Subshrubs to perennial or annual herbs. Stems often weak and clambering, often notably prickly or “sticky” (i.e., retrorsely aculeolate, “velcro-like”). Raphides present. Leaves opposite, mostly with leaflike stipules in whorls of 4, 6, or more, usually sessile or occasionally petiolate, without domatia, abaxial epidermis sometimes punctate- to striate- glandular, mostly with 1 main nerve, occasionally triplinerved or palmarly veined; stipules interpetiolar and usually leaflike, sometimes reduced. Inflorescences mostly terminal and axillary (sometimes only axillary), thyrsoid to paniculiform or subcapitate, cymes several to many flowered or infrequently reduced to 1 flower, pedunculate to sessile, bracteate or bracts reduced especially on higher order axes [or bracts sometimes leaflike and involucral], bracteoles at pedicels lacking. Flowers mostly bisexual and monomorphic, hermaphroditic, sometimes unisexual, andromonoecious, occasionally polygamo-dioecious or dioecious, pedicellate to sessile, usually quite small. Calyx with limb nearly always reduced to absent; hypanthium portion fused with ovary. Corolla white, yellow, yellow-green, green, more rarely pink, red, dark red, or purple, rotate to occasionally campanulate or broadly funnelform; tube sometimes so reduced as to give appearance of free petals, glabrous inside; lobes (3 or)4(or occasionally 5), valvate in bud. Stamens (3 or)4(or occasionally 5), inserted on corolla tube near base, exserted; filaments developed to ± reduced; anthers dorsifixed. Inferior ovary 2-celled, ± didymous, ovoid, ellipsoid, smooth, papillose, tuberculate, or with hooked or rarely straight trichomes, 1 erect and axile ovule in each cell; stigmas 2-lobed, exserted. Fruit on pedicels sometimes elongating during development, green, gray, or infrequently white (to red, orange, or black), mostly dry to leathery schizocarps, infrequently spongy, rarely ± fleshy and berrylike, ellipsoid to subglobose; schizocarps separating into 2 indehiscent mericarps, each with 1 seed, subglobose, ellipsoid-oblong, or reniform, smooth and glabrous to tuberculate and/or covered with trichomes often hooked and clinging; seeds small, grooved ventrally (i.e., adaxially); testa membranous; endosperm corneous; embryo curved; cotyledons leaflike; radicle terete, inferior.

More than 600 species: worldwide, mostly in meridional to temperate but also in alpine and arctic regions or in subtropical and tropical zones at higher elevations; 63 species (23 endemic, four of unconfirmed occurrence) in China.


So far, the genera Cruciata and Sherardia have not been found in China yet but may be expected there because of their partly weedy character and widely adventive occurrence. They are included in the key below for future reference but not among the full generic presentations. Sherardia arvensis Linnaeus is widely distributed in warm temperate and high-elevation tropical regions and can be separated from Asperula, Phuopsis, Leptunis, or Galium by its terminal capitulate inflorescences enclosed by leaflike bracts, its clearly developed calyx with 6 acute lobes, and its pink or violet corollas with well-developed funnelform tubes and 4 lobes.

Among the few Cruciata species, the W Eurasian C. pedemontana (Bellardi) Ehrendorfer appears occasionally as an adventive in warm temperate regions. It is common, e.g., in SE North America, and could be found in China too. Cruciata can be separated from Galium by its flowering stems with vegetative apices and the inflorescences consisting only of lateral axillary cymes on middle and lower stem nodes. These cymes are equal to or shorter than the subtending leaves when fully developed. In contrast, the inflorescences are mostly terminal and axillary and longer than the leaves in Galium.

The characters relevant for the taxonomy of Galium and other Rubieae deserve some comments. Life and growth forms are important, particularly with respect to the differentiation into half-shrubs, herbaceous perennials, and annuals. Stem and leaf posture, consistency, shape, and indumentum (e.g., pubescent or retrorsely aculeolate with recurved microhairs) are often quite diverse and may vary within species or even populations. The true leaves are always opposite and 2, but interpetiolar stipules may vary from inconspicuous and divided or simple to enlarged and leaflike, forming whorls of 4 or up to 6 and more. During seedling and shoot development all these taxa pass through the 2- and 4-whorl stage, but some taxa remain at this stage, while others continue to develop more numerous whorl elements toward the middle of their stems. This is a most informative differential character within Rubieae. Other relevant features relate to leaf shape, venation, texture, and particularly indumentum. Here, the presence of longer or shorter microhairs (use a lens) on surfaces and particularly margins as well as their forward or backward direction is of taxonomic importance.

Other morphological characters decisive for Rubieae taxonomy concern the inflorescences (e.g., the position and structure of the cymes). Flower shape is essential for the traditional separation of the genera Asperula (with salverform, funnelform, or cup-shaped corollas) and Galium (with ± rotate corollas). It is now clear that there are transitions between these character states and that even closely related taxa may differ in this respect. So far, it has been possible to provisionally maintain Asperula and Galium by the transfer of obviously misplaced taxa and by using the presence or absence of bracts and bracteoles as a differential character for the two genera (see Ehrendorfer et al., loc. cit. 2005).

The indumentum of ovaries and fruit as well as fruit consistency also vary strongly within Rubieae. Informative are, for example, ± fleshy berries (as in Belbunion Bentham & J. D. Hooker, Rubia, and certain Galium taxa) vs. dry schizocarps or the presence vs. absence of hairiness and whether the trichomes are hooked (i.e., the fruit disperse as “stick-tights” on animals) vs. straight. However, the distinction between all these structures is arbitrary, and there are even transitions between trichomes and tuberculate protuberances of various shapes as well as between hairy and glabrous.
All this is well illustrated by Yang and Li (Bull. Natl. Mus. Nat. Sci., Taichung 11: f. 1. 1998). Furthermore, ovary and fruit indumentum and surface structures may change during development and sometimes vary genetically within species or even within populations, as in several *Galium* species. In general, authors in other regions have documented infraspecific variation from glabrous to densely hairy or tuberculare fruit but traditionally have only separated plants with hooked trichomes into different species. However, intrepid Chinese authors have easily combined these latter morphotypes, e.g., in *G. dahluricum* sensu W. C. Chen (in FRPS 71(2): 255. 1999), whereas Fl. Japan (3a: 238–239. 1993) distinguished *G. manshuricum* on the basis of this character. Only careful studies and field observations can clarify such cases, as in *G. spurium*, where the infraspecific variation of fruit, either smooth, tuberculare, or covered with hooked hairs, has been proven.

Further differential characters for Rubieae come from the fields of paleynology (e.g., number of colpi), karyology (e.g., deviations from the normal chromosome base number $x = 11$ in *Asperula* sect. *Cynanchicae* (Candolle) Boissier with $x = 10$ and in *Galium* sect. *Aparinoides* (Jordan) Grenier with $x = 12$; common occurrence of polyplody), and reproductive biology. Most of the perennial Rubiaeae taxa have conspicuous hermaphroditic and andromonoecious flowers and inflorescences and are insect-pollinated and self-incompatible outbreeders (e.g., *Phuopsis* or *G. boreale* and *G. verum*). Nevertheless, for several years with small and inconspicuous flower aggregates selfing and autogamy have been documented (e.g., *G. aparine*, *G. spurium* and *Sherardia arvensis*). Furthermore, polygamodioecy and dioecy occur in some groups (e.g., *G. elegans*).

Up to now, only few and insufficient data from all these fields are available for Asian Rubieae species and have not been mentioned in FRPS. Nevertheless, such data are significant and will have to be addressed in more detailed future systematic Rubieae studies from this region.

The α-taxonomy of Rubieae in E Asia is still in a problematic state. A general survey of the collections at the herbaria KUN, MO, PE, W, and WU has revealed the existence of many very polymorphic, complex, and insufficiently understood species groups. Therefore, the present treatment has to be regarded as provisional.

A particularly critical case concerns several *Galium* species described by H. Léveillé from 1904–1917 (see Launer & Ferguson, Notes Roy. Bot. Gard. Edinburgh 32: 103–115. 1973). These descriptions are most fragmentary and the relevant types are not yet studied sufficiently (but see Mill, Edinburgh J. Bot. 53: 193–213. 1996). Relevant taxa in alphabetical order are *G. blinii* (see under that name), *G. bodinieri* (see under *G. blinii* and *G. rebaei*), *G. cavaleriei* (see under *G. asperifolium*), *G. comarisi* (see under *G. dahluricum*), *G. equirilius* (see under *G. asperifolium*), *G. hongnoense* (see under *G. spurium*), *G. maiirei* (see under *G. elegans*), *G. martini* (see under *G. hongnoense*), *G. quinatum* (see under *G. blinii*), *G. remotiflorum* (see under *G. hongnoense*), and *G. venosum* (see under *G. hongnoense*).

The treatment of *Galium* for the Flora of Taiwan by Yang and Li (Bull. Natl. Mus. Nat. Sci., Taichung 11: 101–117. 1998; Fl. Taiwan, ed. 2, 4: 254–259. 1998) is not satisfactory in several aspects: keys and descriptions are rather idealized and lack carefully observed ranges of morphological variation for the taxa; species are circumscribed more narrowly and based on different characters than used by other authors in the region (e.g., presence vs. absence of leaf indumentum is considered variable within species by most other authors); the treatment is not well reconciled with continental *Galium* taxonomy (e.g., there are no references to the Russian floras, and names synonymized by others are used without explanation); and at least two names based on types from Taiwan are missing.

With respect to a more “natural” and general taxonomic classification of the Rubieae and *Galium*, a number of recent morphological, karyological, palynological, and particularly DNA-analytical studies (e.g., Natali et al., loc. cit.; Robbrecht & Manen, Syst. & Geogr. Pl. 76: 85–146. 2006; Brenner & Eriksson, loc. cit.; Soza & Olmstead, loc. cit.) are available. They show that *Theligonum* should be placed into a separate tribe (Theligonieae), that the tribe Rubieae is monophyletic, and that *Kelloggia* (as subtribe Kelloggiinae, still with normal Rubieaeae stipules, calyx teeth, and 3-colpate pollen, but already with hooked trichomes on the dry mericarps) occupies a basal position in Rubieae. The Central American genus *Didymaea* J. D. Hooker (still with normal stipules but with the calyx already lacking, 5-colpate pollen, and seeds separating from the fleshy pericarp) represents a link to the genus *Rubia* in the true Rubieae. Their stipules are nearly always leaflike, the pollen is polycolpate, and the seeds never separate from the pericarp. *Rubia*, a well-circumscribed and certainly monophyletic genus, is always perennial, has 5-lobed corollas, and berrylake fruit.

The remaining Rubieae are also monophyletic as a whole, but their traditional genera *Asperula*, *Bataprine* Nieuwland, *Callipeltis* Steven, *Crucianella* Linnaeus, *Cruiciata*, *Galium*, *Leptunis*, *Mericarpeaa* Boissier, *Microphysa*, *Phuopsis*, *Relbunium*, *Sherardia*, *Valantia* Linnaeus, and *Warburgina* Eig are all essentially interdigitated. They are difficult to separate and can hardly be brought into concordance with available phylogenetic data. These advanced Rubieae tend to develop more and more apomorphic character profiles, i.e., change from perennial to annual, increase in numbers of leaflike stipules from 4 to numerous, loss of bracts and prophylls in the inflorescences, reduction from 5-lobed to (3 or)4-lobed corollas, specialization of mericarps, etc. As shown by the most comprehensive phylogram available so far (Natali et al., loc. cit.: f. 2; Soza & Olmstead, loc. cit.: f. 1, 2) and new findings (unftbl.), these more apomorphic Rubieae form a polytomy or a grade with seven parallel clades. The most basal clade (1) consists of the monotypic *Galium* sect. *Cynogalizia* Pobedimova only. The following *Sherardia* clade (2) includes *Crucianella*, *Phuopsis*, *Sherardia*, and several sections of *Asperula* together with *Leptunis*. Separate clades are formed by *G. sect. Depauperata* Pobedimova (3), *A. sect. Glabella* Grisebach, including *G. sect. Aparinoides* (4), and *A. sect. Asperula* (5). The *Cruciata* clade (6) consists not only of the genera *Cruciata* and *Valantia* but also of all sections of *Galium* (including the traditional genera *Bataprine*, *Microphysa*, and *Relbunium*) that form whorls of 2 leaves and normally not more than 2 even-sized leaflike stipules. Finally, the *G. sect. Galium* clade (7) comprises this and various other sections of *Galium*, which regularly develop whorls of leaves and leaflike stipules with 5 to more elements.

From the above data and the fact that a number of major groups of Rubieae have not been DNA-analyzed yet, it is obvious that it is still difficult and partly impossible to harmonize DNA-supported clades with the traditional genera and sections. Thus, extensive changes are expected for generic and sectional circumscriptions within Rubieae in the future. Therefore, we refrain from taxonomic changes for the present flora, list taxa in alphabetical order, and only supplement phylogenetic comments. Thus, the present treatment in principle follows FRPS (71(2): 216–286. 1999), mainly based on Pobedimova et al. (Fl. URSS 23: 287–381. 1958), but also considers Ehrendorfer et al. (loc. cit. 2005). In order to make comparison with available phylogenetic data and present infragenetic classification easier, relevant information is inserted as a “Taxonomic Conspicuous” before the individual species descriptions. It was not until this volume was ready for the press that the need for the nomen novum, *Galium glabra*uculum, was discovered; therefore, this species alone is outside of the alphabetical order.
Here the key to species of *Galium* is extensively revised from that of FRPS. It includes all of the Chinese *Galium* species with full ranges of differential character variation. Furthermore, it keys out all other Rubieae genera which are easily confused with *Galium* and are documented or can be expected in China. Details on the genera *Asperula*, *Leptunis*, *Microphysa*, *Phuopsis* and *Rubia* can be found where they are listed in alphabetical order, references to *Cruciata* and *Sherardia* appear in the comments above.

Several species are keyed out more than once in the present key because they are circumscribed by combinations of characters rather than by unique features. Furthermore, many *Galium* species are markedly variable because of genetic differentiation (e.g., *G. bungei*, *G. elegans*) but also because of phenetic plasticity due to different environmental conditions. References to the number of leaves and leaflike stipules in whorls as well as leaf measurements refer to middle stem regions. Measurements of organs with hairy surfaces (e.g., leaves, fruit, and mericarps) here apply to the solid surface of the structure and do not include the trichomes. The terms “leaf whorl,” “ovary,” and “uncinate trichome” follow common usage in *Galium*. Infraspecific taxa are adopted from FRPS in order to facilitate future and more detailed work on this group and comparison with other floras. They are not included in the following main key but are subordinated under the relevant species in alphabetical order and keyed out there.

**Taxonomic conspectus of the Rubieae (excluding Kelloggia and Rubia)**


Species are markedly variable because of genetic differentiation (e.g., *G. bungei*, *G. elegans*) but also because of phenetic plasticity due to different environmental conditions. References to the number of leaves and leaflike stipules in whorls as well as leaf measurements refer to middle stem regions. Measurements of organs with hairy surfaces (e.g., leaves, fruit, and mericarps) here apply to the solid surface of the structure and do not include the trichomes. The terms “leaf whorl,” “ovary,” and “uncinate trichome” follow common usage in *Galium*. Infraspecific taxa are adopted from FRPS in order to facilitate future and more detailed work on this group and comparison with other floras. They are not included in the following main key but are subordinated under the relevant species in alphabetical order and keyed out there.

### Clade 1

*Galium* sect. *Cymogalia* Pobedimova s.s.

39. *Galium paradoxum* (D)

### Clade 2

*Phuopsis* stylosa

Sherardia arvensis

Leptunis trichodes

Asperula oppositifolia

### Clade 3

*Galium* sect. *Depasperata* Pobedimova


### Clade 4

*Galium* sect. *Aparinoides* (Jordan) Grenier

27. *Galium karakulense* (E)

25. *Galium innocuum* (as *G. trifidum*; E; incl. "G. alustre")

### Clade 5

*Asperula* sect. *Asperula*

*Asperula orientalis*

### Clade 6

*Galium* sect. *Platygalium* W. D. J. Koch s.l.

9. *Galium bungei* (E; incl. *G. martini*; M)

45. *Galium salviniense* (E)

12. *Galium crassifolium* (A)

31. *Galium lineartifolium* (E)

21. *Galium hirtiflorum* (Z)

20. *Galium glandulatum* (A)

18. *Galium forrestii* (D)

44. *Galium rapifragum* (Z)

35. *Galium morii* (D)

54. *Galium taroakeense* (A)

34. *Galium minutissimum* (M)

36. *Galium nankotaizanum* (M; incl. *G. mathoraseense*)

47. *Galium serylloides* (A)

29. *Galium kinita* (G)

24. *Galium huhehense* (M)

30. *Galium kunmingense* (Z)

17. *Galium formosense* (as *G. kwanzanense*; M)

15. *Galium elegans* (D)

63. *Galium yunanense* (M)

26. *Galium kuntschaticum* (D)

10. *Galium chekiangense* (as *G. nakaiii*: G)

Microphysa elongata

40. *Galium platygaliun* (K)

32. *Galium maximovici* (K)

7. *Galium boreale* s.l. (G)

60. *Galium turkestanicum* (M)

### Clade 7

*Galium* s.s.

*Galium* sect. *Hylaee* (Grisebach) Ehrendorfer s.l.

37. *Galium odoratum* (J)

4. *Galium asperuloides* (A)

22. *Galium hoffmeisteri* (as subsp. of *G. asperuloides*; A)

14. *Galium echinocarpum* (A)

53. *Galium takasagomontanum* (M)

59. *Galium trilorum* (A)

58. *Galium trifloriforme* (Z)


48. *Galium sichuanense* (Z)


56. *Galium tokyoense* (as var. of "G. davuricum"; F)

41. *Galium pratii* (M)

52. *Galium taiwanense* (M)

3. *Galium asperfolium* (I)

6. *Galium bilmii* (as syn. of *G. asperfolium* var. i; incl. *G. quinatum*; M)

51. *Galium sungapense* (A)

42. *Galium pusillosetosum* (A)

1. *Galium acutum* (M)

43. *Galium reae* (Z)

33. *Galium megacystarion* (Z)

5. *Galium baldensiforme* (A)

49. *Galium gahbrusiulcum* (A)

28. *Galium karatavense* (as *G. rivale* s.l.; K)

61. *Galium uliginosum* (F)

*Galium* sect. *Leiogaliun* Ledebour

38. *Galium paniculatum* (M; incl. *G. xinjiangense*; J)

*Galium* sect. *Orientigaliun* Ehrendorfer

8. *Galium ballatun* (I)

*Galium* sect. *Galium*

23. *Galium humifissum* (L)

62. *Galium verum* (H)

11. *Galium consuipunueum* (as *G. maj-mechense*; H)

46. *Galium saurense* (M)

*Galium* sect. *Aparine* W. D. J. Koch s.s.

50. *Galium spurium* (as *G. aparne var. tenerum*; B)

2. *Galium aparine* (B)

*Galium* sect. *Kogylia* Dumortier s.s.

57. *Galium tricoreum* (as *G. tricorne*; B)

*Galium* sect. *Microgalium* Grisebach

19. *Galium ghalanicum* (Z)

55. *Galium tenuissimum* (C)
Key to species of Galium and to related genera of the Rubieae

1a. Interpetiolar stipules inconspicuous, multifid or fimbriate, not leaflike and not forming whorls with true leaves; corolla funnelform, (4 or)5-lobed; ovary and dry mericarps with hooked trichomes ........................................ Kelloggia (see p. 183)

1b. Interpetiolar stipules mostly leaflike and in whorls with true leaves, rarely reduced.

2a. Corolla lobes regularly 5; fruit fleshy, mericarps berrylike, (2 or 1, by non-development), often dispersed together ................................................................. Rubia (see p. 305)

2b. Corolla lobes usually 4 (rarely 3); fruit dry or leathery, mericarps mostly 2, nearly always separating for dispersal.

3a. Leaves in middle stem region opposite, with stipules reduced or ± leaflike and in whorls of 4 but then always smaller than true leaves.

3b. Leaves in middle stem region opposite and with very similar leaflike stipules in whorls of 4–16.

4a. Corolla pink, funnelform, with well-developed tube longer than lobes; fruit smooth ........ Asperula oppositifolia (see p. 78)

4b. Corolla white, rotate, with tube shorter than lobes; fruit with uncinate trichomes.

5a. Perennial herbs; leaves 5–30 × 5–23 mm, obtuse to truncate at base, on petioles 1.5–10 mm; flowers 3–11 in cymes; corolla with 4 lobes ................................................................. 39. G. paradoxum

5b. Annual herbs; leaves 2–12 × 1–4 mm, acute to cuneate at base, subsessile or on short petioles; flowers solitary at each node; corolla mostly with 3 lobes .......................................................... 16. G. exile

6a. Leaf apex rounded, obtuse, or ± blunt, never acute or with a hyaline mucro; leaves in whorls of 4–6, linear to broadly obovz, 1-nerved, dried blackening; ripe mericarps globose, didymous and with a short zone of contact, glabrous; corolla cup-shaped to slightly campanulate, 3- or 4-merous.

6b. Leaf apex mostly ± acute, often with a hyaline mucro; leaves in whorls of 4–16, sometimes broader and with 3–5 palmate nerves; ripe mericarps ovoid to subglobose, with a longer zone of contact and with diverse surface structures; corolla diverse, but often rotate and always 4-merous.

7a. Inflorescences with 1–3(or 4)-flowered cymes; corolla mostly 3-lobed, 1–1.8 mm in diam.; leaves mostly 3–8 × 1–2 mm ................................................................. 27. G. karakulense

7b. Inflorescences with 1–3(or 4)-flowered cymes; corolla mostly 3-lobed, 1–1.8 mm in diam.; leaves mostly 3–8 × 1–2 mm ................................................................. 25. G. innocuum

8a. Leaves and leaflike stipules in middle stem region never in whorls of more than 4 (if rarely in whorls of up to 6 then leaves with 3–5 palme principal veins), from linear to broadly ovate.

8b. Leaves wider, with 1 or 3 main veins; fruit hairs appressed.

9a. Stem apex vegetative, with few- to several-flowered lateral cymes only in leaf axils and shorter than or ± equal to subtending leaves, nodding in fruit ............................................ Cruciata (see comments above)

9b. Stem apex usually floriferous, with terminal and axillary cymes, often longer than subtending leaves and mostly not nodding in fruit.

10a. Condensed plants of rocks or high elevations; stems usually less than 10 cm tall, glabrous or with spreading (but never retrorse) hairs; leaves mostly ± ovate, (1–)3–8(–20) × (0.8–)2–4(–10) mm, with 1–3 main veins; corolla rotate, often only 1.5–2 mm in diam.; mericarps with spreading (rarely appressed) hooked or ± straight trichomes.

11a. Mericarps with ± straight hairs, 2–2.5 mm in diam.; stems mostly pilose or hirtellous.

11b. Mericarps with weakly to strongly curved and uncinate trichomes; stems partly glabrous.

12a. Fruiting pedicels straight; Xizang ............................................................................. 47. G. serpylloides

12b. Fruiting pedicels noding; Taiwan ............................................................................ 36. G. nankotaizanum

13a. Corolla ca. 3 mm in diam.; stems glabrous ......................................................... 53. G. takasagomontanum

13b. Corolla 1.2–2 mm in diam.; stems ± hairy or glabrous.

14a. Stems ± hairy.

14b. Stems glabrous; Taiwan.

15a. Leaves ovate to broadly lanceolate, acute, up to 3.5 mm wide; Yunnan ..................... 44. G. rupifragum

15b. Leaves broadly elliptic to obovate, obtuse and mucronate, up to 10 mm wide;
Taiwan .................................................................................................................. 17. G. formosense

16a. Leaves very small, only 0.8–1 mm wide, with 1 main vein only; fruit hairs spreading ............................................................................................................. 34. G. minutissimum

16b. Leaves wider, with 1 or 3 main veins; fruit hairs appressed.

17a. Leaves with 3 main veins; corolla only ca. 1.2 mm in diam. ................................. 35. G. morti

17b. Leaves with 1 main vein; corolla ca. 2 mm in diam. ............................................... 54. G. takaokense

10b. Taller plants, usually of lower elevations with larger leaves (if plants ± condensed then stem hairs retrorsely curved or fruit hairs appressed but not hooked).
18a. Leaves with 1 principal vein or 2 lateral veins only weakly visible and not extending past middle of blade.

19a. Open corollas funnelform, 2.5–3 mm, tube somewhat shorter than lobes; fruit with pericarp smooth to granular, becoming slightly inflated, enclosing both mericarps at dispersal ................................................................. Microphysa elongata (see p. 216)

19b. Open corollas rotate, fused basal part much shorter than lobes; mericarps clearly separated.

20a. Stems ± strigose-hirsute, with hairs ± retrorse (but not retrorsely aculeolate); leaves ovate or elliptic to linear-lanceolate, broadest ± in middle, at lower side usually with glandlike spots; flowers unisexual, usually yellowish, ± greenish, or reddish; fruit normally with uncinate trichomes.

