Mesoamerican Orchid Novelties 3

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ABSTRACT. Five new Mesoamerican species are described in the orchid genera *Chysis*, *Scaphyglottis*, and *Sobralia*. *Chysis addita* Dressler (Chiapas) and *C. orichalcea* Dressler (El Salvador), described here, are allies of *Chysis laevis* Lindley with shorter and wider segments; *C. addita* has laminar keels and winglike extensions on the column foot; the predominantly yellow *C. orichalcea* has convex lateral lip margins. The new species *Scaphyglottis bicallosa* Dressler (Costa Rica) has smaller, more numerous flowers than *S. amparoana* (Schlechter) Dressler and a higher, bilobed callus. Also new, *Scaphyglottis monspirrae* Dressler (Panama) has narrower leaves than *S. punctulata* (Reichenbach f.) C. Schweinfurth and a three-lobed lip. Another novel species, *Sobralia purpurea* Dressler (Costa Rica), has lanceolate leaves 1–2.5 cm wide and an intensely purple, oblong lip. The synonymy of *Chysis bruennowiana* Reichenbach f. & Warscewicz and the identity of *C. tricostata* Schlechter are discussed. New combinations are published for *Arpophyllum giganteum* subsp. *alpinum* (Lindley) Dressler, *A. giganteum* subsp. *medium* (Reichenbach f.) Dressler, and *Scaphyglottis pachybulbon* (Schlechter) Dressler.

This paper continues the descriptions of new species found in the preparation of the Orchidaceae for *Flora Mesoamericana* and new combinations needed for that treatment (Dressler, 1997, 1998). New species are described in the genera *Chysis*, *Scaphyglottis*, and *Sobralia*, and new combinations are published in *Arpophyllum* and *Scaphyglottis*.

ARPOPHYLLUM

Arpophyllum giganteum Hartweg ex Lindley, Ann. & Mag. Nat. Hist. 4: 384. 1840. TYPE: Mexico. Between Tonatze and Talea, April, *Hartweg s.n.* (holotype, K-L).

Arpophyllum giganteum subsp. **alpinum** (Lindley) Dressler, comb. nov. Basionym: *Arpophyllum alpinum* Lindley, Benth. Pl. Hartw.: 93. 1842. TYPE: Guatemala. In montibus Totonicapan, *Hartweg s.n.* (holotype, K-L).

Arpophyllum giganteum subsp. **medium** (Reichenbach f.) Dressler, comb. nov. Basionym: *Arpophyllum medium* Reichenbach f., Beitr. Orch.-K. C. Amer.: 89. 1866. TYPE: Guatemala. Las Nubes, 9 I 1857, *Wendland s.n.* (holotype, W).

The genus *Arpophyllum* is a small group of very similar species, with little variation in flower structure. Correll (1947) recognized only two species, *A. alpinum* and *A. spicatum* La Llave & Lexarza, differing in the length of the sepals, petals, and lip. *Arpophyllum spicatum*, the type of the genus, is quite distinctive in its thick, succulent leaves. As noted by Garay (1970, 1974), *A. laxiflorum* is also clearly distinct in its subentire lip and the puberulent surface of the ovaries. Garay recognized five species, with *A. medium* being intermediate between *A. giganteum* and *A. alpinum*. While the aspects of typical *A. alpinum*, *A. giganteum*, and *A. medium* are distinctive, there is much variation, with the limits between *A. medium* and the other two being unclear, though *A. alpinum*, of high elevations, cannot be confused with *A. giganteum*, of low elevations. As *A. medium* is intermediate between these and I find no feature that will consistently distinguish it from either extreme, I am compelled to treat all three as subspecies of *A. giganteum*.

KEY TO THE SPECIES AND SUBSPECIES OF *ARPOPHYLLUM*

1. Ovary and rachis sparsely glandular-puberulent, without black scales or trichomes 2
1′. Ovary and rachis with prominent black scales and trichomes 3
2(1). Leaves fleshy, canaliculate, cannot be flattened without breaking . . . . . *A. spicatum* La Llave & Lexarza
2′. Leaves leathery, not canaliculate, easily flattened . . . . . *A. laxiflorum* Pfitzer
3(1). Lateral sepals 4–5 mm long; column less than 3 mm; leaves usually more than 2.5 cm wide; inflorescence 10–16 × 1.8–2.5 cm . . . . . *A. giganteum* subsp. *giganteum*
3′. Lateral sepals 6–9 mm long; column usually 3 mm or more; leaves up to 2.5 cm wide; inflorescence either shorter *or* wider than above . . 4
4(3). Inflorescence 3–7 cm long . . . . . *A. alpinum* subsp. *alpinum*

4′. Inflorescence 6–10 cm . . . . . *A. alpinum* subsp. *medium*

CHYSIS

The genus *Chysis* is generally scarce both in the field and in herbaria. Its scarcity in herbaria may be due, in part, to the thick pseudobulbs and the large, fleshy flowers. A further problem is that flowers pressed when old and wilted are slow to rehydrate. Storing them in alcohol for two or three weeks may be necessary. Hooker (1861) felt the "structure of flowers, pseudobulbs, and foliage" of *C. limminghei* to be "identical with the others." As far as known, all *Chysis* lips have three or five larger keels and usually two to several smaller, lateral keels. Paul Allen (1955), following Hooker and others, chose the keels as the primary feature in classification and reduced *Chysis* to two species and several varieties, depending on the presence of 5 large and 2 smaller keels in *C. aurea*, or, in *C. laevis*, 3 large and 2 smaller keels. This system (Allen, 1955) ignores significant differences in the keels and in other features, but was used for many years, partly because so little material of the genus is available. The two new species described here are both allies of *C. laevis*, having thick pseudobulbs and smooth keels on the lip. Another plant, more similar to *C. aurea* and painted by Rodríguez C., is also clearly undescribed, but I have seen no pressed material of the species (Rodríguez C. et al., 1986). There are plants, apparently of this species, in cultivation, and I believe its description should wait until specimens are available.

