Flora of China 24: 73–263. 2000.

LILIACEAE

百合科 bai he ke

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Herbs perennial, with a rhizome, bulb, or corm, rarely shrubby or treelike. Leaves basal and/or cauline, alternate, opposite, or whorled, parallel or rarely reticulate veined. Inflorescence a raceme, panicle, spike, umbel, reduced panicle, or other, or flowers solitary. Flowers bisexual, rarely unisexual, actinomorphic, rarely zygomorphic; bracts present or absent; bracteoles present or absent. Perianth usually corollalike, 6-merous, rarely 4- or 8-merous, in 2 whorls; segments free (tepals) or united. Stamens 6, rarely 3, 4, or 8, inserted opposite perianth segments; filaments free or adnate to perianth, rarely connate into a corona; anthers usually 2-loculed, basifixed or dorsifixed and versatile, introrse, latrorse, or extrorse, dehiscing usually by vertical slits. Carpels usually connate for most or all of their length, rarely only at base; ovary superior, rarely semi-inferior, 3-loculed, rarely 2- or 4-loculed, with axile placentae, or rarely 1-loculed with a parietal placenta; ovules usually anatropous. Nectaries septal, perigonal, or absent. Fruit a capsule or berry. Seeds with abundant endosperm and small embryo.

About 250 genera and 3500 species: worldwide, especially in temperate and subtropical regions; 57 genera (three endemic, two introduced) and 726 species (379 endemic, 11 introduced) in China.

The circumscription adopted here for Liliaceae *sensu lato* follows FRPS and is not supported by current phylogenetic analysis of the group. However, the genus order has been adjusted to reflect the more recent classification of Kubitzki (Fam. Gen. Vasc. Pl. 3, 1998), who placed the genera in segregate families as follows: Alliaceae: *Allium*, *Milula*; Anemarrhenaceae: *Anemarrhena*; Anthericaceae: *Chlorophytum*, *Diuranthera*; Asparagaceae: *Asparagus*; Asphodelaceae: *Aloe*, *Eremurus*; Calochortaceae: *Streptopus*, *Tricyrtis*; Colchicaceae: *Disporum*, *Gloriosa*, *Iphigenia*; Convallariaceae: *Aspidistra*, *Campylandra*, *Convallaria*, *Disporopsis*, *Heteropolygonatum*, *Liriope*, *Maianthemum*, *Ophiopogon*, *Peliosanthes*, *Polygonatum*, *Reineckea*, *Rohdea*, *Speirantha*, *Theropogon*, *Tupistra*; Dracaenaceae: *Dracaena*; Hemerocallidaceae: *Dianella*, *Hemerocallis*; Hostaceae: *Hosta*; Hyacinthaceae: *Barnardia*; Liliaceae: *Cardiocrinum*, *Clintonia*, *Erythronium*, *Fritillaria*, *Gagea*, *Lilium*, *Lloydia*, *Nomocharis*, *Notholirion*, *Tulipa*; Lomandraceae: *Cordyline*, *Thysanotus*; Melanthiaceae: *Chionographis*, *Heloniopsis*, *Veratrum*, *Ypsilandra*, *Zigadenus*; Nartheciaceae: *Aletris*, *Petrosavia*, *Tofieldia*; Smilacaceae: *Heterosmilax*, *Smilax*; Trilliaceae: *Paris*, *Trillium*.

The Liliaceae contain many members of economic importance. Notable among them are some species of *Allium*, *Aloe*, *Fritillaria*, *Hemerocallis*, *Lilium*, and *Tulipa*. The genera *Ornithogalum* Linnaeus, *Ruscus* Linnaeus, *Sansevieria* Thunberg, and *Yucca* Linnaeus are represented in China by introduced, cultivated ornamentals. They were treated in FRPS but are not described in this account.

Wang Fa-tsuan & Tang Tsin, eds. 1978; 1980. Liliaceae. Fl. Reipubl. Popularis Sin. 15: 1–280; 14: 1–308.

1a. Herbs saprophytic, without green leaves ..... 2. *Petrosavia*
1b. Plants autotrophic, with green leaves.
2a. Plants cormous or bulbiferous.
3a. Plants cormous.
4a. Perianth segments 7–10 × ca. 1 mm, straight; leaves straight at apex ..... 26. *Iphigenia*
4b. Perianth segments 45–50 × ca. 8 mm, strongly reflexed; leaves with an apical tendril ..... 27. *Gloriosa*
3b. Plants bulbiferous.
5a. Styles 3; anthers reniform, with confluent locules.
6a. Pedicel pubescent; perianth segments not glandular at base ..... 4. *Veratrum*
6b. Pedicel glabrous; perianth segments glandular at base ..... 5. *Zigadenus*
5b. Style 1, simple to 3-fid; anthers not reniform, with 2 separate locules.
7a. Inflorescence an umbel, at first wholly enveloped by a scarious spathe ..... 32. *Allium*
7b. Inflorescence generally not an umbel or, if umbellate, never wholly enveloped by a scarious spathe.
8a. Flowers more than 30, in a dense raceme or spike.
9a. Bulb cylindric; inflorescence spicate; perianth segments partly united; plants with a strong, onionlike odor ..... 33. *Milula*
9b. Bulb ovoid or globose; inflorescence racemose; perianth segments free; plants without a strong, onionlike odor ..... 34. *Barnardia*
8b. Flowers 1–20, in a lax inflorescence.
10a. Leaves 2, apparently opposite; perianth segments strongly reflexed ..... 16. *Erythronium*
10b. Leaves generally more than 2; perianth segments not reflexed.
11a. Leaves cordate to ovate, reticulate veined ..... 19. *Cardiocrinum*
11b. Leaves neither cordate nor ovate, parallel veined.
12a. Bulbs with fleshy, farinaceous scales; perianth segments each with a concave nectary near base adaxially ..... 17. *Fritillaria*
12b. Bulbs without fleshy, farinaceous scales; perianth segments without a concave nectary.

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13a. Anthers pseudobasifixed; axis of seed usually straight or slightly curved; leaves basal or cauline.
14a. Basal leaves not arising from bulb but from underground stem; bulb more than 1 cm in diam.; perianth more than 2 cm, deciduous after anthesis ..... 15. *Tulipa*
14b. Basal leaves arising from bulb; bulb usually 4–5 mm in diam.; perianth less than 2 cm, persistent after anthesis.
15a. Perianth segments ± hardened and enlarged after anthesis, 1.5–2 × as long as capsule ..... 13. *Gagea*
15b. Perianth segments withered after anthesis, neither hardened nor enlarged, often shorter than capsule ..... 14. *Lloydia*
13b. Anthers dorsifixed and versatile; axis of seed moderately to strongly curved; leaves cauline or at least mostly so.
16a. Bulb with a brown, scarious tunic; bulbels many, around roots; style 3-fid, apically recurved; seeds wingless ..... 18. *Notholirion*
16b. Bulb naked; bulbels absent; style apically with 3 stigmatic crests; seeds winged.
17a. Perianth segments similar, usually without spots or blotches ..... 20. *Lilium*
17b. Inner perianth segments larger than outer ones, generally all segments with dark spots or blotches ..... 21. *Nomocharis*
2b. Plants not bulbiferous or cormous, but often producing rhizomes or other underground organs.
18a. Leaves reduced to scales; branchlets becoming leaflike (cladodes), needlelike or linear, 0.2–3 mm wide, numbering several hundred in a single plant ..... 41. *Asparagus*
18b. Leaves not reduced to scales; branchlets not as above, fewer than 100 in a single plant.
19a. Fruit bursting irregularly at an early stage and exposing seeds; seeds ellipsoid to globose, each resembling a berry or small drupe.
20a. Leaves subplicate veined, with transverse venation between main veins; filaments united into a ring nearly closing mouth of perianth ..... 57. *Peliosanthes*
20b. Leaves parallel veined, without clear, transverse venation between main veins; filaments not forming a ring.
21a. Leaves longitudinally whitish striped; flowers ± nodding; ovary semi-inferior; filaments much shorter than anthers; seeds blue ..... 56. *Ophiopogon*
21b. Leaves not whitish striped; flowers erect or suberect; ovary superior; filaments longer than or as long as anthers; seeds blackish ..... 55. *Liriope*
19b. Fruit a berry or capsule, never bursting before seed maturation.
22a. Leaves 3–15 in 1 whorl; outer perianth segments leaflike.
23a. Leaves usually 4–15 in 1 whorl; flowers 4-merous or more, inner perianth segments much narrower than outer ones ..... 9. *Paris*
23b. Leaves 3 in a whorl; flowers 3-merous, inner perianth segments only a little narrower than outer ones .... 10. *Trillium*
22b. Leaves not in 1 whorl; outer perianth segments not leaflike.
24a. Flowers unisexual; leaves reticulate veined between 3 or 5 main veins; plants mostly shrubby climbers.
25a. Perianth segments free (except in *Smilax synandra*) ..... 11. *Smilax*
25b. Perianth segments united into a tube ..... 12. *Heterosmilax*
24b. Flowers bisexual; leaves parallel veined; plants not woody climbers.
26a. Leaves succulent ..... 29. *Aloe*
26b. Leaves never succulent.
27a. Stems ± woody and continuously thickened, with clear leaf scars in apical part; leaves usually crowded at or toward apex of stem or branches.
28a. Petiole 10–30 cm, leaf blade with veins essentially parallel but with lateral veins branching from midvein in proximal 1/2; ovary with 2 to many ovules per locule ..... 36. *Cordyline*
28b. Petiole absent to 8 cm, leaf blade with veins truly parallel from base, lateral veins absent; ovary with 1 or 2 ovules per locule ..... 42. *Dracaena*
27b. Stems not woody, without leaf scars.
29a. Fruit a capsule.
30a. Flowers clearly zygomorphic, upper 3 or 4 perianth segments much larger than lower ones ..... 8. *Chionographis*
30b. Flowers actinomorphic.
31a. Styles 3.
32a. Leaves laterally flattened, basally equitant, sword-shaped; bracteole cupular; pedicel glabrous; anthers ovate, with 2 separate locules ..... 1. *Tofieldia*
32b. Leaves not laterally flattened; bracteole absent; pedicel pubescent; anthers reniform, with confluent locules ..... 4. *Veratrum*
31b. Style 1, simple to 3-parted.
33a. Perianth proximally adnate to semi-inferior ovary ..... 3. *Aletris*
33b. Perianth not adnate to superior ovary.
34a. Stem elongate, ascending; leaves cauline; 3 stigma lobes each 2-parted at apex ..... 23. *Tricyrtis*

34b. Stem very short; leaves basal or nearly so; stigma not as above.
35a. Stamens 3 ..... 40. *Anemarrhena*
35b. Stamens 6.
36a. Perianth segments united.
37a. Leaves basally abruptly tapered into a petiole; flowers purplish to white ..... 37. *Hosta*
37b. Leaves linear, basally not tapered into a petiole; flowers yellowish to reddish ... 31. *Hemerocallis*
36b. Perianth segments free.
38a. Flowers not subtended by bracts; leaves basally gradually tapered into a petiole.
39a. Inflorescence racemose or spicate; anthers basifixed, usually reniform, with ± confluent locules ..... 6. *Ypsilandra*
39b. Inflorescence umbellate or umbellate-racemose; anthers dorsifixed, lanceolate, with locules separate or confluent only at apex ..... 7. *Heloniopsis*
38b. Flowers subtended by bracts; leaves ± linear or filiform, basally not tapered into a petiole.
40a. Leaves filiform, ca. 1 mm wide; inflorescence an umbel ..... 35. *Thysanotus*
40b. Leaves ± linear, more than 2 mm wide; inflorescence a raceme or a panicle.
41a. Perianth segments 1.7–4 cm; base of anthers with 2 prominent, caudate appendages 1–3 mm ..... 39. *Diuranthera*
41b. Perianth segments usually 1–1.5 cm; base of anthers with 2 lobes to 0.5 mm.
42a. Flowers more than 50, densely arranged in a terminal raceme; capsule globose, not angled ..... 28. *Eremurus*
42b. Flowers several to 20, laxly arranged in a terminal panicle or occasionally a raceme; capsule usually broadly globose, 3-angled ..... 38. *Chlorophytum*

29b. Fruit a berry.
43a. Filaments swollen immediately below anther; leaves scabrous along midvein abaxially and at margin ..... 30. *Dianella*
43b. Filaments not as above; leaves never scabrous along midvein abaxially, rarely so at margin.
44a. Stem elongate; leaves cauline.
45a. Perianth segments free.
46a. Inflorescence racemose with pedicels less than 6 mm or paniculate, axis elongate, ± ascending; stem simple; plants not stoloniferous ..... 43. *Maianthemum*
46b. Inflorescence usually 1-flowered or umbellate, rarely racemose with pedicels more than 1 cm, axis short, nodding; stem often branched; plants sometimes stoloniferous.
47a. Perianth segments basally neither saccate nor spurred ..... 24. *Streptopus*
47b. Perianth segments basally ± saccate or spurred ..... 25. *Disporum*
45b. Perianth segments united.
48a. Inflorescence terminating a stem (pseudoterminal leaf absent).
49a. Inflorescence only terminal, ± ascending, racemose or paniculate, pubescent; anthers positioned at perianth mouth or exserted from perianth; plants hemicryptophytic ..... 43. *Maianthemum*
49b. Inflorescences often both terminal and axillary, nodding, racemose or subumbellate, often 1- or 2-flowered, sometimes 3–6-flowered, glabrous; anthers included in perianth; plants epiphytic ..... 44. *Heteropolygonatum*
48b. Leaf terminating a stem (pseudoterminal leaf present).
50a. Corona absent; filaments inserted on perianth tube; rhizome never green ..... 45. *Polygonatum*
50b. Corona present; filaments inserted on corona; rhizome mostly green ..... 46. *Disporopsis*
44b. Stem very short; leaves basal or nearly so.
51a. Perianth segments free.
52a. Plants sympodial; anthers subextrorse; scape pubescent ..... 22. *Clintonia*
52b. Plants monopodial; anthers introrse; scape glabrous.
53a. Leaves oblong to oblanceolate, 3–5 cm wide, basally tapered into a petiole; bracteole absent; anthers dorsifixed and versatile ..... 48. *Speirantha*
53b. Leaves grasslike, 4–12 mm wide, sessile; bracteole present; anthers basifixed ..... 47. *Theropogon*
51b. Perianth segments united.
54a. Scape arising from a creeping rhizome, with 1 flower apically ..... 54. *Aspidistra*
54b. Scape arising from a leaf tuft, with a several- to many-flowered inflorescence apically.
55a. Inflorescence a raceme; flowers nodding; leaf bases forming a pseudostem ..... 49. *Convallaria*
55b. Inflorescence a spike; flowers erect; pseudostem absent.
56a. Perianth lobes reflexed; anthers lanceolate; rhizome slender, 2–4 mm in diam. ..... 50. *Reineckea*
56b. Perianth lobes spreading to inflexed; anthers ovate to suborbicular; rhizome usually

stout, (2–)6–30 mm in diam.

57a. Perianth lobes very small, inflexed ..... 52. *Rohdea*

57b. Perianth lobes 1/3–1/2 as long as tube, spreading to incurved.

58a. Anthers positioned higher than or as high as stigma; style short, 1(–3.5) mm, or absent; stigma small, 3-lobed ..... 51. *Campylandra*

58b. Anthers positioned lower than stigma; style long, 4–12 mm; stigma large, 2–7 mm in diam., peltate to mushroom-shaped ..... 53. *Tupistra*

1. TOFIELDIA Hudson, Fl. Angl., ed. 2, 157 ["175"]. 1778.

岩菖蒲属 yan chang pu shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, with a short, ascending rhizome. Leaves basal or nearly so, 2-ranked, basally equitant, sword-shaped, laterally flattened. Scape erect, slender, apically with a many-flowered raceme or rarely a spike. Flowers bisexual, arising from axils of bracts, small, often subtended by 1 cupular or rarely 3 nearly free bracteoles. Perianth segments 6, free or basally connate, persistent. Stamens 6, often free, sometimes connate at base or inserted at base of perianth segments; anthers ovate, basifixed or subdorsifixed, introrse to latrorse. Ovary superior, usually ovoid, 3-lobed apically, stipitate or sessile; ovules numerous; septal nectaries often present. Styles 3, rather short, with introrse stigmas. Fruit a septicidal capsule, 3-loculed, sometimes folliclelike due to very deep clefts. Seeds small, usually linear to oblong.

About 20 species: mainly in subarctic, temperate, and subtropical regions of the N hemisphere; three species (two endemic) in China.

Although Tamura (in Kubitzki, Fam. Gen. Vasc. Pl. 3: 389. 1998) placed *Tofieldia* in the Nartheciaceae, Wu Zhengyi (editor's note) believes it should be treated in the segregate family Tofieldiaceae, as was done by Takhtajan (Diversity Classific. Fl. Pl. 478. 1997).

1a. Style nearly as long as anthers; capsule globose, 2–2.5(–3) mm in diam., apically scarcely or slightly 3-lobed, with persistent, conspicuously thickened stigmas; pedicel 0.5–0.8 mm at anthesis ..... 1. *T. coccinea*

1b. Style obviously longer than anthers; capsule ellipsoid or obovoid, apically 3-lobed to 3-parted, with persistent stigmas not thickened; pedicel (1–)1.5–12 mm at anthesis.

2a. Seeds without a white, longitudinal band; pedicel (1–)1.5–3(–7) mm; capsule horizontal to nodding ..... 2. *T. divergens*

2b. Seeds with a white, longitudinal band on 1 side; pedicel (3–)5–12 mm; capsule suberect ..... 3. *T. thibetica*

1. Tofieldia coccinea Richardson in Franklin, Narr. Journey Polar Sea, 736. 1823.

长白岩菖蒲 chang bai yan chang pu

Tofieldia fauriei H. Léveillé & Vaniot; *T. nutans* Willdenow; *T. taquetii* H. Léveillé & Vaniot.

Leaves 2.5–7(–8) cm × 2–3(–4) mm, rather rigid, margin scabrous, apex acuminate, veins inconspicuous. Scape 5–16 cm, with 1 or 2 short, linear leaves in proximal part. Racemes 7–30 mm, densely many flowered. Flowers horizontally spreading or more often nodding; pedicel 0.5–0.8 mm at anthesis, elongate to 1.5–2(–3.5) mm in fruit; bracteole 1, cupular, apically 3-lobed, rarely to 3-fid. Perianth segments white or slightly tinged with pink or rarely purple, oblanceolate-oblong, 2–3 × ca. 0.5 mm. Stamens protruding from or rarely equaling perianth. Ovary ovoid, scarcely 3-lobed apically. Styles rather thick, ca. 0.4 mm, nearly as long as anthers. Capsule nodding, globose, 2–2.5(–3) mm in diam., apically scarcely or slightly 3-lobed, with persistent styles 0.5–0.8 mm and stigmas conspicuously thickened. Seeds nearly linear-fusiform, rarely ellipsoid, (0.8–)1 mm, without a white, longitudinal band. Fl. Jul–Aug, fr. Aug–Sep. 2*n* = (20), 30, (32).

Meadows, wetlands, crevices of rocks or cliffs; 1800–2400 m. Anhui, S Jilin [Japan, Korea, Mongolia, Russia; North America].

2. Tofieldia divergens Bureau & Franchet, J. Bot. (Morot) 5: 157. 1891.

叉柱岩菖蒲 cha zhu yan chang pu

Tofieldia brevistyla Franchet; *T. esquirolii* H. Léveillé; *T. labordei* H. Léveillé & Vaniot; *T. tenella* Handel-Mazzetti; *T. yunnanensis* Franchet.

Leaves 3–22 cm × 2–4 mm, rather rigid, margin scabrous, apex acuminate, veins inconspicuous. Scape 8–35 cm, usually with 1 or 2 linear leaves in proximal part. Racemes 2–10 cm, many flowered. Flowers ascending to slightly nodding; pedicel (1–)1.5–3(–7) mm at anthesis; bracteole 1, cupular, apically slightly 3-lobed. Perianth segments white, narrowly oblanceolate to narrowly elliptic, 2–3 × 0.4–0.5 mm. Stamens protruding from perianth. Ovary oblong-ovoid, ca. 3 mm, 3-lobed to 3-fid apically. Styles rather slender, 0.5–1 mm, obviously longer than anthers. Capsule horizontally spreading to nodding, obovoid-trigonous or ellipsoid, ca. 3 × 2 mm, apically 3-fid to 3-parted, with persistent styles 1–1.5 mm and stigmas scarcely thickened. Seeds linear-fusiform, ca. 1 × 0.5 mm, without a white, longitudinal band. Fl. Jun–Aug, fr. Jul–Sep.

• Crevices on rocks or cliffs, moist grassy slopes, forests; 1000–4300 m. W Guizhou, SW Sichuan, Yunnan.

3. Tofieldia thibetica Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 95. 1887.

岩菖蒲 yan chang pu

Tofieldia iridacea Franchet; *T. macilenta* Franchet; *T. setchuenensis* Franchet.

Leaves 5–20 cm × 3–7 mm, rather rigid, margin scabrous, apex acuminate, veins inconspicuous. Scapes 10–30(–38) cm,

with 1 or 2 linear leaves in proximal part. Racemes ca. 15 cm, many flowered. Flowers ascending or nearly so; pedicel (3–)5–12 mm at anthesis; bracteole 1, cupular, apically 3-lobed. Perianth segments white, narrowly oblanceolate-oblong, 2–3 × 0.4–0.5 mm. Stamens protruding from perianth. Ovary oblong-ovoid, ca. 2.5 mm, 3-lobed apically. Styles slender, ca. 1 mm, obviously longer than anthers. Capsule suberect, obovoid-ellipsoid, 2.5–3 × ca. 2 mm, apically 3-lobed, with persistent styles (0.3–)1–1.5 mm and stigmas scarcely thickened. Seeds linear-fusiform, ca. 1 × 0.5 mm, with a white, longitudinal band on 1 side. Fl. Jun–Jul, fr. Jul–Sep.

• Cliffs, crevices on rocks along valleys, thickets, moist grassy slopes; 700–2300 m. Guizhou, EC Sichuan, NE Yunnan.

2. PETROSAVIA Beccari, Nuovo Giorn. Bot. Ital. 3: 7. 1871.

无叶莲属 wu ye lian shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Miyoshia Makino; *Protolirion* Ridley.

Herbs small, mycotrophic, without chlorophyll, with a slender, scaly rhizome. Stem erect, simple, slender. Leaves reduced to alternate scales. Inflorescence a corymb or a raceme, terminal, to more than 10-flowered. Flowers bisexual, arising from axils of small bracts, erect, small, often subtended by a bracteole. Perianth segments 6, connate at base, persistent, inner ones larger than outer. Stamens 6; filaments subulate, adnate to base of perianth segments; anthers ovate, dorsifixed or nearly basifixed, introrse. Ovary superior to semi-inferior; ovules numerous; carpels 3, connate for 1/4–1/2 their length, sometimes connate only at base; septal nectaries present. Styles short; stigmas capitellate or slightly 2-cleft. Fruit a capsule, folliclelike. Seeds small, elliptic, ± winged.

Three species: China, Indonesia, Japan, Malaysia, Myanmar, Thailand, Vietnam; two species (one endemic) in China.

1a. Scalelike leaves on stem usually 3–5 mm apart; bracts obviously longer than pedicel ..... 1. *P. sinii*
1b. Scalelike leaves on stem usually 1–2 cm apart; bracts slightly shorter than pedicel ..... 2. *P. sakuraii*

1. Petrosavia sinii (K. Krause) Gagnepain in Lecomte, Fl. Indo-Chine 6: 802. 1934.

无叶莲 wu ye lian

Protolirion sinii K. Krause, Notizbl. Bot. Gart. Berlin-Dahlem 10: 806. 1929; *Miyoshia sinii* (K. Krause) Nakai.

Herbs pale yellow, 4–10 cm tall, glabrous. Rhizome ca. 1.5 mm thick, usually densely scaly. Stem usually solitary, slender. Scalelike leaves contiguous, especially in proximal part of stem, usually 3–5 mm apart, ovate, small, 2–4 mm, membranous. Inflorescence a raceme, sometimes ± corymbose, 1.5–2 cm, 7–12-flowered; bracts lanceolate, 2–3 mm, obviously longer than pedicel. Pedicel 1–2 mm, bracteolate in apical part. Flowers small. Perianth adnate for ca. 1/2 its length to ovary; segments ovate-deltoid, 1-veined, outer ones ca. 0.6 × 0.5 mm, inner ones ca. 1 × 1.2 mm. Stamens ca. 0.8 mm; anthers ovate. Ovary ovoid, 3-fid. Fl. Jul.

• Bamboo forests; ca. 1000 m. EC Guangxi (Dayao Shan).

2. Petrosavia sakuraii (Makino) J. J. Smith ex van Steenis, Trop. Natuur 23: 52. 1934.
疏花无叶莲 shu hua wu ye lian

Miyoshia sakuraii Makino, Bot. Mag. (Tokyo) 17: 145. 1903; *Protolirion miyoshia-sakuraii* Makino, nom. illeg. (included *M. sakuraii*); *Protolirion sakuraii* (Makino) Dandy.

Herbs pale yellow, (7–)11–28 cm tall, glabrous. Rhizome ca. 2 mm thick. Stems slender, 1 or 2 arising from rhizome. Scalelike leaves rather lax, particularly in apical part of stem, usually 1–2 cm apart, narrowly to broadly ovate, 2–4(–5) mm, membranous, 1-veined. Inflorescence a raceme, sometimes ± corymbose, 2–8.5 cm, to more than 10-flowered; bracts lanceolate to ovate, 2–3 mm, slightly shorter than pedicel. Pedicel 3–5 mm, bracteolate in proximal part or near base. Flowers small. Perianth adnate for ca. 1/3 its length to ovary; segments ovate-deltoid, 1-veined, outer ones 0.8(–1) × ca. 1 mm, inner ones (1.5–)2 × ca. 2 mm. Stamens ca. 1 mm; anthers ovate. Ovary broadly ovoid, 3-partite. Capsule ca. 3 × 3 mm. Seeds dark brown, ellipsoid, 0.3–0.4(–0.5) mm, longitudinally striate; testa white, elongate, membranous. Fl. Jul–Aug, fr. Oct. $2n = 60$.

Mixed forests, bamboo forests; near sea level to 1700 m. Guangxi, SE Sichuan, Taiwan [Indonesia (N Sumatra), Japan, Myanmar, Vietnam].

3. ALETRIS Linnaeus, Sp. Pl. 1: 319. 1753.

粉条儿菜属 fen tiao er cai shu

Liang Songyun (梁松筠 Liang Song-jun); Nicholas J. Turland[1]

Stachyopogon Klotzsch.

Herbs perennial. Indumentum (if present) usually glandular. Roots usually fibrous, sometimes thickened and fleshy, or a mixture of both. Rhizome short, rarely cormlike. Leaves basal, tufted, grasslike, lanceolate to linear, with a conspicuous midvein. Scape

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simple, erect, usually with a few small, bractlike leaves. Inflorescence a terminal raceme, densely capitate or shortly cylindric to laxly elongate, sometimes viscid; rachis pubescent, puberulent, or glabrous. Flowers bisexual, small, distinctly pedicellate or subsessile. Pedicel bearing a bract and bracteole toward either base or apex, pubescent, puberulent, or glabrous; bracteole similar to bract but smaller. Perianth 6-lobed distally, pubescent, puberulent, or glabrous; tube proximally adnate to ovary; lobes erect, spreading, recurved, or revolute. Stamens 6; filaments short; anthers basifixed. Ovary semi-inferior, 3-loculed; ovules many per locule. Style simple, sometimes indistinct; stigma obscurely 3-lobed. Fruit a loculicidal capsule enveloped by persistent perianth, terminating in persistent style and stigma. Seeds numerous, brown, fusiform, to 1.5 mm.

Twenty-one species: Bhutan, China, India, Indonesia, Japan, Kashmir, Korea, Malaysia, Myanmar, Nepal, Philippines, Sikkim; E North America; 15 species (nine endemic) in China.

In measurements given in this account, the scape includes the raceme, the flower includes the pedicel, and the capsule includes the persistent style and stigma.

1a. Perianth pubescent, sometimes sparsely or minutely so.
2a. Leaves 1–1.5 cm wide; perianth 7–10 mm ..... 15. *A. megalantha*
2b. Leaves less than 1 cm wide; perianth less than 7 mm.
3a. Bracts 2–5 × flower length ..... 14. *A. glandulifera*
3b. Bracts shorter than or subequaling flower length, sometimes a few bracts near base of raceme to 2 × flower length.
4a. Flowers usually subsessile, pedicels absent to 1(–2) mm, bract and bracteole borne on distal 1/2 of pedicel (often near apex); perianth lobes linear-lanceolate or narrowly oblong-lanceolate to linear; capsule turbinate, oblong-obovoid, obovoid, or ovoid.
5a. Capsule turbinate, oblong-obovoid, or obovoid, distinctly angular, 3–5 × 2–3 mm, abruptly contracted distally when dehisced; leaves 2–4(–5) mm wide ..... 2. *A. spicata*
5b. Capsule ovoid, not angular, 4–6 × 3–4.5 mm, not or only slightly contracted distally when dehisced; leaves (2–)3–5(–8) mm wide ..... 3. *A. stenoloba*
4b. Flowers distinctly pedicellate, pedicels 0.5–3.5 mm, bract and bracteole borne on proximal 1/2 of pedicel (often near base); perianth lobes ovate to lanceolate; capsule subglobose.
6a. Leaves 1–5, laxly tufted; rhizome cormlike, 3–7 mm in diam. ..... 13. *A. scopulorum*
6b. Leaves numerous, densely tufted; rhizome not cormlike.
7a. Perianth lobes oblong-lanceolate, 2–3 mm ..... 11. *A. pedicellata*
7b. Perianth lobes ovate, ca. 1 mm ..... 12. *A. yaanica*

1b. Perianth glabrous, rarely papillose.
8a. Raceme rachis and pedicels glabrous; bract and bracteole borne on proximal 1/2 of pedicel (often near base).
9a. Raceme covered with viscid secretion; perianth tube urceolate, strongly constricted at apex, lobes erect ..... 1. *A. glabra*
9b. Raceme not covered with viscid secretion; perianth tube broadly funnelform, lobes strongly recurved or revolute.
10b. Rhizome surrounded by mass of fibers from disintegrated leaf bases; capsule with persistent stigma conspicuously thickened and capitate ..... 5. *A. gracilis*
10a. Rhizome not surrounded by mass of fibers but sometimes by persistent, dead leaves; capsule with persistent stigma not or only slightly thickened ..... 6. *A. cinerascens*
8b. Raceme rachis and pedicels pubescent or puberulent; bract and bracteole usually borne on distal 1/2 of pedicel (often near apex).
11a. Rhizome often surrounded by mass of fibers from disintegrated leaf bases; roots thickened, fleshy; leaves usually rather few (5–10) and laxly tufted; capsule ovoid-ellipsoid or ovoid-conical ..... 7. *A. pauciflora*
11b. Rhizome not surrounded by mass of fibers; roots fibrous; leaves numerous and densely tufted; capsule narrowly ovoid to subglobose.
12a. Raceme densely capitate or oblong-capitate; bract and bracteole borne on proximal 1/2 of pedicel (often near base) ..... 8. *A. capitata*
12b. Raceme elongate and lax to short and dense but not capitate; bract and bracteole usually borne at or near apex of pedicel.
13a. Perianth 4–7.5 mm, lobes 2–5.5 mm, erect, spreading, recurved, or revolute, 1–5 × tube length ..... 4. *A. laxiflora*
13b. Perianth 3–4.5 mm, lobes 1–2 mm, erect or recurved, 0.3–1 × tube length.
14a. Scape very slender, wiry, often somewhat flexuous, 7–20 cm; bract shorter than perianth; perianth often densely papillose, lobes recurved ..... 10. *A. alpestris*
14b. Scape relatively stout, not wiry, straight and erect, 1.5–10 cm; bract equaling or longer than perianth; perianth not or scarcely papillose, lobes erect or slightly recurved ..... 9. *A. nana*

1. Aletris glabra Bureau & Franchet, J. Bot. (Morot) 5: 156. 1891.

无毛粉条儿菜 wu mao fen tiao er cai

Aletris dickinsii Franchet; *A. foliata* (Maximowicz) Bureau & Franchet var. *glabra* (Bureau & Franchet) Yamamoto; *A. foliata* var. *sikkimensis* (J. D. Hooker) Franchet; *A. formosana* (Hayata) Sasaki; *A. sikkimensis* J. D. Hooker; ?*A. tavelii* H. Léveillé; *Metanarthecium formosanum* Hayata.

Plants glabrous throughout. Rhizome stout. Leaves usually rather few (4–10) and laxly tufted, sometimes more numerous and dense, linear-lanceolate to linear, 5–30 cm × 5–18 mm. Scape 15–100 cm. Raceme 7–45 cm, covered with viscid secretion (to which dust, fibers, seeds, etc. adhere), laxly to densely 15–120-flowered. Flowers subsessile to distinctly pedicellate; pedicel 0.5–3(–4.5) mm; bract borne at or near base of pedicel, linear-lanceolate, 2–16 mm, slightly shorter than flower to 2.5 × flower length, apex obtuse; bracteole borne on proximal 1/2 of pedicel above bract. Perianth yellowish green or cream (with green or greenish brown midvein on lobes), 3–6 mm, sometimes sparsely papillose; tube urceolate, abruptly constricted at apex; lobes erect, oblong-lanceolate or narrowly so, 1.5–3 × 0.5–1 mm, 0.6–1 × tube length, apex obtuse. Capsule obovoid to subglobose, angular or ± so, 4–6 × 3–4.5 mm, apex of valves gradually narrowed; style to 0.7 mm; stigma not or only slightly thickened. Fl. May–Aug, fr. Aug–Nov. 2*n* = 26.

Abies, *Pinus*, and *Quercus* forests, thickets, moist meadows, flood lands, alpine grasslands, rocky slopes; 1200–4000 m. Fujian, Gansu, Guizhou, Hubei, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, Sikkim].

Aletris glabra is very similar to, and overlaps morphologically with, the Japanese *A. foliata* (Maximowicz) Bureau & Franchet (J. Bot. (Morot) 5: 156. 1891). The latter species tends to have a larger perianth (5–7 mm), with lobes 0.75–1.2 × tube length, and capsule ovoid to obovoid-subglobose. If the two were considered synonymous, the name *A. foliata* would have priority because it is based on *Metanarthecium foliatum* Maximowicz (in Trautvetter et al., Decas Pl. Nov. 10. 1882). In making their new combination in *Aletris*, Bureau and Franchet misspelled the names as *"A. foliosa"* and *"M. foliosum,"* respectively, and were followed by several other authors. *Aletris fauriei* H. Léveillé & Vaniot (in H. Léveillé, Repert. Spec. Nov. Regni Veg. 5: 283. 1908), described from Korea, seems slightly closer to *A. foliata* than to *A. glabra* judging from the only specimens seen by the present authors (the type collection).

2. Aletris spicata (Thunberg) Franchet, J. Bot. (Morot) 10: 199. 1896.

粉条儿菜 fen tiao er cai

Hypoxis spicata Thunberg in Murray, Syst. Veg., ed. 14, 326. 1784; *Aletris japonica* Lambert (1811), nom. illeg. (included *Hypoxis spicata*), not Houttuyn (1780) nor Thunberg (1780); *A. spicata* var. *micrantha* Satake.

Leaves numerous, densely tufted, linear, 5–30 cm × 2–4 (–5) mm. Scape 15–70 cm. Raceme 5–35 cm, laxly 10–80-flowered; rachis densely pubescent. Flowers subsessile; pedicel absent to 1(–2) mm, densely pubescent; bract and bracteole borne on distal part of pedicel, linear-lanceolate, proximally pubescent; bract 4–8 mm, shorter than or equaling flower (sometimes a few bracts at base of raceme to 2 × flower length, rarely all bracts exceeding flowers), apex acute. Perianth white, yellowish white, or yellowish green, sometimes striped or apically tinged pink, 4–7 mm, densely pubescent, rarely sparsely so; tube oblong-urceolate; lobes ± erect, linear-lanceolate, 1.5–3 × ca. 0.5 mm, usually ca. 1 × tube length or shorter, apex acute. Capsule turbinate, obovoid, or oblong-obovoid, distinctly angular, 3–5 × 2–3 mm, abruptly constricted distally when dehisced, apex of valves ± gradually narrowed; style ca. 1 mm; stigma not or only slightly thickened. Fl. Mar–Aug, Nov, fr. May–Aug. 2*n* = 26, 52*.

Forests, thicket margins, scrub, grasslands, streamsides, roadsides; 100–2900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan (including Ryukyu Islands), ?N Malaysia, Philippines (Luzon)].

3. Aletris stenoloba Franchet, J. Bot. (Morot) 10: 203. 1896.

狭瓣粉条儿菜 xia ban fen tiao er cai

Aletris longibracteata T. L. Xu; *A. spicata* (Thunberg) Franchet var. *fargesii* Franchet.

Leaves numerous, densely tufted, linear, 5–35 cm × (2–)3–5(–8) mm. Scape 25–80 cm. Raceme 5–35 cm, laxly 10–60-flowered; rachis pubescent. Flowers subsessile; pedicel absent to 1(–2) mm, pubescent; bract and bracteole borne on distal part of pedicel, linear-lanceolate, proximally pubescent; bract 4–8 (–11) mm, shorter than or equaling flower (sometimes a few bracts at base of raceme to 2 × flower length), apex acute. Perianth white or pale yellow, sometimes apically tinged pink, 4–7 mm, sparsely pubescent, rarely densely so; tube urceolate; lobes ± erect, narrowly oblong lanceolate to linear, 2.5–4 × 0.5–1 mm, usually ca. 1 × tube length or longer, apex obtuse to acute. Capsule ovoid, not angular, 4–6 × 3–4.5 mm, not or only slightly constricted distally when dehisced, apex of valves abruptly narrowed; style 1–2 mm; stigma not or only slightly thickened. Fl. Mar–Jul, fr. May–Sep.

• Forests, *Pinus* plantations, pastures, grassy slopes, hillsides, streamsides, wet hollows, moist shaded cliffs; 300–3300 m. Gansu, Guangdong, Guangxi, Guizhou, Hubei, Shaanxi, Sichuan, Yunnan.

Aletris stenoloba is very similar to *A. spicata*, and the two species may easily be confused in the absence of fruiting material; the capsule shape is the most reliable distinguishing character. Fruiting material of *A. stenoloba* and *A. laxiflora* may also be confused, although the latter differs in its glabrous perianth with lobes 1–5 × tube length.

4. Aletris laxiflora Bureau & Franchet, J. Bot. (Morot) 5: 155. 1891.

疏花粉条儿菜 shu hua fen tiao er cai

Aletris elata F. T. Wang & Tang; *A. gracilipes* F. T. Wang & Tang; *A. revoluta* Franchet; *Mondo cavaleriei* (H. Léveillé) Farwell; *Ophiopogon cavaleriei* H. Léveillé.

Leaves numerous, densely tufted, linear, 3–25(–35) cm × 1.5–6(–10) mm. Scape 10–70 cm. Raceme 2–30 cm, somewhat densely to very laxly 4–60-flowered; rachis pubescent or puberulent. Flowers subsessile to distinctly pedicellate; pedicel 0.5–6(–10) mm, pubescent or puberulent; bract and bracteole

usually borne at or near apex of pedicel (rarely at middle or base); bract lanceolate to narrowly so, 3–12 mm, shorter than flower (sometimes a few bracts at base of raceme to 2 × flower length), glabrous, apex acute. Perianth white to pink, 4–7.5 mm, glabrous (but sometimes slightly puberulent at base of tube); tube very short, broadly funnelform; lobes erect, spreading, recurved, or revolute, narrowly oblong or narrowly lanceolate, 2–5.5 × 0.8–1.5 mm, 1–5 × tube length, apex obtuse to acute. Capsule narrowly ovoid to subglobose, 4–8 × 2–4 mm, apex of valves abruptly narrowed; style 1–3 mm; stigma thickened or not. Fl. Mar–Aug, fr. Apr–Aug.

• Forests, river banks, stream beds, rocks; 1100–2900 m. Guizhou, Sichuan, E Xizang (Bomi Xian).

Typical *Aletris laxiflora* from C Sichuan and E Xizang has short, usually erect perianth lobes, while plants from C and E Sichuan and Guizhou have longer, often recurved or revolute perianth lobes, and have been called *A. revoluta*. Intermediate plants occur where the two entities overlap in C Sichuan. All are here regarded as a single, variable species. The type of *A. gracilipes*, from C Sichuan, also belongs here and not under *A. stelliflora* (i.e., *A. gracilis*) as given in FRPS; it is unusual in having 6–10 mm long pedicels with a basal bract and bracteole.

