
New and Critical Taxa of *Rubia* and *Galium* (Rubiaceae, Rubieae) for the *Flora of China*

Friedrich Ehrendorfer

Faculty Center for Biodiversity (former Institute of Botany), University of Vienna, Rennweg 14,
A-1030 Vienna, Austria. friedrich.ehrendorfer@univie.ac.at

ABSTRACT. On the basis of extensive herbarium studies, *Rubia pseudogalium* Ehrend., *Galium chekiangense* Ehrend., *G. kunmingense* Ehrend., *G. rupifragum* Ehrend., and *G. sichuanense* Ehrend. are described, illustrated, and discussed as new species from Zhejiang (= Chekiang), Yunnan, and Sichuan, respectively, for the flora of eastern and southwestern China. *Galium dahuricum* var. *densiflorum* (Cufod.) Ehrend. is a new combination.

Key words: *Flora of China*, *Galium*, IUCN Red List, *Rubia*, Rubiaceae, Rubieae.

This article has emerged from extensive herbarium studies and text preparation concerning the genera of the Rubieae tribe for the forthcoming Rubiaceae volume (19) of the *Flora of China*. It includes descriptions, discussions, and photographs of new taxa: one species of *Rubia* L. and four species and a new varietal combination of *Galium* L. From DNA-based analytical studies (Natali et al., 1996, unpublished), it has become clear that *Rubia* (together with the small Mexican genus *Didymaea* Hook. f.) occupies a relatively basal and plesiomorphic position within the tribe. The genus *Rubia* is well separated, clearly monophyletic, has only about 80 species, and is limited to Eurasia and Africa. In contrast, in its present provisional classification, the more apomorphic genus *Galium* is difficult to circumscribe and clearly polyphyletic. It includes more than 600 species with a worldwide distribution and is the largest genus of the tribe. For a survey of the present status of Rubieae systematics, differential characters of genera and sections, as well as keys, see Ehrendorfer et al. (2005).

NEW SPECIES IN *RUBIA*

- 1. *Rubia pseudogalium*** Ehrend., sp. nov. **TYPE:** China. Yunnan: Gaoligong Shan region, Tengchong Xian, Wuhe Xiang, ridge S of pass at top of Gaoligong Shan on old rd. from Baoshan to Tengchong via Dahaoping, W side of Gaoligong Shan, 2525 m, W-facing 0°–10° slope, 24°54'40"N, 98°45'25"E, bamboo mixed w/ broadleaf evergreen

trees and shrubs, vine climbing through bamboo, loam on decomposed granite, 5 Sep. 2003, *Gaoligong Shan Biodiversity Survey 18832* (holotype, WU; isotypes, CAS, KUN). Figure 1.

Haec species habitu speciebus generis *Galii* L. similis, ex affinitate *Rubiae truppelianae* Loes., ab ea foliis usque ad 4-nis tantum verticillatis, petiolis non longioribus quam 6 mm (nec 6–40 mm), pedunculis brevioribus 3–6 mm (nec 10–40 mm) longis, inflorescentiis semper lateralibus atque lobis corollae 1.2–1.5 mm (nec ca. 2 mm) attingentibus differt.

Sprawling or twining herbs, to 2 m; *stems* branched, quadrangular, glabrous and smooth or sparsely retrorsely aculeolate. *Leaves* and leaflike stipules in whorls of never more than 4; petioles (1–)2–4(–6) mm; blades drying blackened, subleathery, abaxial surface somewhat brighter than adaxial surface, linear-lanceolate, lanceolate, or lanceolate-oblong, often somewhat falcate, 20–40 × 2–8 mm, length/width index 4–10, apex acute or shortly acuminate, margin and midvein adaxially somewhat retrorsely aculeolate or smooth, base cuneate to acute; principal vein 1, the 2 basal lateral veins very weak, but extending beyond half of the leaf length, often hardly visible. *Inflorescences* axillary, thyrsoid, somewhat narrowly elongate, many (at least 5)-flowered, glabrous; peduncles 3–6 mm; bracts small, linear-lanceolate, 0.5–3 mm; pedicels 1–6 mm. *Flower* with the *ovary* inferior (hypanthium), obovoid, ca. 0.8 mm; *corolla* rotate, yellowish green, white, or purple, lobes 5, ovate-triangular, 1.2–1.5 mm, shortly acuminate. *Berry* didymous, blackened, subglobose, 3–5 mm diam.

Distribution and habitat. *Rubia pseudogalium* is known from subtropical, montane, evergreen, broad-leaf forests from Yunnan Province, China, in the Gaoligong Shan region, at altitudes of 2400–3000 m.