Chysis addita Dressler, sp. nov. TYPE: Mexico. Chiapas: Cintalapa, epiphytic, moist ridge with *Pinus*, *Quercus*, and *Liquidambar* and Montane Rain Forest between Colonia Francisco I. Madero and Colonia A. López Matéos, elev. 1250 m, flowers yellow and maroon, 31 Dec. 1980, *D. E. Breedlove 49026* (holotype, CAS). Figure 1A–D.

Chysis laevi Lindley similis sed segmentis brevioribus, latioribus, callo 3 lamellis instructo, pede columnae ornato.

Roots felty, 1.5–3 mm diam.; stems caespitose, more than 23 cm long, clavate, long-stipitate; leaves several, petioles 3–3.5 cm long, blades elliptic, 18–20 × 3.2–4 cm, acuminate; inflorescence ca. 15 cm long, peduncle 12–13 cm long, rachis ca. 3 cm long, with 3 flowers (in type), floral bracts ovate, concave, acute or apiculate, ca. 9–10 × 4–6 cm; ovary and pedicel 23 mm long; dorsal sepal narrowly obovate, obtuse, 25 × 13 mm; lateral sepals oblong-ovate, apically oblique, subacute, 22 × 16.7 mm; petals cuneate-obovate, falcate, 27 × 8–10 mm; lip 3-lobed, 20 × 31 mm, base cordate, lateral lobes obliquely ovate, obtuse, 8–9 × 8 mm; midlobe broadly flabellate with raised veins, margins undulate, 7 × 15 mm; base of lip glabrous, keels 3, not reaching base of midlobe, basally low, distally forming 3 rounded lamellae 5–6 × 1.5–2 mm; column 12–13 mm long, column foot 10 mm long, with rounded lateral lobes near apex, with a small appendix or callus between column foot and base of lip.

This species resembles *C. laevis* in having three large keels on the lip, but the keels are laminar, rather than thick and fleshy. The flower parts are all shorter and proportionately wider than in *C. laevis*. The most distinctive features of the species are found on the column foot. The foot has small, rounded wings beyond the middle, and distal to the wings there is a curious appendix between the column foot and the lip. The epithet, *addita*, refers to this appendix or addition. This very distinctive species is known only from the type but should appear elsewhere in Chiapas and in Guatemala.

Chysis orichalcea Dressler, sp. nov. TYPE: El Salvador. Cerro Los Naranjos, 1850 m elev., Mar., *F. Hamer 162* (holotype, AMES; isotype, SEL). Figure 1E–G.

Chysis laevi Lindley similis sed segmentis brevioribus, latioribus, labello rotundato differt.

Roots felty-pilose, 1.5–4 mm diam.; pseudobulbs 20–26 × 2–3 cm, clavate. Leaves several, 10–40 × 2–7 cm (including short petioles), elliptic, acuminate. Peduncle 12–20 cm, raceme 3–12 cm, several-flowered, floral bracts lance-ovate, acute, 12–15 × 4–6 mm; ovary and pedicel 30–33 mm; flowers yellow or yellow-orange, sepals and petals marked with red stripes; dorsal sepal obovate-oblong, obtuse, 26–32 × 10–13 mm; laterals falcate-