5. Aletris gracilis Rendle, J. Bot. 44: 41. 1906.

星花粉条儿菜 xing hua fen tiao er cai

Aletris stelliflora Handel-Mazzetti.

Plant glabrous throughout. Rhizome surrounded by a dense collar of persistent fibers from disintegrated leaf bases. Leaves 5 to numerous, usually laxly tufted, linear, 2–20 cm × 2–7(–9) mm. Scape 7–40 cm. Raceme 2–15 cm, not covered with viscid secretion, laxly 5–40-flowered. Flowers distinctly pedicellate; pedicel 1–10 mm; bract borne at or near base of pedicel, narrowly lanceolate, 3–9(–16) mm, shorter than flower (rarely a few bracts at base of raceme slightly longer than flower), apex obtuse to subacute; bracteole borne on proximal 1/2 of pedicel above bract. Perianth yellowish, whitish, or pinkish, 4–5 mm; tube broadly funnelform; lobes strongly recurved or revolute, narrowly oblong or oblong, 2–3 × ca. 1 mm, 1.5–2 × tube length, apex obtuse to rounded or truncate. Capsule narrowly ovoid, 4.5–7 × 2.5–3.5 mm, apex of valves abruptly narrowed; style 0.5–2 mm; stigma conspicuously thickened, capitate. Fl. Jul–Sep, fr. Sep–Oct.

Alpine swamps, alpine grasslands, bamboo thickets, thicket margins, grassy cliffs, rocks; 2500–3900 m. SE Xizang, NW Yunnan [Bhutan, NE India, N Myanmar, Sikkim].

The type of *Aletris gracilis* corresponds with *A. stelliflora*, not *A. laxiflora* as given in FRPS, so the name *A. gracilis* has priority over *A. stelliflora*, which was described in 1936. *Aletris gracilis* is easily distinguished from *A. laxiflora* by its completely glabrous raceme rachis and pedicels.

6. Aletris cinerascens F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 254. 1978.

灰鞘粉条儿菜 hui qiao fen tiao er cai

Plants glabrous throughout. Rhizome not surrounded by a dense collar of fibers but sometimes by persistent, dead leaves. Leaves somewhat numerous, densely tufted, linear-lanceolate, 4–13 cm × 3–12.5 mm. Scape 8–35 cm. Raceme 2.5–19 cm, not covered with viscid secretion, laxly 10–23(or more)-flowered. Flowers distinctly pedicellate; pedicel 1–10 mm; bract borne at or near base of pedicel (sheathing, so sometimes appearing apical on very short pedicels), lanceolate, 3–7 mm, shorter than flower, apex obtuse; bracteole borne on proximal 1/2 of pedicel above bract. Perianth yellowish, 4–6 × 2–2.5 mm; tube very short, broadly funnelform; lobes strongly recurved or revolute, narrowly lanceolate, 3–4.5 × 1–1.5 mm, ca. 3 × tube length, apex obtuse. Capsule oblong-ovoid or ± ellipsoid, 5–7 × 3–3.5 mm, apex of valves abruptly narrowed; style 1.5–2.5 mm; stigma not or only slightly thickened. Fl. and fr. Jun–Nov.

• Grassy hilltops, dry slopes, forests; 2700–3100 m. Guangxi, WC Yunnan (Jingdong Xian).

7. Aletris pauciflora (Klotzsch) Handel-Mazzetti, Symb. Sin. 7: 1220. 1936.

少花粉条儿菜 shao hua fen tiao er cai

Roots thickened, fleshy. Rhizome stout, sometimes clump-forming, often surrounded by a dense collar of persistent fibers from disintegrated leaf bases. Leaves usually rather few (5–10) and laxly tufted, sometimes more numerous and dense, linear-lanceolate to linear, 3–25 cm × 1–10 mm. Scape 3.5–40 cm. Raceme 1–20 cm, densely to laxly 4–40-flowered, rachis pubescent. Flowers distinctly pedicellate; pedicel 1–12 mm, pubescent; bract and bracteole borne at or near apex of pedicel; bract lanceolate to narrowly linear-lanceolate, 3–20 mm, 1–4 × flower length, glabrous, apex obtuse to rounded. Perianth dark red, red, pink, orange, yellow, greenish yellow, or white, 3.5–6 mm, glabrous; tube campanulate; lobes usually recurved, sometimes erect, oblong-ovate to lanceolate, 1.5–2.5 × 0.8–1.5 mm, 0.6–1 × tube length, apex obtuse to rounded. Capsule ovoid-ellipsoid or ovoid-conical, 4–6 × 2.5–4 mm, apex of valves gradually narrowed; style to 0.5 mm; stigma thickened. Fl. Apr–Aug, fr. Jun–Oct.

Mixed, coniferous, and broad-leaved forests, scrub, bamboo scrub, swamps, marshes, bogs, stream banks, wet flushes, damp meadows, grassy alpine slopes, open stony pastures, exposed ridges, river gravels, moraines, rocks; 1500–4900 m. Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, N Myanmar, Nepal, Sikkim].

Two varieties may be recognized, although intermediate plants and mixed collections occur. In FRPS, they were distinguished, in addition to bract length, by having racemes laxly flowered (var. *pauciflora*) or densely flowered (var. *khasiana*). However, raceme density seems to indicate the developmental stage of the inflorescence (i.e., denser is younger) rather than correlate with bract length.

1a. Bract obviously longer than flower, to 4 × flower length ..... 7a. var. *pauciflora*
1b. Bract subequaling flower ..... 7b. var. *khasiana*

7a. Aletris pauciflora var. **pauciflora**

少花粉条儿菜(原变种) shao hua fen tiao er cai (yuan bian zhong)

Stachyopogon pauciflorus Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar, 49. 1862; *Aletris mairei* H. Léveillé; *A. nepalensis* J. D. Hooker, nom. illeg. (included *S. pau-*

ciflorus and *S. spicatus* Klotzsch); *A. nepalensis* var. *delavayi* Franchet; *A. pauciflora* f. *minuscula* Handel-Mazzetti.

Bract obviously longer than flower, to 4 × flower length.

Grassy alpine slopes; 3400–4100 m. Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, N Myanmar, Nepal, Sikkim].

7b. Aletris pauciflora var. **khasiana** (J. D. Hooker) F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 172. 1978.

穗花粉条儿菜 sui hua fen tiao er cai

Aletris khasiana J. D. Hooker, Fl. Brit. India 6: 265. 1892; *A. lanuginosa* Bureau & Franchet; *A. lanuginosa* var. *khasiana* (J. D. Hooker) Franchet; *Stachyopogon spicatus* Klotzsch.

Bract subequaling flower.

Forests, bamboo scrub, swamps, shady rocks; 1500–4900 m. Sichuan, Xizang, Yunnan [NE India].

8. Aletris capitata F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 254. 1978.

头花粉条儿菜 tou hua fen tiao er cai

Leaves numerous, densely tufted, linear, 2–15 cm × 1–3 mm. Scape 10–35 cm. Raceme capitate or oblong-capitate, 0.5–1.5 cm, densely 7–11-flowered; rachis pubescent. Flowers distinctly pedicellate; pedicel 0.5–3 mm, pubescent; bract and bracteole borne on proximal 1/2 of pedicel, often near base, lanceolate; bract 2.5–5 mm, slightly shorter than flower, glabrous, apex obtuse to subacute. Perianth white, 4–5 mm, glabrous; tube campanulate; lobes spreading or recurved, oblong, 2–4 × ca. 1 mm, 1–1.5 × tube length, apex obtuse-rounded. Capsule ovoid, 3.5–4 × ca. 2.5 mm, apex of valves gradually narrowed; style ca. 1 mm; stigma slightly thickened. Fl. Jun, fr. Aug.

• Shady rocks, grasslands, forests; 2400–3500 m. C Sichuan (Baoxing Xian, Tianquan Xian).

9. Aletris nana S. C. Chen, Acta Phytotax. Sin. 19: 503. 1981.

矮粉条儿菜 ai fen tiao er cai

Aletris alpestris Diels var. *occidentalis* H. Hara.

Leaves numerous, densely tufted, linear, 1–3.5 cm × 1–4 mm. Scape somewhat stout, not wiry, straight and erect, 1.5–10 cm. Raceme 0.5–3.5 cm, densely or somewhat laxly 3–14-flowered, becoming lax in fruit; rachis pubescent or puberulent. Flowers distinctly pedicellate; pedicel 1–4 mm, pubescent or puberulent; bract and bracteole borne at or near apex of pedicel; bract lanceolate, 2–6 mm, equaling or exceeding flower, glabrous, apex acute. Perianth white or pinkish white, 3–4 mm, glabrous, not or scarcely papillose; tube broadly funnelform; lobes erect or slightly recurved, triangular-ovate to lanceolate, 1–1.5 × 0.7–1 mm, 0.3–0.45 × tube length, apex obtuse. Capsule subglobose, 2.5–3 mm, apex of valves ± abruptly narrowed; style ca. 0.4 mm; stigma not or only slightly thickened. Fl. May–Jun, fr. Aug–Sep.

Wet grassy meadows, swamps, damp rock crevices, in moss, among boulders; 3200–4600 m. S Xizang, NW Yunnan (Yulongxue Shan) [Nepal].

Type material of *Aletris alpestris* var. *occidentalis*, described by Hara (J. Jap. Bot. 47: 276. 1972) from Nepal and Xizang, corresponds with *A. nana.*

10. Aletris alpestris Diels, Bot. Jahrb. Syst. 36(Heft 5, No. 82): 20. 1905.

高山粉条儿菜 gao shan fen tiao er cai

Aletris dielsii F. T. Wang & Tang.

Leaves numerous, densely tufted, linear, 1.5–8 cm × 2–4 mm. Scape very slender, wiry, often somewhat flexuous, 7–20 cm. Raceme 1–4 cm, laxly 4–10-flowered; rachis puberulent. Flowers distinctly pedicellate; pedicel 2–4 mm, puberulent; bract and bracteole borne at or near apex of pedicel; bract lanceolate, 1.5–4 mm, shorter than flower, glabrous, apex acute. Perianth white or pinkish white, 3.5–4.5 mm, glabrous but often densely papillose; tube cupular or campanulate; lobes recurved, lanceolate, 1.5–2 × 0.5–1 mm, 0.6–1 × tube length, apex of valves obtuse to acute. Capsule ovoid-globose, ca. 3 × 2.5 mm, apex abruptly narrowed; style ca. 0.3 mm; stigma not or only slightly thickened. Fl. Apr–Jul, fr. Aug–Sep.

• Cliffs, rocks in forests; 800–3900 m. Guizhou, Shaanxi, Sichuan, NE Yunnan (Yiliang Xian).

11. Aletris pedicellata F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol., n.s., 1: 109. 1943.

长柄粉条儿菜 chang bing fen tiao er cai

Leaves numerous, densely tufted, linear-lanceolate to linear, 2–8 cm × 1.5–5 mm. Scape 7–30 cm. Raceme 2–12 cm, somewhat laxly 8–45-flowered; rachis pubescent. Flowers distinctly pedicellate; pedicel 1.5–7 mm, pubescent; bract and bracteole borne on proximal 1/2 of pedicel; bract linear-lanceolate, 2–7 mm, shorter than flower, pubescent at least proximally, apex acute. Perianth white or pink, 3–6 mm, pubescent; tube cupular; lobes ± erect, oblong-lanceolate, 2–3 × 0.5–0.8 mm, ca. 1 × tube length, apex obtuse. Capsule subglobose, 2–3.5 × 2–3 mm, apex of valves abruptly narrowed; style ca. 0.5 mm; stigma not or only slightly thickened. Fl. and fr. May–Jun.

• About 800 m. Sichuan.

12. Aletris yaanica G. H. Yang, Acta Phytotax. Sin. 25: 237. 1987.

雅安粉条儿菜 ya an fen tiao er cai

Leaves numerous, densely tufted, linear-lanceolate, rarely lanceolate, 2–3 cm × 2–4 mm. Scape 7–10 cm. Raceme 1–2 cm, 7–9-flowered; rachis pubescent. Flowers distinctly pedicellate; pedicel 1–2.5 mm, pubescent; bract and bracteole borne on proximal part of pedicel, often at or near base; bract linear-lanceolate, ca. 4 mm, slightly shorter than flower, base pubescent, apex acute. Perianth creamy white, 1.5–2.5 mm, pubescent; tube campanulate; lobes erect, ovate, ca. 1 × 0.7 mm, ca. 1 × tube length, apex obtuse. Ovary subglobose. Capsule unknown. Fl. May.

• About 800 m. C Sichuan (Ya'an Xian).

Aletris yaanica is known only from the type collection. The protologue illustrates a plant at early anthesis which seems very similar to

A. pedicellata. Further gatherings are needed to establish whether or not it is distinct.

13. Aletris scopulorum Dunn, J. Linn. Soc., Bot. 38: 370. 1908.

短柄粉条儿菜 duan bing fen tiao er cai

Aletris makiyataroi Naruhashi.

Rhizome cormlike, subglobose, 3–7 mm in diam. Leaves 1–5, laxly tufted, linear, 3–15 cm × 2–4.5 mm. Scape 10–35 cm, slender, often wiry. Raceme 2.5–12.5 cm, laxly 4–17-flowered, rachis pubescent. Flowers shortly pedicellate; pedicel 0.5–3.5 mm, pubescent; bract and bracteole borne on proximal 1/2 of pedicel; bract linear-lanceolate, 2–5.5 mm, shorter than or equaling flower, ± glabrous, apex acute. Perianth white, 3–5 mm, sparsely pubescent or glabrescent; tube campanulate; lobes erect or slightly recurved, narrowly oblong-lanceolate to linear, 1.5–2.5 × 0.3–0.7 mm, ca. 1 × tube length or slightly longer, apex obtuse to rounded. Capsule subglobose, 3–3.5 × 2.5–3 mm, apex of valves abruptly narrowed; style ca. 0.5 mm or indistinct; stigma not or only slightly thickened. Fl. Mar–Apr, fr. Apr.

Roadside scrub, grassy slopes, moist places on steppes, wastelands; near sea level to 400 m. Fujian, Guangdong, Hunan, Jiangxi, Zhejiang [Japan].

The type of *Aletris makiyataroi*, described from Japan in 1973, corresponds with that of *A. scopulorum*, which was formerly considered endemic to China.

14. Aletris glandulifera Bureau & Franchet, J. Bot. (Morot) 5: 156. 1891.

腺毛粉条儿菜 xian mao fen tiao er cai

Aletris biondiana Diels; *A. lactiflora* Franchet.

Leaves 5–10, laxly tufted, linear, 5–18 cm × 2–6 mm. Scape 10–30 cm. Raceme 2–7.5 cm, laxly 5–25-flowered; rachis pubescent. Flowers distinctly pedicellate; pedicel 0.5–3 mm, pubescent; bract and bracteole borne at or near apex of pedicel; bract narrowly linear-lanceolate, 5–15 mm, 2–5 × flower length, base pubescent, apex subacute. Perianth white, 2.5–4.5 mm, pubescent; tube urceolate; lobes ± erect, ovate to lanceolate, 1–2 × ca. 0.7 mm, 0.6–0.8 × tube length, apex obtuse. Capsule ovoid to subglobose, 3–3.5 × 2.5–3 mm, apex of valves abruptly narrowed; style ca. 0.5 mm; stigma not or only slightly thickened. Fl. Jul.

• Forested slopes, grassy places, herb communities; 3300–4300 m. Gansu, Shaanxi, Sichuan.

15. Aletris megalantha F. T. Wang & Tang, Acta Phytotax. Sin. 1: 119. 1951.

大花粉条儿菜 da hua fen tiao er cai

Leaves rather few (ca. 10), laxly tufted, linear-lanceolate to linear, 15–40 cm × 10–15 mm. Scape to 40 cm. Raceme 9–12 cm, somewhat laxly 15–20-flowered; rachis pubescent. Flowers distinctly pedicellate; pedicel 2–3 mm, stout, densely pubescent; bract and bracteole borne near apex of pedicel; bract lanceolate to narrowly so, 6–18 mm, slightly longer than to 2 × as long as flower, base pubescent, apex obtuse. Perianth pink, 7–10 mm, densely pubescent; tube urceolate; lobes erect, deltoid-ovate, 2–3 × ca. 1.5 mm, 0.3–0.5 × tube length, apex obtuse-rounded. Capsule unknown. Fl. Jul.

• Grassy slopes; 2800–3400 m. W Yunnan (Zhenkang Xian).

4. VERATRUM Linnaeus, Sp. Pl. 2: 1044. 1753.

藜芦属 li lu shu

Chen Xinqi (陈心启 Chen Sing-chi); Hiroshi Takahashi[5]

Herbs perennial, usually andropolygamous, with short, thick rhizomes and stout, slightly fleshy roots. Stems erect, terete, stout, usually pubescent, leafy, usually enclosed basally by fibers or reticulate fibers formed from disintegrated sheaths. Leaves alternate, sheathed and clasping, broad to narrow, strongly plicately veined, basally usually narrowed. Inflorescence usually a terminal panicle, many flowered. Flowers shortly pedicellate or subsessile, white, yellowish, green, or dark purple-brown, funnelform, cupular to opening flat. Tepals 6, usually free, spreading, persistent in fruit. Stamens 6, inserted at base of tepals; anthers reniform to cordate-orbicular, with locules confluent and dehiscent by an apical valve. Ovary 3-loculed, slightly 3-lobed apically, ovules usually many. Styles 3, short, persistent, stigmatic adaxially. Fruit a septicidal capsule. Seeds several per valve, flattened, narrowly winged.

About 40 species: mainly in temperate regions of the N hemisphere; 13 species (eight endemic) in China.

1a. Basal sheath of stem with only longitudinal veins, becoming fibrous when disintegrated.
  2a. Leaves glabrous or sparsely pubescent ..... 2. *V. oxysepalum*
  2b. Leaves densely pubescent abaxially.
    3a. Leaves silvery pubescent abaxially ..... 1. *V. dahuricum*
    3b. Leaves brownish or grayish pubescent abaxially.
      4a. Tepals prominently erose-denticulate at margin; ovary densely woolly ..... 4. *V. grandiflorum*
      4b. Tepals scarcely erose-denticulate at margin; ovary glabrous ..... 3. *V. lobelianum*
1b. Basal sheath of stem with both longitudinal and transverse veins, becoming reticulate when disintegrated.
  5a. Leaves conspicuously petiolate.
    6a. Plants rather small, to 40 cm tall; flowers relatively small, with tepals 2–3 × ca. 1 mm; capsule

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pendulous ..... 8. *V. micranthum*

6b. Plants relatively large, usually to 1 m tall; flowers relatively large, with tepals more than 4 × 2 mm; capsule erect.

7a. Leaf blade papillose-pubescent on abaxial veins ..... 7. *V. oblongum*

7b. Leaf blade glabrous.

8a. Pedicels on branches of panicle 1 cm or more, ca. 2 × as long as perianth ..... 6. *V. maackii*

8b. Pedicels on branches of panicle less than 1 cm, subequaling perianth ..... 9 . *V. schindleri*

5b. Leaves sessile or sometimes shortly petiolate in distal part of stem.

9a. Leaf blade usually broadly elliptic to broadly ovate-lanceolate, to 10 cm wide; flowers black-purple ..... 5. *V. nigrum*

9b. Leaf blade narrowly oblong or lorate, 1–3(–8.5) cm wide; flowers usually yellowish green or greenish white, rarely dark purple (in *V. formosanum*).

10a. Tepals adaxially with 2 conspicuous glands in proximal part ..... 12. *V. mengtzeanum*

10b. Tepals eglandular.

11a. Bracts glabrous; flowers usually dark purple ..... 10. *V. formosanum*

11b. Bracts white woolly-ciliate; flowers yellowish to greenish.

12a. Branches of panicle horizontally spreading or slightly recurved, sometimes zigzagged, pedicels 7–15 mm ..... 13. *V. taliense*

12b. Branches of panicle suberect or spreading at an acute angle, pedicels (1–)2–3(–4) mm ..... 11. *V. stenophyllum*

1. Veratrum dahuricum (Turczaninow) Loesener, Verh. Bot. Vereins Prov. Brandenburg 68: 134. 1926.

兴安藜芦 xing an li lu

Veratrum album Linnaeus var. *dahuricum* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 28(1): 295. 1855.

Plants 70–150 cm tall, basally with dense, non-reticulate fibers formed from disintegrated sheaths. Leaves cauline, sessile, basally clasping; leaf blade elliptic or ovate-elliptic, 13–23 × 5–11 cm, abaxially densely silvery pubescent, apex acuminate. Panicle ± fusiform, 20–60 cm, many flowered; lateral branches subequaling terminal raceme, basal one usually with branchlets; rachis densely white pubescent-woolly; bracts ovate-lanceolate, pubescent marginally and abaxially. Pedicel ca. 2 mm. Tepals yellowish green, with white margin, elliptic or ovate-elliptic, 0.8–1.2 cm × 3–4 mm, abaxially pubescent, base clawed, margin erose. Stamens 4–6 mm. Ovary ovoid, densely pubescent. Fl. Jun–Aug.

Meadows, moist grassy slopes; near sea level to 500 m. Heilongjiang, Jilin, Liaoning, ?Nei Mongol [Korea, Russia].

2. Veratrum oxysepalum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 13: 79. 1840.

尖被藜芦 jian bei li lu

Veratrum patulum Loesener.

Plants to 1 m tall, basally with dense, non-reticulate fibers formed from disintegrated sheaths. Leaves cauline, sessile, basally clasping; leaf blade elliptic or oblong, (3–)14–22(–29) × ca. 14 cm, abaxially glabrous or sparsely pubescent, apex acute or acuminate. Panicle 30–35(–50) cm, many flowered; lateral branches and terminal raceme 8–12 cm; rachis densely pubescent-woolly. Pedicel 1–3(–6) mm, shorter than bracts. Tepals adaxially white, abaxially green, oblong to obovate-oblong, 7–11 × 3–6 mm, base narrowed, margin denticulate, apex rounded or subacute; outer tepals slightly pubescent at abaxial base. Stamens 4–7 mm. Ovary ca. 2 × 1 mm, sparsely pubescent or papillose-pubescent. Fl. Jul. 2*n* = 32, 64, 70(–72), 80.

Forested slopes, moist meadows; near sea level to 2200 m. Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia].

3. Veratrum lobelianum Bernhardi, Neues J. Bot. 2: 356. 1807.

阿尔泰藜芦 a er tai li lu

Plants to more than 1 m tall, stout, basally with non-reticulate fibers formed from disintegrated sheaths. Leaves cauline, sessile or subsessile, basally clasping; leaf blade broadly ovate-elliptic, 18–22 × 10–16 cm, in apical part of stem lanceolate and much smaller, abaxially densely puberulent, apex obtuse or acuminate. Panicle to 30 cm, with many branches and branchlets, densely many flowered; rachis densely gray pubescent. Pedicel 1–2 mm, shorter than bracts, pubescent. Tepals yellowish green, narrowly elliptic, 1.1–1.2 cm × 4–4.5 mm, narrowed to a stalklike base, margin inconspicuously denticulate, apex subacute or obtuse. Stamens 6–7 mm. Ovary glabrous. Capsule 2–2.5 × ca. 1 cm. Fl. and fr. Aug–Sep. 2*n* = 32.

Shaded and moist places in mountain forests; 1500–2000 m. N Xinjiang [Kazakstan, Mongolia, Russia; Europe].

4. Veratrum grandiflorum (Maximowicz ex Baker) Loesener, Verh. Bot. Vereins Prov. Brandenburg 68: 135. 1926.

毛叶藜芦 mao ye li lu

Veratrum album Linnaeus var. *grandiflorum* Maximowicz ex Baker, J. Linn. Soc., Bot. 17: 471. 1879; *V. bracteatum* Batalin var. *tibeticum* Loesener; *V. puberulum* Loesener.

Plants stout, to 1.5 m tall, basally with non-reticulate fibers formed from disintegrated sheaths. Leaves cauline, sessile, basally clasping; leaf blade broadly elliptic to oblong-lanceolate, 10–15(–26) × 6–9(–16) cm, abaxially densely brown or gray pubescent, apex obtuse-rounded or acuminate. Panicle 20–50 cm; lateral branches suberect or spreading at an acute angle, 5–10(–14) cm; terminal raceme ca. 2 × as long as lateral ones. Pedicel 2–3(–5) mm, shorter than bracts, sometimes densely pubescent. Tepals greenish white, broadly oblong or elliptic,

1.1–1.7 cm × ca. 6 mm, base slightly clawed, margin erose-denticulate, apex obtuse; outer tepals densely pubescent abaxially, particularly in proximal part. Stamens 6–10 mm. Ovary subconical, densely pubescent. Capsule 1.5–2.5 × 1–1.5 cm. Fl. and fr. Jul–Aug. 2*n* = 32*.

• Forested slopes, moist grassy places; 2600–4000 m. Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang.

5. Veratrum nigrum Linnaeus, Sp. Pl. 2: 1044. 1753.

藜芦 li lu

Veratrum bracteatum Batalin; *V. nigrum* var. *microcarpum* Loesener; *V. nigrum* subsp. *ussuriense* (Loesener) Voroschilov; *V. nigrum* var. *ussuriense* Loesener; *V. ussuriense* (Loesener) Nakai.

Plants stout, to 1 m tall, basally with black, reticulate fibers formed from disintegrated sheaths. Leaves cauline, sessile or sometimes shortly petiolate in distal part of stem; leaf blade broadly elliptic to broadly ovate-lanceolate, usually 22–25 × ca. 10 cm, glabrous, apex acute or acuminate. Panicle many flowered; lateral branches suberect or spreading at an acute angle, often with male flowers; terminal raceme usually with bisexual flowers; rachis densely white woolly; bracts pubescent marginally and abaxially. Pedicel on branches of panicle ca. 5 mm, subequaling bracts, densely woolly. Tepals black-purple, oblong, 5–8 × ca. 3 mm, spreading or slightly recurved in bisexual flowers, margin entire. Stamens 2.5–4 mm. Ovary glabrous. Capsule 1.5–2 × 1–1.3 cm. Fl. and fr. Jul–Sep. 2*n* = 16, 64.

Forested or grassy slopes; 1200–3300 m. Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan [Kazakstan, Mongolia, Russia; C Europe].

6. Veratrum maackii Regel, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 4(4): 169. 1861.

毛穗藜芦 mao sui li lu

Veratrum bohnhofii Loesener; *V. mandschuricum* Loesener; *V. nigrum* Linnaeus var. *maackii* (Regel) Maximowicz; *Zigadenus japonicus* Miquel.

Plants rather slender, 60–100(–160) cm tall, basally with brown, reticulate fibers formed from disintegrated sheaths. Petiole to 10 cm; leaf blade oblong-lanceolate or narrowly oblong-elliptic, 25–32 × 1–4(–8) cm, glabrous, base cuneate, apex long acuminate. Panicle with 2 or 3 rather short branches, rarely with branchlets, laxly flowered; rachis densely woolly; bracts 3–4 mm, pubescent marginally and abaxially. Pedicel 1–1.4 cm, ca. 2 × as long as perianth. Tepals black-purple, subobovate-oblong, 5–7 × 2–3 mm, base not clawed, margin entire. Stamens 3–4 mm. Ovary glabrous. Capsule erect, 1–1.7 × 0.5–1 cm. 2*n* = 16.

Mountain forests, alpine meadows; 400–1700 m. ?Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong [Japan, Korea, Russia].

7. Veratrum oblongum Loesener, Verh. Bot. Vereins Prov. Brandenburg 68: 142. 1926.

长梗藜芦 chang geng li lu

Veratrum maximowiczii Baker var. *hupehense* Pampanini.

Plants rather slender, to 1 m tall, basally with brown, reticulate fibers formed from disintegrated sheaths. Leaves long petiolate; leaf blade narrowly elliptic to oblong-lanceolate, usually 20–30 × 2–6 cm, usually papillose-pubescent along abaxial veins, base cuneate, apex long acuminate. Panicle to 80 cm, with many lateral branches ca. 15 cm, sometimes basal branches with branchlets, laxly many flowered; rachis woolly; bracts 2–5 mm, much shorter than pedicel. Pedicel slender, 1–1.5 cm. Tepals spreading or recurved, purple, oblong, 5–7(–8) × 2–3 mm, base not clawed, apex obtuse; outer tepals pubescent at abaxial base. Stamens 2.5–3.5 mm. Ovary glabrous. Capsule erect, 1.5–2 × ca. 0.7 cm. Fl. and fr. Aug–Sep.

• Shrubby slopes; 1000–2100 m. W Hubei, Jiangxi, E Sichuan.

8. Veratrum micranthum F. T. Wang & Tang, Contr. Inst. Bot. Natl. Acad. Peiping 6: 215. 1949.

小花藜芦 xiao hua li lu

Plants rather slender, 30–40 cm tall, basally with brown, reticulate fibers formed from disintegrated sheaths. Leaves 3 or 4 in proximal part of stem; petiole 2–3 cm; leaf blade oblong-elliptic, 16–18 × 1.7–3.5 cm, glabrous, base cuneate, apex acute. Panicle 15–19 cm, laxly many flowered; lateral branches 3–5 cm, rather slender, usually with male flowers; terminal raceme longer, with bisexual flowers; rachis shortly woolly; bracts 1–2 mm, pubescent marginally and abaxially. Pedicel 1–2 mm. Tepals yellowish green, suboblong, 2–3 × ca. 1 mm, base not clawed, margin ciliate, apex obtuse. Stamens 1–1.5 mm. Ovary glabrous. Capsule pendulous, ca. 1 × 0.7 cm.

• NE and W Sichuan, Yunnan.

9. Veratrum schindleri Loesener, Verh. Bot. Vereins Prov. Brandenburg 68: 139. 1926.

牯岭藜芦 gu ling li lu

Veratrum atroviolaceum Loesener; *V. warburgii* Loesener.

Plants to 1 m tall, basally with brown, reticulate fibers formed from disintegrated sheaths. Leaves basally narrowed to a rather long or basally clasping petiole; leaf blade broadly elliptic to lorate, (15–)20–30(–60) × (0.5–)2–10(–13) cm, glabrous, base cuneate, apex acute to acuminate. Panicle variable in length, laxly many flowered; branches spreading; rachis gray-white woolly; bracts 5–7 mm, abaxially woolly. Pedicel 6–8(–14) mm. Tepals yellowish green, greenish white, brownish, deep purple-violet, or black-purple, subelliptic, oblong, oblong-lanceolate, or obovate-elliptic, 5–8 × 2–3 mm, base not clawed, apex obtuse or subacute; outer tepals pubescent at least at abaxial base. Stamens 2–5 mm. Ovary glabrous. Capsule erect, 1–2 × ca. 1 cm. Fl. and fr. Jun–Oct. 2*n* = 16*.

• Shaded and moist places on forested slopes; 700–1400 m. Anhui, Fujian, Guangdong, Guangxi, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang.

Chinese records of *Veratrum japonicum* (Baker) Loesener (e.g., in FRPS) are referable to *V. schindleri*.

10. Veratrum formosanum Loesener, Verh. Bot. Vereins Prov. Brandenburg 68: 142. 1926.

台湾藜芦 tai wan li lu

Veratrum formosanum f. *albiflorum* (Masamune) Masamune; *V. formosanum* var. *albiflorum* Masamune; *V. kudoi* Masamune.

Plants stout, to more than 30 cm tall, basally usually with blackish, reticulate fibers formed from disintegrated sheaths. Leaves sessile, basally somewhat clasping; leaf blade linear-lanceolate, 12–20 × 1–2 cm, glabrous. Panicle many flowered; rachis densely woolly; bracts deltoid-lanceolate, 0.5–1.5 cm, glabrous. Pedicel 1–1.5 cm, densely woolly. Tepals dark purple, rarely white, oblanceolate, 1–1.5 cm × 2–3 mm, glabrous, base slightly cuneate. Ovary glabrous. Capsule ca. 2 × 1.3 cm. Seeds ca. 8 mm, winged. Fl. and fr. Aug. 2*n* = 16*.

• Grasslands, open dry places on mountains. Taiwan.

This description follows that by Liu and Ying (in Li et al., Fl. Taiwan 5: 84. 1978).

11. Veratrum stenophyllum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 303. 1912.

狭叶藜芦 xia ye li lu

Plants to more than 1 m tall, basally with several whitish or brownish, membranous sheaths which usually become reticulate fibers apically. Leaves sessile, basally clasping; leaf blade lorate, narrowly oblong, oblanceolate, or subfalcate, 25–32 × 2.5(–8.5) cm, glabrous or papillose-puberulent on abaxial veins, base narrowed, apex long acuminate. Panicle densely many flowered; lateral branches slender, with male flowers; terminal raceme with bisexual flowers; bracts 2–3 mm, abaxially woolly. Pedicel (1–)2–3(–4) mm. Tepals pale yellow or yellowish green, oblong or ovate-oblong, 4–7 × 2–4 mm, slightly pubescent at abaxial base, base shortly clawed, apex subacute. Ovary glabrous. Capsule erect, appressed to rachis. Fl. and fr. Jul–Oct.

• Shaded places in forests, forest margins, grassy slopes; 2000–4000 m. W Sichuan, NW Yunnan.

1a. Leaf blade glabrous; flowers relatively large, tepals 5–7 × 3–4 mm ..... 11a. var. *stenophyllum*
1b. Leaf blade papillose-puberulent on abaxial veins; flowers relatively small, tepals 4–4.5 × 2–2.5 mm ..... 11b. var. *taronense*

11a. Veratrum stenophyllum var. **stenophyllum**

狭叶藜芦(原变种) xia ye li lu (yuan bian zhong)

Veratrum yunnanense Loesener.

Leaf blade glabrous. Tepals 5–7 × 3–4 mm.

• Grassy slopes, shaded places in forests; 2000–4000 m. W Sichuan, NW Yunnan.

11b. Veratrum stenophyllum var. **taronense** F. T. Wang & Z. H. Tsi in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 282. 1980.

滇北藜芦 dian bei li lu

Leaf blade papillose-puberulent on abaxial veins. Tepals 4–4.5 × 2–2.5 mm.

• Forest margins; 2900–3800 m. NW Yunnan (Gongshan Drung-Nu Zu Zizhixian).

12. Veratrum mengtzeanum Loesener, Verh. Bot. Vereins Prov. Brandenburg 68: 145. 1926.

蒙自藜芦 meng zi li lu

Veratrum wilsonii C. H. Wright ex Loesener.

Plants to 1–1.5 m tall, basally with several brownish or whitish, membranous sheaths which usually become reticulate fibers apically. Leaves basal and cauline, sessile, basally clasping; leaf blade narrowly oblong or lorate, 22–50 × 1–3 cm, glabrous, apex long acuminate. Panicle 16–30(–50) cm, laxly branched; rachis stout, shortly woolly; bracts 8–10 mm, sparsely pubescent. Pedicel 1–1.3 cm. Tepals whitish or yellow-green, spreading, obovate-spatulate to elliptic-obovate, 8–12 × 4–6 mm, texture rather thick, base conspicuously clawed, apex obtuse-rounded, adaxially with 2 conspicuous glands in proximal part. Ovary glabrous. Capsule erect, 1.5–2 × ca. 1 cm. Fl. and fr. Jul–Oct.

• Forests, hillsides; 1200–3300 m. Guizhou, Yunnan.

13. Veratrum taliense Loesener, Verh. Bot. Vereins Prov. Brandenburg 68: 145. 1926.

大理藜芦 da li li lu

Veratrum cavaleriei Loesener.

Plants to more than 1 m tall, basally with several whitish or brownish, membranous sheaths which usually ± become reticulate fibers apically. Leaves basal and cauline, sessile, basally clasping; leaf blade sublorate, 20–40 × 1.5–3 cm, glabrous, apex long acuminate. Panicle to 85 cm, laxly branched; branches 12–16 cm, sometimes slightly zigzagged; terminal raceme more than 40 cm; rachis stout, shortly woolly; bracts 7–9 mm, pubescent. Pedicel 0.9–1.2 cm. Tepals yellowish green, oblong, 8–11 × 4–5 mm, eglandular, base subsessile, apex subacute. Ovary glabrous. Capsule 1.5–2 × ca. 1 cm. Fl. and fr. Oct–Nov.

• Grassy slopes; ca. 2400 m. SW Sichuan, Yunnan.

5. ZIGADENUS Michaux, Fl. Bor.-Amer. 1: 213. 1803.

棋盘花属 qi pan hua shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, hermaphroditic or polygamous, with a bulb or less often a horizontal rhizome. Leaves basal or nearly so and also cauline, linear to narrowly lanceolate. Scape erect, glabrous, without thickening. Inflorescence terminal, racemose or paniculate, glabrous; bracts linear-lanceolate to oval. Tepals 6, free or basally adnate to ovary, adaxially with 1 or 2 glands just above narrowed

base, persistent. Stamens 6, free or basally adnate to perianth, slightly shorter than perianth; filaments filiform or widened in proximal part; anthers small, suborbicular to reniform, basifixed, extrorse, with confluent locules, dehiscing transversely by valves. Ovary superior or semi-inferior, 3-loculed; ovules many. Styles 3, slender. Capsule ovoid to conical, 3-lobed, ventricidal. Seeds many, oblong or oblanceolate, narrowly winged or angular.

About ten species: N Arctic to temperate regions, especially in North America; one species in China.

1. Zigadenus sibiricus (Linnaeus) A. Gray, Ann. Lyceum Nat. Hist. New York 4: 112. 1857.

棋盘花 qi pan hua

Melanthium sibiricum Linnaeus, Sp. Pl. 1: 339. 1753; *Anticlea sibirica* (Linnaeus) Kunth.

Bulb cylindric, rarely to ovoid, slender, with blackish brown coat. Leaves (10–)13–35 cm × 2–8(–10) mm, glabrous, base tapering to sheath, apex obtuse. Scape (10–)30–50 cm, usually with 1 or 2 slightly smaller leaves in proximal part. Inflorescence usually racemose, less often 1- or 2-branched and paniculate, laxly 4–12-flowered; bracts linear-lanceolate to ovate. Pedicel 0.7–2 cm. Flowers erect. Tepals greenish white, obovate-oblong or oblong, 6–9 × 2.2–2.6(–4) mm, spreading at anthesis, each with a large, yellowish green, obcordate gland nearly at base. Filaments glabrous, gradually widened toward base; anthers reniform. Ovary semi-inferior, conical, ca. 4 mm. Styles recurved, extending beyond perianth after anthesis. Capsule conical, ca. 1.5 cm. Seeds suboblong, ca. 5 mm. Fl. Jul, fr. Aug–Sep. 2*n* = 32.

Forests, damp places in thickets, grassy slopes; near sea level to 2600 m. Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Shanxi, Sichuan [Japan (Rebun and Rishiri Islands), Korea, Mongolia, Russia].

6. YPSILANDRA Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 93. 1887.

丫蕊花属 ya rui hua shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, with a short, thickened, slightly fleshy rhizome, glabrous. Leaves basal, rosulate, linear to lanceolate or oblanceolate, or spatulate, basally gradually narrowed to a petiole. Scape arising from axils of lateral leaves, erect, simple, with several to many scaly leaves. Inflorescence a terminal raceme, 2–30-flowered; bract absent. Flowers bisexual, usually nodding at anthesis, ascending in fruit, spreading funnelform. Tepals 6, free, with a nectary gland basally on adaxial side, persistent. Stamens 6, rather long, free from tepals, inner ones basally adnate to ovary, outer ones free; anthers usually reniform, basifixed, with confluent locules. Ovary superior, 3-lobed, 3-loculed; ovules many per locule. Style 1, very short to long; stigma capitate to 3-cleft. Fruit a capsule, trigonous, 3-lobed apically, loculicidal. Seeds numerous, narrowly fusiform, both ends caudate.

Five species: Bhutan, China, Myanmar, Nepal; five species (three endemic) in China.