21a. Plants usually less than 15 cm tall, strongly branched from base; leaves often less than 8 mm, mostly glabrescent or glabrous, subleathery; inflorescences with few-flowered, bracteate cymes ................................................................. 20. G. glandulosum

21b. Plants usually more than 15 cm tall, little branched; leaves usually longer than 8 mm, hairy on both sides; inflorescences paniculate to corymbiform, little bracteate.

22a. Leaves linear-elliptic to narrowly lanceolate, mostly 8–17 × 1–2.5 mm, dried rather papery; inflorescence paniculate ................................................................. 21. G. hirtiflorum

22b. Leaves ovate-elliptic, mostly 8–12 × 3–5 mm, dried rather subleathery; inflorescence corymbiform ................................................................. 18. G. forrestii

20b. Stems glabrous or with indumentum, but not with retrorse hairs; leaves often broadest above middle and thinner, without glandlike spots; flowers usually bisexual.

23a. Leaves ± linear, often longer than 20 mm, in addition to 1 principal, with 2 weaker lateral veins; corolla 4–5 mm in diam.

24a. Leaves linear-spatulate, 1–4 mm wide; inflorescences loose, broadly paniculiform; ovaries and fruit glabrous and smooth ........................................................... 31. G. linearifolium

24b. Leaves linear-lanceolate, 3–9 mm wide; inflorescences dense, elongate-paniculate; ovaries and fruit with sparse hooked trichomes or glabrous ......................................... 60. G. turkestanicum

23b. Leaves not linear, mostly shorter than 20 mm; corolla smaller.

25a. Leaves ovate, length/breadth index 2 or less, in addition to 1 principal, with 2 weaker lateral veins; corolla larger; fruit with spreading hooked or straight hairs; Taiwan.

26a. Mericarps with straight trichomes; corolla 2–2.5 mm in diam.; stems pilose or glabrescent ................................................................. 36. G. nankotaizanum

26b. Mericarps with hooked trichomes; corolla ca. 3 mm in diam.; stems glabrous ................................................................. 53. G. takasagomontanum

25b. Leaves ovate-oblong to lanceolate, length/breadth index 2 or more, with only 1 principal vein; corolla 1.5–2 mm in diam.; ovaries and fruit glabrous or with various indumentum.

27a. Leaves dried subleathery; fruit with appressed, ± curved (but not uncinate) hairs; Shanxi ................................................................. 12. G. crassifolium

27b. Leaves dried papery; fruit with various indumentum.

28a. Plants ascending, weak, sparsely hairy or glabrous; inflorescence few flowered, peduncles and pedicels very thin and elongated, latter mostly 4–8 mm; fruit with spreading uncinate trichomes ......................................................... 45. G. salwinense

28b. Plant erect, more robust, indumentum diverse; inflorescences ± many flowered, peduncles and pedicels thicker and shorter, latter mostly 2–4 mm; fruit tuberculate, with appressed or spreading hooked trichomes, or more rarely smooth ................................................................................................. 9. G. bungei

18b. Leaves with 3–5 palmate principal veins, lateral veins well marked and extending for more than half of blade length.

29a. Corolla funnelform or cup-shaped, 2–5 mm in diam., with fused lower part ± as long as lobes; ovaries and fruit glabrous.

30a. Corolla cup-shaped or campanulate, 2–2.7 mm in diam.; cauline leaves broadly lanceolate, always in whorls of 4 ................................................................. 30. G. kunmingense

30b. Corolla funnelform or campanulate, 2.5–5 mm in diam.; middle stem leaves ovate to elliptic, in whorls of 4–6.

31a. Open corollas 3.5–5 mm in diam.; cauline leaves usually in whorls of 4, 12–28 mm ......................................................................................................................... 40. G. platygalium

[44b. Inflorescences branched, not enclosed by bracts; corolla rotate, campanulate, 
44a. Inflorescences capitate and enclosed by leaflike bracts; corolla funnelform or salverform, 
uncinate trichomes or glabrous ................................................................. 60. G. turkestanicum 
32b. Leaves lanceolate to ovate, shorter, 3 principal veins mostly readily visible. 
33a. Fruit glabrous, smooth to granular-papillose, or with appressed and ± hooked or with spreading and straight (but never with spreading and hooked) trichomes. 
34a. Open corollas 3–4 mm in diam.; stems (except nodes) mostly glabrous and smooth. 
35a. Leaves ovate-lanceolate to ovate, papillose, length/breadth index mostly 2.5 or less; cymes rather few flowered; ovaries and fruit with ± appressed, apically somewhat bent trichomes .......................................................... 24. G. hupehense 
35b. Leaves mostly rather narrowly lanceolate, smooth or ± hairy, length/breadth index mostly 3 or more; cymes many flowered; ovaries and fruit glabrous or with various indumentum .......................................................... 7. G. boreale 
36a. Cauline leaves broadly to narrowly lanceolate, length/breadth index often 3.5 or more. 
37a. Stems hairy throughout; leaves lanceolate; fruit with straight hairs or rarely glabrous ............................................................. 29. G. kinuta 
37b. Stems (except nodes) glabrous; leaves ovate-lanceolate (sometimes also broader), apex subacute to acuminate, striate-punctate glandular below; fruit glabrous and smooth .......................................................... 36. G. nankotaizanum 
38a. Leaves 6–30 × 3–20 mm; fruiting pedicels straight; fruit glabrous or scaberulous; mainland ................................................................. 15. G. elegans 
39a. Open corollas 3 mm or more in diam.; stems (except nodes) often glabrous and smooth. 
40a. Leaves lanceolate to ovate-lanceolate or elliptic, length/breadth index 3.5 or more, 
apex acute to acuminate ................................................................. 7. G. boreale 
40b. Leaves ovate, length/breadth index less than 3. 
41a. Leaf apex obtuse to rounded, usually mucronate; mainland .................. 26. G. kamtschaticum 
41b. Leaf apex acuminate; Taiwan .................................................. 53. G. takasagomontanum 
39b. Open corollas 2.5 mm or less in diam.; stems often ± hairy. 
42a. Leaves ovate-lanceolate to narrowly elliptic, with acute apex, length/breadth index normally more than 2.5 .................................................. 66. G. yunnanense 
42b. Leaves ovate to broadly elliptic, with obtuse to rounded apex, entire or shortly mucronate, length/breadth index normally less than 2.5. 
43a. Leaves up to 20 mm wide; plants slender to usually rather robust; mainland ........... 15. G. elegans 
43b. Leaves up to 10 mm wide; slender low plants; Taiwan .................... 17. G. formosense 

8b. Leaves and leaflike stipules in middle stem region regularly in whorls of more than 4, i.e., in whorls of 5–16, with only 1 principal vein, linear to broadly lanceolate or elliptic, but never ovate or with a length/breadth index of less than 2.5.

44a. Inflorescences capitate and enclosed by leaflike bracts; corolla funnelform or salverform, 
4–15 mm, with 4 or 5 lobes. 
45a. Plants perennial, 20–70 cm tall; calyx limb obsolete; corolla 5-lobed, 12–14 mm .......... Phuopsis stylosa (see p. 291) 
45b. Plants annual; corolla 4-lobed, shorter. 
46a. Calyx teeth well developed; corolla pink, tube 4–5 mm ..................... Sherardia arvensis (see comments above) 
46b. Calyx lacking; corolla bluish, tube 7–13(–15) mm ......................... Asperula orientalis (see p. 78) 
44b. Inflorescences branched, not enclosed by bracts; corolla rotate, campanulate, 
or funnelform, 0.5–13 mm, mostly with 4 (rarely 3) lobes. 
47a. Medium stem leaves marginally (and often on upper side) with microhairs directed forward (use 20× lens), thus antrorsely ciliolate or aculeolate; stems mostly not retrorsely aculeolate. 
48a. Ovaries and fruit densely covered with uncinate trichomes; plants perennial with smooth stems.
49a. Corolla funnelform, with tube ± as long as lobes .......................................................... 37. *G. odoratum*
49b. Corolla rotate, with tube markedly shorter than lobes.

50a. Robust, procumbent to ascending plants often longer than 50 cm; inflorescences terminal and lateral with cymes in upper 2–4 nodes .............................................................. 59. *G. triflorum*
50b. Slender erect plants, less than 50 cm tall; inflorescences predominantly terminal.

51a. Leaves 6–25 × 2–7 mm; open corollas ca. 2 mm in diam.; Taiwan (cf. also 53. *G. takasagomontanum*) ........................................................................................................ 14. *G. echinocarpum*
51b. Leaves often larger; open corollas 1.5–3.5 mm in diam.; mainland.

52a. Leaves mostly in whorls of 7 or 8, (ob)lanccolate, length/breadth index mostly 3.5–4.5, subpetiolate; fruit with uncinate trichomes 0.6–0.8 mm; expected in Xizang ......................................................... 4. *G. asperuloides*
52b. Leaves mostly in whorls of 6, narrowly obovate to broadly oblanceolate, length/breadth index mostly 2.5–3.5, clearly petiolate; fruit with uncinate trichomes 0.8–1.2 mm or longer; widespread ................................................................. 22. *G. hoffmeisteri*

48b. Ovaries and fruit glabrous or hairy, but never with uncinate trichomes; plants perennial or annual.

53a. Plants annual, slender; flowers on pedicels and peduncles often longer than 5 mm and in lax, diffuse inflorescences.
53a. Leaves filiform, 20–30 mm, ascending; corolla funnelform, pink to red; ovary and mericarps with dense, short and curved hairs ...................... *Leptunis trichodes* (see p. 213)
53b. Plants perennial, slender to robust; flowers on pedicels and peduncles 0.5–20 mm, in lax to ± congested inflorescences.

54a. Leaves filiform, 20–30 mm, ascending; corolla funnelform, pink to red; ovary and mericarps with dense, short and curved hairs ...................... *Leptunis trichodes* (see p. 213)
54b. Leaves linear to oblanceolate, 4–20 mm, spreading to reflexed; corolla ± rotate, whitish, yellowish, or greenish; ovary and fruit glabrous or slightly tuberculate.

55a. Inflorescences broadly ovate, diffuse and intricate, with fruiting pedicels elongated to 20 mm ................................................................. 55. *G. tenuissimum*
55b. Inflorescences rather narrowly thyrsoid, not diffuse and intricate, with fruiting pedicels only up to 4 mm ................................................................. 19. *G. ghilliacum*

53b. Plants perennial, slender to robust; flowers on pedicels and peduncles 0.5–5 mm, in lax to ± congested inflorescences.

56a. Corolla funnelform, lobed for 1/2–2/3, white.
56a. Inflorescences lax, ± ebracteate; stems erect, smooth; main stem leaves 15–65 × 3–12 mm ............................................................................. 38. *G. paniculatum*
56b. Inflorescences congested, strongly bracteate; stems procumbent, mostly ± hairy; main stem leaves 5–23 × 1–2(–5) mm ................................................................. 23. *G. humifusum*

56b. Corolla rotate, lobed for 3/4 or more, often yellowish; plants erect to ascending.

58a. Leaves in middle stem region in whorls of not more than 6; plants of (sub)alpine region, not taller than 30 cm ..................................................................................... 46. *G. saurense*
58b. Leaves in middle stem region in whorls of more than 6 and up to 12.

59a. Open corollas 3.5–5 mm in diam., white; fruit somewhat spongy or fleshy, 3–3.5 mm, with a dry pericarp separating from rest of fruit ........................................................................ 8. *G. bullatum*
59b. Open corollas 3.5–5 mm in diam., yellow to whitish; fruit with dry mericarps, 1.5–2 mm, with pericarp dark and firmly attached to rest of fruit.

60a. Leaves mostly 2.5–5 mm wide, glabrous abaxially; fruit ca. 1.5 mm ....................... 11. *G. consanguineum*
60b. Leaves 2.5–5 mm wide, glabrous to densely pubescent abaxially; fruit 1.5–2 mm .............. 62. *G. verum*

61a. Annuals, often in ± disturbed, weedy habitats; stems and leaf margins retroversely aculeolate; fully developed mericarps subspherical, 2–6 mm; open corollas 1–2 mm in diam.
61b. Perennials, in ± natural habitats; fully developed mericarps ellipsoid, 1.5–3 mm; open corollas 1–4 mm in diam.
64a. Middle stem leaves narrowly obovate to oblanceolate, mostly 18–28 × 5–10 mm; stems slightly retrorsely aculeolate; inflorescences of medium size, with terminal and lateral, few- to several-flowered, rather loose cymes with small bracts, in fruit stiffly divaricate; corolla rotate, 1.5–2 mm in diam.; fruit with hooked trichomes ................................. 58. G. trifloriforme

64b. Middle stem leaves mostly smaller; inflorescences different, usually more bracteate; fruit smooth, verrucose, or with hooked trichomes.

65a. Corolla funnelform to subcampanulate, with tube ± as long as or slightly shorter than lobes, whitish; ovaries and fruit glabrous, smooth or verrucose; leaves papery to subleathery and glossy; stems rough, retrorsely aculeolate, procumbent to clambering.

66a. Corolla funnelform; plants robust, 0.6–1.2 m, often forming mats; main stem leaves 8–50 × 2–8 mm .................................................................................................................. 28. G. karataviense

66b. Corolla subcampanulate; plants slender and ± erect, 10–60 cm tall; main stem leaves 3–16 × 1–3 mm ..................................................................................................................... 61. G. uliginosum

65b. Corolla rotate, fused basal part much shorter than lobes; ovaries and fruit with hooked trichomes, tuberculate, or glabrous; stems glabrous, rough, or hairy.

67a. Middle stem leaves larger, (5–)10–35(–50) × (1–)2.5–10 mm, mostly ± hairy, at least margins retrorsely aculeolate; cymes lateral and terminal, many flowered; ovaries and fruit glabrous or with diverse indumentum; plants from lower elevations, relatively robust, erect or clambering, stems up to 0.7 m tall.

68a. Stems branched from base; cymes leafy, with bracts to last branches; stems and leaves (nodes and margins excepted) glabrous and smooth; mericarps with spreading uncinate trichomes .......................................................................................... 48. G. sichuanense

68b. Stems normally branched from middle; cymes usually less leafy; stems and leaves mostly with more indumentum; fruit glabrous, papillose, tuberculate, or with uncinate trichomes.

69a. Peduncles and pedicels slender, filiform and often ± flexuose, with inconspicuous bracts; pedicels up to 5 mm, in fruit elongated to 10 mm or more; flowers never reddish; plants usually clambering; ovary and fruit surfaces diverse.

70a. Fruit often with uncinate trichomes; mainland ............................................................................................................. 13. G. dahuricum

70b. Fruit glabrous; Taiwan ........................................................................................................................................... 52. G. taiwanense

69b. Peduncles and pedicels rather stiff and often divaricate and ± bracteate; pedicels shorter than 5 mm and hardly elongated in fruit; ovary and fruit surfaces diverse, but often glabrous.

71a. Corolla red to purple (very rarely maroon or white), 1.5–2.5 mm in diam. ....................... 6. G. blinii

71b. Corolla whitish, yellowish, or greenish.

72a. Corolla small, 1.5–2 mm in diam., yellow to greenish white, lobes aristate; inflorescences divaricate and regularly bracteate with bracts similar to but smaller than leaves, giving a diffuse miniature aspect; ovary and fruit surface variable; plants often clambering ................................................................. 3. G. asperifolium

72b. Corolla larger, mostly more than 2 mm in diam.; inflorescences ebracteate or with bracts ± reduced and irregularly distributed; ovary and fruit surface smooth to tuberculate; plants erect, hardly clambering.

73a. Leaves lanceolate, gradually narrowed into acute apex .............................................. 41. G. prattii

73b. Leaves subspatulate to obovate, apex rounded and abruptly narrowed into a mucro ................................. 56. G. tokyoense

67b. Middle stem leaves uniformly small, 2–12(–15) × 0.3–3.5 mm, glabrous and smooth to ± hairy; cymes lateral and terminal, few flowered; ovaries and fruit with uncinate (very rarely ± straight) trichomes or glabrous; plants from high elevations, usually reduced and weak, caespitose to procumbent, stems only up to 0.3 m.

74a. Ovaries and fruit with uncinate (very rarely ± straight) trichomes.

75a. Leaves and stems ± densely hispid and often retrorsely aculeolate; stems with 4 conspicuous whitish angles ................................................................. 42. G. pusillosetosum

75b. Leaves completely glabrous and smooth or only slightly hairy and/or retrorsely aculeolate; stems with 4 inconspicuous angles.

76a. Leaves dried blackening, papery and thin, oblanceolate to narrowly obovate, with flat margins, hardly longer than 7 mm ................................................................. 5. G. baldensiforme

76b. Leaves dried greenish-brownish, with ± revolute margins, often longer than 7 mm.

77a. Plants nearly always smooth; leaves ± subleathery; ovary in flower ca. 1 mm ................................................................. 49. G. glabriusculum
77b. Plants retrogress aculeolate at least on margins and lower side of papery leaves; ovary in flower 0.5–0.8 mm .......................................................... 51. G. sungpanense

74b. Ovaries and fruit glabrous, smooth, papillose, or verrucose; Himalaya.

78a. Plants weak to procumbent but not mat-forming; cells of adaxial leaf surface relatively large, readily visible individually with 20× lens; corolla mostly whitish ................................................................. 33. G. megacyttarion

78b. Plants procumbent and often mat-forming; cells of adaxial leaf surface small, not or hardly visible individually with 20× lens.

79a. Stems ± densely hairy and/or retrogress aculeolate, with 4 conspicuous whitish angles ........................................................................................................ 42. G. pusillosetosum

79b. Stems glabrous or only slightly retrogress aculeolate, with inconspicuous angles.

80a. Leaves on main stems 2–8.5 mm; inflorescence cymes 1– few flowered, fascicled; corolla white, pale green, or pale yellow, with upper surface of lobes papillose ................................................................. 1. G. acutum

80b. Leaves on main stems 5–10.5 mm; inflorescence cymes 1–6-flowered; corolla nearly always red or purple, with upper surface of lobes glabrous and smooth except ± puberulent on margins and central vein ........................................... 43. G. rebae


尖瓣拉拉藤 jian ban la la teng

Herbs, perennial, procumbent, much branched, mat-forming. Stems up to 30 cm, (4 or 6)-angled, glabrous, smooth or sometimes with (very rarely more dense) short and straight hairs. Leaves in whorls of up to 6, sessile; blade drying papery and blackish, linear-oblancoate to narrowly elliptic-oblancoate, 2–8.5 × 0.3–1.5 mm, glabrous and smooth, occasionally with straight hairs, base cuneate, margins flat to thinly revolute, very rarely antrorsly aculeolate, apex acute, ± contracted and mucronate; vein 1. Inflorescences with terminal and axillary cymes, 1– few flowered; peduncles (1.5–)3–8(–10) mm; pedicels (0.1–)0.5–2(–3) mm, glabrous, smooth. Ovary ellipsoid-oovoid, ca. 0.5 mm, didymous, glabrous. Corolla white, pale greenish, or yellowish, rotate, 1.2–3.5 mm in diam., glabrous to puberulent, lobed for 2/3 or more; lobes 4, lanceolate-spulate, inside (i.e., adaxially) papillose, shortly acuminate. Mericarps ellipsoid, ca. 1 × 0.4–0.6 mm, glabrous, smooth or granular-verruculose, often on elongating pedicels. Fl. and fr. Jul–Oct.

Mountain rocks and slopes; 2000–4100 m. ?Sichuan, Xizang, ?Yunnan [India, Nepal, Pakistan].

Galium acutum is a (sub)alpine Himalayan member of the G. asperifolium group (see under that species). This group of taxa can be divided into subgroups: (1) from lower elevations and (2) from higher elevations. The latter subgroup is represented in the W Himalaya of Pakistan by G. acutum alone (Niazamuddin & Ehrendorfer, Pl. Syst. Evol. 155: 71–75. 1987). Mill (Edinburgh J. Bot. 53: 193–213. 1996; Fl. China 19: 104–141. 2011. presented a differential table which has been incor-

porated into the present descriptions. Nevertheless, from the material available now, it appears that only flower color (white or greenish white in G. acutum and reddish crimson in G. rebae) is really decisive for their separation. Furthermore, at lower elevations, G. acutum appears linked to G. asperifolium var. sikkimense. Cufodontis (Oesterr. Bot. Z. 89: 239. 1940) has described such transitional forms with longer and ± retrogress aculeolate stems and hairy corolla lobes from the Indian Himalaya as G. acutum var. trichanthum Cufodontis.

Mill (loc. cit. 1996: 194–198) considered G. acutum to be restricted to the NW Himalaya except for one provisionally identified specimen from Sikkim. In contrast, specimens studied by us from the herbaria PE, KUN, and WU clearly show that G. acutum extends much further to the east, reaching Yunnan and Sichuan.

Galium himalayense was regarded as a synonym of G. acutum by Cufodontis (loc. cit.: 239–243). Mill (loc. cit. 1996: 195; loc. cit. 1999: 831–832) agreed but maintained the taxon as G. acutum var. himalayense and described its sympatric occurrence with G. acutum var. acutum throughout the NW Himalaya. As Mill did not consider the possible occurrence of flower dimorphism in G. acutum, it remains uncertain whether the flower and stigma size differences listed are possibly correlated with male and female plants or simply correspond to hermaphrodite variants within the morphological amplitude of the species. In order to stimulate such studies and to clarify the distribution of the two taxa in China, a key and descriptions (according to Mill, loc. cit. 1996) follow:

1a. Open corollas 2.3–3.5 mm in diam.; stigmas united to near middle, in total length subequal to stamens ................. 1a. var. acutum

1b. Open corollas 1.2–2.3 mm in diam.; stigmas united only shortly at base, in total length shorter than stamens ...... 1b. var. himalayense

1a. Galium acutum var. acutum

尖瓣拉拉藤(原变种) jian ban la la teng (yuan bian zhong)

Galium asperifolium Wallich var. setosum Cufodontis.

Leaves of main stems with blades mucronate at apex, mucro 0.2–0.45 mm. Corolla 2.3–3.5 mm in diam.; lobes 1.9–4 × as long as wide, mucronate with mucro 0.15–0.3 mm. Stigmas united to near middle, in total length subequal to stamens. Fl. and fr. Jul–Oct.
Mountain rocks and slopes; 2000–4100 m. ?Sichuan, Xizang, ?Yunnan [India, Nepal, Pakistan].


喜玛拉雅帚拉藤 xi ma la ya jian ban la la teng


Leaves of main stems with blade submucronate at apex, micro 0.15–0.2 mm. Corolla 1.2–2.3 mm in diam.; lobes 1.4–2.75 × as long as wide, acute or submucronate with macro to 0.1 mm. Stigmas united only shortly at base, in total length shorter than stamens. Fl. and fr. Jul–Oct.

Mountain rocks and slopes; 2000–4100 m. ?Sichuan, Xizang, ?Yunnan [India, Nepal].


原拉拉藤 yuan la la teng

Herbs, annual, procumbent or clambering. Stems 30–90 cm high, 4-angled, 1–4 mm in diam., branched from base, retrorsely aculate along angles, glabrescent to pilose at nodes. Leaves at middle stem region in whorls of 6–10, subsessile; blade drying papery, narrowly oblong-oblanceolate to narrowly oblong-oblanceolate, 10–60 × 3–10 mm, usually somewhat pilosulous or hirsutulous axially, retrorsely aculate along midrib abaxially, base acute, margins flat to thinly revolute, retrorsely aculate, apex acute and shortly mucronate; vein 1. Inflorescences terminal and axillary, cymes 2- to several flowered; axes glabrous to aculeolate; bracts ± leaflike or none, 1–5 mm; peduncles 1–5 mm, pedicels 1–30 mm, finally elongating and sometimes curved directly under fruit. Ovary subglobose, 0.3–0.5 mm, with uncinate trichomes. Flowers hermaphroditic. Corolla yellowish green or white, rotate, 1.5–2 mm in diam.; lobes 4, triangular to ovate, acute. Mericarps subglobose to kidney-shaped, 2.5–5 mm, with a dense cover of uncinate trichomes 0.4–1.2 mm from swollen base. Fl. Mar–Jul, fr. Apr–Nov.

Forest margins, riversides, meadows, open fields, farmlands; near sea level to 2500 m. Evidently rare in China and possibly only introduced [originally in W Eurasia and the Mediterranean, but today nearly worldwide as an adventive].

The Galium aparine group (G sect. Aparine, formally part of G sect. Kolgyda s.l.) forms an annual, extremely polymorphic, and predominantly autogamous polyploid complex, also called G aparine s.l. or G aparine agg. One has to consider as possible perennial ancestors the morphologically very close E Asiatic taxa (e.g., G sunganense; see there) and other annuals, such as the Aegean endemic G monachi (Boissier & Heldreich) (2x = 22) and the Eurasian and African G spurium (2x and 4x, 2n = 20, 40). By allopolyploidy they apparently have contributed in the Mediterranean and W Asia to G aparine s.s. (4x, 6x, and 8x with ± euploid and slightly oscillating aneuploid chromosome numbers), which today has become a nearly worldwide weed (Ehrendorfer et al., Fl. Iranica 176: 239. 2005).

