

79. RUBIA Linnaeus, Sp. Pl. 1: 109. 1753.

茜草属 qian cao shu

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Shrubs, subshrubs, or perennial herbs, not rarely clambering or climbing vines or rarely lianas, unarmed; stems often prickly and/or longitudinally ribbed or winged. Raphides present. Leaves opposite and with interpetiolar, triangular or ovate, persistent to caducous (*Rubia siamensis*) or reduced (*R. tibetica*) stipules or with leaflike stipules in whorls of 4, 6, to many in middle stem regions; domatia none; main veins single or 3–5 (or more) and then palmate, secondary veins lateral. Inflorescences thyrsoid, with terminal and/or axillary cymes, usually paniculiform and often expanding from new axes developing with age; individual cymes few to many flowered, pedunculate, bracteate. Flowers pedicellate or sessile, rather small, usually bisexual and monomorphic, rarely polygamo-dioecious (*R. cordifolia*). Ovary inferior (hypanthium), ellipsoid, subglobose, 2-celled, ovules 1 in each cell, erect, axile. Calyx limb reduced and obsolete. Corolla white to cream, yellow, greenish or red to purplish, often turning black when dried, mostly rotate, but rarely also campanulate to funnel-shaped, inside glabrous or infrequently papillose; lobes predominantly 5 (rarely also less or more), valvate in bud, often long acuminate. Stamens usually 5, inserted at corolla base (or tube), exerted; filaments developed to reduced; anthers dorsifixed. Stigmas 2-lobed, included or exerted. Fruit developing into 2 separate or (by reduction) into only 1 subglobose, baccate, berrylike mericarp with fleshy meso- and endocarp, dark red, purple, black, or infrequently orange (*R. cordifolia*), glabrous or somewhat hairy; seeds (“pyrenes”) 2, ellipsoid, subglobose, or plano-convex, with membranous testa; endosperm corneous; embryo subincurved; cotyledons leaflike; radicle prolonged, basiscopic.

About 80 species: extending from tropical and temperate Asia to Japan and Indonesia, through the Himalaya to SW Asia, E to S Africa, through the Mediterranean to W Europe, Macaronesia, and the Azores; locally introduced and persisting from cultivation in Mexico, Chile, and elsewhere; 38 species (20 endemic) in China.

As already mentioned in the present volume under *Galium*, *Rubia* is the type genus of the family, the tribe Rubieae, and the subtribe Rubiinae. As an Old World clade, *Rubia* is related to the Mesoamerican genus *Didymaea* and occupies a relative basal position within Rubiinae: its 5-lobed corollas, fleshy fruit, and always perennial growth form apparently are plesiomorphic features. This and its clear separation from the somewhat more apomorphic *Sherardia-Asperula-Galium* group is well documented by DNA data (Natali et al., *Opera Bot. Belg.* 7: 193–203. 1996; Soza & Olmstead, *Taxon* 59: 755–771. 2010). *Rubia* is keyed out from among the other Chinese taxa of Rubieae under *Galium* on p. 107. Its best differential characters are the dominantly 5-merous flowers combined with baccate, berrylike mericarps. The latter also occur independently among New World taxa of *Galium* (and *Relbunium*).

Among the Rubieae tribe *Rubia* (after *Galium* and *Asperula* in their present circumscription) is the third largest and obviously monophyletic genus. Nearly half of its recognized species occur in China. Because of excessive variability, the occurrence of hybridization and polyploidy as well as the lack of detailed studies (particularly on material in the major herbaria of China and elsewhere), our knowledge of *Rubia* is limited and the present treatment of the genus still quite provisional.

More recent taxonomic surveys of *Rubia* are available for the former Soviet Union (Pojarkova, *Fl. URSS* 23: 382–417. 1958), India (Deb & Malick, *Bull. Bot. Surv. India* 10(1): 1–16. 1968), Iran (Ehrendorfer et al., *Fl. Iranica* 176: 48–72. 2005), Bhutan (Long, *Edinburgh J. Bot.* 53: 108–110. 1996; Long, *Fl. Bhutan* 2(2): 823–825. 1999), and Taiwan (T. Y. A. Yang, *Fl. Taiwan*, ed. 2, 4: 321–324. 1998). Particularly in the first of these contributions, but also in the following two, the infrageneric taxonomy of *Rubia* is briefly considered. The majority of the Chinese species are characterized by 3–5(–11) palmate veins in their relatively broad leaves. These taxa correspond to *R.* sect. *Oligoneura* Pojarkova (= *R.* [unranked] *Cordifoliae* Candolle; *R.* sect. *Cordifoliae* (Candolle) K. Schumann ex Deb & Malick). Within this section Pojarkova (loc. cit.) has recognized two series: one predominantly climbing vines with long leaf petioles as *R.* ser. *Cordifoliae* (Candolle) Pojarkova (with 16 species in China; see under *R. cordifolia*), the other mostly erect perennial herbs with very short leaf petioles as *R.* ser. *Chinenses* (with three species in China; see under *R. chinensis*). The latter is close to the informal *R. mandersii* group, where the leaves are sessile (three species in China; see under *R. mandersii*). Finally, there are two species groups with vines. One is the *R. sikkimensis* group with sessile leaves and leaflike stipules (two Chinese species; see under *R. tenuis*), in the other, the *R. siamensis* group, typical (not leaflike) interpetiolar stipules appear between the opposite leaves (four species in China; see under *R. siamensis*).

The remaining ten Chinese species have leaves with only 1(–3) main vein(s) and predominantly pinnate vein branching. In the present treatment this refers to the species *Rubia chitralensis*, *R. deserticola*, *R. dolichophylla*, *R. reznizenkoana*, *R. schugnanica*, *R. tibetica*, and *R. tinctorum*, here provisionally accommodated in *R.* sect. *Rubia* s.l. (including *R.* sect. *Meganthera* Pojarkova (= *R.* sect. *Rubia* s.s.), *R.* sect. *Campylanthera* Pojarkova, and *R.* sect. *Chonanthe* Pojarkova). The placement of the E Asiatic species *R. haematantha* (the *R. haematantha* group; see there) as well as *R. pseudogalium* and *R. truppeliana* (the *R. truppeliana* group; see there) is doubtful; they may belong to *R.* sect. *Oligoneura* in spite of their very narrow leaves and only 1 main vein. The more detailed infrageneric subdivisions of *Rubia* by Pojarkova listed above have been based on size and form of anthers and other flower details and are in need of more general and detailed study.

Relevant characters for the separation of *Rubia* taxa on the species level are growth habit, indumentum, number, shape and consistency of leaves and stipules, presence or absence of petioles, inflorescence structures, color and morphology of corollas from rotate to funnel-shaped, fruit color, etc. Particularly, leaf characters often vary excessively under different environmental and developmental conditions (e.g., in more widespread taxa as *Rubia cordifolia* and its allies; see further comments there). These facts are difficult to evaluate, at least on dried specimens.

The ground-up rhizomes and roots of *Rubia tinctorum*, the type species of the genus, have long been the source of important red textile dyes (madder red, alizarin, rose madder, alizarin crimson). This use was of course much more important before the invention of aniline dyes (e.g., madder colored the red coats of the 18th-century British army). Nevertheless, *R. tinctorum* is still widely cultivated at a local scale and used, in particular, to

color wool for handmade oriental rugs in C and SW Asia (Murphy, Root of Wild Madder, 1–297. 2005) but also in fine art painting. The worldwide occurrence, cultivation, chemistry, and cultural role of this species was discussed in detail by Chenciner (Madder Red. 2000). The stems of *R. manjith* are also used to produce a red dye (fide Long, loc. cit. 1999).

The key here generally follows that of H. S. Lo (in FRPS 71(2): 287–290. 1999), with the measurements updated from the descriptions and species added as appropriate.

- 1a. Leaves with only 1 evident midvein; lateral veins pinnate, when palmate weak and obscure.
 - 2a. Leaves linear to narrowly lanceolate or oblong, mostly 3.5–30 × as long as wide.
 - 3a. Leaves with well-developed petioles; plants of forests.
 - 4a. Leaves in whorls of up to 6–8, with petioles 6–35 mm; peduncles 10–40 mm; corolla lobes ca. 2 mm; Shandong 36. *R. truppeliana*
 - 4b. Leaves in whorls of never more than 4, with petioles 3–6 mm; peduncles 3–6 mm; corolla lobes 1.2–1.5 mm; Yunnan 24. *R. pseudogalium*
 - 3b. Leaves without distinct petioles, sessile to subsessile; plants of open habitats.
 - 5a. Corolla dark red or perhaps sometimes white; leaves 6–8 per whorl, narrowly linear, less than 1 mm wide, midvein without evident lateral veins 12. *R. haematantha*
 - 5b. Corolla yellow or white; leaves 4–6 per whorl, linear-lanceolate to lanceolate-oblong, wider than 1 mm.
 - 6a. Leaves 5–14 mm wide, midvein with pinnate lateral veins; stems with aculeolate angles; inflorescence cymes terminal and distributed along lower stem nodes; corolla lobes ca. 2 mm 8. *R. dolichophylla*
 - 6b. Leaves 20–50 mm wide, lateral veins not evident; stems smooth; inflorescence cymes clustered near stem apices; corolla lobes 2.3–2.7 mm 28. *R. schugnanica*
 - 2b. Leaves broadly (ob)lanceolate, lanceolate-oblong, ligulate, elliptic, elliptic-oblong, lanceolate-ovate, ovate, or broadly ovate, mostly 1–3.5 × as long as wide.
 - 7a. Corolla lobes with apex aristate, arista 0.5–0.8 mm; leaves 4–6 in a whorl, lanceolate or elliptic-oblong, drying firmly leathery 7. *R. deserticola*
 - 7b. Corolla lobes obtuse, acute, or acuminate to mucronate, with arista up to 0.4 mm; leaves lanceolate to broadly ovate, drying papery to leathery.
 - 8a. Larger leaves longer and wider than 3 × 1.5 cm, dried papery to subleathery.
 - 9a. Leaves dried papery; corolla limb 6–7.5 mm in diam.; anthers ca. 0.4 mm 4. *R. chitralensis*
 - 9b. Leaves dried papery to subleathery; corolla limb 3–4.5 mm in diam.; anthers ca. 0.6 mm 34. *R. tinctorum*
 - 8b. Leaves 0.5–3 × 0.2–1.5 cm, dried leathery.
 - 10a. Leaves and leaflike stipules similar, mostly up to 6 per whorl; lower nodes of older stems not sheathed with old leaf bases; corolla yellow, lobes often 4, obtuse with short incurved cusp 26. *R. rezniczenkoana*
 - 10b. Leaves 2 with 2 smaller leaflike interpetiolar stipules in whorls of 4; lower nodes of older stems shortly sheathed with membranous bases of old leaves; corolla whitish, lobes usually 5, acuminate 33. *R. tibetica*
- 1b. Leaves with 3–11 evident principal and palmate veins (including midrib), arising from at or near base.
 - 11a. Leaves opposite, with evident interpetiolar stipules; plants of moist forests.
 - 12a. Leaves tuberculate-hispidulous; stipules ± leaflike but smaller than true leaves 6. *R. crassipes*
 - 12b. Leaves glabrous, scabrous, or ± hairy; stipules ovate to triangular, very different from true leaves.
 - 13a. Leaf margins entire and smooth, petioles 0.3–2.5 cm; inflorescence axes slender and filiform 11. *R. filiformis*
 - 13b. Leaf margins aculeolate, petioles (1–)2–4(–8) cm; inflorescence axes stout.
 - 14a. Ovary and fruit densely hairy 10. *R. falciformis*
 - 14b. Ovary and fruit glabrous.
 - 15a. Stipules large, ovate, acuminate, (5–)12–35(–60) × (3–)8–25(–40) mm; dried leaves light green and ± ferruginous, particularly below and on main veins 15. *R. magna*
 - 15b. Stipules small, triangular, 3–5(–7) × 2–3 mm; dried leaves dark green 30. *R. siamensis*
 - 11b. Leaves and leaflike stipules similar, in whorls of 4–12; plants of various habitats.
 - 16a. Erect herbs, if ± climbing vines then leaves (sub)sessile; leaves and leaflike stipules 4 or sometimes 6 per whorl.
 - 17a. Leaves markedly cordate at base.
 - 18a. Older stems broadly 4-winged 25. *R. pterygocaulis*
 - 18b. Older stems quadrangular to narrowly 4-angled.
 - 19a. Stem angles retrorsely aculeate; mountains of Taiwan 2. *R. argyi*
 - 19b. Stem angles smooth; Sichuan 13. *R. latipetala*
 - 17b. Leaves cuneate, obtuse, truncate, rounded, or shallowly cordulate at base.
 - 20a. Leaves sessile or subsessile (if flowers 4-merous then see *Galium*).
 - 21a. Principal leaf veins 7–11; stems and leaves strongly hairy; fused basal part of corolla only