1a. Stamens and style not extending beyond tepals at anthesis; stigma shortly or deeply 3-lobed (lobes 0.3–0.8 mm).
  2a. Stigma deeply 3-lobed (lobes ca. 0.8 mm); style 1–1.5 mm; tepals 4–5 mm, spatulate or oblanceolate to elliptic, shorter than capsule; flowers 5–17 per scape ..... 4. *Y. yunnanensis*
  2b. Stigma shortly to moderately 3-lobed (lobes 0.3–0.5 mm); style 2.5–6 mm; tepals 7–12 mm, linear to linear-lanceolate, longer than capsule; flowers 2–6 per scape ..... 5. *Y. alpina*
1b. Stamens and style extending beyond tepals at anthesis; stigma capitate, slightly or scarcely 3-lobed.
  3a. Scape densely covered with many imbricate, scaly leaves; pedicel shorter than tepals ..... 2. *Y. kansuensis*
  3b. Scape laxly covered with several scaly leaves; pedicel equaling tepals.
    4a. Either pedicel or tepals 6–10 mm; stamens and style obviously extending beyond tepals at anthesis; ovary lobes 1/3–2/5 as long as ovary ..... 1. *Y. thibetica*
    4b. Either pedicel or tepals 4–6 mm; stamens and style slightly extending beyond tepals at anthesis; ovary lobes 1/5–1/4 as long as ovary ..... 3. *Y. cavaleriei*

1. Ypsilandra thibetica Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 94. 1887.

丫蕊花 ya rui hua

Helonias thibetica (Franchet) N. Tanaka; *Ypsilandra thibetica* var. *angustifolia* F. T. Wang & Tang.

Rhizome 1–5 × ca. 1 cm. Leaves usually more than 10, oblanceolate, basally gradually narrowed to a petiole; petiole 3–15 cm × 3–5 mm; leaf blade 4–14 × 1–4.8 cm, apex acuminate. Scape 7–50 cm, usually longer than basal leaves, laxly covered with several scaly leaves. Raceme 5–30-flowered. Pedicel 6–10 mm, nearly as long as tepals. Tepals white, pink, or purple, spatulate-oblanceolate, 6–10 × 1.5–2.5 mm, 3–5-veined. Stamens 1–1.8 cm, obviously extending beyond tepals at anthesis. Ovary deeply 3-lobed apically; lobes 1/3–2/5 as long as ovary. Style 1.6–2 cm, slightly longer than stamens; stigma capitate, slightly or scarcely 3-lobed. Capsule broadly ovoid, 1/2–2/3 as long as persistent tepals. Seeds 4–5 mm. Fl. Mar–Apr, fr. May–Jun. 2*n* = 34*.

• Forests, moist places on hillsides, shady slopes along valleys; 1300–2900 m. NE Guangxi, S Hunan, Sichuan.

2. Ypsilandra kansuensis R. N. Zhao & Z. X. Peng, Acta Bot.

Bor.-Occid. Sin. 7: 57. 1987.

甘肃丫蕊花 gan su ya rui hua

Rhizome 1–2.5 × 0.4–1 cm. Leaves 8 or 9, linear to linear-oblanceolate, basally gradually narrowed to a petiole; petiole 2–7 cm × 3–4 mm; leaf blade 3–14 cm × 3–9 mm, apex acuminate. Scape 6–14 cm, usually slightly shorter than basal leaves, densely covered with many imbricate, scaly leaves except on inflorescence. Raceme 5–13-flowered. Pedicel 3–6 mm, shorter than tepals. Tepals white, tinged purple basally, spatulate-oblanceolate, 7–10 × 2–3 mm. Stamens 7–11 mm, slightly extending beyond tepals at anthesis. Ovary 3-lobed apically. Style 0.9–1.3 cm, longer than stamens; stigma capitate, scarcely 3-lobed. Capsule deltoid-obovoid, ca. 1 cm across, much shorter than persistent tepals. Seeds 4–5 mm. Fl. Mar–Apr, fr. May–Jun.

• Hillsides; 2000–2100 m. S Gansu.

3. Ypsilandra cavaleriei H. Léveillé & Vaniot, Mem. Pontif. Accad. Romana Nuovi Lincei 23: 375. 1905.

小果丫蕊花 xiao guo ya rui hua

Ypsilandra parviflora F. T. Wang & Tang.

Leaves usually more than 10, oblanceolate, basally gradually narrowed to a petiole; petiole 5–12 cm × 2–4 mm; leaf blade 3–13 × 2–4.6 cm, apex acuminate. Scape usually slightly longer than basal leaves. Raceme 6–10-flowered. Pedicel 4–6 mm, nearly as long as tepals. Tepals white or pink, spatulate-oblanceolate, 4–5 × 1.5–2 mm, 3–5-veined. Stamens 5–6 mm, slightly extending beyond tepals at anthesis. Ovary slightly 3-lobed apically; lobes 1/5–1/4 as long as ovary. Style 6–7 mm, slightly longer than stamens; stigma capitate, slightly or scarcely 3-lobed. Capsule broadly ovoid, ca. 2/3 as long as persistent tepals. Seeds ca. 4 mm. Fl. Mar–Apr, fr. Apr–May.

• Shady places on slopes, hillsides along streams; 1000–1400 m. NW Guangdong, Guangxi, Guizhou, S Hunan.

4. Ypsilandra yunnanensis W. W. Smith & Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 143. 1916.

云南丫蕊花 yun nan ya rui hua

Helonias yunnanensis (W. W. Smith & Jeffrey) N. Tanaka; *Ypsilandra yunnanensis* var. *himalaica* H. Hara; *Y. yunnanensis* var. *micrantha* Handel-Mazzetti.

Rhizome rather short. Leaves 6 or 7, basally gradually narrowed to a petiole; petiole 0.7–4 cm × 3–5 mm; leaf blade spatulate, 2–9 × 1–3.5 cm, apex subacute. Scape 3–30(–40) cm, much longer than basal leaves. Raceme rather narrow, densely 5–17-flowered. Pedicel 2–3 mm. Tepals spatulate or oblanceolate to elliptic, 4–5 × 1–2 mm. Stamens 3–4 mm, not extending beyond tepals at anthesis or slightly so in fruit. Ovary slightly 3-lobed apically. Style 1–1.5 mm, not elongate in fruit; stigma deeply 3-lobed; lobes ca. 0.8 mm, recurved. Capsule broadly obovoid, slightly longer than persistent tepals. Seeds ca. 5 mm. Fl. Jun–Jul, fr. Aug–Oct.

Rhododendron forests, thicket margins, grassy slopes; 2700–4000(–4300) m. NE Xizang, NW Yunnan [Bhutan, Myanmar, Nepal].

5. Ypsilandra alpina F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 81. 1936.

高山丫蕊花 gao shan ya rui hua

Helonias alpina (F. T. Wang & Tang) N. Tanaka.

Leaves several, basally gradually narrowed to a petiole; petiole 3–4 cm; leaf blade lanceolate, 7–8 × 1–1.4 cm, apex acute. Scape 22–26 cm, much longer than basal leaves. Raceme rather narrow, 2–6-flowered. Pedicel 3–4 mm. Tepals yellow, linear to linear-lanceolate, 7–12 × 1.5–2 mm. Stamens 4–9 mm, shorter than tepals at anthesis. Ovary slightly 3-lobed apically. Style 2.5–6 mm; stigma shortly to moderately 3-lobed; lobes 0.3–0.5 mm. Capsule shorter than tepals. Fl. Jul–Oct.

Thicket margins, grasslands; 2000–4300 m. SE Xizang, NW Yunnan [Myanmar].

7. HELONIOPSIS A. Gray, Mem. Amer. Acad. Arts, ser. 2, 6: 416. 1858, nom. cons.

胡麻花属 hu ma hua shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Hexonix Rafinesque, nom. rej.; *Kozola* Rafinesque, nom. rej.; *Sugerokia* Miquel.

Herbs perennial, with a short, thickened rhizome, glabrous. Leaves basal, rosulate, narrowly oblong to oblanceolate or obovate, proximally gradually narrowed to a petiole, evergreen, margin smooth, sometimes minutely undulate. Scape arising from center of leaf rosette, erect, simple, hollow, with 2–8 scale leaves. Inflorescence a terminal umbel or umbel-like raceme, 1–10-flowered; bract usually absent. Flowers bisexual, usually slightly nodding at anthesis, ascending in fruit, spreading funnelform. Tepals 6, free, spatulate or linear-oblanceolate to oblong, adaxially often with a deep pocket of a nectary gland at base, persistent. Stamens 6, often adnate basally to tepals, sometimes free, always free from ovary, usually exserted, rarely included; anthers lanceolate, dorsifixed, extrorse to latrorse, sometimes with locules confluent at apex. Ovary superior, 3-loculed; ovules 60–180 per locule. Style 1, slender, rather long; stigma capitate. Fruit a capsule, 3-lobed, loculicidal. Seeds small, linear, both ends caudate.

Five species: China, Japan, Korea; one species (endemic) in China.

Tanaka (J. Jap. Bot. 73: 102–115. 1998) reduced *Heloniopsis* and *Ypsilandra* to synonymy under *Helonias*. However, a recent molecular phylogenetic study by Fuse and Tamura (Plant Biol. 2: 1–13. 2000) confirmed that *Helonias*, *Heloniopsis*, and *Ypsilandra* are not mixed with each other, and they each deserve independent generic status.

1. Heloniopsis umbellata Baker, J. Bot. 12: 278. 1874.

胡麻花 hu ma hua

Helonias umbellata (Baker) N. Tanaka; *Heloniopsis acutifolia* Hayata; *H. arisanensis* Hayata ex Honda; *H. taiwaniana* S. S. Ying; *Sugerokia acutifolia* (Hayata) Koidzumi; *S. arisanensis* (Hayata ex Honda) Koidzumi; *S. umbellata* (Baker) Koidzumi.

Leaves basal; petiole 0.5–2 cm; leaf blade oblanceolate to obovate, 1.5–14 × 0.6–2.2 cm, margin usually slightly undulate, apex acute to shortly caudate. Scape 4–20 cm; cauline, scale leaves 4–6, lanceolate to oblong, 6–10 mm. Inflorescence often umbellate, sometimes umbellate-racemose, 3–10-flowered. Pedicel 5–11(–20) mm. Tepals white tinged with pink, linear-oblanceolate, 6–13 × 2–3 mm. Stamens free, slightly exserted; filaments purplish; anthers ca. 2 mm. Style filiform, 0.8–1 mm. Fl. Jan–Apr. 2*n* = 34*.

• Moist rocks; 700–2500 m. Taiwan.

8. CHIONOGRAPHIS Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 11: 435. 1867, nom. cons.

白丝草属 bai si cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Siraitos Rafinesque, nom. rej.

Herbs perennial, often hermaphroditic or andropolygamous, sometimes gynodioecious, rarely androdioecious, with a short, stout rhizome, glabrous. Leaves basal, rosulate, petiolate, spatulate to ellipitic, evergreen, margin entire or minutely undulate. Scape arising from center of leaf rosette, erect, simple, with 3–30 small, bractlike leaves. Inflorescence a terminal spike, many flowered; bract absent. Flowers sessile, zygomorphic, small. Tepals free; upper 3 or 4 spatulate-linear to filiform; lower 2 or 3 much shorter or absent. Stamens 6, inserted at base of tepals, rather short; anthers basifixed, subcordate-ovate to subglobose, extrorse, with locules confluent or free. Ovary globose, 3-loculed; ovules 2 per locule. Styles 3, stigmatic adaxially. Fruit a capsule, ?septicidal. Seeds fusiform, winged at 1 end.

Four species: China, Japan, Korea; one species (endemic) in China.

1. Chionographis chinensis K. Krause, Notizbl. Bot. Gart. Berlin-Dahlem 10: 807. 1929.

白丝草 bai si cao

Chionographis merrilliana H. Hara; *Siraitos chinensis* (K. Krause) F. T. Wang & Tang.

Leaves several to more than 10; petiole 1–6 cm; leaf blade spatulate to ellipitic, 1–6 × 1–3.5 cm, glabrous, margin slightly undulate, apex subacute. Scape 14–40 cm; bractlike leaves 4 or 5, lanceolate-ovate, 2–5 mm. Spike 3–14 cm, usually elongate after anthesis, rather densely many flowered. Flowers fragrant. Tepals white to pale yellow; upper 3 or 4 tepals 3–8 mm, 0.2–0.5 mm wide in distal part; lower 2 or 3 tepals 0.5–1.5 mm, sometimes absent. Stamens 1–1.5 mm, 3 longer than others; anthers subcordate-ovate, with locules confluent. Capsule subobovoid, ca. 4 × 2 mm, dehiscent distally. Seeds 1.8–2.8 × 0.6–0.9 mm. Fl. Apr–May, fr. Jun.

• Shady and damp places on slopes or hillsides; near sea level to 700 m. Fujian, Guangdong, NE Guangxi, Hunan.

9. PARIS Linnaeus, Sp. Pl. 1: 367. 1753.

重楼属 chong lou shu

Liang Songyun (梁松筠 Liang Song-jun); Victor G. Soukup[1]

Daiswa Rafinesque; *Euthyra* Salisbury; *Kinugasa* Tatewaki & Suto.

Herbs perennial. Rhizome slender or thickened. Stem erect, simple. Leaves 4 to many, very rarely 3, in a terminal whorl, petiolate, lanceolate to ovate, with 3 main veins and anastomosing veinlets. Flowers bisexual, solitary, terminal, pedunculate. Tepals 3–8, in 2 whorls, free; outer ones green, rarely ± white, ovate to lanceolate; inner ones linear or occasionally absent. Stamens 8–24 or more, 2–8 × as many as tepals; filaments narrow, flat; anthers basifixed, often with convex connective apically. Ovary subglobose, 1-loculed with parietal placentation or 4–10-loculed with axile placentation. Style short; stigma lobes 4–10. Fruit a berry or a berrylike capsule, indehiscent or loculicidal, several to many seeded.

About 24 species: Bhutan, China, India, Japan, Korea, Laos, Mongolia, Myanmar, Nepal, Russia, Sikkim, Thailand, Vietnam; Europe; 22 species (12 endemic) in China.

The rhizomes of many species are used medicinally in China.

1a. Ovary 4–10-loculed, with axile placentation; berry indehiscent; seeds sometimes with a spongy (never succulent) aril on 1 side.
2a. Rhizome creeping, elongate, slender, 2–5 mm thick; seeds without aril, funicle not swollen.
3a. Leaves usually 6–8; outer tepals oblong-lanceolate to ovate-lanceolate, 10–25(–30) mm wide ..... 20. *P. verticillata*

[1] Herbarium, Department of Biological Sciences, University of Cincinnati, Cincinnati, Ohio 45221-0006, U.S.A.

3b. Leaves usually 4; outer tepals narrowly lanceolate, 3–9 mm wide.
4a. Leaves oblong-lanceolate or ovate-elliptic; outer tepals reflexed, 3–5 mm wide ..... 21. *P. bashanensis*
4b. Leaves broadly obovate or ovate; outer tepals spreading horizontally, 5–9 mm wide ..... 22. *P. quadrifolia*
2b. Rhizome 8–45 mm thick; seeds ± enveloped by whitish green, spongy aril formed by swollen funicle.
5a. Leaves 9–10 ..... 19. *P. dulongensis*
5b. Leaves 4–6.
6a. Leaves wrinkled, obovate, 10–15 × 6.3–10 cm, basally rounded ..... 18. *P. rugosa*
6b. Leaves not wrinkled.
7a. Leaves elliptic or oblanceolate, base subcuneate ..... 17. *P. vaniotii*
7b. Leaves oblong, ovate- or obovate-oblong, or oblong-lanceolate, base shallowly cordate or rounded.
8a. Seeds white or yellow-red, slightly enveloped by swollen funicle ..... 16. *P. forrestii*
8b. Seeds yellow-brown, 1/2 enveloped by greenish white or rarely orange, spongy aril formed by enlarged funicle ..... 15. *P. axialis*
1b. Ovary 1-loculed with parietal placentation; berrylike capsule dehiscing irregularly; seeds with a succulent aril.
9a. Stamens 4–6 × as many as outer tepals; seeds enveloped by orange aril ..... 1. *P. dunniana*
9b. Stamens 2 or 3 × as many as outer tepals; seeds enveloped by red aril.
10a. Leaves with white, yellowish, or purple markings.
11a. Leaves with purple markings; stamens ca. 3 × as many as leaves ..... 12. *P. polyandra*
11b. Leaves with white or yellowish markings; stamens 2 × as many as leaves.
12a. Outer tepals as many as leaves, shorter than inner ones ..... 10. *P. luquanensis*
12b. Outer tepals fewer than leaves, longer than inner ones ..... 11. *P. marmorata*
10b. Leaves without markings.
13a. Plants pubescent or papillose-pubescent.
14a. Free portion of connective 0.5–1 mm ..... 8. *P. mairei*
14b. Free portion of connective 13–15 mm ..... 9. *P. wenxianensis*
13b. Plants glabrous or nearly so.
15a. Free portion of connective 6–15 mm.
16a. Inner tepals pendulous, margin undulate ..... 7. *P. undulata*
16b. Inner tepals (if present) not pendulous, margin not undulate ..... 14. *P. thibetica*
15b. Free portion of connective 1–4(–5) mm (except in *P. polyphylla* var. *pseudothibetica*).
17a. Filaments ca. 1 mm, shorter than free portion of connective ..... 5. *P. daliensis*
17b. Filaments more than 2 mm, longer than free portion of connective.
18a. Free portion of connective transversely ellipsoid, subglobose, or shortly conical, as wide as or wider than long ..... 13. *P. fargesii*
18b. Free portion of connective inconspicuous or longer than wide.
19a. Leaves (18–)23–26 × (11–)14–16 cm ..... 3. *P. vietnamensis*
19b. Leaves 5–17 × 2–11 cm.
20a. Leaves ovate ..... 2. *P. cronquistii*
20b. Leaves oblong to lanceolate.
21a. Inner tepals dark purple, usually much shorter than outer ones .... 4. *P. delavayi*
21b. Inner tepals yellow-green, usually slightly shorter or longer than outer ones ..... 6. *P. polyphylla*

1. Paris dunniana H. Léveillé, Repert. Spec. Nov. Regni Veg. 9: 78. 1910.

海南重楼 hai nan chong lou

Daiswa dunniana (H. Léveillé) Takhtajan; *D. hainanensis* (Merrill) Takhtajan; *Paris hainanensis* Merrill.

Plants 1.5–3 m tall. Rhizome 2–5 cm thick. Leaves 4–8; petiole 5–10 cm; leaf blade obovate-oblong 15–30 × 7.5–16 cm. Peduncle 60–140 cm. Outer tepals (5 or)6–8, green, oblong-lanceolate, 5–10 × 1.5–2.4 cm; inner ones green, filiform-linear, longer than outer ones. Stamens 20 or more; filaments (0.4–)0.8–1.5 cm; anthers 1.2–2.1 cm; free portion of connective 0.5–4 mm, apex acute. Ovary 1-loculed; stigma lobes (5 or) 6–8, ca. 5 mm. Capsule berrylike, subglobose, ca. 4 cm in diam., dehiscent, pale green at maturity. Seeds white, wholly enveloped by orange, succulent, aril, ca. 4 mm wide. Fl. Mar–Apr, fr. Oct–Nov. 2*n* = 10*.

• Forests; near sea level to 1100 m. Guizhou, Hainan, Yunnan.

Many plants of this species have been cultivated and closely investigated by Li (Bull. Bot. Res., Harbin 6(1): 109–111. 1986). The stamens are 20 (e.g., in *Cavalerie 3652*, the type gathering of *Paris dunniana*) or more, rather than 10–12, as described by Takhtajan (Brittonia 35: 257–258. 1983).

2. Paris cronquistii (Takhtajan) H. Li, Acta Bot. Yunnan. 6: 357. 1984.

凌云重楼 ling yun chong lou

Plants to 1 m tall. Rhizome 2–10 × 2–3 cm. Stem scabrous. Leaves 4–6; petiole 2.5–7.5 cm; leaf blade ovate, 11–17 ×

6–11 cm, adaxially sometimes with purple markings, abaxially purple or mottled with purple. Peduncle 12–60 cm. Outer tepals 5 or 6, green, ovate-lanceolate or lanceolate, 3.5–9 × 1.3–2 cm; inner ones yellow-green, narrowly linear, 3–8 cm × 1–5 mm. Stamens usually 15–18; filaments 3–8 mm; anthers 0.7–1.5 cm; free portion of connective 1–2 mm, apex acute. Ovary green or pale purple, globose, 1-loculed, 5- or 6-ribbed. Style short; stigma lobes 5 or 6. Capsule red at maturity, dehiscent. Seeds subglobose, wholly enveloped by red aril. Fl. May–Jun, fr. Oct–Nov.

• Evergreen forests on limestone slopes, ravine forests, mossy forests; 900–2100 m. SW Guangxi, Guizhou, Sichuan, SE Yunnan.

1a. Inner tepals 3.2–8 cm × ca. 1 mm ..... 2a. var. *cronquistii*
1b. Inner tepals ca. 3 cm × 5 mm ..... 2b. var. *xichouensis*

2a. Paris cronquistii var. **cronquistii**

凌云重楼(原变种) ling yun chong lou (yuan bian zhong)

Daiswa cronquistii Takhtajan, Brittonia 35: 262. 1983.

Inner tepals 3.2–8 cm × ca. 1 mm. 2*n* = 10*.

• Ravine forests, mossy forests; 900–2100 m. SW Guangxi, Guizhou, Sichuan, SE Yunnan.

2b. Paris cronquistii var. **xichouensis** H. Li, Bull. Bot. Res., Harbin 6(1): 113. 1986.

西畴重楼 xi chou chong lou

Inner tepals ca. 3 cm × 5 mm.

• Evergreen forests on limestone slopes; 1400–1500 m. SE Yunnan (Xichou Xian).

3. Paris vietnamensis (Takhtajan) H. Li, Acta Bot. Yunnan. 6: 357. 1984.

南重楼 nan chong lou

Daiswa hainanensis (Merrill) Takhtajan subsp. *vietnamensis* Takhtajan, Brittonia 35: 259. 1983.

Plants 1–1.5 m tall. Rhizome 1.5–3.5 cm thick. Leaves 4–6; petiole 4–10 cm; leaf blade obovate to obovate-oblong, (18–)23–26 × (11–)14–16 cm, base shallowly cordate or subrounded. Peduncle (5–)30–90 cm. Outer tepals 4–7, green, lanceolate to oblong-lanceolate, usually 6–8 × 2–3 cm; inner ones narrowly linear, 5.5–11 × ca. 1 mm, distally slightly widened. Stamens 2(or 3) × as many as outer tepals; filaments 2–5 mm; anthers 0.6–1.6 cm; free portion of connective 1–5 mm, apex acute. Ovary violet, conical-ovoid, 1-loculed. Style short; stigma lobes 6. Fl. Apr–Jul. 2*n* = 10*.

Evergreen broad-leaved forests; 1200–1900 m. Guangxi, Yunnan [Vietnam].

4. Paris delavayi Franchet, J. Bot. (Morot) 12: 190. 1898.

金线重楼 jin xian chong lou

Daiswa delavayi (Franchet) Takhtajan; *Paris henryi* Diels.

Plants 0.5–1.5 m tall. Rhizome 1.5–5 × 0.8–1.5 cm. Stem 30–70 cm. Leaves 6–8; petiole 0.8–1.5 cm; leaf blade lanceolate or oblong-lanceolate, 6–15 × 2–3 cm. Peduncle 16–75 cm. Outer tepals (3 or)4 or 5, usually recurved, purple-green or green, narrowly lanceolate, 2–4 cm × 4–9 mm; inner ones usually dark purple, filiform-linear, shorter than outer ones. Stamens usually 8 or 10; filaments 2–4 mm; anthers 0.6–1.8 cm; free portion of connective purple, 1.5–4 mm, acute-tipped. Ovary green or distally purple, conical-ovoid. Style 3–5 mm; stigma lobes (3 or)4–6. Capsule green at maturity, conical-ovoid. Seeds enveloped by red, succulent aril. Fl. Apr–May, fr. Sep–Oct. 2*n* = 10*.

Forests, bamboo forests, thickets; 1300–2000 m. Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan [Vietnam].

5. Paris daliensis H. Li & V. G. Soukup in H. Li, Acta Bot. Yunnan., Suppl. 5: 15. 1992.

大理重楼 da li chong lou

Plants 70–90 cm tall. Rhizome 5–6 × 1–1.5 cm. Leaves 7–9; petiole 3–4.5 cm; leaf blade oblong, 11–15.5 × 3.2–4.5 cm, base rounded or obtuse. Peduncle 10–18 cm. Outer tepals (3–)5, green, lanceolate, 5–6.5 × 1.8–2 cm; inner ones erect, yellow-green, linear, slightly thickened distally, 6–8 cm × ca. 1 mm. Stamens (6–)10, deep purple, 5–7 mm; filaments ca. 1 mm; anthers ca. 4 mm; free portion of connective thickened, oblong-ovoid, 2–3 mm, apex obtuse. Ovary deep purple, ovoid, (3–)5-loculed. Style short; stigma lobes (3–)5. Fl. Jun.

• Forests; ca. 2600 m. W Yunnan (Dali Xian).

6. Paris polyphylla Smith in Rees, Cycl. 26: *Paris* no. 2. 1813.

七叶一枝花 qi ye yi zhi hua

Plants 10–100 cm tall. Rhizome 1–2.5 cm thick. Leaves 5–10(–22); petiole (0.5–)1–6 cm; leaf blade variable, usually oblong to lanceolate, 6–15(–30) × 0.5–5 cm, base rounded to cuneate. Peduncle 5–24(–65) cm. Outer tepals (3 or)4–6(or 7), green or yellow-green, narrowly ovate-lanceolate to lanceolate, (3–)4.5–7(–11) × 1–4 cm; inner ones usually yellow-green, narrowly linear, shorter or longer than outer ones, 1–1.5(–5) mm wide. Stamens 2 × as many as outer tepals, (6–)8–12(–14) or sometimes more; filaments 4–10 mm; anthers 5–12 mm; free portion of connective usually 0.5–4 mm. Ovary subglobose, ribbed, 1-loculed, sometimes tuberculate. Style short, base enlarged, purple to white; stigma lobes (4 or)5. Capsule globose, sometimes tuberculate. Seeds enveloped by red, succulent aril. Fl. and fr. Mar–Nov.

Forests, bamboo forests, thickets, grassy or rocky slopes, streamsides; 100–3500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Laos, Myanmar, Nepal, Sikkim, Thailand, Vietnam].

1a. Ovary and capsule tuberculate ..... 6h. var. *latifolia*
1b. Ovary and capsule smooth.
2a. Free portion of anther connective 3–15 mm.
3a. Filaments 1–2 mm; anthers ca. 6 mm ..... 6g. var. *minor*
3b. Filaments 4–6 mm; anthers 12–18 mm ..... 6i. var. *pseudothibetica*
2b. Free portion of anther connective 1–2 mm.
4a. Filaments to 10 mm; stigma lobes

7 ..... 6j. var. *kwantungensis*

4b. Filaments 4–7 mm; stigma lobes (4 or)5.

5a. Inner tepals (2–)3–5 mm wide, distally usually widened and narrowly spatulate ..... 6b. var. *yunnanensis*

5b. Inner tepals 1–2 mm wide, distally never widened.

6a. Style and apical part of ovary white ..... 6e. var. *alba*

6b. Style and apical part of ovary green or purple.

7a. Anthers ca. 2 × as long as filaments ..... 6c. var. *chinensis*

7b. Anthers shorter than or nearly as long as filaments.

8a. Plants ca. 10 cm tall; free protion of anther connective inconspicuous ..... 6d. var. *nana*

8b. Plants more than 30 cm tall; free portion of anther connective conspicuous, 0.5–1 mm.

9a. Leaf blade oblong, elliptic, or obovate-lanceolate, 2.5–5 cm wide ..... 6a. var. *polyphylla*

9b. Leaf blade lanceolate to linear-lanceolate, 1.5–2.5 cm wide ..... 6f. var. *stenophylla*

6a. Paris polyphylla var. **polyphylla**

七叶一枝花(原变种) qi ye yi zhi hua (yuan bian zhong)

Daiswa polyphylla (Smith) Rafinesque; *Paris biondii* Pampanini; *P. debeauxii* H. Léveillé; *P. taitungensis* S. S. Ying.

Plants 30–100 cm tall. Leaves 6–10, 2.5–5 cm wide. Inner tepals narrowly linear, 1–2 mm wide, usually slightly longer than outer ones. Filaments 4–7 mm; anthers 5–8 mm; free portion of connective 0.5–1 mm. 2*n* = 10*.

Forests, thickets, grassy slopes; 100–2400 m. Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Nepal, Vietnam].

6b. Paris polyphylla var. **yunnanensis** (Franchet) Handel-Mazzetti, Symb. Sin. 7: 1216. 1936.

滇重楼 dian chong lou

Paris yunnanensis Franchet, Mem. Soc. Philom. (Paris) 1888: 290. 1888; *Daiswa birmanica* Takhtajan; *D. yunnanensis* (Franchet) Takhtajan; *P. aprica* H. Léveillé; *P. atrata* H. Léveillé; *P. birmanica* (Takhtajan) H. Li & Noltie; *P. cavaleriei* H. Léveillé & Vaniot; *P. christii* H. Léveillé; *P. franchetiana* H. Léveillé; *P. gigas* H. Léveillé & Vaniot; *P. mercieri* H. Léveillé; *P. pinfaensis* H. Léveillé; *P. polyphylla* var. *platypetala* Franchet; *P. polyphylla* var. *yunnanensis* f. *velutina* H. Li & Noltie.

Plants 30–100 cm tall. Leaves 5–9. Inner tepals (2–)3–5 mm wide, distally slightly widened, usually slightly shorter than outer ones. Filaments 4–7 mm; anthers 7–12 mm; free portion of connective 1–2 mm. 2*n* = 10*.

Broad-leaved or coniferous forests, bamboo forests, thickets, grassy slopes; 1400–3100 m. Guizhou, Sichuan, SE Xizang, Yunnan [India, Myanmar].

6c. Paris polyphylla var. **chinensis** (Franchet) H. Hara, J. Fac. Sci. Univ. Tokyo, Sect. 3, 10: 176. 1969.

华重楼 hua chong lou

Paris chinensis Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 97. 1887; *Daiswa chinensis* (Franchet) Takhtajan; *D. chinensis* subsp. *brachysepala* (Pampanini) Takhtajan; *P. brachysepala* Pampanini; *P. brevipetala* Y. K. Yang; *P. formosana* Hayata.

Plants 40–130 cm tall. Leaves 5–10(or 11). Inner tepals shorter than outer ones. Filaments 5–6 mm; anthers 1–1.2 cm; free portion of connective 0.5–1.5(–2) mm. 2*n* = 10*.

Forests, bamboo forests, thickets; 2800–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan [Laos, Myanmar, Thailand, Vietnam].

6d. Paris polyphylla var. **nana** H. Li, Bull. Bot. Res., Harbin 6(1): 123. 1986.

矮重楼 ai chong lou

Plants ca. 10 cm tall. Leaves 4–6. Inner tepals 1–2 mm wide, much longer than outer ones. Filaments ca. 4 mm; anthers ca. 3 mm; free portion of connective very short or inconspicous.

• S Sichuan (Yibin Shi).

6e. Paris polyphylla var. **alba** H. Li & R. J. Mitchell in H. Li, Bull. Bot. Res., Harbin 6(1): 123. 1986.

白花重楼 bai hua chong lou

Paris marchandii H. Léveillé.

Leaves 8. Inner tepals equaling outer ones. Anthers slightly longer than filaments; free portion of connective less than 1 mm. Apical part of ovary and style white.

• 1500–2900 m. Guizhou, Hubei, Yunnan.

6f. Paris polyphylla var. **stenophylla** Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 97. 1887.

狭叶重楼 xia ye chong lou

Daiswa bockiana (Diels) Takhtajan; *D. lancifolia* (Hayata) Takhtajan; *Paris arisanensis* Hayata; *P. bockiana* Diels; *P. hamifer* H. Léveillé; *P. lancifolia* Hayata; *P. polyphylla* var. *brachystemon* Franchet.

Plants 35–115 cm tall. Leaves (6–)8–14(–22), 1.5–2.5 cm wide. Inner tepals 1–2 mm wide, nearly as long as outer ones. Filaments 4–6 mm; anthers 5–6 mm; free portion of connective ca. 0.5 mm. 2*n* = 10*.

Forests, rocky slopes; near sea level to 3500 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Myanmar, Nepal, Sikkim].

6g. Paris polyphylla var. **minor** S. F. Wang, Bull. Bot. Res., Harbin 8(3): 139. 1988.

小重楼 xiao chong lou

Plants 7–15 cm tall. Leaves 7–14. Inner tepals equaling or slightly longer than outer ones. Filaments 1–2 mm; anthers ca. 6 mm; free portion of connective ca. 4 mm. 2*n* = 10*.

• Forests; 1500–2500 m. Sichuan.

6h. Paris polyphylla var. **latifolia** F. T. Wang & C. Yu Chang in F.T.Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 250. 1978.

宽叶重楼 kuan ye chong lou

Plants 50–55 cm tall. Leaves 8–13. Inner tepals slightly shorter than outer ones. Filaments ca. 6 mm; anthers 6.5–11 mm; free portion of connective 0.2–0.5 mm. Ovary and capsule tuberculate. 2*n* = 10*.

• Forests, streamsides; 300–2300 m. Anhui, Henan, Hubei, Jiangxi, Shaanxi, Shanxi.

6i. Paris polyphylla var. **pseudothibetica** H. Li, Bull. Bot. Res., Harbin 6(1): 126. 1986.

长药隔重楼 chang yao ge chong lou

Paris polyphylla var. *pseudothibetica* f. *macrosepala* H. Li.

Leaves 9. Inner tepals absent or 3.5–7 cm, equaling or slightly longer than outer ones. Filaments 4–6 mm; anthers ca. 3 × as long as filaments; free portion of connective variable in length, 3–10(–15) mm.

• Forests, thickets; 1800–1900 m. NE Yunnan (Yiliang Xian).

6j. Paris polyphylla var. **kwantungensis** (R. H. Miao) S. C. Chen & S. Yun Liang, Acta Phytotax. Sin. 33: 490. 1995.

广东重楼 guang dong chong lou

Paris kwantungensis R. H. Miao, Acta Sci. Nat. Univ. Sunyatseni 1982(3): 74. 1982.

Leaves 7. Inner tepals ca. 6 cm, equaling outer ones. Filaments to 10 mm; anthers ca. 15 mm; free portion of connective ca. 1 mm. Stigma lobes usually 7.

• SW Guangdong (Xinyi Xian).

7. Paris undulata H. Li & V. G. Soukup in H. Li, Acta Bot. Yunnan., Suppl. 5: 16. 1992.

卷瓣重楼 juan ban chong lou

Rhizome 1–1.5 cm thick. Stem 70–80 cm. Leaves 7–9; petiole ca. 3.5 cm; leaf blade suboblong, 10–12 × 4–4.5 cm, base subrounded or broadly cunneate. Peduncle 20–30 cm. Outer tepals 4 or 5, green, lanceolate or oblanceolate, 5–6 × ca. 2 cm; inner ones pendulous, yellow-green, linear, 5–6 cm × 2–3 mm, margin undulate. Stamens 8 or 10; filaments 5–6 mm; anthers 1.1–1.2 cm; free portion of connective cylindric, 1.1–1.5 mm, apex acute. Ovary green, ovoid-globose, 1-loculed, apex truncate. Stigma lobes 4 or 5, purple, 6–7 mm. Fl. Apr–May.

• C Sichuan (Emei Shan).

8. Paris mairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 11: 302. 1912.

毛重楼 mao chong lou

Daiswa pubescens (Handel-Mazzetti) Takhtajan; *D. violacea* (H. Léveillé) Takhtajan; *Paris polyphylla* Smith var. *pubescens* Handel-Mazzetti; *P. pubescens* (Handel-Mazzetti) F. T. Wang & Tang; *P. violacea* H. Léveillé.

Plants papillose-pubescent, to 1 m tall. Rhizome 1–2 cm thick. Leaves 5–9; petiole rather short; leaf blade deep green, tinged with pale green along veins, oblong, obovate-oblanceolate, or oblanceolate, 5–14 × 2–5 cm, base cuneate or subrounded. Outer tepals (4 or)5–8(or 9), green, oblong-lanceolate, 3–7 × 1–2 cm; inner ones equaling or longer than outer ones, 1(–2) mm wide. Stamens (8–)10–16(–18), 1.1–1.5 cm; filaments usually 5–8 mm; anthers 7–9 mm; free portion of connective 0.5–1 mm, apex acute. Ovary purple-red, conical-ovoid, 1-loculed. Style short; stigma lobes 5–8. Capsule purple. Seeds wholly enveloped by red aril. Fl. May–Jul, fr. Aug–Sep. 2*n* = 10*.

• Forests, thickets, alpine grassy slopes; 1800–3500 m. Guizhou, W Sichuan, N Yunnan.

9. Paris wenxianensis Z. X. Peng & R. N. Zhao, Acta Bot. Bor.-Occid. Sin. 6: 133. 1986.

文县重楼 wen xian chong lou

Plants pubescent, 60–100 cm tall. Rhizome 4–6 × 1.2–2 cm. Stem densely pubescent. Leaves 10–13; petiole very short; leaf blade elliptic-lanceolate, 14–19 × 2.5–5.5 cm, base cuneate, densely pubescent along abaxial veins and at margin. Peduncle 14–25 cm, pubescent. Outer tepals 6, green, lanceolate, 5.5–9.5 × 1.2–2 cm, pubescent along abaxial veins; inner ones yellow-green, linear, conspicuously shorter than outer ones, 1–2 mm wide. Stamens 12, 2.7–3.7 cm; filaments 7–8 mm; anthers 1.1–1.4 cm; free portion of connective cylindric, 1.3–1.5 cm, apex acute. Ovary yellow-green or pale purple, subglobose, 1-loculed. Style short; stigma lobes 6. Capsule purplish green. Fl. Apr–Jul, fr. Aug.

• Forests; 1900–2400 m. S Gansu (Wen Xian).

10. Paris luquanensis H. Li, Acta Bot. Yunnan. 4: 353. 1982.

禄劝花叶重楼 lu quan hua ye chong lou

Plants 6–12 cm tall. Rhizome terete, 2–3 × 0.6–0.8 cm. Stem purple. Leaves 4 or 5; petiole very short or absent; leaf blade obovate, obovate-oblanceolate, or rhombic-obovate, 3.2–5 × 2–3.7 cm, base cuneate, with pale green marking along veins, abaxially deep purple. Peduncle purple, 2.5–5 cm. Outer tepals 4 or 5, deep green adaxially, purplish abaxially, ovate, ovate-lanceolate, or narrowly elliptic, 8–9 × 4–5.5 mm; inner ones linear-filiform, much longer than outer ones, ca. 1.7 cm × 1 mm. Stamens 8 or 10, ca. 5 mm; filaments ca. 5 mm, equaling anthers; connective inconspicuous. Ovary purple, 1-loculed, 4- or 5-ribbed. Style short; stigma lobes inconspicuous. Capsule purple, ribbed. Seeds ovoid, wholly enveloped by deep red aril. Fl. Jun, fr. Sep. 2*n* = 10*.

• Forests, thickets; 2100–2800 m. NC Yunnan (Luquan Xian).

11. Paris marmorata Stearn, Bull. Brit. Mus. (Nat. Hist.), Bot. 2(3): 79. 1956.

花叶重楼 hua ye chong lou

Paris polyphylla Smith subsp. *marmorata* (Stearn) H. Hara.

Plants 10–15 cm tall. Rhizome ca. 3 × 1.4 cm. Leaves 5 or 6; petiole very short; leaf blade narrowly elliptic or lanceolate, 6.5–8.5 × 1.2–2 cm, adaxially green with white markings, abaxially purple-red, base cuneate. Peduncle 1–2 cm. Outer tepals 3 or 4, adaxially green with white markings, abaxially purple-red, narrowly lanceolate, 3–4 cm × 6–8 mm; inner ones purple and slightly widened distally, green proximally, filiform-linear. Stamens 6–8; filaments 2.5–3.5 mm; anthers 1.5–2.5 mm, connective inconspicuous. Ovary green, subglobose. Style short; stigma lobes 3(or 4). Capsule deep purple. Fl. May, fr. Jun. 2*n* = 10*, 20.

Broad-leaved forests; 2400–2800 m. Sichuan, S Xizang, Yunnan [Bhutan, N India, Nepal].

12. Paris polyandra S. F. Wang, Bull. Bot. Res., Harbin 5(1): 169. 1985.

多蕊重楼 duo rui chong lou

Plants 25–65 cm tall. Rhizome 2–3 × 1–1.5 cm. Leaves 5 or 6; petiole 1.5–4 cm; leaf blade ovate, 7–9 × 3.5–5 cm, with purple marking adaxially, base subcordate or rounded. Peduncle 7–12 cm. Outer tepals 6, green, ovate-lanceolate, 3–4 × 1–1.3 cm, apex long acuminate; inner ones narrowly linear, 2.3–4 × 0.1–0.3 mm. Stamens 18, 1.2–1.5 cm; filaments ca. 2 mm; anthers 1–1.3 cm; free portion of connective purple-brown, less than 0.5 mm. Ovary ellipsoid, angular. Style red; stigma lobes 6. Fl. May–Jun.

