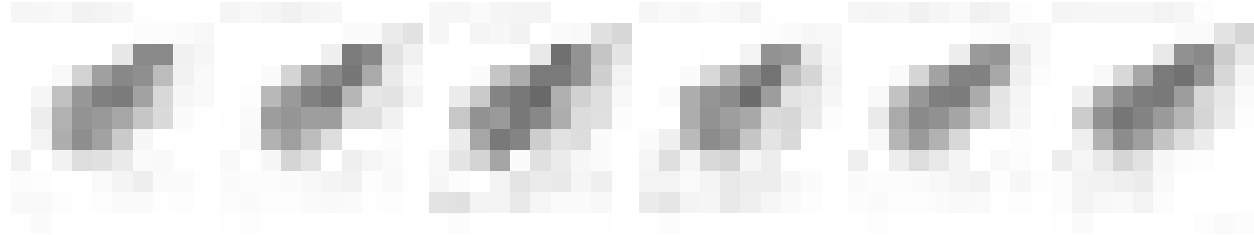
A genus of about 10 species, herbs, north temperate in distribution. References: Mathias & Constance (1945)=MC.

Conioselinum chinense (Linnaeus) Britton, Sterns, & Poggenburg, Hemlock-parsley. Nutrient-rich seepage over cliffs and through boulderfields, at high elevations, known from seepage over cliffs and through boulderfields at about 1500 m on the north slope of Grandfather Mountain (Avery County, NC), and from a north-facing greenstone cliff-top seep at 1150 m on Stony Man, Page County (VA). July-September. The specific epithet is a misnomer; the species is native to n. North America (the specific epithet a misnomer): south to PA, IN, IA, and NB, and disjunct in VA and NC) and ne. Asia (e. Siberia), but not found in China (the epithet a mistake based on confusion between "Genesee," New York, and "Chinensem"). The single NC population was first discovered in 1842 by Asa Gray and John Carey, and not seen again until 1989. The VA population was first reported by Fleming & Ludwig (1996). The report of the species from Roan Mountain was found to be in error; see *Anthriscus* (Mellichamp, Matthews, & Smithka 1987, 1988). [= RAB, C, F, G, K, MC, Pa, S, W]

***Conium* Linnaeus 1753 (Poison-hemlock)**

A genus of 6 species, herbs, north temperate and s. African in distribution. References: Mathias & Constance (1945)=MC.

* *Conium maculatum* Linnaeus, Poison-hemlock. Ditches, roadsides, streambanks, disturbed areas; native of Eurasia. May-June; June-July. All parts of the plant are highly toxic if ingested, causing respiratory failure in humans and other mammals. [= RAB, C, F, GW, K, MC, Pa, S, W, WV]



***Coriandrum* Linnaeus 1753 (Coriander, Cilantro)**

A genus of 3 species, herbs, sw. Asian in distribution. References: Mathias & Constance (1945)=MC.

* *Coriandrum sativum* Linnaeus, Coriander, Cilantro, Mexican-parsley, Chinese-parsley. Disturbed areas, cultivated in gardens, sometimes persisting or escaped; native of Eurasia. June-July. [= RAB, C, F, G, K, MC, S]

***Cryptotaenia* A.P. de Candolle 1829 (Honewort)**

A genus of 4 species, herbs, in north temperate areas. References: Nesom in FNA (in prep.); Mathias & Constance=MC.

Cryptotaenia canadensis (Linnaeus) A.P. de Candolle, Honewort. Moist and nutrient-rich forests (alluvial, bottomland, slope, and cove forests). May-June; June-August. NB and QC to MB, south to e. GA, sw. GA, Panhandle FL, AL, and TX. Closely related to *C. japonica* Hasskarl, which has sometimes been subsumed within it. [= F, FNA, GW, K1, K2, MC, Pa, RAB, WH, WV; < *C. canadensis* – C, G; = *Deringa canadensis* (Linnaeus) Kuntze – S]

***Cyclospermum* Lagasca y Segura 1821 (Marsh-parsley)**

A genus of 3 species, herbs, of tropical and warm temperate America. Only distantly related to *Apium* and warranting generic status (Ronse et al. 2010). References: Ronse et al. (2010)=Z; Mathias & Constance (1945)=MC.

Cyclospermum leptophyllum (Persoon) Sprague ex Britton & Wilson, Marsh-parsley. Freshwater marshes, disturbed areas, roadside ditches. April-early June; June-July. Widespread in se. North America, from NC and OK south into tropical America. [= K, WH, Z; = *Apium leptophyllum* (Persoon) F. Mueller ex Bentham – RAB, C, G, GW, MC; = *Cyclospermum leptophyllum*, orthographic variant; ? *Cyclospermum ammi* Lagasca y Segura – S]

***Cynosciadium* A.P. de Candolle 1829**

A genus of 2 species, of sc. North America. References: Mathias & Constance (1945)=MC.

Cynosciadium digitatum A.P. de Candolle. Wet places, ditches, blackland prairies. IL, sw. TN (Shelby County), and AL west to OK and TX. [= C, F, G, GW, K, MC, S]

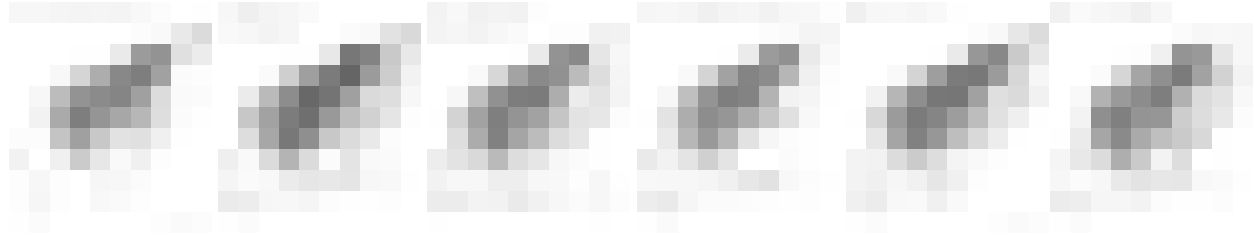
Daucus Linnaeus 1753 (Wild Carrot, Queen-Anne's-lace)

A genus of about 22 species, herbs, of temperate and tropical areas, primarily Old World. References: Mathias & Constance (1945)=MC.

- 1 Involucral bracts scarious-margined, spreading or reflexed in fruit; spines of fruit not prominently barbed apically; umbel rays 10-65 mm long (at least some in a given inflorescence usually exceeding 3 cm); umbellets (10-) 20-numerous flowered; central flower of the umbel usually dark purple; plant a freely-branched biennial**D. carota**
- 1 Involucral bracts not scarious-margined, appressed-ascending in fruit; spines of fruit prominently barbed apically; umbel rays 5-26 mm long; umbellets 5-12 flowered; central flower of the umbel white; plant an unbranched (or rarely few-branched) annual.....**D. pusillus**

* **Daucus carota** Linnaeus, Queen-Anne's-Lace, Carrot, Wild Carrot. Pastures, fields, roadsides, waste places; native of Europe. May-September. The cultivated carrot is a form with a fleshy taproot rich in carotene; the familiar field weed has a "caroty" flavor, but the root is woody and tan in color. [= RAB, C, F, G, K, MC, Pa, S, W, WH, WV]

Daucus pusillus Michaux, American Queen-Anne's-lace. Pastures, fields, roadsides, waste places. April-May; May-June. This native relative of *D. carota* is smaller and less branched. Widespread in Southeastern United States, north to NC and MO. It should be expected in the lower Piedmont of NC and in the Coastal Plain of se. VA, which it closely approaches. Robert Wright has collected this species as a waif in Henrico County, VA (R. Wright, 2002, pers. comm.). [= RAB, C, F, G, K, MC, S, W, WH]



Erigenia Nuttall 1818 (Harbinger-of-spring, Pepper-and-salt)

A monotypic genus, an herb of e. North America. References: Nesom in FNA (in prep.); Buddell & Thieret (1985)=Z; Mathias & Constance (1945)=MC.

Erigenia bulbosa (Michaux) Nuttall, Harbinger-of-spring, Pepper-and-salt, Erigenia. Mesic, nutrient-rich forests, either over calcareous substrate or on very rich alluvial deposits (such as riverbanks). February-May. S. PA, w. NY, s. ON, c. MI, and se. WI south to MD, DC, c. VA, w. VA, nc. NC, w. NC, e. TN, nw. GA, c. AL, n. MS, sw. AR, and se. KS (almost entirely west of the Blue Ridge). Rodgers (1950) states "reported in mtns. of N.C. by Kephart and Hyams;" now documented from both the nc. Piedmont and the w.MD, DC, Mountains. See Buddell & Thieret (1985) for a very interesting and entertaining account of this plant. [= RAB (excluded), C, F, G, K, MC, Pa, S, W, WV, Z]

Eryngium Linnaeus 1753 (Eryngo)

A genus of about 250 species, herbs, tropical and temperate. References: Bell (1963)=Z; Mathias & Constance (1945)=MC; Calviño, Martínez, & Downie (2008).