- 0.2–0.3 mm, lobes 1–1.2 mm 23. *R. polyphlebia*
- 21b. Principal leaves veins 3 or 5; stems and leaves ± glabrescent to glabrous, scabrous; fused basal part of corolla 0.5–0.6 mm.
- 22a. Slender vines; leaves drying papery; flowers ca. 3 mm in diam. 32. *R. tenuis*
- 22b. Erect to spreading herbs; leaves drying mostly ± leathery; flowers 3–5 mm in diam.
- 23a. Stems 8-ribbed; leaves lanceolate to lanceolate-elliptic, 4–7 cm 9. *R. edgeworthii*
- 23b. Stems 4-angled; leaves broadly elliptic, linear-lanceolate, ovate, obovate, or elliptic-oblong, 1–5 cm.
- 24a. Stems and leaves glabrous to scabrous, latter drying papery; principal main veins 5; corolla ca. 5 mm in diam. 16. *R. mandersii*
- 24b. Stems and leaves often ± hairy or scabrous, latter drying ± papery; principal veins 3–5; corolla ca. 3 mm in diam. 38. *R. yunnanensis*
- 20b. Leaves petiolate, petioles 0.3–9 cm.
- 25a. Stems clearly retrorsely aculeolate.
- 26a. Leaves suborbicular to ovate, length/breadth index 1–1.8, dried papery 2. *R. argyi*
- 26b. Leaves lanceolate to ovate, length/breadth index 2–3, dried papery to subleathery 22. *R. podantha*
- 25b. Stems smooth to sparsely scaberulous.
- 27a. Leaves ± broadly elliptic, principal veins 5–7, dried thinly papery; fused part of corolla 0.2–0.6 mm 3. *R. chinensis*
- 27b. Leaves broadly lanceolate to ± broadly ovate, principal veins 3–5, dried papery to subleathery; fused part of corolla 0.8–2 mm.
- 28a. Leaves ± broadly ovate, length/breadth index 1.2–1.5, base cordulate to cordate, dried papery, principal veins 3–5; fused part of corolla 1.5–2 mm 13. *R. latipetala*
- 28b. Leaves broadly lanceolate to ovate, length/breadth index 1.5–2.5, base obtuse, rounded, or cordulate, dried thickly papery to subleathery, principal veins often impressed; fused part of corolla 0.8–1 mm 29. *R. schumanniana*
- 16b. Vines or lianas, climbing to sprawling; leaves petiolate, petioles 0.1–12 cm.
- 29a. Fruit, stems, and leaves hirsute, strigillose, hirtellous, or villosulous 35. *R. trichocarpa*
- 29b. Fruit glabrous, stems and leaves glabrous or with diverse indumentum.
- 30a. Leaves 4–12 per whorl, at least middle stem nodes with 6 or more leaves.
- 31a. Leaves oblanceolate, base cuneate to acute; petioles 0.6–3.5 cm 36. *R. truppeliana*
- 31b. Leaves ovate to suborbicular or lanceolate to oblong-lanceolate, base truncate, rounded, cordulate, or cordate; petioles 1–11 cm.
- 32a. Leaves ovate to suborbicular, largest mostly longer than 4 cm, length/breadth index 1.2–1.5, base cordulate or cordate; petioles 2–11 cm 31. *R. sylvatica*
- 32b. Leaves lanceolate to oblong-lanceolate, largest mostly shorter than 4 cm, length/breadth index 2.5–4, base truncate, rounded, or cordulate to cordate; petioles 1–9 cm 5. *R. cordifolia*
- 30b. Leaves 4, very rarely more per whorl.
- 33a. Stems, leaves abaxially, and/or outside of corolla moderately to densely hirtellous or hispidulous with trichomes regularly hooked at apex; leaves small, 0.8–3.5 × 0.3–1.5 cm 19. *R. oncotricha*
- 33b. Stems, leaves, and corollas outside glabrous, or with diverse indumentum, but never with regularly hooked hairs; leaves larger, 0.7–13 × 0.3–6.5 cm.
- 34a. Leaves drying thickly leathery, oblong-ovate to elliptic, apex obtuse 6. *R. crassipes*
- 34b. Leaves drying papery to leathery, ovate, oblong-lanceolate, ovate-lanceolate, oblong-ovate, cordiform, suborbicular, or lanceolate, apex subacute, acuminate, caudate, or obtuse and cuspidate.
- 35a. Dried plants flushed with red, particularly on lower leaf side; corolla rotate, purplish red, red, or orange, with spreading lobes of 1.2–1.5 mm; mature fruit dark red 17. *R. manjith*
- 35b. Dried plants green, gray, or yellowish (if rarely flushed with red then corollas campanulate with reflexed lobes); corolla white, yellow, greenish, or red; mature fruit black, dark blue, or orange.
- 36a. Corollas (sub)campanulate, tube (0.5–)0.8–1.2 mm, lobes ± reflexed, 1.2–1.5 mm.
- 37a. Stems 4-ridged to markedly winged; leaves lanceolate, length/breadth index more than 3 1. *R. alata*
- 37b. Stems quadrangular but never winged; leaves broader, length/breadth index less than 3.
- 38a. Leaves of main stems ovate-cordiform to suborbicular-cordiform, ± as long as wide or slightly longer than wide, when dry axially mealy green or pale green 20. *R. ovatifolia*
- 38b. Leaves lanceolate, oblong-ovate, oblong-suborbicular, or ovate, 2–3 × as long as wide, when dry green, brownish green, black, or perhaps red 22. *R. podantha*
- 36b. Corollas rotate, fused part 0.2–0.5 mm, lobes ± spreading.
- 39a. Corollas purplish red, with lobes 3–4 mm 18. *R. membranacea*

- 39b. Corollas white, yellow, greenish yellow, or purplish red, with lobes 1–2.5 mm.
- 40a. Corollas pale yellow to white, with lobes 2–2.5 mm 21. *R. pallida*
- 40b. Corolla variously colored, with lobes 1–1.5 mm.
- 41a. Leaves linear to narrowly lanceolate, 5–10 × as long as wide 27. *R. salicifolia*
- 41b. Leaves broader, oblong-lanceolate, oblong-ovate, ovate, cordiform, or suborbicular, not more than 4 × as long as wide.
- 42a. Leaves ovate to suborbicular, length/breadth index 1–1.8, base cordate or cordulate.
- 43a. Largest leaves mostly shorter than 4 cm, usually cuspidate or apiculate toward apex, length/breadth index 1–1.8, drying ± thickly papery, blackening, with lateral veins usually ± impressed and tertiary venation visible; petioles 0.5–5 cm 2. *R. argyi*
- 43b. Largest leaves mostly longer than 4 cm, usually attenuate toward apex, length/breadth index 1.2–1.5, drying thinly papery, often remaining greenish, lateral veins never impressed and tertiary venation less visible; petioles 2–11 cm 31. *R. sylvatica*
- 42b. Leaves lanceolate to oblong-lanceolate, attenuate toward apex, length/breadth index 2.5–4, lateral veins never impressed and tertiary venation less visible, base truncate, rounded, or cordulate.
- 44a. Flowers white; Taiwan 14. *R. linnii*
- 44b. Flowers purplish red, greenish, yellowish, or white; mainland.
- 45a. Stems smooth or sparsely aculeolate; flowers purplish red, greenish yellowish, or whitish; fruit 3.5–4 mm in diam., black at maturity 37. *R. wallichiana*
- 45b. Stems rather markedly or sparsely aculeolate; flowers greenish, yellowish, or whitish; fruit 4–6(–7) mm in diam., orange at maturity 5. *R. cordifolia*

1. *Rubia alata* Wallich in Roxburgh, Fl. Ind. 1: 384. 1820.

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Rubia cordifolia Linnaeus var. *longifolia* Handel-Mazzetti;
R. lanceolata Hayata.

Climbers and vines, herbaceous, perennial; stems to 4 m, quadrangular, 4-ridged, or usually 4-winged at least when older with wings to 1.5 mm wide, glabrous or hirtellous-puberulent at nodes, retrorsely aculeolate. Leaves and leaflike stipules in whorls of 4, often unequal (stipules smaller); petiole 0.2–10 cm, on principal axes longer than on lateral ones, those of stipules often shorter or even lacking; blade drying thinly leathery, linear-lanceolate or narrowly lanceolate, 3.5–9 × 0.4–2 cm, with length/breadth index above 3, glabrous and smooth or sometimes sparsely scaberulous, base rounded to cordulate, margin thinly revolute and usually aculeolate, apex acute; principal veins palmate, 3(or 5) with lateral veins sometimes weakly evident. Inflorescences thyrsoid, paniculate, with terminal and axillary, many-flowered cymes; axes smooth to aculeolate, ridged to thinly winged; bracts elliptic to lanceolate-elliptic, 0.8–3 mm; pedicels 1–4 mm. Ovary ca. 0.7 mm, smooth. Corolla white, pale yellow, or greenish, campanulate, fused base 0.5–1 mm, glabrous; lobes triangular to lanceolate, 1.2–1.5 mm, apex caudate-acuminate. Mericarp berry black, 5–7 mm. Fl. May–Aug, fr. Aug–Nov.

Forest margins on mountain slopes, thickets; 600–2000 m. Provinces south of the Chang Jiang, east to Taiwan, west to Sichuan, north to C Henan and S Shanxi: Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [Nepal].

Rubia alata, an obvious member of *R. ser. Cordifoliae*, is here treated in the sense of H. S. Lo (in FRPS 71(2): 312, t. 70, f. 1–6. 1999), which may or may not correspond to its original application and its type. Accordingly, it is mainly characterized by relatively narrow leaves,

petioles frequently bent near the base of the blade, stem angles with thin ridges to narrow or remarkably well-developed wings, and paniculate inflorescences, small flowers, and black fruit similar to other species of the *R. cordifolia* group (see additional comments under that species). The protologue of *R. alata* does not address the shape of the leaves and describes the stems as winged or not. This suggests the possibility that that the type's leaves are not markedly narrower and its stems not more markedly winged than those of *R. cordifolia* and related species. *Rubia alata* was not treated by Deb and Malick (Bull. Bot. Surv. India 10(1): 1–16. 1968) for India, nor by Long (Fl. Bhutan 2(2): 823–825. 1999) for Bhutan. The Kew Rubiaceae checklist (Govaerts et al., World Checkl. Rubiaceae; <http://www.kew.org/wcsp/rubiaceae/>; accessed on 15 Sep 2010) considers it to be a synonym of *R. cordifolia* but gives no source for this conclusion. From the relatively abundant herbarium material studied and the rather narrow species concept used in the present treatment, we believe that it is justified to distinguish *R. alata* sensu H. S. Lo and *R. cordifolia* s.s.

Rubia lanceolata from Taiwan is provisionally referred here as a synonym to *R. alata*. Some of the named varieties of *R. cordifolia* may also belong to this species but a clarification is impossible with our present insufficient knowledge of *R. ser. Cordifoliae*. The herbarium name "*R. cordifolia* var. *stenophylla* Franchet" does not appear to have ever been published anywhere.

The numerous collections from the Biodiversity Survey of the Gaoligong Shan area in Yunnan have revealed the common occurrence of *Rubia alata* and the presence of rare *R. siamensis* together with many populations, which link these two quite different taxa. These intermediates exhibit most varied differential character recombinations of the two species with respect to leaf shape, from broadly lanceolate to cordate (length/breadth index below 3) or from small triangular and sessile stipules to fully leaflike elements with long petioles. In addition, new characters appear, such as greenish to yellowish fruit colors. The suspicion that all this is the result of hybridization needs support by further studies.

2. *Rubia argyi* (H. Léveillé & Vaniot) H. Hara ex Lauener & D. K. Ferguson, Notes Roy. Bot. Gard. Edinburgh 32: 114. 1972.

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Galium argyi H. Léveillé & Vaniot, Bull. Soc. Bot. France 55: 58. 1908; *Rubia akane* Nakai; *R. akane* var. *erecta* Masamune; *R. chekiangensis* Deb.

Vines, herbaceous, perennial (rarely erect in mountains of Taiwan: *Rubia akane* var. *erecta*); stems probably to 2 m or more, quadrangular to narrowly 4-winged especially when older, glabrous to pilosulous, retrorsely aculeolate sometimes becoming smooth with age. Leaves nearly exclusively in whorls of 4, equal or sometimes unequal; petiole 0.5–5 cm; blade when drying often blackening, ± thickly papery, suborbicular-cordiform, broadly ovate-cordiform, or oblong-suborbicular, (1–)2–4.5(–5) × (1–)1.5–3.5(–4) cm, length/breadth index 1–1.8, glabrous or sparsely to densely pilosulous or hirtellous, scaberulous, base cordate to cordulate, margins sparsely to densely retrorsely aculeolate, apex cuspidate to apiculate; principal veins palmate, 5 or 7, veins usually ± impressed and tertiary venation visible. Inflorescences thyrsoid, paniculate, with terminal and axillary, many-flowered cymes, axes aculeolate, glabrous to pilosulous; bracts lanceolate or lanceolate-elliptic, 1–4 mm; pedicels rather stout, 1–2.5 mm. Ovary ca. 0.8 mm, smooth. Corolla yellowish-greenish to white, rotate to bell-shaped, glabrescent, fused base 0.5–0.7 mm; lobes lanceolate, 1.3–1.4 mm, spreading to ± reflexed. Mericarp berry black, subglobose 5–7(–9) mm in diam. Fl. Jul–Oct, fr. Aug–Nov.