IUCN Red List category. According to the many specimens seen from the Gaoligong Shan region, *Rubia pseudogalium* can be placed in the IUCN Red List category Least Concern (LC; IUCN, 2001) as long as natural protection is maintained in the region.

Phenology. The new species was noted to flower from May to June and to fruit from July to August.

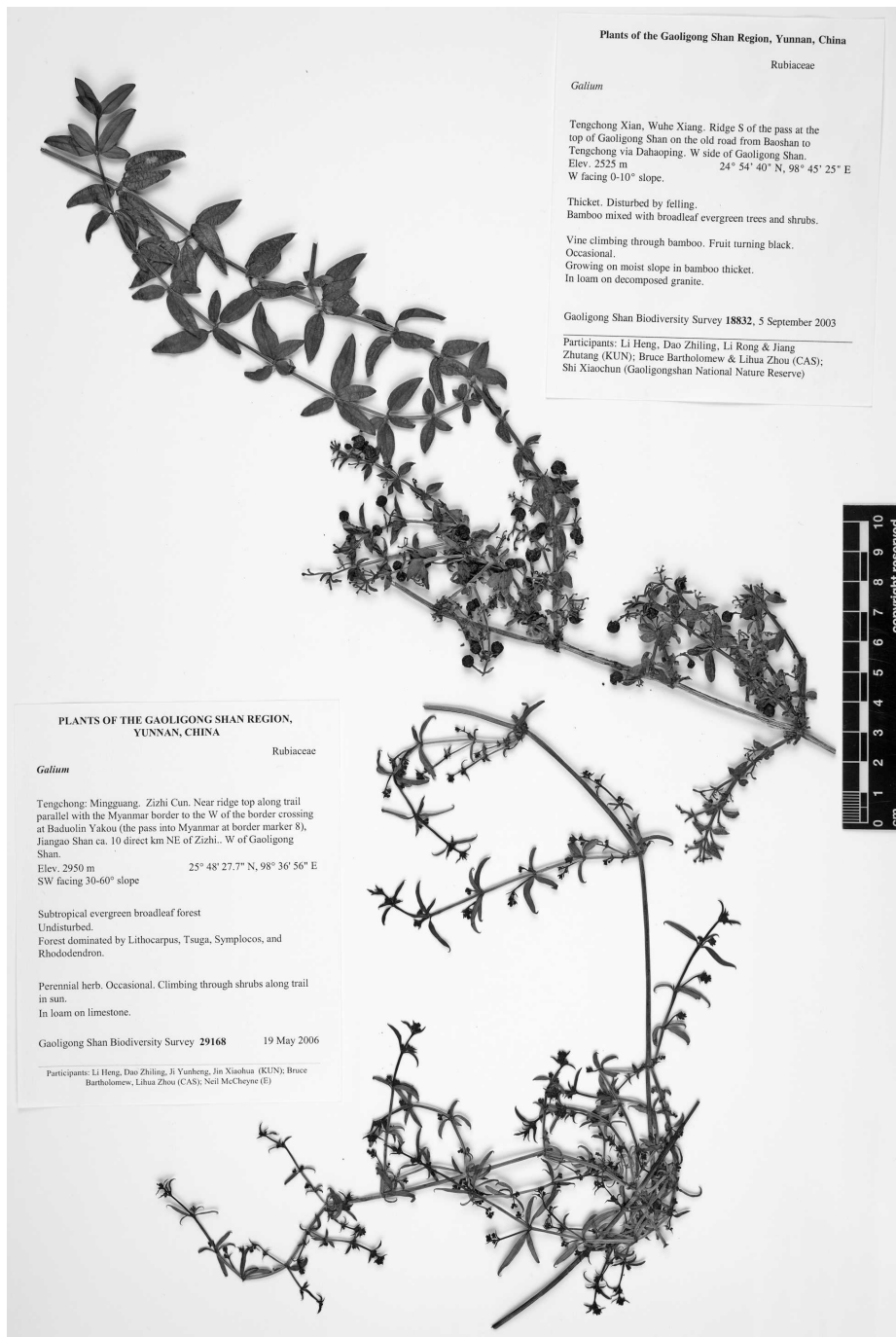


Figure 1. *Rubia pseudogalium* Ehrend. The plant above is the holotype (Gaoligong Shan Biodiv. Survey 18832, WU); the lower is one of the paratypes (Gaoligong Shan Biodiv. Survey 29168, WU). Scale bar = 10 cm.