- 1 Leaves thickly coriaceous, palmately lobed, the lobes and teeth tipped with stout spines; [subgenus *Eryngium*].....**E. maritimum**
- 1 Leaves thin, fleshy, or subcoriaceous, entire, toothed, palmately lobed, or pinnately incised, the teeth or lobes (if present) unarmed or with weak spines.
 - 2 Inflorescence unbranched, the heads solitary on peduncles from the leaf axils of the prostrate to erect stem; [subgenus *Monocotyloidea*].
 - 3 Leaves pinnately lobed or dissected.....**E. divaricatum**
 - 3 Leaves entire, irregularly toothed (rarely with some irregular lobing).
 - 4 Heads subglobose or hemispherical when fully developed, about as wide as long; bracts subtending the head barely extending beyond the base of the head; main stems leaves linear, narrowly elliptic, narrowly oblanceolate, sometime tricuspid apically**E. baldwinii**
 - 4 Heads cylindrical, longer than wide; bracts subtending the head longer than the radius of the head, thus extending conspicuously beyond the base of the head; main stem leaves elliptic, broader than above.....**E. prostratum**
 - 2 Inflorescence branched, the heads in a cyme borne terminally on the erect stem.
 - 5 Basal and cauline leaves (all, or at least many of the cauline) definitely deeply lobed into 3 or more divisions, < 10 cm long.
 - 6 Heads blue; basal leaves serrate but not divided; [subgenus *Monocotyloidea*].....**E. hookeri**
 - 6 Heads greenish; basal leaves pinnately or pinnately-ternately divided.
 - 7 Plants slender, not fleshy, green; basal and cauline leaves 2-6 cm long, 3-5 (-7) pinnately parted; heads 5-8 mm in diameter; [native species of dry pinelands of the Coastal Plain of e. GA, s. AL, and FL]; [subgenus *Monocotyloidea*].....**E. aromaticum**

- 7 Plants stout, fleshy, usually glaucescent; basal leaves 10-25 cm long and wide, pinnately or pinnate-ternately divided into > 7 segments, the cauline leaves similar but reduced in size and number of divisions; heads 10-15 mm in diameter; [rare ballast waif of disturbed ground]; [subgenus *Eryngium*] *E. campestre*
- 5 Basal and cauline leaves unlobed (except sometimes the uppermost; note that bracts in the inflorescence are often lobed), 3-100 cm long; [subgenus *Monocotyloidea*].
- 8 Blades of basal and lower cauline leaves 3-7 (-10) cm long, acute to obtuse apically, cordate to truncate basally, with a length/width ratio of 1.5-3 (-6) *E. integrifolium*
- 8 Blades of basal and lower cauline leaves 10-100 cm long, acuminate to acute apically, clasping basally, with a length/width ratio of 5-50.
- 9 Leaves with primary veins parallel, with marginal bristles; flowers greenish-white.
 - 10 Larger leaves > 1.5 cm wide; marginal bristles of leaves solitary *E. yuccifolium* var. *yuccifolium*
 - 10 Larger leaves < 1.5 cm wide; marginal bristles in fascicles of 1-3 (-4), those on the lower portion of the leaf usually in fascicles of 2-3 *E. yuccifolium* var. *synchaetum*
- 9 Leaves with primary veins pinnate-reticulate, with or without marginal bristles; flowers blue.
- 11 Styles 3.0-3.5 mm long at maturity, scarcely exceeding the bractlets (which subtend each flower); heads subglobose to hemispherical, 6-12 mm in diameter; middle cusp of the bractlets elongate, distinctly longer than the lateral cusps *E. aquaticum* var. *aquaticum*
- 11 Styles 4.0-6.0 mm long at maturity, exceeding the bractlets; heads globose, 9-15 mm in diameter; middle cusp of the bractlets about equal in length to the lateral cusps *E. aquaticum* var. *ravenelii*

Eryngium aquaticum Linnaeus var. *aquaticum*, Marsh Eryngo. Tidal freshwater to brackish marshes. July-September. NJ to ne. FL along the Atlantic coast, mostly in brackish marshes. [= RAB, K, MC, Z; < *E. aquaticum* - C, F, G, GW, Pa, WH; = *E. virginianum* Lamarck - S]

Eryngium aquaticum Linnaeus var. *ravenelii* (A. Gray) Mathias & Constance, Ravenel's Eryngo. Wet savannas, mostly or entirely over calcareous substrate. July-September. Se. NC (Onslow and Pender counties) south to sw. GA and n. FL. McMillan (2003) suggests that it may warrant specific status distinct from *E. aquaticum*. [= RAB, K, MC, Z; < *E. aquaticum* - GW, WH; = *E. ravenelii* A. Gray - S]

Eryngium aromaticum Baldwin, Fragrant Eryngo. Dry pinelands. E. GA west to s. AL, south to s. FL. [= K, MC, S, WH, Z]

Eryngium baldwinii Sprengel. Pinelands, temporary pools, ditches, other moist to wet sites. S. GA and s. AL south to s. FL. [= GW, K, S, WH, Z; = *E. baldwini* - MC, orthographic variant]

* *Eryngium campestre* Linnaeus, Field Eryngo. Ballast waif around ports, in AL (Mobile), MD, and NJ (Z; Kartesz 1999); native of Eurasia. [= K, MC, Z]



* *Eryngium divaricatum* Hooker & Arnott. Disturbed areas, introduced on ballast at old port towns (Wilmington, NC; Pensacola, FL); native of South America. July-October. Not seen in recent years and probably not persistent. [= RAB, K, MC, S, WH, Z]

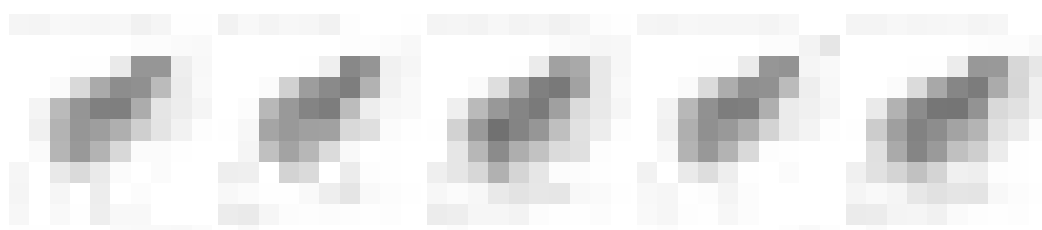
* *Eryngium foetidum* Linnaeus, Spiritweed. Listed by Kartesz (1999) as introduced in GA and FL, but the only reports are very early and anecdotal, and the species was excluded from the North American flora by Coulter & Rose (1900), with no subsequent documentation that would change that conclusion. Native of Mexico, Central America, South America, and West Indies. [= K, MC] {excluded; not keyed}

*? *Eryngium hookeri* Walpers. Ditches, other wet areas. MS and AR west to OK and TX, perhaps recently adventive in the eastward portions of that distribution, not credited as occurring east of TX in Matthias & Constance (1945). [= K, MC]

Eryngium integrifolium Walter, Savanna Eryngo. Savannas, pine flatwoods, seepages, other moist, nutrient-poor places. August-October. Se. VA (Greensville County) (Belden et al. 2004) and e. NC south to ne. FL and Panhandle FL, west to OK and TX, inland in c. TN. [= RAB, K, MC, W, WH, Z; > *E. integrifolium* - S; > *E. ludovicianum* Morong - S]

* *Eryngium maritimum* Linnaeus, Sea Holly. Ocean and soundside dunes; presumably native of Europe. July. [= RAB, C, G, K, MC, Z]

Eryngium prostratum Nuttall ex A.P. de Candolle, Creeping Eryngo, Spreading Eryngo. Floodplain forests, bogs, pond margins, moist ditches and lawns, other moist, open habitats; definitely native southward, perhaps only rather recently spread to the northern parts of our area. May-October. Se. VA south to FL, west to OK and TX. [= RAB, C, GW, K, MC, S, W, WH, Z; > *E. prostratum* var. *prostratum* - F, G; > *E. prostratum* var. *disjunctum* Fernald - F, G]



Eryngium yuccifolium* Michaux var. *synchaetum A. Gray ex Coulter & Rose, Southern Rattlesnake-master. Wet savannas, especially those over calcareous clay soils. June-August. A Southeastern Coastal Plain endemic: se. NC to s. FL and west across the Gulf Coastal Plain, the exact range limits obscure. The distinction between the two varieties, seemingly clear in NC and elsewhere in states bordering the Atlantic, seems to become less straightforward farther west, as in LA and AR. In NC it has been seen in Pender, Brunswick, Columbus, Bladen, and Robeson counties. [= RAB, K, MC, Z; < *E. yuccifolium* – GW, WH; = *E. synchaetum* (Gray ex Coulter & Rose) Coulter & Rose – S]