Forest margins, thickets, fences at village sides; 300–3400 m. Anhui, Fujian, Guangdong, Guangxi, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Zhejiang [Japan, Korea].

Rubia akane is here treated as a synonym of *R. argyi*, following the Kew Rubiaceae checklist (Govaerts et al., World Checkl. Rubiaceae; <http://www.kew.org/wcsp/rubiaceae/>; accessed on 15 Sep 2010), Yamazaki (Fl. Japan 3a: 232. 1993), and H. S. Lo (in FRPS 71(2): 316. 1999). The recent Taiwanese flora (T. Y. A. Yang, Fl. Taiwan, ed. 2, 4: 322. 1998), however, continues to regard *R. akane* as a separate species and characterizes it by white flowers, whereas *R. argyi* generally is regarded as yellowish-greenish flowering. Aside from corolla color, no differential characters are apparent between the two taxa. However, in addition to the typical climbing and vinelike “var. *akane*” in Taiwanese localities below 2000 m, at higher elevations and more open habitats of the Taiwanese mountains, there is an upright growing type called *R. akane* var. *erecta*, which seems to be endemic. As a species it has been called *R. nankotaizana* Masamune (Hokuriku J. Bot. 2: 40. 1953). If it is actually conspecific, it should be transferred as a variety to *R. argyi*.

Rubia argyi belongs to *R. ser. Cordifoliae* and is well illustrated in the FRPS treatment by H. S. Lo (loc. cit.: 317, t. 71, f. 1–6). With the differential characters available (mainly the relatively broad and short leaves with veins impressed), it can be separated rather clearly from the very closely related members *R. cordifolia* s.l. (or better *R. cordifolia* agg., see there). To lump it with *R. cordifolia* (e.g., Z. Ying Zhang, Fl. Tsinling. 1(5): 14. 1985) does not appear justified. Within the *R. cordifolia* agg. *R. argyi* comes closest to *R. sylvatica*, from which it deviates primarily by its larger leaves, partly in whorls of more than 4. *Rubia ovatifolia* can be separated by its definitely campanulate flowers with a fused base of 0.8–1 mm. For additional comments see under *R. cordifolia*.

3. *Rubia chinensis* Regel & Maack in Regel, Tent. Fl. Ussur. 76. 1861.

中国茜草 *zhong guo qian cao*

Herbs, perennial, rhizomatous; stems erect, to 60 cm tall, solitary or usually grouped, unbranched or few branched, quadrangular, glabrous to pilosulous at least near nodes, ribs rounded, smooth to sparsely scaberulous. Leaves in whorls of 4; petiole (0.3–)0.5–2 cm; blade drying thinly papery, ovate, oblong-ovate, or broadly elliptic, 3–10 × 1.2–4.5 cm, length/breadth index 1.8–2.3, adaxially subglabrous and scaberulous, abaxially glabrous to pilosulous, base obtuse, rounded, or cordulate, margin scaberulous to ciliate, apex acute or acuminate; principal veins 5 or 7, palmate. Inflorescences thyrsoid, terminal and axillary in upper nodes, paniculate, many flowered, 5–30 cm, glabrous to pilosulous; axes scaberulous to smooth; bracts lanceolate, 1.5–8 mm; pedicels 2–7 mm. Ovary ca. 0.8 mm, smooth to scaberulous. Corolla greenish white, rotate, 3–4 mm in diam., glabrous, with fused base 0.2–0.6 mm; lobes 5, lanceolate, 1.7–2 mm, acute to caudate. Mericarp berry black, ca. 4 mm in diam., smooth. Fl. May–Jul, fr. Sep–Oct.

Forests on mountains, forest margins, meadows; 200–1400 m. E and N China [Japan, Korea, Russia].

Rubia chinensis and a few related species with erect (not climbing) stems and broad leaves with short petioles have been placed by Pojarkova (Fl. URSS 23: 391–392. 1958) into *R. ser. Chinenses*. Other Chinese species of this group include the closely related *R. latipetala* and *R. schumanniana*. The *R. mandersii* species group (see there) is similar but has sessile leaves.

For *Rubia chinensis* H. S. Lo (in FRPS 71(2): 301, t. 66, f. 8–13. 1999) gives good drawings and differentiates two varieties (elsewhere also treated as forms). They are listed here for reference but apparently are not well marked in China. They were not included in the Fl. Hebei. (2: 577. 1988), and in Fl. Japan (Yamazaki, 3a: 231–232. 1993) they were synonymized and said to be difficult to distinguish. Generally, it appears that Japanese populations of *R. chinensis* have somewhat smaller leaves than those from China.

- 1a. Leaves adaxially subglabrous or hirtellous along principal veins, pilosulous abaxially 3a. var. *chinensis*
- 1b. Leaves glabrous or aculeolate along midvein 3b. var. *glabrescens*

3a. *Rubia chinensis* var. *chinensis*

中国茜草(原变种) *zhong guo qian cao* (yuan bian zhong)

Rubia mitis Miquel.

Leaves subglabrous or hirtellous adaxially along principal veins, abaxially pilosulous, margin ciliate.

E and N China [Japan, Korea, Russia].

3b. *Rubia chinensis* var. *glabrescens* (Nakai) Kitagawa, Lin. Fl. Manshur. 405. 1939.

无毛大砧草 *wu mao da zhen cao*

Rubia mitis f. *glabrescens* Nakai, J. Jap. Bot. 14: 115. 1938; *R. chinensis* f. *glabrescens* (Nakai) Kitagawa.

Leaves glabrous except aculeolate adaxially along midvein, abaxially glabrous, margin scaberulous.

NE China [Japan, Korea].

4. *Rubia chitralensis* Ehrendorfer, Nytt Mag. Bot. 3: 228. 1954.

高原茜草 gao yuan qian cao

Herbs, perennial, with woody rootstock; stems up to 50 cm tall, clustered, subterete to slightly winged, glabrous, smooth. Leaves in whorls of up to 6 (or 7), sessile; blade drying membranous, lanceolate-ovate to lanceolate, (2–)4–5 × 0.7–1.5 cm, adaxially glabrous or sparsely antrorsely scaberulous, abaxially glabrous with midrib antrorsely aculeolate, margins retrorsely scaberulous, apex acute to acuminate; principal vein 1, lateral veins 2, weak. Inflorescences terminal, pyramidal, leaf-like, with 1- to several-flowered cymes; peduncles glabrous, smooth; bracts elliptic to ovate, 6–7 mm; pedicels 2–6 mm. Ovary 1–2 mm, glabrous. Corolla yellowish green to whitish yellow, rotate, 6–7.5 mm in diam., fused basal part 0.5–0.7 mm; lobes lanceolate, ca. 3 mm, acuminate to incurved-mucronate, arista to ca. 0.8 mm. Mericarp berry black and shiny, 3.5–5 mm in diam., glabrous. Fl. Jun–Jul, fr. Jul–Oct.

Stony slopes in *Juniperus* and subalpine belt; ca. 2900[–4000] m. Xinjiang [Afghanistan, Pakistan, Tajikistan, Uzbekistan].

Rubia chitralensis is distantly related to other SW to C Asiatic but rather subshrubby taxa, as *R. gedrosiaca* Bornmüller, *R. laxiflora* Gontscharov, or *R. tibetica*. These taxa were placed by Pojarkova (Fl. URSS 23: 398–417. 1958) into several series of the heterogeneous *R.* sect. *Campylanthera*, distributed from C Asia to the Mediterranean.

5. *Rubia cordifolia* Linnaeus, Syst. Nat., ed. 12, 3: 229. 1768.

茜草 qian cao

Rubia cordifolia var. *coriacea* Z. Ying Zhang; *R. cordifolia* subsp. *pratensis* (Maximowicz) Kitamura; *R. cordifolia* var. *pratensis* Maximowicz; *R. cordifolia* var. *rotundifolia* Franchet; *R. pratensis* (Maximowicz) Nakai.

Vines, herbaceous, climbing or scrambling herbs, with red rhizomatous base and roots; stems to 3.5 m, several to many from base, often much branched, quadrangular, glabrous to puberulent, with ribs rounded to thinly winged, sparsely to densely retrorsely aculeolate. Leaves in whorls of 4 or more (up to 8 or rarely 12); petiole (1–)1.5–3(–6) cm; blade drying papery to thickly papery, usually remaining ± greenish, lanceolate, oblong-lanceolate, ovate, or oblong-ovate, (1–)1.5–4(–7) × (0.3–)0.5–1.5(–2.5) cm, length/breadth index mostly 2.5–4, glabrous to pilosulous or hirtellous, sparsely to densely scaberulous, base rounded, truncate, cordulate, or cordate, margin serrulate-aculeolate, apex obtuse and apiculate to acute or acuminate; principal veins 3 or 5, palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, several- to many-flowered cymes; axes glabrous to puberulent or pilosulous, ± aculeolate; bracts linear-lanceolate to ligulate, 1–3 mm; pedicels 1–4 mm. Ovary 0.5–0.8 mm, smooth to scaberulous. Flowers hermaphroditic (rarely polygamo-dioecious?). Corolla pale yellow or greenish yellow, rotate, glabrous, fused base 0.2–0.4 mm; lobes lanceolate, spreading to reflexed, 1.2–1.5 mm, caudate. Mericarp berry becoming orange then apparently black, 4–6 mm in diam. Fl. Aug–Sep, fr. Oct–Nov.

Sparse forests, forest margins, grasslands; 300–2800 m. Anhui, Gansu, Hebei, Hunan, Qinghai, Shandong, Shanxi, Sichuan, Xizang, Yunnan [Japan, Korea, Mongolia, Russia (Far East); S and SE Asia to Sri Lanka and Java, through the Himalaya to Afghanistan; (sub)tropical Africa].

As noted by most previous authors (Pojarkova, Fl. URSS 23: 387–391. 1958; Ehrendorfer et al., Fl. Iranica 176: 52–53. 2005), the plants included in *Rubia cordifolia* s.l. comprise a geographically very widespread (from E and SE Asia to Afghanistan, from Sudan to S Africa), morphologically extremely “polymorphic,” polyploid, and still most insufficiently understood racial complex. Its populations, together with related taxa, have been grouped into *R.* ser. *Cordifoliae* by Pojarkova (loc. cit.), characterized by their generally clambering to climbing habit; leaves and leaflike stipules in whorls of 4 or more, petiolate, palmately 3–7-veined; and corollas rotate to shortly campanulate, with anthers ellipsoid, somewhat curved, and 4–6 × shorter than the corolla lobes. Depending on narrow or wider species concepts and differential characters chosen, the elements of this series have been quite variously treated. In the present flora the following 16 species are assembled in *R.* ser. *Cordifoliae*: 1. *R. alata*, 2. *R. argyi*, 5. *R. cordifolia*, 6. *R. crassipes*, 14. *R. linii*, 17. *R. manjith*, 18. *R. membranacea*, 19. *R. oncotricha*, 20. *R. ovatifolia*, 21. *R. pallida*, 22. *R. podantha*, 25. *R. pterygocaulis*, 27. *R. salicifolia*, 31. *R. sylvatica*, 35. *R. trichocarpa*, and 37. *R. wallichiana*. Species 5, 14, 20, 31, and 37 are so close and linked by occasional intermediates that they can be understood as *R. cordifolia* s.l. or *R. cordifolia* agg. The above species description refers to *R. cordifolia* s.s.

The type specimen of *Rubia cordifolia* in the Linnaean Herbarium (no. 131.7, LINN) has no flowers or fruit, but its distinct habit with leaves in whorls of 4, oblong-cordate, acute, and with long petioles corresponds to the above description of the species in a more narrow sense and to the figure in H. S. Lo (in FRPS 71(2): 307, t. 68, f. 7–12. 1999). The complications in the typification of *R. cordifolia* have been detailed by Jarvis (Order Out of Chaos, 800. 2007). The description by Linnaeus was emended by Gaertner (Novi Comment. Acad. Petrop. 14(1): 541. 1770). The original reference to “4-merous flowers” may have been due to the occasional occurrence of 4- among the typical 5-merous flowers or simply to a mistake. The fruit were originally described as unknown, but later their color was given as red. Pojarkova (loc. cit.: 466–467) noted for *R. cordifolia* and for *R.* ser. *Cordifoliae* as a whole that the fruit were orange or brownish when immature and black when fully mature and dry. Personal observations revealed a group of distinctive Chinese specimens with vegetative parts drying yellowed and the mature, or near-mature, fruit drying clear bright orange but evidently turning black at maturity (e.g., *Fu Kunjun 10394*, MO!). Thus, fruit color may be of taxonomic relevance in *Rubia* but is in need of more detailed studies.