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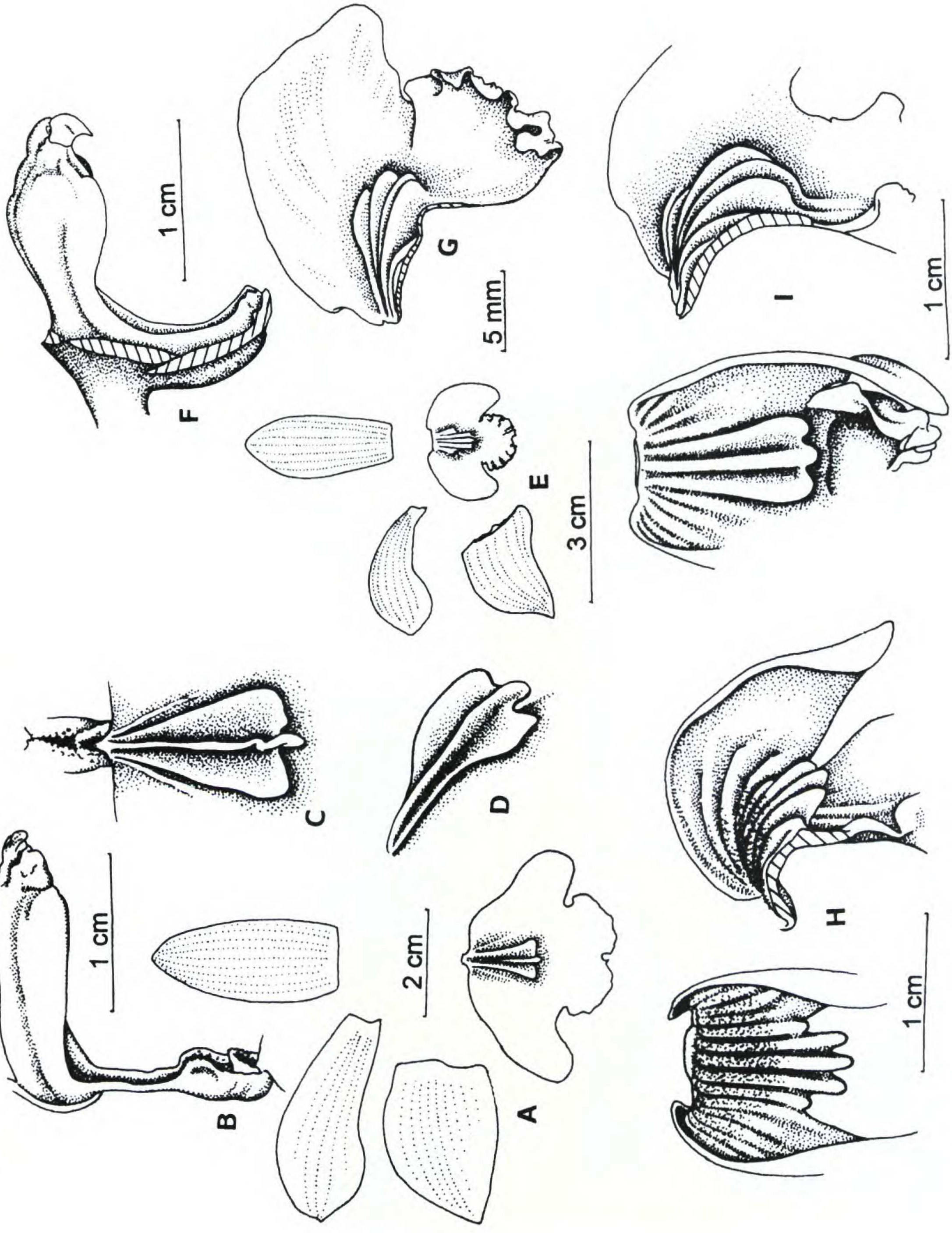
Figure 1. A–D. *Chysis addita* Dressler (*Breedlove 49026*). —A. Perianth parts, flattened. —B. Lateral view of column. —C, D. Two views of callus. E–G. *Chysis orichalcea* Dressler (*Hamer 546*). —E. Perianth parts, flattened. —F. Lateral view of column. —G. Lip and callus, the near lateral lobe lost. —H. *Chysis bruennowiana* Reichenbach f. & Warscewicz (liquid material of cultivated plant), two views of callus. —I. *Chysis tricostata* Schlechter (*Horich 60-7-43*), two views of callus.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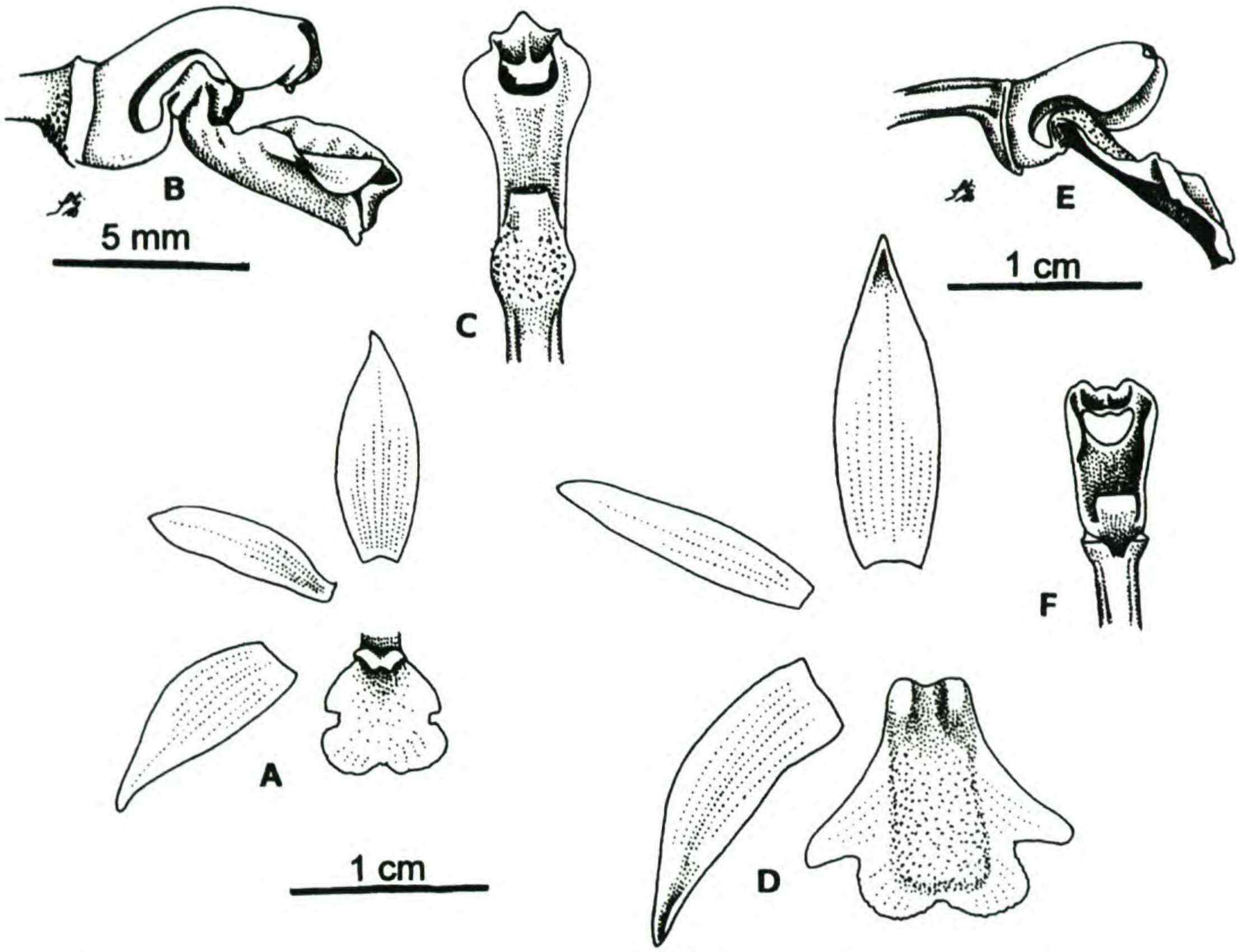