Eryngium yuccifolium* Michaux var. *yuccifolium, Northern Rattlesnake-master. Diabase barrens and glades, olivine barrens, pine savannas, pine flatwoods over loamy or clay soils, other open sites with at least periodic moisture, generally in sites showing some prairie affinities. June-August. Widespread in southeastern and midwestern North America, the exact range limits of the typical variety and var. *synchaetum* somewhat obscure. [= RAB, K, MC, Z; < *E. yuccifolium* – C, F, G, GW, W, WH; = *E. aquaticum* – S, misapplied]

***Falcaria* Fabricius 1827 (Sickleweed)**

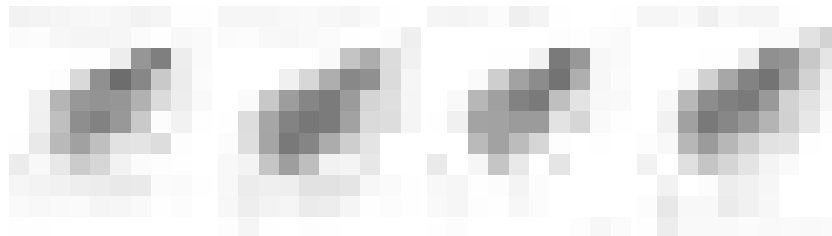
A monotypic genus, an herb, of Eurasia. References: Mathias & Constance (1945)=MC.

* ***Falcaria vulgaris* Bernhardt**, Sickleweed. Disturbed areas; native of Eurasia. July-September. [= C, F, K, Pa; = *F. sioides* (Wibel) Ascherson – G, MC, WV]

***Foeniculum* P. Miller 1763 (Fennel)**

A genus of 4-5 species, herbs, of Asia and Mediterranean Europe. References: Mathias & Constance (1945)=MC.

* ***Foeniculum vulgare* P. Miller**, Fennel. Fields, dredge spoil, old gardens, waste places, vacant lots, roadsides; native of Mediterranean Europe. June-August; August-September. This is the common garden fennel, cultivated for its seeds, leaves, "bulbs" (finocchio), and ornamental appearance (especially bronze forms), widely used in Mediterranean cuisines. [= RAB, C, F, G, K, MC, W, WH, WV; = *Foeniculum foeniculum* (Linnaeus) Karsten – S]



***Harperella* Rose 1906 (Harperella)**

A genus of 3 species, herbs, temperate, of e. North America. Based on work of Feist & Downie (2008), *Harperella* should be (re)-separated from *Ptilimnium*. References: Feist & Downie (2008); Easterly (1957)=Z; Kral (1981a)=Y; Rose (1911)=X; Mathias & Constance (1945)=MC; Maddox & Bartgis (1990); Kress, Maddox, & Roesel (1994).

- 1 Leaves 8-30 cm long; plants 4-10.5 dm tall, not proliferating from the nodes (strictly annual); rays 10-25 mm long, 6-15 per inflorescence; pedicels 3.0-6.0 mm long; [of still water of Coastal Plain ponds].....***H. nodosa***
- 1 Leaves 4-12 (-15) cm long; plants 1-5 (-8) dm tall, proliferating from the nodes (thus adventitiously perennial); rays 1-9 mm long, 2-5 (-9) per inflorescence; pedicels 0.5-2.0 (-2.5) mm long; [of shoals, outcrops, and banks of rocky streams or rivers]
- 2 Umbellets 6-15-flowered; [n. AL and AR].....***H. fluviatilis***
- 2 Umbellets 2-8-flowered; [w. MD, e. WV, VA, and c. NC].....***H. vivipara***

***Harperella nodosa* Rose**, Harperella. Rocky riverbeds, upland depression ponds, seepage on granite flatrocks. June-August. Disjunct and fragmented in distribution: w. MD, e. WV, VA, and c. NC; SC and c. GA; N. AL; AR. Three taxa are sometimes recognized, but recent studies (molecular and morphological) show insufficient reliable bases for separating them (M.A. Feist 2012, pers. comm.). See references for additional information and discussion. Belden et al. (2004) provide details on the Virginia occurrence in Aquia Creek, Stafford County. [= *Ptilimnium nodosum* (Rose) Mathias – C, K, Y; > *Harperella fluviatilis*

Rose – S, X; = *Harperella nodosa* Rose – S, X; > *Harperella vivipara* Rose – X; > *Ptilimnium fluviatile* (Rose) Mathias – G, GW, RAB, WV, Z; > *Ptilimnium nodosum* (Rose) Mathias – GW, MC, RAB, Z; > *Ptilimnium viviparum* (Rose) Mathias – F, MC; > *Ptilimnium fluviatilis* – MC, orthographic variant;

Helosciadium W.D.J. Koch 1824

A genus of 5 species, herbs, of Eurasia. References: Ronse et al. (2010)=Z; Mathias & Constance (1945)=MC.

* ***Helosciadium nodiflorum*** (Linnaeus) W.D.J. Koch, Fool's Watercress. Disturbed areas near old seaports; native of Eurasia. [= Z; = *Apium nodiflorum* (Linnaeus) Lagasca y Segura – RAB, K, MC; = *Ciclospermum nodiflorum* (Linnaeus) W.D.J. Koch – S]

Heracleum Linnaeus 1753 (Cow-parsnip, Hogweed)

A genus of about 65 species, herbs, north temperate (and tropical mountains). References: Poindexter in FNA (in prep.); Mathias & Constance (1945)=MC; Yu et al. (2011).

- 1 Oil tubes on the fruit (0.6-) 0.8-1.0 mm wide; rays of the principal umbel 50-150; plant to 5.5 m in height, the hollow stems to 15 cm in diameter; lower leaves to 25 dm long; umbels to 5 dm across; [rare alien].....***H. mantegazzianum***
 1 Oil tubes on the fruit 0.3-0.5 (-0.8) mm wide; rays of the principal umbel 15-30 (-45); plant to 3 m in height, the hollow stems to 5 cm in diameter; lower leaves to 10 dm long; umbels to 3 dm across; [native].....***H. maximum***

* ***Heracleum mantegazzianum*** Sommier & Levier, Giant Hogweed. Disturbed areas; pastures, native of the Caucasus Mountains. June-August. Introduced and well-established in ne. North America; recently found in NC (Poindexter, Weakley, & Denslow 2011). [= C, FNA, K, Pa]

Heracleum maximum W. Bartram, Masterwort, Cow-parsnip, American Hogweed. Forests, roadbanks, meadows, forest openings. May-July; July-August. NL (Labrador) west to AK, south to DE, PA, OH, IN, IL, MO, KS, NM, AZ, CA, and in the Appalachians south to w. NC, e. TN, and n. GA; also in e. Siberia. The synonymy reflects two questions, one nomenclatural, the other taxonomic. North American plants are very similar to European ones, leading some workers to treat our plants as a subspecies or variety of the European. If recognized as specifically distinct from Eurasian *H. sphondylium*, the nomenclatural question is whether to accept Bartram's (older) name as validly published. [= F, FNA, GW, K, WV; = *H. lanatum* Michaux – RAB, C, G, MC, Pa, W; = *H. sphondylium* Linnaeus var. *lanatum* (Michaux) Dorn; = *H. sphondylium* Linnaeus ssp. *montanum* (Schleicher ex Gaudin) Briquet]

Imperatoria Linnaeus 1753 (Masterwort)

A genus of 3 species, of Eurasia. References: Ball in FNA (in prep.); Mathias & Constance (1945)=MC.

* ***Imperatoria ostruthium*** Linnaeus, Masterwort. Disturbed areas; native of Europe. May-July. Naturalized in ne. United States; reported from Carter County, TN (Chester, Wofford, & Kral 1997), and from scattered localities in PA (Rhoads & Klein 1993). [= FNA, MC, WV; = *Peucedanum ostruthium* (Linnaeus) W.D.J. Koch – C, K, Pa]



Ligusticum Linnaeus 1753 (Lovage)

A genus of 40-50 species, herbs, circumboreal and north temperate. References: Mathias & Constance (1945)=MC.

Ligusticum canadense (Linnaeus) Britton, Nondo, Angelico, American Lovage. Moist to dryish, nutrient-rich forests and woodlands. June-July; August-September. S. PA south to c. GA, AL, and Panhandle FL; also in s. MO and n. AR, centered in the Southern and Central Appalachians and the Ozarks-Ouachitas, but extending considerably into adjacent provinces, and even slightly into the Coastal Plain. A distinctive character is the straightish and toothless basal portion of each leaflet. [= RAB, C, F, G, K, MC, Pa, S, W, WV]

Lilaeopsis Greene 1891 (Lilaeopsis)

A genus of about 13 species, herbs, warm temperate and tropical, of America, Australia, and New Zealand. References: Bone et al. (2011); Affolter (1985)=Z; Mathias & Constance (1945)=MC; Hatch & Slack (2008).