Even with the present, rather narrow circumscription, there is still much variation among the Chinese populations of *Rubia cordifolia*. This refers to indumentum, consistency, shape and size of leaves, number of leaves and leaflike stipules per whorl, flower shape, and fruit color. Leaf indumentum does not seem to be correlated with that of the inflorescence axes. Instead, either may be glabrous or pubescent, apparently independently, which is unusual in Rubiaceae. In zones of contact, particularly with the closely related *R. sylvatica* and *R. ovatifolia*, one has to expect transitional individuals. The status of *R. wallichiana* (see there) and its separation from *R. cordifolia* is doubtful anyway.

The infraspecific synonymy of *Rubia cordifolia* listed above follows H. S. Lo (loc. cit.: 315); it has not yet been checked in detail for lack of any more authoritative treatment of *R.* ser. *Cordifoliae*. *Rubia cordifolia* var. *coriacea* was not listed by H. S. Lo and is here synonymized provisionally, as we have seen no authentic material. According to its protologue, it differs from typical *R. cordifolia* in its subleathery

leaves, which are glabrous below. With respect to *R. cordifolia* var. *munjista* (Roxburgh) Miquel see *R. manjith*.

6. *Rubia crassipes* Collett & Hemsley, J. Linn. Soc., Bot. 28: 68. 1890.

厚柄茜草 hou bing qian cao

Vines, herbaceous, climbing, to 3 m; stems quadrangular becoming subterete, tuberculate-hispid, scabrous. Leaves in whorls of 4, often \pm unequal; petiole 0.5–1.8 cm or smallest leaves sometimes sessile; blade drying thickly leathery, ovate-oblong to elliptic, (0.7–)2–4.5 cm, tuberculate-hispid, base rounded to cordulate, margin slightly revolute, apex obtuse; principal veins 5, palmate. Inflorescences thyrsoid, paniculate, 3–7 cm, with axillary and terminal cymes; axes rather stout; bracteoles ovate or lanceolate, 2.5–3.5 mm. Flowers unknown. Immature mericarp berry black when dry, ca. 4 mm in diam. Fr. autumn.

Forest margins on mountain ridges; 1400–2400 m. Yunnan [Myanmar, Thailand].

We have seen no authentic material of *Rubia crassipes*. The above description corresponds to the protologue and to H. S. Lo (in FRPS 71(2): 313. 1999). The extended description and photo of plants from Thailand regarded as this species by Puff (Fl. Thailand: Rubiaceae; http://homepage.univie.ac.at/christian.puff/FTH-RUB/FTH-RUB_HOME.htm; accessed on 5 Oct 2010) deviates by straight and soft hairs in addition to the scabrous indumentum and considerably larger leaves. Puff also added data on the shallowly campanulate, 5-lobed flowers 2.4–4 mm in diam., and considered the taxon as part of the *R. cordifolia* group. Only further extensive studies will clarify the doubtful delimitation and taxonomic placement of *R. crassipes*.

7. *Rubia deserticola* Pojarkova in Schischkin, Fl. URSS 23: 722. 1958.

沙生茜草 sha sheng qian cao

Plants herbaceous, perennial, with woody rootstock; stems suberect, to 1 m tall quadrangular, angles recurved prickly. Leaves in whorls of 4–6, subsessile; blade drying firmly leathery, lanceolate to elliptic-oblong, aculeolate abaxially on midrib and along thickened margins, base acute, apex acuminate; principal vein 1. Inflorescences terminal, many flowered, leafy and bracteose. Ovary 1–2 mm, glabrous. Corolla yellowish white, rotate, fused basal part ca. 0.3 mm; limb 3.5–4.5 mm in diam.; lobes lanceolate, aristate. Anthers very small, ca. 0.3 mm. Mericarp berry black, 3.5–5 mm in diam. Fl. Jun, fr. Jul.

Sandy and salty semideserts. Xinjiang (Yili) [Kazakhstan].

We have seen no authentic material of *Rubia deserticola*. This local C Asiatic semidesert species was regarded as close to the common Mediterranean *R. peregrina* Linnaeus by Pojarkova (loc. cit.) and placed into *R. ser. Peregrinae* Pojarkova of *R. sect. Campylanthera*.

8. *Rubia dolichophylla* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 2: 115. 1844.

长叶茜草 chang ye qian cao

Herbs, perennial, rhizomatous; stems erect, to 1 m tall, glabrous, angled, retrorsely aculeolate. Leaves in whorls of 4, sessile or subsessile; blade drying papery, linear to lanceolate-

oblong, 5–12 \times 0.5–1.4 cm, glabrous, abaxially prickly on midrib and often on veins, base acute to cuneate, margins revolute and antrorsely aculeolate, apex acute to acuminate; lateral veins pinnate, 6–10 pairs. Inflorescences thyrsoid, with terminal and axillary, several- to many-flowered cymes, nearly as long as or shorter than subtending leaves; axes aculeolate; bracts linear, 2–5 mm; pedicels 2–6 mm. Ovary 1–1.2 mm in diam. Corolla pale yellow, rotate, fused basal part ca. 0.6 mm; lobes ovate, ca. 2 mm, abruptly contracted with arista ca. 0.5 mm. Mericarp berry black, 2.5–5 mm. Fl. May–Aug, fr. Jul–Sep.

Along rivers and among rocks; 1900–2100 m. Xinjiang [Afghanistan, Kazakhstan, Pakistan, Tajikistan; SW Asia (Iran)].

Rubia dolichophylla, well illustrated in H. S. Lo (in FRPS 71(2): 293, t. 62, f. 1–6. 1999), according to Pojarkova (Fl. URSS 23: 404–407. 1958) is one of the two species of *R. ser. Dolichophyllae* Pojarkova, both C Asiatic rhizome-forming herbs. Specimens of *R. jesoensis* (Miquel) Miyabe & Miyaki from Japan with a similar growth form might key out as *R. dolichophylla* but are readily separable by their stems with vegetative apex and exclusively axillary inflorescences with cymes borne along the lower stem portion and usually shorter than the supporting leaves. In *R. dolichophylla* the partial inflorescences are terminal and axillary. As already correctly shown by Pojarkova (loc. cit.), *R. jesoensis* appears related to *R. tatarica* (Treviranus) F. W. Schmidt from SE Russia and adjacent Siberia, and both belong to *R. ser. Tataricae* Pojarkova.

9. *Rubia edgeworthii* J. D. Hooker, Fl. Brit. India 3: 203. 1881.

川滇茜草 chuan dian qian cao

Herbs, scandent to climbing; stems 8-ribbed, scabrous. Leaves in whorls of 4, subsessile; blade drying papery, lanceolate to lanceolate-elliptic, 4–7 \times 1.2–2 cm, both surfaces scaberrulous and sometimes hirtellous, base acute to obtuse, margins entire, apex acute to acuminate; principal veins 3 or 5, palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, many-flowered cymes, usually much longer than subtending leaves; axes hirtellous, scaberrulous to glabrescent; bracts lanceolate or subovate, 2–5 mm; pedicels 2–5 mm. Ovary subglabrous to hirtellous. Corolla pale yellow, somewhat funnel-shaped, glabrous or hirtellous outside, fused basal part ca. 0.5 mm; lobes 5, ovate to lanceolate, 1–1.2 mm, obtuse to acute. Mericarp berry unknown. Fl. Sep.

Grassy slopes; ca. 2100 m. Guangxi (Longlin), Sichuan (Miyi), Yunnan (Heqing) [N India].

We have not seen authentic material of *Rubia edgeworthii*, but both Deb and Malick (Bull. Bot. Surv. India 10(1): 11–12. 1968) and H. S. Lo (in FRPS 71(2): 304, t. 67, f. 8–13. 1999) presented good drawings. Nevertheless, nothing is known about the important underground organs of this species (rootstock or rhizome?). Judging from other characters, *R. edgeworthii* may belong to the vines of the *R. sikkimensis* group with *R. tenuis* (see there), but one also has to consider the upright, not climbing members of the *R. mandersii* group; both are elements of *R. sect. Oligoneura*. H. S. Lo (loc. cit.: 308) noted that the unpublished name “*Rubia lancilimba* F. C. How” has been written on specimens of this species.

10. *Rubia falciformis* H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 23. 1999.

镰叶茜草 lian ye qian cao

Herbs, perennial, presumably scandent vines; stems quad-

rangular, scabrous. Leaves opposite; petiole 3–4 cm, rather stout, retrorsely aculeolate; blade drying greenish, thickly leathery, falcate-lanceolate, 11–15 cm, both surfaces scaberulous, usually aculeolate along principal veins, base rounded or subcordate, margin revolute and aculeolate, apex acuminate; principal veins 5, palmate, impressed above, with higher order reticulate veins immersed; stipules caducous, unknown. Inflorescences axillary, with many-flowered cymes. Flowers unknown. Mericarp berries dark orange-yellow when dry, 3.5–4 mm in diam., binary or solitary, densely villous with pubescence drying ferruginous. Fr. Oct.

- Wet lands in forests; ca. 1100 m. Yunnan (Lianghe).

Authentic material of *Rubia falciformis* has not been available, but H. S. Lo (in FRPS 71(2): 295, t. 63, f. 9–11. 1999) presented a good drawing. With the exception of the strongly hairy fruit and the deciduous (and unknown) stipules, its description corresponds to *R. siamensis*, also known from Yunnan, and thus belongs to its group within *R. sect. Oligoneura*.

11. *Rubia filiformis* F. C. How ex H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 24. 1999.

丝梗茜草 si geng qian cao

Vines, herbaceous, to 2–3 m tall; stems quadrangular or narrowly 4-winged, glabrous or subglabrous, retrorsely aculeolate on angles. Leaves opposite; petiole (2–)3–15(–25) mm; blade drying thinly leathery or papery, ovate or rarely ovate-lanceolate, 2–9 × 1–4.5 cm, both surfaces glabrous and smooth or sparsely aculeolate along veins, base rounded, subcordate, or obtuse, margins entire and smooth, apex acute to acuminate; principal veins 3 or 5(or 7), palmate, adaxially impressed; stipules ovate, ca. 5 mm, usually caducous. Inflorescences thyrsoid, paniculiform, with terminal and axillary, many-flowered cymes and slender, subfiliform, smooth and glabrous axes. Flowers unknown. Fruiting pedicels 7–14 mm; mericarp berries black, 4–5 mm in diam. Fr. in late winter.

- Forests; 1000–1500 m. Yunnan (Malipo).

We have seen no authentic specimens of *Rubia filiformis*, but there is a good drawing in H. S. Lo (in FRPS 71(2): 297, t. 64, f. 1–5. 1999). The species evidently belongs to the *R. siamensis* group of *R. sect. Oligoneura*.

12. *Rubia haematantha* Airy Shaw, Bull. Misc. Inform. Kew 1931: 450. 1931.

红花茜草 hong hua qian cao

Herbs, perennial, erect to somewhat climbing, with woody rootstock; stems 0.5 m or more, clustered, quadrangular, angles ± retrorsely aculeolate. Leaves in whorls of up to 6–8(–10), narrowly linear, 20–50 × 0.5–1 mm, base acute, margins revolute and antrorsely aculeolate, otherwise glabrous and smooth, single vein forming a thick midrib ca. 1/2 of leaf breadth, apex acute, with hyaline point. Inflorescence thyrsoid, with lax, few-flowered axillary and terminal cymes; bracts filiform; pedicels ca. 5 mm. Ovary ca. 0.5 mm, glabrous. Corolla dark red (perhaps sometimes ?white), rotate, 3–4 mm in diam., glabrous; lobes triangular, 3-veined, abruptly caudate with acumen ca. 1 mm. Mericarp berry black, 3–4 mm in diam. Fl. summer–

early autumn, fr. late autumn–early winter.

- Dry and rocky meadows; 3000–3800 m. Sichuan, NW Yunnan.

Together with *Rubia angustissima* Wallich ex G. Don and *R. charifolia* Wallich ex G. Don from the Himalaya, both with greenish-yellowish flowers, the dark-red flowering *R. haematantha* forms an aberrant, closely related species assembly, provisionally called *R. angustissima* group. It occurs from the W Himalaya (Kashmir) to Nepal, Myanmar, Bhutan, and SW China. The group shares retrorsely aculeate stems, linear to filiform leaves in whorls of up to 8(–10), and caudate corolla lobes. Species delimitation within this group is still provisional. Whereas Deb and Malick (Bull. Bot. Surv. India 10(1): 5. 1968) unite *R. angustissima* and *R. charifolia* (“*R. charaefolia*”), the two taxa are maintained by Long (Fl. Bhutan 2(2): 823–825. 1999). The reliability of the flower color as differential character of *R. haematantha* also needs further study. If only one species is accepted, its name would have to be *R. angustissima*.

13. *Rubia latipetala* H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 23. 1999.