Figure 2. A–C. *Scaphyglottis bicallosa* Dressler (*Lankester 978*). —A. Perianth parts, flattened. —B. Lateral view of column and lip. —C. Ventral view of column. D–F. *Scaphyglottis amparoana* (Schlechter) Dressler (*Dressler 5577*). —D. Perianth parts, flattened. —E. Lateral view of column and lip. —F. Ventral view of column.

ovate, 23–27 × 11–14 mm; petals spatulate, falcate, 25–30 × 7–13 mm, blades obovate, obtuse; lip 15–19 × 25–30 mm, 3-lobed, lateral lobes oblong, obtuse, ca. 11 × 9 mm; midlobe transversely oblong, ca. 10 × 11 mm, margins undulate, base broadly rounded, with 3 major keels and 2 much shorter, glabrous, apices rounded; column ca. 11 mm, with foot 7–8 mm.

Chysis orichalcea also resembles *C. laevis* but differs in having shorter and wider perianth segments and in the strongly convex lateral margins of the lip (when flattened). Like *C. addita*, this species has something of a callus at the tip of the column foot; a similar, though smaller, callus may sometimes be found in *C. laevis*. The epithet *orichalcea* is derived from the Latin *orichalcum*, chalcopyrite or fool's gold. Though the flowers of this species are quite golden, it is not the real *C. aurea*, whose thick, puberulent, subequal keels diverge distally.

Paratype. EL SALVADOR. Boquerón del Volcán San Salvador, forest No. slope, 1800 m elev., 31 Mar. 1976, *Hamer 546* (AMES).

WORKING KEY TO KNOWN SPECIES OF *CHYSIS*

1a. Base of lip puberulent; major keels of lip 5, subequal or lateral keels shorter; base of lip tapering to point of attachment.
  2a. Keels free, parallel, not forming large, raised callus.
    3a. Keels thick, fleshy, diverging distally . . . . . *C. aurea*
    3b. Keels laminar, not fleshy, parallel . . . . . Rodríguez painting
  2b. Keels united to form a large, raised, fleshy callus with porrect apex.
    4a. Keels markedly unequal, 3 median keels much longer than 2 lateral keels, projecting forward 2–3 mm from distal attachment; pseudobulbs slender, 1–1.5 cm wide, flexible . . . . . *C. bruennowiana*
    4b. Keels 5, subequal; pseudobulbs 1.5–4 cm thick, not flexible.
      5a. Sepals and petals white; some floral bracts as much as 2.5 cm long, ovate, conspicuous; pseudobulbs clavate, distinctly stipitate . . . . . *C. bractescens*
      5b. Sepals and petals marked with purple; floral bracts 10–15 mm long, inconspicuous; pseudobulbs oblong