Discussion. *Rubia pseudogalium* is quite similar in habit to several species of *Galium* and has been mistaken for that genus. However, its regularly 5-merous flowers and berrylike fruits clearly place it in

Rubia, where it appears to be related to *R. truppeliana* Loes. (Loesener, 1919: 183), described from the mountains of Shandong Province in northeastern China. The main differences that distinguish *R. pseudogalium*

are the leaf whorls with never more than four elements (vs. six to eight in *R. truppeliana*), the leaf petioles always shorter than 6 mm (vs. 6–40 mm), the peduncle length 3–6 mm (vs. 10–40 mm), the exclusively lateral (never terminal) inflorescences, and the smaller flowers with lobes only 1.2–1.5 mm (vs. ca. 2 mm). There is remarkable variation in leaf shape (cf. Fig. 1) and flower color, as documented by the numerous paratype specimens available from the Gaoligong Shan region, where *R. pseudogalium* may be endemic.

Paratypes. CHINA. **Yunnan:** Gaoligong Shan region, various localities near Tengchong (Te), Longyang Qu (Lo) & Lushui Xian (Lu), *Gaoligong Shan Biodiversity Survey 23837* (Lo), *24251* (Lu), *25172* (Te), *29168* (Te), *29209* (Te), *29217* (Te), *30132* (Te) (all at CAS, WU).

NEW SPECIES IN *GALIUM*

1. *Galium chekiangense* Ehrend., sp. nov. TYPE: China. Chekiang [Zhejiang]: Xi ming shan, s.d., s. coll. 0830 (holotype, PE [2]). Figure 2.

Haec species ex affinitate *Galii kamschatici* Steller ex Schult. et *G. nakaii* Kudô ex Hara, ab eis foliis in sicco clare brunneolo-iridibus subcoriaceis in superficie papillosis (nec membranaceis laevibusque), in pagina inferiore glanduloso-striatis (nec striis deficientibus) atque mericarpis trichomatibus brevissimis (0.15–0.25 mm) curvatis (nec 0.8–1 mm uncinatis) vestitis differt.

Perennial herbs, with thin rhizomes and 2 to 4 erect stems from a common base, 20–30(–40) cm tall, with only 4 to 5 internodes from the base to the first inflorescence node, with 4 prominent, rounded and whitish angles, glabrous and smooth except for short and stiff hairs at the nodes. *Leaves* and leaflike stipules in whorls of 4, broadly elliptic to ovate, (15–)23–30 (–50) × (8–)11–15(–25) mm, drying somewhat leathery and light brownish green, subsessile, gradually narrowed into the base, broadest near the middle, mostly short-apiculate but without a hyaline point, glabrous except for antrorse microhairs (0.1–0.2 mm) along the 3 main veins, mostly on the abaxial but also on the adaxial surface and along the slightly revolute margins, papillose adaxially under a strong lens (×15), abaxial surface clearly marked by numerous darker and linear idioblasts. *Inflorescences* loosely thyrsoid and elongate, from uppermost 2 to 3 nodes, clearly longer than subtending leaves, the cymes lateral and terminal, somewhat divaricate, 1–4 cm, with few and inconspicuous linear bracts, peduncles ca. 1–2 cm, pedicels 0.1–1 cm. *Flowers* ca. 3 mm diam., white, rotate, with 4 acuminate lobes. *Mericarps* ovoid, 1.5–2(–3?) mm, densely covered by stiff and slightly divergent microhairs of 0.15–0.25 mm with an acute and ± bent apex.

Distribution and habitat. *Galium chekiangense* is probably endemic in southeastern China from Zhejiang (= Chekiang and Fujian), where it is known to grow in lower montane forests at ca. 1400 m elevation.

IUCN Red List category. *Galium chekiangense* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Phenology. *Galium chekiangense* apparently flowers in July and fruits in August.

Discussion. *Galium chekiangense* clearly belongs to *Galium* sect. *Platygalium* W. D. J. Koch s.l. (Ehrendorfer et al., 2005) and apparently is a member of the *G. kamschaticum* species group. This group includes the amph-Beringian *G. kamschaticum* Steller ex Schult., which in China is limited to altitudes of 1500–2300 m in the northeastern provinces of Heilongjiang and Jilin, the Japanese *G. nakaii* Kudô ex Hara from Hokkaido and northern Honshu, and the western North American *G. oreganum* Britton. These three latter species differ from *G. chekiangense* by their leaf blades drying dark brownish (not light brownish green), thin, membranous and smooth, neither papillose adaxially nor with glandular-striate idioblasts abaxially, and by their much longer uncinatate trichomes (0.8–1 mm vs. 0.15–0.25 mm) on the ripe mericarps. In addition, *G. nakaii* has inflorescences with cymes that are mostly shorter (not clearly longer) than the subtending leaves.