Many authorities, including Cufodontis (Oesterr. Bot. Z. 89: 245–247. 1940) and W. C. Chen (in FRPS 71(2): 234–237. 1999), have treated all these plants under Galium aparine s.l. and recognized four varieties: var. aparine, var. echinospermum, var. leiospermum, and var. tenerum. Whereas the first refers to G aparine s.s. described above, the latter three should be assigned to G spurium (see there). Here, we follow the narrow circumscription of G aparine s.s. and the specific separation of G spurium outlined above, in spite of occasional difficulties in separating the two taxa on the basis of flower and mericarp size. A relevant survey of extensive Chinese material at the herbaria PE and KUN has clearly shown the common and wide occurrence of G spurium in comparison with the rare and only occasional documentation of G aparine s.s. Only future karyosystematic studies on the group in E Asia will clarify their distribution and ecological position. With respect to the common confusion of members of the G aparine group with other annual and perennial taxa of Galium see G spurium.

3. Galium asperifolium Wallich in Roxburgh, Fl. Ind. 1: 381. 1820.

楔叶律 xie ye lu


Herbs, perennial, weak to climbing or trailing, usually much branched. Stems 20–70 cm, 4-angled to 4-winged, villosulous to hirtellous and/or sparsely aculeolate to smooth. Leaves on main stems in whorls of up to (6–8), sessile or with very short (ca. 1 mm) petiole; blade drying papery to leathery, adaxially dark green and shiny, abaxially paler, oblong-oblong-oblong, oblong, or obovate, (5–)10–20–25 × (1–)1.5–4–(6) mm, adaxially scabernalous, hirtellous to glabrous, abaxially densely villosulous, hisrate, pilose to glabrous, base acute to cuneate, margins retrorsely aculeolate and ± hairy, flat to thinly revolute, apex obtuse, rounded, truncate, or emarginate and shortly mucronate; vein 1. Inflorescences ± paniculate, up to 18 cm, expanding through growing season, with terminal and axillary, several- to many-flowered cymes; peduncles glabrous to rarely villosulous, regularly spreading to divaricate, with a dichasial branching pattern, at most nodes with leaflike bracts (1–4 mm); pedicels 0.2–2.5 mm. Ovary obovoid, 0.2–0.3 mm, mostly glabrous or smooth, but sometimes also verrucose, hirtellous, or with undeveloped uncinate trichomes. Corolla greenish white or yellow, rotate, 1.5–2 mm in diam., glabrous, lobed for 2/3 or more; lobes 4, triangular-ovate, filamenteous-aristate (rarely only acute). Mericarps elliptic, 1–2 mm, glabrous and smooth or rarely granular-tuberculose, hirtellous, or with appressed to spreading hooked trichomes, on pedicels often slightly elongating to 4 mm. Fl. and fr. (May–)Jun–Sep–(Oct).

Mountain slopes, farmland sides, riversides and beaches, grasslands, forests, thickets, ditch sides, open fields, meadows; 400–3500 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, Xizang, Yunnan [Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Thailand].

Galium asperifolium is an exceedingly variable and widespread species and was the first described from a larger assembly of taxa, here called G asperifolium group and provisionally placed into G sect. Trachygaliu (but certainly not into G sect. Leptogalium as in Yamazaki, Fl. Japan 3a: 238–239. 1993, or into G sect. Leiogaliu as in W. C. Chen, FRPS 71(2): 271. 1999). According to Cufodontis (Oesterr. Bot. Z. 211–251. 1940), Nazimaddin and Ehrendorfer (Fl. Syst. Evol. 155: 71–75. 1987), Mill (Edinburgh J. Bot. 53: 193–213. 1996; Fl. Bhutan 2(2): 825–834. 1999), Ehrendorfer et al. (Fl. Iranica 176: 194. 2005), and the present treatment, the center of diversity of the G asperifolium group lies in the E Himalaya and SW China. Within this area, two subgroups of taxa can be recognized, one with larger plants, longer than 10 mm middle stem leaves, and many-flowered cymes from lower eleva-
tions (1), the other with more condensed growth, shorter middle stem leaves, and 1- to few-flowered cymes from higher elevations (2). Both subgroups include taxa with whitish, yellowish to greenish, and others with reddish, purplish, or brownish flower color. The (sub)alpine subgroup (2) is briefly surveyed under var. sikkimense (= G sikkimensis) in the C and Himalaya (including Bhutan). In addition, subgroup (1) includes taxa with a more easterly distribution, extending from China into the remaining parts of E Asia (including Japan): G dahuricum (including G comarri, G manshuricum, G niewerthii, and G pseudosapenum), G pratii, G taiwanense, and G tokyoense. Subgroup (1) taxa with reddish flowers are G blinii in SW China and the newly described Bhutan endemic G cruculatum R. R. Mill (see also Mill, loc. cit. 1996; loc. cit. 1999).

Because of its great variability with respect to habit and the indumentum of stems, leaves, and fruit, Galium asperifolium is often not easily separable from its closest relatives, and transitional forms occur. Its best differential characters are the many-flowered, divaricate, distally dichasial branching, and strongly bracteate cymes and the small yellowish-greenish flowers with aristate corolla lobes. Galium blinii mainly deviates by larger, reddish flowers and non-aristate corolla lobes. The filiform and flexuous peduncles and pedicels separate the less bracteate inflorescences and larger flowers separate G pratii, G taiwanense, and G tokyoense. To the taxa of the (sub)alpine subgroup (2, e.g., G acutum) G asperifolium is linked particularly through its var. sikkimense.

In addition to its natural complexity, the taxonomy of the Galium asperifolium group is rendered difficult by a number of badly described and insufficiently documented species created by H. Léveillé. On the basis of the studies by Cufodontis (loc. cit.), Lauener and Ferguson (Notes Roy. Bot. Gard. Edinburgh 32: 103–115, 1973), Mill (loc. cit. 1996), and our own judgment, we suggest to dispose of them in the following way: Galium blinii is maintained as a separate species (possibly with G bedinieri and G quinatum as synonyms), whereas G caudatae and G esquirolii and “G cuneatum” are maintained as synonyms to G asperifolium s.l. (including var. sikkimense); G comarri and G niewerthii are treated as synonyms of G dahuricum.

The following schematic key to the varieties of Galium asperifolium corresponds to W. C. Chen (loc. cit.: 271–274) who mainly followed Cufodontis (loc. cit.: 239–240). Only G asperifolium var. setosum has been eliminated because it clearly is a synonym of G acutum. Individuals with uncinate trichomes on ovaries and fruit, but otherwise identical to typical G asperifolium, are reported here for the first time. They still lack a varietal name and are provisionally assigned as synonyms to G asperifolium s.l. (loc. cit. 1999). G sikkimense is here again reduced to varietal status under G asperifolium, following Cufodontis (loc. cit.: 241). Forms of this species with ± glabrescent stems dominate to the east of its wide distribution area, but intraspecific and local variation of stem indumentum is so extensive and continuous as to make this character useless as a basis for specific separation. Mill (loc. cit. 1996: 201–212) assumed G asperifolium var. asperifolium to be most common in C and W Nepal and to be replaced by var. sikkimense toward the east. This statement is in conflict with the data on distribution in China from Chen (loc. cit.) and our own observations presented below. In view of the taxonomical complexity of the G asperifolium group and the common misinterpretation of its members, further careful studies are obligatory.

1a. Plants stout, often clambering; stems usually villosulous to hirtellous and ± densely retrorsely aculeolate; leaf blade relatively large, often oblanceolate-oblong, ± hairy and marginally retrorsely aculeolate; inflorescence large, many flowered; corolla lobes aristate.

2a. Ovary and fruit glabrous, smooth, granular-tuberculate, or with uncinate trichomes.

2b. Ovary and fruit hirtellous.

3a. G asperifolium var. asperifolium

3b. G asperifolium var. tokyoense

3c. G asperifolium var. sikkimense

3d. G asperifolium var. verrucifructum


Herbs, perennial, weak to clambering or trailing. Stems 20–60 cm, usually much branched, sparingly hairy and retrorsely aculeolate to smooth. Leaves often smaller and narrower, less...

Mountain slopes, river beaches, ditch sides, open fields, grasslands, meadows, thickets, forests; 400–3200 m. Guangxi, Guizhou, Hunan, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal].


滇小叶律 段小耀 said the variety is similar to


Mountain slopes, grasslands, thickets; 2300–3500 m. Sichuan, Xizang, NW Yunnan.

The type material of this variety from Yunnan (particularly Han-del-Mazzetti 9697, WU) consists of transitional forms toward Galium acutum.


车辆律 薛永修 said the variety is similar to

Herbs, perennial, emerging from filiform reddish rhizomes. Stems weak but generally erect, 10–45 cm tall, 4-angled, glabrous and smooth, except hispidulous at nodes. Middle stem leaves and leaflike stipules in whorls of (6 or)7 or 8, sub- sessile to very shortly petiolate; blade drying papery or membranous, remaining green, elliptic to narrowly oblong-oblancoeeolate or lanceolate, (10–)20–50(–60) × 3–13 mm, length/breadth index mostly 3.5–4.5, glabrescent, base acute or cuneate, midrib smooth or rarely retrorsely aculeolate, margins and upper leaf side with antrorse microhairs, apex obtuse or rounded and abruptly apiculate; vein 1. Inflorescences terminal and sometimes in axils of upper leaves with few- to several-flowered cymes; axes glabrous, smooth; bracts none or few, 1–2 mm; pedicels 0.5–5 mm. Ovary ovoid, 0.5–0.8 mm, with unicnate trichomes. Corolla white or light greenish, rotate, 2.5–3.8 mm in diam., lobed for 3/4 or more; lobes 4, ovate, acute. Mericarps ellipsoid, 1.8–2.5 mm, with dense unicnate trichomes 0.6–0.8 mm, on fruiting pedicels elongating to 10 mm. Fl. Apr–Aug, fr. May–Sep.

Forests on mountain slopes, thickets, ditch sides, along rivers, meadows; 1500–2800 m. Expected in Xizang [Afghanistan, India, Kashmir, Pakistan].

Galium asperuloides was previously circumscribed more broadly to include as subspecies plants treated here as G. hoffmeisteri. The specific status of the latter is well justified (Ehrendorfer et al., Fl. Iranica 176: 193–194, 2005; see comments and differential characters under that species). When the two taxa are classified as one species, the “typical” plants have to be called G. asperuloides subsp. asperuloides. Vegetative plants are very similar to G. odoratum. Together with G. echinocarpum from Taiwan and others they constitute G. sect. Hylaea.


玉龙拉拉藤 余龙提出了

Herbs, perennial, tender, caespitose. Stems ascending, 3–12(–25) cm tall, 4-angled, glabrous and smooth or rarely slightly retrorsely aculeate. Leaves in whorls of up to 5 or 6, sessile; blade drying papery and blackish, oblancoeeolate to narrowly obovate, 2–7 × 1–3 mm, mostly glabrous and smooth, but occasionally with straight hairs abaxially or marginally slightly retrorsely aculeolate, base cuneate, margin flat, apex acute and often shortly mucronate; vein 1. Inflorescences with cymes terminal and in axils of upper leaves, 1- or usually 2- or 3-flowered; peduncles up to 18 mm and pedicels 2–5 mm, glabrous and smooth, elongating during fruit development. Ovary subglobose, ca. 0.7 mm, densely covered by undeveloped trichomes. Corolla pale green, rotate, ca. 2 mm in diam., glabrous; lobes 4, triangular, acute. Mericarps ellipsoid, ca. 2 mm, with dense brownish yellow unicnate trichomes ca. 0.7 mm. Fl. Aug, fr. Aug–Oct.

Rocky slopes, meadows, frost heave sites, river floodplains in mountains; 2800–4300 m. Qinghai, Sichuan, Xizang, Yunnan (Lijiang).

Galium baldensiforme belongs to the alpine subgroup (2) of the G. asperifolium complex within G. sect. Trachygaliu s.l. (see under G. acutum and G. asperifolium). It has been widely misidentified with related taxa, e.g., with Galium rubricaulum from which it differs in its more obovate, thinner leaves, blackening when dried, and a slight tendency toward more indumentum.

Two collections from Xizang (H. Li 1978-07-22 and Y. T. Chang & Lang, Nie-La-Mu, 1966-06-25, both from PE) differ from typical Galium baldensiforme by purple flowers (reminiscent of G. rebae), ± straight whitish hairs on its (still young) ovaries, and scattered straight hairs on the upper and lower leaf sides (mainly midvein, but glabrous along leaf margins). After closer inspection and field studies, these populations may very well deserve species rank.

A specimen from Sichuan (Dege Co., anonymous collector 7029, PE) with stronger indumentum, subleathery, broadly lanceolate leaves with retrorsely aculeolate margins, and aristate corolla lobes apparently links Galium baldensiforme with G. asperifolium var. sikkimense.


五叶拉拉藤 余龙提出了


Herbs, perennial, weak to climbing, trailing, or matted. Stems usually much branched, 20–70 cm, 4-angled, retrorsely aculeolate to glabrescent. Middle stem leaves in whorls of 6–8, sub-sessile; blade drying papery or leathery, often blackening, linear-oblong to broadly (ob)lancoeeolate, (5–)10–22(–30) × (1–)2–4.5(–5.5) mm, adaxially and particularly abaxially ± rough, base acute to cuneate, margin flat to thinly revolute, densely retrorsely aculeolate, ± gradually narrowed into acute apex; vein 1. Inflorescences with terminal and axillary, several-flowered cymes 2–5 cm; axes ± glabrous, often slightly di-varicating, with small bracts on lower branches only; pedicels (0.2–)1–3(–5) mm. Ovary ovoid, 0.2–0.3 mm, glabrous or with undeveloped trichomes. Corolla red to purple or violet (only very rarely white), rotate, 1.5–2.5(–3) mm in diam., glabrous; lobes 4, triangular-ovate, acute. Mericarps ovoid, 1–2 mm, glabrous, smooth to verrucose, or sometimes with pressed or spreading unicnate trichomes. Fl. Jun–Sep, fr. Jul–Oct.
mountain slopes, river beaches, ditch sides, open fields, grasslands, meadows, thickets, forests; 800–3000 m. Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

*Galium blinii* is a critical taxon that belongs to the lower elevation subgroup (1) of the *G. asperifolium* group (see there). It was considered a synonym of *G. asperifolium* var. *sikkimense* by Cufodontis (Oesterr. Bot. Z. 89: 241. 1940), Lauener and Ferguson (Notes Roy. Bot. Gard. Edinburgh 32: 106. 1973), and W. C. Chen (in FRPS 71(2): 273. 1999). Only Mill (Edinburgh J. Bot. 53: 204. 1996) commented on its reddish purple flowers and other differential characters, regarded it as a distinct species, and proposed to use its old but so far neglected name. Up to now, specimens of this rather widespread taxon were named as *G. asperifolium* var. *sikkimense*, *G. pseudoasprellum* var. *densiflorum*, etc. Analyses of a considerable number of relevant specimens from PE, KUN, and WU support Mill’s interpretation and led to the above, more elaborate description. It shows that *G. blinii* is quite variable with respect to leaf shape and ovary/fruit indumentum but relatively well characterized not only by its reddish purple flowers but also by height, leaf size, retrorsely aculeolate stems and leaf margins, and the usually medium-sized and only small-bracteate cymes, relatively short and firm post-floral peduncles and pedicels, and larger flowers with acute (but not aristate) lobes. This allows separation from its closest relatives, *G. pratii* and *G. asperifolium* (where transitional forms occur), but also from *G. dahuricum* and *G. tokyoense*.

Further studies will have to show to what extent the following, also reddish purplish flowering taxa from SW China can be separated from *Galium blinii*.* G. craticulatum* was described as an endemic from the high mountains of Bhutan (Mill, loc. cit.: 202) and said to differ from *G. blinii* in its present circumscription by completely glabrous stems with conspicuous, vein-marked wings, less retrorsely aculeolate leaves, larger flowers, and longer filaments; *G. bodinieri*, also with red flowers, according to Mill (loc. cit.: 204–205) is reminiscent of *G. craticulatum* (particularly in its broadly winged stems) and may represent a link between *G. blinii* and the alpine, more condensed and shorter leaved *G. rehue*; the purple-flowered *G. quinatum* (not mentioned by Mill) was very poorly described and is listed above as a possible synonym of *G. blinii*, but types have neither been seen by Lauener and Ferguson (loc. cit.: 107) nor by us.


北方拉拉藤 bei fang la la teng

Herbs, perennial, erect, 20–65 cm tall. Stems 4-angled, usually glabrous, rarely shortly hairy, hispidulous at nodes, angles thickened. Leaves in whorls of 4, sessile or subsessile; blade drying papery or thinly leathery, linear-lanceolate or lanceolate to ovate, (10–)15–40–(80) × (1–)3–15 mm, glabrous or sparsely puberulent to hispidulous and/or pilose, abaxially never with striate to punctate glandular idioblasts, base cuneate to sub-rounded, margins usually revolute and antrorsely scaberulous to hispidulous, apex acute or usually narrowly tapered then obtuse to rounded at very tip; principal veins palmate, 3. Inflorescences terminal, elongate or broadly paniculate, 2–15 cm, with several- to many-flowered cymes in axis of uppermost leaves and terminal; peduncles glabrous or puberulent at nodes, smooth or scaberulous; bracts ligulate, lanceolate, or elliptic, 1–4 mm; pedicels 0.5–2 mm elongating in fruit to 3.5 mm. Ovary subglobose, 0.8–1 mm, glabrous or sparsely to densely striiglose to pilosulous. Corolla white or pale yellow, rotate, 3–4 mm in diam., glabrescent, lobed for 3/4 or more; lobes 4, ovate-lanceolate, acute. Mericarps subglobose, 1–2 mm, pericarp firmly attached but sometimes ± inflated, glabrous or ± densely hairy with ± appressed, ascending, or spreading, straight or curved, but hardly truly uncinate trichomes 0.3–0.5 mm. Fl. May–Aug.–(Sep.), fr. (May–)Jun.–Oct.

Open forests and thickets, mountain slopes, grasslands, meadows, open fields, ditch sides, river valleys and beaches, swamps, farmland sides, wastelands; 200–4600 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, India, Japan, Kashmir, Korea, Mongolia, Pakistan, Russia; SW Asia (Armenia, Iran), Europe, North America].

The name *Galium boreale*, as used here in a wide sense, corresponds to a widespread and polymorphic, still insufficiently studied N Hemisphere polyploid complex (Ehrendorfer et al., Fl. Iranica 176: 179–181. 2005) within *G. sect. Platygalium* s.l. In China, another species of this section with much smaller flowers, *G. kinuta*, can be separated from this *G. boreale* aggregate only with difficulties, because the two are linked by intermediate (and possibly hybrid) populations (see under *G. kinuta*).

Within the *Galium boreale* aggregate and the flora of China, W. C. Chen (in FRPS 71(2): 260–263, 285. 1999) recognized only *G. boreale* Linnaeae s.l. with numerous infraspecific taxa and *G. turkestanicum*, whereas 11 species in three series were listed for the flora of the former Soviet Union by Pobedimova et al. (Fl. URSS 23: 345–354. 1958). From these only *G. turkestanicum* is fully accepted here (*G. ussurense* and *G. rubioides* are cited as synonyms under *G. boreale* var. *lanceolatum* and *G. boreale* var. *rubioides*). Furthermore, and according to Pobedimova et al. (loc. cit.), *G. amblyophyllum* Schrenk, *G. amurensce* Pobedimova, and *G. septentrionale* Roemer & Schultes can be expected to occur in China. With the exception of the briefly mentioned *G. septentrionale*, they were not considered by W. C. Chen in FRPS and are only mentioned here. As a competent treatment of the *G. boreale* aggregate is not yet possible, we follow the schematic taxonomic differentiation proposed by Cufodontis (Oesterr. Bot. Z. 89: 225–228. 1940) and accepted by W. C. Chen (loc. cit.). This scheme defines numerous varieties according to leaf shape and the density, type, and distribution of indumentum on leaves, ovaries, and fruit. These varieties form a morphologically ± continuous series, linking the extremes: *G. boreale* var. *ruboides* with large ovate leaves and a broadly paniculate inflorescence and *G. boreale* var. *intermedium* with much smaller lanceolate leaves and an elongated narrow inflorescence. The following key and short descriptions are presented here for reference, to facilitate comparison, and to stimulate future studies.

1a. Ovary and fruit glabrous.
2a. Leaf blade pilose or scabrous abaxially at least along veins.
3a. Leaf blade linear-lanceolate or narrowly lanceolate ...... 7h. var. *lancilimbus*
3b. Leaf blade ovate-lanceolate or ovate.......................... 7k. var. *ruboides*
2b. Leaf blade glabrous abaxially.
4a. Leaf blade linear-lanceolate or narrowly lanceolate .... 7d. var. *hyssopifolium*
4b. Leaf blade broadly lanceolate or ovate-lanceolate ............... 7g. var. *lanceolatum
1b. Ovary and fruit ± hairy.
5a. Ovary and fruit sparsely hirtellous or scabrous.
6a. Leaf blade linear-lanceolate or narrowly lanceolate ...... 7e. var. *intermedium*
6b. Leaf blade broadly lanceolate or ovate-lanceolate ...... 7j. var. *pseudorubioides*
5b. Ovary and fruit densely hirsute or tomentose.

7a. Leaf blade sparsely pubescent or scabrous at least along veins abaxially.

8a. Leaf blade linear-lanceolate or narrowly lanceolate. ... 7c. var. ciliatum

8b. Leaf blade broadly lanceolate or ovate-lanceolate. ... 7f. var. kantschaticum

7b. Leaf blade glabrous abaxially.

9a. Leaf blade less than 4 mm wide. ... 7b. var. boreale

9b. Leaf blade 4–15 mm wide.

10a. Leaf blade 4–6 mm wide. ... 7a. var. angustifolium

10b. Leaf blade wider than 6 mm. ... 7i. var. latifolium


7b. Galium boreale var. boreale

7c. Galium boreale var. ciliatum

7d. Galium boreale var. hyssopifolium (Hoffmann) Candolle, Prodr. 4: 600. 1830.


7f. Galium boreale var. leioecarpum Nakai; G ussurriense Pobedimova.


5b. Ovary and fruit densely hirsute or tomentose.

7a. Leaf blade sparsely pubescent or scabrous at least along veins abaxially.

8a. Leaf blade linear-lanceolate or narrowly lanceolate. ... 7c. var. ciliatum

8b. Leaf blade broadly lanceolate or ovate-lanceolate. ... 7f. var. kantschaticum

7b. Leaf blade glabrous abaxially.

9a. Leaf blade less than 4 mm wide. ... 7b. var. boreale

9b. Leaf blade 4–15 mm wide.

10a. Leaf blade 4–6 mm wide. ... 7a. var. angustifolium

10b. Leaf blade wider than 6 mm. ... 7i. var. latifolium


7b. Galium boreale var. boreale

7c. Galium boreale var. ciliatum

7d. Galium boreale var. hyssopifolium (Hoffmann) Candolle, Prodr. 4: 600. 1830.


7f. Galium boreale var. leioecarpum Nakai; G ussurriense Pobedimova.


5b. Ovary and fruit densely hirsute or tomentose.

7a. Leaf blade sparsely pubescent or scabrous at least along veins abaxially.

8a. Leaf blade linear-lanceolate or narrowly lanceolate. ... 7c. var. ciliatum

8b. Leaf blade broadly lanceolate or ovate-lanceolate. ... 7f. var. kantschaticum

7b. Leaf blade glabrous abaxially.

9a. Leaf blade less than 4 mm wide. ... 7b. var. boreale

9b. Leaf blade 4–15 mm wide.

10a. Leaf blade 4–6 mm wide. ... 7a. var. angustifolium

10b. Leaf blade wider than 6 mm. ... 7i. var. latifolium


7b. Galium boreale var. boreale

7c. Galium boreale var. ciliatum

7d. Galium boreale var. hyssopifolium (Hoffmann) Candolle, Prodr. 4: 600. 1830.


7f. Galium boreale var. leioecarpum Nakai; G ussurriense Pobedimova.

Mountain slopes, open fields, grasslands; 900–1900 m. Heilongjiang, Jilin, Xinjiang [Korea, Russia; C Asia (“Turkestan”)].

Nakai’s two varieties were published simultaneously; the choice of epithet was apparently made by Cufodontis (Oesterr. Bot. Z. 89: 227. 1940).


Leaf blade linear-lanceolate or narrowly lanceolate, 1–6 mm wide, abaxially pilosulous or scabrous at least along veins. Ovary and mericarps glabrous. Fl. and fr. Jun–Sep.