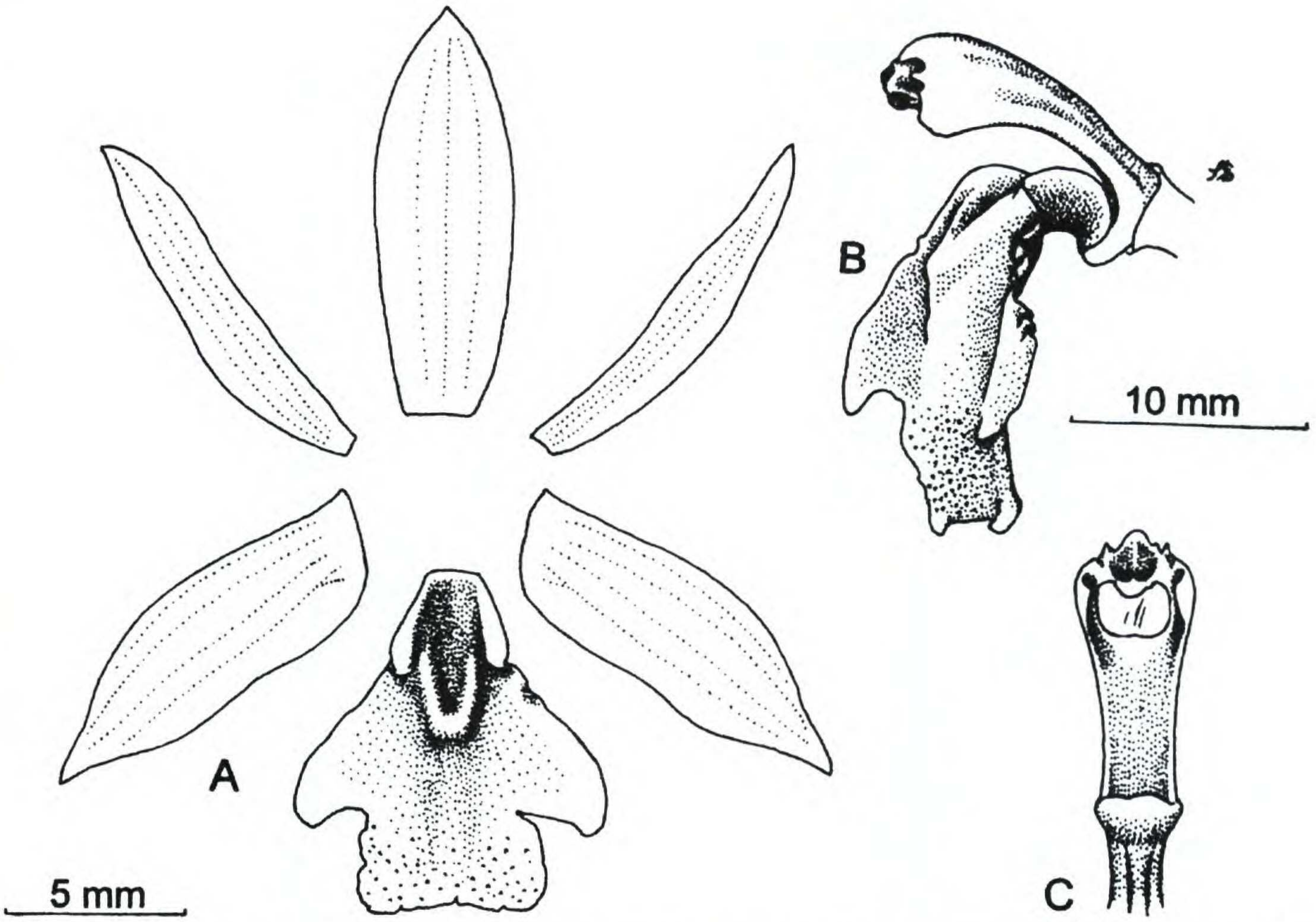

Figure 3. *Scaphyglottis monspirrae* Dressler (*Dressler 5668*). —A. Perianth parts, flattened. —B. Lateral view of lip and column. —C. Ventral view of column.