Representatives of *Galium chekiangense* from the province of Fujian were included and described in *Flora Reipublicae Popularis Sinicae* (Chen, 1999) under the name of *G. nakaii* Kudô ex Hara. Relevant Fujian vouchers were not available to me, but I have seen two fruiting specimens in the PE herbarium from the adjacent province of Zhejiang (formerly Chekiang) determined as *G. kamschaticum*, which closely correspond to the description of *G. nakaii* in Chen (1999). These PE specimens deviate so clearly from authentic Japanese specimens of *G. nakaii*, as well as from *G. kamschaticum* and *G. oreganum*, that their description as a new species appears obligatory. For the above diagnosis, the flower characters were taken from Chen (1999) because the type specimens from PE are in fruit.

For further and more detailed studies of the *Galium kamschaticum* species group, one should refer to the wide circumscription of *G. kamschaticum* (with three varieties) and the confused, partly contradictory description of the fruit indumentum of *G. nakaii* in Yamazaki (1993).

2. *Galium kunmingense* Ehrend., sp. nov. TYPE: China. Yunnan: Kunming, above Su-Chia-Chuen, Hei-Shan, 1950 m, 2 July 1945, *T. N. Liou 13776* (holotype, PE). Figure 3.



Figure 2. *Galium chekiangense* Ehrend. Holotype (s. coll. 0830, PE), with close-up of inflorescence and young fruits inset at top left. Scale bar = 10 cm.

Haec species inter congeneros ad *Galium* sect. *Platygalium* W. D. J. Koch pertinentes quoad corollam in dimidio basali connatam *G. platygalio* (Maxim.) Pobed. et *G. maximowiczii* (Kom.) Pobed. similis, sed ab eis floribus minoribus atque foliis 4-nis tantum verticillatis differt.

Perennial herbs, erect, (12-)15-20(-25) cm; *stems* with 4 prominent rounded angles, with scattered upward (or sometimes also downward), curved short hairs, these more dense at nodes; internodes 1.5-4 cm