Mountain slopes, grasslands, meadows, ditch sides, wastelands; 1800–3000 m. Gansu, Heilongjiang, Sichuan, Xinjiang.

7i. Galium boreale var. pseudorubioides Schur, Enum. Pl. Transsilv. 280. 1866.


Mountain slopes, grasslands, meadows, farmland sides, river beaches; 700–2700 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shanxi, Xinjiang [Kashmir, Korea, Russia; C Asia (“Turkestan”)].


Mountain slopes, meadows; ca. 1400 m. Heilongjiang, Jilin, Xinjiang [Russia; C Asia (“Turkestan”), Europe].

7k. Galium boreale var. rubioides subsp. pseudorubioides (Schur) Soó.

Leaf blade ovate-lanceolate or ovate, 4–6 mm wide, abaxially pilosulous or scabrous at least along veins. Ovary and mericarps glabrous. Fl. and fr. Jun–Sep.

Mountain slopes, grasslands; 1100–1400 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Xinjiang [Russia; Europe].

This broad- and large-leaved taxon is quite distinct from Galium boreale s.s. in Europe and is usually treated there as a separate species. Contrary to the above distribution data given by W. C. Chen (loc. cit.: 261) and according to Pobedimova et al. (loc. cit.: 420) it does not extend into Asia.


泡果拉拉藤 pao guo la teng

Subshrubs, perennial, erect or ascending, sometimes caespitose, 5–40 cm tall. Rootstock stout, woody. Stems 4-angled, very shortly pilose at base, glabrous and smooth above. Leaves in whorls of 5–8, drying blackish, linear to linear-oblancoateleolate, 12–27 × 1–2 mm, glabrous or sparsely ciliolate toward acute apex; vein 1. Inflorescences terminal on main and short lateral branches, cymose to corymbose to ± fleshy. Fl. Oct–Nov, fr. Nov–Jan.

Grasslands, meadows; ca. 500 m. Xinjiang [SW Asia (Armenia, Iran, Nakhichevan)].

Galium bullatum is a member of G. sect. Orientigalium centered in SW Asia and characterized by slightly cup-shaped corollas, never retrorsely aculeolate stems, etc. The above diagnosis is taken from the original description and a collection by Szovits in W (“in Persia borealis”). We have not seen a specimen from China. The description by W. C. Chen (in FRPS 71(2): 274. 1999), evidently based on plants from Xinjiang, deviates from the authentic material in W by describing the stems as retrorsely hispidulous along angles and the corolla as rotate. Species of G. sect. Orientigalium usually are rather locally distributed (Ehrendorfer et al., Fl. Iranica 176: 205–231. 2005), and the distance between Nakhichevan and Xinjiang is enormous. All this makes it quite unlikely that G. bullatum (or even other related members of G. sect. Orientigalium) really occurs in China. A definite decision has to wait until voucher specimens become available for comparison.


四叶律 si ye lü

Herbs, perennial, 5–50 cm tall, erect from tender reddish rootstock or filiform rhizome. Stems often caespitose, 4-angled, unbranched or little branched, smooth, glabrous and smooth or pilosulous to pilose, rarely retrorsely aculeolate, at nodes ± hispidulous. Leaves in whorls of 4, subsessile; blade drying papery, ovate-oblong, ovate-lanceolate, lanceolate-oblong, elliptic-oblong, or narrowly ovoblate, (6–)8–20(–34) × (2–)3–7(–10) mm, length/breadth index usually 3–5, glabrous and sometimes antrorsely aculeolate on midrib and near margins, to pilosulous or pilose throughout, lower side sometimes glandular-punctate or striate, base cuneate, apex acute or slightly obtuse; 1 principal vein, 2 lateral veins usually inconspicuous. Inflorescences terminal and/or axillary, cymose to paniculate, congested to lax, cymes few to several flowered, 1–5 cm; pedicels (1–)2–4(–7) mm. Ovary subglobose to ellipsoid, laterally somewhat flattened, 0.4–0.8 mm in diam., glabrous to strigillose, smooth to tuberculate. Corolla yellowish green or white, rotate, 1.5–2.5 mm in diam., glabrous, smooth; lobes 4, ovate or oblong, acute to acuminate. Mericarps ellipsoid, 1–2 mm in diam., tuberculate, aculeolate or with appressed and curved to spreading and uncinate trichomes ca. 0.3 mm, rarely glabrous and smooth. Fl. Apr–Sep, fr. May–Jan.
Forests, thickets, or meadows on mountains, hills, open fields, farmlands, ditch sides, riversides and beaches, streambeds; near sea level to 3600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

*Galium bungei* designates a group of tender perennial herbs from *G* sect. *Platygalium*, widespread and common at low to middle elevations throughout China. *Galium bungei* is also used medicinally there. The group is very variable with respect to habit and inflorescence, as well as stem, leaf, and fruit indumentum (the latter from tuberculate to spreading hooked trichomes). The small and inconspicuous flowers suggest autogamous reproduction. All this has caused the recognition of several “species.” In view of the gradual nature of this variation and the partly simple genetic basis of the underlying differences, we give them less taxonomic weight, follow Cufodontis (Oesterr. Bot. Z. 89: 219–223, 1940) and the Kew Rubiaceae checklist (Govaerts et al., World Checklist. Rubiaceae; http://www.kew.org/wcsp/rubiaceae/; accessed on 15 Sep 2010), and include them all as synonyms under *G. bungei* s.l.

Only the closely related *G. salwinense*, endemic in Sichuan and Yunnan, is maintained on the basis of its elongated and slender pedicels and the constant hooked fruit trichomes.

Forms of *G. bungei* with broader leaves in Sichuan (e.g., var. *punduanoides*) develop, in addition to the principal vein, stronger side veins somewhat approaching the larger *G. yunnanense*, typically with 3-veined leaves, which occurs in the same area.

To bring some schematic order into the extreme variation of a broadly circumscribed *G. bungei* s.l., Cufodontis (loc. cit.: 221–222) created six varieties, without giving much weight to differences in fruit surface. These varieties were taken up by W. C. Chen in FRPS (71(2): 247–250. 1999) and are also presented here. In contrast to this approach, Yamazaki (J. Jap. Bot. 61: 51. 1991; Fl. Japan 3a: 236–237. 1993) recognized several of these species as varieties for the *Flora of Japan*: *G. pogonanthum* (corresponding to *G. bungei* var. *setuliflorum*), separated by having appressed upcurved short hairs on its fruit rather than spreading hooked trichomes as *G. bungei* s.s.; *G. gracilens* (corresponding to *G. bungei* var. *bungei*), characterized by short appressed punctate fruit hairs and slender inflorescences; and *G. trachyspermum* (corresponding to *G. bungei* var. *trachyspermum*), with short appressed fruit hairs and more condensed inflorescences. For each of these separate species Yamazaki (loc. cit. 1991; loc. cit. 1993) also created several new additional varieties not considered here. For their treatment of Taiwanese members of *G. bungei* s.l. Yang and Li (Bull. Natl. Mus. Nat. Sci., Taichung 11: 105–106. 1998; Fl. Taiwan, ed. 2, 4: 255–256. 1998) accepted two species: *G. gracilens* with tuberculate fruit and *G. fukuyamae* with appressed uncinate fruit hairs. Below, we present the schematic infraspecific classification of W. C. Chen in FRPS. Descriptions are sketchy due to the limited material available. Nevertheless, this may help as a reference and basis for urgently needed future studies on this polymorphic and phylogenetically important group.

1a. Stems pubescent.

2a. Pubescence with trichomes shorter than diam. of stems ............................ 9c. *var. hispidum*

2b. Pubescence with trichomes longer than diam. of stems ............................ 9d. *var. punduanoides*

1b. Stems glabrous, hairy only at nodes.

3a. Corolla lobes sparsely pubescent at least in bud ................................. 9e. *var. setuliflorum*

3b. Corolla lobes glabrous.

4a. Leaf blade broadly elliptic, obovate, or broadly lanceolate; inflorescences crowded, congested to subcapitate

4b. Leaf blade narrowly lanceolate, linear-lanceolate, or ovate-lanceolate; inflorescences lax.

5a. All leaves narrowly lanceolate or linear-lanceolate, to 3 cm ..................... 9a. *var. angustifolium*

5b. Lower stem leaves ovate-lanceolate, upper stem leaves narrower, often less than 2 cm .................................. 9b. *var. bungei*


狭叶四叶律 xia ye si ye lu


- Anhui, Fujian, Gansu, Hebei, Henan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Zhejiang.

9b. *Galium bungei* var. *bungei*

四叶律(原变种) si ye lu (yuan bian zhong)

*Galium fukuyamae* Masamune; *G. gracile* Bunge (1833), not Wallroth (1822); *G. gracile* var. *miltorrhizum* (Hance) Loesener; *G. gracilens* (A. Gray) Makino; *G. lutchuense* Nakai; *G. miltorrhizum* Hance; *G. remotiflorum* H. Léveillé & Vaniot; *G. trachyspermum* A. Gray var. * gracilens* A. Gray.


Forests or meadows on hills or mountains, open fields, farmlands, ditch sides; below 100–2600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].


硬毛四叶律 ying mao si ye lu


- Forests or meadows on mountain slopes, river beaches, open fields; 100–3400 m. Anhui, Fujian, Gansu, Henan, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang.
Galium martini was accepted as a dubious species by W. C. Chen in FRPS (loc. cit.: 282). The protologue (Bull. Soc. Bot. France 55: 58. 1908) is quite incomplete but probably refers to a strongly hairy plant of *G. bungei* s.l. from Guizhou. Therefore, the name is provisionally placed here as a possible synonym of var. *hispidum* or var. *punduanoides* until a detailed study of the type (E) will clarify the matter.

9d. **Galium bungei** var. **punduanoides** Cufodontis, Oesterr. Bot. Z. 89: 221. 1940.

毛四叶律 mao si ye lü


毛冠四叶律 mao guan si ye lü


阔叶四叶律 kuo ye si ye lü


浙江拉拉藤 zhe jiang la la teng

Herbs, perennial, with thin rhizomes. Stems 2–4 from a common base, erect, usually unbranched, 20–30(–40) cm tall, with only 4 or 5 internodes from base to first inflorescence node, with 4 prominent, rounded, and whitish angles, glabrous and smooth except for short and stiff hairs at nodes. Leaves and leaflike stipules in whorls of 4, subsessile; blade drying somewhat leathery and light brownish green, broadly elliptic to ovate, (15–)23–30(–50) × (8–)11–15(–25) mm, length/ breadth index 2.5 or less, gradually narrowed into base, broadest near middle, gradually narrowed into apex, mostly shortly apiculate but without a hyaline point, glabrous except for antrorse microhairs (0.1–0.2 mm) along 3 main veins, mostly on lower but also on upper side and along slightly revolute margins, papilllose on upper side under a strong lens (20×), lower side clearly marked by numerous darker and linear idioblasts. Inflorescences loosely thyrsoid and elongate, from uppermost 2 or 3 nodes, clearly longer than subtending leaves, cymes lateral and terminal, somewhat divaricate, 1–4 cm, with few and inconspicuous linear bracts and rather few flowers; peduncles 1–2 cm and pedicels 0.1–1 cm. Corolla greenish white, rotate, ca. 3 mm in diam., glabrous; lobes 4, acuminate. Ripe mericarps ovoid, 1.5–2(–3) mm, densely covered by stiff and appressed to slightly divergent microhairs, 0.15–0.25 mm and with an acute and ± bent apex. Fl. Jul., fr. Aug.

- Lower montane forests; ca. 1400 m. Fujian, Zhejiang.

Specimens of _Galium chekiangense_ from the province of Fujian were included and described in FRPS (71(2): 265. 1999) under the name of _G. nakaii_ Kudô ex H. Hara (J. Jap. Bot. 9: 517. 1933). These Fujian vouchers were not available, but two fruiting specimens from the adjacent province of Zhejiang (formerly Chekiang: Xi ming shan) in the herbarium PE could be studied. They were determined as "_G. kamtschaticum_" and closely correspond to the description of _G. nakaii_ in FRPS. These PE specimens deviate clearly from authentic Japanese specimens of _G. nakaii_ as well as from _G. kamtschaticum_ and _G. oreganum_ Britton. This has justified the description of _G. chekiangense_ as a new and endemic Chinese species and makes _G. nakaii_ an endemic of Japan.

_Galium chekiangense_ clearly belongs to _G. sect. Platygalium_ s.l. (Ehrendorfer et al., Fl. Iranica 176: 175. 2005) and apparently is a member of the _G. kamtschaticum_ species group, which includes the amphi-Beringian _G. kamtschaticum_ (in China limited to elevations of 1500–2300 m in the NE provinces of Heilongjiang and Jilin), the Japanese _G. nakaii_ from Hokkaido and N Honshu, and the W North American _G. oreganum_. These three latter species differ from _G. chekiangense_ by their leaf blades drying dark brownish (not light brownish green), thin, membranous and smooth, neither papillose above nor with glandular-striate idioblasts below, and by their ripe mericarps with much longer unicinate trichomes (0.8–1 mm, not 0.15–0.25 mm). In addition, _G. nakaii_ has inflorescence cymes mostly shorter (not clearly longer) than the subtending leaves.

For further and more detailed studies of the _Galium kamtschaticum_ group, one should refer to the wide circumscription of _G. kamtschaticum_ (with three varieties) and the confused, partly contradictory description of the fruit indumentum of _G. nakaii_ in Yamazaki (Fl. Japan 3a: 234–235. 1999).


卷边拉拉藤 juan bian la la teng

_Galium consanguineum_ subsp. _majmechense_ (Bordzilowski) A. D. Mikheev; _G. majmechense_ Bordzilowski; _G. verum_ Linnaeus var. _consanguineum_ (Boissier) Boissier.

Herbs, perennial, often caespitose from a stout and woody rootstock with rhizomes. Stems erect, to 1 m tall, 4-angled, glabrous to puberulent at least at nodes, smooth. Leaves in whorls of 6–12, sessile; blade drying papery, linear-oblanceolate to linear, 20–28 × 1–3 mm, glabrous, more rarely ± hairy,
base acute to straight, margin shortly to strongly revolute and usually antrorsely aculeolate, apex acute and mucronate; vein 1. Inflorescences narrowly paniculate with main stems and short lateral and terminal, few- to several- or many-flowered, rather congested cymes; peduncles glabrous, smooth; pedicels 0.5–3 mm, subtended by leaflike bracts. Ovary subglobose to obovoid, 0.5–0.8 mm, smooth, glabrous or ± hirsutulous with straight hairs. Corolla yellow, rotate, ca. 3 mm in diam., glabrous, lobed for 3/4 or more; lobes 4(or 5), lanceolate-oblong, acute to acuminate. Mericarps ellipsoid to obovoid, ca. 1.5 × 0.8 mm, glabrous or ± hirsutulous with straight trichomes. Fl. Jul–Aug, fr. Aug–Sep.

Thickets; [1300–]1700[–2800] m. Xinjiang [SW Asia (Armenia, Azerbaijan, Iran, Iraq, Lebanon, E Turkey)].

Galium consanguineum was treated as G. majamechense (a younger synonym) by W. C. Chen (FRPS 71(2): 269. 1999). It belongs to the polymorphic G. verum group or complex (see additional comments under that species) and apparently links it (as a hybrid taxon?) to more broadly leaved and glabrous members of G. sect. Orientigalium (Ehrendorfer et al., Fl. Iranica 176: 205–207. 2005). Galium consanguineum can be separated from G. verum by its broader (more than 2.5 mm) ± glabrous leaves, but intermediates occur.


Herbs, perhaps perennial, ascending, ca. 10 cm tall. Stems 4-angled, caespitose, glabrous and smooth or sparsely puberulent. Leaves in whorls of 4, sessile or subulate; blade drying leathery, elliptic or ovate, 3–8 × 2–4 mm, scabrous with microhairs, base cuneate or subobtuse, margins antrorsely ciliate, apex obtuse and mucronate; vein 1. Inflorescences terminal and/or axillary, cymose, few flowered, up to 1 cm; axes glabrous and smooth, somewhat bracteate; pedicels ca. 1 mm. Flowers unknown. Mericarps ovoid, 0.5–1 mm, with appressed, slightly curved microhairs, ca. 0.3 mm. Fl. Aug–Sep, fr. Oct.

- Valleys, open habitat; ca. 800 m. Shanxi (Zhenba).

We have seen no authentic material of Galium crassifolium, but the original description is accompanied by a good drawing. In the protologue similarities with the Taiwanese G. tarokoense are suggested. Both species are distantly related, but apparently G. crassifolium falls within the morphological amplitude of the polymorphic G. bungei. Its distinctness with respect to reduced plants from dry habitats should be checked in the future.


大叶猪殃殃 da ye zhu yang yang

Herbs, perennial, from a slender reddish rootstock. Stems erect to ascending, weak to procumbent and often climbing, sometimes up to 2.5 m, 4-angled, sparsely to densely retrorsely aculeolate along angles and at nodes, rarely ± glabrescent. Leaves on main stems in whors of 5 or 6, subsessile; blade drying papery, of quite different sizes, (1–)1.5–3(–4) mm in diam., glabrous; lobes 4, triangular, obtuse to acute or minutely apiculate. Mericarps ellipsoid, ca. 2 mm, with appressed or spreading and uncinate trichomes (0.3–0.5 mm), tuberculate to completely glabrous and smooth, on pedicels elongating to 10 mm or more. Fl. Jun–Sep, fr. Jul–Nov.

Humid forests, thickets, ditch sides, grasslands, meadows; 200–3400 m. Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Korea, Russia].

Within Galium sect. Trachygalium and the extremely polymorphic species group of G. asperifolium (see there) Cufodontis (Oesterr. Bot. Z. 89: 239–243. 1940), Yamazaki (Fl. Japan 3a: 206–240. 1993), and W. C. Chen (in FRPS 71(2): 255–258. 1999) differentiated the closely related taxa G. dahuricum (in FRPS as “G. davuricum,” “the spelling used in the protologue by Ledebour), G. tokyoense, G. pseudoasprellum, and G. manshuricum mainly according to the lack (in the two former) and the presence (in the two latter) of appressed or spreading uncinate trichomes on the mericarps. As this character apparently often varies within populations of these taxa, the present treatment relies on the limits of this species group. So far, G. dahuricum, the former under var. dahuricum, the latter under var. pseudoasprellum, is the only distribution center in E Asia but extends with G. asperifolium Michaux s.s. into E North America.

Galium pseudoasprellum was accepted as a species by Cufodontis (loc. cit.: 237–238), W. C. Chen (loc. cit.: 254–255), and Yamazaki (loc. cit.: 238), and the latter two also maintained G. niewerthii. In our opinion and because of their similar inflorescences, both taxa should be regarded as synonyms of G. dahuricum, the former under var. lasiocarpum, the latter under var. dahuricum. Even if we have not seen authentic specimens of G. niewerthii, all of its characters listed fall within the limits of G. dahuricum; thus, we regard it as a glabrous-fruited form of that variable species. So far, G. comarri has been a badly understood taxon (see Cufodontis, loc. cit.: 241; Lauener, Notes Roy. Bot. Gard. Edinburgh 32: 107. 1972; Mill, Edinburgh J. Bot. 53: 193–213. 1996). Because of its slender inflorescence, extremely long pedicels, and rugose fruit mentioned in the protologue, it can now be safely assigned as another synonym of G. dahuricum var. dahuricum.

The following infraspecific taxa of G. dahuricum (and G. pseudoasprellum), accepted by Cufodontis (loc. cit.: 237–238, 243–244) and W. C. Chen (loc. cit.), are keyed and listed here for comparison.

1a. Ovary and mericarps glabrous or tuberculate .............................................. 13a. var. dahuricum

1b. Ovary and mericarps with spreading or appressed uncinate trichomes.

2a. Inflorescences with loosely branched cymes, with filiform and ± flexuose pedicels of up to 5 mm, in fruit up to 10 mm .......................................... 13b. var. lasiocarpum
2b. Inflorescences more congested, pedicels shorter than 5 mm ···· 13c. var. densiflorum

13a. Galium dahuricum var. dahuricum

大叶猪殃殃 (原变种) da ye zhu yang yang (yuan bian zhong)

Galium asprellum Michaux var. dahuricum (Turczaninow ex Ledebour) Maximowicz; G comari H. Léveillé & Variot; G dahuricum var. leiocarpum Nakai; G niewerthii Franchet & Savatier.


Forests, grasslands; 700–1000 m. Fujian, Guizhou, Hebei, Heilongjiang, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Sichuan, Xinjiang, Yunnan [Korea, Russia].

This variety was listed as Galium niewerthii for the Flora of Japan (Yamazaki, loc. cit.: 238). Forms with many-flowered inflorescences, somewhat shorter pedicels, and glabrous ovaries and fruit have been seen from Yunnan; they apparently tend toward G. asperifolium and/or G. pratii. Galium taiwanense (see there) is very close to G. dahuricum var. dahuricum and evidently replaces it on Taiwan.


东北猪殃殃 dong bei zhu yang yang

Galium asprellum var. lasiocarpum Makino, Bot. Mag. (Tokyo) 17: 76. 1903; G. dahuricum var. mandschuricum (Kitagawa) H. Hara; G mandschuricum Kitagawa; G pseudoasprellum Makino.


Forests, meadows, ditch sides; 300–1100 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan [Japan, Korea].


密花拉拉藤 mi hua la la teng


Stems often lower and leaf blade smaller. Inflorescences shorter and more congested; pedicels rarely longer than 5 mm; bracts larger, similar to leaves. Ovary and mericarps with dense spreading uncinate trichomes. Fl. Jul–Aug, fr. Aug–Nov.

● Forests, thickets, meadows on mountains; 700–3400 m. Gansu, Guizhou, Hebei, Henan, Jiangxi, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan.

The above geographic indications for this variety are uncertain because of confusion with Galium tokyoense, etc. At least in part, G dahuricum var. densiflorum may refer to transitional (?) hybrid forms of G dahuricum var. lasiocarpum with G asperifolium, G blinii, G pratii, and/or G pseudoasprellum.


刺果猪殃殃 ci guo zhu yang yang

Herbs, perennial, emerging from reddish, filiform rhizomes. Stems ascending to erect, 10–40 cm tall, 4-angled, glabrous and smooth. Leaves in whorls of (4 or)5 or 6, subsessile; blade drying papery, glabrous, obovate, narrowly elliptic, or narrowly oblongate, 6–25 × 2–7 mm, glabrous or sometimes sparsely hispid to strigillose, base acute, margins flat, smooth or antrorsely aculeolate, apex acute to obtuse or rounded and abruptly mucronate; vein 1. Inflorescences terminal and in axils of upper leaves, with lax, few- to several-flowered cymes; axes glabrous, smooth; bracts none or leaflike, 2–6 mm; pedicels 0.5–2 mm. Ovary subglobose, 0.5–0.7 mm, densely strigillose with undeveloped trichomes. Corolla white, rotate, ca. 2 mm in diam., glabrous, lobed for 3/4 or more; lobes 4, triangular, apex obtuse. Mericarps subglobose to ellipsoid, ca. 2 mm, with dense uncinate trichomes ca. 1 mm, on pedicels elongating to 10 mm. Fl. May, fr. May–Dec.

● Montane forest regions, grassy fields, along drainage ditches; 900–3500 m. Taiwan.

Galium echinocarpum is very similar to G hoffmeisteri and replaces it on Taiwan. Galium takasagomontanum may belong here as a synonym (see there).


小红参 xiao hong shen

Herbs, perennial, climbing or procumbent to usually erect, 0.1–1 m tall, from a slender rootstock with purplish rhizomes. Stems somewhat stout, 4-angled, smooth, sparsely to densely hirsute, villous, or villosulous and often densely puberulent at nodes, angles thickened. Leaves in whorls of 4, subsessile or petiole to 1.5 mm; blade drying papery to leathery, green to gray, or dark brown, ovate to broadly elliptic, 6–30 × 3–20 mm, length/breadth index mostly 2 or less, sparsely to densely hirtellous, villosulous, or hispidulous to scaberulous at least on principal veins, abaxially often glandular-punctate and/or striate, base rounded to acute, margins antrorsely ciliate to ciliate and flat to thinly revolute, apex rounded to obtuse; principal veins palmate, 3(or 5). Inflorescences thyrsoid to panicle-like, with several- to many-flowered, 2–10 cm long cymes in uppermost leaf axils and terminal; peduncles glabrescent to sparsely scaberulous, hirtellous, puberulent, or villosulous; bracts narrowly spatulate to narrowly elliptic, 1–3 mm; pedicels 0.5–2.5 mm. Flowers dioecious, polygamo-dioecious, or sometimes ?hermaphroditic. Ovary bovoivoid, in staminate flowers ca. 0.5 mm and glabrous to scaberulous or sparsely strigillose, in pistillate and bisexual flowers 0.8–1 mm and usually moderately to densely strigillose, particularly on their lateral side. Corolla white or pale yellow, rotate, 2–2.5 mm in diam., glabrous; lobes 4, ovate-triangular, acute to rounded. Mericarps ellipsoid, 1–1.5 mm, with sparse to dense and spreading uncinate trichomes 0.5–0.8 mm, rarely scaberulous or glabrous. Fl. Apr–Aug–Oct, fr. May–Dec.