- 1 Leaves 7-30 (or more) cm long, often spatulate, up to 11 mm wide toward the apex, with (7-) 10-20 transverse septae; peduncles much shorter than the leaves; pedicels 5-10 mm long ***L. carolinensis***
- 1 Leaves 1-5 cm long, linear (rarely spatulate), 1-2 (-5) mm wide, with 4-8 (-10) transverse septae; peduncles about as long as or longer than the leaves; pedicels 3-4 mm long..... ***L. chinensis***

Lilaeopsis carolinensis Coulter & Rose, Carolina Lilaeopsis. Freshwater marshes and pondshores, ditches, interdune ponds, shores of brackish to freshwater estuarine sounds and rivers. May-June. Se. VA south to FL and west to e. TX (Hatch & Slack 2008); it is also found in South America (Argentina, Brazil, and Paraguay). [= RAB, F, GW, K, S, WH, Z; = *L. attenuata* (Hooker & Arnott) Fernald – C, G, MC]

Lilaeopsis chinensis (Linnaeus) Kuntze, Marsh Lilaeopsis. Brackish and freshwater tidal marshes, especially in mud-flats in the intertidal zone. May-June. NS south to FL and west to TX (Brown & Marcus 1998). The epithet "*chinensis*" is a misnomer; the species is native to e. North America and has nothing to do with China. [= RAB, F, G, GW, K, MC, WH, Z; = *L. lineata* (Michaux) Greene – S]

Oenanthe Linnaeus 1753 (Water-dropwort)

A genus of ca. 25-40 species, herbs, of north temperate and Old World tropical areas. References: Mathias & Constance (1945)=MC; Fading & Watson (2005).

- * ***Oenanthe aquatica*** (Linnaeus) Poir. Native of Europe west to w. Asia. Reported for MD Coastal Plain by Kartesz (2010). [= K2, MC] {investigate}
- * ***Oenanthe javanica*** A.P. de Candolle, Water Celery, Water Parsley, Java Dropwort, Seri. Edges of swamp forests, ditches, seemingly with the ability to spread rapidly; native of Asia. July-August. [= K2] {add to synonymy}



Osmorhiza Rafinesque 1819 (Sweet Cicely, Wild Chervil)

A genus of about 10 species, herbs, of temperate North America, temperate South America, montane tropical Central and South America, and Asia (Wen et al. 2002). References: Lowry & Jones (1979)=Z; Mathias & Constance (1945)=MC; Wen et al. (2002).

- 1 Styles plus stylopodium 0.5-1.5 mm long; flowers 4-7 (-10) per umbellet (including withering staminate flowers); flowers 3-4 mm across; umbellets 3-5 (-6) per umbel, on rays 2-8 (-10) cm long, the umbel therefore relatively uncrowded; roots (and foliage) not strongly anise-scented..... ***O. claytonii***
- 1 Styles plus stylopodium 2.0-3.5 mm long; flowers (6-) 9-18 per umbellet (including withering staminate flowers); flowers 5-6 mm across; umbellets 4-6 (-8) per umbel, on rays 1.5-5.0 (-7.5) cm long, the umbel therefore rather crowded; roots (and foliage) strongly anise-scented... ***O. longistylis***

Osmorhiza claytonii (Michaux) C.B. Clarke, Bland Sweet Cicely, Hairy Sweet Cicely. Cove forests, other moist, fertile forests. April-May; May-June. NS and QC west to SK, south to NC, n. GA, AL, and AR. [= RAB, C, F, G, K, MC, Pa, W, Z; = *O. claytoni* – WV; = *Osmorrhiza claytonii* – S, misspelling]

Osmorhiza longistylis (Torrey) A.P. de Candolle, Anise-root, Smooth Sweet Cicely. Moist, fertile forests. April-May; May-June. QC west to SK, south to GA, TX, and CO. [= RAB, C, F, G, K, Pa, W, Z; > *O. longistylis* var. *brachycoma* Blake – F, MC, WV; > *O. longistylis* var. *longistylis* – F, MC, WV; > *O. longistylis* var. *villicaulis* Fernald – F, MC; = *Osmorrhiza longistylis* – S, misspelling]



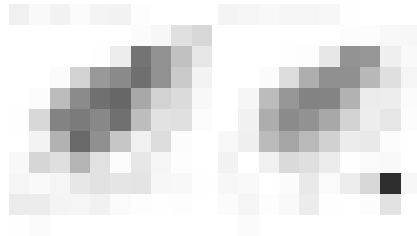
***Oxypolis* Rafinesque 1825 (Dropwort, Hog-fennel, Cowbane)**

A genus of about 4 species, herbs, of temperate North America. Based on work of Feist et al. (2012) and Feist & Downie (2008), *Oxypolis* has been limited to the species with compound leaves, distributed in eastern and w. North America. The 3 taxa with “quill-“ or “rachis-leaves” are placed in *Tiedemannia*, endemic to se. United States and the West Indies. References: Feist et al. (2012); Feist & Downie (2008); Mathias & Constance (1945)=MC; Kral (1981); Tucker et al. (1983).

- 1 Leaflets (5-) 7-11 (-13), pinnately disposed, usually toothed (rarely entire), net-veined..... *O. rigidior*
 1 Leaflets 1-3, entire, palmately disposed, entire, parallel-veined *O. ternata*

Oxypolis rigidior (Linnaeus) Rafinesque, Cowbane, Pig-potato. Bogs, seepages, swamps, wet meadows, streambanks. August-October; October-November. NY west to MN and south to n. FL and TX. Very variable in the size and shape of the leaflets. [= RAB, C, G, GW, K, MC, Pa, W, WH; > *O. rigidior* var. *rigidior* – F, WV; > *O. rigidior* var. *ambigua* (Nuttall) Robinson – F, WV; > *O. rigidior* – S; > *O. turgida* Small – S]

Oxypolis ternata (Nuttall) A. Heller, Savanna Cowbane. Wet pine savannas, sandhill seepages. September-October; October-November. Scattered from se. VA south to Panhandle FL; alleged occurrences in e. TX are based on misidentifications of narrow-leafleted forms of *O. rigidior* (Sorrie et al. 2003). Edmondson’s (2005) change of the name to *O. denticulata* is incorrect; the type of *O. denticulata* is unquestionably *O. rigidior* (Feist 2009). [= *O. ternata* (Nuttall) A. Heller – RAB, C, F, G, GW, K, MC, S, WH; = *O. denticulata* (Baldwin) J.R. Edmondson, misapplied]

***Pastinaca* Linnaeus 1753 (Parsnip)**

A genus of about 14 species, herbs, of temperate Eurasia. References: Mathias & Constance (1945)=MC.

- * ***Pastinaca sativa*** Linnaeus, Parsnip. Roadsides, fields; native of Europe. June-July; July-August. [= RAB, C, F, K, MC, Pa, S, W, WV; > *P. sativa* var. *hortensis* Ehrhart – G; > *P. sativa* var. *sativa* – G]

***Perideridia* Reichenbach 1837**

A genus of about 13 species, perennial herbs, mainly of w. North America. References: Mathias & Constance (1945)=MC.

Perideridia americana (Nuttall ex A.P. de Candolle) Reichenbach, Eastern Yampah. East to the Nashville Basin of c. TN (Davidson, Rutherford, Williamson, and Giles counties) (Chester, Wofford, & Kral 1997; Estes 2004). [= C, F, G, K, MC; = *Eulophus americanus* Nuttall ex A.P. de Candolle – S]

***Petroselinum* J. Hill 1756 (Parsley)**

A genus of about 1-2 species, annual to biennial herbs, of Mediterranean Europe. References: Nesom in FNA (in prep.); Mathias & Constance (1945)=MC.

- * ***Petroselinum crispum*** (P. Miller) Nyman ex A.W. Hill, Parsley, Garden Parsley. Commonly cultivated in gardens, rarely persistent or weakly escaped; native of Mediterranean Europe. June-July. [= C, F, FNA, G, K, MC, RAB, WH; = *Apium petroselinum* Linnaeus – S]

***Pimpinella* Linnaeus 1753**

A genus of about 150 species, herbs, of Europe and Africa. References: Mathias & Constance (1945)=MC.