阔瓣茜草 kuo ban qian cao

Herbs, perennial, with ?rootstock; stems erect, to 20 cm tall, little branched, quadrangular, glabrous, smooth. Leaves in whorls of 4; petiole 0.8–1.8 cm; blade drying greenish, papery, ± broadly ovate, 1.5–3.5 × 1–3 cm, length/breadth index 1.2–1.5, glabrous except hispid on principal veins, base cordulate to cordate, apex acute; principal veins 3–5, palmate. Inflorescences thyrsoid, with terminal and sometimes axillary, 2–5-flowered and 0.5–1 cm long cymes; axes glabrous. Corolla green, turning blackish when dry, bell-shaped, fused part 1.5–2 mm; lobes triangular, ca. 1.5 mm. Mericarp berries unknown. Fl. Aug.

- Forest margins; ca. 3400 m. Sichuan (Barkam).

No authentic material of *Rubia latipetala* was available to us. From the description it belongs to *R. ser. Chinenses*. A completely glabrous and smooth specimen with larger, ovate-cordate leaves (to 5.5 × 3.5 cm) and petioles up to 3.5 cm (1800 m, 21 Jul 1988, PE – sheet no. 1847036) may belong here.

14. *Rubia linii* J. M. Chao, Biol. Bull. Natl. Taiwan Norm. Univ. 1: 48. 1966.

林氏茜草 lin shi qian cao

Herbs, climbing or scrambling, to 1.5 m; stems subterete, glabrous, smooth to sparsely aculeolate. Leaves in whorls of 4; petiole 1–4.5 cm, glabrous; blade drying thinly papery, lanceolate, lanceolate-oblong, or oblong-ovate, 2–7.5 × 0.5–3 cm, length/breadth index 2.5–4, glabrous, upper side sparsely scaberulous, base truncate, rounded, or cordulate, margin flat to thinly revolute and smooth, apex acute to acuminate; principal veins 3(or 5), palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, several- to many-flowered cymes; axes glabrous and smooth; bracteoles lanceolate to narrowly elliptic, 1–3 mm; pedicels 1–4 mm. Ovary 0.3–0.5 mm, smooth. Corolla white, rotate, ca. 2.5 mm in diam., with lobes usually reflexed, outside glabrous, fused base ca. 0.5 mm; lobes 5, triangular, 1–1.2 mm, acute. Mericarp berry black, 4–7 mm in diam. Fl. May–Aug, fr. Apr, Jul.

- Margins of evergreen forests; 500–3000 m. Taiwan.

Rubia linii was accepted in the Fl. Taiwan (ed. 2, 4: 324. 1998), where neither *R. cordifolia* nor *R. wallichiana* figure. In FRPS (71(2): 316. 1999) it was treated in a comment under *R. wallichiana*, as a possible misidentification of that species. *Rubia linii* is an obvious member of the *R. cordifolia* complex (= *R. cordifolia* agg., see additional comments under that species). More detailed studies will have to demonstrate its doubtful specific status; it is obviously very close to *R. cordifolia* and *R. wallichiana*.

15. *Rubia magna* P. K. Hsiao, Acta Phytotax. Sin. 23: 390. 1985.

峨嵋茜草 e mei qian cao

Vines, herbaceous, to 3 m; stems quadrangular or narrowly 4-winged, sparsely retrorsely aculeolate on angles. Leaves opposite; petiole 1–4(–6) cm, retrorsely aculeolate and sometimes ferruginous hirtellous; blade drying thickly papery to leathery, light green and ± ferruginous, particularly below and on main veins, ovate, lanceolate, or oblanceolate, larger leaves 4–12.5 × 1.5–5(–7) cm, smaller 2–3 × 1–2 cm, glabrous to hirtellous, retrorsely aculeolate at least along veins on both surfaces, base rounded to cordate, margins serrulate-aculeolate, apex acuminate; principal veins 3 or mostly 5; stipules conspicuous, persistent, ± broadly ovate, (5–)10–60 × (4–)8–40 mm, acuminate. Inflorescences predominantly axillary, with several- to many-flowered cymes; axes glabrous to hirtellous, sparsely aculeolate; bracts ovate or sublanceolate, 1–5 mm; pedicels 1–4 mm. Ovary ca. 1 mm, glabrous to glabrescent. Corolla yellow to green, 5-merous, cup-shaped to campanulate, 3.5–4.5 mm in diam., papillose to ± hairy outside; tube 0.8–1.3 mm; lobes triangular-ovate, 1.5–1.7 mm, caudate. Mericarp berry black, 4–5 mm in diam. Fl. Jun–Jul, fr. Aug–Oct.

- Broad-leaved subtropical forests; 1200–1500 m. Sichuan, Yunnan.

The above description of *Rubia magna* combines data from the protologue, H. S. Lo in FRPS (71(2): 295, t. 63, f. 1–8. 1999), and new collections from the Gaoligong Shan region of Yunnan. The latter are conspicuous by their lack of hairiness and their conspicuous stipules (much larger than shown in FRPS). Certain discrepancies (protologue: leaves sometimes sessile and opposite but sometimes petiolate and 3–5-verticillate; H. S. Lo (loc. cit.: 294): corolla lobes 4) may be due to mixed material and still need clarification.

Rubia magna is mainly characterized by its opposite leaves, dried green and ferruginous blades, and large stipules. It belongs, together with *R. falciformis* and *R. filiformis*, to the closely related *R. siamensis* group from SW China and adjacent areas.

Originally, *Rubia magna* was described as “a new species of medicinal *Rubia*,” and presumably its uses are detailed in that article.

16. *Rubia mandersii* Collett & Hemsley, J. Linn. Soc., Bot. 28: 68. 1890.

黑花茜草 hei hua qian cao

Herbs, perennial, with slightly woody rootstock; stems 20–60 cm tall, erect, unbranched to diffusely branched, quadrangular to narrowly winged, glabrous, ribs retrorsely aculeolate and scabrous to glabrous. Leaves in whorls of 4, sessile; blade drying thickly papery, broadly elliptic-oblong, ovate, or subor-

bicular, 1.5–3.5 × 0.8–1.9 cm, glabrous but scaberulous at least on upper surface, base rounded to cuneate and subpetiolate, margin aculeolate, apex obtuse or acute; principal veins palmate, 3–5. Inflorescences thyrsoid, narrowly paniculate, with terminal and axillary, many-flowered, long-pedunculate cymes; axes glabrous; bracteoles reduced, narrowly ligulate to lanceolate; pedicels 2–4 mm. Ovary ca. 1.5 mm, glabrous. Corolla greenish, yellowish, or whitish, rotate, ca. 5 mm in diam., glabrous, fused basal part 0.5–0.6 mm; lobes lanceolate or ovate, 1.6–2 mm, apex incurved. Immature mericarp berry ca. 3 mm in diam. Fl. Aug, immature fr. Oct.

Dry rocky mountains, *Pinus* forests; 1900–3000 m. Sichuan, Yunnan [Myanmar, Thailand].

Rubia mandersii, together with the closely related *R. polyphlebia* and *R. yunnanensis*, forms a SW Chinese group of erect herbaceous perennials with rootstock and ± sessile, lanceolate to broadly ovate, and scabrous or hairy leaves in whorls of 4(–6), which belongs to *R. sect. Oligoneura*.

17. *Rubia manjith* Roxburgh ex Fleming, Asiat. Res. 11: 177. 1810.

梵茜草 fan qian cao

Rubia cordifolia Linnaeus var. *khasiana* Watt; *R. cordifolia* var. *munjista* (Roxburgh) Miquel; *R. munjista* Roxburgh.

Vines, herbaceous, drying with reddish cast; stems to 3 m, quadrangular, glabrous, retrorsely aculeolate to smooth, with red pith. Leaves in whorls of 4, equal or unequal; petiole 0.8–4 cm, sparsely aculeolate; blade drying papery, mostly greenish adaxially and purplish red abaxially, oblong-lanceolate, ovate-lanceolate, or ovate, (2.5–)4–6(–8.5) × (0.8–)1.8–2.5(–4) cm, length/breadth index 2–3, both surfaces glabrous and scaberulous, base rounded to cordate, margin flat to thinly revolute, aculeolate, apex long acuminate or caudate; principal veins (3 or)5(or 7), palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, many-flowered and 2.5–10 cm long cymes; axes glabrous and smooth to sparsely aculeolate; bracteoles elliptic-oblong or lanceolate, 0.5–2 mm; pedicels 1.5–3.5 mm. Ovary ca. 0.5 mm, smooth. Corolla red, purplish red, or orange, rotate, glabrous, fused basal part 0.5–0.6 mm; lobes 5, lanceolate to triangular, 1.2–1.5 cm, acuminate. Mericarp berry dark red, 3.5–5 mm in diam. Fl. Jul–Aug, fr. Oct.

Broad-leaved forests, *Pinus* forests and thickets; 700–3600 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal].

Rubia manjith belongs to *R. ser. Cordifoliae*. Among the taxa with small rotate flowers (*R. cordifolia* agg.) it is mainly characterized by its conspicuous reddish cast, particularly on lower leaf sides and flowers (see additional comments under *R. cordifolia*). A similar cast also appears in the otherwise quite different *R. podantha*, a taxon with campanulate flowers.

Deb and Malick (Bull. Bot. Surv. India 10(1): 6–8. 1968), after a lengthy discussion, treated *Rubia manjith* (“*R. munjista*”) as a synonym of *R. cordifolia* only and identified it with *R. cordifolia* var. *khasiana*. In contrast, Long (Fl. Bhutan 2(2): 823–825. 1999) distinguished *R. manjith* from *R. cordifolia* largely by its red cast, both alive and dried, but agreed with the inclusion of *R. cordifolia* var. *khasiana* as a synonym. The same was maintained by H. S. Lo (in FRPS 71(2): 314. 1999), who added “*R. cordifolia* f. *rubra* Kitamura” as a synonym of *R. manjith* and

qualified it as “nom. non rite publ.” Both Deb and Malick (loc. cit.) and Long (loc. cit.) mention the economic and historical importance of the taxon as a source of an excellent red dye.

18. *Rubia membranacea* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 279. 1912.

金钱草 jin qian cao

Rubia membranacea var. *caudata* Z. Ying Zhang; *R. membranacea* var. *incurvata* Z. Ying Zhang.

Vines or climbing herbs; stems to 2 m, quadrangular, glabrous or hirtellous at nodes, scaberulous, retrorsely aculeolate, or sometimes subsmooth. Leaves in whorls of 4; petiole 0.5–2.5(–4) cm; blade drying membranous to papery, lanceolate to subovate, 1–6(–8) × 0.5–2(–4) cm, base rounded to cordate, margins usually aculeolate, apex acuminate or shortly acuminate; principal veins 3 or 5, palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, few- to many-flowered cymes, 2–3 cm; axes glabrous and smooth; pedicels 2–5 mm; bracts narrowly lanceolate, 1–5 mm. Ovary ca. 1.8 mm, glabrous. Corolla purplish red, rotate, fused basal part 0.2–0.6 mm; lobes spreading, ovate-lanceolate, 2–3(–4) mm, caudate. Mericarp berry dark blue or black, 5–9 mm in diam. Fl. May–Jun, fr. Aug–Oct.

• Sparse forests, forest margins, thickets, grasslands; 1100–3000 m. Hubei, Hunan, Sichuan, Yunnan.

We have seen no authentic material of *Rubia membranacea*, which was well illustrated in H. S. Lo (in FRPS 71(2): 293, t. 62, f. 7–12. 1999). The short cymes indicated together with small leaves and relatively large rotate purplish flowers might be distinctive. We have seen only one ± corresponding collection (Sichuan: Mianning Xian, Lamagetou Nature Reserve, *D. E. Boufford et al. 32941*), but it deviates in habit and more loose cymes.

The two varieties of this species listed above were described and figured by Z. Ying Zhang (Fl. Tsinling. 1(5): 17, 421. 1985) but not cited by H. S. Lo (loc. cit.: 314–315). They were distinguished from var. *membranacea* by the orientation of the corolla lobes, said to be “incurved” in var. *incurvata* and long caudate and glabrous in var. *caudata*, differences of doubtful taxonomic relevance.

19. *Rubia oncotricha* Handel-Mazzetti, Symb. Sin. 7: 1031. 1936.

钩毛茜草 gou mao qian cao

Herbs, climbing or scrambling; stems 0.5–1.5 m, quadrangular, densely hirtellous or hispidulous with trichomes usually hooked, angles aculeolate. Leaves in whorls of 4; petiole 0.2–1.5 cm, hirtellous; blade drying rather thickly papery, lanceolate to ovate, 0.8–2.5(–3.5) × 0.3–0.8(–1.5) cm, adaxially densely scaberulous and sometimes also hooked hirtellous, abaxially moderately to densely hirtellous, base rounded to usually cordulate, margin thinly revolute and aculeolate, apex obtuse to shortly acute; principal veins 3(or 5), palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, several- to many-flowered cymes; axes hirtellous or pilosulous, aculeolate; bracteoles lanceolate to narrowly elliptic, 2–5 mm; pedicels 0.5–3(–8) mm. Ovary 0.8–1 mm, smooth. Corolla white or yellow, cup-shaped, outside sparsely to densely hirtellous, fused basal part 0.8–1 mm; lobes triangular-ovate, 1.8–2 mm, cau-

date-acuminate. Mericarp berry 3–3.5 mm in diam., color unknown. Fl. Jul–Sep, fr. Sep–Nov.