Forests, thickets, meadows on mountain slopes, stream sides, open fields, on rocks; 200–3500 m. Anhui, Fujian, Gansu, Guangxi, Guizhou,

Hunan, Qinghai, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, Thailand].

*Galium elegans* is a widely ranging, polymorphic species that may not be completely distinct from several other related taxa. It is here circumscribed more narrowly than by Cufodontis (Oesterr. Bot. Z. 89: 228–232. 1940) and W. C. Chen (in FRPS 71(2): 242–245. 1999), which reduces its variation a bit. These aspects are discussed below.

Plants with narrower leaves are separated here as *Galium yunnanense*. This species comprises two of the varieties included by Cufodontis in *G. elegans*, i.e., *G. elegans* var. *anguistifolium* and *G. elegans* var. *memorosum*. Separation of the two taxa is not always easy, as transitional specimens occasionally occur.

Plants of *Galium elegans* with shortened pedicels and more congested cymes (e.g., from Sichuan, Shimian Xian) may approach the Himalayan *G. confertum* Royle ex J. D. Hooker.

*Galium nephrostigmaticum* was described as a species by Diels, an opinion still maintained by some authors. Here, it is treated as a variety of *G. elegans*, following W. C. Chen (Acta Phytotax. Sin. 28: 301. 1990) who referred to its glabrous to scaberulous ovaries and fruit, as noted in Diels’s protologue. In contrast to this, Cufodontis (loc. cit.) synonymized *G. nephrostigmaticum* with *G. elegans* var. *elegans*. In an extensive discussion he demonstrated that *G. elegans* is dioecious and that *G. nephrostigmaticum* was based on a male plant with staminate flowers and reduced glabrous to smooth ovaries and sessile stigmas. In contrast, pistillate flowers of *G. elegans* have hairy ovaries and fruit, well-developed styles, and reduced stamens. Thus, according to Cufodontis, *G. nephrostigmaticum* does not merit taxonomic recognition. Ehrendorfer et al. (Fl. Iranica 176: 177. 2005) did not contradict the conclusions of Cufodontis but noted that some plants of *G. elegans* are monoecious or have bisexual flowers. This shows that the reproductive biology of this species apparently is more complex than thought before. Provisionally, *G. nephrostigmaticum* is treated here as a variety, pending more detailed studies of this critical group.

The still uncertain relationships between *Galium elegans* on the Chinese mainland and *G. formosense* on Taiwan are discussed under the latter taxon. In the present treatment their separation is maintained provisionally.

The traditional varieties of *Galium elegans* are separated schematically by the density, type, and distribution of the indumentum on the vegetative organs and have doubtful taxonomic value. W. C. Chen in FRPS (loc. cit.) also used leaf size and apex shape as characters to differentiate these varieties. For reference and to facilitate comparison with other works, we present a key to these infraspecific taxa below.

1a. Ovary (and fruit?) glabrous to scaberulous .................. 15c. var. nephrostigmaticum

1b. Ovary and fruit with ± uncinate trichomes.

2a. Leaf blades in middle stem region ovate-lanceolate, length/breadth index 2–2.5, apex acute or obtuse and shortly acuminated, with a dense and fine indumentum .................. 15d. var. velutinum

2b. Leaf blade ovate to ovate-lanceolate or broadly elliptic, length/breadth index usually less than 2, apex usually obtuse or slightly acuminated.

3a. Stems sparsely or densely hirsute; leaf blade small and thickly textured, not black when dry .................................. 15a. var. elegans

3b. Stems pilose or glabrescent at least on upper parts; leaf blade often large and thinly textured, blackish brown when dry .................................. 15b. var. glabriusculum

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**15a. Galium elegans** var. **elegans**

小红参 (原变种) xiao hong shen (yuan bian zhong)

*Galium petiolatum* Geddes.

Stems sparingly or densely hirsute. Leaf blade drying thickly textured, not black, ovate to ovate-lanceolate or broadly elliptic, length/breadth index usually less than 2, apex obtuse or slightly acuminated. Mericarps with spreading uncinate trichomes. Fl. Apr–Aug, fr. May–Dec.

Forests, thickets, meadows on mountain slopes, streambeds, open fields, on rocks; 600–3500 m. Anhui, Gansu, Guizhou, Hunan, Qinghai, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, Thailand].

**15b. Galium elegans** var. **glabriusculum** Requien ex Candolle, Prod. 4: 600. 1830.

广西拉拉藤 guang xi la la teng

*Galium elegans* f. *glabriusculum* (Requien ex Candolle) H. Hara ex H. Ohba.

Stems pilose or glabrescent at least on upper parts. Leaf blade drying ± blackish brown, often thinly textured, ovate, ovate-lanceolate, or elliptic, 10–33 × 5–18 mm, length/breadth index usually 2 or less, apex mostly obtuse. Mericarps with spreading uncinate trichomes. Fl. Jul–Aug, fr. Jul–Oct.

Forests or meadows on mountains and at streamsides; 1100–2900 m. Guangxi, Guizhou, Sichuan, Xizang, Yunnan [India, Nepal].

We have not seen authentic material of this taxon.


脣柱拉拉藤 shen zhu la la teng


- Forests, meadows; 200–3000 m. Gansu, Guizhou, Sichuan, Yunnan.

This taxon apparently refers to male plants only (see above).


毛拉拉藤 mao la la teng

*Galium mairi* H. Léveillé.

Plants densely and finely pubescent, trichomes slender, spreading. Leaf blade lanceolate or ovate-lanceolate, 7–15 × ca.
3 mm, length/breadth index 2–2.5, apex acute or obtuse and shortly acuminate. Mericarps with spreading uncinate trichomes. Fl. and fr. Jul.

- Meadows or on rocks on mountain slopes; 2100–2300 m. Sichuan, Yunnan.


单花拉拉藤  丹hua la la teng

_Galium handelii_ Cufodontis (1940), non Nábělek (1923).

Herbs, annual, slender, procumbent to weak, 4–20 cm tall. Roots slender, reddish when dry. Stems slender, 4-angled, somewhat branched, sparsely retorsely aculeolate to glabrous. Middle stem leaves opposite with clearly smaller, leaflike stipules in whorls of 4; blades drying papery, obovate or oblanceolate to linear-elliptic, (2–)3.5–10(–12) × 1–3.5(–5) mm, adaxially with sparse appressed hairs or glabrous, margins mostly antrorsely ciliolate, otherwise glabrous, base acute, cuneate, or shortly petiolate, apex obtuse to acute but not mucronate; principal vein 1, with inconspicuous pinnate-reticulate lateral veins. Flowers mostly solitary; pedicels 1–3 mm, glabrous. Ovary subglobose, ca. 1 mm, densely covered with undeveloped trichomes. Corolla white, rotate, 1–1.5 mm in diam.; lobes 3(4), ovate, obtuse. Mericarps ovoid to elongated, 2–2.5 mm, with dense, white to yellowish brown, uncinate trichomes 0.2–0.5 mm, on pedicels elongating to 10 mm and curved near apex. Fl. Jun–Jul, fr. Aug–Sep.

Rock crevices on mountain slopes, sand and gravel drifts on grassy plains; 1200–4800 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Nepal].

In his description of _Galium handelii_ Cufodontis (Oesterr. Bot. Z. 89: 234–235. 1940) referred to the close _G. songaricum_ Schrenk (in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 57. 1841) but overlooked the older homonym by Nábělek and the Himalayan _G. exile_. This latter annual has a much wider distribution than thought before and is quite variable in China with respect to leaf shape and hairiness, length of pedicels, shape of mericarps, etc. In view of its remarkably small flowers and high fruit set, it very likely is autogamous.

Within the morphologically and DNA-analytically very isolated _Galium sect. Depauperata_ (Ehrendorfer et al., Fl. Iranica 176: 231–232. 2005) _G. exile_ is morphologically very close to the W North American _G. bifolium_ S. Watson and particularly to _G. songaricum_, described from the C Asian mountain system of Altatau. This latter species, treated in FRPS as “_G. soongoricum,_” is assumed to differ by its 1- or 2(or 3)-flowered cymes, the 4-flowered cymes, and the strongly elongating fruiting pedicels. In FRPS (71(2): 224–227. 1999) both taxa are perennials, 15–25 cm tall. Stems 4-angled, sparsely to rather densely pilose, angles thickened. Leaves in whorls of 4, sessile; blade drying submembranaceous, blackish green, broadly elliptic to obovate, 4–20 × 3–10 mm, length/breadth index 2 or less, both surfaces sparsely to densely pilose at least along veins, base cuneate to obtuse, apex obtuse to rounded and mucronate; principal veins 3, palmate. Inflorescences with terminal and axillary, few- to many-flow ered, 1–3 cm long cymes; pedunules sparsely pilose to glabrous and smooth; bracts spatulate to ovate, 1.5–3 mm; pedicels 1–4 mm. Flowers thermaphroditic. Ovary ovoid, ca. 0.5 mm, densely pubescent with uncinate trichomes. Corolla yellowish white, rotate, 1–2 mm in diam., glabrous; lobes 4, ovate, 0.4–0.8 mm, acute. Mericarps ovoid, ca. 1 mm, with dense white to yellowish uncinate trichomes 0.4–0.5 mm. Fl. Jun–Sep, fr. Jun–Nov.

- Mountains, along trails and roads, fields, open ditches; 600–3000 m. Taiwan (Gaoxiong).

Ohwi described the relatively tall (“20–30 cm”) _Galium formosense_ from lower elevations and the condensed _G. kwanzanense_ (“5–10 cm”) from an exposed higher peak of Taiwan. The technical differences indicated mainly relate to flower diameter (1 mm in the former, 2 mm in the latter). In their study of Taiwanese _Galium_ Yang and Li (Bull. Natl. Mus. Nat. Sci., Taichung 11: 101–117. 1998; Fl. Taiwan, ed. 2, 4: 254–259. 1998) formally synonymized the taxa and demonstrate a considerable ecological amplitude of _G. formosense_ s.l. Furthermore, the specific separation of _G. formosense_ from two other Taiwan mountain endemics, with glabrous stems, _G. mori_ and _G. tarokoense_, needs better documentation.

In FRPS (71(2): 243. 1999), W. C. Chen treated _Galium formosense_ as a synonym of _G. elegans_. He referred to Cufodontis (Oesterr. Bot. Z. 89: 228. 1940) who supported the occurrence of _G. elegans_ in Taiwan based on Hayata’s report of _G. rotundifolium_ Linnaeus (in J. Coll. Sci. Tokyo 30(1): 148. 1911) and to J. M. Chao (in Fl. Taiwan 4: 261. 1978) who considered _G. elegans_ to be the same as _G. formosense_. In their study of Taiwanese _Galium_ Yang and Li (loc. cit. 1998; loc. cit. 1999) did not mention _G. elegans_ nor compare _G. formosense_ to it. This rather suggests that they were unaware of Cufodontis’s work than that they concluded the two species to be distinct. Similarly, Cufodontis (loc. cit.: 211–251), studying only mainland material, did not mention _G. formosense_, already described in 1934. The Taiwanese specimens at MO (studied by C. M. Taylor) appear to represent a distinct species but fall within _G. elegans_ as more broadly circumscribed by Cufodontis (loc. cit.: 228–232). Thus, _G. formosense_ is here provisionally separated and regarded as replacing _G. elegans_ on Taiwan. In future studies, it will be of particular importance to clarify whether the dioecy or polygamo-dioecy found in _G. elegans_ (see there) also occurs in _G. formosense_.


丽江拉拉藤  lijiang la la teng

Herbs, perennial, 15–25 cm tall. Stems little branched, 4-
angled, ± retrorsely strigose hairy. Leaves in whorls of 4, sub-
sessile or shortly petiolate; blade rather subleathery, pale abax-
ially, ovate-elliptic, 8–12 × 3–5 mm, strigose to hirsute, abax-
ially yellowish brown glandular-punctate or striate, base cune-
ate, apex acute or apiculate; principal vein 1, 2 lateral veins
weak. Inflorescences terminal, corymbose, with terminal and
axillary several-flowered and somewhat bracteate cymes; pedi-
cels ca. 1.5 mm. Ovary obovoid, hispidulous. Flowers ca. 2.8
mm in diam., probably sexually differentiated (dioecious or
polygamo-dioecious?). Corolla yellowish green, dark brown
when dry, rotate, lobed for 3/4 or more; lobes 4, subovate, apic-
ulate at apex. Fruit unknown, but probably with uncinate tri-

● Meadows on mountain slopes; 3000–3200 m. Sichuan (Yajiang),
Yunnan (Lijiang).

Because of its uncertain fruit indumentum, Galium forrestii is in
need of further studies. We have not seen authentic material but agree
with Cufodontis (Oesterr. Bot. Z. 89: 232. 1940) that it is obviously
close (or even identical?) with G. glandulosum and/or G. hirtiflorum.
Their characteristic stem indumentum and other similarities link these
taxa as members of the G. hirtiflorum group within G. sect. Platygallium
s.l. (see under G. hirtiflorum).


姬兰拉拉藤 ji lan la la teng

Galium parisiense Linnaeus var. brachypodum Boissier; G.
transcaucasicum Stapf.

Herbs, annual, ascending, branching from base. Stems (4–)8–30–(40) cm tall, tender, 4-angled, with retrorsely aculeo-
late angles and numerous, rather short internodes. Leaves at
middle stem region in whorls of (5 or) 6–8 (or 9), ± sessile; blade
drying papery, linear-elliptic to narrowly oblanceolate, mostly
glabrous but margins and sometimes abaxial vein sparsely to
densely retrorsely aculeolate, base acute, apex acute-acuminate.
Inflorescences narrowly thyrsoid, with axillary and terminal
cymes mostly 2–6-flowered; peduncles as long or 2–4 × as long
as subtending leaves, slightly divaricate, with 1 or 2 bracts, ±
smooth; pedicels thin, 0.5–4 mm, reflexed and hardly elongated
in fruit. Flowers hermaphroditic. Ovary obovoid to ellipsoid, ca.
0.8 mm, glabrous. Corolla white or greenish white, slightly cup-
shaped, 0.8–1.2 mm in diam.; lobes ovate, acute to shortly apic-
ulate. Mericarps subglobose to kidney-shaped, 0.8–1.5 mm,
colliculate, glabrous.

Open habitats; ca. 700 m. Xinjiang (Yining) [Afghanistan, Nepal,
N Pakistan, Tajikistan; SW Asia].

Galium ghilanicum belongs to the annual G. sect. Microgalium
and is a taxon widespread in SW Asia. It is here recorded for the first
time for China. In FRPS (71(2): 237. 1999) it was misidentified as G.
aparine var. leiospermum (= G. aparine E. leiocarpum, G. spurium),
from which it is clearly separable by its antrorsely (and not retrorsely)
aculeate leaf margins. The other Chinese representative of G. sect.
Microgalium, G. tenuissimum, differs from G. ghilanicum mainly by its
strongly elongated peduncles and pedicels.

20. Galium glandulosum Handel-Mazzetti, Symb. Sin. 7:
1028. 1936.

腺叶拉拉藤 xian ye la la teng

Herbs, perennial, caespitose, procumbent or erect, 5–15
cm tall. Stems numerous from reddish rhizomes and roots,
usually strongly branched, 4-angled, densely retrorsely stri-
 golusum at nodes. Leaves in whorls of 4, ses-
sile or subsessile; blade drying subleathery, quite variable in
shape, ovate to oblong or lanceolate, (2.5–)4–10–(14) × (0.6–)
1–3–(4.5) mm, sometimes with scattered hairs adaxially, on marg-
gins and on midrib abaxially, or mostly glabrescent, adaxially
slightly shiny and papillose, abaxially matte and usually mi-
nutely glandular-punctate or -striate, base cuneate, margins rev-
olute, apex acute or subobtuse; principal vein 1, lateral veins 2,
weak. Inflorescences terminal and in axils of upper leaves, with
few- to several-flowered and up to 2 cm long cymes; peduncles
± hairy, bracteate, ± divaricate in fruit; pedicels 1–2(–5) mm.
Flowers usually sexually differentiated (dioecious or polygamo-
dioecious?). Ovary obovoid, ca. 0.8 mm, with ± curved tri-
chomes. Corolla yellowish, greenish, or ± brownish-reddish.
rotate, 1.8–2.7 mm in diam.; lobes 4, ovate, obtuse or slightly
acute. Mericarps reniform, 1.5–2 mm, mostly with ± uncinate trichomes
of ca. 0.3 mm (very rarely also glabrous?), on straight or ±

● Mountain slopes, river beaches, open shrublands and forests,
grasslands, on rocks; 2300–3900 m. Sichuan, Xizang, Yunnan.

Galium glandulosum is mainly characterized by condensed habit,
short and predominantly retrorse stem hairs, subleathery leaves,
often with glandlike idioblasts on abaxial leaf sides, strongly bracteate
cymes, sexual differentiation of flowers, and hooked trichomes on fruit.
Glabrous-fruited specimens included by W. C. Chen in FRPS (71(2):
228. 1999) may belong to other species. Galium glandulosum and G.
forrestii are members of the G. hirtiflorum group (see there) within G.
sect. Platygallium s.l.

1830.

毛花拉拉藤 mao hua la la teng

Herbs, perennial, weak, procumbent or suberect, 10–60 cm
tall. Rhizome and roots red, filiform. Stems numerous, 4-
angled, with retrorse and/or spreading hairs to glabrescent.
Leaves and leaflike stipules in whorls of 4; blade drying papery
or membranous, linear-elliptic to narrowly lanceolate, (3–)8–
17(–25) × (0.5–1)–2.5(–3.5) mm, both surfaces hirsute or only midrib and margins with straight or slightly curved hairs, base
gradually and shortly attenuate, apex obtuse to subacute or
shortly acuminate; vein 1. Inflorescences terminal and axillary,
with several- to many-flowered cymes on peduncles longer than
leaves; pedicels 1–6 mm. Flowers evidently sexually differenti-
ated (dioecious or polygamo-dioecious?). Ovary obovoid, ca.
0.5 mm, hairy. Corolla light greenish, marked with reddish, ro-
rate, 2–2.5 mm in diam.; lobes 4, ovate, cuspidate, sparsely hir-
sute toward apex. Mericarps ellipsoid, 1–1.5 mm, with dense
uncinate trichomes 0.5–0.7 mm. Fl. Jul.–Aug, fr. Sep–Oct.

Among shrubs and stones; 1700–3000 m or higher. Expected in
Xizang [Bhutan, India, Nepal].

Galium hirtiflorum was not included in the Chinese flora by W. C.
Chen but is likely to occur in Xizang. According to Ehrendorfer et al.
(Fl. Iranica 176: 179. 2005) the group of *G. hirtiflorum* s.l. includes a series of vicarious Himalayan taxa: *G. subrubrimerum* Ehrendorfer & Schönbek-Temesy in Pakistan (Swat) and Kashmir, *G. hirtiflorum* s.s. extending eastward to Bhutan and possibly adjacent China, and finally *G. glandulosum* and *G. forestii* reaching Yunnan and Sichuan. Their common group characters are short and retrorse stem hairs, subleathery leaves with glandlike idioblasts abaxially, strongly bracteate cymes, sexual differentiation of flowers, and fruit with uncinate trichomes.


Herbs, perennial, from filiform reddish rhizomes. Stems generally erect, (10–)15–30 (–40) cm tall, 4-angled, glabrous and smooth, sometimes hirsutulous at nodes. Middle stem leaves and leaflike stipules in whorls of up to 6 (in weak plants rarely only up to 4), with petioles up to 3 mm; blade drying papery or membranous, narrowly elliptic-oblong to broadly oblongate, (10–)15–30 (–40) × (4–)5–10 (–12) mm, length/breadth index mostly 2.5–3.5, glabrescent, smooth or rarely retrorsely aculeolate on abaxial midrib, base acute to obtuse, margins antrorsely aculeolate, apex obtuse to rounded and abruptly apiculate; vein 1. Inflorescences terminal and sometimes in axes of upper leaves, with few- to several-flowered cymes; peduncles glabrous, smooth; bracts none or few, 1–2 mm; pedicels 0.3–3 mm. Ovary obovoid to subglobose, 0.5–0.8 mm, stigmaless with undeveloped trichomes. Corolla white or light green, rotate, 2.5–3 mm in diam., glabrescent, lobed for 3/4 or more; lobes 4, ovate, acute. Mericarps ellipsoid, 1.2–2 mm, with dense uncinate trichomes 0.8–1.2 mm, on pedicels elongating up and to 10 mm. Fl. Apr–Aug, fr. May–Sep.

Forests on mountain slopes, thickets, along rivers, ditches, meadows; 400–4000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, ?Japan, Kashmir, Korea, Myanmar, Nepal, Pakistan].

**Galium hoffmeisteri**, together with *G. bungei*, *G. spurium*, and *G. verum*, is one of the most commonly collected species of *Galium* in China. Previous authors usually have included it as a subspecies under *G. asperuloides*. Only recently, the two taxa were discussed and re-established on the species level by Ehrendorfer et al. (loc. cit.: 181–185). *Galium triflorum* is rare in China and closely related to *G. trifloriforme* (see under these species). The latter may be a hybridogenous taxon linking *G. sect. Hylaea* and *G. sect. Trachygalium*. But to synonymize *G. trifloriforme* with *G. hoffmeisteri* (e.g., W. C. Chen in FRPS 71(2): 230. 1999; Govaerts et al., World Checkl. Rubiaceae; http://www.kew.org/wcsp/rubiaceae/; accessed on 15 Sep 2010) is certainly not correct.


**Asperula humifusa** (M. Bieberstein) Besser.

Herbs, perennial, sometimes slightly woody at base, clambering to procumbent, from a thick rootstock with slender, trailing reddish rhizomes. Stems up to 1 m tall, 4-angled to subterete, often caespitose, glabrescent to white pilosulous, hirsutellous, and/or pilose often with mixed trichome types, smooth or sparsely scaberulous. Leaves in whorls of 6–10, sessile, frequently reflexed; blade drying papery, from linear and narrowly oblong-oblongate to oblong-elliptic or ligulate, (5–)10–28 (–32) × (1–)1.5–3 (–6) mm, adaxially glabrous and scaberulous, abaxially glabrous to densely white pilosulous or -pilose, base straight to cuneate, margin antrorsely aculeolate and usually markedly revolute, apex obtuse to acute and mucronate with tip to 2 mm; vein 1. Inflorescences with numerous terminal and axillary, congested to fasciculate, leaflike and many-flowered cymes; peduncles glabrous to hirtellous and/or pilosulous, with reduced leaves and leaflike bracts, 1.5–3 mm; pedicels 1–4 mm. Ovary ellipsoid, 0.8–1 mm, glabrous to hirsutellous with straight trichomes. Corolla yellowish white to white, funnel-form, 1.5–2.5 × 2.5–3 mm, glabrous to sometimes hairy on outside; lobes 4, ca. 1/2 as long as tube, triangular-ovate, acute to apiculate. Mericarps ellipsoid to reniform, 1.5 × 1.5–2 mm, glabrous and smooth, granulate or hirsutellous, becoming separated in middle as fruit expand but remaining attached at top and bottom. Fl. and fr. May–Oct.

Riversides and beaches, forests, grasslands, farmland sides, waste- lands, meadows, mountain slopes; 400–2200 m. Xinjiang [Afghanistan, Kazakhstan, Mongolia, Pakistan, Russia, Turkistan; SW Asia (Armenia, Azerbaijan, Georgia, Iran, Iraq), E Europe (Balkan Peninsula, Ukraine)].
This species has often been included in *Asperula* (e.g., Pobedimova et al., Fl. URSS 23: 276. 1958) because of its funneled form, relatively large, white corollas, but its affinities are clearly with members of *Galium*, particularly *G. verum*, though the flowers are distinct. Rarely the two species form a hybrid, which has been called *G. ×himmelbaueri-anum* (Roniger) Soó, and both should be placed into *G.* sect. *Galium*.

*Galium humifusum* is "a widespread diploid species, very variable due to modificational plasticity and genetic diversity" (Ehrendorfer et al., Fl. Iranica 176: 197. 2005), but at present it does not appear possible to recognize infraspecific taxa.


**湖北拉拉藤** hu bei la la teng

*Galium boreale* Linnaeus var. *mollis* Hemsley; *G. hemsley-anum* Beauverd; *G. hupehense* var. *mollis* (Hemsley) Cufodontis.