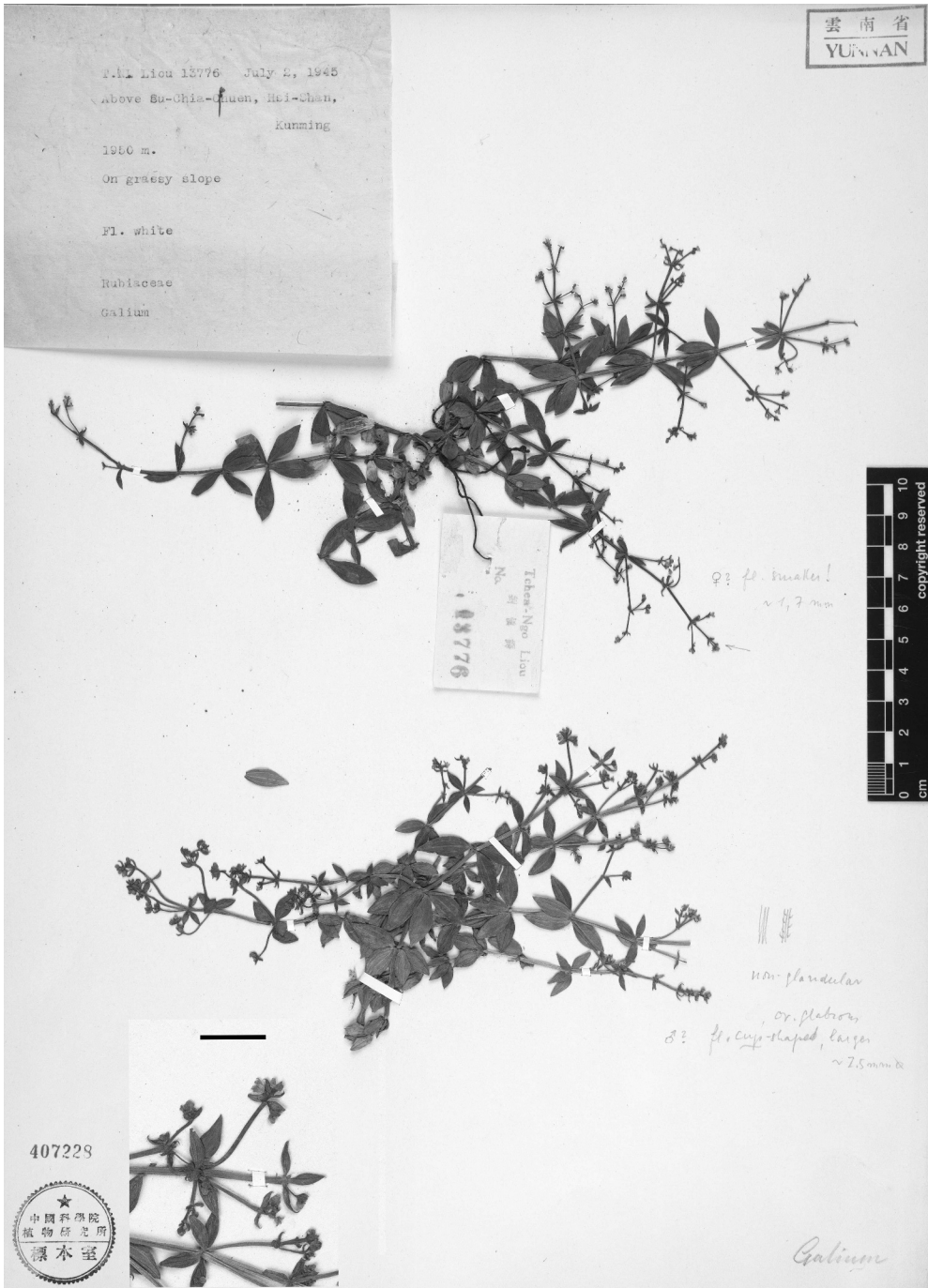


Figure 3. *Galium kunmingense* Ehrend. Holotype (T. N. Liou 13776, PE), with close-up of inflorescence and flowers inset at bottom left. Scale bar = 10 cm.

at middle stem regions, longer or somewhat shorter than leaves. *Leaves* and leaflike stipules in whorls of 4, drying \pm leathery and dark brownish, broadly lanceolate, (10-)15-25(-35) \times (4.5)-6-7.5(-9) mm,

length/width index (2)-2.5-3.5(-4), glabrous, apex acute but not acuminate, margins revolute and antrorsely aculeolate, base cuneate; adaxial surface papillose, abaxial surface without glandular idioblasts;

principal veins 3, prominent and extending into the apex region. *Inflorescences* pyramidal, with cymes terminal and in middle to upper stem nodes, axes glabrous, somewhat divaricate; cymes several- to many-flowered, peduncles mostly 1.5–4 cm, pedicels (0.5–) 1–5 mm; bracts lanceolate, small and inconspicuous. *Flowers* hermaphrodite (always?); *ovary* obovoid, ca. 0.5 mm, glabrous, smooth; *corolla* white to greenish, cup-shaped or campanulate, (2–)2.3–2.5(–2.7) mm diam., fused at the base (i.e., tube) for about the length of the 4 free lobes, these 0.8–1 mm long, lanceolate, acute but not apiculate. *Mericarps* separate, ovoid, ca. 1.5–3 mm, glabrous and \pm smooth.

Distribution and habitat. *Galium kunmingense* apparently is endemic to Yunnan Province and has not yet been found outside the Kunming area. It grows on open grassy or rocky slopes at altitudes of 1950–2500 m.

IUCN Red List category. *Galium kunmingense* apparently has not been collected since 1945, and its habitats around Kunming perhaps are now more or less destroyed. Therefore, its conservation assessment could correspond to the IUCN Red List category Endangered (EN; IUCN, 2001) or worse.

Phenology. *Galium kunmingense* was noted to flower from June to August and to fruit from July to September.

Discussion. It is remarkable that *Galium kunmingense*, a quite conspicuous species, has remained unnoticed up to now. It clearly belongs to *Galium* sect. *Platygalium* s.l. (Ehrendorfer et al., 2005). In addition to our new taxon, this section includes several other species with corollas basally fused to about half their length. One of these, traditionally still maintained as a separate genus, is *Micropphysa elongata* (Schrenk) Pobed., which is found from Kazakhstan to Xinjiang in western China. It differs from *G. kunmingense* by its leaves with only one main vein and by a somewhat inflated fruit pericarp, including both parts of the ripening ovary. Two other members of *Galium* sect. *Platygalium* with similar corollas were formerly regarded as species of *Asperula* L.: *G. platygalium* (Maxim.) Pobed. and *G. maximowiczii* (Kom.) Pobed. These species are distributed from eastern Siberia and Korea to northeastern China and differ from *G. kunmingense* by their larger flowers (3–5 mm diam.) and by leaf whorls often with more than four (i.e., five to six) elements.