- * ***Pimpinella saxifraga*** Linnaeus ssp. *saxifraga*, Burnet-saxifrage. Fields and roadsides, disturbed areas; native of Eurasia. [= K, MC; < *P. saxifraga* – C, F, G, Pa]

***Polytaenia* A.P. de Candolle 1830**

A genus of 3 species, herbs, of North America. References: Nesom in FNA (in prep.) ; Nesom (2012b)=Z; Mathias & Constance (1945)=MC.

Polytaenia nuttallii A.P. de Candolle, Prairie-parsley. Prairies, glades. MI west to NE, south to TX and NM, occurring as a disjunct eastward in prairie-like or glade situations in c. TN (Chester, Wofford, & Kral 1998; Nesom 2012), c. KY, AL, MS, and e. LA (Nesom 2012). [= C, F, FNA, G, K, MC, Z; = *Pleiotaenia nuttallii* (A.P. de Candolle) Coulter & Rose – S]



Ptilimnium Rafinesque 1819 (Bishopweed, Harperella)

A genus of 5 species, annual and perennial herbs, temperate, of e. North America. Based on work of Feist & Downie (2008), *Ptilimnium* should be re-split into two genera, *Harperella* and *Ptilimnium* s.s. References: Feist (2010)=V; Feist & Downie (2008); Easterly (1957)=Z; Kral (1981a)=Y; Rose (1911)=X; Mathias & Constance (1945)=MC; Weakley & Nesom (2004)=Q; Kress, Maddox, & Roesel (1994).

- 1 Leaves reduced to hollow, linear, nodose-septate quills, consisting of the petiole and leaflet-less rachis, undivided [see *Harperella*]
- 1 Leaves dissected into filiform or linear segments.
 - 2 Styles on fruit (0.8-) 1-2 mm long; plant perennial from a small rounded corm at base of stem; rachis of mid-stem leaves with (8-) 10-16 nodes, each node frequently bearing >4 whorled segments; flowering July-October; fruiting mid July-October; fruits 2.2-4 mm long *P. costatum*
 - 2 Styles on fruit 0.1-0.6 mm long; plant annual; rachis of mid-stem leaves with 2-10 nodes, each bearing 1-3 segments; flowering April-August; fruiting late May-September; fruits 1.0-4.2 mm long.
 - 3 Styles on fruit (0.3-) 0.4-0.6 mm long; rachis of mid-stem leaves with 2-4 (-5) nodes; fruits 1.0-1.9 mm long *P. nuttallii*
 - 3 Styles on fruit 0.1-0.2 mm long; rachis of mid-stem leaves with <10 nodes.; fruits 1.4-4.2 mm long
 - 4 Fruits 2.7-4.2 mm long; umbellets usually 5-7 per umbel; flowers usually 5-7 (-8) per umbellet; bracts subtending the umbels and umbellets with 1 (-3) linear segments; leaf segments of mid-stem leaves 15-30 (40), capillary to linear, 0.5-1.9 mm wide; flowering May-early June; fruiting late May-July; [plants of tidal marshes] *P. ahlesii*
 - 4 Fruits 1.4-2.0 mm long; umbellets usually 10 or more per umbel; flowers usually 10 or more per umbellet; bracts subtending the umbel and umbellets with (1-) 3-5 linear segments; leaf segments of mid-stem leaves 50 or more, capillary, usually < 0.5 mm wide (except in submersed leaves); flowering June-August, fruiting July-September; [plants of a wide variety of wet habitats, including tidal marshes] *P. capillaceum*

Ptilimnium ahlesii Weakley & G.L. Nesom, Carolina Bishopweed, Coastal Bishopweed. Cp (GA, NC, SC): tidal freshwater marshes; rare. May-June; Late May-July. This species, recognized but not validly named by H.E. Ahles, ranges from se. NC (Onslow, New Hanover, and Brunswick counties) south through SC to e. GA. The lowermost leaves (withering prior to fruiting) sometimes lack leaflets and thus approach in appearance the quill-leaves of *P. fluviatile* and *P. nodosum*. Feist (2010) expresses doubt as to its distinctiveness. [= Q; < *P. capillaceum* – RAB, V; = *P. macrospermum* – K, nomen nudum]

Ptilimnium capillaceum (Michaux) Rafinesque, Eastern Bishopweed, Atlantic Bishopweed. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): ditches, marshes, other wet places; common. June-August; July-September. MA, NY, and MO south to s. FL and TX. [= RAB, C, F, G, GW, K, MC, Pa, Q, S, W, WH, Z; < *P. capillaceum* – RAB, V]

Ptilimnium costatum (Elliott) Rafinesque, Big Bishopweed. Cp (NC), Pd (GA), Mt (GA): tidal freshwater marshes (NC), wet prairies (GA), bottomland hardwood forests (GA); rare. July-October; mid July-October. Se. NC south to GA, and west to IL, MO, and AR (material from LA and TX is of *P. texense*); it is rare and disjunct through much of that range. It has the potential to be a great deal larger and coarser than any other member of the genus, but individuals will be encountered no larger than a fairly robust plant of *P. ahlesii* or *P. capillaceum*. [= RAB, C, F, G, GW, K, MC, Q, S, V, Z]

Ptilimnium nuttallii (A.P. de Candolle) Britton, Midwestern Bishopweed. Marshes, ditches, wetlands. April-July; late May-early August. KY, MO, and KS south to se. TN (Chester, Wofford, & Kral 1997), s. AL, s. LA, and e. TX. [= C, F, G, GW, K, MC, Q, S, V, Z]



Sanicula Linnaeus 1753 (Sanicle, Snakeroot)

A genus of about 40 species, herbs, nearly cosmopolitan. References: Pryer & Phillippe (1989)=Z; Mathias & Constance (1945)=MC. Key based in part on Z.

Identification note: *Sanicula* species cannot be reliably determined from sterile plants; fruits or flowers are required for identification. An important character is the length of the styles in relation to the calyx and/or to the bristles on the fruit. In the longer-styled species, the styles are slender and curved outward, sometimes enmeshed in the bristles, but distinctly longer than them or than the calyx. In the shorter-styled species, the styles are straight to slightly curved, shorter than or about as long as the bristles, and more or less included in the calyx. In most species the calyx is inconspicuous, but consists of 5 deltoid to narrowly triangular (or even subulate) calyx lobes, 0.4-2.0 mm long, at the summit of the schizocarp (the fruit).

- 1 Styles 1.5× or more as long as the calyx; umbellets dimorphic – some contain both perfect and staminate flowers, while others contain staminate flowers only (except sometimes *S. canadensis* var. *grandis*, which may have polygamous umbellets only); larger leaves 3-7-lobed.
- 2 Calyx lobes 0.4-0.7 mm long, deltoid, flexible or weak in texture, the apices acute to obtuse; petals yellowish green, much longer than the calyx.....*S. odorata*
- 2 Calyx lobes 0.7-2.0 mm long, narrowly triangular to subulate, rigid in texture, the apices acute-acuminate; petals white or greenish-white, equal to or slightly longer than the calyx.
- 3 Styles about 1.5× as long as the calyx, inconspicuously exerted from between the calyx lobes and recurved; umbellets usually polygamous (rarely some staminate only); polygamous umbellets with 6-18 flowers (3 perfect and 3-15 staminate); fruit with a short but distinct pedicel 0.5-1.0 mm long; bases of fruit bristles dilated but not bulbous, often minutely papillose...*S. canadensis* var. *grandis*
- 3 Styles > 2× as long as the calyx, conspicuously exerted from the calyx and recurved; umbellets dimorphic, some polygamous and others staminate only; polygamous umbellets with 12-120 flowers (3-4 perfect and the remainder staminate); fruits sessile to subsessile; bases of fruit bristles prominently bulbous, with a minutely warty-reticulate surface pattern..... *S. marilandica*
- 1 Styles shorter than (or rarely as long as) the calyx; umbellets usually monomorphic (all containing both perfect and staminate flowers), with staminate flowers 1-7 per umbellet; larger leaves 3-foliolate (the lateral leaflets often deeply lobed) or rarely 5-foliolate.
- 4 Sepals on mature fruit connivent, forming a beak-like structure equaling or usually exceeding the adjacent fruit bristles, the tips of the sepals subulate and incurved; pedicels of staminate flowers 3-8 mm long; [mostly of the Mountains in our area, rarely in the Piedmont of VA].....*S. trifoliata*
- 4 Sepals on mature fruit somewhat spreading, loose, inconspicuous and immersed in the adjacent fruit bristles, the tips of the sepals acute or narrowly acute, straight; pedicels of staminate flowers 1-2 (-3) mm long; [collectively widespread in our area].
- 5 Plant a perennial, from thickened, cordlike roots; umbellets with 7-9 flowers (3 perfect and 4-6 staminate) *S. smallii*
- 5 Plant a biennial, from slender, fibrous roots; umbellets with 4-6 flowers (3 perfect and 1-3 staminate).
- 6 Larger leaves mostly 8-15 cm across; leaf teeth weak, hyaline; [widespread in our area, mostly not in the Coastal Plain south of VA]*S. canadensis* var. *canadensis*
- 6 Larger leaves mostly 3-8 cm across, thick in texture; leaf teeth stiff, sharp, and prominently whitened; [of the Coastal Plain in our area].....*S. canadensis* var. *floridana*