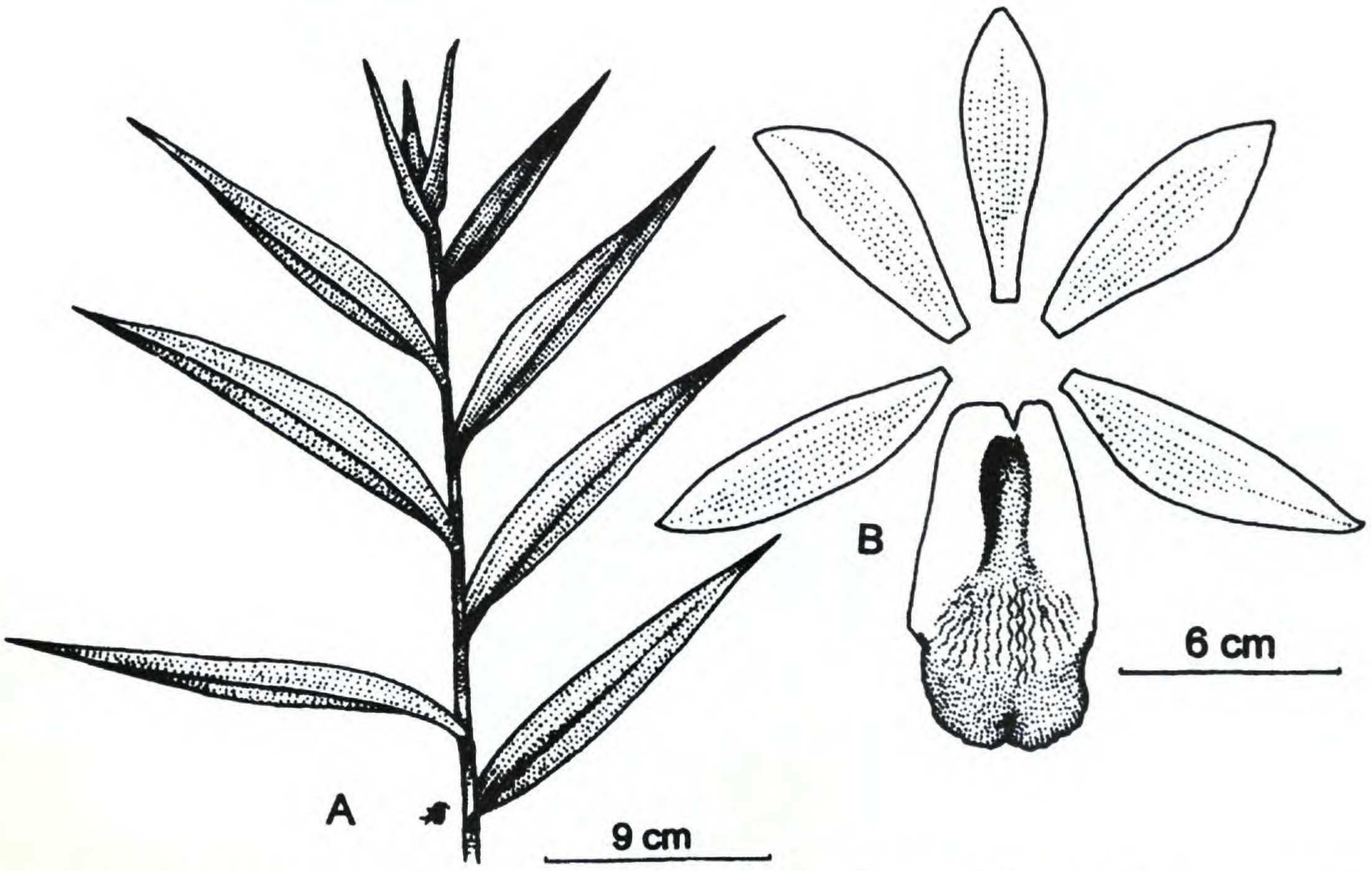

Figure 4. *Sobralia purpurea* Dressler (*Mora & Quirós s.n.*). —A. Part of stem with leaves and inflorescence bracts. —B. Perianth parts, flattened.

or ellipsoid, sessile or short-stipitate . . . . . *C. limminghei*

1b. Base of lip glabrous; major keels 3 or 5, markedly unequal if 5; base of lip broadly rounded or subtruncate.

6a. Appendix present between column foot and lip; column foot with distinct wings; keels laminar . . . . . *C. addita*

6b. Appendix lacking; column foot without wings or these minute, keels fleshy.

7a. Dorsal sepal 3.5–4 cm long; lateral lobes of lip distinctly shorter than midlobe, lateral margins straight or shallowly concave in basal 1/2 to 2/3 . . . *C. laevis*

7b. Dorsal sepal 2.6–3 cm long; lateral lobes of lip subequal to midlobe, lateral margins prominently convex throughout . . . . . *C. orichalcea*

Chysis bruennowiana Reichenbach f. & Warscewicz, Bot. Zeit. 15: 157. 1857. TYPE: Peru. *Warscewicz*, cult. Brünnow (W).

Chysis aurea var. *maculata* Hooker, Bot. Mag. 77: t. 4576. 1851. *Chysis maculata* (Hooker) Fowlie, Orchid Digest 35: 86. 1971. Syn. nov. TYPE: Colombia. Cult. *Lucombe & Pince* (K-L?).

Chysis costaricensis Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 19: 297. 1923. Syn. nov. TYPE: Costa Rica. Alajuela: Forêts de San Ramon, alt. 1500–1600 m, mai 1913, *A. Tonduz 17631* (CR).

The plants called *Chysis costaricensis* or *C. maculata* in Central America are indistinguishable from the South American *C. bruennowiana*, which is more similar to *C. aurea* Lindley than to the other named species of Central America (see Fig. 1H).

Chysis tricostata Schlechter, Notizbl. Bot. Gart. Berlin-Dahlem 8: 123. 1923. TYPE: Cult. Bot. Gart. Berlin-Dahlem, "wahrscheinlich Central America" (B destroyed, Schlechter sketch at AMES).

Though Fowlie (1971) published on Central American *Chysis* and interpreted plants from the Río Birris Canyon, in Costa Rica, as *C. tricostata*, none of his material was preserved. I have seen no good material of *C. tricostata*, but Schlechter's sketch of the type specimen (AMES) agrees well with Fowlie's characterization and with a flower from a Horich collection also from the valley of the Río Birris (MO accession 60-7-43, Fig. 1I). The absence of small lateral keels in addition to the three large keels in the Schlechter sketch of the type may be an oversight. I would prefer not to select a lectotype or a neotype without better material than is now available. Whether *C. tricostata* is an extreme form of *C. laevis* or a distinct species cannot be determined without more and better material.

SCAPHYGLOTTIS

The taxonomy of *Scaphyglottis* is in relatively good order because of Adams's (1993) recent revision, but several novelties have appeared since the revision.

Scaphyglottis bicallosa Dressler, sp. nov. TYPE: Costa Rica. Cartago: Navarro, flowered at Las Cóncavas, 10 Apr. 1925, *C. H. Lankester 978* (holotype, AMES). Figure 2A–C.

Scaphyglottis amparoanae (Schlechter) Dressler similis, sed floribus minoribus et multioribus, labello panduratoobovato, basi alte bicalloso differt.