• Moist and shady places along valleys; 1200–1600 m. SW Sichuan.

13. Paris fargesii Franchet, J. Bot. (Morot) 12: 190. 1895.

球药隔重楼 qiu yao ge chong lou

Plants 50–100 cm tall. Rhizome 1.5–5 × 0.8–2.5 cm. Leaves (3 or)4–6(or 7); petiole 2–5(–9.5) cm; leaf blade ovate, broadly ovate, or ovate-oblong, 9–20 × 4.5–15 cm. Peduncle 20–40 cm. Outer tepals 4 or 5(or 6), green, lanceolate or ovate-lanceolate, 4.5–5 × 1–2 cm, basally narrowed into a short claw; inner ones yellow-green or purple-black, narrowly linear, usually 1–2 cm × 1–2.5(–3.5) mm, very rarely to 3.5–6 mm wide. Stamens 8 or 10(–12), 0.5–1.5 cm; filaments shorter than anthers; free portion of connective purple-black, transversely ellipsoid, subglobose, or shortly conical, 1–2 mm. Ovary conical-ovoid. Style short; stigma lobes 4 or 5. Capsule ovoid-globose. Fl. Apr–Jun, fr. Jul–Sep.

Forests, shady places; 500–2100 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan [Vietnam].

1a. Stamens 5–7 mm; free portion of anther connective transversely ellipsoid or subglobose, ca. 1 mm ..... 13a. var. *fargesii*
1b. Stamens 12–15 mm, free portion of anther connective shortly conical, 1–2 mm ..... 13b. var. *petiolata*

13a. Paris fargesii var. **fargesii**

球药隔重楼(原变种) qiu yao ge chong lou (yuan bian zhong)

Daiswa fargesii (Franchet) Takhtajan; *D. fargesii* var. *brevipetalata* T. C. Huang & K. C. Yang; *Paris fargesii* var. *brevipetalata* (T. C. Huang & K. C. Yang) T. C. Huang & K. C. Yang; *P. fargesii* var. *latipetala* H. Li & V. G. Soukup; *P. hookeri* H. Léveillé; *P. petiolata* Baker ex C. H. Wright var. *membranacea* C. H. Wright; *P. polyphylla* Smith subsp. *fargesii* (Franchet) H. Hara.

Stamens 5–7 mm; free portion of anther connective transversely ellipsoid or subglobose, ca. 1 mm. 2*n* = 10*.

Forests, shady places; 500–2100 m. Guangdong, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan [Vietnam].

13b. Paris fargesii var. **petiolata** (Baker ex C. H. Wright) F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 91. 1978.

具柄重楼 ju bing chong lou

Paris petiolata Baker ex C. H. Wright, J. Linn. Soc., Bot. 36: 145. 1903; *P. delavayi* Franchet var. *ovalifolia* H. Li; *P. delavayi* var. *petiolata* (Baker ex C. H. Wright) H. Li.

Stamens 1.2–1.5 cm; free portion of anther connective shortly conical, 1–2 mm.

• Shady places in forests; 1200–2000 m. Guangxi, Guizhou, Jiangxi, Sichuan.

14. Paris thibetica Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 184. 1887.

黑籽重楼 hei zi chong lou

Plants 35–90 cm tall. Rhizome 0.8–2 cm thick. Leaves 7–12; petiole usually very short; leaf blade lanceolate or narrowly so, 4–15 × 1–3(–5) cm, base cuneate. Outer tepals 4 or 5, green, lanceolate or narrowly so, 3–5 × (0.7–)1.4–1.6 cm; inner ones absent or narrowly linear and equaling or longer than outer ones. Stamens 8–10; filaments 4–5 mm; anthers 8–10 mm; free portion of connective 0.6–2.7 cm. Ovary green, ovoid-globose, 1-loculed, inconspicuously 5-ribbed. Style short; stigma lobes 4 or 5. Capsule ovoid-globose. Seeds black, 1/2 enveloped by red, succulent, crested aril. Fl. Apr–Jul, fr. Jul–Aug.

Forests, forest margins; 1400–3800 m. S Gansu, Guizhou, Sichuan, S Xizang, NW Yunnan [Bhutan, Myanmar, Sikkim].

1a. Inner tepals present ..... 14a. var. *thibetica*
1b. Inner tepals absent ..... 14b. var. *apetala*

14a. Paris thibetica var. **thibetica**

黑籽重楼(原变种) hei zi chong lou (yuan bian zhong)

Daiswa thibetica (Franchet) Takhtajan; *Paris polyphylla* Smith var. *appendiculata* H. Hara; *P. polyphylla* var. *thibetica* (Franchet) H. Hara.

Inner tepals present, narrowly linear, equaling or longer than outer ones. 2*n* = 10*.

Forests; 2400–3600 m. S Gansu, Guizhou, Sichuan, SE Xizang, NW Yunnan [Bhutan, Sikkim].

14b. Paris thibetica var. **apetala** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 149. 1925.

无瓣重楼 wu ban chong lou

Inner tepals absent.

Forests, forest margins; 1400–3800 m. W Sichuan, S Xizang, NW Yunnan [Bhutan, Myanmar, Sikkim].

15. Paris axialis H. Li, Acta Bot. Yunnan. 6: 273. 1984.

五指莲重楼 wu zhi lian chong lou

Paris axialis var. *rubra* H. H. Zhou et al.

Plants 30–55 cm tall. Rhizome brown, 7–8 × 1–1.3 cm. Leaves 4–6; petiole 2.5–4 cm; leaf blade ovate-oblong, 7–10 × 4.5–7 cm, base shallowly cordate or rounded. Peduncle 15–25 cm. Outer tepals 4–6, green, ovate-lanceolate, ca. 3 × 1 cm; inner ones yellow-green, filiform-linear, 5.5–6 cm × 1–2 mm. Stamens (2 or)3 × as many as outer tepals; filaments green, ca. 3 mm; anthers ca. 9 mm; free portion of connective ca. 1 mm, apex acute. Ovary green, subglobose, 4–6-loculed, 4–6-ribbed. Style short; stigma lobes 4–6, ca. 2 mm. Berry pale green, globose, indehiscent. Seeds many, yellow-brown, obovate, 1/2 enveloped by green-white, spongy aril. Fl. Apr–Jun, fr. Jul–Aug. $2n = 10$*.

• Forests; 700–3000 m. Sichuan, NE Yunnan.

16. Paris forrestii (Takhtajan) H. Li, Acta Bot. Yunnan. 6: 359. 1984.

长柱重楼 chang zhu chong lou

Daiswa forrestii Takhtajan, Brittonia 35: 268. 1983; *Paris longistigmata* H. Li.

Plants 18–100 cm tall. Rhizome 2–4.5 × 0.8–2 cm. Leaves (4 or)5 or 6(–8); petiole 1–12 cm; leaf blade oblong, ovate-oblong, obovate-oblong, or oblong-lanceolate, 6.5–16 × 2.4–6.5 cm, base shallowly cordate or rounded. Peduncle 3–15(–20) cm. Outer tepals 4–6(or 7), green, ovate or lanceolate, 1.5–4.5 × 0.6–2 cm; inner ones yellow-green, filiform-linear, 2.5–6.5 cm × 1–2 mm. Stamens 8–12(–14); filaments 3.5–7 mm; anthers 5–8 mm; free portion of connective very short. Ovary purple, conical-ovoid, 4–6-loculed. Style with enlarged base; stigma lobes 5 or 6. Berry green, subglobose, 1.4–1.7 cm in diam. Seeds white or yellow-red, small, slightly enveloped by swollen funicle. Fl. May–Jul, fr. Aug–Nov. $2n = 10$*.

Alpine coniferous forests, evergreen broad-leaved forests; 1900–3500 m. SE Xizang, W Yunnan [Myanmar].

17. Paris vaniotii H. Léveillé, Mem. Pontif. Accad. Romana Nuovi Lincei 24: 355. 1906.

平伐重楼 ping fa chong lou

Plants 30–50 cm tall. Rhizome 3–3.5 × ca. 1.2 cm. Leaves 5 or 6; petiole 1–1.5 cm; leaf blade elliptic or oblanceolate, 7.5–14 × 2.5–5.5 cm, base subcuneate. Outer tepals 5, green, lanceolate, 2.5–3.5 cm × 7–12 mm, base gradually narrowed into a short claw; inner ones filiform-linear, 3.5–5 cm × 1–2 mm. Stamens 10; filaments 3.5–4.5 mm; anthers 5.5–9 mm; free portion of connective 0.5–1.5 mm. Ovary green, 5-loculed; locules inconspicuous. Style with an enlarged base; stigma lobes 5. Fl. Jun. $2n = 10$*.

Shady and moist places in forests. Guizhou, Hunan, Yunnan [Myanmar].

18. Paris rugosa H. Li & Kurita in H. Li, Acta Bot. Yunnan., Suppl. 5: 13. 1992.

皱叶重楼 zhou ye chong lou

Plants 50–70 cm tall. Rhizome ca. 12 × 3–4 cm. Leaves 4 or 5; petiole 1.8–6 cm; leaf blade obovate, 10–15 × 6.3–10 cm, wrinkled, base rounded. Peduncle 9–25 cm. Outer tepals 4 or 5, green, ovate, 3.5–4.5 × 1.7–3.5 cm; inner ones erect, yellow-green, filiform-linear, ca. 7 cm × 1–2 mm. Stamens 12 or 15; filaments green, ca. 4 mm; anthers purple, ca. 1 cm; connective not prolonged. Ovary subglobose, ca. 5 mm in diam., 4- or 5-loculed, 4- or 5-ribbed. Style short; stigma lobes 4 or 5. Fl. May.

• Shady places; 1500–1700 m. NW Yunnan.

19. Paris dulongensis H. Li & Kurita in H. Li, Acta Bot. Yunnan., Suppl. 5: 14. 1992.

独龙重楼 du long chong lou

Plants 50–115 cm tall. Rhizome ca. 25 × 4.5 cm. Leaves 9 or 10; petiole purple, ca. 6 cm, leaf blade oblanceolate or oblong, ca. 25 × 9 cm, wrinkled, base rounded. Peduncle (8–)35 cm. Outer tepals 6 or 7, green, ovate-lanceolate or lanceolate, ca. 8 × 2 cm; inner ones yellow-green, filiform-linear, ca. 8 cm × 1–2 mm. Stamens 12 or 14; filaments green, ca. 7 mm; anthers dark purple, ca. 1.5 mm; connective not exserted. Ovary green, ovoid, 6- or 7-loculed, 6- or 7-ribbed. Style short; stigma lobes 6 or 7. Fl. May.

• Thickets along ravines; 1500–1600 m. NW Yunnan.

20. Paris verticillata Marschall von Bieberstein, Fl. Taur.-Caucas. 3: 287. 1819.

北重楼 bei chong lou

Paris dahurica Fischer ex Turczaninow; *P. hexaphylla* Chamisso; *P. hexaphylla* var. *manshurica* (Komarov) Voroschilov; *P. hexaphylla* f. *purpurea* Miyabe & Tatewaki; *P. manshurica* Komarov; *P. obovata* Ledebour; *P. quadrifolia* Linnaeus var. *dahurica* (Fischer ex Turczaninow) Franchet; *P. quadrifolia* var. *hexaphylla* (Chamisso) B. Fedtschenko; *P. quadrifolia* var. *obovata* (Ledebour) Regel & Tiling; *P. verticillata* subsp. *manshurica* (Komarov) Kitagawa; *P. verticillata* var. *manshurica* (Komarov) H. Hara; *P. verticillata* var. *obovata* (Ledebour) H. Hara; *P. verticillata* f. *purpurea* (Miyabe & Tatewaki) Honda.

Plants 25–60 cm tall. Rhizome slender, 3–5 mm thick. Leaves (5 or)6–8(or 9); petiole very short; leaf blade lanceolate, narrowly oblong, oblanceolate, or obovate-oblanceolate, (4–)7–15 × 1.5–5 cm, base cuneate. Peduncle 4.5–12 cm. Outer tepals usually 4(or 5), green, oblong-lanceolate or ovate-lanceolate, 2–5.5 × 1–3 cm; inner ones yellow-green, 1–3 cm × 1–2 mm. Stamens 8(–10); filaments 5–8 mm; anthers 0.7–1.4 cm; free portion of connective 5–8(–10) mm. Ovary purple, subglobose, 4

(or 5)-loculed. Stigma lobes 4 or 5, long. Berry purple-black, globose, ca. 1 cm in diam. Seeds without aril. Fl. May–Jun, fr. Jul–Sep. 2*n* = 10, 15, 20*.

Forests, thickets, grassy and shady places, hillsides along ravines; 1100–3600 m. Anhui, Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, NW Sichuan, Zhejiang [Japan, Korea, Mongolia, Russia (Siberia)].

21. Paris bashanensis F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 250. 1978.

巴山重楼 ba shan chong lou

Paris quadrifolia Linnaeus var. *setchuenensis* Franchet; *P. setchuenensis* (Franchet) Barkalov.

Plants 25–45 cm tall. Rhizome slender, 2–4 mm thick. Leaves 4(or 5); petiole very short; leaf blade oblong-lanceolate or ovate-elliptic, 4–9 × 2–3.5 cm, base cuneate. Peduncle 2–7 cm. Outer tepals 4, reflexed, narrowly lanceolate, 1.7–3.5 cm × 3–5 mm; inner ones filiform-linear, 1.6–3.4 cm × 1–2 mm. Stamens 8; filaments 3–4 mm; anthers 6–11 mm; free portion of connective subulate, 4–9 mm. Ovary purple, globose, 2–3.5 mm in diam., 4(or 5)-loculed. Stigma lobes 4(or 5), slender. Berry purple, globose, many seeded. Seeds without aril. Fl. May–Jul, fr. Aug–Sep. 2*n* = 10*.

• Moist and shady places in forests; 1400–4300 m. W Hubei, Sichuan.

22. Paris quadrifolia Linnaeus, Sp. Pl. 1: 367. 1753.

四叶重楼 si ye chong lou

Paris quadrifolia var. *angustiovata* D. Z. Ma & H. L. Liu.

Plants 25–40 cm tall. Rhizome creeping, slender, 2–5 mm thick. Leaves usually 4 or 5, subsessile; leaf blade broadly obovate or ovate, 5–10 × 2.5–5 cm, base subcuneate. Peduncle 7–10 cm. Outer tepals 4, spreading horizontally, green, ovate-lanceolate, 2–3 cm × 5–9 mm; inner ones yellow-green, filiform-linear, 1.5–3 cm × 1–2 mm. Stamens 8; filaments 3–5 mm; anthers 3–6 mm; free portion of connective 4–5 mm. Ovary purple-red, globose, 4–8 mm in diam., 4(or 5)-loculed. Stigma lobes 4 or 5, slender. Berry globose, many seeded. Seeds without aril. Fl. Jul, fr. Aug. 2*n* = 15, 20, 25, 30.

Forests, thickets, moist places. N Heilongjiang, N Xinjiang [Mongolia, Russia (Siberia); Europe].

10. TRILLIUM Linnaeus, Sp. Pl. 1: 339. 1753.

延龄草属 yan ling cao shu

Liang Songyun (梁松筠 Liang Song-jun); Victor G. Soukup

Herbs perennial, usually with stout rhizome. Stem erect, simple, basally with a few brown, scalelike sheaths. Leaves 3, in a terminal whorl, sessile or shortly petiolate, rhombic-orbicular to ovate, with 3 or 5 main veins and anastomosing veinlets. Flowers bisexual, solitary, terminal, pedunculate. Tepals 6, in 2 whorls, free; outer ones usually green, persistent; inner ones petaloid, rose purple to white, slightly narrower than outer, withering or deciduous after anthesis. Stamens 6; filaments short; anthers basifixed, linear, with very short connective. Ovary ovoid to globose, 3-loculed; ovules several to many per locule. Style short, deeply 3-lobed often to base. Fruit a berry, globose to ovoid. Seeds several to many, ovoid, small.

About 46 species: Bhutan, China, India, Japan, Korea, Myanmar, Nepal, Russia, Sikkim; North America; four species (one endemic) in China.

1a. Stems tufted; leaves sessile; inner tepals elliptic or obovate.
  2a. Anthers 7–8 mm, longer than filaments ..... 1. *T. kamtschaticum*
  2b. Anthers 3–4 mm, shorter than or equaling filaments ..... 2. *T. tschonoskii*
1b. Stem solitary; leaves shortly petiolate; inner tepals linear-lanceolate or linear.
  3a. Outer tepals similar in shape and size to inner ones, 1.5–2 mm wide; peduncle 2–3 mm ..... 3. *T. govanianum*
  3b. Outer tepals quite different in shape and size from inner ones, 10–12 mm wide; peduncle 12–14 cm ..... 4. *T. taiwanense*

1. Trillium kamtschaticum Pallas ex Pursh, Fl. Amer. Sept. 1: 245. 1814.

吉林延龄草 ji lin yan ling cao

Plants 35–50 cm tall. Rhizome stout, abbreviated. Stems tufted. Leaves sessile, broadly rhombic-orbicular or ovate-orbicular, 10–17 × 7–17 cm. Peduncle 1.5–4 cm. Flowers 3–5 cm wide. Outer tepals green, broadly lanceolate to oblong-lanceolate, 3–3.5 × 0.7–1.2 cm; inner ones white, elliptic or obovate, 3–3.8 × 1–1.6 cm. Stamens ca. 2/5 as long as tepals; filaments 3–4 mm; anthers usually 7–10 mm, with slightly convex connective apically. Ovary subconical-ovoid; stigma rather thick. Berry ovoid-globose, 1.8–2.8 cm in diam. Fl. Jun, fr. Aug. 2*n* = 10*, 24.

Forests, forest margins, moist places; 500–1400 m. Jilin [Japan, Korea, Russia (Siberia); North America].

2. Trillium tschonoskii Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 29: 218. 1884.

延龄草 yan ling cao

Trillium morii Hayata; *T. tschonoskii* var. *himalaicum* H. Hara; *T. tschonoskii* f. *morii* (Hayata) Yamamoto; *T. tschonoskii* var. *morii* (Hayata) Masamune.

Plants 15–50 cm tall. Rhizome stout, abbreviated. Stems tufted. Leaves sessile, rhombic-orbicular to broadly rhombic, 6–15 × 5–15 cm. Peduncle 1–4 cm. Flowers 3–4 cm wide. Outer tepals green, narrowly ovate to ovate-lanceolate, 1.5–2 cm × 5–9 mm, herbaceous; inner ones white, rarely pale purple, ovate-lanceolate, 1.5–2.2 cm × 4–6(–10) mm. Stamens ca. 2/5 as long as tepals; filaments 4–5 mm; anthers 3–4 mm, with

slightly convex connective apically. Ovary conical-ovoid, 7–9 × 5–7 mm; stigma rather thick. Berry black-purple, globose, 1.5–1.8 cm in diam., many seeded. Fl. Apr–Jun, fr. Jul–Aug. 2*n* = 20.

Forests, moist places along ravines, shady and rocky places on hillsides; 1000–3200 m. Anhui, Fujian, Gansu, Hubei, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Japan, Korea, Myanmar, Sikkim].

This is a vulnerable species in China.

3. Trillium govanianum Wallich ex Royle, Ill. Bot. Himal. Mts. 1: 384. 1839.

西藏延龄草 xi zang yan ling cao

Trillidium govanianum (Wallich ex Royle) Kunth.

Plants 12–20 cm tall. Rhizome creeping, slightly elongate, terete, 8–10 mm thick. Stem solitary. Leaves shortly petiolate, ovate or ovate-cordate, 4–6 × 2.2–4 cm. Peduncle 2–3 mm. Flowers 2–2.5 cm wide. Outer tepals green, linear or linear-lanceolate, 1–1.2 cm × 1.5–2 mm; inner ones purple-red, very similar to outer ones in shape, 1.1–1.5 cm × ca. 1 mm. Stamens ca. 1/4 as long as tepals; filaments ca. 2 mm; anthers ca. 1.5 mm. Ovary purple-red, ovoid-globose, 5–6 × 4–5 mm. Fl. May–Jun.

Forests; ca. 3200 m. S Xizang (Dinggyê Xian) [Bhutan, India, Nepal, Sikkim].

4. Trillium taiwanense S. S. Ying, J. Jap. Bot. 64: 154. 1989.

台湾延龄草 tai wan yan ling cao

Plants 15–20 cm tall. Rhizome creeping, subterete, stout, 2–35 cm. Stem solitary. Leaves shortly petiolate, ovate or broadly ovate, 7–9 × 4.5–5.5 cm. Peduncle 12–14 cm. Flowers 3–5 cm wide. Outer tepals green, ovate-lanceolate or elliptic-lanceolate, 3.2–3.5 × 1–1.2 cm; inner ones linear or broadly linear, 1.4–1.9 cm × 1–1.5 mm. Stamens short; filaments 2–3 mm; anthers 1–1.5 mm. Ovary depressed ovoid, 5.5–6.5 × 2.5–4 mm; stigma 3-lobed. Fl. Jun.

• 1600–1700 m. E Taiwan (Hualian Shi).

11. SMILAX Linnaeus, Sp. Pl. 2: 1028. 1753.

菝葜属 ba qia shu

Chen Xinqi (陈心启 Chen Sing-chi); Tetsuo Koyama[1]

Vines climbing or shrubs, woody, less often suberect or herbs, dioecious, usually with short, thick rhizomes. Stems and branches usually prickly. Petiole usually narrowly winged proximally, with an abscission zone between winged portion and apex; tendrils often present. Leaf blade usually ovate to lanceolate, main veins 3–7, connected by a network of cross veins and veinlets. Inflorescence borne in axil of leaf or scalelike bract, of 1(–3) umbels or a panicle, raceme, or spike of umbels; peduncle sometimes with a scalelike prophyll at base. Flowers small; tepals 6, usually free (connate in *Smilax synandra*). Male flowers: stamens 6, rarely 8 or more, inserted at base of tepals; anthers mostly 1-loculed. Female flowers: ovary 3-loculed; ovules 1 or 2 per locule; style very short; stigmas 3; staminodes absent to 6. Fruit a berry, red to black, usually 1- or 2-seeded. Seeds dark brown.

About 300 species: tropical, subtropical, and temperate regions of both hemispheres; 79 species (39 endemic) in China.

1a. Rhizomes stoloniferous, creeping, elongate.
2a. Peduncle with a prophyll at base; leaves not glaucous abaxially ..... 65. *S. pinfaensis*
2b. Peduncle without a prophyll at base; leaves glaucous abaxially.
3a. Petiole 1–2 mm, narrowly winged for ca. 2/3 its length; stem much branched ..... 26. *S. nana*
3b. Petiole 4–13 mm, scarcely winged; stem slightly branched or not ..... 25. *S. pachysandroides*
1b. Rhizomes not stoloniferous, usually tuberous, short.
4a. Inflorescence a spike of umbels with 5–25 sessile umbels on a common axis.
5a. Branches terete, ridged-angled, sparsely prickly; leaf blade 6–11 cm ..... 78. *S. aspera*
5b. Branches 4-angled, not prickly; leaf blade 20–30 cm ..... 79. *S. elegantissima*
4b. Inflorescence a solitary umbel or a raceme of umbels with 2 to many stalked umbels on a common axis.
6a. Branches verruculose or bristly.
7a. Branches densely bristly.
8a. Petiole not bristly; peduncle without a prophyll at base ..... 19. *S. horridiramula*
8b. Petiole densely bristly; peduncle with a prophyll at base ..... 74. *S. setiramula*
7b. Branches verruculose, sometimes young branches minutely bristly.
9a. Peduncle without a prophyll at base.
10a. Branches minutely verruculose, not prickly; inflorescence borne in axil of well-developed leaf ..... 49. *S. nervomarginata*
10b. Branches verruculose or spinulose-verruculose, ± sparsely prickly; inflorescence borne in axil of young leaf on new branches ..... 13. *S. lebrunii*
9b. Peduncle with a prophyll at base.

[1] College of Bioresource Sciences, Nihon University, 1866 Kameino, Fujisawa City, Kanagawa 252, Japan.

11a. Young branches, petiole, and leaf base minutely bristly ..... 57. *S. kwangsiensis*
11b. Young branches, petiole, and leaf base not bristly.
12a. Leaf blade orbicular or nearly so, thickly leathery ..... 70. *S. bauhinioides*
12b. Leaf blade not orbicular, leathery or papery.
13a. Petiole wingless, tendrils absent; receptacle suboblong ..... 67. *S. fooningensis*
13b. Petiole winged, tendrils usually present; receptacle subglobose.
14a. Inflorescence 1-umbellate; branches usually 2- or 3-angled ..... 54. *S. chapaensis*
14b. Inflorescence 2–5-umbellate, forming a raceme of umbels; branches not angled.
15a. Inflorescence with 3–7 umbels; petiole 10–15 mm, tendrils usually present ..... 61. *S. aspericaulis*
15b. Inflorescence with 2 umbels; petiole 7–12 mm, tendrils usually absent ..... 63. *S. malipoensis*
6b. Branches neither verruculose nor bristly.
16a. Inflorescence of 2 to many umbels (if a solitary umbel, then peduncle articulate in proximal part with a prophyll at base).
17a. Branches ± 4-angled.
18a. Branches not zigzagged, angles narrowly winged ..... 72. *S. gagnepainii*
18b. Branches strongly zigzagged, angles wingless ..... 68. *S. quadrata*
17b. Branches terete, not angled.
19a. Tepals of male flowers longitudinally wrinkled; stamens 8–10 ..... 50. *S. luei*
19b. Tepals of male flowers not wrinkled; stamens 6.
20a. Petiole wings well developed, each 4–13 mm wide.
21a. Petiole wings not clasping node at base ..... 75. *S. griffithii*
21b. Petiole wings deeply clasping node at base.
22a. Inflorescence of 2–7 solitary umbels; filaments proximally connate, forming a short column ..... 76. *S. ocreata*
22b. Inflorescence of 10–30 umbels, umbels 2- or 4-subwhorled or nearly clustered; filaments free ..... 77. *S. perfoliata*
20b. Petiole wings weakly developed, each less than 4 mm wide.
23a. Filaments proximally connate, forming a short column.
24a. Receptacle suboblong, 3–6 × 2–4.5 mm; outer tepals of male flowers ca. 5 mm ..... 56. *S. hemsleyana*
24b. Receptacle subglobose, 2–3 mm in diam.; outer tepals of male flowers 7–8 mm ..... 55. *S. vanchingshanensis*
23b. Filaments free.
25a. Branches densely prickly; petiole verruculose-prickly ..... 73. *S. densibarbata*
25b. Branches smooth or sparsely prickly; petiole not verruculose-prickly.
26a. Leaf blade 8–14(–20) cm wide ..... 62. *S. ovalifolia*
26b. Leaf blade 1–5(–7) cm wide.
27a. Petiole laterally compressed, winged portion 1–3 cm ..... 71. *S. planipes*
27b. Petiole subterete, winged portion less than 0.9 cm.
28a. Umbels 2- or 3-flowered; peduncle 1–3 mm; petiole 2.5–5 mm; stem and branches 2- or 4-angled ..... 66. *S. basilata*
28b. Umbels 3–15-flowered; peduncle and petiole both more than 5 mm; stem and branches not or indistinctly obtusely angled.
29a. Stamens very short, less than 1 mm, 1/5–1/3 as long as tepals ..... 64. *S. cocculoides*
29b. Stamens 3–6 mm, more than 1/2 as long as tepals.
30a. Leaf blade thickly leathery, orbicular to elliptic, with 3 main veins concave adaxially and veinlets indistinct; petiole scarcely winged ..... 69. *S. lunglingensis*
30b. Leaf blade leathery or papery, variable in shape, with 3–5 main veins raised or sometimes midvein slightly concave adaxially; petiole winged.
31a. Inflorescence with 3–7 umbels.
32a. Leaf blade leathery, apex acuminate; raceme with terminal umbel abortive; receptacle ellipsoid ..... 59. *S. yunnanensis*
32b. Leaf blade papery, apex mucronate; raceme with terminal umbel well developed; receptacle subglobose.
33a. Berries 1.5–2 cm in diam.; petiole 1.5–5 cm; inflorescence of 2 or 3 umbels; male flowers with tepals greenish yellow ..... 58. *S. megacarpa*
33b. Berries 5–7 mm in diam.; petiole 1–2 cm; inflorescence of 3–6(–10) umbels; male flowers with tepals dull red ..... 60. *S. bracteata*
31b. Inflorescence with 1 umbel.
34a. Berries 1.5–2 cm in diam. ..... 58. *S. megacarpa*
34b. Berries 0.6–1 cm in diam.
35a. Seeds smooth; leaf blade becoming dark green or sometimes tinged black

when dried, not wrinkled adaxially ..... 52. *S. lanceifolia*

35b. Seeds deeply 5- or 6-furrowed; leaf blade becoming grayish when dried, wrinkled along main veins adaxially ..... 53. *S. astrosperma*

16b. Inflorescence a solitary umbel; peduncle not articulate, usually without a prophyll at base.

36a. Stems usually annual, herbaceous.

37a. Leaf blade abaxially pale green, usually glabrous or papillose-puberulent, not white powdery ..... 2. *S. riparia*

37b. Leaf blade abaxially glaucous, white powdery.

38a. Petiole scarcely winged, tendrils (when developed) borne in proximal part ..... 1. *S. nipponica*

38b. Petiole narrowly winged, tendrils borne at middle or in distal part ..... 3. *S. pottingeri*

36b. Stems perennial, becoming woody.

39a. Petiole wings lacerate-fimbriate at margin.

40a. Branchlets usually 4-angled; leaf blade usually rhombic-ovate, with 3(–5) main veins raised adaxially, base cuneate; prickles sparse or absent ..... 44. *S. myrtillus*

40b. Branchlets 2- or 3-angled; leaf blade cordate to ovate, with (3–)5 main veins slightly concave adaxially, base truncate to cordate; prickles rather dense ..... 45. *S. munita*

39b. Petiole wings subentire at margin.

41a. Petiole with abscission zone below apex, hence leaf blade abscising together with distal part of petiole.

42a. Leaf blade abaxially pubescent, papillose-pubescent, or powdery-scabrous.

43a. Peduncle 0.5–3 cm; receptacle thickened and elongate ..... 12. *S. chingii*

43b. Peduncle 3–5 cm; receptacle scarcely thickened, not elongate ..... 37. *S. aberrans*

42b. Leaf blade abaxially glabrous.

44a. Peduncle 0.1–0.3 cm ..... 46. *S. bapouensis*

44b. Peduncle 0.4–5 cm.

45a. Petiole wings semicircular, each 3–5 mm wide, occupying entire length of petiole ..... 16. *S. discotis*

45b. Petiole wings not as above.

46a. Filaments ± connate, forming a column.

47a. Outer tepals free; filaments connate in proximal part ..... 24. *S. emeiensis*

47b. Outer tepals connate for ca. 1/2 their length, forming a tube; filaments connate throughout ..... 33. *S. synandra*

46b. Filaments free.

48a. Inflorescence arising from branches or branchlets with leaves fully developed.

49a. Leaf blade abaxially glaucous.

50a. Inflorescence usually racemose; pedicel erect in fruit ..... 36. *S. austrozhejiangensis*

50b. Inflorescence umbellate; pedicel bent downward in fruit ..... 38. *S. retroflexa*

49b. Leaf blade abaxially green or pale green.

51a. Peduncle slightly shorter or longer than petiole; female flowers with 6 staminodes ..... 4. *S. sieboldii*

51b. Peduncle much shorter than petiole (usually less than 1/2 as long); female flowers with 3 staminodes ..... 5. *S. scobinicaulis*

48b. Inflorescence arising from young branches or branchlets with leaves not fully developed.

52a. Petiole with abscission zone 2–3 mm above winged portion.

53a. Leaf blade elliptic; petiole winged for ca. 1/2 its length ..... 17. *S. glaucochina*

53b. Leaf blade ovate-elliptic to oblong-lanceolate; petiole winged for ca. 2/3 its length ..... 18. *S. elongatoumbellata*

52b. Petiole with abscission zone immediately above winged portion.

54a. Umbels 1- or 2-flowered or racemes 3–5-flowered ..... 9. *S. trinervula*

54b. Umbels 3- to many flowered.

55a. Receptacle oblong or ellipsoid, ± elongate.

56a. Petiole winged for 2/3–4/5 its length ..... 10. *S. ferox*

56b. Petiole winged for 1/3–1/2 its length ..... 11. *S. megalantha*

55b. Receptacle subglobose.

57a. Leaf blade herbaceous, becoming membranous or thinly papery when dried; tendrils partly developed.

58a. Leaf blade abaxially glaucous; berries red at maturity ..... 14. *S. polycolea*

58b. Leaf blade abaxially green or pale green; berries purplish black at maturity ..... 15. *S. outanscianensis*

57b. Leaf blade papery or leathery; tendrils well developed.

59a. Petiole wings each 2–4 mm wide, wider than petiole; tendrils short, slender .... 8. *S. davidiana*

59b. Petiole wings each 0.5–1 mm wide, about as wide as petiole; tendrils long, rather thick.

60a. Tepals of male flowers greenish to yellowish green, recurved at anthesis,

outer ones 1.8–2.5 mm wide ..... 6. *S. china*

60b. Tepals of male flowers yellow, tinged pinkish red, spreading at anthesis, outer ones 1.3–1.5 mm wide ..... 7. *S. nantoensis*

41b. Petiole with abscission zone at apex, hence leaf blade abscising with almost no part of petiole.

61a. Leaves and inflorescences becoming blackish or blackish brown when dried.

62a. Branches slightly ridged, smooth or prickly ..... 20. *S. nigrescens*

62b. Branches neither ridged nor prickly.

63a. Petiole 3–7 mm; umbels 1–3-flowered ..... 39. *S. darrisii*

63b. Petiole 5–5.5 cm; umbels densely 50–100-flowered ..... 48. *S. jiankunii*

61b. Leaves and inflorescences not becoming blackish or blackish brown when dried.

64a. Petiole wings each with a lanceolate auricle at apex.

65a. Outer tepals connate for ca. 1/2 their length, inner ones adnate to filament column ..... 33. *S. synandra*

65b. All tepals free.

66a. Plants suberect or subscandent; tendrils absent.

67a. Leaf blade rhombic-elliptic or ovate-rhombic; peduncle 7–22 mm; auricles of petiole wings 1–1.5 mm ..... 35. *S. hayatae*

67b. Leaf blade ovate; peduncle 3–4 mm; auricles of petiole wings 0.3–0.5 mm ..... 40. *S. mairei*

66b. Vines climbing; tendrils wholly or partly developed.

68a. Leaf blade thinly papery, ovate-lanceolate to broadly lanceolate; branchlets zigzagged; female flowers with 6 staminodes ..... 31. *S. elegans*

68b. Leaf blade leathery, ovate to elliptic; branchlets not zigzagged; female flowers with 3 staminodes.

69a. Peduncle 4–15 mm, 2/3–4/5 as long as petiole ..... 32. *S. corbularia*

69b. Peduncle 1–5 mm, less than 1/2 as long as petiole ..... 34. *S. hypoglauca*

64b. Petiole wings without auricle at apex.

70a. Shrubs erect or suberect; tendrils absent.

71a. Leaf blade lanceolate to oblong-lanceolate, more than 5 × as long as wide; stamens very short, ca. 1/8 as long as tepals ..... 30. *S. tsinchengshanensis*

71b. Leaf blade ovate to elliptic, 2–3 × as long as wide; stamens much longer, 1/3–1/2 as long as tepals.

72a. Filaments connate in proximal part, forming a column ..... 23. *S. cyclophylla*

72b. Filaments free.

73a. Petiole and leaf blade glabrous ..... 21. *S. stans*

73b. Distal 1/2 of petiole and abaxial base of leaf blade (particularly on veins) papillose-puberulent ..... 22. *S. trachypoda*

70b. Vines climbing, shrubby; tendrils wholly or partly developed.

74a. Peduncle shorter than or subequaling petiole; receptacle much thickened, with many persistent bracteoles.

75a. Male flowers slightly 6-angled, scarcely open, ca. 3 mm in diam.; outer tepals cucullate, abaxially deeply channeled ..... 43. *S. glabra*

75b. Male flowers not angled, fully open, 1–1.5 mm in diam.; outer tepals neither cucullate nor abaxially channeled.

76a. Branches minutely prickly; peduncle slightly shorter than petiole; female flowers with 3 staminodes ..... 42. *S. microphylla*

76b. Branches not prickly; peduncle much shorter than petiole; female flowers with 6 staminodes ..... 41. *S. longebracteolata*

74b. Peduncle longer than petiole; receptacle not or only slightly thickened, without persistent bracteoles

77a. Leaf blade abaxially green or pale green.

78a. Leaf blade with 3–5 main veins, outermost veins separate from leaf margins; petiole winged for 1/2–3/4 its length, tendrils borne near middle ..... 51. *S. arisanensis*

78b. Leaf blade with 5–7 main veins, outermost veins nearly combined with leaf margins; petiole winged for ca. 1/4 its length, tendrils borne near base.

79a. Leaf blade papery or thinly leathery, adaxially ± concave along midvein; anthers shorter than filaments ..... 47. *S. biumbellata*

79b. Leaf blade leathery, adaxially not concave along midvein; anthers slightly longer than filaments ..... 49. *S. nervomarginata*

77b. Leaf blade abaxially ± glaucous.

80a. Flowers large, tepals 6–7 mm ..... 29. *S. lushuiensis*

80b. Flowers much smaller, tepals 2–3.5 mm.
81a. Leaf blade with 3 main veins; petiole 3–7 mm, winged for 1/3–1/2 its length; stamens ca. 1/2 as long as tepals ..... 39. *S. darrisii*
81b. Leaf blade with 5–7 main veins; petiole (5–)8–12 mm, winged for 2/3–3/4 its length; stamens ca. 1/3 as long as tepals.
82a. Leaf blade with 5 main veins; filaments basally connate, forming a short column ..... 27. *S. menispermoidea*
82b. Leaf blade with 7 main veins; filaments free ..... 28. *S. pygmaea*

1. Smilax nipponica Miquel, Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch., ser. 2, 2: 87. 1868.

白背牛尾菜 bai bei niu wei cai

Coprosmanthus simadae (Masamune) Masamune; *Smilax herbacea* Linnaeus var. *intermedia* C. H. Wright; *S. herbacea* var. *nipponica* (Miquel) Maximowicz; *S. herbacea* var. *oblonga* C. H. Wright; *S. longipedunculata* Merrill; *S. nipponica* subsp. *manshurica* Kitagawa; *S. nipponica* var. *manshurica* (Kitagawa) Kitagawa; *S. oblonga* (C. H. Wright) J. B. Norton; *S. simadae* Masamune.

Herbs annual, erect or sometimes slightly climbing. Stem simple, terete, 8–100 cm, smooth, hollow and slightly pithy. Petiole 1.5–4.5 cm, scarcely winged; abscission zone distal; tendrils sometimes present. Leaf blade ovate to oblong, 4–20 × 2–14 cm, abaxially glaucous and usually powdery-pubescent. Inflorescence of 1 umbel, basally not prophyllate; peduncle 3–9 cm, slightly compressed; umbels of both sexes 20–30-flowered, base thickened. Male flowers: tepals usually reflexed at anthesis, greenish yellow or white, ca. 4 × 1 mm; stamens 2.5–3.5 mm. Female flowers: tepals subequaling male ones; staminodes 6. Berries blue-black, globose, 6–7 mm in diam., white powdery. Fl. Apr–May, fr. Aug–Sep.

Forests, grassy slopes, moist places along streams; 200–1400 m. Anhui, Fujian, Guangdong, Guizhou, Henan, Hunan, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, ?Yunnan, Zhejiang [Japan, Korea].

2. Smilax riparia A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 55. 1878.

牛尾菜 niu wei cai

Vines annual or sometimes perennial (in S China), climbing. Stem branched, terete, 1–2 m, herbaceous or slightly woody near base, smooth or pubescent, hollow and slightly pithy. Petiole 0.7–2 cm, scarcely winged; abscission zone distal; tendrils usually present. Leaf blade usually ovate to elliptic, 7–15 × 5–11 cm, herbaceous, abaxially glabrous, papillose-puberulent, or pubescent. Inflorescence of 1 umbel, basally not prophyllate; peduncle rather slender, 3–5(–10) cm, slightly compressed; umbels of both sexes 5–20(–30)-flowered, base thickened; bracteoles 1–2 mm, not caducous. Male flowers: tepals yellowish green, 4–5 × 0.6–1 mm; stamens 4–5 mm. Female flowers: tepals slightly smaller than male ones. Berries blue-black, globose, 7–9 mm in diam. Fl. Jun–Jul, fr. Oct.