Herbs, perennial, erect, with slender rhizome. Stems 4-angled, pilosulous. Leaves in whorls of 4, subsessile; blade lanceolate, 30–50 × 6–12 mm, length/breadth index above 4, adaxially hispidulous to scaberulous, abaxially pilose at least on principal veins, apex acuminate to subacute; principal veins 3, palmate. Inflorescence terminal, paniculiform, 15–20 × 4–8 cm, with many-flowered cymes; peduncles and pedicels hairy to glabrescent. Ovary ovoid, densely hairy. Corolla yellowish white, rotate, ca. 2 mm in diam., glabrous or pilose; lobes 4, ovate, hairy outside, acute. Mericarps with straight trichomes (and/or ?glabrous). Fl. Jul, fr. Aug–Sep.

*•* Mountains; ca. 2000 m. Hubei (Yichang), Jiangsu (Kunshan).

*Galium hupehense*, possibly endemic to EC China, is evidently related to the also small-flowered *G. kinuta* (Cufodontis, Oesterr. Bot. Z. 89: 223–224. 1940) but has hairy stems, whereas *G. chekiangense* and *G. boreale* differ i.a. by their larger flowers (3–4 mm in diam.). As we have seen no authentic material of *G. hupehense*, the above description is based on available literature sources only. Its original description gives no information on ovary and fruit indumentum, whereas straight (and ?multicellular) hairs are indicated for the certainly synonymous *G. hemsley-anum*. Possibly by mistake, W. C. Chen (in FRPS 71(2): 281–282. 1999) reported plants with glabrous (var. *hupehense*) and with densely hairy ovaries (var. *mollis*). Both are recorded from Yichang, only the latter from more condensed plants in Kunshan. These uncertainties and the status of *G. hupehense* with its varieties need to be clarified in the future.


**小猪殃殃** xiao zhu yang yang

*Galium modestum* Diels; *G. trifidum* Linnaeus var. *modestum* (Diels) Cufodontis.

Herbs, perennial, weak to procumbent, from slender rhizomes. Stems (7–)10–40(–60) cm, 4-angled, caespitose, glabrous and smooth to sparsely retrorsely aculeolate on margins and midrib, base acute to attenuate, apex rounded or obtuse; vein 1. Inflorescences terminal and axillary, cymes 1–3.5 cm, with 1–3(4) flowers; peduncles glabrous and smooth; bracts ob lanceolate to narrowly elliptic; fruiting pedicels (3–)5–8(–10) mm, straight and ± divaricate. Ovary didymous, glabrous, smooth. Corolla white, cup-shaped to slightly campanulate, 1–1.8 mm in diam.; lobed to 1/2 or slightly more; lobes 3(4), ovate and rounded at tip. Fruit markedly didymous, mericarps (sub)glbose, 2–2.8 mm, glabrous, smooth to slightly puberticate. Fl. and fr. Mar–Aug.

Swampy or wet localities at lower to upper montane elevations. Fujian, Sichuan, Taiwan, Yun nan, and ?elsewhere [India, Indochina, Indonesia (Java, Sumatra), New Guinea].

In the available floras of China and Taiwan, W. C. Chen (in FRPS 71(2): 252–253. 1999) and Yang and Li (Bull. Natl. Mus. Nat. Sci., Taichung 11: 101–117. 1998; Fl. Taiwan, ed. 2, 4, 254–259. 1998) have completely ignored *Galium innocuum*, classifying most of the relevant specimens under *G. trifidum*. In the Kew Rubiaceae checklist (Govaerts et al., World Checkl. Rubiaceae; http://www.kew.org/wesp/rubiaceae/; accessed on 15 Sep 2010) *G. trifidum* var. *modestum* appears as a synonym under *G. innocuum*, with a range from India to China and through Taiwan to SE Asia and New Guinea. Originally, *G. innocuum* was described from Java. In the critical revision of *G. sect. Aparinoides* by Puff (Canad. J. Bot. 54: 1911–1925. 1976), not considered by the above authors, *G. innocuum* is accepted as a valid species and regarded as a southern member of the *G. trifidum* group. The above diagnosis and distribution data correspond to Puff’s revision. He differentiated the two species mainly by their fruiting pedicels: relatively short, straight, and ± divaricate in *G. innocuum* but slender, elongated, and conspicuously arcuate in *G. trifidum* s.s. According to Puff (loc. cit.: 1922–1923) only *G. innocuum* but none of the subspecies of *G. trifidum* occur in China.

This is in strong conflict with W. C. Chen (loc. cit.: 253) who described the distribution of *G. trifidum* in China by listing the provinces Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shandong, Sichuan, Taiwan, Xizang, Yun nan, and Zhejiang. As we have seen only limited Chinese material of *G. sect. Aparinoides*, the question remains whether *G. innocuum* extends from S to N China or is replaced further north by populations of the *G. trifidum* group not mentioned by Puff. Furthermore, one has to consider that species from other sections of *Galium* have often been misidentified as members of *G. sect. Aparinoides*, e.g., *G. bugei*. In view of these uncertainties, we accept only *G. innocuum* but not *G. trifidum* for the present Chinese flora.

Another problematic taxon in *Galium* sect. *Aparinoides* for the *Flora of China* is *G. palustre* Linnaeus. In spite of the critical comments by Cufodontis (Oesterr. Bot. Z. 89: 232. 1940), this species has been included in FRPS by W. C. Chen (loc. cit.: 250). According to Puff (loc. cit.: 1923–1924) this species belongs to the *G. palustre* group of taxa, with leaves often in whorls of more than 4, many-flowered cymes (more than 3 or 4 flowers), and smooth pedicels. Its natural distribution is verified from temperate and boreal Europe to W. Siberia, whereas occurrences in E North America (and elsewhere) are obviously adventive. Considering the common confusion of *G. sect. Aparinoides* taxa (in China particularly *G. innocuum* in the south and *G. karakulense* in the north) and the lack of authentic specimens seen by us, we exclude *G. palustre* from China in the present text.


**三脉猪殃殃** san mai zhu yang yang

Herbs, perennial, erect, 5–25 cm tall, emerging from filiform rhizomes. Stems mostly unbranched, 4-angled, glabrous to sparsely hispidulous. Leaves in whorls of 4, sessile or subes-
sile; blade drying blackish brown and papery, broadly elliptic, ovate, or suborbicular, 10–25 × 6–17 mm, glabrous to hispidulous at least on veins, otherwise adaxially smooth, abaxially not glandular-stitiate, base cuneate to obtuse, margins antrorsely ciliolate or hispidulous, apex ± rounded and usually mucronate; principal veins 3, palmate. Inflorescences small, thyrsoid, cymes terminal and in axes of uppermost leaves, 2–6 cm, few to several flowered, lax; peduncles glabrous, smooth; bracts leaflike or ligulate to narrowly elliptic, 0.5–4 mm; pedicels 1–5 mm. Ovary subglobose, ca. 1 mm, densely pubescent with spreading uncinate trichomes. Corolla white or greenish yellow, rotate, 2.5–3(–4) mm in diam., glabrous, lobed for 3/4 or more; lobes 4, elliptic-lanceolate or ovate-triangular, acute. Mericarps ovoid, 1.5–2 mm, with dense uncinate trichomes 0.8–1 mm, on pedicels usually elongating to 15 mm. Fl. and fr. Jul–Sep.

Forests on mountains, tussocks at ditch sides; 1500–2300 m [as low as ca. 100 m in N Japan]. Heilongjiang, Jilin [Japan, Korea, NE Russia; NW North America].

*Galium kamtschaticum* is an amphi-Beringian member of *G*. sect. *Platygalium* and forms a related species group with *G*. *chekiangense* in SE China, *G*. *nakaii* in Japan, and *G*. *oregumum* in W North America. In the *Flora of Japan* (Yamazaki, Fl. Japan 3a: 206–240. 1993) three varieties are recognized, one of them endemic to Japan, the second extending to Sakhalin and the Kuriles, and only var. *kamtschaticum* more widespread and extending to the NE provinces of China. Specimens from SE China, Zhejiang, that were determined as *G*. *kamtschaticum* and those from Fujian that were listed by W. C. Chen (in FRPS 71(2): 265. 1999) as *G*. *nakaii* differ from typical *G*. *kamtschaticum* by their leaves drying somewhat leathery, greenish-brownish, papillose, glandular-stitiate abaxially, and by their fruit with short hairs 0.1–0.2 mm, with a bent but not hooked tip. In the present flora they are treated as a new species, *G*. *chekiangense* (see the comments under that species).


粗沼拉拉藤 cu zhaol a la teng

Herbs, perennial, procumbent and often matted or lodged, from slender, reddish brown rhizomes. Stems 0.6–1.2 m, much branched, densely retrorsely aculeolate on 4 angles. Leaves in whorls of 6–10, sessile or subsessile; blade drying papery or somewhat leathery and ± glossy, narrowly (ob)lanceolate or narrowly elliptic, (6–)15–25(–50) × (2–)2.5–4(–8) mm, glabrescent, both surfaces sparsely to densely aculeolate on midrib, base acute to cuneate, margins flat to narrowly revolute, densely retrorsely aculeolate, apex acute and shortly mucronate; vein 1. Inflorescences terminal and axillary, to 12 × 9 cm, with several- to many-flowered cymes; peduncles elongating as inflorescences develop, becoming much longer than subtending leaves; axes glabrescent, sparsely to densely retrorsely aculeolate; bracts elliptic or oblong-lanceolate, 1.5–3 × 0.5–1 mm; pedicels 1–3 mm. Ovary ellipsoid to obovoid, 0.5–0.8 mm, glabrous. Corolla bluish to violet (rarely white?), shortly funnelform, 1.5–2.5 mm, tube 1–1.5 × as long as lobes; lobes 4, triangular-spatulate. Mericarps subglobose to ellipsoid, 1.5–2 × 1.7–2 mm, glabrous, smooth or often tuberculate. Fl. and fr. Jun–Sep.

Humid forests, riversides, beaches, wet grasslands; 700–3300 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang [C Asia].

*Galium karakulense* was treated in FRPS (71(2): 280. 1999) as *G*. *rivale*. In a wider sense the latter name and its synonyms apply to a polymorphic polyploid complex (2x, 4x, 6x), ranging from NE, E, and SE Europe to SW and C Asia. Because of its funnelform corollas this group formerly was treated as part of the genus *Asperula*, either as *A*. *aparine* or as *A*. *rivalis* (e.g., in Pobedimova et al., Fl. URSS 23: 275. 1958). More recently, morphological analyses (see Ehrendorfer et al., Fl. Iranica 176: 188. 2005) and DNA-data have clearly shown that it is closely related to *G*. *uliginosum* in *G*. sect. *Trachygalium*. Similarities with the annual *G*. *anguineum* are homologies.

In former treatments (e.g., Fl. Europaea 4: 20. 1976) *Gaium rivale* was circumscribed in a wide sense. On the basis of differences in floral (relative length of corolla tube and lobes, color), fruit (mericarp epidermis with rounded or acute cells), and other characters, several still insufficiently understood microspecies have been suggested (Pobedimova et al., loc. cit.: 327; under *Asperula*; Ehrendorfer & Schönbeck, Fl. Syst. Evol. 174: 200–202. 1991, under *G*. *anguineum*; Ehrendorfer et al., loc. cit., under *G*. *pseudorivale* Tzvelev). Accordingly, among the vicarious microspecies of *G*. *rivale* s.l., *G*. *anguineum* Ehrendorfer & Schönbeck-Temesy from Iraq and Iran, with white corollas and divaricate fruiting axes, is replaced toward the east in C Asia by *G*. *karataviense* (see the comments under that species).


喀拉套拉拉藤 ka la ta la teng


Herbs, perennial, procumbent and often matted or lodged, from slender, reddish brown rhizomes. Stems 0.6–1.2 m, much branched, densely retrorsely aculeolate on 4 angles. Leaves in whorls of 6–10, sessile or subsessile; blade drying papery or somewhat leathery and ± glossy, narrowly (ob)lanceolate or narrowly elliptic, (6–)15–25(–50) × (2–)2.5–4(–8) mm, glabrescent, both surfaces sparsely to densely aculeolate on midrib, base acute to cuneate, margins flat to narrowly revolute, densely retrorsely aculeolate, apex acute and shortly mucronate; vein 1. Inflorescences terminal and axillary, to 12 × 9 cm, with several- to many-flowered cymes; peduncles elongating as inflorescences develop, becoming much longer than subtending leaves; axes glabrescent, sparsely to densely retrorsely aculeolate; bracts elliptic or oblong-lanceolate, 1.5–3 × 0.5–1 mm; pedicels 1–3 mm. Ovary ellipsoid to obovoid, 0.5–0.8 mm, glabrous. Corolla bluish to violet (rarely white?), shortly funnelform, 1.5–2.5 mm, tube 1–1.5 × as long as lobes; lobes 4, triangular-spatulate. Mericarps subglobose to ellipsoid, 1.5–2 × 1.7–2 mm, glabrous, smooth or often tuberculate. Fl. and fr. Jun–Sep.

Swamps and riversides at low to middle elevations. Xinjiang (Chabuchaer) [Afghanistan, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Uzbekistan].

*Galium karataviense* represents *G*. sect. *Aparioides* in C Asia and is considered as a link between the *G*. *trifidum* group in the N Hemisphere and the predominantly Mediterranean-European *G*. *palustre* group (Puff, Canad. J. Bot. 54: 1923–1924. 1976). It is also treated in Pobedimova et al. (loc. cit.) and Ehrendorfer et al. (Fl. Iranica 176: 174. 2005) and may be responsible for some of the erroneous indications of *G*. *palustre* for N China, as discussed under *G*. *inoocumum*. The latter is the second verified species of the section in the more southerly part of the Chinese flora. In comparison with *G*. *karakulense*, *G*. *inoocumum* is a much smaller and more slender plant with few-flowered cymes and smooth pedicels.
iense, with bluish to violet corollas and more convergent fruiting axes. Further studies will have to demonstrate whether species status is really justified for all these taxa and how they correspond to the different cytotypes encountered in this polyploid complex.


_Galium boreale_ Linnaeus var. _japonicum_ Maximowicz; _G. japonicum_ (Maximowicz) Makino & Nakai (1908), not Makino (1895).

Herbs, perennial, erect, 20–60 cm tall. Stems with 4 thickened angles, glabrous and smooth, hispidulous only at nodes. Leaves in whorls of 4, subsessile or petiole to 2 mm; blade drying mostly somewhat leathery, remaining ± green, oblanceolate to ovate-lanceolate, sometimes even narrowly elliptic or ovate, 20–80 × 4–20 mm, length/breadth index (2–)3–5(–6), strigillose or hispidulous at least along veins to glabrescent, sparingly to densely punctate- to striate-glandular abaxially, base acute to rounded, margins flat to thinly revolute, antrorsely ciliate to hispidulous, apex subacute to acute, but hardly concave and long acumenate; principal veins 3, palmate. Inflorescences paniculiform, to 25 × 15 cm, cymes in uppermost leaf axils and terminal, many flowered, lax and often somewhat divaricate; peduncles smooth and glabrous or hispidulous at nodes; bracts oblanceolate to narrowly elliptic, 1.5–3 mm; pedicels 1.5–3 mm. Ovary subglobose to obvoid, ca. 0.8 mm, smooth, glabrous. Corolla white to purplish, rotate, 2–2.5 mm in diam., glabrous; lobes 4, ovate, acuminate. Mericarps subglobose to obvoid, ca. 2.5 mm, glabrous and smooth. Fl. May–Jul, fr. Aug–Sep.

Mesic, generally rich forests on mountain slopes, rocks at watersides, open grasslands, meadows; 500–2100 m. Gansu, Hebei, Henan, Hubei, Liaoning, Shaanxi, Shanxi, Sichuan, Xinjiang [Japan, Korea].

_Galium kinuta_ described from Japan, was first reported for China by Cufodontis (Oesterl. Bot. Z. 89: 223–224. 1940). Nevertheless, the more numerous samples now available suggest certain differences: in Chinese specimens the leaves are more leathery (not papery) when dry, abaxially more markedly punctate-striate-glandular (not inconspicuously so), and apically ± acute (but hardly concave and long attenuate). It is still uncertain whether these differences merit taxonomic separation of the Japanese and Chinese populations. Another critical aspect is the occurrence of specimens intermediate between Chinese _G. kinuta_ and local _G. boreale_ s.l., as observed, e.g., from Henan, Shaanxi, and Shanxi. Local studies will have to show whether this is due to hybridization and whether it is linked to the extreme variability of _G. kinuta_ in leaf shape, ranging from narrowly lanceolate to ovate.

_Galium kinuta_ may be related to the still badly understood _G. huphenense_ (see there). Similarities also exist with _G. platygalium_, which differs by funnelform corollas. _Galium hoffmeisteri (= _G. japonicum_ Makino (1895)) and _G. kinuta_ (= _G. japonicum_ (Maximowicz) Makino & Nakai (1908)) have been widely confused because of similar habit and name confusion.


昆明拉拉藤 kun ming la la teng

Herbs, perennial, erect, (12–)15–20–(25) cm tall. Stems with 4 prominent and rounded angles, with scattered antrorsely (or sometimes also retrorsely) curved short hairs, more dense at nodes; internodes 1.5–4 cm at middle stem regions, longer or somewhat shorter than leaves. Leaves in whorls of 4; blade drying leathery, broadly lanceolate, (10–)15–25–(35) × (4.5–)6–7.5(–9) mm, length/breadth index (2–)2.5–3.5(–4), glabrous, adaxially papillose, abaxially without glandular idioblasts, base cuneate, margins revolute, antrorsely aculeolate, apex acute but not acumenate; 3 prominent principal veins extending into apex region. Inflorescences pyramidal, with cymes from middle to upper stem nodes and terminal, several to many flowered; axes glabrous, somewhat divaricate; peduncles mostly 1.5–4 cm; pedicels (0.5–)1–5 mm; bracts lanceolate, small and inconspicuous. Flowers hermaphroditic. Ovary obovoid, ca. 0.5 mm, glabrous, smooth. Corolla white to greenish, cup-shaped or campanulate, (2–)2.3–2.5(–2.7) mm in diam., fused at base for ± length of 4 free lobes, 0.8–1 mm, lanceolate, acute but not apiculate. Mericarps ovoid, 1.5–3 mm, glabrous and ± smooth. Fl. Jun–Aug, fr. Jul–Sep.

● Open grasslands and rocky slopes; 1900–2500 m. C Yunnan.

The new _Galium kunmingense_ clearly belongs to _G_. sect. _Platygalium_. Among species in the section with corollas basally fused to ca. 1/2 the length _Microphysa elongata_ deviates by leaves with only one main vein, somewhat inflated fruit mericarp, and funnelform corollas. _Galium platygalium_ and _G. maximoviczii_ have similar corollas but deviate by their broader and 3–5-veined leaves. Closer relationships can be assumed for some E Asiatic _Galium_ species with rotate corollas: _G. kinuta_ has glabrous fruit but narrower, adaxially punctate-striate glandular leaves, slender, more floriferous inflorescences, and larger flowers. Apparent relatives with rotate and smaller flowers are _G. huphenense_ with spreading straight fruit hairs, _G. chekiangense_ with appressed curved fruit hairs, and particularly _G. yunnanense_, with spreading unicurate fruit hairs. This latter is ± sympatric with _G. kunmingense_ but differs not only by its rotate (not campanulate/cup-shaped) and smaller corollas and unicurate fruit hairs, but also by its more hairy and abaxially punctate-striate glandular leaves. It is remarkable that _G. kunmingense_, a quite conspicuous species that evidently was not too rare in the surroundings of the capital of Yunnan, has remained unnoticed up to now.


线叶拉拉藤 xian ye la la teng

Herbs, perennial, erect, sometimes slightly woody at base. Stems up to 65 cm tall, 4-angled, hirtellous or puberulent to glabrescent or smooth and glabrous. Leaves in whorls of 4, sessile or subsessile; blade drying leathery, linear-spatulate, often slightly falcate, 10–60 × 1–4 mm, adaxially glabrous, weakly shiny, antrorsely aculeolate along midrib and/or near margins, abaxially glabrous or sparsely hirtellous along midrib, base cuneate or obtuse, margin antrorsely aculeolate or pubescent, revolute, apex obtuse to acute; vein 1. Inflorescences terminal, paniculiform, with few–to many-flowered, 1.5–5 cm long cymes; peduncles hirtellous to glabrous, smooth; bracts narrowly elliptic, 1–3 mm or often lacking; pedicels 1.5–6 mm. Ovary ellipsoid to obovoid, ca. 0.8 mm, glabrous, smooth. Corolla white, rotate, ca. 4 mm in diam.; lobes 4, lanceolate, acute. Mericarps ellipsoid to subglobose, 2.5–3 mm, glabrous and smooth. Fl. Jun–Aug, fr. Jul–Sep.

Grassy slopes, forests, thickets, mountain meadows; 400–1800 m. Hebei, Hubei, Liaoning [Korea].
Galium linearifolium seems to be a rare species and is easily confused with G. boreale. The latter has leaves usually somewhat lanceolate and with 3 main veins. Cufodontis (Oesterr. Bot. Z. 89: 219–223. 1940) mentioned a certain affinity of G. linearifolium with G. hangei. Although G. linearifolium is said in FRPS to have leaves in whorls of 4, the relevant figure (712): 251, t. 56, f. 3. (1999) shows them in whorls of 5, evidently a mistake.


异叶轮草 yi ye lun cao


Herbs, perennial, from thin creeping rhizomes. Stems erect, 0.3–1 m tall, 4-angled, smooth; nodes hispidulous or glabrous. Leaves in whorls of 4–6–8, subsessile or with petiole up to 6 mm; blade drying papery, lanceolate-oblong, lanceolate-elliptic, or ovate to ovate-lanceolate, (23–)35–40(–53) × (7–)9–10(–18) mm, glabrous or sparsely to moderately hispidulous, at least on principal veins, margins antorsely ciliate or -aculeolate, base acute to cuneate, apex tapered and shortly obtuse to acute; veins 3–5, palmate. Inflorescences broadly paniculate, 4–20 × 2–15 cm, lax and many flowered, with cymes in axes of uppermost leaves and terminal; pedicels ± as long as pedicels, 1.5–2.7 mm in diam.; lobes 4, ovate-oblong, obtuse. Corolla white, campanulate; tube ± as long as lobes, 2.5–3.5 mm in diam.; lobes 4, ovate-oblong, obtuse. Ancistrocarps ellipsoid, 2–2.5 mm, glabrous, smooth to granular-papillose. Fl. Jun–Jul, fr. Jul–Oct.

Forests, thickets, or grasslands on mountains, open fields, ditch sides; 1600–3800 m. Anhui, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Zhejiang [Korea, Russia].

Galium maximoviczii differs from the quite close G. platygalium (see there) by somewhat smaller campanulate flowers and larger leaves in whorls of up to 6–8. Within G. sect. Platylium the two species form an isolated group limited to the temperate E Asiatic mainland, characterized by its whorls of leaves and leaflike stipules often with more than 4, up to 6, or rarely even 8 elements, with 3–5 palmate principal veins, and campanulate to funnel-shaped corollas. In Pobedimova et al. (Fl. URSS 23: 273. 1958) the two taxa were placed in the artificial Asperula sect. Galioideae Pobedimova sp. Paniculatae Pobedimova.


大胞拉拉藤 da bao la la teng

Herbs, perennial, weak to procumbent. Stems 6–40 cm, sharply 4-angled, glabrous, smooth, rough or sparsely retrorsely aculeolate; internodes 6.5–33 mm; nodes ± hairy. Middle stem leaves in whorls of up to 6, sessile; blade drying papery, often blackening, linear-lanceolate to narrowly elliptic, 2–12.5 × 0.4–2 mm, glabrous, smooth or sparsely retrorsely aculeolate on midrib abaxially, adaxially with relatively large epidermal cells (use 20× lens), base acute, margins flat to thinly revolute, apex acute then contracted and mucronate; vein 1. Inflorescences axillary, with 1- or occasionally 3-flowered cymes; pedicels 0.2–1.5 mm, glabrous, smooth. Ovary ellipsoid-obovoid, ca. 0.5 mm, glabrous, smooth. Corolla white or pale green (perhaps sometimes drying pink), rotate, 1.5–2.7 mm in diam.; lobes 4, lanceolate-spatulate, glabrous beneath, puberulent above, with shortly acuminate apex, clearly longer than stamens. Ancistrocarps ellipsoid, 0.7–1.1 × 1–1.5 mm, glabrous, granular-verruculose, with pedicels often elongating to 3.5 mm. Fl. and fr. Jul–Sep.

Open places, forests; 1800–3100 m. ?Sichuan, Xizang [Bhutan, India, Nepal].