• Forest margins, sparse forests, and grasslands on mountain slopes; 500–3200 m. Guangxi, Guizhou, Sichuan, Yunnan.

Rubia oncotricha, apparently endemic to SW China, is aberrant by its mostly hooked indumentum (H. S. Lo in FRPS 71(2): 300, t. 65, f. 10–14. 1999). Nevertheless, it clearly belongs to *R. ser. Cordifoliae* (see additional comments under *R. cordifolia*).

20. *Rubia ovatifolia* Z. Ying Zhang ex Q. Lin, J. Wuhan Bot. Res. 24: 212. 2006.

卵叶茜草 luan ye qian cao

Vines, herbaceous, perennial, climbing; stems to 1.5 m, slender, quadrangular, glabrous and smooth to sparsely aculeolate. Leaves in whorls of 4; petiole (1.5–)2.5–5.5(–13) cm; blade drying thinly papery, adaxially green, abaxially pale green, ovate-cordiform to suborbicular-cordiform, on lateral branches sometimes ovate, (2–)4–7(–12) × (1–)2–5(–6.5) cm, length/breadth index 1.5–2, glabrous to scaberulous, base cordulate to cordate, margins retrorsely ciliolate or smooth, apex caudate-acuminate, rarely ± obtuse; principal veins 5, palmate. Inflorescence thyrsoid, leafy, with terminal and axillary, few- to many-flowered cymes; axes glabrous and smooth or sparsely aculeolate; bracts linear or lanceolate-linear, 1–3.5 mm; pedicels 1–3 mm. Ovary ca. 1 mm, glabrous. Corolla whitish or pale yellow, subcampanulate, glabrous; tube 0.8–1 mm; lobes spreading and somewhat bent, ovate to lanceolate-triangular, ca. 1.4 mm, caudate. Mericarp berry black at maturity, 4–5 mm in diam. Fl. Jul, fr. Oct–Nov.

• Sparse forests or thickets on mountains; 1700–2200 m. Gansu, Guizhou (Bijie), ?Hubei, Hunan, Shanxi, Sichuan, Yunnan, Zhejiang (Changhua).

This name was first published by Z. Ying Zhang (Fl. Tsinling. 1(5): 15, 420. 1985) but not validly so because two gatherings were designated as types (*Vienna Code*, Art. 37.2). This was corrected in the above citation from 2006.

We have not seen authentic material of *Rubia ovatifolia*, but there are good drawings in the Tsinling flora and in H. S. Lo (in FRPS 71(2): 307, t. 68, f. 1–5. 1999). This and the description show that it belongs to the taxa of *R. ser. Cordifoliae* and the group with campanulate flowers, as *R. alata* or *R. podantha*. This differential character, so far rather neglected, separates these taxa, e.g., from *R. argyi*. Nevertheless, one has to expect intermediates that link *R. ovatifolia* with *R. sylvatica* and *R. cordifolia* s.s. (see the latter for additional comments).

H. S. Lo (loc. cit.: 306) differentiated two varieties of doubtful status: the ranges of petiole length indicated can be found on a single specimen among the principal and the lateral stems; the descriptions do not specify which leaves to measure. The so-called “var. *oligantha*” may be a depauperate or very young specimen of this or some other species. The name was not validly published because no type was indicated and because the name of the species to which it was assigned was not validly published (*Vienna Code*, Art. 37.1 and Art. 43.1, respectively). Without further study it should not be validated.

21. *Rubia pallida* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 277. 1912.

浅色茜草 qian se qian cao

Herbs, climbing to scandent; stems to 2 m, quadrangular, glabrous or sometimes pilose, retrorsely aculeolate. Leaves in whorls of 4(or 6); petiole 0.5–6 cm; blade drying papery, lanceolate or subovate, 0.6–3.5 × 0.3–1.5 cm, length/breadth index ca. 2, subglabrous or adaxially sparsely hirtellous, abaxially scaberulous, base rounded to cordulate, margin densely serrate-aculeolate, apex acuminate; principal veins 3 or 5, palmate. Inflorescences thyrsoid, paniculate, with terminal or axillary, few to several-flowered cymes; axes retrorsely aculeolate; bracts lanceolate, 1–2 mm, subglabrous or hirtellous; pedicels 1–4 mm. Ovary ca. 0.7 mm, smooth. Corolla white or pale yellow, rotate, glabrous or papillose, fused basal part ca. 0.5 mm; lobes spreading, ovate-triangular or lanceolate-triangular, 2–2.5 mm, acuminate. Mericarp berry black, ca. 4 mm in diam. Fl. Jun–Jul, fr. Sep–Oct.

- Thickets, roadsides; 2600–3100 m. NW Yunnan.

Rubia pallida belongs to *R. ser. Cordifoliae*. It is obviously close to *R. cordifolia* but deviates by its larger flowers. See further comments under that species.

22. *Rubia podantha* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 277. 1912.

柄花茜草 bing hua qian cao

Rubia nephrophylla Deb.

Plants herbaceous, perennial, erect or ± climbing, with rootstock and rhizomes; stems to 1.2 m, quadrangular, glabrous to strigose, with retrorsely aculeolate ribs or narrow wings. Leaves in whorls of 4(or 6), sometimes unequal; petiole 1–5 cm; blade drying papery to subleathery, reddish abaxially or brownish green, lanceolate, lanceolate-ovate, or oblong-ovate, 1.5–5 × 0.5–1.5 cm, length/breadth index 2.5–3.5, both surfaces glabrous, strigillose, or strigose and sparsely to densely scaberulous, base truncate to cordate, margin serrulate-aculeolate or ciliate, apex acute to acuminate; principal veins 3 or 5, palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, ± many-flowered cymes, axes strigillose to glabrous; aculeolate; bracts lanceolate, 1–5 mm; pedicels 1.5–4 mm. Ovary ca. 0.8 mm, subglabrous. Corolla purplish red or yellowish white, campanulate, glabrous to sparsely hirsutulous; fused part 0.8–1 mm; lobes ovate to lanceolate, 1–1.5 mm, strongly reflexed, caudate to shortly acuminate. Mericarp berry black at maturity, 4–5 mm in diam. Fl. Apr–Jun, fr. Jun–Sep.

- Forest margins, sparse forests, grasslands; 700–3000 m. W Guangxi, W Sichuan, Yunnan.

The type specimens of *Rubia podantha* collected by Forrest from the Lichiang Range, Yunnan, are described in the protologue as semi-scandent, with leaves lanceolate, base cordate, reddish below, and somewhat campanulate purplish flowers. This corresponds well with the figure in H. S. Lo (in FRPS 71(2): 317, t. 71, f. 7–12. 1999) and with a specimen collected from the type locality by Handel-Mazzetti in WU. Thus, *R. podantha* belongs to *R. ser. Cordifoliae* and appears related to other species with campanulate flowers, as *R. alata* or *R. ovatifolia*. It shares the reddish hue with the always scandent *R. manjith*, which has broader leaves and smaller, rotate flowers.

23. *Rubia polyphlebia* H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 22. 1999.

多脉茜草 duo mai qian cao

Herbs, perennial, with rootstock; stems erect and rather stout, to 50 cm tall, quadrangular, sulcate, densely shortly hirsute to hispid. Leaves in whorls of 4, sessile; blade drying papery, broadly elliptic-oblong, ovate, or sometimes suborbicular, 2–4.5 × 1–3 cm, both surfaces densely hairy and ± scabrous, base obtuse to subrounded, margins shortly aculeolate-ciliate, apex acute to weakly obtuse; principal veins 7–11, palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, many-flowered and to 10 cm long cymes; axes shortly hairy, aculeolate to glabrescent; bracts leaflike or lanceolate to linear-lanceolate, 1–2 mm; pedicels ca. 1 mm. Ovary 0.4–0.5 mm, subglabrous. Corolla pale yellow, rotate, 2.5–3 mm in diam., hairy outside, glabrous or scabrous inside, fused basal part 0.2–0.3 mm; lobes ovate or lanceolate, 1–1.2 mm, apex ± recurved. Immature mericarp berry 3–5 mm in diam.

- Sichuan.

Rubia polyphlebia belongs to the *R. mandersii* group (see there) of *R. sect. Oligoneura*. We have seen no material of this species, but there is a good drawing in H. S. Lo (in FRPS 71(2): 304, t. 67, f. 1–7. 1999).

24. *Rubia pseudogalium* Ehrendorfer, Novon 20: 268. 2010.

高黎贡山茜草 gao li gong shan qian cao

Herbs, perennial, sprawling or twining; stems to 2 m, branched, quadrangular, glabrous and smooth or sparsely retrorsely aculeolate. Leaves and leaflike stipules in whorls of never more than 4; petiole (1–)2–4(–6) mm; blade when drying blackening, subleathery, lower side somewhat brighter than upper, linear-lanceolate, lanceolate, or lanceolate-oblong, often somewhat falcate, 20–40 × 2–8 mm, base cuneate to acute, margins and vein adaxially somewhat retrorsely aculeolate or smooth, apex acute or shortly acuminate; principal vein 1, 2 basal lateral veins very weak, often hardly visible. Inflorescences thyrsoid, with axillary, somewhat narrowly elongate, many-flowered cymes; peduncles glabrous, 3–6 mm; bracts small, linear-lanceolate, 0.5–3 mm; pedicels 1–6 mm. Ovary inferior, obovoid, ca. 0.8 mm. Corolla yellowish green, white, or purple, rotate, fused part 0.2–0.5 mm; lobes 5, ovate-triangular, 1.2–1.5 mm, shortly acuminate. Mericarp berry blackening, globose, 3–5 mm in diam. Fl. May–Jun, fr. Jul–Aug.

- Subtropical montane evergreen broad-leaved forests; 2400–3000 m. Yunnan (Gaoligong Shan region).

This new species is strongly reminiscent of certain taxa of *Galium* in habit. Its technical features (as well as DNA data) clearly place it into *Rubia*. In spite of its narrow leaves with only 2 weak lateral veins, it appears to belong to *R. sect. Oligoneura*. It forms an obviously related group with *R. truppeliana* from the mountains of Shandong. Main differences are the leaf whorls never with more than 4 elements, the shorter leaf petioles and peduncles, and the smaller flowers. There is remarkable variation in leaf shape and flower color, as documented by the numerous specimens available from the Gaoligong Shan region, where *R. pseudogalium* may be endemic.

25. *Rubia pterygocaulis* H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 22. 1999.

翅茎茜草 chi jing qian cao

Herbs, perennials, with erect stems tufted from rootstock and from subterranean rhizomes; lower stem portions quadrangular, broadly winged, upper with wings reduced, retrorsely aculeolate. Leaves in whorls of 4–6; petiole 0.5–1 cm; blade drying leathery, ovate, 1–2 × 0.5–1 cm, both surfaces sparsely scaberulous to aculeolate, base cordate, margin revolute and aculeolate, apex cuspidate-acuminate; principal veins 3, palmate, with lateral veins extending for ca. half of blade length. Inflorescences thyrsoid, with terminal and axillary, several-flowered and 1.5–2.5 cm long cymes; axes retrorsely aculeolate with reduced bracts; pedicels filiform, 1–2 mm. Ovary ca. 1 mm, smooth. Corolla dried dark brownish, rotate, ca. 2.5 mm in diam., glabrous; lobes lanceolate-ovate, 1–1.2 mm, cuspidate. Mericarp berry unknown. Fl. Jun.

- Forests, thickets; 300–1000 m. Sichuan (Jiuzhaigou).

No authentic material of *Rubia pterygocaulis* was available, but a good drawing (including underground organs) is found in H. S. Lo (in FRPS 71(2): 300, t. 65, f. 1–9. 1999). The local taxon evidently is a somewhat xerophytic member of *R. ser. Cordifoliae*.

26. *Rubia reznitzenkoana* Litvinov, Trudy Bot. Muz. Imp. Akad. Nauk 7: 75. 1910.

小叶茜草 xiao ye qian cao

Subshrubs, with oblique rootstock; stems to 0.5 m, clumped, quadrangular, glabrous, smooth. Leaves in whorls of 4–6 (or 7), subsessile or sessile; blade drying stiffly papery, elliptic-oblong, ligulate, oblanceolate, or lanceolate, 0.5–1.7 × 0.2–0.8 cm, glabrous, smooth, base obtuse to cuneate, margins thickened and aculeolate, apex acute to obtuse with stiff short cusp; principal vein 1. Inflorescences thyrsoid, with terminal and axillary, several- to many-flowered cymes; axes glabrous and smooth; bracts leaflike, 2–5 mm; pedicels ca. 1 mm. Ovary ca. 0.8 mm, smooth. Corolla yellow, funnel-shaped, (2.5–)3–3.5(–4) mm; tube ca. 1.5 mm; lobes often only 4, oblong-lanceolate, ca. 2 mm, obtuse with short incurved cusp. Mericarp berry black-purple when dry, 6–7 mm in diam. Fl. Jun, fr. Aug.