Forests, thickets, grassy slopes, hillsides along valleys; near sea level to 2100 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, ?Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Philippines].

1a. Leaf blade abaxially glabrous ..... 2a. var. *riparia*
1b. Leaf blade abaxially papillose-puberulent or pubescent.
2a. Stem, branches, and inflorescence glabrous ..... 2b. var. *acuminata*
2b. Stem, branches, and inflorescence pubescent ..... 2c. var. *pubescens*

2a. Smilax riparia var. **riparia**

牛尾菜(原变种) niu wei cai (yuan bian zhong)

Coprosmanthus oldhamii (Miquel) Masamune var. *daibuensis* (Hayata) Masamune; *C. pseudochina* Masamune var. *daibuensis* (Hayata) Masamune; *Smilax flaccida* C. H. Wright; *S. herbacea* Linnaeus var. *angusta* C. H. Wright; *S. herbacea* var. *daibuensis* Hayata; *S. herbacea* var. *foetida* H. Léveillé; *S. herbacea* var. *heterophylla* H. Léveillé; *S. herbacea* var. *lancilimba* Merrill; *S. higoensis* Miquel var. *maximowiczii* (Koidzumi) Kitagawa; *S. maximowiczii* Koidzumi; *S. oldhamii* Miquel var. *daibuensis* (Hayata) T. Koyama; *S. ovatorotunda* Hayata; *S. riparia* f. *ovatorotunda* (Hayata) T. Koyama; *S. takaoensis* Hayata.

Stem, branches, leaves,and inflorescence glabrous. Female flowers: staminodes absent.

Forests, thickets, grassy slopes, hillsides along valleys; near sea level to 1600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, ?Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Philippines].

2b. Smilax riparia var. **acuminata** (C. H. Wright) F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 192. 1978.

尖叶牛尾菜 jian ye niu wei cai

Smilax herbacea Linnaeus var. *acuminata* C. H. Wright, J. Linn. Soc., Bot. 36: 98. 1903.

Stem, branches and inflorescence glabrous. Leaf blade abaxially papillose-puberulent especially on main veins, apex subcuspidate-acuminate. Female flowers: staminodes 6.

• Forests, grassy slopes, hillsides along valleys; 900–2100 m. Henan, Hubei, Shaanxi, Sichuan.

2c. Smilax riparia var. **pubescens** (C. H. Wright) F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 192. 1978.

毛牛尾菜 mao niu wei cai

Smilax herbacea Linnaeus var. *pubescens* C. H. Wright, J. Linn. Soc., Bot. 36: 98. 1903.

Stem, branches, leaves, and inflorescence pubescent.

• W Hubei.

3. Smilax pottingeri Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 69: 174. 1900.

纤柄菝葜 xian bing ba qia

Heterosmilax pottingeri (Prain) F. T. Wang & Tang.

Vines herbaceous, becoming blackish when dried. Stem terete, rigid, slightly woody proximally, smooth. Petiole 2–5 cm, slightly compressed, narrowly winged; wings 1–2.5 cm × ca. 1 mm, apically minutely auriculate; abscission zone inconspicuous; tendrils commonly present. Leaf blade abaxially glaucous, ovate to broadly so, 10–18 × 6–17 cm, herbaceous to thinly papery, abaxially white powdery, main veins 5–7. Male inflorescence of 1 umbel, basally not prophyllate; peduncle 3–6 cm; umbel densely 40–70-flowered, base 3–4 mm in diam. Male flowers: tepals 4–5 × 1–1.5 mm; stamens slightly shorter than tepals. Female flowers unknown.

Dense forests, thickets, river banks, hillsides along valleys; 1100–1500 m. S Yunnan [Laos, Myanmar, Thailand].

Only a few sterile and fruiting specimens have been collected from China. The description of the male flowers follows Koyama (in Smitinand et al., Fl. Thailand 2: 245. 1975).

4. Smilax sieboldii Miquel, Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch., ser. 2, 2: 87. 1868.

华东菝葜 hua dong ba qia

Coprosmanthus oldhamii (Miquel) Masamune; *Smilax formosana* (Hayata) Hayata; *S. herbacea* Linnaeus var. *oldhamii* (Miquel) Maximowicz; *S. nebelii* Gilg; *S. oldhamii* Miquel; *S. sieboldii* var. *formosana* Hayata; *S. sieboldii* f. *inermis* (Nakai) H. Hara; *S. sieboldii* var. *inermis* Nakai.

Vines climbing. Stem branched, subterete, 1–2 m, ± woody; stem and branches with scattered, blackish, needlelike prickles. Petiole 1–2 cm, narrowly winged for ca. 1/2 its length; abscission zone distal; tendrils well developed. Leaf blade ovate to broadly so, 3–9 × 2–5(–8) cm, herbaceous. Inflorescence of 1 umbel, basally not prophyllate; peduncle slender, 1–2.5 cm, subequaling or longer than petiole; umbels of both sexes usually 3–8-flowered, base scarcely thickened. Male flowers: tepals yellowish green, 4–5 × 1.2–1.4 mm, inner ones slightly narrower than outer; stamens 2–3 mm. Female flowers: tepals smaller than male ones; staminodes 6. Berries blue-black, globose, 6–7 mm in diam. Fl. May–Jun, fr. Oct.

Forests, thickets, grassy slopes; near sea level to 1800(–2500) m. Anhui, Fujian, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang [Japan, Korea].

5. Smilax scobinicaulis C. H. Wright, Bull. Misc. Inform. Kew 1895: 117. 1895.

短梗菝葜 duan geng ba qia

Smilax brevipes Warburg; *S. cavaleriei* H. Léveillé & Vaniot; *S. martini* H. Léveillé & Vaniot; *S. microphylla* C. H. Wright var. *nigrescens* Warburg; *S. ocreata* H. Léveillé & Vaniot (1905), not A. de Candolle (1878); *S. scobinicaulis* var. *brevipes* (Warburg) Handel-Mazzetti; *S. sieboldii* Miquel var. *scobinicaulis* (C. H. Wright) T. Koyama.

Vines climbing. Stem branched, terete, 1–2 m, ± woody; stem and branches sparsely prickly, rarely scarcely so; prickles blackish, needlelike, 4–5 mm. Petiole 0.5–1.5 cm, narrowly winged for ca. 1/2 its length; abscission zone distal; tendrils well developed. Leaf blade sometimes becoming blackish when dried, ovate to elliptic-ovate, 4–12.5 × 2.5–8 cm, herbaceous. Inflorescence of 1 umbel, basally not prophyllate; peduncle rather short, usually less than 1/2 as long as petiole; umbels of both sexes 3–8-flowered, base not thickened. Male flowers: tepals yellowish green, 4–5 × 1–1.8 mm; stamens 2–3 mm. Female flowers: tepals slightly smaller than male ones; staminodes 3. Berries blue-black, globose, 6–9 mm in diam. Fl. May, fr. Oct.

• Forests, thickets, shaded places on slopes; 600–1200 m. Gansu, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Shanxi, Yunnan.

6. Smilax china Linnaeus, Sp. Pl. 2: 1029. 1753.

菝葜 ba qia

Coprosmanthus japonicus Kunth; *Smilax china* f. *obtusa* H. Léveillé; *S. china* var. *taiheiensis* (Hayata) T. Koyama; *S. pteropus* Miquel; *S. taiheiensis* Hayata.

Vines climbing. Stem branched, terete, 1–5 m, woody, sparsely prickly. Petiole 0.5–1.5 cm, narrowly winged for 1/2–2/3 its length; abscission zone just above winged portion; tendrils usually present. Leaf blade elliptic to orbicular, 3–10 × 1.5–6(–10) cm. Inflorescence borne in axil of young leaf, of 1 umbel, basally not prophyllate; peduncle 1–2 cm; umbels of both sexes 10–25-flowered, subglobose, base subglobose, 2–3 mm in diam.; bracteoles many, small. Male flowers: tepals yellowish green, 3.5–4.5 × 1.5–2.5 mm; stamens 3–4 mm; filaments filiform. Female flowers: staminodes 6. Berries red, globose, 0.6–1.5 cm in diam., minutely white powdery. Fl. Feb–May, fr. Sep–Nov. 2*n* = 30*, 90*.

Forests, thickets, hillsides, grassy slopes, shaded places along valleys or streams; near sea level to 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, ?Liaoning, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Myanmar, Philippines, Thailand, Vietnam].

Smilax taquetii H. Léveillé (Repert. Spec. Nov. Regni Veg. 10: 372. 1912), described from Korea, was identified as *S. china* by McKean (Notes Roy. Bot. Gard. Edinburgh 44: 196. 1986).

7. Smilax nantoensis T. Koyama, Taiwania 20: 120. 1975.

南投菝葜 nan tou ba qia

Vines climbing. Stem much branched distally, terete, 0.8–2 m, woody, unarmed. Petiole 0.7–1.5(–2) cm, narrowly winged for 2/3–3/4 its length; abscission zone just above winged portion; tendrils usually 5–10 cm. Leaf blade usually ovate or elliptic, 3–10 × 1.5–4 cm. Inflorescence borne in axil of young leaf or bract on new branches, of 1 umbel, basally not prophyllate; peduncle 5–10 mm; umbels of both sexes 3–10-flowered, base neither thickened nor elongate. Male flowers: tepals yellow, tinged pinkish red, 4.5–5 × 1.3–1.5 mm; stamens 4–4.5 mm. Female flowers: tepals 2.5–3 × 1–1.7 mm; staminodes 3. Berries red, globose, 6–8 mm in diam.

• Forest margins, grassy forest openings; 800–900 m. C Taiwan.

8. Smilax davidiana A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 104. 1878.

小果菝葜 xiao guo ba qia

Smilax china Linnaeus var. *brachypoda* Rehder.

Vines climbing. Stem branched, 1–2(–4) m, terete, slightly woody, sparsely prickly. Petiole usually 5–7 mm, winged for 1/2–2/3 its length; wings 2–4 mm wide; abscission zone just above winged portion; tendrils rather short. Leaf blade usually elliptic, 3–7(–14) × 2–4.5(–12) cm. Inflorescence borne in axil of young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 5–14 mm; umbels of both sexes 3–13-flowered, base thickened, sometimes slightly elongate; bracteoles persistent. Male flowers: tepals yellowish green, 3.5–4 × 1–2 mm. Female flowers: tepals subequaling male ones, staminodes 6. Berries globose, 5–6 mm in diam. Fl. Mar–Apr, fr. Oct–Nov.

Forests, thickets; 400–1700 m. Fujian, Guizhou, Hunan, Jiangxi, Zhejiang [Japan].

9. Smilax trinervula Miquel, Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch., ser. 2, 2: 87. 1868.

三脉菝葜 san mai ba qia

Smilax biflora Siebold ex Miquel var. *trinervula* (Miquel) Hatusima ex T. Koyama; *S. china* Linnaeus var. *trinervula* (Miquel) Makino; *S. esquirolii* H. Léveillé; *S. leucocarpa* H. Léveillé & Vaniot.

Subshrubs suberect or slightly climbing, deciduous. Stem branched, 0.5–2 m, unarmed or sparsely prickly. Petiole 3–5 mm, narrowly winged for ca. 2/3 its length; abscission zone just above winged portion; tendrils usually present. Leaf blade abaxially glaucous, usually elliptic, 2–5 × 1–2.5 cm, papery. Inflorescence borne in axil of young leaf on new branchlets, of 1 umbel or raceme, basally not prophyllate; peduncle 3–7 mm; umbel 1–5-flowered, base not thickened. Male flowers: tepals yellowish green, ca. 4 × 0.8–1.5 mm. Female flowers: tepals ca. 4 mm; staminodes 6. Berries red, globose, 5–6 mm in diam. Fl. Mar–Apr, fr. Oct–Nov.

Forests, thickets; 400–1700 m. Fujian, Guizhou, Hunan, Jiangxi, Zhejiang [Japan].

10. Smilax ferox Wallich ex Kunth, Enum. Pl. 5: 251. 1850.

长托菝葜 chang tuo ba qia

Vines climbing. Stem branched, terete, woody, usually sparsely prickly. Petiole 4–7(–13) mm, winged for 2/3 to nearly all its length; wings 1.5–2.5 mm wide; abscission zone distal; tendrils only occasionally developed on old stem or branches. Leaf blade abaxially often glaucous, oblong to oblong-lanceolate, 3.5–9(–12) × 1.5–3.5(–6) cm, papery to leathery. Inflorescence borne in axil of young leaf, of 1 umbel, basally not prophyllate; peduncle 1–1.6(–2.5) cm; umbels of both sexes 4–11-flowered, usually ± racemose due to elongate base, base thickened, 2–5 × 1–2 mm. Male flowers: tepals pale yellow, 3–4.5 × 1.5–2 mm; filaments 1.5–2 mm. Female flowers: tepals slightly smaller than male ones; staminodes 6. Berries red, globose, 8–10 mm in diam. Fl. Apr–May, fr. Oct–Dec. 2*n* = 104.

Dense forests, thickets, shaded slopes; 1000–2900 m. Guangdong, Guangxi, Guizhou, Yunnan [Bhutan, India, Myanmar, Nepal, Vietnam].

11. Smilax megalantha C. H. Wright, Bull. Misc. Inform. Kew 1895: 118. 1895.

大花菝葜 da hua ba qia

Smilax cinerea Warburg; *S. loupouensis* H. Léveillé; *S. megalantha* var. *alata* F. T. Wang & Tang; *S. tortuosa* Diels.

Vines climbing. Stem branched, terete, to 5 m, woody, sparsely prickly. Petiole 1–2.5 cm, winged; wings 1–2 mm wide; abscission zone just above winged portion; tendrils sometimes present. Leaf blade abaxially usually glaucous, elliptic to oblong-ovate, thickly leathery, 6–16 × 2.5–9 cm. Inflorescence borne in axil of young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 1–2.5 cm, occasionally articulate; umbels of both sexes 4–13-flowered, usually ± racemose due to elongate base, base thickened, 2–4 × 1–2 mm; bracteoles persistent. Male flowers: tepals yellowish green or white, 6–8 × 2–3 mm. Female flowers: tepals slightly smaller than male ones, staminodes 6. Berries red, globose, 1–1.5 cm in diam. Fl. Mar–Apr, fr. Oct–Nov.

• Forests, thickets, shaded places; 900–3400 m. Guizhou, Hubei, Sichuan, Yunnan.

12. Smilax chingii F. T. Wang & Tang, Sinensia 5: 426. 1934.

柔毛菝葜 rou mao ba qia

Smilax chingii var. *papillosifolia* J. M. Xu; *S. megalantha* C. H. Wright var. *ferruginea* F. T. Wang; *S. megalantha* var. *maclurei* Merrill.

Vines climbing. Stem branched, terete, 1–7 m, woody, sparsely prickly. Petiole 0.5–2 cm, winged; wings 3–10 × 2–3 mm; abscission zone just above winged portion; tendrils usually absent. Leaf blade ovate-elliptic to oblong-lanceolate, 5–18 × 1.5–7(–11) cm, abaxially brownish or white pubescent. Inflorescence borne in axil of young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 0.5–3 cm, occasionally articulate; umbels of both sexes several flowered, usually slightly racemose due to elongate base, base thickened, 2–4 × 1–2 mm; bracteoles present. Male flowers: tepals 7–8 × 3.5–4 mm. Female flowers: tepals slightly smaller than male ones; staminodes 6. Berries red, globose, 1–1.4 cm in diam. Fl. Mar–Apr, fr. Nov–Dec.

• Forests, thickets, grassy slopes, shaded places along valleys or streams; 700–1600(–2800) m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan.

13. Smilax lebrunii H. Léveillé, Fl. Kouy-Tcheou, 257. 1914.

粗糙菝葜 cu cao ba qia

Smilax megalantha C. H. Wright var. *asperata* F. T. Wang.

Vines climbing. Stem branched, 1–2 m, terete, woody; branches ± verruculose or spinulose-verruculose. Petiole 0.5–1.5 cm, winged; wings 4–10 × 2–3 mm; abscission zone distal; tendrils sometimes present. Leaf blade elliptic, ovate, or lan-

ceolate, 4–10 × 1.5–5.5 cm. Inflorescence borne in axil of young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 1–2.5 cm; umbels of both sexes several flowered, base slightly thickened, sometimes elongate. Male flowers: outer tepals yellowish green, 4.5–5 × 1.8–2 mm. Female flowers: tepals 4.5–5 mm; staminodes 6. Berries red, globose, 1–1.5 cm in diam. Fl. Mar–Apr, fr. Oct–Nov.

Forests, thickets, grassy slopes, shaded roadsides; 800–2900 m. Gansu, Guangxi, Guizhou, Hunan, Sichuan, Yunnan [Myanmar].

14. Smilax polycolea Warburg in Diels, Bot. Jahrb. Syst. 29: 257. 1900.

红果菝葜 hong guo ba qia

Vines climbing. Stem branched, to 7 m, woody, scarcely prickly. Petiole 5–10(–20) mm, winged; wings 3–5 × 1–2 mm; abscission zone just above winged portion; tendrils partly present. Leaf blade abaxially glaucous, elliptic to ovate, 4–7(–12) × 2.5–4(–6) cm. Inflorescence borne in axil of young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 0.5–3 cm; umbels of both sexes 3–13-flowered, base usually slightly thickened, sometimes elongate; bracteoles several, persistent. Male flowers: tepals yellowish green, 3.5–4.5 × 1.2–2 mm. Female flowers: tepals subequaling male ones; staminodes 6. Berries red, globose, 7–8 mm in diam., white powdery. Fl. Apr–May, fr. Sep–Oct.

• Forests, thickets, shaded places on slopes; 900–2200 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan.

15. Smilax outanscianensis Pampanini, Nuovo Giorn. Bot. Ital., n.s., 18: 109. 1911.

武当菝葜 wu dang ba qia

Smilax discotis Warburg subsp. *concolor* (J. B. Norton) T. Koyama; *S. discotis* var. *concolor* J. B. Norton.

Vines climbing. Stem branched, 2–3 m, woody, scarcely prickly. Petiole 5–10 mm, winged; wings 3–5 × 1–2 mm; abscission zone just above winged portion; tendrils sometimes present. Leaf blade elliptic to ovate, 4–10 × 2–4.5 cm. Inflorescence borne in axil of young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 5–12 mm; umbels of both sexes several flowered, base slightly thickened, sometimes elongate; bracteoles persistent. Male flowers: tepals yellowish green, 6–7 × 1.4–2.8 mm. Female flowers: tepals smaller than male ones; staminodes 3–6. Berries purplish black, globose, 7–10 mm in diam. Fl. May, fr. Sep–Oct.

• Forests, thickets, shaded hillsides along valleys or streams; 1100–2100 m. Hubei, Jiangxi, Sichuan.

16. Smilax discotis Warburg in Diels, Bot. Jahrb. Syst. 29: 256. 1900.

托柄菝葜 tuo bing ba qia

Plants shrubby, suberect to subscandent. Stem branched, terete, 0.5–3 m, scarcely or sparsely prickly. Petiole 4–5(–15) mm, broadly winged for all its length; wings ± shell-shaped, 3–5 mm wide; abscission zone apical; tendrils sometimes present. Leaf blade abaxially glaucous, usually subelliptic, 4–10(–20) × 2–5(–10) cm, base cordate. Inflorescence borne in axil of rather young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 1–4 cm; umbels of both sexes several flowered, base slightly thickened, sometimes elongate; bracteoles small. Male flowers: tepals yellowish green, ca. 4 × 1–1.8 mm. Female flowers: tepals slightly smaller than male ones; staminodes 3. Berries black, globose, 6–8 mm in diam., white powdery. Fl. Apr–May, fr. Oct.

• Forests, thickets, shaded places on slopes; 600–2100 m. Anhui, Fujian, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, ?Zhejiang.

17. Smilax glaucochina Warburg in Diels, Bot. Jahrb. Syst. 29: 255. 1900.

黑果菝葜 hei guo ba qia

Smilax bodinieri H. Léveillé & Vaniot; *S. sebeana* Miquel var. *glaucochina* (Warburg) T. Koyama.

Vines climbing. Stem branched, terete, 0.5–4 m, woody, sparsely prickly. Petiole 0.7–1.5(–2.5) cm, winged, wings 4–8 × 1.5–2 mm; abscission zone distal; tendrils usually present. Leaf blade abaxially glaucous, elliptic, 5–8(–20) × 2.5–5(–14) cm, thickly papery, occasionally abaxially white powdery. Inflorescence borne in axil of rather young leaf on new branchlets, of 1 umbel, basally not prophyllate; peduncle 1–3 cm; umbels of both sexes 5–18-flowered, base slightly thickened. Male flowers: tepals yellowish green, 5–6 × 1.5–3 mm. Female flowers: tepals subequaling male ones; staminodes 3. Berries black, globose, 7–8 mm in diam., white powdery. Fl. Mar–May, fr. Oct–Nov.

• Forests, thickets, grassy slopes; near sea level to 1600 m. Anhui, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Zhejiang.

18. Smilax elongatoumbellata Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 358. 1911.

台湾菝葜 tai wan ba qia

Smilax elongatoreticulata Hayata; *S. elongatoumbellata* f. *elongatoreticulata* (Hayata) T. Koyama.

Plants shrubby, suberect to scandent. Stem and branches scarcely or sparsely prickly. Petiole 5–8 mm, narrowly winged for ca. 2/3 its length; abscission zone distal; tendrils usually present. Leaf blade abaxially glaucous, ovate-elliptic to oblong-lanceolate, 2.5–9 × 1–4 cm, main veins (3–)5, prominent on both sides. Inflorescence borne in axil of proximal leaf, of 1 umbel, basally not prophyllate; peduncle 1–4 cm; umbels of both sexes 9–28-flowered. Male flowers: outer tepals ca. 6.5 × 3 mm, inner ones ca. 1/2 as wide as outer ones. Female flowers: tepals smaller than male ones. Berries blackish, globose, 6–8 mm in diam., white powdery. Fl. Mar.

1300–1500 m. Taiwan [Japan (Ryukyu Islands)].

19. Smilax horridiramula Hayata, Icon. Pl. Formos. 9: 131. 1920.

刺枝菝葜 ci zhi ba qia

Vines climbing. Stem and branches densely bristly throughout; bristles horizontally spreading, slender, needlelike, ca. 5 mm, apex sometimes forked. Petiole ca. 1 cm, winged; wings ca. 5 × 1–1.5 mm; abscission zone distal; tendrils usually

present. Leaf blade abaxially slightly glaucous, elliptic to oblong-ovate, 5–6 × 3–3.5 cm, papery, base rounded, apex somewhat mucronate, main veins 5. Inflorescence of 1 umbel, basally not prophyllate; peduncle 3–4 cm. Flowers unknown. Berries blue-black at maturity, globose, ca. 6 mm in diam.

• C and E Taiwan.

20. Smilax nigrescens F. T. Wang & Tang ex P. Y. Li, Acta Phytotax. Sin. 11: 253. 1966.

黑叶菝葜 hei ye ba qia

Vines climbing. Stem branched, to 2 m, woody, scarcely or sparsely prickly. Petiole 6–12 mm, narrowly winged for 1/2–2/3 its length; abscission zone distal or subapical; tendrils usually present. Leaf blade becoming blackish when dried, abaxially usually glaucous, ovate-lanceolate or ovate, 3.5–9.5 × 1.5–5 cm, papery. Inflorescence of 1 umbel, basally not prophyllate; peduncle 0.8–1.5(–2.5) cm; umbels of both sexes 4–14-flowered, base slightly thickened; bracteoles ovate. Male flowers: tepals yellowish green, ca. 2.5 × 1 mm. Female flowers: tepals slightly smaller than male ones, staminodes 6. Berries blue-black, globose, 6–8 mm in diam. Fl. Apr–Jun, fr. Sep–Oct.

• Forests, thickets, shaded slopes; 900–2500 m. Gansu, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

21. Smilax stans Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 17: 170. 1872.

鞘柄菝葜 qiao bing ba qia

Smilax pekingensis A. de Candolle; *S. tenuissima* Hayata; *S. vaginata* Decaisne; *S. vaginata* var. *pekingensis* (A. de Candolle) T. Koyama; *S. vaginata* var. *stans* (Maximowicz) T. Koyama.

Shrubs deciduous, erect, unarmed. Stem densely branched, 0.3–3 m. Petiole 5–12 mm, abaxially striate-ridged, narrowly winged for ca. 2/3 its length; wings apically confluent to petiole; abscission zone subapical; tendrils absent. Leaf blade abaxially glaucous, ovate to suborbicular, 1.5–4(–6) × 1.2–3.5(–5) cm, sometimes abaxially slightly powdery. Inflorescence of 1 umbel, basally not prophyllate; peduncle slender, 0.7–2 cm; umbels of both sexes 1–3(–6)-flowered, base not thickened. Male flowers: tepals yellowish green or sometimes pink, 2.5–3 × 0.7–1 mm. Female flowers: tepals slightly smaller than male ones; staminodes 6. Berries black, globose, 6–10 mm in diam., white powdery. Fl. Mar–May, fr. Oct–Nov.

Forests, thickets, shaded places on grassy slopes; 400–3200 m. Anhui, Gansu, Guangdong, Guangxi, Guizhou, ?Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Taiwan, ?Yunnan, Zhejiang [Japan].

22. Smilax trachypoda J. B. Norton in Sargent, Pl. Wilson. 3: 3. 1916.

糙柄菝葜 cao bing ba qia

Smilax stans Maximowicz var. *verruculosifolia* J. M. Xu.

Shrubs deciduous, erect, unarmed. Stem and branches terete, indistinctly striate-ridged. Petiole 5–10 mm, widened toward base, abaxially striate-ridged, adaxially channeled, papillose-puberulent in distal 1/2, narrowly winged for ca. 2/3 its length; wings apically confluent to petiole; abscission zone apical; tendrils absent. Leaf blade ovate or broadly so, 2–4 × 1–3 cm, papery, abaxially papillose-puberulent on basal veins. Inflorescence of 1 umbel, basally not prophyllate. Flowers very similar to those of *Smilax stans*. Berries black, globose, 5–7 mm in diam. Fl. May–Jun, fr. Oct.

• Forests, thickets, shaded places on slopes; 1300–3100 m. Gansu, Henan, Hubei, Shaanxi, Sichuan.

23. Smilax cyclophylla Warburg in Diels, Bot. Jahrb. Syst. 29: 257. 1900.

合蕊菝葜 he rui ba qia

Shrubs erect, unarmed. Stem and branches terete. Petiole 6–13 mm, widened toward base, abaxially striate-ridged, narrowly winged for ca. 2/3 its length; wings apically confluent to petiole; abscission zone apical; tendrils absent. Leaf blade abaxially glaucous, 2–7 × 1–4 cm, elliptic-oblong to ovate. Inflorescence of 1 umbel, basally not prophyllate; peduncle 1–3 cm; umbels of both sexes 3–5-flowered, base slightly thickened. Male flowers: tepals yellowish green, outer ones 2.5–3 × ca. 0.8 mm, inner ones ca. 2.5 × 0.5 mm; filaments connate, forming a column ca. 0.8 mm. Female flowers: tepals slightly smaller than male ones; staminodes 6. Berries black, globose, 5–7 mm in diam. Fl. Apr–May, fr. Oct.

• Forests, thickets, shaded places on slopes; 1600–2700 m. Sichuan, Yunnan.

24. Smilax emeiensis J. M. Xu, Acta Phytotax. Sin. 23: 234. 1985.

峨眉菝葜 e mei ba qia

Shrubs erect, unarmed. Stem laxly branched, terete, 0.4–2 m, smooth. Petiole slender, 2.5–5.5 cm, abaxially striate-ridged, narrowly winged for ca. 1/5 its length; wings apically confluent to petiole; abscission zone just above winged portion; tendrils absent. Leaf blade cordate to ovate-cordate, 4–13 × 3–11 cm, papery. Inflorescence of 1 umbel, basally not prophyllate; peduncle 2–3.5 cm; umbels of both sexes 5–15-flowered, base slightly thickened. Male flowers: tepals pale green, 2.6–3.5 × 1–1.5 mm; filaments connate, forming a column ca. 1 mm. Female flowers: tepals subequaling male ones; staminodes 6. Berries black, globose, ca. 6 mm in diam. Fl. May–Jun, fr. Oct.

• Forest margins, hillsides, grassy slopes; 2200–2700 m. C Sichuan (Emei Shan).

25. Smilax pachysandroides T. Koyama, Brittonia 26: 136. 1974.

川鄂菝葜 chuan e ba qia

Smilax umbrosa J. M. Xu.

Subshrubs or small shrubs, suberect. Rhizome creeping, stolonlike, 1–2 mm in diam. Stem sometimes with 1 or 2 branches, terete, 10–30 cm, 2–4-leaved. Petiole 4–13 mm, abaxially striate-ridged, scarcely winged; abscission zone at middle; tendrils absent. Leaf blade abaxially very glaucous, broadly ovate, elliptic, or suborbicular, 3–7.5 × 3–6 cm, base cordate, main veins 3–5. Female inflorescence borne in axil of scalelike, membranous bract, of 1 umbel, basally not prophyllate; peduncle 1–2 cm; umbel 2–5-flowered, base not thickened. Male

flowers unknown. Female flowers very small; staminodes 2 or 3. Berries ca. 7 mm in diam. (immature). Fr. Nov–Dec.

• Bamboo forests, forest margins; 1700–1900 m. W Hubei, SW Sichuan.

26. Smilax nana F. T. Wang, Bull. Fan Mem. Inst. Biol. 5: 116. 1934.

矮菝葜 ai ba qia

Subshrubs or small shrubs, deciduous, erect. Rhizome creeping, stolonlike, 1–2 mm in diam. Stem branched, 20–50 cm, smooth. Petiole 1–2 mm, widened toward base, abaxially striate-ridged, adaxially channeled, narrowly winged for ca. 2/3 its length; abscission zone distal; tendrils absent. Leaf blade abaxially glaucous, oblong-elliptic, 0.5–1.8 cm × 3–8 mm, papery, base obtuse, apex mucronate. Male flowers unknown. Female inflorescence of 1 umbel, basally not prophyllate; peduncle 5–7 mm; umbel 1- or 2-flowered, base not thickened; bracteoles ovate, very small; pedicels 3–5 mm. Fruit unknown.

• Mixed forests; 2400–2700 m. W Yunnan (Yangbi Xian).

27. Smilax menispermoidea A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 108. 1878.

防己叶菝葜 fang ji ye ba qia

Smilax luteocaulis H. Léveillé; *S. rubriflora* Rehder.

Vines deciduous, climbing, unarmed. Stem branched, terete, 0.5–3 m, woody. Petiole 5–12 mm, abaxially striate-ridged, narrowly winged for 2/3–3/4 its length; wings apically confluent to petiole; abscission zone apical; tendrils usually present. Leaf blade abaxially glaucous, ovate or elliptic-ovate, 2–6(–10) × 2–5(–7) cm. Inflorescence of 1 umbel, basally not prophyllate; peduncle 2–4 cm; umbels of both sexes 5–15-flowered, base scarcely thickened. Male flowers: tepals purplish red, ca. 2.5 × 1 mm; stamens 0.6–1 mm; filaments basally connate, forming a short column. Female flowers: tepals subequaling male ones; staminodes 6, sometimes antheriferous. Berries purplish black, globose, 7–10 mm in diam. Fl. May–Jun, fr. Oct–Nov.

Forests, thickets, shaded places on slopes; 2600–3700 m. Gansu, Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Myanmar, Sikkim].

28. Smilax pygmaea Merrill, Philipp. J. Sci. 5: 339. 1910.

峦大菝葜 luan da ba qia

Smilax glaucophylla Klotzsch var. *randaiensis* (Hayata) T. Koyama; *S. menispermoidea* A. de Candolle subsp. *randaiensis* (Hayata) T. Koyama; *S. menispermoidea* var. *randaiensis* (Hayata) T. Koyama; *S. randaiensis* Hayata.

Vines suberect to scandent, unarmed. Stem branched, 45–80 cm, woody, smooth. Petiole 0.8–1.2 cm, narrowly winged for ca. 2/3 its length; abscission zone apical; tendrils absent or rather short. Leaf blade abaxially glaucous, ovate or lanceolate-ovate, 3–6 × 2–2.5 cm, thickly herbaceous to subleathery, main veins 7, base rounded to shallowly cordate, apex acute or acuminate. Inflorescence of 1 umbel, basally not prophyllate; peduncle slender, 1.5–3 cm; umbels of both sexes 3–10-flowered. Male flowers: tepals red-brown, lanceolate-oblong, 2.5–3.5 mm; stamens 0.8–1.1 mm. Female flowers: tepals lanceolate-ovate, 2–3 mm. Berries dark blue, globose, ca. 6 mm in diam. Fl. Aug.

Mountain forests. Taiwan [Philippines].

29. Smilax lushuiensis S. C. Chen, Acta Phytotax. Sin. 26: 142. 1988.

泸水菝葜 lu shui ba qia

Vines climbing, unarmed. Stem branched, subterete, to more than 1 m, woody, slightly striate. Petiole 7–10 mm, widened toward base, narrowly winged for ca. 3/4 its length; abscission zone apical; tendrils just above winged portion. Leaf blade abaxially glaucous, ovate-cordate or orbicular-cordate, thinly papery, main veins 5, apex apiculate. Male inflorescence of 1 umbel, basally not prophyllate; peduncle slender, 3–4.5 cm; umbel 6–15-flowered, base thickened, ca. 2 mm in diam.; pedicels 1–2 cm. Male flowers: tepals spreading, narrowly oblong or ovate-oblong, 6–7 × 1.5–2 mm; filaments very short; anthers 0.3–0.5 mm. Female flowers and fruit unknown. Fl. May.

• Broad-leaved forests; 2500–2700 m. W Yunnan.

30. Smilax tsinchengshanensis F. T. Wang, Bull. Fan Mem. Inst. Biol. 5: 119. 1934.

青城菝葜 qing cheng ba qia

Shrubs erect, unarmed. Stem and branches inconspicuously obtusely ridged. Petiole 0.5–1.5(–1.8) cm, widened toward base, narrowly winged for 1/4–1/3 its length; abscission zone apical; tendrils absent. Leaf blade abaxially glaucous, lanceolate or oblong-lanceolate, 7–12 × 1–2.5(–3) cm. Inflorescence borne in axil of leaf or scalelike bract at base of young branches, of 1 umbel, basally sometimes prophyllate; peduncle slender, 1.5–5 cm; umbels of both sexes several flowered, base scarcely thickened. Male flowers: tepals dark red, 2.3–2.5 × 1–1.2 mm; stamens very short. Female flowers: tepals slightly smaller than male ones; staminodes 3. Berries black, globose, 7–10 mm in diam. Fl. Oct, fr. Oct–Nov of following year.

• Forests; 800–1900 m. Guizhou, W Sichuan.

31. Smilax elegans Wallich ex Kunth, Enum. Pl. 5: 163. 1850.

西藏菝葜 xi zang ba qia

Smilax parvifolia Wallich ex J. D. Hooker.

Vines climbing, unarmed. Stem branched, to more than 1 m, woody, smooth; young branches zigzagged. Petiole 0.5–1.5 cm, narrowly winged for 1/3–1/2 its length; wings apically lanceolate-auriculate; abscission zone apical; tendrils commonly present. Leaf blade abaxially glaucous, ovate-lanceolate or broadly lanceolate, 3–9 × 1–3.5 cm, main veins 5–7. Inflorescence of 1 umbel, basally not prophyllate; peduncle slender, 1–5 cm; umbels of both sexes 1–4-flowered, base not thickened; bracteoles 2 or 3, lanceolate. Male flowers: tepals greenish, ca. 1.5 × 0.7 mm; stamens rather short. Female flowers: tepals ca. 1.2 × 0.5 mm; staminodes 6, subulate. Fl. Jun. $2n = 32$.

Broad-leaved forests, *Tsuga* forests; 2200–2800 m. S Xizang [Bhutan, India, Myanmar, Nepal].

This species was misidentified in FRPS as *Smilax glaucophylla* Klotzsch.

32. Smilax corbularia Kunth, Enum. Pl. 5: 262. 1850.

筐条菝葜 kuang tiao ba qia

Vines climbing, unarmed. Stem branched, 3–9 m, woody. Petiole 0.8–1.4 cm, narrowly winged for ca. 1/2 its length; wings each with a lanceolate auricle (2–6 mm) apically; abscission zone apical; tendrils usually present. Leaf blade abaxially glaucous, ovate to oblong-elliptic, 4–14 × 2–4.5(–7) cm, leathery, margin recurved. Inflorescence of 1 umbel, basally not prophyllate; peduncle 4–15 mm; umbels of both sexes 10–20-flowered, base thickened; bracteoles many, persistent. Male flowers: tepals not spreading, greenish yellow, outer ones cymbiform, 2.5–3 × ca. 2 mm, inner ones 2–2.5 × ca. 1 mm, thickened, abaxially concave; filaments connate, forming a short column. Female flowers: tepals 2–2.5 mm; staminodes 3. Berries dark red, globose, 6–7 mm in diam. Fl. May–Jul, fr. Dec.

Forests, thickets; near sea level to 1600 m. Guangdong, Guangxi, Hainan, Yunnan [Indonesia, Malaysia, Myanmar, Vietnam].

Three closely allied taxa, *Smilax corbularia*, *S. hypoglauca*, and *S. synandra*, form a natural group in SE Asia. Among them, *S. synandra* differs rather distinctly from the others in its partly connate tepals (rather like those of *Heterosmilax*), the tube of which is sometimes 4-angled. Certain intermediates blur the distinction between *S. corbularia* and *S. hypoglauca*. In addition to the key characters, the leaf blades of *S. hypoglauca* tend to be thinner than those of *S. corbularia*, and the umbels of the former species bear far fewer flowers than those of the latter. The differences among the taxa might be ecological, in which case intensive future field investigations would be necessary.

1a. Leaf blade adaxially slightly shiny, with conspicuous, reticulate veins, base subrounded, margin slightly recurved ..... 32a. var. *corbularia*
1b. Leaf blade adaxially shiny, with inconspicuous, reticulate veins, base shallowly cordate to broadly cuneate, margin strongly recurved ..... 32b. var. *woodii*

32a. Smilax corbularia var. **corbularia**

筐条菝葜(原变种) kuang tiao ba qia (yuan bian zhong)

Smilax banglaoensis R. H. Miao.

Leaf blade ovate, ovate-oblong, or narrowly elliptic, adaxially slightly shiny, reticulate veins conspicuous adaxially, base subrounded, margin slightly recurved.

Forests, thickets; near sea level to 1600 m. Guangdong, Guangxi, Hainan, Yunnan [Myanmar, Vietnam].

32b. Smilax corbularia var. **woodii** (Merrill) T. Koyama, Quart. J. Taiwan Mus. 13: 15. 1960.

光叶菝葜 guang ye ba qia

Smilax woodii Merrill, Univ. Calif. Publ. Bot. 15: 27. 1929; *S. amaurophlebia* Merrill; *S. balansana* Baillon ex Gagnepain.

Leaf blade ovate to ovate-elliptic, adaxially shiny, reticulate veins inconspicuous adaxially, base shallowly cordate to broadly cuneate, margin strongly recurved.

Forests; near sea level to 500 m. Hainan [Indonesia, Malaysia].

33. Smilax synandra Gagnepain, Bull. Soc. Bot. France 81: 73. 1934.

筒被菝葜 tong bei ba qia

Heterosmilax erecta F. T. Wang & Tang; *Smilax corbularia* Kunth subsp. *synandra* (Gagnepain) T. Koyama.

Shrubs suberect to subscandent, unarmed. Stem and branches slightly 4-angled. Petiole 5–10 mm, narrowly winged for ca. 1/2 its length; wings each with a lanceolate auricle apicaly; abscission zone apical; tendrils absent. Leaf blade abaxially glaucous, oblong or ovate-oblong, 6–15 × 1.2–7 cm, papery, abaxially minutely white powdery. Inflorescence of 1 umbel, basally not prophyllate; peduncle compressed, slender, 1.2–1.5 cm; umbels of both sexes 10–20-flowered, base thickened; bracteoles lanceolate. Male flowers: outer tepals 2–2.5 mm, connate for ca. 1/2 their length, forming a tube, inner ones adnate to filaments; filaments connate, forming a column. Female flowers: perianth tubular-campanulate, 2.5–3 mm, apically with 3 obtuse teeth and 3 abortive inner tepals; staminodes 3. Fl. Jan.

Wastelands, grassy slopes; near sea level to 1000 m. Guangdong, Hainan, SE Yunnan [Thailand, Vietnam].