Closer relationships can be assumed between *Galium kunmingense* and some other eastern Asiatic species of *Galium* sect. *Platygalium* s.l. with rotate corollas. One of these, *G. kinuta* Nakai & H. Hara, also has glabrous fruits, but differs by its narrower leaves that are punctate-striate with glandular idoblasts on the abaxial surface and by its more slender

inflorescences with more numerous flowers. Other apparent relatives of *G. kunmingense* with rotate flowers of less than 3 mm diam. have hairy fruits, including *G. hupehense* Pamp. with appressed hooked hairs on the fruits, *G. nakaii*, and particularly *G. yunnanense* H. Hara & C. Y. Wu, both of the latter with spreading, uncinuate fruit hairs. *Galium yunnanense* is more or less sympatric with *G. kunmingense*, but has rotate (vs. campanulate or cup-shaped), smaller corollas and uncinuate fruit hairs, and its leaves are also more hairy and punctate-striate glandular abaxially. Members of the polymorphic aggregate of *G. boreale* L. and *G. rubioides* L. differ from *G. kunmingense* by their more elongate (not pyramidal) inflorescences and rotate, larger flowers (more than 3 mm diam.).

Paratypes. CHINA. **Yunnan:** Kunming City, Heinongtan [Helongtan], 9 Oct. 1940(?), S. E. Liu 16789 (PE); Wei-si Hsien, Yeh-Chih, 2500 m, July 1935, C. W. Wang s.n. (PE).

3. *Galium rupifragum* Ehrend., sp. nov. TYPE: China. Yunnan: Ping-pien Hsien, 1500 m, 18 July 1934, H. T. Tsai 60986 (holotype, PE; isotype, PE). Figure 4.

Haec species quoad habitum gracile atque fructus trichomata uncinata *Galio salwinensi* Hand.-Mazz. ut videtur affinis, sed ab eo foliorum venis principalibus 3 atque caulis internodiis numerosioribus brevioribus distinguitur.

Perennial herbs, densely caespitose, emerging from a slender, branching rootstock; all vegetative parts very fragile when dried and with a loose indumentum of soft hairs 0.5–0.8 mm, \pm straight and spreading, on the adaxial leaf surface slightly bent downward; *stems* ascending or erect, 5–10 cm tall, 4-angled, hairy, with 12 to 18 internodes, increasing in length from 2–8 (–15) mm or more upward, with some short vegetative lateral branches produced from the middle region to the inflorescence base. *Leaves* and leaflike stipules in whorls of 4, thinly papery and remaining \pm greenish when dried, ovate to broadly lanceolate, 5–8 \times 2.5–3.5 mm, base attenuate, apex acute to apiculate, margins flat or slightly revolute, loosely hairy on both sides and marginally; principal veins palmate, 3, the lateral veins weak. *Inflorescences* terminal, mostly with 3 cymes, each with 3 to 5 flowers, bracts few and \pm reduced, peduncles 4–5 mm, pedicels 0.5–3 mm, glabrescent, somewhat elongated and divaricate in fruit. *Flowers* hermaphrodite; *ovary* ovoid, ca. 0.5 \times 0.3 mm, with hardly developed appressed hairs; *corolla* rotate, greenish white, ca. 1.5 mm diam., with 4 triangular and acute to slightly apiculate lobes. *Mericarps* ca. 0.8–1 mm, with spreading, uncinuate trichomes ca. 0.25 mm.



Figure 4. *Galium rupifragum* Ehrend. Holotype (H. T. Tsai 60986, PE), with close-up of inflorescence and flowers inset at bottom right. Scale bar = 10 cm.

Distribution and habitat. *Galium rupifragum* is known only from the mountainous type locality in Yunnan Province (Ping-pien Hsien), where it grows on rocks at 1800 m elevation.

IUCN Red List category. In its rocky habitat *Galium rupifragum* may be less vulnerable to human interference, but no further details are known. Thus, its conservation assessment is assessed here as Data

Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Phenology. According to the type specimen, *Galium rupifragum* appears to flower from June to August and to fruit from July to September.

Discussion. With its perennial growth form, the leaves and leaflike stipules in whorls of never more than four, and its mericarps covered with uncinete trichomes, *Galium rupifragum* is a typical member of *Galium* sect. *Platygalium* s.l. (Ehrendorfer et al., 2005). Affinities apparently exist with the eastern Asiatic *G. bungei* Steud. group, in particular with *G. salwinense* Hand.-Mazz. in southwestern China. *Galium rupifragum* is similar to *G. salwinense* in its slender growth form and uncinete fruit hairs, but in *G. salwinense* the leaves have only a single main vein and there are fewer (only up to 10) and longer (up to 10–20 mm) stem internodes. Nevertheless, on Mt. Omei (in Sichuan Province), typical *G. salwinense* occurs at lower elevations, whereas at higher altitudes its reduced forms somewhat approach *G. rupifragum*. The new species is also similar to species of the *G. morii* group, which comprises five closely related species from the high mountains of Taiwan. Of the species of the *G. morii* group, *G. rupifragum* is particularly close to *G. morii* Hayata itself and the related *G. formosense* Ohwi. *Galium rupifragum* differs from *G. morii* by its hirsute stems and the more divaricate, often longer peduncles and pedicels and from *G. formosense* by its lower growth form and smaller leaves.