Galium megacyttarion (type from Uttar Pradesh, Raizada 7326, E) belongs to the high elevation Himalayan subgroup (2) of the G. asperifolium group, which includes G. acutum (see additional comments under these species). The protologue of G. megacyttarion describes the flowers as having stamens shorter than the corolla; comparable information is not yet available for the majority of the Chinese Galium species. We have seen no material cited in the original description nor plants which undoubtedly belong here. Nevertheless, one very condensed provenance (Duthie 7492, from Bhutan, the Black Mountain Expedition 1888, WU) exhibits the large leaf epidermal cells described for G. megacyttarion, but it deviates by having antorse microhairs on the adaxial leaf side and glabrous leaf margins, finely rough stems, many-flowered cymes, and glabrous petals. It was determined by Cufodontis (Oesterr. Bot. Z. 89: 241–243. 1940) erroneously as G. asperifolium var. sikkimensis. Another plant with large epidermal cells has been seen from Sichuan (W. C. Chen, 23 Jun 1988, PE), but this corresponds in all other characters to G. pusillosetosum.


微小拉拉藤 wei xiao la la teng

Herbs, perennial (not annual), ascending, caespitose, minute, 2–3 cm tall. Stems 4-angled, branched, glabrous or sometimes hispidulous at nodes. Leaves in whorls of 4; blade rhombic-oblanceolate, 2.3 × 0.8–1 mm, glabrous or abaxially hispidulous along midrib, base attenuate, apex obtuse; vein 1. Inflorescence with terminal and partly axillary few-flowered cymes, glabrous axes, and ca. 2 mm long pedicels. Flowers unknown. Ancistrocarps reniform, sparsely hispid with apically weakly curved trichomes.

Mountains; 1800–2400 m. Taiwan (Hualian).

Galium minutissimum was accepted as a species by W. C. Chen (in FRPS 71(2): 283. 1999) but was not treated or mentioned by Yang and Li in their publication on Galium in Taiwan (Bull. Natl. Mus. Nat. Sci., Taichung 11: 101–117. 1998) or in the subsequent second edition of Fl. Taiwan (4: 254–259. 1998). We have seen no authentic material, and the specific status of G. minutissimum remains uncertain. The taxon obviously belongs to G. sect. Platylgium and the closely related G. morii group (see there) from the high mountains of Taiwan.


森氏猪殃殃 sen shi zhu yang yang

Galium sigeyosus Masamune.

Herbs, perennial, erect, 5–10 cm tall. Stems slender, 4-angled, glabrous. Leaves in whorls of 4, sessile or subsessile; blade drying papery, obovate, ovate, elliptic, or elliptic-oblanceolate, 1–6 × 1.5–10 mm, glabrous or sparsely hairy abaxially, base obtuse, margins smooth, apex obtuse or apiculate-acute; principal veins 3, palmate. Inflorescences terminal or sometimes axil-
lary, with few-flowered cymes of 0.5–1.5 cm; peduncles and bracts glabrous; pedicels 1–2 mm. Ovary densely stipitate glabrous with undeveloped trichomes. Corolla 7 white, rotate, ca. 1.2 mm in diam., lobed for 3/4 or more; lobes 4, ovate. Mericarps subglobose, ca. 1 mm, with dense, ± appressed uncirrurate trichomes.

- Mountains; 2500–3400 m. Taiwan (T’ai-Yi).

*Galium morii* was described as a very small plant from Yu Shan (Mt. Morrison) in Taiwan. We have seen no authentic material. The present description combines information from the protologue, FRPS (71(2): 241. 1999), and Yang and Li (Bull. Natl. Mus. Nat. Sci., Taichung 11: 106–107. 1998; Fl. Taiwan, ed. 2, 4: 256. 1998). But there are certain conflicts: whereas the leaves were characterized by FRPS as 1- or indistinctly 3-veined, the protologue and Yang and Li said they were 3-veined.

*Galium morii* was the first species to be described from an obviously closely related assembly of *G. sect. Platygala* taxa growing in the high mountains of Taiwan, which is here called the *G. morii* group and also includes *G. formosense*, *G. minutissimum*, *G. nankotaizanum*, and *G. tarokoense*. On the mainland, the newly described *G. rapifragum* from Yunnan obviously also belongs here. This *G. mori* group is characterized by low and condensed growth, small ovate to elliptic or broadly lanceolate leaves, reduced inflorescences, and hairy fruit. Affinities obviously exist with the aggregates of *G. elegans* and *G. serpyilloides*.

Characters used to differentiate the taxa of the *Galium morii* group are stem indumentum, number of leaf veins (1–3), uncinate to straight hairy, and both surfaces sparsely hirsute at least along midrib, base cuneate to obtuse then abruptly acuminate; its name refers to this. Otherwise, *G. nankotaizanum* is characterized by its straight or slightly curved fruit trichomes. This links it to the high-alpine Himalayan group of *G. serpyilloides* s.l. (see there). Otherwise, *G. nankotaizanum* also appears similar to taxa with hooked fruit trichomes, e.g., *G. tarokoense*, with glabrous stems and only 1 principal leaf vein, from which it apparently differs by larger flowers.


**Asperula odorata** Linnaeus, Sp. Pl. 1: 103. 1753.

Herbs, perennial, from slender and elongated rhizomes. Stems erect, 10–50 cm tall, 4-angled, glabrous and smooth except hispidulous at nodes. Leaves in whorls of 6–10, sessile or petiolate to 1 mm; blade drying papery, oblongate, oblong-lanceolate, or narrowly elliptic, (6–)15–50(–65) × (3–)4.5–15(–17) mm, length/breadth index ca. 4, glabrous except antrorsely aculeate on margins and with antrorse microhairs on upper side and sometimes on abaxial midrib, base acute to cuneate, margins flat, apex acute or usually obtuse then abruptly mucronate; vein 1. Inflorescences terminal, with several to many-flowered cymes; axes glabrous, smooth; bracts none or leaflike, 1–3 mm; pedicels 1–4 mm. Ovary ellipsoid to obovoid, ca. 0.8 mm, densely hispidulous. Corolla white or bluish white, ± broadly funneliform, 4.5–6.5 × 3–7 mm, glabrous, lobed for ca. 1/2; lobes 4, triangular-spatulate, acute. Mericarps subglobose, 2–2.5 mm, with dense uncinate trichomes 1–1.2 mm. Fl. and fr. Jun–Sep.

Mountain forests; 1500–2800 m. Gansu, Heilongjiang, Jilin, Liaoning, Ningxia, Qinghai, Shandong, Shanxi, Sichuan, Xinjiang [Japan, Korea, Russia; NW Africa, SW Asia, Europe; introduced in North America].

Dried plants of *Galium odoratum* have a sweet coumarine odor, which is still evident on herbarium specimens; its name refers to this. On account of its funneliform corollas (with the tube ± as long as the lobes), *G. odoratum* usually has been treated as a member of *Asperula*. As shown by Ehrendorfer et al. (Fl. Iranica 176: 183. 2005) and verified by DNA-analytical studies, it belongs to *G. sect. Hylaea* and is closely related to *G. asperuloides* and *G. hoffmeisteri*. Without flowers it is difficult to separate, particularly from the former with more narrow leaves, but generally *G. odoratum* is more robust. As a constant element of temperate deciduous forests (often with *Fagus*), it has an extensive but rather disjunct distribution area throughout Eurasia, with diploid cytotypes in E Asia, replaced by tetraploids in Europe.


**Asperula paniculata** Bunge in Ledebour, Fl. Altaic. 1: 140. 1829; *Galium xinjiangense* W. C. Chen.
Herbs, perennial, often somewhat caespitose from elongated, much branched, and ca. 1 mm thick rhizomes. Stems erect, to 60 cm tall, 4-angled, little branched, glabrous and smooth, only sometimes puberulent at nodes. Leaves in whorls of up to 6, subsessile; blade drying papery, discolorous (more pale abaxially), lanceolate or narrowly lanceolate, (15–)25–60(–70) × (3–)5–10(–12) mm, glabrous, smooth or mostly somewhat anturcise ciliate on margins and midrib, base acute to cuneate, apex acute to acuminate; vein 1. Inflorescences terminal, 8–16 × 8–16 cm, corymbiform to paniculate, lax, with several- to many-flowered cymes; axes glabrous, smooth with few lanceolate, 1–3 mm long bracts and 1.5–6 mm long pedicels. Ovary obovoid, ca. 1 mm, glabrous. Corolla white, drying often yellowish brown, campanulate to funnel-form, ca. 4 mm in diam., glabrous, lobed for ca. 1/2; lobes 4, triangular, acute. Fruit on elongating pedicels with ellipsoid, ca. 2 mm, glabrous and smooth micarps. Fl. Jun–Jul, fr. Aug–Sep.

Montane river valleys, open forests, grasslands, rocky slopes and talus; 1300–1900 m. Xinjiang [Russia].

When W. C. Chen described Galium xinjiangense, he compared it only with the completely different G. odoratum, not being aware of the certainly conspecific G. paniculatum. Because of its corolla shape, this characteristic and relatively isolated taxon was originally described as Asperula. But there is no affinity to any group of Asperula as presently circumscribed. Instead, there are similarities with G. sect. Nemoralis. M. Pobeda et al. (Fl. URSS 23: 271. 1958) also discussed the disjunct distribution of this relict species, which extends from its center in the Altai to the middle Yenisei and to the Dzungarian Alatau in NW China (Xinjiang).


林猪殃殃

Herbs, perennial, ascending from filiform rhizomes. Stems erect, slender, 4–25 cm tall, 4-angled and narrowly winged, glabrous and smooth, only nodes slightly shortly hairy. Middle stem leaves opposite and with 2 leaflike but clearly smaller stipules in whorls of 4, at lower nodes stipules linear, 1.5–3 mm; petiole 1.5–10 mm; leaf blade membranous, suborbicular, broadly ovate to ovate-lanceolate, or elliptic-oblong, (5–)6–30(–40) × (3.5–)4–7(–10) mm, adaxially with scattered, ± appressed, short hairs, abaxially glabrescent, base attenuate, obtuse to truncate, margins anturcise hirsutodentate, apex acute to rounded; single principal vein with 2–4 pairs of pinnate lateral veins. Inflorescences terminal and in axils of upper leaves with 3–11-flowered cymes; axes trichotomous and ± dioecious; bracts narrowly elliptic or ligulate, 0.8–3 mm; pedicels 1–3 mm. Ovary ovoid, ca. 0.5 mm, with undeveloped unicarpic hairs. Corolla white, rotate, 2.5–3 mm in diam., lobed for 1/2–2/3; lobes ovate, obtuse, subapiculate to acute or acuminate. Micarps ovoid, 1–2 mm, densely covered with unicarpic yellowish brown trichomes 0.8–1 mm, on pedicels thickening and elongating up to 11 mm. Fl. May–Aug, fr. Jun–Sep.

Fruits, meadows, near water, on shady (sub)alpine rocks; 1200–4000 m. Anhui, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Qinghai, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Korea, Nepal, Russia].

Galium paradoxum is a rather unusual species of the genus because of its broad, petiolate, and pinnately nerved opposite leaves, forming whorls of 4 with 2 smaller leaflike stipules. Therefore, it can be confused with other genera, in particular Kelloggia, which differs by its calyx teeth and its never-leaflike stipules. Because of its isolated position, G. paradoxum was made the type species of G. sect. Cymogalia and placed into a monotypic series, G. sect. Paradoxa (see Pobedimova et al., Fl. URSS 23: 326. 1958). As shown by Ehrendorfer et al. (Fl. Iranica 176: 232. 2005) and unpublished DNA analyses, it is only distantly related to G. kamtschaticum, G. rotundifolium, and G. elegans in G. sect. Platygaliun s.l. or to members of G. sect. Hylaea, as G. hoffmeisteri.

Schönbeck-Temesy and Ehrendorfer (in Tan et al., Davis & Hedge Festschrift, 111–114. 1989) commented on the morphological variation and biogeography of Galium paradoxum and recognized three subspecies, of which subsp. paradoxum and subsp. duthiei occur in China as keyed out and described below. The third, G. paradoxum subsp. franchetianum Ehrendorfer & Schönbeck-Temesy, is restricted to Japan and can be recognized by its relatively larger leaves, and short trichomes and often acute apices, and by its relatively large flowers. A survey of many new collections now available from the herbaria PE, KUN, MO, and WU shows that ranges of variation in all differential features used overlap and that many intermediates occur. With respect to the two Chinese taxa one can suspect not only an allopatric but also an altitudinal differentiation pattern.

1a. Leaves usually lanceolate-ovate, (10–)12–30(–40) × (5–)7–15(–23) mm; corolla lobes obtuse to subapiculate. 39a. subsp. paradoxum

1b. Leaves broadly ovate to suborbicular, (5–)6–10(–17) × (3.5–)4–7(–10) mm; corolla lobes acute to acuminate. 39b. subsp. duthiei

39a. Galium paradoxum subsp. paradoxum

林猪殃殃


Fruits, meadows, near water; 1200–3000 m. Anhui, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Qinghai, Shanxi, Sichuan, Yunnan, Zhejiang [Bhutan, Korea, Russia].

39b. Galium paradoxum subsp. duthiei

达氏林猪殃殃


On shady (sub)alpine rocks; 2700–4000 m. Hubei, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal].

In an otherwise quite typical specimen of this subspecies (e.g., Sichuan, Lutinghsien Mujiaogou: T. P. Wang 18-9-1938, PE) the stipules at the mid-stem region are quite comparable to true leaves, only
slightly smaller. This results in a considerable similarity to small plants of *Galium hoffmeisteri* from G sect. *Hylaee*, which differ by their leaves and leaflike stipules in whorls of up to 5 or 6.


卵叶轮草 *luan ye lun cao*


Herbs, perennial, from thin creeping rhizomes. Stems erect, 20–35 cm tall, with 4 thickened angles, smooth, at nodes glabrous or hispidulous. Leaves in whorls of 4–6, subsessile, with petiole up to 2 mm; blade drying papery to leathery, elliptic or elliptic-oblong to ovate, (12–)20–25(–28) × (7–)10–11(–15) mm, glabrous or hirtellous to hispidulous along principal veins, ± abruptly narrowed into short petioles, margins occasionally ciliolate, apex obtuse to subacute; principal veins 3–5, palmate. Inflorescences umbel-like thyrsoid and many-flowered panicles with terminal and lateral cymes from uppermost leaf axils; pedicels smooth and glabrous; bracts narrowly ob lanceolate or elliptic to ligulate, 1.3 × 0.5–1.5 mm; pedicels 0.5–1.5 mm. Ovary ellipsoid, ca. 0.8 mm, glabrous. Corolla white, funnelform, with tube ± as long as lobes, 4–5 mm in diam.; lobes 4, elliptic-oblong. Mericarps ovoid, 1.7–2.8 mm, glabrous and smooth. Fl. and fr. Jul–Sep.


康定拉拉藤 *kang ding la la teng*


Herbs, perennial, erect to weak, up to 50 cm tall. Stems obtusely 4-angled, usually branched, ± retrorsely aculeolate on angles or glabrous. Leaves in whorls of 6, sessile; blade drying papery, lanceolate, 15–35 × 2.5–6 mm, glabrous, adaxially smooth or scabrous along midrib and near margins, abaxially sparsely retrorsely aculeolate along midrib, base cuneate, margins sparsely to densely retrorsely aculeolate, flat to thinly revolute, gradually narrowed into acute to acuminate apex; vein 1. Inflorescences terminal and axillary, cymes several flowered; peduncles glabrous, smooth; bracts none or few, 1–2 mm; pedicels 1–4 mm. Ovary obovoid, 0.5–0.8 mm, glabrous. Corolla white to greenish, rotate, 2.5–3 mm in diam., lobed for 2/3 or more, glabrous; lobes 4, triangular-spatulate, acute to shortly acuminate. Mericarps ovoid, ca. 1 mm, glabrous, smooth or minutely granulose. Fl. Jun, fr. Aug.

- Valleys, open habitats of the montane zone; 3100–3700 m. Sichuan (Ka ding ding).

*Galium pratii* apparently is endemic in Sichuan. It is often so close to forms of the reddish-purplish flowering *G. blinii* that only the longer lanceolate leaves, the more flower-rich cymes, and the white to greenish flower color of *G. pratii* help to separate them. Otherwise, *G. pratii* seems to link *G. asperifolium* and *G. tokyoense*. From the first it differs by less-bracteate inflorescences and less-acuminate corolla lobes, from the second by its leaves, which are lanceolate and apically more gradually narrowed (vs. subspatulate and apically rounded, mucronate).


细毛拉拉藤 *xi mao la la teng*

Herbs, perennial, procumbent and ascending, caespitose, (5–)10–20(–40) cm tall. Stems with 4 prominent whitish angles, variable from ± densely hispid with straight trichomes of ca. 0.8 mm to retrorsely (very rarely also antrorsely) aculeolate. Middle stem leaves in whorls of up to 5 or 6 (never only 4), subsessile; blade drying blackish, narrowly oblanceolate to narrowly lanceolate, (3–)5–10(–17) × 0.8–2(–4.2) mm, hispid, retrorsely aculeolate on midrib and margins or glabrescent, base cuneate, apex acute and shortly mucronate; vein 1, whitish. Inflorescences with axillary and/or terminal cymes, few to several flowered; peduncles divaricate, with leaflike bracts, 1–3 mm; pedicels 0.5–3 mm. Ovary ovoid, ca. 0.6 mm, densely hispidulous, glabrescent or glabrous. Corolla purple, yellowish green, or white, rotate, 2.5–3 mm in diam., lobed for 2/3 or more, glabrous; bracts none or few, 1–2 mm; pedicels 0.5–3 mm. Ovary ovoid, ca. 0.6 mm, densely hispidulous, glabrescent or glabrous. Corolla purple, yellowish green, or white, rotate, 2.5–3 mm in diam., glabrous or scaberulous inside; lobes 4, ovate, acute. Fruit subglobose, 2 cm in diam., with dense to sparse ± unicinate trichomes 0.5–0.7 mm or glabrous and smooth. Fl. and fr. May–Aug.

Mountain slopes, open ground and grasslands; 2100–3900 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Bhutan, Nepal].

*Galium pusillosetosum* is an obvious alpine member of the *G. asperifolium* group (G. sect. *Trachygalium* s.l.). Main differential characters are its relatively dense leaf and stem indumentum and its conspicuous whitish stem angles. These separate it from *G. acutum*, *G. baldensisforme*, *G. megacyttarion*, *G. rebae*, *G. glabriusculum*, and *G. sungnanae*. Nevertheless, its variability with respect to leaf epidermal cell size, flower color, and ovary and fruit indumentum is remarkable.


芮苞拉拉藤 *ruí bāo la la teng*

? *Galium bodinieri* L. Héveilî.

Herbs, perennial, procumbent and mat-forming. Stems (5–)14–30(–45) cm, 4-angled or -sulcate, branched, glabrous and smooth, but sometimes with scattered straight hairs. Leaves in whorls of up to 6, sessile; blade drying papery, blackish, linear-lanceolate to narrowly oblanceolate, 2.5–10.5 × 0.4–1.4 mm, with inconspicuous epidermal cells, glabrous and smooth, rarely with a few straight hairs on abaxial midvein, base cuneate, margins entire and smooth, flat to thinly revolute, apex acute, contracted and shortly mucronate; vein 1. Inflorescences
with predominantly axillary cymes, 1–6-flowered; axes glabrous, smooth; pedicels 0.1–3.2 mm. Ovary ellipsoid-obovoid, ca. 0.5 mm, glabrous, smooth. Corolla red, purple, or occasionally white, rotate, 1.7–3.6 mm in diam., glabrous to papillose; lobes 4, lanceolate-spatulate, adaxially glabrous except puberulent on margins and central vein, apex acute to shortly acuminate. Mericarps ellipsoid, ca. 1.5 × 0.7 mm, glabrous and smooth or granular-verruculose, on pedicels often elongating to 5 mm. Fl. and fr. Jun–Nov.

Damp banks under evergreen forests, alpine meadows, on rocks; 2000–4000 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

Galium rebae belongs to the Himalayan and SW Chinese complex of (sub)alpine taxa from the G. asperifolium group studied by Mill (Edinburgh J. Bot. 53: 193–213. 1996; Fl. Bhutan 2(2): 825–834. 1999). It is closely related to G. acutum and often only separable by its flower color (see comments under that species). At the same time, it appears linked to the likewise reddish flowering but larger G. blinii at lower elevations. Reddish flowers also occur in G. pusilfisetosum, which differs by its dense stem, leaf, and fruit indumentum.


屏边拉拉藤  ping bian la la teng

Herbs, perennial, densely caespitose, emerging from a slender branching rootstock; all vegetative parts very fragile when dried and with a loose indumentum of soft hairs, 0.5–0.8 mm, ± straight and spreading, on upper leaf surface slightly retrorse. Stems ascending or erect, 5–10 cm tall, 4-angled, hairy, with 12–18 internodes, increasing in length from 2–8(–15) mm upward, with some short vegetative lateral branches from middle region to inflorescence base. Leaves in whorls of 4; blade thinly papery and remaining ± greenish when dried, ovate to broadly lanceolate, 5–8 × 2.5–3.5 mm, loosely hairy on both sides and marginally, base truncate, margins ± revolute, apex acute to apiculate; principal veins 3, palmate, lateral weak. Inflorescences terminal, often with 3 cymes, each with 3–5 flowers; bracts few and ± reduced; peduncles 4–5 mm and pedicels 0.5–3 mm, glabrescent, somewhat elongated and divaricate in fruit. Flowers hermaphroditic. Ovary ovoid, ca. 0.5 × 0.3 mm, with still undeveloped appressed hairs. Corolla greenish white, rotate, ca. 1.5 mm in diam., with 4 triangular and acute to slightly apiculate lobes. Mericarps 0.8–1 mm, with spreading unicinate trichomes ca. 0.25 mm. Fl. and fr. Jul–Sep.

Shady habitats, rocks in forests; 1700–2800 m. Sichuan, Yunnan (Gongshan).

The regional Galium salwinense is apparently closely related to the widespread G. bungei. Nevertheless, its habit, elongated pedicels, and fruit surface, always with short and spreading hooked trichomes, offer reliable differential characters.


狭序拉拉藤  xia xu la la teng

Galium densiflorum Ledebour var. saurense (Litvinov) Tzvelev.

Herbs, perennial, caespitose, with stout rootstock and slender, woody rhizomes. Stems erect or ascending, 8–30 cm tall, 4-angled and ± puberulent. Leaves in whorls of 4 in lower and of 6 in middle stem region, sessile; blade dark green adaxially, pale green abaxially, linear or linear-oblong, 7–15 × 0.5–2.5 mm, smooth or usually sparsely to densely scaberulous adaxially, usually densely hairy abaxially, base acute to cuneate, margins ± revolute, apex mucronate; vein 1. Inflorescences narrowly paniculate with axillary and terminal, 3–15-flowered cymes; peduncles bracteose, ± densely pubescent (rarely glabrescent), with 1–3 mm long pedicels. Ovary ellipsoid, ± puberulent. Corolla yellow, rotate, 3–4 mm in diam., lobed for 3/4 or more; lobes 4; ovate-oblong, acute. Mericarps ellipsoid, ca. 2 × 3 mm, ± densely puberulent (rarely glabrous or ± tuberculate). Fl. and fr. Jul–Aug.

Alpine and subalpine habitats. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia].

Galium saurense, a C Asian mountain taxon, belongs to G. sect. Galium and the extremely polymorphic Eurasian G. verum group. It refers to condensed alpine populations, in which the leaf whorls are reduced to 4–6 elements. The Kew Rubiaceae checklist (Govaerts et al., World Checkl. Rubiaceae; http://www.kew.org/wscp/rubiaceae/; accessed on 15 Sep 2010) treats it as a synonym of G. verum subsp. verum, whereas Ehrendorfer et al. (Fl. Iranica 176: 199, 204. 2005) suggest to maintain its specific rank as long as the whole group has not been studied more intensively. In Pobedimova et al. (Fl. URSS 23: 368–369. 1958) G. saurense is reported I.a. from the Tien Shan in the border region of Kazakhstan and Xinjiang, but its description is in conflict with

**隆子拉拉藤 long zi la t-eng**

Herbs, perennial, ascending, 3–10 cm tall. Rootstock woody, rhizomatous. Stems 4-angled, branched, shortly pubescent. Leaves in whorls of 4 (or ?5), sessile; blade drying papyry, ovate or elliptic, 4–6 × 2.5–4 mm, glabrous or sparsely hirtellous, base rounded, margins thinly revolute, usually with antrorse microhairs, apex obtuse or slightly acute; principal vein 1 (or with 2 inconspicuous side veins). Inflorescences terminal and in axils of upper leaves, with cymes 5–8 mm, few or usually 3-flowered; pedicels 1–2 mm. Flowers hermaphroditic to subdioecious. Ovary appressed hairy. Corolla yellowish green, rotate, ca. 2 mm in diam.; lobes 4, ovate-triangular, acute. Mericarps up to 2 mm, with straight lanate hairs. Fl. and fr. Jun–Sep.

*Mountain slopes*; 3600–3800 m. Xizang (Lhünzê) [India, Nepal].