Sanicula canadensis Linnaeus var. *canadensis*, Canada Sanicle, Black Snakeroot. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): dry-mesic to mesic forests; common. April-May; June-July. VT and s. ON west to MN and SD, south to Panhandle FL and e. TX. [= F, G, Pa, Z; < *S. canadensis* – RAB, C, MC, W, WH, WV; < *S. canadensis* var. *canadensis* – K; = *S. canadensis* – S]

Sanicula canadensis Linnaeus var. *floridana* (Bicknell) H. Wolff, Florida Sanicle, Florida Snakeroot. Cp (FL, GA, NC, SC, VA): dry-mesic to mesic, sandy forests, often associated with *Fagus grandifolia* (and southward *Magnolia grandiflora*); common (uncommon north of GA). April-May; June-July. Se. VA south to c. peninsular FL, west to s. MS, in the Coastal Plain. Additional differences between var. *floridana* and var. *canadensis* should be investigated. They may not be worthy of taxonomic differentiation. [= F, G; < *S. canadensis* – RAB, C, MC, WH; < *S. canadensis* var. *canadensis* – K; = *S. floridana* Bicknell – S]

Sanicula canadensis Linnaeus var. *grandis* Fernald, Large Sanicle. {herbarium work, and information on habitats, rarity}. June-August. VT and n. NY west to s. ON, WI, se. MN, and n. IA, south to PA, n. WV, n. KY, c. IL, and allegedly south in the Mountains to VA and/or NC. [= F, K, Pa, Z; < *S. canadensis* – RAB, C, MC, W, WV]

Sanicula marilandica Linnaeus, Maryland Sanicle, Black Snakeroot. Mesic to dry-mesic nutrient-rich forests. May-June; July-August. QC and NL (Newfoundland) west to BC, south to Panhandle FL, se. LA, NM, and WA. The Coastal Plain populations (designated as var. *petiolulata* by Fernald) are disjunct from the main range of distribution, occur in rather different (more acidic) habitats, and warrant additional study. The primary morphological difference indicated by F is that var. *petiolulata* has "the leaflets of 1 or 2 lower cauline leaves on petiolules 1.5-5 cm long" (vs. sessile or short-petiolate). [= RAB, C, K, MC, Pa, W, WH, WV, Z; > *S. marilandica* var. *marilandica* – F, G; > *S. marilandica* var. *petiolulata* Fernald – F, G; = *S. marylandica* – S, orthographic variant]

Sanicula odorata (Rafinesque) K.M. Pryer & L.R. Phillippe, Clustered Sanicle, Clustered Snakeroot, Yellow-flowered Snakeroot, Fragrant Snakeroot. Mesic to dry-mesic nutrient-rich forests. May-June; June-July. NS and QC west to MN and e. SD, south to Panhandle FL and e. TX. [= K, Pa, WH, Z; = *S. gregaria* Bicknell – RAB, C, F, G, MC, S, W, WV]

Sanicula smallii Bicknell, Southern Sanicle, Small's Sanicle. Mesic to dry-mesic forests. April; May-June. C. VA, sw. VA, s. WV, KY, se. MO, south to Panhandle FL, se. LA, c. LA, and e. TX. [= RAB, C, F, G, K, MC, S, W, WH]

Sanicula trifoliata Bicknell, Beaked Sanicle, Large-fruited Sanicle. Cove forests, other mesic, nutrient-rich forests. May; June-July. QC and VT west to s. WI and se. MN, south to n. VA, w. NC, n. GA, c. TN, c. IL, and ne. IA. [= RAB, C, F, G, K, MC, Pa, S, W, WV, Z]



Scandix Linnaeus 1753 (Venus'-comb)

A genus of about 15-20 species, herbs, temperate, of Eurasia. References: Mathias & Constance (1945)=MC.

* *Scandix pecten-veneris* Linnaeus, Venus'-comb, Shepherd's-needle. Roadsides, fields, disturbed areas; native of Mediterranean Europe. March-April. [= RAB, C, G, K, MC, S, WH]

Seseli Linnaeus

A genus... References: Mathias & Constance (1945)=MC.

* *Seseli libanotis* (Linnaeus) J.F.W. Koch, Moon Carrot. Disturbed areas; native of Mediterranean Europe. July-September. [= C, G, MC]

Sium Linnaeus 1753 (Water-parsnip)

A genus of about 9 species, perennial herbs, of the northern hemisphere. References: Nesom in FNA (in prep.); Mathias & Constance (1945)=MC.

Sium suave Walter, Water-parsnip. Freshwater marshes, brackish marshes, swamp forests. June-August; August-October. NL (Newfoundland) west to AK, south to Panhandle FL, n. peninsular FL, and CA; e. Russia, China, Korea, and Japan. The plant can be very coarse, up to 3 m in height and the stem to 5 cm in diameter. The taxonomic status of *Sium floridanum* Small, known from se. VA south to GA, needs additional investigation; it is probably just a depauperate shade form. [= FNA, C, K, Pa, RAB, W, WH, WV; > *S. suave* – F, G, GW, MC; > *S. floridanum* Small – F, G, GW, MC, S; > *S. cicutaeifolium* Schrank – S]

Smyrniium Linnaeus 1753

A genus of ca. 7 species, herbs, native of Europe.

* *Smyrniium perfoliatum* Linnaeus. Moist forests; native of Mediterranean Europe. Found in a mesic forest in Cherokee County, AL, apparently introduced via seed in nursery material (Keener 2007).



Spermolepis Rafinesque 1825 (Spermolepis)

A genus of 5 species, herbs, of North America, Argentina, and Hawaii. References: Nesom (2012c); Mathias & Constance (1945)=MC.

- 1 Ovary and fruit with hooked bristles.....*S. echinata*
- 1 Ovary and fruit with pointed hairs or rounded tubercles.
 - 2 Ovary and fruit with sharply pointed thick-based, single-celled hairs; primary rays of the umbel widely spreading to weakly ascending, not greatly differing in length.....*S. divaricata*
 - 2 Ovary and fruit with multicellular tubercles, lacking a sharp tip; primary rays of the umbel strongly ascending, differing conspicuously in length*S. inermis*

Spermolepis divaricata (Walter) Rafinesque ex Seringe, Southern Spermolepis, Roughfruit Spermolepis. Sandy roadsides, disturbed areas. April-May; May-June. VA south to s. FL, west to TX, and north in the interior to KS and MO. Apparently native in our area, though weedy in behavior, and perhaps introduced only in VA. [= RAB, C, G, GW, K, MC, S, WH, Z]

* *Spermolepis echinata* (Nuttall ex A.P. de Candolle) Heller, Bristlefruit Spermolepis, Hooked Spermolepis. Sandy roadsides, disturbed areas; native of sc. United States and n. Mexico (Coahuila and Tamaulipas). April; May. [= RAB, C, F, G, K, MC, S, WH, Z]

Spermolepis inermis (Nuttall ex A.P. de Candolle) Mathias & Constance, Western Spermolepis. Calcareous prairies in the Mountains (GA), disturbed areas in the Coastal Plain (NC). Native in sc. United States and n. Mexico (Coahuila), scattered eastward as a native. April; May. [= RAB, C, F, G, K, MC, Z; ? *S. patens* (Nuttall ex A.P. de Candolle) B.L. Robinson – S]

Taenidia (Torrey & A. Gray) Drude 1898 (Yellow Pimpernel)
(by D.B. Poindexter and A.S. Weakley)

A genus of 2 species, perennial herbs, of temperate e. North America. Although *Taenidia montana* has been traditionally separated into a monotypic genus, *Pseudotaenidia*; Cronquist (1982) has suggested that *Pseudotaenidia* be submerged in *Taenidia*. Cronquist's argument that the two monotypes are most closely related to one another is very possibly correct and has been generally followed since, but awaits further assessment with molecular methods. References: Mathias & Constance (1945)=MC; Cronquist (1982)=Z.