4. *Galium sichuanense* Ehrend., sp. nov. TYPE:
China. Sichuan: Dao-cheng, 3380 m, 31 July 1973, *Coll. Exp. Veg. Szechuan 2431* (holotype, PE). Figure 5.

Haec species ob habitum perenne hemicyptophyticum, folia margine in parte retrorse aculeolata atque mericarpia setis uncinatis obsita ad *Galium* sect. *Trachygalium* K. Schum. pertinet, etiam ob characteres nonnullos ad sect. *Hylaeam* (Griseb.) Ehrend. accedit, sed a harum sectionum speciebus omnibus modo ramificationis, foliis membranaceis, caulibus foliisque praecipue glabris, inflorescentiis foliosis atque floribus parvis perclare distinguitur.

Perennial herbs, from filiform rhizomes, ascending to erect, ca. 30 cm tall; stems single, strongly branched from the base, prominently 4-angled with angles whitish, glabrous, smooth or slightly aculeolate at nodes. *Leaves* and leaflike stipules on middle stem regions in whorls of 4 to 6, lanceolate, (12–)15–20 (–25) × (3–)4–6(–7) mm, drying papery and greenish brown, sessile and gradually narrowed into the base, largest breadth near middle, apex cuspidate with hyaline point; glabrous except on adaxial

surface near margins with antrorse appressed microhairs, on the ± flat margins retrorsely and sometimes also weakly antrorsely aculeolate; principal vein 1. *Inflorescences* broadly ovoid, many-flowered, the cymes terminal and lateral, 2.5–5 cm, slender, leafy, and bracteate to the last branches, ± divaricate; axes glabrous, peduncles 1.5–2 cm, pedicels 0.5–5 mm. *Flowers* hermaphrodite; *ovary* obovoid, 0.5–0.8 mm, with appressed curved hairs; *corolla* rotate, 1.5–2 mm diam., when dry reddish brown, lobed ca. 3/4, lobes 4, triangular, cuspidate. *Mericarps* ovoid, 1.8–2.5 mm, with ± spreading uncinete trichomes 0.2–0.3 mm.

Distribution and habitat. The new species is apparently endemic to Sichuan Province (Dao-Cheng) from montane forests at elevations from 3200 to 4000 m.

IUCN Red List category. The evidently rare and localized *Galium sichuanense* has not been collected since 1989. Because it grows in a forested area that is evidently not protected, its conservation assessment should be classified as Endangered (EN) according to IUCN Red List criteria (IUCN, 2001).

Phenology. According to the type specimen, *Galium sichuanense* appears to flower from July to August and to fruit from August to September.

Discussion. At the present time, only two collections of *Galium sichuanense* are known from the type locality. The new species is morphologically isolated and not closely related to any other species of the genus. Its character profile, particularly its perennial, hemicyptophytic growth form, the partly retrorsely aculeolate leaf margins, and the fruits with uncinete trichomes, delegate the taxon to *Galium* sect. *Trachygalium* K. Schum., but there are also features characteristic of *Galium* sect. *Hylaea* (Griseb.) Ehrend. (Ehrendorfer et al., 2005). Nevertheless, the combination of the branching pattern, the membranous leaves, the predominantly glabrescent stems and leaves, the leafy inflorescences, and the small flowers separate it clearly from all other members of these two sections.

The Japanese *Galium kikumuyura* (Hayata) Ohwi, another isolated and apparently relictual species from eastern Asia, can also be compared with *G. sichuanense*. The two share the leaves in whorls of four to six, the small flowers (only ca. 2 mm diam.), as well as the hooked fruit trichomes and may be related. In contrast, the habit and the somewhat antrorsely rough or even aculeolate leaf margins of *G. kikumuyura* are reminiscent of *G. bungei* (*Galium* sect. *Platygalium*). Unique characters of *G. kikumuyura* are the 1- to 3-flowered cymes on long peduncles with a single bract



Figure 5. *Galium sichuanense* Ehrend. Holotype (Coll. Exp. Veg. Szechuan 2431, PE), with close-up of inflorescence, flowers, and young fruits inset at top right. Scale bar = 10 cm.

and the elongate, curved mericarps. Its taxonomic placement within *Galium* is also quite uncertain.

Paratypes. CHINA. **Sichuan:** Dao-Cheng, 3200 m, 25 Aug. 1981, Coll. Exp. Chinghai-Tibet 4295a (PE [2]).