Epiphytic, to at least 45 cm tall; roots smooth, whitish, 0.5–1.5 mm diam.; basal stems 15–23 cm long, with several levels of superposed shoots decreasing in size upward; stems stout but not pseudobulbous, to ca. 5 mm diam., basally covered by verrucose, tubular sheaths; leaves 2, apical, ligulate, 9.5–21 × 0.7–1.2 cm, apically asymmetrically retuse; inflorescence terminal, from a cluster of several bracts, the bracts to 21 × 6 mm, the outer bracts verruculose; raceme 5–6 cm long, fractiflex, with 6–8 flowers; floral bracts 16–21 × 7–13 mm, elliptic, keeled, caducous; sepals and petals greenish buff, lip white with chrome yellow blotch; ovary and pedicel 14–27 mm long; dorsal sepal elliptic, acute, 9–11.5 × 3.6–4 mm, keeled distally; lateral sepals elliptic-lanceolate, subacuminate, 10–12 × 3.4–3.7 mm, keeled distally; petals oblong or lanceolate-oblong, basally cuneate, apiculate, 8.5–10.5 × 2.2–2.5 mm; lip 3-lobed, ca. 5 × 5.5 mm, basally short unguiculate, attached to column foot, sharply bent near base, the bend with 2 high calli, blade obovate, the lateral lobes ca. 1 mm long, midlobe transversely oblong, shallowly retuse, 2 × 5.5 mm; column ca. 5 mm long, arcuate, winged, with a prominent, concave foot, the free portion ca. 1.5 mm long, porrect and curving upward to base of lip.

This species is closely allied to *Scaphyglottis amparoana* (Schlechter) Dressler, from which it differs in the smaller, more numerous flowers, and especially in the column foot and the base of the lip. In *S. amparoana* the column foot is porrect, and the blade of the lip is thickest basally, slightly sulcate, and gradually thinner toward the apex (see Fig. 2D–F). In *S. bicallosa* the column foot bends somewhat upward and the base of the blade is bent upward and again downward, with a thick, twoparted callus at the bend. The proportions of the lip and column also suggest that these are distinct species. Noting that the description of *Costaricaea*

amparoana (Schlechter, 1923: 31) indicated relatively small flowers, Adams (1993) apparently feared that the material of *S. bicallosa* might actually correspond to the type of *S. amparoana*. I have examined other specimens of *S. amparoana* from the type locality, La Palma de San José, and while they do have smaller flowers than most other *S. amparoana*, they are larger than the flowers of *S. bicallosa* and they do not show the other distinctive features of that species. Schlechter's sketch of the lip of *S. amparoana* (at AMES) suggests an imperfectly rehydrated flower, but the lip is still quite unlike that of *S. bicallosa*.

Paratype. COSTA RICA. **Cartago:** La Fuente, 1200 m, 9 Apr. 1925, *A. Alfaro 72* (AMES, US).

Scaphyglottis monspirrae Dressler, sp. nov. TYPE: Panama. Darién: Cerro Pirre, elev. 1200–1400 m, 15–16 July 1977, *R. L. Dressler 5668* (holotype, MO). Figure 3.

Scaphyglottis punctulatae (Reichenbach f.) C. Schweinfurth similis, sed foliis angustioribus, labello profunde trilobato differt.

Epiphytic, 20–50 cm tall, with 2 or 3 levels of superposed shoots, with the stems decreasing in size upward; stems slender, not forming distinct pseudobulbs; roots 0.5–1 mm diam., whitish, smooth; basal stems 24–36 cm long, with striate sheaths bearing persistent leaf blades similar to the apical leaves; apical leaves 2, lanceolate-ligulate, tapering, narrowly retuse, 9–18.5 cm × 5–7 mm; sepals and petals brownish green, lip cream; ovary and pedicel 15–20 mm long; sepals elliptic or oblong, acute, 9–9.5 × 2.3–3 mm; petals narrowly elliptic or lanceolate, acute, 9–9.5 × 1.7–4 mm; lip 3-lobed, 9–10 × 7–9 mm, with low U-shaped callus near base of blade, base articulate to column foot, broadly cuneate with erect margins, lateral lobes antrorse-triangular, rounded, 1 × 1.8 mm, midlobe subquadrate, subtruncate, 2.3 × 4.2 mm, verruculose; column 5–5.5 mm long, arcuate, winged distally, the wings rounded-triangular, somewhat antrorse, column foot prominent, ca. 1.5 mm long.

The presence of well-developed leaves at midstem suggests a close relationship between *S. monspirrae* and *S. punctulata* (Reichenbach f.) C. Schweinfurth, and especially with the form of *S. punctulata* that occurs in central Panama, without pseudobulbs and with many persistent lateral leaves. The distinctly 3-lobed lip suggests affinity with *S. triloba* B. R. Adams. Such a relationship cannot be discounted, though *S. triloba* has much wider leaves, a much narrower lip, and the lip and column foot are more distinctly "sigmoid" than in this or any other *Scaphyglottis* species, with the lip folding back on the column foot and then forward again on itself in a pronounced and compressed "Z." Both *S. monspirrae* and *S. triloba* are known from little material, and a more detailed comparison of the two must wait until better material is available. The epithet, *monspirrae*, refers to the type locality, Cerro Pirre.

Table 1. A comparison of *Scaphyglottis lindeniana* and *S. pachybulbon*.