Sandy lands. Xinjiang [Kazakhstan, Mongolia].

Rubia reznitzenkoana is a rather isolated C Asiatic psammophyte, for which Pojarkova (Fl. URSS 23: 397. 1958) has created the monotypic *R. sect. Chonanthe*, which we include provisionally into *R. sect. Rubia* (see introduction to *Rubia*).

27. *Rubia salicifolia* H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 23. 1999.

柳叶茜草 liu ye qian cao

Vines, herbaceous, or ± climbing herbs; stems to perhaps 1.5 m, quadrangular to 4-ridged, glabrous, ribs aculeolate. Leaves in whorls of 4; petiole 3–12 cm, aculeolate, often pulvinate and strongly bent at base of blade; blade drying papery, grayish brown, linear to narrowly lanceolate, 3–9 × 0.5–1 cm, both surfaces glabrous, smooth or sparsely scaberulous, base obtuse to rounded, margin flat and smooth to denticulate, apex acute to acuminate; principal veins 3, palmate. Inflorescences thyrsoid, paniculate, with terminal and axillary, few- to many-flowered cymes; axes glabrous, aculeolate; bracts linear-lanceolate, 0.5–3 mm; pedicels 3–4 mm. Ovary ca. 0.5 mm, scaberu-

lous. Corolla green, rotate, glabrous; fused basal part ca. 0.5 mm; lobes lanceolate-triangular, ca. 1 mm, cuspidate. Fruit apparently black, 5–6 mm. Fl. Jun–Jul, fr. Sep.

- Moist valleys; ca. 2000 m. Guangdong, Sichuan (Jiulong), ?Yunnan.

This species belongs to *Rubia ser. Cordifoliae* and has been well illustrated in H. S. Lo (in FRPS 71(2): 312, t. 70, f. 7–12. 1999). The above description is based in part on provisionally identified specimens, some of them from Guangdong. Affinities may exist with *R. alata* and its transitional forms with *R. cordifolia* agg. (see additional comments under these species).

28. *Rubia schugnanica* B. Fedtschenko ex Pojarkova in Schischkin, Fl. URSS 23: 725. 1958.

四叶茜草 si ye qian cao

Herbs, perennial, or subshrubs, with a rootstock; stems numerous, erect, quadrangular, glabrous, smooth. Leaves in whorls of 4(–6), subsessile or sessile; blade drying subleathery, narrowly lanceolate to linear-lanceolate, 20–50 × 2–5 mm, both surfaces glabrous, smooth, sessile or base narrowed into a very short petiole, margins thickened and retrorsely aculeolate, apex long acuminate; principal vein 1. Inflorescences thyrsoid, with terminal and axillary, several-flowered cymes, shorter than or as long as subtending leaves; peduncles glabrous, 3–10 mm; pedicels 2–5 mm; bracts none or linear, 1–3 mm. Ovary ca. 0.8 mm, smooth. Corolla yellow, rotate; tube 0.2–0.7 mm; lobes lanceolate, 2.3–2.7 mm, acute to mucronate with cusp 0.4–0.6 mm. Mericarp berry black, 3–4 mm in diam. Fl. Jul, fr. Aug.

Sandy lands; ca. 2500 m. Xinjiang [Tajikistan].

We have not seen authentic material of *Rubia schugnanica*. Pojarkova (loc. cit.) placed it into the small C Asiatic and mostly subshrubby *R. ser. Laxiflorae* Pojarkova of *R. sect. Campylanthera*, which we provisionally include in *R. sect. Rubia*.

29. *Rubia schumanniana* E. Pritzl, Bot. Jahrb. Syst. 29: 583. 1901.

大叶茜草 da ye qian cao

Rubia chinensis Regel & Maack var. *esquirolii* (H. Léveillé) H. Léveillé; *R. cordifolia* Linnaeus var. *maillardii* (H. Léveillé & Vaniot) H. Léveillé; *R. esquirolii* H. Léveillé; *R. leiocaulis* Diels; *R. maillardii* H. Léveillé & Vaniot; *R. schumanniana* var. *maillardii* (H. Léveillé & Vaniot) Handel-Mazzetti.

Herbs, perennial, erect (or rarely ?climbing), with rhizomatous base; stems to 1 m, quadrangular to subterete, sometimes shallowly ribbed and/or sulcate, glabrous or puberulent near nodes, smooth or sometimes sparsely retrorsely aculeolate. Leaves in whorls of 4; petiole equal to unequal, 0.5–1.5(–3) cm; blade drying thickly papery to subleathery, broadly lanceolate, oblong-ovate, or ovate, 3–10 × 1.7–4 cm, length/breadth index 1.5–2.5, glabrous or usually hispidulous along principal veins and scaberulous on lamina, base obtuse to rounded or cordulate, margins thinly revolute and smooth to scaberulous, apex acuminate or subacute; principal veins 3 or 5, palmate, plane to impressed adaxially. Inflorescences thyrsoid-paniculate, cymes 5–12 cm, many flowered, terminal and from uppermost stem

axils; peduncles scaberulous, puberulent, or glabrescent; bracteoles lanceolate, 3–4 mm, ciliate; pedicels 1–6 mm. Ovary ca. 1 mm, glabrous. Corolla white or greenish yellow, somewhat campanulate, 4–5 mm in diam., outside glabrous, inside puberulent to scaberulous, fused base 0.8–1 mm; lobes lanceolate, 2–2.2 mm, acute to acuminate. Mericarp berry black, 5–7 mm in diam. Fl. May–Jul, Nov, fr. Aug–Oct.

- Forests; 800–3000 m. Sichuan, Yunnan.

Rubia schumanniana (see H. S. Lo in FRPS 71(2): 301, t. 66, f. 1–7. 1999) belongs to *R. ser. Chinenses*, where it is close to *R. chinensis* and *R. latipetala*, but also to taxa of the *R. mandersii* group with sessile leaves. This plant is described as rarely climbing in H. S. Lo (loc. cit.: 299), but that may be due to misidentified specimens.

30. *Rubia siamensis* Craib, Bull. Misc. Inform. Kew 1911: 397. 1911.

对叶茜草 *dui ye qian cao*

Vines, herbaceous, to 3 m; stems quadrangular, glabrous, scaberulous to retrorsely aculeate along angles. Leaves opposite; petiole (1–)2–4(–8) cm, aculeolate; blade drying papery to subleathery, ovate or ovate-lanceolate, 6–12 × (1.5–)3–6(–7.5) cm, glabrous on both surfaces, scaberulous and ± aculeolate on principal veins and margins, base cordate or rounded, apex acute or acuminate; principal veins 3–5(or 7), palmate, reticulate veinlets usually visible on both surfaces; stipules triangular, 3–5(–7) × 2–3 mm, persistent. Inflorescences thyrsoid, paniculiform, with axillary, many-flowered cymes; bracts reduced. Ovary ca. 0.5 mm, glabrous. Corolla greenish, campanulate, ca. 3 mm in diam.; tube ca. 1.25 mm; lobes linear-lanceolate, ca. 2 mm, acute. Fruit of 2 subglobose mericarp berries, 1 sometimes aborted, each 4–5 mm in diam., shiny and black when fresh. Fl. Jun–Jul, fr. Aug–Sep.

Evergreen moist forests; [900–]2200–2500 m. SW Yunnan [N Thailand].

Rubia siamensis has been illustrated by H. S. Lo (in FRPS 71(2): 297, t. 64, f. 6–9. 1999) and by Puff (Fl. Thailand: Rubiaceae; http://homepage.univie.ac.at/christian.puff/FTH-RUB/FTH-RUB_HOME.htm; accessed on 5 Oct 2010) who also gives an extended description. Together with other tropical taxa from SW China and N Thailand (*R. magna*, *R. falciformis*, and *R. filiformis*), all with opposite leaves and true stipules, it forms a well characterized group within *R. ser. Oligoneura*, obviously not closely related to the polymorphic *R. ser. Cordifoliae*. Nevertheless, in the intensively studied Gaoligong Shan region of Yunnan, where *R. siamensis* occurs sporadically, a remarkable series of transitional specimens was documented, linking it with *R. alata*, a member of *R. ser. Cordifoliae* (see under *R. cordifolia*).

31. *Rubia sylvatica* (Maximowicz) Nakai, J. Jap. Bot. 13: 783. 1937.

林生茜草 *lin sheng qian cao*

Rubia cordifolia Linnaeus var. *sylvatica* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 140. 1859.

Vines, herbaceous, perennial; stems to 3.5 m, quadrangular, glabrous, aculeolate on ribs. Leaves in whorls of 4–10(–12); petiole 2–11 cm, aculeolate; blade drying thinly membranous or papery, brown-black or blackish green, ovate to suborbicular, 3–11 × 2–9 cm, length/breadth index 1.2–1.5, both surfaces

glabrous, scaberulous on lamina and aculeolate on principal veins, base cordulate to cordate, margins aculeolate, apex acuminate to caudate-cuspidate; principal veins 5 or 7, palmate. Inflorescences thyrsoid, with terminal and axillary, several- to many-flowered cymes; axes slender, glabrous, scaberulous; bracts lacking or linear to lanceolate-linear, 1–5 mm; pedicels 1–7 mm. Ovary ca. 0.8 mm, smooth. Corolla greenish, rotate to slightly patelliform, glabrous, fused basal part 0.4–0.6 mm; lobes triangular, 1–1.5 mm, acuminate. Mericarp berry black, 5–10 mm in diam., with pedicels elongating, to 15 mm. Fl. Jul–Aug, fr. Sep–Oct.

Moist forests or forest margins; 800–3500 m. Throughout N China, also in Sichuan [Russia].

Rubia sylvatica belongs to *R. ser. Cordifoliae*. It is apparently connected by transitional specimens with *R. cordifolia* s.s., *R. ovatifolia*, and other closely related species, but quite well separated from the similar *R. argyi*. See these taxa for additional comments and the key for differential characters.

A critical taxon is *Rubia hexaphylla* (Makino) Makino (1927) from Korea and Japan, of which we have not seen authentic specimens. From its description (Yamazaki, Fl. Japan 3a: 232. 1993) one could suspect it to be the same as *R. sylvatica*. If this is proven, the former name has priority. The Kew Rubiaceae checklist (Govaerts et al., World Checkl. Rubiaceae; <http://www.kew.org/wcsprubiaceae/>; accessed on 15 Sep 2010) treats *R. sylvatica* as a synonym of *R. cordifolia* subsp. *cordifolia* but maintains *R. hexaphylla*.

32. *Rubia tenuis* H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 24. 1999.

纤梗茜草 *xian geng qian cao*

Vines, herbaceous, perennial; stems quadrangular, retrorsely aculeolate on ribs. Leaves in whorls of 4, sessile; blade drying thinly papery, broadly elliptic, 1.5–4 × 0.9–2.3 cm, both surfaces subsmooth or scaberulous to aculeolate on principal veins, base rounded to obtuse, margin sparsely aculeolate, apex cuspidate; principal veins 5, palmate. Inflorescences thyrsoid, with terminal and at lower stem nodes axillary, many-flowered cymes to 14 cm; peduncles slender; bracteoles lanceolate, 2.5–4 mm. Corolla yellow, shallowly campanulate to subrotate, 4–5 mm in diam.; lobes lanceolate, ca. 2 mm, apex incurved, acuminate. Fruit unknown. Fl. Jul.

- Forests, thickets. Sichuan (Luding).

We have not seen authentic material of *Rubia tenuis*, but there is a good drawing in H. S. Lo (in FRPS 71(2): 310, t. 69, f. 1–4. 1999). With respect to habit, indumentum, sessile leaves, inflorescences, and flowers, affinities are suggested with *R. edgeworthii* (see there) and *R. sikkimensis* Kurz. This latter species, well described and figured by Deb and Malick (Bull. Bot. Surv. India 10(1): 12. 1968), is distributed from NE India to Bhutan, but may also reach adjacent China. It mainly differs by larger leaves (5–13 × 2–5 cm) with a rather cuneate base and more acuminate leaf apex. The three species can be assembled provisionally in a *R. sikkimensis* group within *R. ser. Oligoneura*.

33. *Rubia tibetica* J. D. Hooker, Fl. Brit. India 3: 204. 1881.