NEW CIRCUMSCRIPTIONS IN THE *Galium DAHURICUM* GROUP AND A NEW COMBINATION

During the revision of considerable herbarium material of Rubiaceae, tribe Rubieae, from East Asia

(KUN, PE, WU), it became necessary to redefine species circumscriptions within the extremely variable *Galium dahuricum* group (section *Trachygalium* s.l., sensu Ehrendorfer et al., 2005), which includes the North American *G. asprellum* and the East Asian *G. dahuricum*, *G. pseudoasprellum* Makino, *G. manshuricum* Kitag., and *G. tokyoense* Makino. For the separation of these taxa, it is suggested to place less weight on glabrous (character state “a”) versus uncinately hairy mericarps (character state “b”) as in Cufodontis (1940) and Chen (1999), because the corresponding forms do not rarely occur within single populations. Instead, the more reliable character states of elongate, filiform, and flexuose (character state “A”) versus shorter, stiffer, and somewhat divaricate peduncles and pedicels (character state “B”) should be used for species delimitation within the *G. dahuricum* group. This makes it necessary to place *G. pseudoasprellum* (Ab) and *G. manshuricum* (Ab) under *G. dahuricum* (Aa) and to reestablish *G. tokyoense* (Ba) as a species, formerly treated as a variety under *G. dahuricum* (Aa). Thus, *G. manshuricum* is treated here as *G. dahuricum* var. *manshuricum*, and *G. dahuricum* var. *fructoglabrum* is synonymized with *G. dahuricum* var. *dahuricum*. In order to accommodate critical individual plants with somewhat more congested inflorescences and uncinately hairy mericarps, Cufodontis (1940) had created the variety *G. pseudoasprellum* var. *densiflorum*. This variety, slightly approaching *G. tokyoense*, has to be transferred now to *G. dahuricum*.

1. *Galium dahuricum* Turcz. ex Ledeb., Fl. Ross. 2: 409. 1844. Turcz. in Bull. Soc. Imp. Natural. Moscou 18: 312–313. 1845. TYPE: Russia, in umbrosis humidis Dahuriae maxime orientalis, prope unionem fluviorum Schilka et Argun, ad rivuolos, s.d., *N. S. Turczaninow* s.n. (holotype, LE).

1a. *Galium dahuricum* var. *dahuricum*.

1b. *Galium dahuricum* var. *densiflorum* (Cufod.) Ehrend., comb. nov. Basionym: *Galium pseudoasprellum* Makino var. *densiflorum* Cufod., Oes-terr. Bot. Z. 89: 237. 1940. TYPE: China. Sikang [Sichuan]: “Kangting vel Tachienlu, in prato herboso-fruticoso,” 2700 m, 10 July 1934, *H. Smith* s.n. (holotype, UPS).

Acknowledgments. I am very grateful to Mag. H. Rainer (at W and WU) for the photographs of the type specimens and to the keepers of the herbaria CAS, KUN, PE, W, and WU, who made the specimens available for the present study. Charlotte M. Taylor and Victoria C. Hollowell kindly helped with the text and editorial matters.

Literature Cited

- Chen, W.-C. 1999. *Galium*. Pp. 216–286 in *Flora Reipublicae Popularis Sinicae*, Vol. 73(2). Science Press, Beijing. Translation by Tao Chen. <http://flora.huh.harvard.edu/china/mss/volume19/Rubiaceae-MO_original.htm>, accessed 24 June 2010.
- Cufodontis, G. 1940. Revision der chinesischen *Galium*-Arten, nebst Bemerkungen über einige ihrer Formenkreise. Österr. Bot. Zeitschr. 89(3): 211–251.
- Ehrendorfer, F., E. Schönbeck-Temesy, C. Puff & W. Rechinger. 2005. Rubiaceae. Pp. 1–287 in K. H. Rechinger (editor), *Flora Iranica*, Vol. 176. Naturhistorisches Museum, Vienna.
- IUCN. 2001. IUCN Red List Categories and Criteria, Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland, and Cambridge, United Kingdom.
- Loesener, T. 1919. *Prodromus Florae Tsingtauensis*. Die Pflanzenwelt des Kiautschou-Gebietes. Beih. Bot. Centralbl., Abt. 2 37(2): 1–206.
- Natali, A., J. F. Manen, M. Kiehn & F. Ehrendorfer. 1996. Tribal, generic and specific relationships in the Rubioideae-Rubiaceae (Rubiaceae) based on sequence data of a cpDNA intergenic region. *Opera Bot. Belg.* 7: 193–203.
- Yamazaki, T. 1993. Rubiaceae. Pp. 206–240 in K. Iwatsuki, T. Yamazaki, D. E. Boufford & H. Ohba (editors), *Flora of Japan*, Vol. IIIa. Kodansha, Tokyo.