34. Smilax hypoglauca Bentham, Fl. Hongk. 369. 1861.

粉背菝葜 fen bei ba qia

Smilax corbularia Kunth var. *hypoglauca* (Bentham) T. Koyama

Vines climbing, unarmed. Stem branched, 2–3(–4) m, woody, smooth. Petiole 0.7–1.3 cm, narrowly winged for ca. 1/2 its length; wings apically lanceolate-auriculate; abscission zone apical; tendrils usually rather long. Leaf blade abaxially glaucous, narrowly elliptic to ovate-oblong, 5–12 × 2–5 cm, leathery, main veins 3–5, margin slightly recurved. Inflorescence of 1 umbel, basally not prophyllate; peduncle 1–5 mm; umbels of both sexes 10–20-flowered, base thickened; bracteoles many, small. Male flowers: tepals not spreading, greenish, outer ones ca. 2.5 × 1.8 mm, inner ones ca. 2.2 × 1 mm, thickened, abaxially concave; filaments connate, forming a short column. Female flowers: tepals 2.2–2.5 mm; staminodes 3. Berries globose, 8–10 mm in diam. Fl. Jul–Aug, fr. Dec.

• Open forests, thicket margins; near sea level to 1300 m. Fujian, Guangdong, Guizhou, Jiangxi, ?Yunnan.

35. Smilax hayatae T. Koyama, Quart. J. Taiwan Mus. 10: 15. 1957.

菱叶菝葜 ling ye ba qia

Smilax gracillima Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 359. 1911, not H. Léveillé & Vaniot (1905).

Shrubs suberect to subscandent. Stem branched, terete, slender, smooth. Petiole 2–5(–8) mm, winged for 1/2–3/5 its length; wings ca. 3 mm, apically with a deltoid-lanceolate au-

ricle 1–1.5 mm; abscission zone apical; tendrils absent. Leaf blade ovate-rhombic or rhombic-elliptic, 3–5(–7) × 1–2.5(–4.5) cm. Male inflorescence of 1 umbel, basally not prophyllate; peduncle slender, 0.7–1.7(–2.2) cm; umbel 2–7-flowered, base scarcely thickened. Male flowers: tepals greenish, outer ones linear-oblong, 1–2 × 0.4–0.8 mm, inner ones ca. 1 × 0.2 mm; stamens ca. 1/2 as long as tepals; anthers subglobose. Female flowers unknown. Berries red, globose, ca. 8 mm in diam. Fl. Apr, fr. Oct.

• Forests, hillsides along valleys or streams; 900–1500 m. N Guangdong, Taiwan.

36. Smilax austrozhejiangensis Q. Lin, Acta Phytotax. Sin. 28: 71. 1990.

浙南菝葜 zhe nan ba qia

Shrubs suberect, unarmed. Stem branched, 50–100 cm, smooth. Petiole 2–5 mm, narrowly winged for 1/2–3/4 its length; wings apically with an ovate-lanceolate auricle ca. 1 mm; abscission zone just above winged portion; tendrils absent. Leaf blade abaxially glaucous, ovate-lanceolate, ovate, or oblong-lanceolate, 3–7.5 × 1–3 cm. Inflorescence racemose or sometimes subumbellate, basally not prophyllate; peduncle slender, 1–2 cm; umbels of both sexes 2–7-flowered; bracteoles small, persistent. Male flowers: tepals elliptic, ca. 1.5 × 0.5–0.8 mm; stamens 0.7–0.8 mm. Female flowers: tepals ca. 1 × 0.5 mm; staminodes 6. Berries orange-red, globose, 5–7 mm in diam. Fl. Apr–May, fr. Jul–Nov.

• Forests, shrubby slopes; 500–600 m. S Zhejiang.

37. Smilax aberrans Gagnepain, Bull. Soc. Bot. France 81: 71. 1934.

弯梗菝葜 wan geng ba qia

Smilax tsaii F. T. Wang.

Subshrubs or shrubs, suberect, unarmed. Stem branched, 0.5–2 m, smooth. Petiole 0.7–1.5 cm, papillose distally, winged for ca. 1/3 its length; abscission zone subapical; tendrils absent. Leaf blade elliptic or ovate-elliptic, 7–12 × 2.5–6.5 cm, abaxially papillose-pubescent or powdery-scabrous particularly on reticulate veins. Inflorescence borne in axil of leaf or scalelike bract on young branches, of 1 umbel, basally not prophyllate; peduncle 4–6.5 cm; umbels of both sexes 5–20-flowered. Male flowers: tepals greenish yellow or pale purple, 2–2.5 × ca. 1 mm; stamens very short. Female flowers: tepals grayish white, 1.5–2 × ca. 0.8 mm; staminodes 6. Berries globose, 8–11 mm in diam.; carpopodium recurved. Fl. Mar–Apr, fr. Dec.

Forests, thickets, shaded places along streams; near sea level to 1600 m. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [Vietnam].

38. Smilax retroflexa (F. T. Wang & Tang) S. C. Chen, Acta Phytotax. Sin. 34: 436. 1996.

苍白菝葜 cang bai ba qia

Smilax aberrans Gagnepain var. *retroflexa* F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 254. 1978; *S. aberrans* subsp. *retroflexa* (F. T. Wang & Tang) T. Koyama.

Subshrubs or shrubs, suberect, unarmed. Stem branched, to 1 m, smooth. Petiole 1–1.5 cm, widened toward base, abaxially striate-ridged, sometimes papillose distally, narrowly winged for ca. 1/3 its length; abscission zone subapical; tendrils absent. Leaf blade abaxially very glaucous, elliptic to ovate, 5–11 × 2–5.5 cm, abaxially glabrous. Inflorescence borne in axil of leaf or scalelike bract on young branches, of 1 umbel, basally not prophyllate; peduncle 2–4 cm; umbels of both sexes 3–20-flowered. Male flowers: tepals ca. 2 × 1 mm; stamens very short, ca. 1/4 as long as tepals; filaments basally connate, forming a short column ca. 0.2 mm. Berries subglobose, ca. 1 cm in diam.; carpopodium recurved. Fl. Apr, fr. Nov.

Forests, thickets, shady places along streams; 900–1700 m. Guangxi, Guizhou, SW Sichuan, S Yunnan [Vietnam].

39. Smilax darrisii H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 553. 1913.

平滑菝葜 ping hua ba qia

Shrubs suberect to subscandent, unarmed. Stem branched, terete, 50–100 cm, smooth. Petiole slender, 3–7 mm, narrowly winged for 1/3–1/2 its length; abscission zone apical; tendrils sometimes present. Leaf blade usually turning blackish when dried, abaxially glaucous, ovate-elliptic to elliptic, 2–5 × 1–2.5 cm. Inflorescence of 1(or 2) umbels, basally not prophyllate; peduncle slender, 3–7 mm; umbel 1–3-flowered, base not thickened; bracteoles small, usually caducous. Male flowers: tepals 2–2.5 × 0.8–1.3 mm; stamens 1–1.5 mm. Female flowers unknown. Berries purplish black, globose, 5–7 mm in diam. Fl. Jun, fr. Nov.

• Forested slopes; 1100–2200 m. Guizhou, Sichuan, Yunnan.

This species is quite different from *Smilax microphylla* C. H. Wright in having elliptic leaves that are blackish when dried and a scarcely swollen peduncle apex.

40. Smilax mairei H. Léveillé, Bull. Acad. Int. Géogr. Bot. 25: 39. 1915.

无刺菝葜 wu ci ba qia

Shrubs suberect, unarmed. Stem branched, smooth. Petiole 4–6 mm, narrowly winged for ca. 3/4 its length; wings each with a small auricle (0.3–0.5 mm) apically; abscission zone subapical; tendrils absent. Leaf blade ovate, 1–3.3 × 0.6–1.5 cm, rounded at base. Male inflorescence of 1 umbel, basally not prophyllate; peduncle 3–4 mm; umbel usually 7–10-flowered; pedicels 2–5 mm. Male flowers: tepals yellow, ovate, ca. 1 × 0.6 mm; stamens nearly 1/2 as long as tepals; filaments free. Female flowers and fruit unknown. Fl. Jun.

• Rocks; ca. 2400 m. ?Xizang, Yunnan.

41. Smilax longebracteolata J. D. Hooker, Fl. Brit. India 6: 305. 1892.

长苞菝葜 chang bao ba qia

Smilax elegans Wallich ex Kunth subsp. *subrecta* Noltie.

Vines climbing, unarmed. Stem branched, 1–5 m, woody, smooth. Petiole 0.5–1.5(–2) cm, narrowly winged for 1/2–2/3 its length; abscission zone apical; tendrils usually present. Leaf blade abaxially glaucous, ovate, oblong-ovate, or triangular-lanceolate, 3.5–9 × 1–5 cm. Inflorescence of 1 umbel, basally not prophyllate; peduncle 5–12 mm, slightly compressed, usually

slightly shorter than petiole; umbels of both sexes 10–30-flowered, base thickened; bracteoles many, persistent. Male flowers: tepals greenish or reddish, 2–2.5 × 0.7–1 mm; stamens very short. Female flowers: tepals 2–2.5 mm; staminodes 6. Berries blue-black, globose, 5–7 mm in diam. Fl. May–Jun, fr. Dec.

Forests, thickets, shaded places along valleys; 1000–3000 m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar].

42. Smilax microphylla C. H. Wright, Bull. Misc. Inform. Kew 1895: 117. 1895.

小叶菝葜 xiao ye ba qia

Smilax castaneiflora H. Léveillé; *S. elegans* Wallich ex Kunth subsp. *microphylla* (C. H. Wright) Noltie; *S. gracillima* H. Léveillé & Vaniot (1905), not Hayata (1911); *S. labordei* H. Léveillé & Vaniot; *S. microphylla* var. *angustifolia* Warburg.

Vines climbing. Stem branched, 1–5 m, woody; branches minutely prickly. Petiole 0.5–2 cm, narrowly winged for 1/2–2/3 its length; abscission zone apical; tendrils commonly present. Leaf blade abaxially glaucous, ovate-lanceolate to linear-lanceolate, 3–9 × 1–4 cm. Inflorescence of 1 umbel, basally not prophyllate; peduncle strikingly shorter than petiole, usually minutely scabrous; umbels of both sexes 2–15-flowered, base thickened; bracteoles many, small, persistent. Male flowers: tepals greenish, 1.6–2 × 0.7–1 mm; stamens very short. Female flowers: tepals slightly smaller than male ones; staminodes 3. Berries blue-black, globose, 5–7 mm in diam. Fl. Jun–Aug, fr. Oct–Nov.

• Forests, thickets, shaded places on slopes; 500–1600 m. S Gansu, Guizhou, Hubei, Hunan, S Shaanxi, Sichuan, Yunnan.

43. Smilax glabra Roxburgh, Fl. Ind., ed. 1832, 3: 792. 1832.

土伏苓 tu fu ling

Smilax blinii H. Léveillé; *S. calophylla* Wallich var. *concolor* C. H. Wright; *S. dunniana* H. Léveillé; *S. glabra* var. *maculata* Bodinier ex H. Léveillé; *S. hookeri* Kunth; *S. mengmaensis* R. H. Miao; *S. trigona* Warburg.

Vines climbing, unarmed. Stem branched, terete, 1–4 m, woody, smooth. Petiole 5–15(–30) cm, narrowly winged for 1/4–3/5 its length; abscission zone apical; tendrils well developed. Leaf blade elliptic- or ovate-lanceolate, 6–15 × 1–7 cm. Inflorescence of 1 umbel, basally not prophyllate; peduncle 1–5(–8) mm, strikingly shorter than petiole; umbels of both sexes 10–30(–60)-flowered, base thickened; bracteoles many. Male flowers: perianth greenish white, slightly 6-angled, scarcely open; outer tepals broadly obovate-orbicular, cucullate, ca. 2 × 3 mm, abaxially deeply channeled, inner ones ca. 1 mm wide, margin irregularly denticulate. Female flowers: inner tepals entire at margin; staminodes 3. Berries blue-black, 6–10 mm in diam., white powdery. Fl. Jul–Nov, fr. Nov–Apr.

Forests, thickets, thinly forested slopes along valleys, river banks; 300–1800 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, ?S Shaanxi (Qin Ling), Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Myanmar, Thailand, Vietnam].

The tuberlike rhizomes are used medicinally.

44. Smilax myrtillus A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 106. 1878.

乌饭叶菝葜 wu fan ye ba qia

Smilax myrtillus var. *dulongensis* H. Li; *S. rigida* Wallich ex Kunth subsp. *myrtillus* (A. de Candolle) T. Koyama; *S. rigida* var. *myrtillus* (A. de Candolle) T. Koyama.

Shrubs erect. Stem densely branched, 50–100 cm, sparsely prickly; branchlets usually 4-angled, with winglike edges. Petiole 1–4 mm, basally auriculate; auricles paired, lanceolate to ovate, 1–2 × ca. 0.5 mm, membranous, margin lacerate-fimbriate; abscission zone at middle; tendrils absent. Leaf blade usually rhombic-ovate, 1–5 × 0.6–2.5(–3) cm, thinly papery, main veins 3(–5), raised adaxially. Inflorescence of 1 umbel, basally not prophyllate; peduncle 5–10 mm; umbels of both sexes 2–10-flowered. Male flowers: tepals purplish green, ca. 1.5 × 0.4–0.6 mm; stamens ca. 0.5 mm. Female flowers: tepals ca. 1 × 0.3 mm; staminodes 3. Berries blue-black, globose, 6–8 mm in diam. Fl. Jul, fr. Oct–Nov.

Forest, forest margins, thickets; 1600–3100 m. SE Xizang, Yunnan [Bhutan, India, Myanmar].

45. Smilax munita S. C. Chen, Acta Phytotax. Sin. 34: 436. 1996.

劲直菝葜 jin zhi ba qia

Smilax rigida Wallich ex Kunth, Enum. Pl. 5: 164. 1850, not Solander (1794); *S. myrtillus* A. de Candolle var. *rigida* Noltie.

Shrubs erect. Stem branched, 50–100 cm; branches 2- or 3-angled, with winglike edges; prickles on branches straight, 5–7 mm, rigid. Petiole ca. 1 mm, basally auriculate; auricles paired, lanceolate to ovate, 1–2 × ca. 0.5 mm, membranous with lacerate-fimbriate margin; abscission zone near middle; tendrils absent. Leaf blade cordate to ovate, 1.5–2.5 × 1.2–2.8 cm, main veins (3–)5, adaxially concave. Inflorescence of 1 umbel, basally not prophyllate; peduncle 4–7 mm; umbels of both sexes 2–8-flowered. Male flowers: tepals greenish, 1.2–1.5 × 0.3–0.5 mm; stamens very short. Female flowers: tepals ca. 1.2 mm; staminodes 3. Berries blue-black, 7–9 mm in diam. Fl. Jul, fr. Oct–Nov.

Mixed forests, broad-leaved deciduous forests; 2100–2800 m. S Xizang, Yunnan [Bhutan, Myanmar, Nepal, Sikkim].

46. Smilax bapouensis H. Li, Acta Bot. Yunnan., Suppl. 5: 20. 1992.

巴坡菝葜 ba po ba qia

Shrubs evergreen, suberect. Stem branched, 2–3 m, sparsely prickly. Petiole 5–12 mm, narrowly winged for ca. 1/2 its length; abscission zone above middle; tendrils usually present. Leaf blade ovate, 2–6 × 1–1.3 cm, leathery, main veins 5, median 3 veins elevated abaxially, base rounded, apex acute. Male flowers unknown. Female inflorescence of 1 umbel, basally not prophyllate; peduncle very short, 1–3 mm; umbel 5–8-flowered, base thickened, subglobose, ca. 2 mm in diam.; pedicels ca. 3 mm, rigid. Female flowers: tepals yellowish green, linear-

oblong, ca. 2.5 × 1 mm. Berries purplish black, globose, 4–8 mm in diam. Fl. May, fr. Nov.

• Open forests, thickets, hillsides along streams and valleys. NW Yunnan (Gongshan Drung-Nu Zu Zizhixian).

47. Smilax biumbellata T. Koyama, Brittonia 26: 133. 1974.

西南菝葜 xi nan ba qia

Vines climbing, unarmed. Stem laxly branched terete, rather slender, 2–5 m, woody. Petiole 5–20 cm, narrowly winged for ca. 1/4 its length; abscission zone subapical; tendrils well developed. Leaf blade oblong-lanceolate to narrowly ovate, 7–15 × 1–5 cm. Inflorescence borne in axil of leaf or scalelike bract, of 1 umbel, basally not prophyllate; peduncle slender, 1.5–5 cm; umbels of both sexes 7–17-flowered, base slightly thickened, 1–2 mm in diam. Male flowers: tepals purplish red or greenish yellow, 2.5–3 × ca. 1 mm. Female flowers: tepals ca. 2.2 × 0.8 mm; staminodes 3. Berries blue-black, globose, 8–10 mm in diam. Fl. May–Jul, fr. Oct–Nov.

Forests, thickets; 800–2900 m. S Gansu, Guangxi, Guizhou, Hunan, Sichuan, Xizang, Yunnan [India, Myanmar].

48. Smilax jiankunii H. Li, Acta Bot. Yunnan., Suppl. 5: 21. 1992.

建昆菝葜 jian kun ba qia

Vines climbing, unarmed, usually becoming blackish when dried. Stem terete, 4–5 mm, woody. Petiole 5–5.5 cm, narrowly winged for ca. 1/2 its length; abscission zone distal; tendrils well developed. Leaf blade ovate or ovate-oblong, ca. 18 × 10 cm, abaxially slightly white powdery. Male inflorescence of 1 umbel, basally not prophyllate; peduncle to 10 cm; umbel densely 50–100-flowered, base thickened. Male flowers: perianth greenish, campanulate; outer tepals linear-oblong, ca. 5 × 1.5 mm, slightly fleshy, inner ones slightly narrower; stamens ca. 3.2 mm; anthers ca. 1 mm. Female flowers and fruit unknown. Fl. Apr–May.

• Forested slopes; 1300–1600 m. NW Yunnan (Gongshan Drung-Nu Zu Zizhixian).

49. Smilax nervomarginata Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 361. 1911.

缘脉菝葜 yuan mai ba qia

Vines climbing, unarmed. Stem branched, terete, 1–2 m, woody; branches striate-ridged, sometimes minutely verruculose. Petiole 0.6–1.8 cm, narrowly winged for ca. 1/4 its length; abscission zone subapical; tendrils well developed. Leaf blade oblong, elliptic, or ovate-elliptic, 6–12 × 1.5–4.5(–7) cm, leathery, 5–7-veined, midvein obviously raised adaxially, base obtuse, apex acuminate. Male inflorescence borne in axil of leaf or scalelike bract, of 1 umbel, basally not prophyllate; peduncle slightly compressed, slender, 1.5–4 cm; umbel 6–17-flowered, base slightly thickened. Male flowers: tepals purplish brown, ca. 2.5 × 1 mm. Female flowers unknown. Berries globose, 7–10 mm in diam. Fl. Apr–May, fr. Oct.

Forests, forest margins, thickets; near sea level to 1000 m. Anhui, Guizhou, Hunan, Jiangxi, Zhejiang [Japan (Ryukyu Islands)].

1a. Branches minutely verruculose ..... 49a. var. *nervomarginata*

1b. Branches not verruculose ..... 49b. var. *liukiuensis*

49a. Smilax nervomarginata var. **nervomarginata**

缘脉菝葜(原变种) yuan mai ba qia (yuan bian zhong)

Smilax sempervirens F. T. Wang.

Branches minutely verruculose.

Forests, forest margins, thickets; near sea level to 1000 m. Anhui, Guizhou, Hunan, Jiangxi, Zhejiang [Japan (Ryukyu Islands)].

49b. Smilax nervomarginata var. **liukiuensis** (Hayata) F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 217. 1978.

无疣菝葜 wu you ba qia

Smilax liukiuensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 360. 1911.

Branches not verruculose.

Forests. Anhui, Jiangxi, Zhejiang [Japan (Ryukyu Islands)].

50. Smilax luei T. Koyama, Taiwania 20: 117. 1975.

吕氏菝葜 lu shi ba qia

Vines climbing, unarmed. Stem branched, 1–4 m, woody. Petiole 1–1.7 cm, shortly and narrowly winged; abscission zone subapical; tendrils well developed. Leaf blade lanceolate-ovate to oblong-lanceolate, (3–)5–13 × 1–3.5 cm. Inflorescence in axil of bract, of 1 umbel, basally not prophyllate; peduncle slender, longer than petiole; umbels of both sexes 10–25-flowered. Male flowers: tepals greenish purple, 3.2–3.7 × 1–1.2 mm, adaxially longitudinally wrinkled with several ridges; stamens 9(or 10), 1.7–2 mm; filaments short. Female flowers: tepals dark green; staminodes 5 or 6, filiform. Berries black, globose, 6–8 mm in diam.

• Forest margins; near sea level to 700 m. C Taiwan.

51. Smilax arisanensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 356. 1911.

尖叶菝葜 jian ye ba qia

Vines climbing. Stem branched, to 10 m, woody, sometimes sparsely prickly. Petiole 0.7–2 cm, usually twisted, narrowly winged for 1/2–3/4 its length; abscission zone subapical; tendrils commonly present. Leaf blade usually becoming bronze-colored when dried, oblong to ovate-lanceolate, 7–12(–15) × 1.5–3.5(–5) cm. Inflorescence of 1 umbel, basally sometimes prophyllate; peduncle slender, 1.5–3.5 cm; umbels of both sexes 5–25-flowered, base scarcely thickened. Male flowers: tepals greenish white or pale green, 2–3 × ca. 1 mm; stamens ca. 1.5 mm. Female flowers: tepals 1.5–2 × ca. 0.8 mm; staminodes 3. Berries purplish black, globose, ca. 8 mm in diam. Fl. Apr–May, fr. Oct–Nov.

Forests, thickets, shaded places along valleys or streams; near sea level to 1500 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Vietnam].

52. Smilax lanceifolia Roxburgh, Fl. Ind., ed. 1832, 3: 792. 1832.

马甲菝葜 ma jia ba qia

Vines climbing. Stem branched, terete, 1–2 m, woody; branchlets occasionally zigzagged. Petiole 1–2(–2.5) cm, narrowly winged for 1/5–1/4 its length; abscission zone at middle; tendrils usually present. Leaf blade lanceolate to ovate-oblong, 6–17 × 2–8 cm. Inflorescence of 1(or 2) umbels, basally prophyllate; peduncle 1–1.5 cm, proximally articulate; umbels of both sexes densely 20–30-flowered, base slightly thickened. Male flowers: tepals yellowish green, 3–4.5 × ca. 1 mm; stamens 3–4 mm. Female flowers: tepals 1.5–2 × ca. 0.6 mm; staminodes 6. Berries yellowish red to black, globose, 6–7 mm in diam. Fl. Sep–Mar, fr. Oct–Nov.

Forests, forest margins, thickets, shaded places on slopes; 100–2800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, NE India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sikkim, Thailand, Vietnam].

This species is very difficult to treat taxonomically due to the extreme polymorphism of the included entities.

1a. Main veins obviously concave on adaxial leaf surface ..... 52e. var. *impressinervia*
1b. Main veins raised on adaxial leaf surface (sometimes midvein slightly concave).
  2a. Leaf blade usually ovate or ovate-lanceolate, usually 1–3 × as long as wide.
    3a. Leaf blade usually papery, adaxially not or slightly shiny; peduncle usually shorter than petiole ..... 52a. var. *lanceifolia*
    3b. Leaf blade usually leathery, adaxially shiny; peduncle usually longer than petiole ..... 52b. var. *opaca*
  2b. Leaf blade lanceolate to narrowly oblong-lanceolate, usually 5–7 × as long as wide.
    4a. Branchlets ± zigzagged; peduncle longer than petiole; tepals yellowish green ..... 52c. var. *elongata*
    4b. Branchlets not zigzagged; peduncle shorter than or subequaling petiole; tepals purple ..... 52d. var. *lanceolata*

52a. Smilax lanceifolia var. **lanceifolia**

马甲菝葜(原变种) ma jia ba qia (yuan bian zhong)

Smilax micropoda A. de Candolle.

Leaf blade usually ovate to ovate-lanceolate, usually 1–3 × as long as wide, papery, adaxially not or slightly shiny, main veins raised adaxially (sometimes midvein slightly concave). 2*n* = 32.

Forests, thickets, shaded places on slopes; 600–2800 m. Guangxi, Guizhou, Hubei, Sichuan, Yunnan [Bhutan, NE India, Laos, Myanmar, Sikkim, Thailand, Vietnam].

52b. Smilax lanceifolia var. **opaca** A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 57. 1878.

暗色菝葜 an se ba qia

Smilax laevis Wallich ex A. de Candolle; *S. laevis* var. *ophirensis* A. de Candolle; *S. laevis* var. *parkii* A. de Candolle; *S. lanceifolia* subsp. *opaca* (A. de Candolle) T. Koyama; *S. opaca* (A. de Candolle) J. B. Norton.

Leaf blade leathery, usually ovate to ovate-lanceolate, usually 1–3 × as long as wide, adaxially obviously shiny, main veins raised adaxially (sometimes midvein slightly concave).

Forests, thickets, shaded places on slopes; 100–1000(–2000) m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang [Cambodia, Indonesia, Laos, Malaysia, Thailand, Vietnam].

52c. Smilax lanceifolia var. **elongata** (Warburg) F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 220. 1978.

折枝菝葜 zhe zhi ba qia

Smilax microphylla C. H. Wright var. *elongata* Warburg in Diels, Bot. Jahrb. Syst. 29: 259. 1900; *S. austrosinensis* F. T. Wang & Tang; *S. tortipetiolata* H. Léveillé & Vaniot.

Branchlets zigzagged. Leaf blade lanceolate or narrowly oblong-lanceolate, usually 5–6 × as long as wide, thickly papery to leathery, main veins raised adaxially (sometimes midvein slightly concave). Peduncle longer than petiole. Tepals yellowish green.

• Forests, shaded places on slopes; 500–2000 m. Guangdong, Guangxi, Guizhou, Jiangxi, Sichuan, ?Yunnan, Zhejiang.

52d. Smilax lanceifolia var. **lanceolata** (J. B. Norton) T. Koyama, Quart. J. Taiwan Mus. 13: 26. 1960.

长叶菝葜 chang ye ba qia

Smilax cocculoides Warburg var. *lanceolata* J. B. Norton in Sargent, Pl. Wilson. 3: 11. 1916.

Leaf blade lanceolate to narrowly oblong-lanceolate, usually 5–7 × as long as wide, main veins raised adaxially (sometimes midvein slightly concave). Peduncle shorter than or subequaling petiole. Tepals purple.

• Forests, forest margins; 1500–2000 m. S Yunnan.

52e. Smilax lanceifolia var. **impressinervia** (F. T. Wang & Tang) T. Koyama, Quart. J. Taiwan Mus. 13: 26. 1960.

凹脉菝葜 ao mai ba qia

Smilax impressinervia F. T. Wang & Tang, Sinensia 5: 425. 1934.

Leaf blade lanceolate to oblong-lanceolate, thinly leathery; main veins 3, obviously concave adaxially. Peduncle subequaling petiole.

• Shaded places in forests; 1000–2000 m. Guangxi, Guizhou, Yunnan.

53. Smilax astrosperma F. T. Wang & Tang, Fl. Hainan. 4: 534. 1977.

灰叶菝葜 hui ye ba qia

Vines climbing. Stem branched, terete, 1–2 m, woody, sometimes sparsely prickly. Petiole 1–1.5 cm, narrowly winged for 1/5–1/4 its length; abscission zone at or above middle;

tendrils usually present. Leaf blade becoming grayish when dried, lanceolate, 8–12 × 2–4 cm, adaxially wrinkled along 3 concave main veins. Inflorescence usually of 1 umbel, basally prophyllate; peduncle 1.5–2.5 cm, proximally articulate; umbels of both sexes 3–5-flowered, base slightly thickened. Male flowers: tepals lanceolate-oblong, 3.5–4 × 0.7–1 mm. Female flowers: tepals 2.5–3 × 0.6–0.8 mm; staminodes 3(or 4). Berries globose, 5–6 mm in diam., 1-seeded. Seeds oblate-globose, deeply 5- or 6-furrowed. Fl. Nov.

• Open forests; near sea level to 1000 m. Guangxi, Hainan.

54. Smilax chapaensis Gagnepain, Bull. Soc. Bot. France 81: 72. 1934.

密疣菝葜 mi you ba qia

Smilax lanceifolia Roxburgh var. *reflexa* (J. B. Norton) T. Koyama; *S. micropoda* A. de Candolle var. *reflexa* J. B. Norton.

Vines climbing. Stem branched, terete, 1–3 m, woody; branches 2- or 3-angled, densely verruculose, sometimes also sparsely prickly. Petiole 1–2(–2.5) cm, narrowly winged for ca. 1/4 its length, basally slightly verruculose; abscission zone at middle or above; tendrils usually present. Leaf blade ovate to lanceolate, 8–15 × 3–6 cm. Inflorescence of 1 umbel, basally prophyllate; peduncle 1–1.5 cm, proximally articulate; umbels of both sexes 20–30-flowered, base slightly thickened. Male flowers: tepals 3–4 × ca. 1 mm; stamens 3.5–4 mm. Female flowers: tepals slightly smaller than male ones; staminodes 6. Berries globose, 6–7 mm in diam. Fl. Feb–Mar, fr. Oct–Nov.

Forests, thickets, shaded places on slopes; 600–1500 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan [Vietnam].

55. Smilax vanchingshanensis (F. T. Wang & Tang) F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 224. 1978.

梵净山菝葜 fan jing shan ba qia

Smilax laevis Wallich ex A. de Candolle var. *vanchingshanensis* F. T. Wang & Tang, Sinensia 5: 424. 1934.

Vines climbing. Stem branched, to 5 m, woody, sometimes sparsely prickly. Petiole 1–2 cm, narrowly winged for 1/5–1/3 its length; abscission zone at middle; tendrils well developed. Leaf blade ovate-oblong to lanceolate, 8–16 × 4–9 cm, adaxially slightly shiny, main veins 5. Inflorescence of 1(or 2) umbels, basally prophyllate; peduncle 1–2(–3) cm, proximally articulate when inflorescence of 1 umbel; umbels of both sexes 10–40-flowered, base thickened. Male flowers: tepals yellowish green, 7–8 × 0.8–1.6 mm; stamens 7–8 mm; filaments basally connate, forming a short column ca. 1 mm. Female flowers: tepals 3–4 × ca. 0.5 mm; staminodes 6. Berries ca. 9 mm in diam. Fl. Sep–Oct, fr. Dec–Feb.

• Open forests, forest margins, grassy slopes; 400–1400 m. Guizhou, Hubei, Sichuan.

56. Smilax hemsleyana Craib, Bull. Misc. Inform. Kew 1912: 409. 1912.

束丝菝葜 shu si ba qia

Smilax zeylanica Linnaeus subsp. *hemsleyana* (Craib) T. Koyama.

Vines climbing. Stem branched, 3–5(–15) m, woody, sometimes sparsely prickly. Petiole 1.5–2.5 cm, narrowly winged for ca. 1/4 its length; abscission zone at middle; tendrils usually present. Leaf blade broadly ovate to elliptic, 7–13 × 4–11 cm. Inflorescence of 1(or 2) umbels, basally prophyllate; peduncle 1.5–4.5 cm, proximally articulate, with 1 or 2 bracts; umbels of both sexes densely many flowered, base thickened, suboblong, 3–6 × 2–4.5 mm in fruit. Male flowers: tepals ca. 5 × 0.5–1 mm; stamens slightly exserted; filaments basally connate, forming a column ca. 1 mm. Female flowers: tepals ca. 4 × 0.7–1.5 mm; staminodes 3, filiform. Berries 7–8 mm in diam. Fl. Apr–May, fr. Nov.

Thickets, grassy slopes; 600–1700 m. S Guizhou, Yunnan [India, Myanmar, Thailand].

57. Smilax kwangsiensis F. T. Wang & Tang, Sinensia 5: 425. 1934.

缘毛菝葜 yuan mao ba qia

Vines climbing. Stem branched, to 3 m, woody, smooth or slightly scabrous, sometimes sparsely prickly. Petiole 1.5–2.5 cm, glabrous or minutely setose, narrowly winged for 1/4–1/3 its length; wings ciliate or minutely fimbriate at margin; abscission zone at middle or distal; tendrils well developed. Leaf blade ovate-lanceolate to elliptic-lanceolate, 8–18 × 3.5–5.5 cm, papery, base rounded or cuneate, apex acuminate. Male inflorescence of 1 umbel, basally prophyllate; peduncle much longer than petiole, proximally articulate; umbels of both sexes many flowered. Male flowers (var. *setulosa*): tepals yellowish green, outer ones ca. 8 × 1.2 mm, inner ones ca. 8 × 0.6 mm. Berries globose, ca. 1.2 cm in diam. Fl. Aug, fr. Oct–Nov.

• Forests; 300–400 m. SW Guangdong, S Guangxi.

1a. Stem and branches glabrous; petiole glabrous or sparsely and minutely setose ..... 57a. var. *kwangsiensis*
1b. Stem and branches ± scabrous, sometimes minutely setose; petiole densely and minutely setose ..... 57b. var. *setulosa*

57a. Smilax kwangsiensis var. **kwangsiensis**

缘毛菝葜(原变种) yuan mao ba qia (yuan bian zhong)

Stem and branches glabrous. Petiole glabrous or sparsely and minutely setose.

• Forests; 300–400 m. S Guangxi.

57b. Smilax kwangsiensis var. **setulosa** F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 254. 1978.

小刚毛菝葜 xiao gang mao ba qia

Stem and branches ± scabrous, sometimes minutely setose. Petiole densely and minutely setose.

• Forests. SW Guangdong (Xinyi Xian).

58. Smilax megacarpa A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 186. 1878.

大果菝葜 da guo ba qia

Vines climbing, usually unarmed. Stem branched, terete, to 10 m, woody. Petiole 1.5–5 cm, narrowly winged for 1/3–1/2 its length; abscission zone distal; tendrils usually present. Leaf blade sometimes turning blackish when dried, ovate to elliptic, (5–)10–20 × 3–12 cm, papery or subleathery, adaxially slightly shiny, base rounded or truncate, apex submucronate. Inflorescence of (1 or)2 or 3 umbels, 3–6(–10) cm, basally prophyllate; umbels of both sexes 6–20-flowered, base slightly thickened. Male flowers: tepals greenish yellow, 6–7 × 0.6–1.5 mm. Female flowers unknown (in China). Berries dark red, globose, 1.5–2 cm in diam. Fl. Oct–Dec, fr. May–Jun.

Forests, thickets, shaded slopes; near sea level to 1500 m. Guangxi, Hainan, S Yunnan [Cambodia, India, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

Chinese records of *Smilax macrocarpa* Blume (e.g., in FRPS) are referable to *S. megacarpa*.

59. Smilax yunnanensis S. C. Chen, Bull. Bot. Res., Harbin 3(3): 111. 1983.

云南菝葜 yun nan ba qia

Vines climbing. Stem terete, woody, occasionally sparsely prickly. Petiole (2–)3–3.5 cm, narrowly winged for ca. 1/3 its length; abscission zone at middle; tendrils well developed. Leaf blade ovate to ovate-lanceolate, 11–13 × 6–7 cm, thickly leathery, adaxially shiny, main veins 7, raised on both sides, base rounded, apex acuminate. Male inflorescence a raceme of 3 lateral umbels and an abortive terminal umbel, 3.5–4.5 cm, basally prophyllate; umbels densely 30–40-flowered, base thickened, ellipsoid, 4–5 × 3–4 mm; bracteoles many. Male flowers: tepals greenish yellow or pale yellow, linear, outer ones ca. 7 × 1.8 mm, inner ones much narrower; stamens ca. 7 mm; anthers ca. 1.2 mm. Female flowers and fruit unknown. Fl. Sep.

• Forested slopes; ca. 1000 m. S Yunnan.

60. Smilax bracteata C. Presl, Reliq. Haenk. 1: 131. 1827.

圆锥菝葜 yuan zhui ba qia

Smilax lyi H. Léveillé; *S. stenopetala* A. Gray.

Vines climbing. Stem branched, subterete, to 10 m, woody, sometimes sparsely prickly. Petiole 1–2 cm, narrowly winged for 2/5–1/2 its length; abscission zone distal; tendrils commonly present. Leaf blade broadly elliptic to ovate-elliptic, 5–17 × 3–11 cm. Inflorescence a raceme of 3–6(–10) umbels, 3–7 cm, basally prophyllate; umbels of both sexes 12–25-flowered, base slightly thickened, globose, ca. 2 × 2 mm. Male flowers: tepals olive green to dark red, ca. 5 × 0.7–1.3 mm. Female flowers: tepals smaller than male ones; staminodes 3. Berries globose, 5–7 mm in diam. Fl. Nov–Feb, fr. Jun–Aug. $2n = 32$.

Forests, thickets, shaded places on grassy slopes; near sea level to 1800 m. Fujian, Guangdong Guangxi, S Guizhou, Hainan, Taiwan, Yunnan [Cambodia, Indonesia, Japan, Laos, Malaysia, Philippines, Thailand, Vietnam].

61. Smilax aspericaulis Wallich ex A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 195. 1878.

疣枝菝葜 you zhi ba qia

Smilax bracteata C. Presl subsp. *verruculosa* (Merrill) T. Koyama; *S. bracteata* var. *verruculosa* (Merrill) T. Koyama; *S. trachyclada* Hayata; *S. verruculosa* Merrill.

Vines climbing. Stem woody; stem and branches densely verruculose, sometimes sparsely prickly. Petiole 1–1.5 cm, narrowly winged for 2/5–1/2 its length; abscission zone distal; tendrils usually present. Leaf blade broadly ovate-elliptic, 6–15 × 4–10 cm, thickly herbaceous or papery, base rounded, apex subacute. Inflorescence a raceme of 3–7 umbels, 3–6 cm, basally prophyllate; umbels of both sexes many flowered, base slightly thickened. Male flowers: outer tepals ca. 5 × 1.2 mm, inner ones much narrower. Female flowers: tepals smaller than male ones; staminodes 3. Berries purplish black, ovoid-globose or somewhat pear-shaped, 5–6 mm in diam. Fl. Dec–Feb, fr. Jul–Sep.

Forests, thickets, shaded slopes; near sea level to 1900 m. Guangxi, Guizhou, Hainan, Taiwan, ?Xizang, Yunnan [India, Myanmar, Philippines, Vietnam].

Smilax aspericaulis is often treated as a variety or subspecies of *S. bracteata* because it differs only in its verruculose stems (vs. stems occasionally thorny but not verruculose). It is possible that *S. aspericaulis* represents an ecotype of *S. bracteata* occurring at higher elevations.

62. Smilax ovalifolia Roxburgh, Fl. Ind., ed. 1832, 3: 794. 1832.

卵叶菝葜 luan ye ba qia

Smilax macrophylla Roxburgh.

Vines climbing, large. Stem branched, to 10 m, woody; branches smooth or sparsely prickly. Petiole 1.6–3 cm, narrowly winged for 1/2–2/3 its length; abscission zone subapical; tendrils well developed. Leaf blade ovate to suborbicular, 12–23(–26) × 8–14(–20) cm, main veins 7. Inflorescence of (1 or)2 or 3 umbels, 1.5–4 cm, basally prophyllate; peduncle 1.3–3 cm, proximally articulate when inflorescence of 1 umbel; umbels of both sexes 12–40-flowered, base thickened. Male flowers: outer tepals 5–6 × ca. 1.5 mm, inner ones much narrower. Female flowers: tepals slightly smaller than male ones; staminodes 3. Berries dark red, ellipsoid-globose, 0.9–1.2 cm in diam. $2n = 64, 96, 128$.

Forests; near sea level to 1500 m. Hainan [India, Myanmar, Nepal, Thailand, Vietnam].

63. Smilax malipoensis S. C. Chen, Bull. Bot. Res., Harbin 3(3): 113. 1983.

马里坡菝葜 ma li po ba qia

Vines climbing. Stem subterete, woody, furrowed when dried, sparsely verruculose. Petiole 7–12 mm, abaxially verruculose near base, winged; wings 3–5 × 1–1.6 mm, margin crisped; abscission zone at middle; tendrils absent. Leaf blade oblong to oblong-elliptic, (5.5–)11–13 × (1.5–)3–5 cm, main veins 7, abaxially convex, adaxially slightly raised. Male inflorescence of 2 umbels, 4–4.5 cm, basally prophyllate; umbels 10–20-flowered, ca. 2 cm in diam., base globose, 2–3 mm in diam. Male flowers: outer tepals greenish white, 5–6 × ca. 1.8 mm, inner ones much narrower; stamens 5.5–6 mm; anthers ca. 2 mm. Female flowers and fruit unknown. Fl. Nov.