- 1 Fruit slightly compressed laterally (perpendicular to the commissure), not winged; fresh plant with celery-like odor; [widespread in our area].*T. integerrima*
- 1 Fruit dorsally compressed (parallel to the commissure), winged; fresh plant with anise-like odor; [endemic to the Central Appalachians of w. VA and e. WV north to w. MD and sc. PA] *T. montana*

Taenidia integerrima (Linnaeus) Drude, Yellow Pimpernel. In rocky, dry to dry-mesic forests and woodlands over mafic or calcareous rock, such as diabase, amphibolite, calcareous siltstone, calcareous shale, or limestone. April-May; May-June. QC, ON, MN, and SD south to c. GA, AL, MS, LA, and TX. [= RAB, C, F, G, K, MC, Pa, S, W, WV, Z]

Taenidia montana (Mackenzie) Cronquist, Mountain Pimpernel, Shale-barren Pimpernel. Shale barrens and rocky woodlands over shale, greenstone, calcareous sandstone, and other calcareous and mafic rocks. May-June. A Central Appalachian endemic: w. VA and e. WV north to w. MD and sc. PA. [= C, K, Pa, Z; = *Pseudotaenidia montana* Mackenzie – F, G, MC, W, WV; = – C, K, Z]



Thaspium Nuttall 1818 (Meadow-parsnip)

A genus of 3-4 species, herbs, temperate, of e. North America. References: Mathias & Constance (1945)=MC; Cooperider (1985)=Z; Coulter & Rose (1900)=Y.

Identification notes: Because *Thaspium* and *Zizia* are often confused when not in fruit, a combined key emphasizing vegetative characters has been provided; it may also be helpful to use the key to genera, and if a clear answer is obtained, then use the *Thaspium-Zizia* combined key, skipping taxa of the "wrong" genus

- 1 Leaves 3-4-ternate, the very numerous ultimate segments 1-3 mm wide; petals white (fading to yellowish tan in older herbarium material)*Thaspium pinnatifidum*
- 1 Leaves simple, 3-foliolate, or 2-3-ternate, the final leaflets or segments > 5 mm wide; petals yellow, maroon, or pale yellow.
 - 2 Basal leaves 2-ternate or more divided.
 - 3 Leaflets coarsely and rather lacerately serrate or incised, many of the teeth at least 2 mm long as measured on the shorter side; umbel rays 8-10, < 3.5 cm long even in fruit; petals pale to creamy yellow*Thaspium barbinode*
 - 3 Leaflets finely to coarsely serrate, but not lacerate or incised, few if any of the teeth > 2 mm long as measured on the shorter side; umbel rays mostly either more in number or longer; petals golden yellow.

- 4 Teeth of the leaflets fine, averaging (4-) 5-10 per cm of margin, acuminate (the 2 sides making an angle of about 45 degrees); umbel rays (8-) 10-18, in fruit 2.5-4 (-5) cm long; basal leaves many-foliolate, the leaflets mostly acuminate; fruit ca. 2x as long as wide.....*Zizia aurea*
- 4 Teeth of the leaflets coarse, averaging (1-) 2-3 (-4) per cm of margin, acute to obtuse (the 2 sides making an angle of about 90 degrees); umbel rays 4-10 (-12), the longest to 11 cm long in fruit (some on a plant at least 5 cm long); basal leaves 3-5 (-7)-foliolate, the leaflets mostly rounded to obtuse at the apex; fruit 1-1.5x as long as wide*Zizia trifoliata*
- 2 Basal leaves simple or 3-foliolate.
- 5 Teeth of the leaflets coarse, averaging 2-3 (-4) per cm of margin, the long side of most of the teeth 2-10 mm long; basal leaves mostly 3-foliolate (or more divided); middle and upper stem leaves equally or more divided than the basal leaves (the most divided leaves usually those of the mid-stem).....*Zizia trifoliata*
- 5 Teeth of the leaflets fine, averaging 4-10 per cm of margin, the long side of most of the teeth 0.5-2 (-4) mm long; basal leaves simple (and cordate) or 3-foliolate; middle and upper stem leaves 3-foliolate (rarely simple).
- 6 Teeth relatively acute, without a well-developed callous tip and a thickened, translucent border (use 10x); lower portion of stem puberulent, the upper nodes also usually puberulent (use 10x); leaf margins often ciliate; umbel rays 7-15; flowers golden yellow...*Zizia aptera*
- 6 Teeth relatively obtuse, with a well-developed callous tip and a thickened, translucent border (use 10x); lower portion of stem glabrous, the upper nodes sometimes minutely roughened; leaf margins glabrous and hyaline; umbel rays 4-10 (-11); flowers maroon or golden yellow.
- 7 Flowers golden yellow.....*Thaspium trifoliatum* var. *aureum*
- 7 Flowers dark maroon.....*Thaspium trifoliatum* var. *trifoliatum*

Thaspium barbinode (Michaux) Nuttall. Moist forests. April-May; July-August. NY and ON west to IA, south to c. GA, c. AL, and ne. MO. The hispid, purple-tinged leaf sheath is a good additional character for this species. [= RAB, S, W; = *T. barbinode* var. *barbinode* - F, Y; < *T. barbinode* - C, G, K, MC, Pa, WV, Z (also see *T. chapmanii*)]

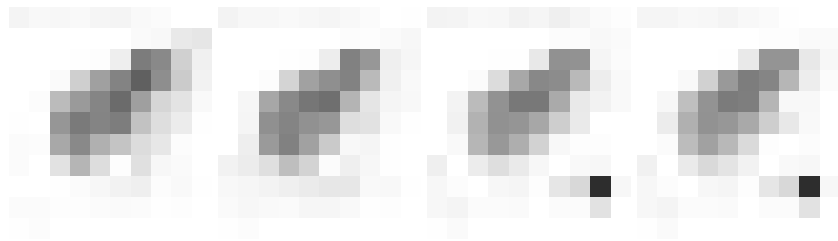
Thaspium chapmanii (Coulter & Rose) Small. Calcareous bluffs. Sw. PA, s. ON, s. MI, sw. WI, and s. MN south to Panhandle FL and e. TX. [= *T. barbinode* var. *angustifolium* Coulter & Rose - F; < *T. barbinode* (Michaux) Nuttall - C, G, K, MC, Pa, WH, WV, Z; > *T. barbinode* var. *angustifolium* - Y; > *T. barbinode* var. *chapmanii* Coulter & Rose - Y] {not yet keyed}

Thaspium pinnatifidum (Buckley) A. Gray. Forests and woodlands over calcareous rock, such as limestone, dolostone, or calcareous siltstone). May-June; June-July. KY south to w. NC, e TN (Chester, Wofford, & Kral 1997), and n. AL. The report from VA is of unknown documentation. The distribution and rarity of this plant is complicated because of confusion with *T. chapmanii*. [< *T. pinnatifidum* - RAB, K, MC, S, W, Y, Z]

Thaspium species 1. Calcareous woodlands and forests. Endemic to KY. [< *T. pinnatifidum* - C, F, G, K, MC, S, W, Y, Z] {not yet keyed}

Thaspium trifoliatum (Linnaeus) A. Gray var. *aureum* (Linnaeus) Britton. Mt (NC, SC, VA), Pd (NC, SC, VA), Cp (NC, SC, VA), {GA}: moist forests; uncommon (rare in Coastal Plain). April-May; July-August. NY west to MN, south to SC, AL, AR, and se. KS. Various workers have differed on the characters used to separate two varieties in *T. trifoliatum*. RAB and C separate the two strictly on petal color; F, however, allows var. *aureum* to sometimes have purple petals, seeming to regard the critical differences to be var. *aureum*'s generally more robust size and larger fruits (4.5 mm long vs. 3-4 mm long). It is presently not clear how two varieties should be separated, or, indeed, if varieties are warranted. Though the ranges overlap, var. *aureum* is generally more northern and western, var. *trifoliatum* more southern and eastern. [= K, S, Y; = *T. trifoliatum* var. *flavum* Blake - RAB, C, F, MC, Pa, W, WV, Z; < *T. trifoliatum* - G]

Thaspium trifoliatum (Linnaeus) A. Gray var. *trifoliatum*. Mt (NC, SC, VA), Pd (NC, SC, VA), Cp (FL, NC, SC, VA), {GA}: moist forests; common (rare in Coastal Plain). April-May; July-August. NJ, PA, and MO, south to Panhandle FL and LA. [= RAB, C, F, K, MC, Pa, S, W, WV, Y, Z; < *T. trifoliatum* - G]



Tiedemannia DC. 1829 (Water Dropwort)

A genus of 3 taxa, perennial herbs, of se. United States and the West Indies. References: Feist et al. (2012)=Z; Feist & Downie (2008); Judd (1982b)=Y; Mathias & Constance (1945)=MC; Kral (1981); Tucker et al. (1983).