Another isolated and apparently relict species from E Asia has to be compared with *Galium sichuanense*, the Japanese *G. kikumagura* (see also under *G. hoffmeisteri*). The two share the leaves in whorls of 4–6, the small flowers, and the hooked fruit trichomes. In contrast, the habit and the somewhat antrorsely rough or even aculeolate leaf margins of *G. kikumagura* are reminiscent of *G. bungetii* (see *Platygalium*). Unique characters of *G. kikumagura* are the very few-flowered cymes on long peduncles with a single bract and the elongate, curved mericarps. Its taxonomic placement within *Galium* also is uncertain.

49. *Galium glabriusculum* Ehrendorfer, nom. nov.

**无梗拉拉藤 wu geng la t-eng**

Herbs, perennial, weakly procumbent to erect. Stems (5–)7–15(–30) cm, 4-angled, glabrous and smooth, rarely shortly hairy at nodes. Leaves in whorls of up to 5 or 6, sub sessile; blade glinless brown and subleathery when dried, narrowly lanceolate to narrowly elliptic, 3–12 × 1–2.5 mm, glabrous and smooth, very rarely with straight hairs adaxially or slightly retrorsely aculeolate on margins, base cuneate, margins thinly revolute, apex acute and shortly mucronate; vein 1. Inflorescences terminal and lateral 1–3-flowered cymes on up to 10 mm long peduncles (often elongating in fruit) and with sub sessile flowers on 0.5–3 mm long pedicels. Ovary sub globose, ca. 1 mm, densely covered with undeveloped trichomes. Corolla white, rotate, ca. 1.5 mm in diam.; lobes 4, ovate, obtuse. Mericarps ellipsoid, ca. 3 mm, with dense spreading yellowish brown uncinate trichomes ca. 0.7 mm. Fl. and fr. Jul–Aug.

*Meadows, alpine mountain slopes*; 3800–4700 m. Sichuan (Daocheng).

*Galium glabriusculum* is a well-documented species of the alpine subgroup (2) within the *G. asperfolium* complex (see under that species and *G. acutum*). It is similar to *G. sunganense* and *G. baldensisforme*...
and mainly differs from the former by its narrower and more leathery leaves and from both by the nearly total lack of indumentum.


猪殃殃  zhu yang yang

Galium agrestre Wallroth; G agrestre var. echinospermum Wallroth; G agrestre var. leiospermum Wallroth; G aparine Linnaeus var. echinospermum (Wallroth) T. Durand; G aparine f. leiocarpum Makino; G aparine var. leiospermum (Wallroth) T. Durand; G aparine var. spurium (Linnaeus) W. D. J. Koch; G aparine var. tenerum (Grenier & Godron) H. G. Reichenbach; G aparine var. vaillantii (Candolle) W. D. J. Koch; G hongnoense H. Léveillé; G oliganthum Nakai & Kitagawa; G pauciflorum Bunge (1833), not Willdenow ex Candolle (1830); G spurium var. echinospermum (Wallroth) Hayek; G spurium var. tenerum Grenier & Godron; G vaillantii Candolle; G vitataicum Hurasawa.

Herbs, annual, procumbent or climbing, 30–50 cm tall. Stems 4-angled, 0.5–2.5 mm in diam., ± branched from base, retrorsely aculeate on angles, glabrescent to pilose at nodes. Leaves at middle stem region in whorls of 6–8, subsessile; blade drying papery, narrowly oblong-obovate to narrowly oblong-obovate, 5–40 × 1–5(–8) mm, usually pilosulous or hirsutulous adaxially, retrorsely aculeate along midrib abaxially and along margins, base acute, margins flat to thinly revolute, apex acute and shortly mucronate; vein 1. Inflorescences terminal and axillary, cymes 2– to several flowered; axes glabrous to aculeate; bracts leaflike or none, 1–5 mm; pedicels 1–4 cm; pedicels 0.5–15 mm, finally elongating and often curved directly under fruit. Ovary subglobose, 0.3–0.5 mm, with unicinate trichomes or glabrous. Corolla yellowish green or white, rotate, 1–1.5 mm in diam., lobed for 2/3 or more; lobes 4, triangular to ovate, acute. Mericarps subglobose to broadly kidney-shaped, 1–3 mm in diam., glabrous or often densely covered with unicinate trichomes 0.1–1 mm from straight bases. Fl. Mar–Jul, fr. Apr–Nov.

Open fields, riversides, farmlands, mountain slopes; near sea level to 4600 m. Common and widespread throughout China except Hainan and mainly differs from the former by its narrower and more leathery leaves and from both by the nearly total lack of indumentum. Fl. China 19: 104–141. 2011.

Besides, perennial, slender, with tender rootstock. Stems procumbent or ascending, up to 30 cm, 4-angled, ± retrorsely aculeate to somewhat hirsutulous or smooth. Leaves in whorls of up to 5 or 6, sessile or narrowed to very short petiole; blade drying greenish brown and stiffly papery to subleathery, oblong-obovate or narrowly elliptic-obovate, 3.5–12(–15) × 1.5–3.5 mm, glabrous to ± hirsutulous, sparsely to densely retrorsely aculeate along margins and sometimes also on abaxial side of midrib, margins thinly revolute, apex acute and cuspidate; vein 1. Inflorescences with terminal and axillary cymes, 1–3-flowered with lanceolate bracts; pedicels up to 10 mm, glabrous and smooth; pedicels 2–7 mm, straight and elongating in fruit. Ovary obovoid, 0.5–0.8 mm, densely covered by undeveloped unicinate trichomes. Corolla pinkish or ± purplish, rotate, 1.1–1.5 mm in diam., glabrous; lobes 4, triangular, obtuse. Fruit with obvoid mericarps, ca. 2.5 mm, densely covered with spreading yellowish brown unicinate trichomes 0.4–0.8 mm. Fl. and fr. Jul–Sep.

- Thickets or meadows, often in shady places; higher elevations up to 3300 m. Hebei, Sichuan, Xinjiang.

The description of Galium sungpanense in FRPS 71(2): 233. 1999) includes some details that do not agree with the material seen and may have been based in part on specimens of other taxa. This has been corrected in the above description.

Galium sungpanense belongs to the throughout-perennial G sect. Trachygalium s.l. and the G asperifolium group (see there). It appears to link its montane (1) and alpine (2) subgroups and shares the few-flowered cymes with the latter. From G baldensiforme and G glabriusculum, both also with unicinate hairy fruit, it is separated by marginally stronger retrorsely aculeate and partly longer leaves.

Remarkable are the close affinities between Galium sungpanense and members of the annual G sect. Euparinae. The single decisive difference is the tender perennial (and possibly short-lived?) rootstock of G sungpanense. Only its pinkish to purplish flowers and the never-curved fruiting pedicels allow the separation of plants collected without...
subterranean organs from the common G. spurium. This suggests that G. sect. Euaparine could have originated from G. sect. Trachygalium-like ancestors.


Herbs, perennial, procumbent. Stems 4-angled, sparsely scaberulous. Leaves on main stems in whorls of up to 6, sessile; blade drying ?papery, oblanceolate or narrowly obovate-oblong, (4–)10–20(–31) × (1–)2–4 mm, glabrous and smooth adaxially, glabrous or hairy and retrorsely aculeolate along midrib abaxially and along margins, base acute to cuneate, apex acute or acuminate; vein 1. Inflorescences with terminal and axillary cymes; pedicels 3–5 mm. Ovary ovoid, ca. 0.7 mm, glabrous. Corolla ?white, rotate, 2–2.5 mm in diam., lobed for 2/3 or more; lobes 4, ovate, obtuse. Mericarps ellipsoid, 1–1.5(–2) mm, with dense, appressed uncinate trichomes ca. 0.3 mm. Fl. and fr. summer–winter.

- Shady sites on limestone substrates; 1400–2700 m. Taiwan.

Galium tarokoense belongs to a group of high mountain taxa from Taiwan, including G. morii (see there). Its main differential characters are the lack of indumentum on most parts, the only 1-nerved leaves, and the short appressed fruit hairs.


Herbs, annual, erect. Stems (10–)30–50(–60) cm tall, with strong, intricate and divaricate branching from base, 4-angled, usually retrorsely aculeolate, more rarely glabrescent to smooth. Leaves at middle stem region in whorls of 6–8, subsessile or sessile; blade drying papery, linear to oblanceolate, (4–)8–15(–20) × 0.5–1(–2) mm, mostly glabrous and sparsely to densely antrorsely aculeolate near margins and on veins abaxially, base straight to acute, apex acute to acuminate-aristate; vein 1. Inflorescences broadly paniculate, very lax and loosely divaricate, cymes axillary and terminal, with 3–11(–14) flowers; axes glabrous or sparsely hispidulous; bracts none or small, leaflike; pedicels 3–15 mm, strongly elongating in fruit up to 20 mm. Ovary ovoid to ellipsoid, ca. 0.8 mm, glabrous. Corolla whitish, pale yellow, or greenish, rotate to slightly cup-shaped, 1.5–2 mm in diam., glabrous; lobes 4, oblong-elliptic, acute to aristate. Mericarps ellipsoid to ovoidob, ca. 1 × 1.25 mm, glabrous, smooth or ± tuberculato. Fl. and fr. May–Jul.

Open mountain slopes; 300–2800 m. Xinjiang (Xinyuan) [Kashmir, Kyrgyzstan, Pakistan, Russia, Turkmenistan; SW Asia (Armenia, Georgia, Iran, Iraq, Lebanon, Syria, Turkey), Europe (Balkan Peninsula, Hungary)].

Galium tenuissimum is a member of the annual G. sect. Microgali um, differentiated by antrorsely aculeolate leaf margins. It is widespread through SE Europe, SW and C Asia, and reaches its eastern limit in NW China.


Herbs, perennial, erect or ascending but not clambering. Stems 30–70 cm tall, 4-angled, retrorsely aculeolate. Middle stem leaves in whorls of 5 or 6, subsessile; blade drying papery, subspatulate to obovate, (11–)17–35(–40) × (2.5–)3–7(–10)
mm, mostly retrorsely aculeolate adaxially, along midrib abaxially and always along margins, base acute, apex rounded to emarginate, abruptly cuspidate; vein 1. Inflorescences congested, cymes terminal and in axils of uppermost leaves, several to many flowered, up to 4 cm; axes rough or glabrous and smooth; bracts few and small, only on lower inflorescence branches; pedicels 1–2 mm. Ovary obovoid, ca. 0.8 mm, glabrous. Corolla white, rotate, 1.3–3.5 mm in diam., glabrous; lobes acute to obtuse. Mericarps obovoid, ca. 2 mm, glabrous, smooth or tuberculate. Fl. and fr. Jun–Jul.

Forests, grasslands, meadows, riversides, open fields; 200–900 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong [Japan, Korea].

Cufodontis (Oesterr. Bot. Z. 89: 243–244. 1940) and W. C. Chen (in FRPS 71(2): 256. 1999) treated *Galium tokyoense* as a variety of *G. dahuricum* (see discussion under that species), but in the recent *Flora of Japan* (Yamazaki, Fl. Japan 3a: 239. 1993) it is again regarded as a separate species. As a view of its erect (not clambering) growth, the abruptly acuminate leaf shape, the short and post-florally not elongated pedicels, and the always glabrous fruit this rank appears quite justified.


麦仁珠 mai ren zhu

Herbs, annual, weakly ascending to procumbent or clambering. Stems 5–80 cm tall, 4-angled, often little branched, glabrescent, densely retrorsely aculeolate on angles. Leaves in whorls of 6–8, subsessile; blade drying papery, narrowly oblanceolate to thinly revolute, apex acute, obtuse, or rounded and abruptly mucronate; vein 1. Inflorescences with axillary and terminal cymes on upper 2 or 3 nodes, mostly 2–8-flowered; axes glabrous, smooth; bracts none or few, narrowly elliptic to narrowly lanceolate, 2–5 mm; pedicels ca. 1.5 mm. Ovary obovoid, ca. 0.5 mm, densely hispidulous with undeveloped trichomes. Corolla white or pale green, rotate, 1.5–2 mm in diam., glabrous; lobes 4, triangular, acute. Mericarps ellipsoid, 1.5–2.5 mm, with dense uncinate trichomes ca. 1 mm, fruiting pedicels divaricate and elongating to 10 mm. Fl. and fr. Jul–Sep.

Mountain forests, open fields; 2200–3400 m. Heilongjiang, Jilin, Nei Mongol, Qinghai [Japan, Korea, NE Russia].

*Galium tricorniforme* is a variable and problematic taxon from NE Asia. It was either accepted as a separate species (e.g., by Pobedimova et al., Fl. URSS 23: 303. 1958; Yamazaki, Fl. Japan 3a: 239. 1993) or was treated as a synonym of *G. triflorum* (see Cufodontis, Oesterr. Bot. Z. 89: 236–237. 1940) or of *G. hoffmeisteri* (e.g., W. C. Chen in FRPS 71(2): 230. 1999, as *G. asperuloides* subsp. *hoffmeisteri*; Govaerts et al., World Checkl. Rubiaceae; http://www.kew.org/wcsp/rubiaceae/; accessed on 15 Sep 2010). It differs from the very close typical *G. triflorum* by its more condensed inflorescence with cymes terminal and on the upper 1 or 2(3) nodes, its always retrorsely aculeolate leaf margins, and its mostly rough stems.

These differential characters make *Galium tricorniforme* a link between members of G sect. *Hylaee*, with smooth stems and antrorsely directed microhairs on leaf margins, and of the *G. asperifolium* group of G sect. *Trachygalium*, mostly with retrorsely aculeolate stems and antrorsely directed microhairs on leaf margins (but often also with antrorsely directed microhairs on the adaxial leaf surface). From the available material, it appears that *Galium tricorniforme* applies to the central part of this practically continuous morphological series. This series begins with *G. odoratum*, *G. hoffmeisteri*, *G. echinocarpum*, *G. nipponicum*, and typical *G. triflorum* on the side of G sect. *Hylaee*, continues via *G. triflrorum var. asperriforme* Fernald and *G. triflorum* var. *asperriforme*, and ends on the other side with *G. asprelliforme*, *G. dahuricum*, *G. blinii*, and other typical members of the *G. asperifolium* group of G sect. *Trachygalium*. It is remarkable that this transitional series apparently corresponds to a polyploid complex with marginal taxa including 2x, *G. triflorum* 4x-, and 6x-, and *G. trifloriforme* × 10x-cytopotypes. Thus, phylogenetic reticulation may have caused the still insufficiently resolved taxonomic confusion around *G. triflorum*, *G. tricorniforme*, and their relatives (cf. Pobedimova et al., loc. cit.: 287–381; Cufodontis, loc. cit.; Yamazaki, loc. cit.; Ehrendorfer et al., Fl. Iranica 176: 182. 2005).
flowered, 2–15 cm; peduncles glabrous or scabrous; bracts few, oblanceolate, 1–2 mm; pedicels 1–4 mm. Ovary ellipsoid and laterally flattened, ca. 1 mm. Corolla whitish, rotate, 4–5 mm in diam.; lobes 4(0 or 5), elliptic to lanceolate, acute or mucronulate. Mericarps ellipsoid, at least 2 mm, glabrous or with ± sparse hooked trichomes ca. 0.3 mm. Fl. Jul.–Aug, fr. Aug.–Sep.

Meadows and dry slopes in the (sub)alpine zone. Expected in Xinjiang [Kazakhstan, Russia].

*Galium turkestanicum* is included as a dubious species for W China by W. C. Chen (FRPS 71(2): 285. 1999). It belongs to the extremely polymorphic *G. boreale* group of *G. sect. Platygalium* s.l. and represents a particularly vigorous taxon with very narrow leaves and lateral leaf veins only weakly developed (Ehrendorfer et al., Fl. Iranica 176: 180. 2005). Pobedimova (loc. cit.) gives its distribution as including the Tien Shan. Therefore, it probably also occurs in NW China, Xinjiang.


*Galium uliginosum* is a typical member of *G. sect. Trachygalium* and closely related to the *G. rivale* group, represented in China by *G. karatavisci*. It differs from it by a much more slender habit and much shorter corolla tubes. All other Chinese species of *G. sect. Trachygalium* s.l. have rotate corollas.

We have seen specimens of *Galium uliginosum* from Xinjiang only. In view of the more northerly distribution of the species, the indications for Sichuan and Yunnan (in FRPS 71(2): 258. 1999) may refer to another taxon and should be verified.


*Galium verum* is a typical member of *G. sect. Trachygalium* and closely related to the *G. rivale* group, represented in China by *G. karatavisci*. It differs from it by a much more slender habit and much shorter corolla tubes. All other Chinese species of *G. sect. Trachygalium* s.l. have rotate corollas.

We have seen specimens of *Galium uliginosum* from Xinjiang only. In view of the more northerly distribution of the species, the indications for Sichuan and Yunnan (in FRPS 71(2): 258. 1999) may refer to another taxon and should be verified.


*Galium triflorum* is obviously rare in China and does not occur in the Himalaya, as already suspected by Pobedimova et al. (Fl. URSS 23: 300–303. 1958). We have seen only two non-flowering specimens from SW China (Guizhou: Northern Qian [Guizhou] Team 907, PE; Sichuan: G. H. Yang 54472, PE), which apparently belong here. Indications for Sichuan and Yunnan (in FRPS 71(2): 258. 1999) may refer to another taxon and should be verified.

Mountain forests; 1500–2000 m. Guizhou, Sichuan [Japan, Korea, Russia; Europe, North America].

*Galium triflorum* is obviously rare in China and does not occur in the Himalaya, as already suspected by Pobedimova et al. (Fl. URSS 23: 300–303. 1958). We have seen only two non-flowering specimens from SW China (Guizhou: Northern Qian [Guizhou] Team 907, PE; Sichuan: G. H. Yang 54472, PE), which apparently belong here. Indications for more northern provinces by W. C. Chen (FRPS 71(2): 232. 1999) have been listed here under *G. trifloriforme* (see there), a taxon not recognized as distinct by W. C. Chen (loc. cit.: 230). Both taxa urgently need more detailed study. *Galium triflorum* is very similar and morphologically subcontinuous with *G. trifloriforme* but differs from it by its more elongate inflorescences, mostly smooth stems, and particularly by its antrorse aculeolate leaf margins. This latter character clearly places it into *G. sect. Hylaecia* and into the close neighborhood of *G. hoffmeisteri* on the mainland, *G. echinocarpum* on Taiwan, and *G. nipponicum* in Japan.

*Galium trifloriforme* is a typical member of *G. sect. Trachygalium* and closely related to the *G. rivale* group, represented in China by *G. karatavisci*. It differs from it by a much more slender habit and much shorter corolla tubes. All other Chinese species of *G. sect. Trachygalium* s.l. have rotate corollas.

We have seen specimens of *Galium uliginosum* from Xinjiang only. In view of the more northerly distribution of the species, the indications for Sichuan and Yunnan (in FRPS 71(2): 258. 1999) may refer to another taxon and should be verified.
bracteose; axes usually densely puberulent, hirtellous, rarely glabrous and smooth; bracts ± leaflike, 1.5–3 mm; pedicels 1–3 mm. Flowers fragrant, hermaphrodite. Ovary ellipsoid to sub-globose, 0.5–0.8 mm, glabrous to densely hairy with straight trichomes. Corolla yellow to white, rotate, ca. 3 mm in diam., glabrous, lobed for 3/4 or more; lobes 4, lanceolate-oblong, subobtuse, acute to acutipulate. Mericarps ellipsoid and laterally flattened, 1.5–2 mm, glabrous to densely hispidulous with straight trichomes. Fl. Apr–Aug, fr. May–Oct.

Mountains, grasslands, meadows, river beaches, open fields, ditch sides, streambeds, wet places, forests, thickets, valleys; near sea level to 4100 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Russia].

Although W. C. Chen (loc. cit.: 268) included Japan in the distribution of this variety, its name is not mentioned in Fl. Japan. According to Yamazaki (loc. cit.: 240) treated this as a form within *Galium verum* subspp. *asiaticum* and listed *G. verum* f. *nikkoense* as a synonym of *G. verum* f. *lacteum*.

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*Galium verum* subsp. *asiaticum* (Nakai) T. Yamazaki.


Mountain grasslands, open fields, river beaches; below 100–1700 m. Anhui, Gansu, Hebei, Heilongjiang, 'Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Russia].

According to Yamazaki (Fl. Japan 3a: 240. 1993) *Galium verum* subspp. *asiaticum* includes all Japanese forms of *G. verum* and differs from the typical subspecies by longer leaves and hisrate (not minutely pubescent) stems.

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**白花蓬子菜** bai hua peng zi cai


Leaf blade pubescent and scabrous adaxially. Corolla white. Ovary and mericarps glabrous.

Wet places on mountains and in open fields; 500–1000 m. Gansu, Hebei, Heilongjiang, Jinlin, Liaoning, Ningxia, Shaanxi [Japan, Korea].

Yamazaki (loc. cit.: 240) treated this as a form within *Galium verum* subspp. *asiaticum* and listed *G. verum* f. *nikkoense* as a synonym of *G. verum* f. *lacteum*.

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**淡黄蓬子菜** dan huang peng zi cai


Mountain grasslands, open fields; ca. 600 m. Hebei, Liaoning, Shandong [Japan, Europe].

Although W. C. Chen (loc. cit.: 268) included Japan in the distribution of this variety, its name is not mentioned in Fl. Japan.

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**日光蓬子菜** ri guang peng zi cai

*Galium verum* f. *nikkoense* (Nakai) Ohwi.

Leaf blade pubescent and scabrous adaxially. Corolla white. Ovary and mericarps glabrous.

Shandong [Japan].

Yamazaki (loc. cit.: 240) treated this variety as a synonym of *Galium verum* f. *lacteum*.

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**毛蓬子菜** mao peng zi cai


Forests on mountain slopes, farmland sides, grasslands; 400–3100 m. Gansu, Hebei, Heilongjiang, Jinlin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang [Japan].

The type of the name of this variety comes from SW Asia (S Azerbaijan: Talish) and may not fully conform to the Chinese popula-
Mountains, river beaches, open fields, ditch sides, grasslands, meadows, thickets, forests; near sea level to 4000 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [India, Japan, Korea, Pakistan; SW Asia, Europe; adventive in North America and elsewhere].

The citation here of *Galium luteum*, a long-recognized synonym of *G. verum* based on a type from France, follows W. C. Chen (loc. cit.: 266). Ehrendorfer et al. (loc. cit.: 200–201) recognized two forms within *G. verum* subsp. *verum*, separated by density and distribution of pubescence: *f. verum* with glabrous ovaries and fruit vs. *f. subpubescens* with pubescent ovaries and fruit. Thus, their *f. subpubescens* corresponds to var. *tomentosum* and var. *trachycarpum* of Cufodontis (loc. cit.: 216–219) and W. C. Chen (loc. cit.: 268–269).


*Galium yunnanense* Wallich var. *angustifolium* Cufodontis; *G. elegans* var. *nemorosum* Cufodontis.

Herbs, perennial, procumbent to scrambling or matted, up to 1 m, from slender rhizomes. Stems glabrescent and smooth to sparsely or moderately pilose to villous or retrorsely hispid, nodes more densely hairy, angles 4, usually thickened. Leaves in whorls of 4, subsessile; blade drying membranous, green, elliptic, ovate-lanceolate, or lanceolate, 5–50 × 3–15 mm, length/breadth index normally above 2.5, adaxially hispidulose to hirsute, abaxially glabrescent to densely pilose and usually glandular-punctate, base cuneate to obtuse, margins sparsely to densely pilose or antrorsely ciliate, apex acute to acuminate and often mucronulate; principal veins 3, palmate. Inflorescences terminal and in axils of uppermost leaves, paniculate, many flowered, 2–12 cm, diffusely branched; pedicels pilose to glabrescent; bracts inconspicuous, ligulate to ovate, 1.5–2.5 mm, often lacking upward; pedicels 2.5–7 mm. Flowers dioecious, polygamous, or ?hermaphroditic. Ovary obovoid, ca. 0.5 mm, densely appressed hairy. Corolla white, rotate, 1–1.5 mm in diam.; lobes 4, ovate, subacute. Mericarps ovoid, 1.5–2 mm, with dense, uncinate, stilt and spreading, basally white to apically brown trichomes ca. 0.8 mm. Fl. and fr. Jul–Nov.

- Forests, meadows on mountains, riversides, streamsides; 700–3300 m. Gansu, Guangxi, Guizhou, Hunan, Sichuan, Yunnan.

As noted in the protologue, *Galium yunnanense* is similar to *G. elegans* and comprises plants that previously have been included in a more broadly circumscribed *G. elegans*. In particular, the two varieties of *G. elegans* described by Cufodontis in 1940 and cited as synonyms above now key to *G. yunnanense*. In spite of its variability and occasional forms approaching *G. bungei* (see there), the specific separation of *G. yunnanense* from *G. elegans* by Chen (Acta Phytotax. Sin. 28: 301. 1990) seems well justified. It reduces the morphological variation within *G. elegans* and results in a much clearer circumscription of the two taxa.