• Mixed forests; 1600–1800 m. SE Yunnan (Malipo Xian).

64. Smilax cocculoides Warburg in Diels, Bot. Jahrb. Syst. 29: 257. 1900.

银叶菝葜 yin ye ba qia

Smilax polycolea Warburg var. *acuminata* Warburg.

Shrubs subscandent, unarmed. Stem suberect, branched, 0.5–2 m. Petiole usually curved, 5–10 mm, transversely wrinkled on proximal 1/2, basally narrowly winged; wings sometimes auriculate apically; abscission zone at middle; tendrils absent. Leaf blade abaxially grayish green, ovate, elliptic-ovate, or ovate-lanceolate, abaxially slightly shiny. Male inflorescence of 1(or 2) umbels, basally prophyllate; peduncle 1–2 cm, articulate 2–5 mm from base; umbels 3–15-flowered, base scarcely thickened. Male flowers: tepals yellowish green, outer ones 2.5–3.5 × 1–1.5 mm; stamens very short, ca. 0.7 mm. Female flowers unknown. Berries blackish blue, globose, ca. 8 mm in diam. Fl. Feb–Apr, fr. Nov.

• Forests, thickets; 500–1900 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

65. Smilax pinfaensis H. Léveillé & Vaniot in H. Léveillé, Mem. Pontif. Accad. Romana Nuovi Lincei 23: 355. 1905.

平伐菝葜 ping fa ba qia

Shrubs suberect, unarmed. Rhizome stolonlike, 2–3 mm in diam. Stem branched, smooth. Petiole 4–6 cm, basally narrowly winged; abscission zone apical; tendrils absent. Leaf blade lanceolate to oblong-lanceolate, 8–16 × 1.5–4 cm, leathery, 3-veined, with midvein concave adaxially, base subrounded, apex acuminate. Male inflorescence of 1 umbel, basally prophyllate; peduncle 8–14(–20) cm, proximally articulate; umbel 5- or 6-flowered, base scarcely thickened; bracteoles small; pedicels 5–9 mm. Male flowers: tepals spreading, ovate or ovate-elliptic, 1.5–1.8 × ca. 1 mm; stamens very short, 0.3–0.4 mm; anthers shorter than filaments. Female flowers unknown. Fl. Mar.

• Forests. SC Guizhou (Guiding Xian).

66. Smilax basilata F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 254. 1978.

少花菝葜 shao hua ba qia

Vines climbing. Stem branched, to 2 m, woody; branches 2–4-angled, sometimes sparsely prickly. Petiole 2.5–5 mm, narrowly winged for 1/2–2/3 its length; abscission zone distal; tendrils sometimes present. Leaf blade lanceolate, ovate-lanceolate, or oblong-lanceolate, 3–7 × 1–2(–2.5) cm, leathery or thickly papery. Male inflorescence of 1 umbel, basally prophyllate; peduncle 1–3 mm, much shorter than petiole, proximally articulate; umbels 2- or 3-flowered, base scarcely thickened. Male flowers: tepals greenish, outer ones ca. 2 × 1 mm, inner ones ca. 1 × 0.6 mm; stamens ca. 1/2 as long as tepals; anthers suborbicular. Female flowers unknown. Berries dark purple, globose, ca. 1 cm in diam. Fl. Mar–Apr, fr. Nov.

• Forests, grassy slopes; 1200–2000 m. Guangxi, SE Yunnan.

The recently described *Smilax guiyangensis* C. X. Fu & C. D. Shen (Acta Phytotax. Sin. 35: 70. 1997), from C Guizhou (Guiyang), appears to be a distinct species closely related to *S. basilata*, from which it differs in having white-marked leaf blades and rather long peduncles conspicuously longer than the petioles.

67. Smilax fooningensis F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 255. 1978.

富宁菝葜 fu ning ba qia

Vines climbing. Stem branched, woody; branches densely verruculose. Petiole 1–2 cm, wingless; abscission zone between middle and distal part; tendrils absent. Leaf blade ovate, 7.5–15.5 × 4–8 cm, leathery, base subtruncate or broadly cuneate, apex acuminate. Male inflorescence of 1 umbel, basally prophyllate; peduncle 3–5 cm, proximally articulate; umbel densely many flowered, base thickened, oblong-ellipsoid, 4–5 × 1.5–2 mm. Male flowers: tepals yellowish green, outer ones oblong, 2–2.5 × ca. 0.8 mm, inner ones ca. 2 × 0.4 mm; stamens ca. 1/2 as long as tepals; anthers oblong, ca. 0.5 mm. Female flowers and fruit unknown. Fl. May.

• Forests; ca. 600 m. SE Yunnan (Funing Xian).

68. Smilax quadrata A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 183. 1878.

方枝菝葜 fang zhi ba qia

Vines climbing. Stem branched, woody; branches strongly zigzagged, obtusely 4-angled, subsquare in cross section, sometimes sparsely prickly. Petiole 1–1.7 cm, narrowly winged for 1/2–2/3 its length; abscission zone distal; tendrils usually present. Leaf blade oblong to ovate-oblong, 7–11 × 2.5–4.5 cm, thickly papery or thinly leathery, base subtruncate or rounded, apex mucronate. Male inflorescence a raceme of 2–4 umbels, 2.5–4 cm, basally prophyllate; umbels 20–30-flowered, base slightly thickened. Male flowers: tepals 4–5 × ca. 1.5 mm, inner ones ca. 5 × 0.5 mm; stamens 4–5 mm; anthers linear, ca. 1.2 mm. Female flowers and fruit unknown. Fl. Oct.

Forests, shaded places along valleys; 1900–2000 m. ?Xizang, SE and WC Yunnan (Jingdong Xian, Yanshan Xian) [India, Myanmar].

69. Smilax lunglingensis F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 86. 1936.

马钱叶菝葜 ma qian ye ba qia

Smilax siderophylla Handel-Mazzetti.

Vines climbing. Stem branched, subterete, 1–3 m or more, woody; branches usually sparsely prickly. Petiole 2–3 cm, wingless or rarely narrowly winged for ca. 1/2 its length; abscission zone distal; tendrils usually present. Leaf blade elliptic, ovate-elliptic, or orbicular, 5–11 × 3–9 cm, thickly leathery, main veins 3, strongly convex abaxially, concave adaxially. Inflorescence a raceme of 2–4 umbels, 3–5 cm, basally prophyllate; umbels of both sexes 15–25-flowered, base subglobose. Male flowers: tepals yellow, outer ones ca. 6 × 2 mm, inner ones much narrower; stamens ca. 6 mm. Female flowers: tepals smaller than male ones; staminodes 3. Berries black, globose, 5–6 mm in diam. Fl. Mar–Apr, fr. Aug–Oct.

• Forests, thickets, shaded and damp places on slopes; 1800–2700 m. Yunnan.

70. Smilax bauhinioides Kunth, Enum. Pl. 5: 243. 1850.

圆叶菝葜 yuan ye ba qia

Vines climbing. Stem branched, terete, 1–2 m, woody; branches densely verruculose, sparsely prickly. Petiole 1.5–2 cm, scarcely winged; abscission zone distal; tendrils usually present near base. Leaf blade suborbicular, 4.5–7 × 4–6.5 cm, thickly leathery, main veins 5, raised on both sides except midvein concave adaxially, base rounded, apex mucronate.

Pinus forests; ca. 300 m. S Guangxi (Dongxing Xian) [Vietnam].

This species is closely related to *Smilax lunglingensis*, which has similar inflorescences and flowers. Only sterile material of *S. bauhinioides* has so far been collected in China; it clearly matches material of the same species from Vietnam.

71. Smilax planipes F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 255. 1978.

扁柄菝葜 bian bing ba qia

Vines climbing, unarmed. Stem branched, woody; branches striate. Petiole usually curved, 2–4 cm, laterally compressed, abaxially keeled, narrowly winged for 1/2–2/3 its length; abscission zone distal; tendrils well developed. Leaf blade suboblong, oblong-lanceolate, or ovate-lanceolate, 6.5–18 × 3–6.5 cm. Male inflorescence of 1 umbel, basally prophyllate; peduncle 2–3.5 cm, proximally articulate, with 2 lanceolate bracts; umbel 4–7-flowered, base scarcely thickened; bracteoles caducous. Male flowers: outer tepals 7–8 × ca. 2 mm, inner ones ca. 7 × 1 mm; stamens subequaling tepals; anthers oblong. Female flowers unknown. Berries globose, 1.2–1.5 cm in diam.; carpopodium usually curved. Fr. Dec–Jan.

• Forests; near sea level to 1300 m. S Guangxi, SE Yunnan.

72. Smilax gagnepainii T. Koyama, Bull. Natl. Sci. Mus., Tokyo, B, 3(4): 163. 1977.

四翅菝葜 si chi ba qia

Smilax tetraptera Gagnepain, Bull. Soc. Bot. France 81: 74. 1934, not Schlechter (1906).

Vines climbing. Stem branched, woody; branches 4-angled, sometimes sparsely prickly, angles narrowly winged. Petiole 1.5–4 cm, winged for ca. 2/3 its length; wings 1–3 mm wide; abscission zone distal; tendrils sometimes present. Leaf blade ovate-lanceolate or elliptic-lanceolate, 17–25 × 4–10 cm, thickly leathery, main veins 3(–5), base rounded or broadly cuneate. Inflorescence of 1 umbel, basally prophyllate; peduncle 1.5–4 cm, proximally articulate; umbel 5–20-flowered.

Open forests; ca. 700 m. SW Guangxi, SE Yunnan [Vietnam].

Only a few sterile specimens have been collected in China; one of them possesses immature fruit.

73. Smilax densibarbata F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 255. 1978.

密刺菝葜 mi ci ba qia

Vines climbing. Stem and branches densely prickly; prickles slightly curved, sometimes forked. Petiole 1–2 cm, minutely verruculose-prickly, winged for 1/4–1/2 its length; abscission zone near middle; tendrils usually present. Leaf blade elliptic to ovate-elliptic, 8–15 × 3–7 cm. Inflorescence of 1 umbel, basally prophyllate; peduncle 1.5–2.5 cm, proximally articulate; umbels of both sexes densely many flowered, base slightly thickened. Male flowers: tepals greenish, ca. 5 × 0.8–1.5 mm; stamens 5–6 mm. Female flowers: tepals slightly smaller than male ones; staminodes 6. Berries globose, 8–10 mm in diam. Fl. Jan–Feb, fr. Nov–Dec.

• Forests; 1000–1300 m. SE Yunnan.

74. Smilax setiramula F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 255. 1978.

密刚毛菝葜 mi gang mao ba qia

Vines climbing. Stem branched, woody; stem and branches densely prickly-bristly; bristles 5–6 mm. Petiole 1.5–2.5 cm, densely bristly, wingless; tendrils usually present. Leaf blade ovate, 10–14.5 × 6–11 cm, papery, abaxially ± bristly from base to middle, adaxially sometimes also sparsely bristly, main veins 3, base usually shallowly cordate, apex acuminate. Male inflorescence of 1 umbel, basally prophyllate; peduncle 2.5–3.5 cm, minutely bristly, proximally articulate; umbel many flowered. Male flowers (not fully at anthesis): tepals greenish, ca. 4 mm; anthers ca. 1.5 mm. Female flowers and fruit unknown. Fl. Nov–Dec.

• Forests, thickets; 1000–1700 m. SE Yunnan.

75. Smilax griffithii A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 198. 1878.

墨托菝葜 mo tuo ba qia

Smilax griffithii var. *pallescens* (A. de Candolle) T. Koyama; *S. pallescens* A. de Candolle.

Vines climbing, large. Stem and branches woody, smooth or somewhat scabrous, occasionally with sparse prickles. Petiole 2–5 cm, broadly winged for 1/3–2/5 its length; wings 4–13 mm wide; abscission zone distal; tendrils often developed. Leaf blade ovate-elliptic to ovate, 14–22 × 7–9.5 cm, leathery, main veins (5–)7. Inflorescence of 9–12 umbels, 7–9 cm, basally prophyllate; umbels of both sexes ± grouped in whorls of 2–4, 10–30-flowered, base thickened, ca. 3 mm in diam. Male flowers: tepals yellowish green, outer ones 4–4.5 × ca. 1 mm, inner ones ca. 4 × 0.6 mm; stamens subequaling tepals. Female flowers: tepals smaller than male ones. Fruit unknown.

Broad-leaved forests; 1700–1800 m. SE Xizang (Mêdog Xian) [India, Myanmar, Thailand].

Only a few sterile specimens have been collected. The description of the flowers follows Koyama (in Smitinand et al., Fl. Thailand 2: 226, 228. 1975).

76. Smilax ocreata A. de Candolle in A. de Candolle & C. de Candolle, Monogr. Phan. 1: 191. 1878.

抱茎菝葜 bao jing ba qia

Smilax perulata H. Léveillé & Vaniot.

Vines climbing. Stem and branches usually woody, sparsely prickly. Petiole 2–3.5 cm, broadly winged for 1/3–1/2 its length; wings 0.5–2 cm wide, basally deeply clasping node; abscission zone at middle or distal; tendrils commonly developed. Leaf blade ovate to elliptic, 9–20 × 4.5–15 cm, leathery. Inflorescence a raceme of 2–4(–7) umbels, 4–10 cm, basally prophyllate; umbels of both sexes not grouped, 10–30-flowered, base thickened, subglobose. Male flowers: tepals yellowish green, tinged pink, 5–6 × 0.5–1 mm; stamens 6–10 mm; filaments basally connate, forming a column ca. 2 mm. Female flowers: inner tepals very narrow; staminodes absent. Berries dark red, globose, ca. 8 mm in diam. Fl. Mar–Jun, fr. Jul–Oct.

Forests, thickets, shaded and damp slopes along valleys; near sea level to 2200 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, ?Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Vietnam].

77. Smilax perfoliata Loureiro, Fl. Cochinch. 2: 622. 1790.

穿鞘菝葜 chuan qiao ba qia

Smilax prolifera Wallich ex Roxburgh.

Vines climbing. Stem branched, to 8 m, woody; stem and branches smooth or sometimes sparsely prickly. Petiole 2–4 cm, broadly winged for 1/2–2/3 its length; wings 7–12(–25) mm wide, basally deeply clasping node, tapering toward apex; abscission zone distal; tendrils usually developed. Leaf blade usually ovate, 6–17 × 3–12 cm. Inflorescence of 10–30 umbels, 5–17 cm, basally prophyllate; rachis often slightly zigzagged; umbels of both sexes ± grouped in whorls of 2–4, densely many flowered, base ellipsoid, ca. 4 × 3 mm. Male flowers: outer tepals 5–6 × ca. 1 mm, inner ones ca. 5 × 0.3 mm; stamens ca. 5 mm. Female flowers: tepals slightly smaller than male ones; staminodes 3. Berries globose, 4–6 mm in diam., Fl. Apr, fr. Oct. 2*n* = 32.

Forests, thickets; near sea level to 1500 m. Hainan, Taiwan, S Yunnan [India, Laos, Myanmar, Thailand, Vietnam].

78. Smilax aspera Linnaeus, Sp. Pl. 2: 1028. 1753.

穗菝葜 sui ba qia

Smilax maculata Roxburgh.

Vines climbing. Stem and branches woody, ridged-angled, usually very sparsely prickly; prickles short, slightly compressed. Petiole often curved or twisted, 3–4 cm, sometimes sparsely prickly, wingless; abscission zone apical; tendrils rather long. Leaf blade cordate-deltoid to ovate-lanceolate, 6–15 × 5–9.5 cm. Inflorescence a spike of 5–25 umbels, 7–45 cm, basally prophyllate; umbels of both sexes sessile on elongate rachis, 3–6-flowered, base slightly thickened; bracteoles many, broadly ovate. Male flowers: tepals white, 4–5 × ca. 1 mm; stamens 2–2.5 mm. Female flowers: tepals slightly smaller than male ones; staminodes 6. Fl. Jan–Feb, fr. Nov–Dec. 2*n* = 32*.

Forests; 1000–2000 m. S Xizang, SW Yunnan [Bhutan, India, Myanmar, Nepal; E and N Africa, SW Asia, C and S Europe].

79. Smilax elegantissima Gagnepain, Bull. Soc. Bot. France 81: 619. 1934.

四棱菝葜 si leng ba qia

Smilax polycephala F. T. Wang & Tang.

Vines climbing, unarmed. Stem and branches woody; branches 4-angled, angles narrowly winged. Petiole 6–7 cm, laterally compressed, narrowly winged for ca. 1/3 its length; abscission zone apical; tendrils rather long. Leaf blade abaxially glaucous, elliptic to ovate-elliptic, 20–30 × 8–13 cm, leathery. Inflorescence a spike of 7–12 umbels, 11–28 cm, basally prophyllate; umbels sessile on elongate, slightly zigzagged rachis, 4–12-flowered, base thickened; bracteoles many, broadly ovate. Male flowers: tepals pale yellow, outer ones ca. 5 × 1.5–2 mm; stamens ca. 1/2 as long as tepals; filaments very short; anthers ca. 1.5 mm. Female flowers unknown. Berries globose, ca. 1 cm in diam. Fl. Aug.

Forests; ca. 1500 m. SE Yunnan [Vietnam].

12. HETEROSMILAX Kunth, Enum. Pl. 5: 270. 1850.

肖菝葜属 xiao ba qia shu

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama

Oligosmilax Seemann; *Pseudosmilax* Hayata.

Vines climbing, woody or somewhat herbaceous, dioecious. Stem and branches smooth, not prickly. Petiole narrowly winged basally or proximally, with a subapical abscission zone; tendrils usually present. Leaf blade usually ovate or oblong-lanceolate, main veins 5–9, outermost pair usually running along margins. Inflorescence borne in axil of leaf or scalelike bract, a solitary, many-flowered umbel; peduncle usually compressed, without a scalelike prophyll at base. Flowers small; tepals connate, forming a bottle-shaped tube with opening only at toothed apex. Male flowers: stamens 3, 6, or 9–12; filaments connate proximally or throughout, forming a column (synandrium); anthers free, introrse; connective usually projecting beyond locules. Female flowers: ovary 3-loculed; ovules 1 or 2; stigmas 3, usually recurved; staminodes 3–6. Fruit a berry, black, globose, 1–6-seeded. Seeds dark brown.

Twelve species: tropical and subtropical Asia; nine species (five endemic) in China.

1a. Male flowers with 9–13 stamens.
  2a. Stamens 1/4–1/3 as long as perianth.
    3a. Male perianth ovoid, narrowly ovoid, or suboblong, (5–)7–10 mm; filament column ca. 1 mm ..... 4. *H. polyandra*
    3b. Male perianth lanceolate-bottle-shaped, 11–20 mm; filament column 2–3.5 mm ..... 5. *H. longiflora*
  2b. Stamens 3/5–4/5 as long as perianth.

4a. Male umbel 5–9-flowered; filaments connate throughout, forming a column ..... 3. *H. yunnanensis*
4b. Male umbel 20–60-flowered; filaments connate only proximally, forming a column but leaving apices free.
5a. Male perianth 4–8 mm; peduncle 5–40 mm ..... 1. *H. septemnervia*
5b. Male perianth 2.5–3 mm; peduncle 32–55 mm ..... 2. *H. seisuiensis*
1b. Male flowers with (2 or)3(or 4) stamens.
6a. Stem, branches, and petiole pubescent, rarely glabrescent; male perianth oblong, teeth acute at apex ..... 6. *H. chinensis*
6b. Stem, branches, and petiole glabrous; male perianth subobovoid, teeth obtuse at apex.
7a. Male filaments connate only proximally, forming a column but leaving apices free ..... 7. *H. japonica*
7b. Male filaments connate throughout, forming a column.
8a. Male perianth 4–4.5 mm, apically 3-dentate; female perianth 3.7–4 mm ..... 8. *H. gaudichaudiana*
8b. Male perianth 3–3.5 mm, apically scarcely dentate and subtruncate; female perianth ca. 2.3 mm ..... 9. *H. micrandra*

1. Heterosmilax septemnervia F. T. Wang & Tang, Sinensia 5: 428. 1934.

短柱肖菝葜 duan zhu xiao ba qia

Vines climbing. Stem to more than 1 m, woody. Petiole 1.5–4 cm, narrowly winged for 1/7–1/3 its length; tendrils vestigial or well developed. Leaf blade ovate to orbicular, 6–22 (–25) × 4.5–15 cm. Peduncle (0.5–)1.5–4 cm. Umbels of both sexes 20–60-flowered, base thickened, 3–5 mm in diam.; pedicels 1.5–2.5 cm. Male flowers: perianth ellipsoid, 4–8 × 3–4 mm, teeth obtuse at apex; stamens 8–10; filaments 3–5 mm, connate for 1/3–1/2 their length, forming a column but leaving apices free; anthers ovate, ca. 1.2 mm. Female flowers: perianth ovoid-globose, 3–5 × 3–3.5 mm, teeth obtuse at apex; staminodes 3–6. Berries purple, subglobose, 5–10 × 6–8 mm. Fl. May–Jun, fr. Sep–Nov.

Densely forested slopes, hillsides along valleys or streams; 700–2400 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan [Vietnam].

2. Heterosmilax seisuiensis (Hayata) F. T. Wang & Tang, Sinensia 5: 427. 1934.

台湾肖菝葜 tai wan xiao ba qia

Pseudosmilax seisuiensis Hayata, Icon. Pl. Formos. 9: 125. 1920; *Heterosmilax hogoensis* (Hayata) T. Koyama; *P. hogoensis* Hayata.

Vines climbing. Stem branched, to 3 m, woody. Petiole 1.5–3 cm, narrowly winged for 1/4–1/5 its length; tendrils well developed. Leaf blade usually becoming yellowish brown when dried, ovate or cordate-ovate, 7–20(–25) × 3.5–15(–18) cm. Male inflorescence: peduncle (4–)5–6 cm, slightly compressed; umbel 50–60-flowered, base thickened, globose, 1.5–3 mm in diam.; pedicels 1–2 cm. Male flowers: perianth oblong or obovoid, 2.5–3 × 1.5–2 mm, teeth obtuse at apex; stamens 9; filaments 2–2.5 mm, connate proximally, forming a column 1–1.5 mm but leaving apices free; anthers lanceolate-ovate, 0.8–1 mm. Female flowers unknown. Berries suboblate-globose, 5–8 × 6–9 mm. Fl. Apr–May, fr. Oct.

• About 1300 m. Taiwan.

3. Heterosmilax yunnanensis Gagnepain, Bull. Soc. Bot. France 81: 70. 1934.

云南肖菝葜 yun nan xiao ba qia

Vines climbing. Stem slender, woody. Petiole 0.8–2 cm, narrowly winged for ca. 1/3 its length; tendrils well developed. Leaf blade ovate or broadly so, 2.5–5.5 × (1–)1.5–3.8 cm. Male inflorescence: peduncle 5–10 mm, slightly compressed; umbel 5–9-flowered, base slightly thickened, 1–1.5 mm in diam.; pedicels very slender, 1–1.2 cm. Male flowers: perianth narrowly ellipsoid to narrowly obovoid, 6.5–9 × 2.5–3.5 mm, tapering toward base, apically contracted to orifice; stamens 6(or 9); filaments connate throughout, forming a fusiform-cylindric column 5.5–6 mm, apically 1.5–1.8 mm thick; anthers ovate-deltoid, 1–1.5 mm. Female flowers and fruit unknown.

• W Yunnan (Binchuan Xian).

4. Heterosmilax polyandra Gagnepain, Bull. Soc. Bot. France 81: 70. 1934.

多蕊肖菝葜 duo rui xiao ba qia

Vines climbing. Stem branched, woody. Petiole 0.5–2 cm, narrowly winged for 1/4–1/3 its length; tendrils well developed. Leaf blade lanceolate-elliptic to lanceolate-ovate, 5–13 × 1.5–7 cm. Peduncle 2–10 cm. Umbels of both sexes 10–30-flowered, base 1.5–2 mm in diam.; pedicels 1–2 cm. Male flowers: perianth suboblong or subovoid, 3–7(–10) × 2–4 mm; stamens 9–12, 1–2.5 mm; filaments connate throughout, forming a short column ca. 1 mm; anthers elliptic, ca. 1 mm. Female flowers: perianth broadly ellipsoid, 2.8–3 × 2–2.5 mm; ovary ca. 2.5 mm; staminodes 3–6, filiform. Berries suboblate-globose, ca. 9 mm in diam. Fl. and fr. Nov.

Dense forests; 100–1800 m. S Yunnan [India, Laos, Thailand].

5. Heterosmilax longiflora K. Y. Guan & Noltie, Edinburgh J. Bot. 50: 59. 1993.

长花肖菝葜 chang hua xiao ba qia

Vines climbing. Stem branched, terete, woody, rigid. Petiole 1–1.5 cm, narrowly winged near base; tendrils well developed. Leaf blade lanceolate to ovate, 9–12 × 2.5–7.5 cm, herbaceous, thin, adaxially slightly shiny, main veins 7, base cordate to rounded, margin weakly undulate, apex acuminate or acute. Male inflorescence: peduncle 3.5–6.5 cm, compressed; umbel 15–30-flowered, base thickened, globose, 2–3.5 mm in diam.; pedicels 1–1.8 cm. Male flowers: perianth lanceolate-bottle-shaped, 1.1–2 cm × 1.5–4 mm, teeth 0.3–0.5 mm; stamens 12; filaments connate, forming a column 2–3.5 mm; anthers ovate, 1–1.5 mm. Female flowers and fruit unknown.

• Forested hills. S Yunnan (Xishuangbanna Dai Zu Zizhizhou).

No specimens of this species have been seen by the present authors.

6. Heterosmilax chinensis F. T. Wang, Bull. Fan Mem. Inst. Biol. 5: 121. 1934.

华肖菝葜 hua xiao ba qia

Vines climbing. Stem and branches pubescent, rarely eventually glabrescent. Petiole 0.5–2.5 cm, pubescent, narrowly winged for ca. 1/3 its length; tendrils well developed. Leaf blade oblong to lanceolate-ovate, 3.5–16 × 1–6 cm. Inflorescence borne in axil of leaf or scalelike bract; peduncle 0.5–3 cm, puberulent; umbels of both sexes 10–30-flowered, base 2–3 mm in diam.; pedicels 3–10 mm. Male flowers: perianth oblong-ellipsoid, 5–6 × 1.5–2 mm, tapering to both ends, teeth ca. 1 mm; stamens 3; filaments ca. 2 mm, connate for ca. 1/2 their length; anthers ca. 1 mm. Female flowers: perianth red-brown, ovoid, 2.5–3.8 × ca. 2 mm, narrowed to orifice; stigmas reaching base of perianth teeth; staminodes 3, filiform, ca. 1 mm. Berries subglobose, 7–10 mm in diam. Fl. May–Jun, fr. Sep–Dec.

• Dense forests, thickets along valleys; 300–2100 m. Guangdong, Guangxi, Sichuan, Yunnan.

7. Heterosmilax japonica Kunth, Enum. Pl. 5: 270. 1850.

肖菝葜 xiao ba qia

Heterosmilax arisanensis Hayata; *H. indica* A. de Candolle; *H. raishaensis* Hayata; *H. tsaii* F. T. Wang & Tang; *Smilax bockii* Warburg; *S. planipedunculata* Hayata; *S. stemonifolia* H. Léveillé & Vaniot.

Vines climbing. Stem woody. Petiole 1–3 cm, narrowly winged for 1/4–1/3 its length; tendrils well developed. Leaf blade ovate-lanceolate to subcordate, (3–)6–22 × 2.5–12 cm. Inflorescence borne in axil of leaf or scalelike bract; peduncle 1–3 cm; umbels of both sexes 20–50-flowered, base 2–4 mm in diam.; pedicels 2–7(–11) mm. Male flowers: perianth oblong or narrowly obovoid, 3.5–4.5(–6) × 2–3 mm; stamens (2 or)3(or 4); filaments connate for 1/3–2/5 length, forming a column; anthers oblong, 0.5–1 mm. Female flowers: perianth subglobose or ovoid-globose, 2.5–3 × 1.5–2 mm; stigmas erect; staminodes 3(–6). Berries black, 6–10 mm in diam. Fl. Jun–Aug, fr. Jul–Nov.

Densely forested slopes, mixed forests on hillsides, thickets; 500–1800 m. Anhui, Fujian, Gansu, Guangdong, Hunan, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, NE India, Japan].

8. Heterosmilax gaudichaudiana (Kunth) Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 17: 176. 1872.

合丝肖菝葜 he si xiao ba qia

Smilax gaudichaudiana Kunth, Enum. Pl. 5: 252. 1850; *Heterosmilax gaudichaudiana* var. *hongkongensis* (Seemann) A. de Candolle; *H. gaudichaudiana* var. *latifolia* Bodinier ex H. Léveillé; *H. japonica* Kunth var. *gaudichaudiana* (Kunth) F. T. Wang & Tang; *Oligosmilax gaudichaudiana* (Kunth) Seemann; *S. erythrantha* Baillon ex Gagnepain; *S. hongkongensis* Seemann; *S. mcclurei* T. Koyama.

Vines climbing. Stems woody. Petiole 1–3(–5) cm, narrowly winged for 1/5–1/3 its length; tendrils well developed. Leaf blade ovate to subcordate-orbicular, 4–14 × 2–13 cm. Peduncle 1–3.5(–9) cm, compressed. Umbels of both sexes 5–50-flowered, base globose, 2–3 mm in diam.; pedicels 0.5–1.5 cm. Male flowers: perianth red-purple, ovoid-ellipsoid or narrowly ovoid, 4–4.5 × 2–3 mm, teeth deltoid; stamens 3, 3–4 mm; filaments connate throughout, forming a column; anthers ovate, 0.5–0.7 mm. Female flowers: perianth ovoid-ellipsoid, ca. 3.8 × 2.3 mm; stigmas ca. 3 mm; staminodes 5 or 6. Berries purplish black, globose, 0.8–1.2 cm in diam. Fl. May–Jun, fr. Jul–Dec.

Dense forests, sparsely forested slopes, hillsides, shrubby slopes along valleys; 600–1000 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan [Vietnam].

9. Heterosmilax micrandra T. Koyama, Brittonia 36: 201. 1984.

小花肖菝葜 xiao hua xiao ba qia

Vines climbing. Stems woody. Petiole 1–4 cm, narrowly and shortly winged basally; tendrils well developed. Leaf blade ovate, lanceolate-ovate, or orbicular-ovate, 4–15 × 1.5–12 cm. Peduncle 1–3.5 cm, compressed. Umbels of both sexes 6–15-flowered, base thickened, 2–4 mm in diam.; pedicels 6–12 mm. Male flowers: perianth orange-red, suboblong or oblong-ovoid, 3–3.5 × ca. 1.6 mm, scarcely toothed apically; stamens 3; filaments connate throughout, forming a column ca. 3 mm; anthers ovate-orbicular, ca. 0.5 mm. Female flowers: perianth pale green, ovoid-globose, ca. 2.3 × 2.1 mm; stigmas erect. Berries blackish, depressed globose, 0.8–1.5 cm in diam.

• Dense forests; 400–500 m. S Hainan.

13. GAGEA Salisbury, Ann. Bot. (König & Sims) 2: 555. 1806.

顶冰花属 ding bing hua shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Szechenyia Kanitz.

Herbs perennial, small, bulbiferous. Bulbs ovoid to globose, covered with a tunic, distally sometimes with a collar of persistent leaf bases, basally sometimes with bulbels. Stem usually simple. Leaves basal or also cauline, linear or filiform. Inflorescence usually umbellate, corymbose, or racemose, less often reduced to a solitary flower, basally usually subtended by a bract; bracteole 1. Flowers bisexual. Tepals 6, free, in 2 whorls, yellow or yellow-green, very rarely white or other color, persistent, ± indurescent and accrescent in fruit. Stamens 6, equal or 3 longer; filaments filiform or proximally widened and flat; anthers basifixed. Ovary 3-loculed; ovules many per locule. Style usually rather long; stigma capitate or 3-lobed. Fruit a capsule, 3-angled, loculicidal, surrounded by enlarged,

persistent tepals. Seeds many, globose to flat.

About 90 species: temperate regions of N Africa, Asia and Europe, mainly in C Asia and the Mediterranean region; 17 species (one endemic) in China.

1a. Leaves 1 or 2 basal only; leafy bract (floral leaf) subtending inflorescence 1, sometimes with extra, much smaller bracts; seeds globose or ovoid-globose, rarely flat.
2a. Leaves semiterete, fistulose ..... 4. *G. fragifera*
2b. Leaves flat, not fistulose.
3a. Bulb without bulbel at base.
4a. Leaves filiform, less than 1 mm wide; seeds flat ..... 5. *G. divaricata*
4b. Leaves linear or narrowly so, 2–10 mm wide; seeds globose.
5a. Leaves not falcate, 3–10 mm wide, not keeled abaxially ..... 6. *G. nakaiana*
5b. Leaves falcate, 2–3 mm wide, keeled abaxially ..... 7. *G. fedtschenkoana*
3b. Bulb usually with 1 to many bulbels within or around tunic base.
6a. Bulbel 1, lateral, within tunic ..... 3. *G. filiformis*
6b. Bulbels many, within or around tunic.
7a. Bulbels arranged in a ring, surrounding tunic base; style nearly as long as ovary ..... 1. *G. granulosa*
7b. Bulbels crowded, sublateral, within tunic; style much longer than ovary ..... 2. *G. terraccianoana*
1b. Leaves 1 or 2 basal and 2–5 cauline; seeds flat, rarely polyhedral.
8a. Seeds polyhedral.
9a. Tepals yellow adaxially, yellowish green abaxially ..... 16. *G. tenera*
9b. Tepals yellowish white or whitish adaxially, pale yellow-green abaxially ..... 17. *G. ova*
8b. Seeds flat.
10a. Stigma deeply 3-lobed, lobes more than 1 mm ..... 8. *G. pauciflora*
10b. Stigma capitate or slightly 3-lobed, lobes very short, less than 1 mm.
11a. Bulblets present in axils of cauline leaves, globose.
12a. Bulb with a collar of persistent leaf bases distally ..... 9. *G. jaeschkei*
12b. Bulb without a collar of persistent leaf bases distally.
13a. Leaves filiform, less than 1 mm wide; bulblets in axils of all cauline leaves ..... 10. *G. bulbifera*
13b. Leaves narrowly linear, 1–2 mm wide; bulblets only in axils of proximal cauline leaves ..... 11. *G. stepposa*
11b. Bulblets not present in axils of cauline leaves.
14a. Tepals 1.4–1.8 cm; basal leaves not overtopping inflorescence ..... 15. *G. neopopovii*
14b. Tepals 0.8–1.2 cm; basal leaves overtopping inflorescence.
15a. Basal leaves nearly 2 × as long as stem ..... 13. *G. altaica*
15b. Basal leaves slightly longer than stem.
16a. Basal leaves 1 or 2; bulbs without bulbels at base; plants 3–6 cm tall ..... 14. *G. olgae*
16b. Basal leaf always 1; bulbs with several to many bulbels at base; plants 5–15(–30) cm tall ..... 12. *G. albertii*

1. Gagea granulosa Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 27(2): 112. 1854.

粒鳞顶冰花 li lin ding bing hua

Plants to 20 cm tall. Bulb ovoid, 4–7 mm in diam.; tunic brown, submembranous; bulbels numerous, arranged in a ring around tunic base. Leaves basal only, usually 1, narrowly linear, 20–24 cm × 2–5 mm, conspicuously parallel veined. Inflorescence usually 2–4-flowered, umbellate. Floral leaf lanceolate, slightly longer than inflorescence, 4–8 mm wide. Pedicel glabrous or sparsely pubescent. Tepals yellow adaxially, yellowish abaxially, narrowly elliptic-linear or linear-lanceolate, 9–11 × 1.5–2 mm. Stamens 4–6 mm. Style nearly as long as ovary; stigma capitate, scarcely lobed. Seeds globose. Fl. Jun.

Coniferous forests, thickets, moist grasslands; 1300–2000 m. N and W Xinjiang [Kazakstan, Mongolia, Russia; Europe].

2. Gagea terraccianoana Pascher, Repert. Spec. Nov. Regni Veg. 2: 58. 1906.

小顶冰花 xiao ding bing hua

Gagea japonica Pascher; *G. nipponensis* Makino; *G. vaginata* Pascher (1906), not Popov ex Goloskokov (1955).

Plants 4–15 cm tall. Bulb ovoid or ovoid-globose, 4–7 mm in diam.; tunic brown-yellow or black-brown; bulbels 1 to numerous, crowded within tunic, narrowly ovoid. Leaves basal only, 1, narrowly linear, 5–18 cm × 1–3 mm. Inflorescence usually 2–5-flowered, umbellate. Floral leaf lanceolate to linear-lanceolate, shorter than or equaling inflorescence, 2–5 mm wide, sometimes laxly hairy on basal margin or pilose. Pedicels unequal, pilose or glabrous. Tepals yellow adaxially, yellowish green abaxially, sometimes slightly tinged with dull purple-red, linear, linear-lanceolate, or narrowly ovate, 6–11 × 1–2 mm, sometimes pilose abaxially and proximally, with a sacciform projection at base. Stamens 3–8 mm; filaments flat at base. Style 1.5–4 × as long as ovary. Capsule obovoid or subglobose, 1/4–1/2 as long as persistent tepals. Seeds globose. Fl. and fr. Mar–May.

Forest margins, thickets, mountain grasslands; near sea level to 2300 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Qinghai, Shaanxi, Shanxi [Korea, Mongolia, Russia].

Records of *Gagea hiensis* Pascher from China (e.g., in FRPS) are referable to *G. terraccianoana*.

3. Gagea filiformis (Ledebour) Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 751 [“851”]. 1841.

林生顶冰花 lin sheng ding bing hua

Ornithogalum filiforme Ledebour, Fl. Altaic. 2: 30. 1830; *Gagea minuta* Grossheim; *G. nigra* L. Z. Shue; *G. pseudorubescens* Pascher; *G. sacculifera* Regel.

Plants 5–10 cm tall. Bulb ovoid-globose, 4–9 mm in diam.; tunic bright brown or chestnut brown, submembranous; bulbel 1, within tunic, small. Leaves basal only, 1, narrowly linear, 5–13 cm × 2–4(–8) mm. Inflorescence (1–)3–7(or more)-flowered, umbellate or corymbose. Floral leaf linear-lanceolate, equaling or slightly longer than inflorescence, 3–8 mm wide, glabrous or pilose; bracteoles pubescent. Tepals yellowish adaxially, yellow-green abaxially, ca. 8 mm, sometimes slightly saccate at base. Pedicel glabrous or pilose. Stamens 4.5–6 mm; filaments ca. 4 mm. Style slightly longer than ovary; stigma capitate, scarcely lobed. Capsule obovoid, 3-angled, 1/5–2/5 as long as enlarged, persistent tepals. Seeds red-brown, ovoid-globose, ca. 1.5 × 1 mm. Fl. and fr. Apr–May.

Forests, thickets, meadows, grasslands, dry slopes, plains, deserts; near sea level to 2300 m. N and W Xinjiang [Afghanistan, Kazakstan, Mongolia, Pakistan, Russia].

4. Gagea fragifera (Villars) E. Bayer & G. López, Taxon 38: 643. 1989.

钝瓣顶冰花 dun ban ding bing hua

Ornithogalum fragiferum Villars, Hist. Pl. Dauph. 2. 270. 1787; *Gagea emarginata* Karelin & Kirilov.

Plants 8–15 cm tall. Bulb ovoid-globose, 5–8 mm in diam.; tunic brown-yellow, papery; bulbels absent. Leaves basal only, 1 or 2, semiterete, fistulose, 7–20 cm × 3–4 mm. Inflorescence usually 3–5-flowered, umbellate. Floral leaf broadly lanceolate, slightly shorter than or equaling inflorescence, 6–10 mm wide. Pedicels unequal, pilose. Tepals yellow adaxially, yellow-green abaxially, narrowly oblong. 1–2 cm × 3–4 mm, apex obtuse or emarginate. Stamens 5–10 mm. Style nearly as long as ovary. Capsule obovoid, trigonous, ca. 1/2 as long as enlarged, persistent tepals. Seeds globose. Fl. and fr. Apr–May.

Meadows, moist places on forest margins, river flats; 1600–2300 m. W Xinjiang [Kazakstan, Mongolia, Russia (Siberia)].