- 1 Mature fruits with corky-thickened peripheral ribs, the fruit with a narrowly rectangular cross-section, about as thick near the ends of the ribs as at the center, 0.8-2 mm thick at the edge; plants with stoloniferous rhizomes 1-3 (-10) dm long; lower nodes often losing their leaves by flowering ; umbellets/umbel 5-9 (-12).....*T. canbyi*
- 1 Mature fruits with peripheral ribs progressively thinning away from the seed cavity, the fruit with a fusiform cross-section, distinctly thinner toward the ends of the ribs than at the center, 0.2 mm thick at the edge; plants with stout rhizomes or a caudex, not long stoloniferous; lower nodes generally retaining their leaves until flowering; umbellets/umbel (5-) 10-30.
- 2 Flowers white; segments of phyllodia cylindrical; phyllodes 2-8 mm in diameter at base; [widespread in the southeastern Coastal Plain, from se. NC south to s. FL, west to e. TX].....*T. filiformis* ssp. *filiformis*

- 2 Flowers maroon to pink; segments of phyllodia distinctly bulging between the partitions; phyllodes 4-17 mm in diameter at base; [of the FL Panhandle]..... *T. filiformis* ssp. *greenmanii*

Tiedemannia canbyi (J.M. Coulter & Rose) Feist & S.R. Downie, Canby's Cowbane. Clay-based Carolina bays and other depression wetlands. July-September; August-October. Sw. GA through SC to se. NC (mostly in the middle and inner Coastal Plain); e. MD to (formerly) DE. See Tucker et al. (1983) for detailed information on this rare species and a comparison of it to the more widespread *O. filiformis*. [= Z; = *Oxyopolis canbyi* (J.M. Coulter & Rose) Fernald – C, F, G, K, MC, Y]

Tiedemannia filiformis (Walter) Feist & S.R. Downie ssp. *filiformis*, Water Dropwort. Wet savannas, sandhill seepages. July-September; August-October. Se. NC south to s. FL, west to se. TX; West Indies. [= Z; = *Oxyopolis filiformis* (Walter) Britton – RAB, GW, K, MC, S; = *O. filiformis* ssp. *filiformis* – WH, Y]

Tiedemannia filiformis (Walter) Feist & S.R. Downie ssp. *greenmanii* (Mathias & Constance) Feist & S.R. Downie. Depression ponds, wet pine flatwoods. July-September; August-October. Endemic to Bay, Calhoun, and Gulf counties, FL. The frequency of intermediate populations caused Judd (1982b) and Feist et al. (2012) to conclude that subspecific rank was most appropriate. [= Z; = *Oxyopolis greenmanii* Mathias & Constance – K, MC; = *O. filiformis* (Walter) Britton ssp. *greenmanii* (Mathias & Constance) Judd – WH, Y]



Torilis Adanson 1763 (Hedge-parsley, Bur-parsley)

A genus of about 15 species, herbs, temperate, of the Old World. References: Mathias & Constance (1945)=MC.

- 1 Rays reduced or absent, < 5 mm long, the inflorescence therefore compact, appearing like a head; inflorescences opposite the leaves, on peduncles 0-1 (-2) cm long; mericarps dimorphic, one with spines, the other tuberculate..... *T. nodosa*
- 1 Rays and pedicels well-developed, > 5 mm long, the inflorescence therefore open, distinctly and obviously an umbel; inflorescences opposite the leaves and terminal, on peduncles (1-) 3-16 cm long; mericarps monomorphic, both with spines.
 - 2 Involucral bracts 0-1; fruits 3-4 mm long (not including the spines); spines straight or nearly so, with a minute hook at the tip..... *T. arvensis*
 - 2 Involucral bracts >2, generally 1 per ray; fruits 2-2.5 mm long (not including the spines); spines curved, not hooked at the tip..... *T. japonica*

* ***Torilis arvensis*** (Hudson) Link, Spreading Bur-parsley, Field Hedge-parsley. Roadsides, fields, disturbed areas; native of Europe. May-June. [= RAB, C, MC, W; > *T. arvensis* ssp. *arvensis* – K]

* ***Torilis japonica*** (Houttuyn) A.P. de Candolle. Disturbed areas; native of Eurasia. June-July. Naturalized south to se. PA, VA, and w. NC (Denslow 2011). [= C, F, G, K, MC, Pa, WV; = *T. anthriscus* (Linnaeus) Gmelin]

* ***Torilis nodosa*** (Linnaeus) Gaertner, Knotted Bur-parsley. Disturbed areas; native of Mediterranean Europe. May. [= RAB, G, K, MC, S]

Trepocarpus Nuttall ex A.P. de Candolle 1829 (Whitenymph)

A monotypic genus, an herb, temperate, of se. United States. References: Nesom in FNA (in prep.); Mathias & Constance (1945)=MC.

Trepocarpus aethusae Nuttall ex A.P. de Candolle, Whitenymph. Rich moist forests, calcareous glades, sometimes weedy in disturbed soils. May-June. C. SC south to Panhandle FL and AL, west to e. TX, north in the interior to w. TN, w. KY, AR, and se. OK. Nelson (1993) states that despite "something of a reputation as a rarity," *Trepocarpus* is "a reasonably successful weed." [= C, FNA, GW, K, MC, RAB, WH]



Zizia W.D.J. Koch 1825 (Golden-Alexanders)

A genus of about 4 species, herbs, temperate, of North America. References: Mathias & Constance (1945)=MC; Cooperrider (1985)=Z.

[see combined key to *Thaspium* and *Zizia* under *Thaspium*]

Zizia aptera (A. Gray) Fernald, Heartleaf Golden-Alexanders. Moist forests, openings, and woodland edges. April-May; July-August. NY west to BC, south to GA, Panhandle FL, MO, and CO. [= RAB, F, G, GW, K, MC, Pa, W, WH, WV, Z; > *Z. aptera* var. *aptera* – C; = *Z. cordata* W.D.J. Koch ex A.P. de Candolle – S]

Zizia aurea (Linnaeus) W.D.J. Koch, Common Golden-Alexanders. Moist forests. April-May; June-July. NB west to SK, south to sw. GA, Panhandle FL, and e. TX. [= RAB, C, F, G, GW, K, MC, Pa, S, W, WH, WV, Z]

Zizia trifoliata (Michaux) Fernald, Mountain Golden-Alexanders. Moist forests, woodlands, and woodland borders; common (rare in Coastal Plain). April-May; July-August. MD, VA, WV, and TN south to n. peninsular FL, Panhandle FL, and c. AL; a report for AR (Kartesz 2010) is false. [= RAB, C, F, G, GW, K, W, WH, WV; > *Z. trifoliata* – MC; > *Z. latifolia* Small – MC, S; > *Z. bebbii* (Coulter & Rose) Britton – S]



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| CERATOPHYLLACEAE..... | 419 | JUNCACEAE..... | 225 | PITTIOSPORACEAE..... | 1119 | URTICACEAE..... | 569 |
| CHENOPODIACEAE..... | 749 | JUNCAGINACEAE..... | 140 | PLANTAGINACEAE..... | 888 | VALERIANACEAE..... | 1118 |
| CHRYSOBALANACEAE..... | 616 | KRAMERIACEAE..... | 467 | PLATANACEAE..... | 446 | VERBENACEAE..... | 957 |
| CISTACEAE..... | 681 | LAMIACEAE..... | 908 | PLUMBAGINACEAE..... | 722 | VITACEAE..... | 622 |
| CLEOMACEAE..... | 687 | LARDIZABALACEAE..... | 424 | POACEAE..... | 307 | VITACEAE..... | 463 |
| CLETHRACEAE..... | 798 | LAURACEAE..... | 123 | PODOCARPACEAE..... | 106 | WOODSIACEAE..... | 90 |
| COLCHICACEAE..... | 159 | LEGUMINOSAE..... | 468 | PODOSTEMACEAE..... | 630 | XANTHORRHOEACEAE..... | 191 |
| COMMELINACEAE..... | 209 | LEITNERIACEAE..... | 669 | POLEMONIACEAE..... | 778 | XEROPHYLLACEAE..... | 154 |
| COMPOSITAE..... | 972 | LENTIBULARIACEAE..... | 947 | POLYGALACEAE..... | 521 | XYRIDACEAE..... | 219 |
| CONVOLVULACEAE..... | 863 | LEPUROPETALACEAE..... | 597 | POLYGONACEAE..... | 722 | ZAMIACEAE..... | 100 |
| CORNACEAE..... | 771 | LILIACEAE..... | 162 | POLYPODIACEAE..... | 97 | ZANNICHELLIACEAE..... | 141 |
| CRASSULACEAE..... | 457 | LIMNANTHACEAE..... | 686 | PONTEDERIACEAE..... | 213 | ZINGIBERACEAE..... | 216 |
| CRUCIFERAE..... | 689 | LINACEAE..... | 628 | PORTULACACEAE..... | 768 | ZOSTERACEAE..... | 141 |
| CUCURBITACEAE..... | 593 | LINDERNIACEAE..... | 906 | POTAMOGETONACEAE..... | 141 | ZYGOPHYLLACEAE..... | 467 |
| CUPRESSACEAE..... | 106 | LINNAEACEAE..... | 1116 | PRIMULACEAE..... | 784 | | |
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