	S. pachybulbon	*S. lindeniana*
Stipe	shorter than pseudobulb, usually thick	longer than pseudobulb, slender
Pseudobulb	thickest basally	subfusiform
Leaves	narrow, length = 6–10 × width	wider, length = 3–5 × width
Lip	widest below middle, white	middle subequal to apex, green
Base of lip (below bend)	shorter than blade	longer than blade

Scaphyglottis pachybulbon (Schlechter) Dressler, comb. nov. Basionym: *Hexadesmia pachybulbon* Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 17: 26. 1922. TYPE: Panama. *C. W. Powell 229* (holotype, B destroyed; isotypes, AMES, MO).

Even with the removal of *Scaphyglottis pachybulbon*, of Costa Rica and western Panama, *S. lindeniana* remains a variable species ranging from Mexico to Bolivia. John Atwood finds *S. pachybulbon* to be sympatric with *S. lindeniana* in the area of Monteverde and considers them quite distinct (pers. comm.). Further, preliminary analyses of DNA suggest that *S. lindeniana* and *S. pachybulbon* are closely allied but distinct (Dressler, Williams & Whitten, in prep.). While no one feature is absolute in separating them, there are a number of features that, together, separate them quite well. The pseudobulbs are different in shape, the basal stipes are much shorter in *S. pachybulbon*, and the proportions of the lip are also distinctive. The only specimens about which I have any doubts are very poor or quite incomplete. The differences in proportion of both plant and flower are summarized in Table 1.

Sobralia

Sobralia purpurea Dressler, sp. nov. TYPE: Costa Rica. San José: Carretera Interamericana Sur, km 39, Casa Mata, entrada a San Cristóbal, 800 m, junio 1990, floreció en cultivo 19 Abril 1993, *Dora E. Mora & Carlos Quirós s.n.* (holotype, USJ). Figure 4.

Herba epiphytica vel terrestris, folia disticha, lanceolata, acuminata, flos terminalis, singulis vel successiva, sepalum dorsale oblanceolatum, sepala lateralia elliptico-lanceolata, labellum in basi convolutum, lamina expansa subquadrato-oblonga, retusa differt.

Plant ca. 1 m or more in height; leaves distichous, lanceolate, caudate-acuminate, 15–18 × 1.1–2.5 cm, sparsely lepidote beneath, texture papery, with 9 major veins (including marginal veins), sheaths striate, glabrous; inflorescence terminal, bract cluster ellipsoid, 5.5–6 cm long, bracts striate, sparsely lepidote distally; sepals oblanceolate, subobtuse, dorsal 7.5–8 × 2.1 cm, laterals 8.5–8.9 × 2–2.3 cm; petals narrowly ovate, subacute, 7–7.9 × 2.3–3 cm; lip subquadrate oblong, 8.5–9.5 × 4.5–4.9, apparently without keels; midlobe 3.3 × 4.2 cm, deeply retuse, somewhat crisped; column 3.3 cm, clavate.

This new species is distinctive in its narrow, caudate leaves of rather thin texture, in the nearly smooth inflorescence bracts, and especially in the narrow, suboblong lip, which is described as being intensely purple, or "casi nazareno." There is some uncertainty about the exact origin of the plant. One of the collectors remembers the plant as being found near Casa Mata, as recorded on the label, while the other remembers the plant as collected on the road between Empalme and Santa María de Dota. So far, we have been unable to re-collect the plant in either area, but the plants should stand out when in flower.

Acknowledgments. I am very much indebted to Stig Dalström for preparing the drawings of the new taxa, to Eric Hágsater and the staff of AMO for discussion of *Arpophyllum* and for the loan of useful material of *Chysis*, and to Roberto González Tamayo for help with the Latin diagnoses.

Literature Cited

Adams, B. R. 1993. A Taxonomic Revision of the Genus *Scaphyglottis* Poeppig & Endl. (Orchidaceae–Epidendroideae). Ph.D. Dissertation, Southern Illinois University at Carbondale.

Allen, P. H. 1955. A revision of the genus *Chysis*. Amer. Orchid Soc. Bull. 24: 664–666.

Correll, D. S. 1947. Some revisions of American orchids. Lloydia 10: 214–217.

Dressler, R. L. 1997. Novedades en orquídeas mesoamericanas—1. Orquideología 20: 253–265.

———. 1998. Orchids of Mesoamerica 2, Cranichidinae. Bol. Inst. Bot. Univ. Guadalajara 5: 69–86.

Dunsterville, G. C. K. & L. A. Garay. 1965. Venezuelan Orchids Illustrated, vol. 3. Andre Deutsch, London.

Fowlie, J. A. 1971. Obscure species: Three distinctive species of *Chysis* from Central America. Orchid Digest 35: 85–87.

Garay, L. A. 1970. Notas sobre el género *Arpophyllum* y su ocurrencia en Colombia. Orquideología 5: 66–73.

———. 1974. Sinopsis del género *Arpophyllum*. Orquídea (Méx.) 4: 3–19.

Hooker, W. J. 1861. *Chysis aurea* var. *lemminghei*. Bot. Mag. Tab. 5265.

Rodríguez C., R. L, D. E. Mora, M. E. Barahona & N. H. Williams. 1986. Géneros de orquídeas de Costa Rica. Editorial Universidad de Costa Rica, San José.

Schlechter, R. 1923. Beiträge zur Orchideenkunde von Zentralamerika. II. Additamenta ad Orchideologiam Costaricensem. Repert. Spec. Nov. Regni Veg. 19: 1–307.