西藏茜草 *xi zang qian cao*

Herbs, perennial, erect, or subshrubs, forming loose cushions from a massive woody rootstock; stems to 0.3 m, quadrangular,

gular, glabrous or mostly with ± dense hirtellous indumentum, on angles shortly aculeolate and hispidulous with partly hooked trichomes, lower nodes usually shortly sheathed with membranous bases of old leaves. Leaves opposite and with interpetiolar and ± leaflike stipules in whorls of 4(–6), sessile or subsessile; blade drying leathery, broadly to narrowly ovate, elliptic, elliptic-oblong, or lanceolate, 1–3 × 0.3–1.5 cm, both surfaces hirtellous to ± glabrous, base acute to obtuse, margins retrorsely aculeolate, toward acute and often cuspidate apex usually antrorsely aculeolate; principal vein 1, sometimes with 2 weak lateral veins. Inflorescences leafy and bracteose, with axillary and terminal, 1- to few-flowered cymes; axes mostly glabrous; pedicels (2–)4–6(–14) mm. Ovary 0.8–1.2 mm, sometimes hirtellous. Corolla yellow, rotate, 5–8 mm in diam., outside sometimes scaberulous; fused base ca. 0.5 mm; lobes lanceolate or lanceolate-ovate, 2–2.5 mm, acuminate. Mericarp berry 3–4 mm in diam. Fl. Jun, fr. Aug.

In gravel at river bottoms; [1700–]3600[–4400] m. Xinjiang, Xizang [Afghanistan, India (Punjab), Kashmir, Kyrgyzstan, Pakistan, Tajikistan].

Rubia tibetica is a relatively widespread SW to C Asiatic and typically montane to alpine pioneer species. It was illustrated by Deb and Malick (Bull. Bot. Surv. India 10(1): 4, f. 3. 1968), who lectotypified its name with a specimen from “Tibet” (i.e., Xinjiang). The species is notable for its shoot morphology: the well-developed vegetative leaves of lower stem nodes often appear in a 4-verticillate arrangement with ± leaflike stipules, whereas the basalmost first leaves produced by the stems and also the leaves of reproductive nodes are generally paired and exhibit typical interpetiolar stipules.

Deb and Malick (loc. cit.: 4–5) described *Rubia aitchisonii* Deb & Malick from Bagdis, Afghanistan, and separated it by: “Lamina ovate, sub-orbicular, elliptic-ovate or lanceolate, 2–6 in a whorl” in *R. tibetica* vs. “Lamina elliptic-lanceolate, 2 opposite” in *R. aitchisonii*. Ehrendorfer and Schönbeck-Temesy (Fl. Iranica 176: 67. 2005) noted that the only locality of *R. aitchisonii* lies within the area of *R. tibetica* and that the suspected specific differences fall within the morphological variability of *R. tibetica*. Thus, future studies may show that *R. aitchisonii* is better synonymized under *R. tibetica*.

Rubia tibetica was placed by Pojarkova (Fl. URSS 23: 401–404. 1958) into *R. ser. Tibeticae* Pojarkova in *R. sect. Campylanthera* together with two other alpine, C Asiatic species: *R. regelii* Pojarkova and *R. komarovii* Pojarkova. They differ from *R. tibetica* by leaves and leaflike stipules in whorls of up to 6 but have not been recorded yet from N China. *Rubia garrettii* Craib from Thailand, also suspected to be a member of this group, certainly does not belong here (see Puff, Fl. Thailand: Rubiaceae; http://homepage.univie.ac.at/christian.puff/FTH-RUB/FTH-RUB_HOME.htm; accessed on 5 Oct 2010). Whereas the *R. tibetica* group is provisionally included in *R. sect. Rubia*, *R. garrettii* obviously belongs to *R. sect. Oligoneura*.

34. *Rubia tinctorum* Linnaeus, Sp. Pl. 1: 109. 1753.

染色茜草 ran se qian cao

Rubia iberica (Fischer ex Candolle) K. Koch; *R. tinctorum* var. *iberica* Fischer ex Candolle.

Herbs, sprawling to climbing, perennial, with extensive stout, woody, and red rhizomes; stems to 1–2.5 m, often fascicled, quadrangular with ± sharp angles, somewhat retrorsely aculeolate or glabrous. Leaves in whorls of 4–6, shortly petio-

late to subsessile; blade drying papery to subleathery, lanceolate, lanceolate-oblong, or elliptic-oblong, 3–10 × 0.5–3.5 cm, glabrous or mostly along lower midrib and margins retrorsely aculeolate, base acute, apex acute; lateral veins 3 or 4 pairs, pinnate. Inflorescences thyrsoïd, leaflike and many-flowered cymes terminal and axillary from upper stem nodes; axes ± retrorsely aculeolate; peduncles up to 50 mm with bracts narrowly elliptic, 2–5 mm; pedicels (0.75–)1.5–8(–12) mm. Ovary ca. 0.8 mm, glabrous. Corolla yellow to greenish yellow, rotate-funnelform, glabrous; tube ca. 1 mm; limb 3–4.5 mm in diam.; lobes lanceolate, ca. 1 mm, shortly acuminate. Anthers large, 0.5–0.6(–0.8) mm, straight. Mericarp berry black, 3.5–4 × 4–4.5 mm. Fl. Jun–Aug, fr. Jul–Sep.

Rather dry open ground; 400–2300 m. Xinjiang [Afghanistan, NW India, Kashmir, Kazakhstan, Pakistan, Turkmenistan; SW Asia (Iran, Turkey); widely cultivated and escaped or weedy from Europe and the Mediterranean throughout the world].

Rubia tinctorum is the madder of commerce, cultivated for the dye derived from its rhizomes and roots, and still used in textiles and fine paints. Mainly because of its relatively large and straight anthers, this and a few related taxa from C Asia have been placed into *R. sect. Meganthera* by Pojarkova (Fl. URSS 23: 392–397. 1958). As *R. tinctorum* is the type species of the genus, this section has to be called *R. sect. Rubia* (Ehrendorfer et al., Fl. Iranica 176: 54. 2005).

35. *Rubia trichocarpa* H. S. Lo, J. Trop. Subtrop. Bot. 7(1): 23. 1999.

毛果茜草 mao guo qian cao

Vines, apparently climbing; stems quadrangular, hirsute at least at nodes, retrorsely aculeolate along ribs. Leaves in whorls of 4(–6); petiole slightly shorter than blade, retrorsely aculeate; blade drying thinly papery, grayish green, ovate to cordate, 4–12 × 2.5–7 cm, adaxially glabrous and scaberulous, abaxially sparsely strigillose, hirsutulous, or villosulous, base deeply cordate, margins densely ciliate, apex acuminate; principal veins 3–5, palmate. Inflorescences thyrsoïd, paniculate, axillary and perhaps also terminal cymes many flowered and longer than subtending leaves; axes slender, villosulous and retrorsely aculeolate; bracteoles lanceolate, 1.5–2 mm. Flowers not seen. Immature mericarp berry black and shiny when dry, densely ferruginous villous.

- Sichuan (Lixian).

Rubia trichocarpa evidently belongs to *R. ser. Cordifoliae*, but no authentic material was available to us. A specimen from Xizang, collected 17 Jul 1973 (PE), fits the above description, with its short hispidulous indumentum extending from stems and leaves to the inflorescence, flowers, and young fruit. It has cymes rather condensed; flowers sessile or on pedicels up to 1.2 mm; and corollas dried purple, ca. 2 mm in diam., campanulate with reflexed petals of ca. 0.8 mm.

36. *Rubia truppeliana* Loesener, Beih. Bot. Centralbl., Abt. 2, 37: 183. 1920.

山东茜草 shan dong qian cao

Herbs, perennial, sprawling or twining, to 2 m; stems branched, quadrangular, glabrous or sparsely puberulent, retrorsely aculeolate on angles, sometimes sulcate-striate. Leaves in whorls of up to 6 or 8; petiole 6–35 mm, aculeolate; blade drying dark green, subleathery, oblanceolate, broadest toward

base, 20–35 × 4–6 mm, scaberulous to retrorsely aculeolate on margins and vein on lower or on both sides, base cuneate to acute, apex acute or shortly acuminate; principal vein 1, 2 lateral veins weaker and hardly reaching half of leaf length. Inflorescences thyrsoïd, with terminal and axillary congested to subcapitate cymes; axes aculeolate; bracts lanceolate or linear-lanceolate, 0.5–3 mm; peduncles 10–40 mm; pedicels 0.5–4 mm. Ovary ca. 0.8 mm, smooth. Corolla rotate, glabrous, color not recorded; fused basal part ca. 0.4 mm; lobes ovate-triangular, ca. 2 mm, acuminate. Mericarp berry not seen. Fl. Jul–Aug.

- Forests, thickets; 100–300 m. Shandong.

This local species is certainly close to the newly described *Rubia pseudogalium* from the Gaoligong Shan region of Yunnan but clearly separable (see there). In habit both are quite similar to *Galium*. In spite of their very narrow leaves and only slightly palmate veins, this *R. trupeliana* group probably should be placed into *R. sect. Oligoneura*.

37. *Rubia wallichiana* Decaisne, Nouv. Mém. Acad. Roy. Sci. Bruxelles 12: 61. 1837.

多花茜草 duo hua qian cao

Vines or climbing herbaceous perennials; stems to 3 m, 4-angled, glabrous or puberulent at nodes, smooth or sparsely aculeolate. Leaves in whorls of 4(–6); petiole 0.6–6 cm; blade drying thinly papery, lanceolate or ovate-lanceolate, 2–7 × 0.5–2.5 cm, glabrous and sparsely scaberulous, base rounded, truncate, or sometimes cordulate, margins denticulate-aculeolate to smooth, apex acuminate; principal veins 3(or 5), palmate. Inflorescences thyrsoïd, paniculate, with terminal and axillary, many-flowered cymes; axes glabrous, smooth to sparsely scaberulous; bracts lanceolate to ligulate, 1–3.5 mm; pedicels 1–4 mm. Ovary ca. 0.5 mm, smooth. Corolla purplish red, greenish yellow, or white, rotate, fused basal part 0.1–0.5 mm; lobes lanceolate to lanceolate-triangular, 1.3–1.5 mm, acuminate, glabrous. Mericarp berry black, 3.5–4 mm in diam. Fl. Aug–Oct, fr. Aug–Dec.

Forests, forest margins, thickets, open fields, village fences; 300–2600 m. Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Sichuan, Yunnan [Bhutan, NE India, Nepal].

The above description and distribution data of *Rubia wallichiana* have been taken over from H. S. Lo (in FRPS 71(2): 315–316. 1999). There are hardly any differential characters relative to *R. cordifolia* s.s. aside from vague references to less prickly stems or differences in flower and fruit color (see key). Thus, this dubious taxon clearly belongs to *R. ser. Cordifoliae*. Deb and Malick (Bull. Bot. Surv. India 10(1): 1–16. 1968) do not even mention *R. wallichiana*. In Fl. Bhutan (2(2): 823–825. 1999) the name is used in a wide sense and evidently includes what is here treated as *R. cordifolia*, *R. sylvatica*, and possibly even *R. argyi*. The Kew Rubiaceae checklist (Govaerts et al., World Checkl. Rubiaceae; <http://www.kew.org/wcsp/rubiaceae/>; accessed on 15 Sep 2010) accepts *R. wallichiana* as a distinct species. We have hardly seen specimens from China that clearly correspond to *R. wallichiana* (and not to other taxa of *R. cordifolia* agg.). In view of all this, we regard *R. wallichiana* as a possible synonym of *R. cordifolia* s.s. but maintain it as a species in the present flora in order to stimulate its clarification.

38. *Rubia yunnanensis* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 278. 1912.

紫参 zi shen

Rubia ustulata Diels.

Herbs, perennial, with rootstock and somewhat thickened storage roots; stems usually clumped, suberect, to 0.5 m, quadrangular or narrowly 4-winged, hirsute at nodes to glabrescent, smooth or rarely scabrid. Leaves in whorls of 4(–6), sessile; blade drying papery, lanceolate, ovate, obovate, elliptic-oblong, broadly elliptic, or suborbicular, 1–4(–5) × 0.3–2 cm, both surfaces hairy to scabrid, base cuneate to rounded, margins flat or often revolute, apex acuminate, shortly cuspidate, or acute; principal veins 3(or 5), palmate. Inflorescences thyrsoïd, paniculate, terminal and axillary cymes usually longer than subtending leaves; axes subglabrous to sparsely hirsutulous; bract-oles lanceolate, 2–5 mm; pedicels 1–3 mm. Ovary 0.3–0.4 mm in diam., glabrous. Corolla yellow or pale yellow, rotate, ca. 3 mm in diam., glabrous; fused basal part ca. 0.5 mm; lobes subovate, 1.2–1.5(–2) mm, apex thickened, incurved, shortly rostrate. Mericarp berries not seen.

- Thickets, grassy slopes, roadsides; 1700–3000 m. Sichuan, Yunnan.

In his publication of *Rubia yunnanensis* Diels referred to an unpublished herbarium name “*R. sikkimensis* var. *yunnanensis* Franchet” and commented that “it is quite different from *R. sikkimensis*.” *Rubia ustulata* was published on the same page immediately after *R. yunnanensis* and said to differ by its smaller size, smaller and more equal leaves and leaflike stipules, and more cuspidate petals. In view of the variability of these characters, its synonymization by H. S. Lo (in FRPS 71(2): 303. 1999) is accepted. The species evidently has a considerable altitudinal range and consequently varies from quite elongated to considerably condensed. Within *R. sect. Oligoneura*, *R. yunnanensis* belongs to the *R. mandersii* group of SW China.