The name *Gagea fistulosa* Ker Gawler, based on *Ornithogalum fistulosum* Ramond ex de Candolle, has been used for this species. However, both names are nomenclaturally superfluous and therefore illegitimate because when originally published they included in synonymy the earlier name *O. bohemicum* Zauschner (currently *G. bohemica* (Zauschner) Schultes & J. H. Schultes).

5. Gagea divaricata Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 510. 1880.

叉梗顶冰花 cha geng ding bing hua

Plants ca. 5 cm tall. Bulb ovoid, 6–9 mm in diam.; tunic pale brown or yellowish brown, scarious, breaking up into fibers; bulbels absent. Leaves basal only, 1, filiform or very narrowly linear, 5–8 cm × ca. 1 mm, glabrous. Inflorescence (1 or) 2–5-flowered. Floral leaf linear-lanceolate, longer than inflorescence, 1–1.5 mm wide, base sheathed, pilose, margin ciliate. Tepals yellow, with green band along midvein abaxially, linear or broadly lanceolate, 8–10 × 1.5–2 mm, apex mucronate. Pedicel glabrous, 18–28 mm, recurved in young fruit, erect at maturity. Stamens 4–5 mm. Style slightly longer than ovary; stigma capitate, scarcely lobed. Seeds flat. Fl. Apr.

Deserts, sandy places; near sea level to 1000 m. W Xinjiang [Kazakstan, Uzbekistan].

6. Gagea nakaiana Kitagawa, Lin. Fl. Manshur. 136. 1939.

顶冰花 ding bing hua

Gagea coreana Nakai, Bot. Mag. (Tokyo) 46: 603. 1932, not H. Léveillé (1910); *G. coreanica* Koidzumi; *G. lutea* (Linnaeus) Ker Gawler var. *nakaiana* (Kitagawa) Q. S. Sun.

Plants 15–20 cm tall. Bulb ovoid-globose, 5–10 mm in diam.; tunic brown-yellow; bulbels absent. Leaves basal only, 1, narrowly linear, 1.5–22 cm × 3–10 mm, gradually tapering from middle to base, glabrous. Inflorescence 3–5-flowered, umbellate. Floral leaf lanceolate, nearly as long as inflorescence, 4–6 mm wide. Pedicels unequal, glabrous. Tepals yellow, linear or narrowly lanceolate, 9–12 × ca. 2 mm. Stamens 6–8 mm; filaments flat basally. Style 1.5–2 × as long as ovary; stigma inconspicuously 3-lobed. Capsule ovoid to obovoid, ca. 2/3 as long as enlarged, persistent tepals. Seeds globose. Fl. and fr. Mar–Apr. $2n = 48$.

Forests, thickets, grasslands. Heilongjiang, Jilin, Liaoning [India, Japan, Korea, Nepal, Pakistan, Russia, Sikkim].

Records of *Gagea lutea* (Linnaeus) Ker Gawler from China (e.g., in FRPS) are referable to *G. nakaiana*.

7. Gagea fedtschenkoana Pascher, Repert. Spec. Nov. Regni Veg. 1: 190. 1905.

镰叶顶冰花 lian ye ding bing hua

Plants dark green, 4–10 cm tall. Bulb usually ovoid, 6–10 mm in diam.; tunic brown-yellow, subleathery; bulbels absent or occasionally 1 or 2. Leaves basal only, 1, narrowly linear, falcate, 7–16 cm × 2–3 mm, keeled abaxially. Inflorescence 2–5-flowered, umbellate or corymbose. Floral leaf narrowly lanceolate, usually longer than inflorescence, 2–4 mm wide, margin ciliate near base. Pedicels unequal, glabrous or pilose. Tepals pale yellow adaxially, tinged with green or dull purple abaxially, linear or narrowly oblong, 8–12 × ca. 2 mm. Stamens, 6–8 mm. Style ca. 2 × as long as ovary. Capsule obovoid, trigonous, ca. 1/2 as long as enlarged, persistent tepals. Seeds globose. Fl. and fr. Apr–May.

Meadows, forest margins, thickets, steppes; near sea level to 2500 m. N Xinjiang [Kazakstan, Mongolia, Russia].

8. Gagea pauciflora (Turczaninow ex Trautvetter) Ledebour, Fl. Ross. 4: 143. 1852.

少花顶冰花 shao hua ding bing hua

Plecostigma pauciflorum Turczaninow ex Trautvetter, Pl.

Imag. Descr. Fl. Russ. 8. 1844; *Gagea lloydioides* (Kanitz) Pascher; *G. provisa* Pascher; *Lloydia szechenyiana* Engler; *Szechenyia lloydioides* Kanitz.

Plants 8–28 cm tall. Bulb narrowly ovoid; tunic brownish, distally with a short collar of persistent leaf bases. Stem ± puberulent. Leaves basal and cauline; basal leaf 1, 10–25 cm × 1–1.5 mm, laxly puberulent on margin and veins; cauline leaves usually 1–3, basal one 6–7 cm. Inflorescence 1–3-flowered, racemose. Tepals green-yellow, linear, 0.9–2(–2.5) cm × 3–5 mm. Stamens 5–10 mm. Style 2.5–3.5 mm, nearly as long as ovary; stigma deeply 3-lobed; lobes usually more than 1 mm. Capsule subobovoid, 7–16 × 6–10 mm, 1/2–3/5 as long as enlarged, persistent tepals. Seeds flat. Fl. Apr–Jun, fr. Jun–Jul.

Grassy slopes, wastelands, dunes; 400–4100 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Qinghai, Shaanxi, Xizang [Mongolia, Russia].

9. Gagea jaeschkei Pascher, Sitzungsber. Deutsch. Naturwiss.-Med. Vereins Böhmen “Lotos” Prag, 52: 128. 1904.

高山顶冰花 gao shan ding bing hua

Gagea pamirica Grossheim.

Plants 3–5 cm tall. Bulb narrowly ovoid, 4–6 mm in diam.; tunic yellow-brown, distally with a collar of persistent leaf bases, partly surrounded by roots; bulbels very inconspicuous or absent. Stem pubescent. Leaves basal and cauline; basal leaf 1, narrowly linear, 5–7 cm × 1.5–2 mm, keeled abaxially; cauline leaves 5 or 6, ± with bulblets in axils. Inflorescence 1-flowered. Pedicel pubescent. Tepals yellow adaxially, dull purple abaxially, ovate-lanceolate or narrowly elliptic, 8–10 × 2–3 mm. Stamens 6–8 mm; filaments basally flat, nearly as long as anthers. Style equaling ovary; stigma slightly 3-lobed. Seeds flat. Fl. Jun.

Alpine steppes, moist places; 4100–4600 m. SW Xinjiang (Taxkorgan Tajik Zizhixian) [Afghanistan, Kazakstan, Pakistan; SW Asia].

10. Gagea bulbifera (Pallas) Salisbury, Ann. Bot. (König & Sims) 2: 557. 1806.

腋球顶冰花 ye qiu ding bing hua

Ornithogalum bulbiferum Pallas, Reise Russ. Reich. 2: 736. 1773.

Plants 4–6 cm tall. Bulb ovoid, 3–6 mm in diam.; tunic brown, surrounded by numerous roots. Stem gray-white pubescent or glabrescent in fruit. Leaves basal and cauline; basal leaves usually 2, filiform, 3–7 cm × 0.5–0.8 mm; cauline leaves (2 or)3–5. Inflorescence (1 or)2–4-flowered, racemose. Tepals yellow adaxially, green abaxially, narrowly oblong or linear-spatulate, 6–9 × 1.5–2 mm. Stamens 4–7 mm. Style ca. 2 × as long as ovary. Capsule oblong, 3-angled, 4–6 × 2–3 mm. Seeds flat. Fl. and fr. Apr. $2n = 24$.

Steppes on hillsides, dry grassy slopes; 600–1200 m. Xinjiang (Tian Shan) [India, Kazakstan, Russia].

11. Gagea stepposa L. Z. Shue in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 282. 1980.

草原顶冰花 cao yuan ding bing hua

Plants 4–6 cm tall. Bulb ovoid, 3–5 mm in diam.; tunic brown, papery, not surrounded by roots; bulbels occasionally present. Stem gray-white pubescent. Leaves basal and cauline; basal leaves 2, usually narrowly linear, 3–8 cm × 1–2 mm, keeled abaxially; cauline leaves 3–5, narrowly linear-lanceolate, proximal 1 or 2 each with a globose bulblet in axil. Inflorescence 1- or 2-flowered. Tepals orange-yellow adaxially, dark purple abaxially, narrowly elliptic, 8–12 × 3–4 mm. Stamens 6–9 mm; filaments 5–7 mm; anthers oblong, 1/4–1/3 as long as filaments. Style equaling or slightly longer than ovary; stigma capitate. Seeds flat. Fl. and fr. Apr–May.

• Dry slopes; 1100–2300 m. N Xinjiang.

12. Gagea albertii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 512. 1880.

毛梗顶冰花 mao geng ding bing hua

Plants 5–15 cm tall. Bulb ovoid, 4–7 mm in diam.; tunic brownish yellow or pale gray, papery, distally with a collar of persistent leaf bases 1–5 cm, not surrounded by numerous roots; bulbels 1 to several, within tunic. Stem gray-white pubescent proximally. Leaves basal and cauline; basal leaf 1, filiform or narrowly linear, 8–20 cm × 1–1.5(–2) mm, margin involute; cauline leaves 1–3. Inflorescence (1 or)2- or 3(–5)-flowered, subcorymbose or racemose. Pedicel pubescent. Tepals pale yellow adaxially, greenish yellow abaxially, narrowly elliptic or narowly oblong, 0.9–1.5 cm × 2–4 mm. Stamens 6–10 mm; filaments much longer than anthers; anthers ca. 2 mm. Style slightly longer than ovary; stigma slightly 3-lobed. Capsule oblong, 3-angled, ca. 2/3 as long as persistent tepals. Seeds flat. Fl. and fr. Apr–May.

Deserts on hillsides, steppes; 400–1100 m. N Xinjiang [Kazakstan].

13. Gagea altaica Schischkin & Sumnevitcz, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 8: 1. 1929 [“1928”].

阿尔泰顶冰花 a er tai ding bing hua

Plants 5–12 cm tall. Bulb ovoid, 4–6 mm in diam.; tunic grayish brown, distally with a collar of persistent leaf bases 1–2 cm. Stem glabrous or shortly hairy. Leaves basal and cauline; basal leaf 1, narrowly linear or subfiliform, equaling or much longer than stem; cauline leaves 1–3. Inflorescence 1- or 2-flowered, very rarely more flowers in a corymbose raceme. Tepals golden yellow adaxially, greenish brown abaxially, oblong or oblong-ovate, 1–1.2 cm × 2.5–4.5 mm. Stamens 7–9 mm; filaments much longer than subglobose anthers. Seeds flat. Fl. Apr.

Desert steppes, dry slopes. N Xinjiang [Kazakstan, Russia].

14. Gagea olgae Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 292. 1875.

乌恰顶冰花 wu qia ding bing hua

Plants 3–6 cm tall. Bulb ovoid, 4–5 mm in diam.; tunic brown, reticulate veined, distally with a collar of persistent leaf bases 1–1.5 cm; bulbels absent. Stem grayish white pubescent, particularly proximally. Leaves basal and cauline; basal leaves 1 or 2, filiform-linear, 4–8 cm × 0.6–1 mm, keeled abaxially,

margin involute; cauline leaves 2 or 3, margin ciliate. Inflorescence 1- or 2-flowered. Tepals yellow adaxially, dark purple abaxially, linear or narrowly oblong, 8–10 × ca. 2 mm. Stamens 6–7.5 mm; filaments ca. 2 × as long as oblong anthers. Style slightly longer than ovary; stigma capitate, scarcely 3-lobed. Seeds flat. Fl. May.

Alpine steppes, hillsides along ravines. ?SW Xinjiang (Wuqia Xian) [Afghanistan, India, Kazakstan, Pakistan, Uzbekistan].

The presence of this species in China requires confirmation.

15. Gagea neopopovii Goloskokov, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Kazahsk. SSR 9: 8. 1975.

新疆顶冰花 xin jiang ding bing hua

Gagea vaginata Popov ex Goloskokov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 87. 1955, not Pascher (1906); *G. subalpina* L. Z. Shue.

Plants 8–12 cm tall. Bulb narrowly ovoid, 5–7 mm in diam.; tunic membranous, brownish, distally with a collar of persistent leaf bases; bulbels absent. Leaves basal and cauline; basal leaf 1, narrowly linear, 10–12 cm × 1–2 mm, distally slightly falcate; cauline leaves 3 or 4, margin ciliate. Inflorescence 1(or 2)-flowered. Pedicel glabrous. Tepals yellow adaxially, dark purple-red abaxially, narrowly oblong or linear, 1.4–1.8 cm × 3–5 mm. Stamens 0.9–1.2 cm. Style ca. 2 × as long as ovary; stigma slightly 3-lobed. Seeds flat. Fl. Apr.

Alpine steppes, meadows. Xinjiang (Tian Shan) [Kazakstan].

16. Gagea tenera Pascher, Sitzungsber. Deutsch. Naturwiss.-Med. Vereins Böhmen “Lotos” Prag 52: 128. 1904.

细弱顶冰花 xi ruo ding bing hua

Plants 6–15 cm tall. Bulb ovoid-globose or globose, 5–8 mm in diam.; tunic dark brown, subleathery; bulbels several, within tunic, narrowly ovoid. Leaves basal and cauline; basal leaf 1, filiform, 9–15 cm × 1.5–2.5 mm; cauline leaves 2 or 3, proximal 2 narrowly lanceolate, 2–4 cm × 3–4 mm, basally slightly amplexicaul. Inflorescence 2- or 3(–5)-flowered, corymbose. Pedicel glabrous. Tepals yellow adaxially, yellowish green abaxially, narrowly oblong or narrowly elliptic-linear, 8–12 × 2.5–3 mm. Stamens 6–9 mm. Style slightly longer than ovary; stigma slightly 3-lobed. Seeds polyhedral. Fl. Apr. $2n = 36$.

Steppes on hillsides. ?Xinjiang (Tian Shan) [Kazakstan, Russia].

The presence of this species in China requires confirmation.

17. Gagea ova Stapf, Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 50(2): 16. 1885.

多球顶冰花 duo qiu ding bing hua

Plants 5–10(–15) cm tall. Bulb ovoid, 4–7 mm in diam.; tunic black-brown, leathery; bulbels many, crowded within tunic. Leaves basal and cauline; basal leaf 1, filiform, semiterete, 7–15 cm × 0.5–0.8 mm; cauline leaves 2 or 3, usually with a floral shoot in axil. Inflorescence 2–6-flowered, resembling a dichasium. Pedicel glabrous or slightly pilose. Tepals white or yellowish white adaxially, pale yellow-green abaxially, narrowly oblong, 5–9 × 1.5–2 mm. Stamens 4–7 mm; filaments much longer than elliptic anthers. Style ca. 2 × as long as ovary; stigma capitate, scarcely lobed. Capsule obvoid, ca. 1/2 as long as persistent tepals. Seeds polyhedral. Fl. and fr. Apr–May. $2n = 48$.

Desert steppes, plains, dry slopes; near sea level to 1200–2000 (–?4600) m. Xinjiang [Afghanistan, Kazakstan, Tajikistan; SW Asia].

14. LLOYDIA Reichenbach, Fl. Germ. Excurs. 102. 1830, nom. cons.

洼瓣花属 wa ban hua shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Giraldiella Dammer (1905), not Müller (Halle) (1898); *Huolirion* F. T. Wang & Tang.

Herbs perennial, small, bulbiferous. Bulbs usually ovoid, covered with a tunic; tunic generally with a collar of persistent leaf bases, apex splitting longitudinally. Stem simple. Leaves usually filiform; basal leaves 1 to several, rather long. Inflorescence terminal, 1–4-flowered. Flowers bisexual. Tepals 6, free, white or yellow, sometimes mottled with purple, usually with a nectary, hairs, or lamellae near base adaxially. Stamens 6, inserted at base of tepals; filaments erect, sometimes hairy; anthers basifixed. Ovary 3-loculed; ovules numerous per locule. Style rather long; stigma scarcely or slightly 3-lobed. Fruit a capsule, distally loculicidal. Seeds numerous, deltoid to narrowly ovate-linear, sometimes winged at 1 end.

About 20 species: temperate regions of the N hemisphere; eight species (two endemic) in China.

1a. Basal leaves 1 or 2; filaments glabrous.
  2a. Style 2.5–4 × as long as ovary; stigma shortly 3-lobed ..... 4. *L. yunnanensis*
  2b. Style nearly as long as to slightly longer than ovary; stigma indistinctly 3-lobed.
    3a. Tepals white, greenish veined; seeds globose ..... 1. *L. triflora*
    3b. Tepals white, violet veined, base mottled with purple; seeds subdeltoid or crescent-shaped-deltoid, flat ..... 2. *L. serotina*
1b. Basal leaves 3–8; filaments hairy (sometimes glabrous in *L. oxycarpa*).
  4a. Tepals 0.9–1.3 cm, neither hairy nor lamellar; style ca. 3 mm; filaments glabrous or sparsely pubescent ..... 3. *L. oxycarpa*
  4b. Tepals 1.3–2 cm, inner ones generally hairy or lamellar near base adaxially (smooth in *L. flavonutans*); style 4–5 mm; filaments usually densely villous.
    5a. Tepals white, mottled with purple; leaves and bracts white pubescent at margin, particularly at base of bracts; outer tepals slightly narrower than inner ones ..... 8. *L. ixiolirioides*
    5b. Tepals yellow; leaves and bracts generally glabrous, rarely slightly pubescent at margin; outer tepals

ca. 2/3 as wide as inner ones.
6a. Inner tepals crested-lamellar near base adaxially ..... 5. *L. tibetica*
6b. Inner tepals not crested-lamellar.
7a. Tepals villous or rarely slightly hairy at or near base adaxially ..... 6. *L. delavayi*
7b. Tepals glabrous adaxially ..... 7. *L. flavonutans*

1. Lloydia triflora (Ledebour) Baker, J. Linn. Soc., Bot. 14: 300. 1874.

三花洼瓣花 san hua wa ban hua

Ornithogalum triflorum Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 529. 1815; *Gagea triflora* (Ledebour) Schultes & J. H. Schultes.

Plants 15–30 cm tall. Bulb ca. 6 mm in diam. Basal leaf 1, narrowly linear, 1–1.5 mm wide; cauline leaves 1–3(or 4), basal one narrowly lanceolate, 3.5–7 cm × 4–6 mm. Inflorescence 2–4-flowered. Tepals white, greenish veined, linear to oblanceolate, 1–1.2 cm × 1.7–2.2 mm. Stamens ca. 1/2 as long as tepals. Style 3–4 mm; stigma capitate, indistinctly 3-lobed. Capsule obovoid, 3-angled, ca. 1/3 as long as enlarged, persistent tepals. Seeds globose. Fl. May–Jun, fr. Jul.

Thickets, grassy slopes, hillsides along ravines. Hebei, Heilongjiang, Jilin, Liaoning, Shanxi [Japan, Korea, Russia].

2. Lloydia serotina (Linnaeus) Reichenbach, Fl. Germ. Excurs. 102. 1830.

洼瓣花 wa ban hua

Plants 3–20 cm tall. Bulb 1.5–2.5 cm × 6–7 mm. Basal leaves (1 or)2, filiform, slightly shorter or longer than stem, ca. 1 mm wide; cauline leaves 2–4, linear or narrowly so, 1–3 cm × 1–3 mm. Inflorescence 1- or 2-flowered. Tepals white, violet veined, basally mottled with purple, obovate-oblong, 0.5–1.5 cm × 2–5 mm, usually with a small, nectariferous groove near base adaxially, apex obtuse-rounded. Stamens 1/2–3/5 as long as tepals; filaments glabrous. Ovary suboblong or narrowly ellipsoid, 3–4 × 1–1.5 mm. Style 3–4 mm; stigma indistinctly 3-lobed. Capsule subobovoid or subovoid, 3–7 mm, apex with persistent style. Seeds subdeltoid or crescent-shaped-deltoid, flat. Fl. Jun–Aug, fr. Aug–Oct.

Thickets, grassy slopes, alpine grasslands; 2400–5000 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kazakstan, Korea, Mongolia, Nepal, Pakistan, Russia, Sikkim; Europe, North America].

1a. Plants 10–20 cm tall; tepals 1–1.5 cm; capsule 6–7 mm ..... 2a. var. *serotina*
1b. Plants 3–4 cm tall; tepals 0.5–0.7 cm; capsule 3–5 mm ..... 2b. var. *parva*

2a. Lloydia serotina var. **serotina**

洼瓣花(原变种) wa ban hua (yuan bian zhong)

Bulbocodium serotinum Linnaeus, Sp. Pl. 1: 294. 1753; *Anthericum serotinum* (Linnaeus) Linnaeus; *Lloydia alpina* Salisbury; *L. himalensis* Royle; *L. serotina* var. *unifolia* Franchet.

Plants 10–20 cm tall. Tepals 1–1.5 cm. Capsule subobovoid, 6–7 mm. Seeds deltoid. $2n = 24, 36, 48$.

Thickets, grassy slopes; 2400–4000 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kazakstan, Korea, Mongolia, Nepal, Pakistan, Russia, Sikkim; Europe, North America].

2b. Lloydia serotina var. **parva** (C. Marquand & Airy Shaw) H. Hara, Bull. Univ. Mus. Univ. Tokyo 2: 166. 1971.

矮小洼瓣花 ai xiao wa ban hua

Lloydia serotina f. *parva* C. Marquand & Airy Shaw, J. Linn. Soc., Bot. 48: 228. 1929.

Plants 3–4 cm tall. Tepals 0.5–0.7 cm. Capsule subovoid, 3–5 mm. Seeds crescent-shaped-deltoid.

Alpine grasslands; 3700–5000 m. W Sichuan, Xizang [Bhutan, Nepal, Sikkim].

3. Lloydia oxycarpa Franchet, J. Bot. (Morot) 12: 192. 1898.

尖果洼瓣花 jian guo wa ban hua

Lloydia forrestii Diels; *L. forrestii* var. *psilostemon* Handel-Mazzetti.

Plants 5–20(–25) cm tall. Bulb 1–2 cm × 6–7 mm. Basal leaves 3–7, filiform, ca. 1 mm wide; cauline leaves several, narrowly linear, 1–3 cm × ca. 1 mm. Inflorescence usually 1-flowered. Tepals yellow or yellowish green, obovate-elliptic, 0.9–1.3 cm × 3–4 mm, glabrous, without a nectariferous groove near base adaxially, apex obtuse. Stamens 3/5–2/3 as long as tepals; filaments glabrous or sparsely pubescent. Ovary narrowly ellipsoid, ca. 3 × 1 mm. Style ca. 3 mm; stigma slightly thickened. Capsule narrowly obovoid-oblong, ca. 1.5 cm × 4 mm. Seeds narrowly ovate-linear, ca. 2.5 mm, longitudinally 3-angled, winged at 1 end. Fl. May–Jul, fr. Aug.

• Sparsely forested slopes, grasslands; 2800–4800 m. S Gansu, Sichuan, Xizang, Yunnan.

4. Lloydia yunnanensis Franchet, J. Bot. (Morot) 12: 192. 1898.

云南洼瓣花 yun nan wa ban hua

Lloydia filiformis Franchet; *L. mairei* H. Léveillé; *L. yanyuanensis* S. Yun Liang.

Plants 5–20 cm tall. Bulb 5–12 × 3–4 mm; tunic brown. Basal leaves 1 or 2, filiform, usually shorter than stem, 0.5–1 mm wide; cauline leaves 2 or 3, narrowly linear, 0.4–2 cm × 0.5–0.8 mm. Inflorescence usually 1-flowered. Tepals white or yellowish, mottled with purple or red, glabrous, sometimes with 2 inconspicuous, nectariferous grooves near base adaxially; outer tepals oblong, 0.9–1.2 cm × 3–4 mm; inner ones obovate, 0.9–1.2 cm × 5–6 mm. Stamens 1/2–2/3 as long as tepals; filaments glabrous. Ovary ovoid to subellipsoid, 1.8–2.5 × 1–1.5 mm. Style slender, 6–10 mm; stigma shortly 3-lobed. Fl. Jun–Jul.

Forest margins, scrub, shady places on slopes, grasslands, rocky places along valleys; 2300–4100 m. W Sichuan, Yunnan [Sikkim].

5. Lloydia tibetica Baker ex Oliver, Hooker's Icon. Pl. 23: t. 2216. 1892.

西藏洼瓣花 xi zang wa ban hua

Giraldiella montana Dammer; *Lloydia montana* (Dammer) P. C. Kuo; *L. tibetica* var. *lutescens* Franchet.

Plants 10–30 cm tall. Bulb 2.5–3.5 cm × 6–9 mm. Basal leaves 3–10, narrowly strap-shaped, usually shorter than stem, 1.5–3 mm wide; cauline leaves 2 or 3, narrowly linear, 1.5–2.5 cm × 1–2 mm, margin occasionally minutely ciliate. Inflorescence 1–5-flowered; bracts narrowly linear, 6–10 mm. Tepals yellow, purplish green veined, usually villous at base adaxially; outer tepals suboblong, 1.3–2 cm × 4–6 mm; inner ones obovate-elliptic, 1.3–2 cm × 6–8 mm, with 1–4 crested lamellae near base adaxially. Stamens 7–10 mm; filaments densely villous except apically. Ovary ovoid, 3–4(–5) mm. Style 4–6(–8) mm; stigma slightly 3-lobed. Fl. May–Jul.

Shady slopes, grasslands; 2300–4100 m. Gansu, Hebei, Hubei, Shaanxi, Shanxi, Sichuan, Xizang [Nepal].

6. Lloydia delavayi Franchet, J. Bot. (Morot) 12: 193. 1898.

黄洼瓣花 huang wa ban hua

Plants 15–25 cm tall. Bulb 2–3 cm × 5–8 mm. Basal leaves 3–9, narrowly strap-shaped, usually shorter than stem, 1.5–3 mm wide; cauline leaves several, 1–2.5 cm × 1–2 mm. Inflorescence 1–4-flowered; bracts 5–9 mm. Tepals yellow, purplish green veined, generally villous or rarely slightly hairy at or near base adaxially; outer tepals suboblong, 1.4–1.8 cm × 4–6 mm; inner ones obovate-elliptic, 1.4–1.8 cm × 6–8 mm. Stamens ca. 1/2 as long as tepals; filaments densely villous except apically. Ovary ovoid, 3–4 mm. Style 4–10 mm; stigma slightly 3-lobed. Fl. Jul–Aug.

Rocky slopes, grasslands; 2700–3900 m. Yunnan [Myanmar].

7. Lloydia flavonutans H. Hara, J. Jap. Bot. 49: 202. 1974.

平滑洼瓣花 ping hua wa ban hua

Plants 10–25 cm tall. Bulb 1.5–2.5 cm × 6–7 mm. Basal leaves 3–8, narrowly strap-shaped, usually shorter than stem, 1.5–2.5 mm wide; cauline leaves several, 1–2 cm × 1–2 mm. Inflorescence 1–4-flowered; bracts 0.6–1.5 cm. Tepals yellow, purplish green veined, 1.4–1.9 cm, glabrous; outer tepals suboblong, 4–6 mm wide, inner ones obovate-elliptic, 6–8 mm wide. Stamens 0.9–1.2 cm; filaments densely villous except apically. Ovary ovoid, 3–4 mm. Style 4–6 mm, stigma slightly 3-lobed. Fl. May–Jul.

Thickets, meadows; 4000–5000 m. S Xizang [Bhutan, Nepal, Sikkim].

8. Lloydia ixiolirioides Baker ex Oliver, Hooker's Icon. Pl. 23: t. 2215. 1892.

紫斑洼瓣花 zi ban wa ban hua

Lloydia tibetica Baker ex Oliver var. *purpurascens* Franchet.

Plants 15–30 cm tall. Bulb 2–3 cm × 5–7 mm. Basal leaves usually 4–8, narrowly linear, shorter than stem, 1–2(–5) mm wide; cauline leaves 2 or 3, 2–3.5 cm × 1–2 mm, margin usually white pubescent-ciliate especially near base. Inflorescence 1- or 2-flowered; bracts 6–12 mm, margin white ciliate. Tepals white, mottled with purple proximally, obovate-elliptic, 1.5–2 cm × 5–6 mm, with several lines of hairs near base adaxially. Stamens 7–9 mm; filaments densely villous. Ovary oblong, 3–4 mm. Style 3–4 mm. Capsule narrowly oblong, 1.5–2 cm × ca. 4 mm. Seeds narrowly ovate-linear, ca. 2.5 mm, longitudinally 3-angled. Fl. Jun–Jul, fr. Aug.

• Shady slopes, grasslands; 3000–4300 m. Sichuan, Xizang, Yunnan.

The Himalayan species *Lloydia longiscapa* Hooker was recorded from NW Yunnan by Handel-Mazzetti (Symb. Sin. 7: 1202. 1936, based on *Handel-Mazzetti 6700*) and later stated to occur in W China, including S Xizang, by Hara (in Ohashi, Bull. Univ. Mus. Univ. Tokyo 8: 133. 1975). It is closely related to *L. ixiolirioides*, but differs in having glabrous tepals. None of the many specimens examined for this treatment belongs to *L. longiscapa*; therefore, the species is excluded until its presence in China can be confirmed.

15. TULIPA Linnaeus, Sp. Pl. 1: 305. 1753.

郁金香属 yu jin xiang shu

Chen Xinqi (陈心启 Chen Sing-chi); Helen V. Mordak[1]

Amana Honda; *Orithyia* D. Don.

Herbs perennial, bulbiferous. Bulbs truncate basally, sometimes elongate and tapering apically, covered with a tunic; tunic usually hairy inside. Stem simple or occasionally branched, proximal part usually underground. Leaves basal and cauline, spaced or ± crowded, rarely opposite, sessile and clasping at base, linear to narrowly ovate. Inflorescence usually 1-flowered; bracts absent or sometimes present. Flowers bisexual, erect, campanulate to saucer-shaped. Tepals 6, free, often colored, outer and inner ones different in shape, apex usually with a minute tuft of white hairs. Stamens 6, equal or 3 longer; filaments sometimes hairy; anthers basifixed. Ovary 3-loculed; ovules many per locule. Style columnar or very short; stigma 3-lobed. Fruit a loculicidal capsule. Seeds flat, usually subdeltoid.

About 150 species: temperate regions of N Africa, Asia, and Europe, mainly in C Asia and the Mediterranean region; 13 species (one endemic) in China.

[1] Herbarium: Higher Plants, V. L. Komarov Botanical Institute, Russian Academy of Sciences, Prof. Popov Street 2, St. Petersburg 197376, Russia.

1a. Bracts 2–4, much smaller than leaves.
2a. Leaves conspicuously overtopping flower, 10–25 × 0.5–0.9(–1.2) cm; bracts usually 2, opposite, very rarely 3 and whorled ..... 1. *T. edulis*
2b. Leaves slightly or scarcely overtopping flower, 7–15 × (0.5–)0.9–2.2 cm; bracts usually 3 or 4, whorled, very rarely 2 and opposite ..... 2. *T. erythronioides*
1b. Bracts absent.
3a. Filaments hairy at least toward base.
4a. Tunic woolly-pubescent inside distally; capsule subglobose ..... 10. *T. biflora*
4b. Tunic appressed hairy inside distally or glabrous; capsule oblong.
5a. Tepals yellow at base; filaments hairy at base ..... 9. *T. patens*
5b. Tepals not yellow at base; filaments wholly hairy, rarely so only at base ..... 11. *T. dasystemon*
3b. Filaments glabrous.
6a. Leaves 2, opposite; tunic glabrous inside ..... 12. *T. heterophylla*
6b. Leaves 2–4 or more, spaced or ± crowded but never opposite; tunic usually hairy inside.
7a. Style 1.5–4 mm; stem glabrous.
8a. Stamens equal; style 1.5–2 mm ..... 8. *T. sinkiangensis*
8b. Stamens unequal, inner ones longer than outer; style to 4 mm ..... 13. *T. uniflora*
7b. Style less than 1 mm.
9a. Outer tepals yellow, not tinged with other color abaxially ..... 4. *T. iliensis*
9b. Outer tepals yellow, tinged with violet, red, purplish, green or other deep color abaxially.
10a. Tunic with appressed hairs inside basally and distally ..... 7. *T. altaica*
10b. Tunic with appressed hairs inside only distally.
11a. Stem usually densely or sparsely pubescent; filaments slightly dilated at middle and gradually narrowed at both ends ..... 4. *T. iliensis*
11b. Stem glabrous; filaments dilated in basal or distal part.
12a. Filaments gradually attenuate from base; leaves spaced ..... 3. *T. kolpakovskiana*
12b. Filaments dilated in distal part; leaves ± crowded.
13a. Leaves 3, 5–10 mm wide; flower solitary, tepals 1.5–2.5 cm ..... 5. *T. thianschanica*
13b. Leaves (3–)5 or 6(or 7), 10–15 mm wide; flowers 1–4, tepals 3–4 cm ..... 6. *T. tetraphylla*

1. Tulipa edulis (Miquel) Baker, J. Linn. Soc., Bot. 14: 295. 1874.

老鸦瓣 lao ya ban

Orithyia edulis Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 158. 1867; *Amana edulis* (Miquel) Honda; *A. graminifolia* (Baker ex S. Moore) A. D. Hall; *Gagea argyi* H. Léveillé; *G. coreana* H. Léveillé (1910), not Nakai (1932); *G. hypoxioides* H. Léveillé; *Tulipa graminifolia* Baker ex S. Moore.

Bulb ovoid, 1.5–4 cm in diam.; tunic brownish, papery, densely villous-woolly inside. Stem usually simple, 10–25 cm, slender, glabrous. Leaves usually 2, glaucous, linear, (10–)15–25 cm × (2–)5–9(–12) mm, relatively thick, glabrous. Bracts usually 2, opposite, very rarely 3 and whorled, narrowly linear, 1.5–3 cm × 1–2 mm. Flower solitary; pedicel 2–4 cm. Tepals white, streaked with purple-red, narrowly elliptic-lanceolate or lanceolate, 2–3 cm × 4–7 mm. Inner stamens slightly longer than outer; filaments glabrous, slightly dilated near middle or base. Style ca. 4 mm. Capsule subglobose, 5–7 mm in diam., apex long beaked. Fl. Mar–Apr, fr. Apr–May. 2*n* = 48*

Grassy slopes, hillsides; near sea level to 1700 m. Anhui, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Zhejiang [Japan, Korea].

Wu Zhengyi (editor's note) believes that this and the following species would be better treated under the segregate genus *Amana* on the basis of morphology and geographic distribution.

2. Tulipa erythronioides Baker, J. Bot. 13: 292. 1875.

阔叶老鸦瓣 kuo ye lao ya ban

Amana latifolia (Makino) Honda; *Tulipa edulis* (Miquel) Baker var. *latifolia* Makino; *T. latifolia* (Makino) Makino.

Bulb ovoid, 2–4 cm in diam.; tunic brownish, papery, densely villous-woolly inside. Stem 11–20 cm, glabrous. Leaves usually 2, glaucous, linear to narrowly oblong, 7–15 × (0.5–)0.9–2.2 cm, glabrous. Bracts usually 3 or 4, whorled, very rarely 2 and opposite, narrowly linear, 1.5–2 cm × 1–2 mm. Pedicel 1–4 cm. Tepals broadly lanceolate, 1.5–1.8 cm × 2.5–3 mm. Outer stamens 5–6 mm; inner ones longer, ca. 7.5 mm; filaments dilated proximally, glabrous. Style ca. 3 mm. Fl. Apr.

Anhui, Zhejiang [Japan].

3. Tulipa kolpakovskiana Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 266. 1877.

迟花郁金香 chi hua yu jin xiang

Tulipa aristata Regel.

Bulb ovoid, 1.5–2 cm in diam.; tunic black, leathery, appressed hairy inside distally. Stem usually glabrous. Leaves 3, spaced, linear-lanceolate, varying in size, usually overtopping flower, 0.5–1.5 cm wide, glabrous, margin crisped. Bracts absent. Flowers solitary or paired, nodding in bud. Tepals yellow, rarely orange-red, ± tinged with violet, oblong to rhomboidal-oblong, 3–6 × 0.5–2 cm. Stamens equal, 1–2 cm; filaments glabrous, gradually attenuate from base. Style very short. Fl. May.

2*n* = 24.

Semideserts. NW Xinjiang [Kazakstan, Kyrgyzstan].

4. Tulipa iliensis Regel, Gartenflora 28: 162. 1879.

伊犁郁金香 yi li yu jin xiang

Bulb ovoid, 1–2 cm in diam.; tunic blackish brown, thinly leathery, appressed hairy inside basally and distally. Stem 10–20(–30) cm, densely or sparsely pubescent distally, very rarely glabrous. Leaves 3 or 4, spaced or ± crowded, linear or linear-lanceolate, usually not overtopping flower, 0.5–1.5 cm wide. Bracts absent. Flower solitary. Tepals yellow, sometimes turning dark red or pale red when dry, oblong to elliptic-rhomboidal, 2.5–3.5 × 0.4–2 cm; outer ones abaxially tinged with greenish red to greenish purple. Stamens equal; filaments slightly dilated at middle and gradually narrowed at both ends, glabrous. Style very short. Capsule ellipsoid, 1.8–2.2 × 1.2–1.5 cm. Fl. and fr. Mar–May. 2*n* = 24.

Grassy or gravelly slopes, semideserts; 400–1400 m. Xinjiang [Kazakstan].

Reports of *Tulipa gesneriana* Linnaeus and *T. schrenkii* Regel from China (e.g., in FRPS) are based on misidentified plants of *T. iliensis*.

5. Tulipa thianschanica Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 508. 1880.

天山郁金香 tian shan yu jin xiang

Bulb ovoid, 1.5–2 cm in diam.; tunic blackish brown, thinly leathery, appressed hairy inside distally. Stem 10–15 cm, glabrous. Leaves 3, ± crowded, spreading and slightly recurved apically, linear or linear-lanceolate, usually overtopping flower, 5–10 mm wide, margin usually crisped. Bracts absent. Flower solitary. Tepals yellow, suboblong, 1.5–2.5 × 0.5–1.5 cm; inner ones sometimes tinged with red. Stamens 1.2–1.7 cm, equal; filaments glabrous, abruptly dilated from middle to apex. Style very short. Fl. May–Jun.

Steppes; 1000–1800 m. NW Xinjiang [Kazakstan].

6. Tulipa tetraphylla Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 296. 1875.

四叶郁金香 si ye yu jin xiang

Bulb ovoid, 1.5–2 cm in diam.; tunic blackish, appressed hairy inside distally. Stem glabrous. Leaves (3–)5 or 6(or 7), crowded, sublorate, overtopping flower, 1–1.5 cm wide, margin crisped. Flowers 1–4. Tepals yellow, oblong to oblong-rhomboidal, 3–4 cm × 6–7 mm; outer ones tinged with violet and abaxially greenish; inner ones abaxially dingy green. Stamens 1–1.3 cm, equal; filaments glabrous, dilated distally, gradually narrowed toward base. Style short. Fl. May 2*n* = 24, 48.

Gravelly places, dry slopes. NW Xinjiang [Kazakstan, Kyrgyzstan].

7. Tulipa altaica Pallas ex Sprengel, Syst. Veg. 2: 63. 1825.

阿尔泰郁金香 a er tai yu jin xiang

Bulb ovoid, slightly elongate apically, 2–3.5 cm in diam.; tunic brown, papery, appressed hairy inside or glabrous at middle. Stem 10–30(–35) cm, distally pubescent. Leaves usually 3 or 4, grayish green, ovate to lanceolate, varying in size, not overtopping flower, 0.6–3(–5) cm wide, glabrous or ± pubescent, margin sometimes crisped. Flower solitary. Tepals yellow, abaxially tinged with greenish purple-red or pink, oblong to oblong-rhomboidal, 2–3.5 × 0.5–2 cm. Stamens glabrous, attenuate from base. Style very short. Capsule broadly ellipsoid, 2.5–4 × 1.5–2 cm. Fl. May, fr. Jun–Jul. 2*n* = 24.

Thickets, sunny slopes; 1300–2600 m. NW Xinjiang [Kazakstan, Russia (W Siberia)].

8. Tulipa sinkiangensis Z. M. Mao in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 282. 1980.

新疆郁金香 xin jiang yu jin xiang

Bulb ovoid, elongate apically, 1–1.5(–2.2) cm in diam.; tunic papery, densely appressed hairy inside except at middle. Stem simple or rarely branched, (6–)9–15 cm, glabrous or occasionally minutely pubescent distally. Leaves 3, crowded, narrowly ovate-oblong to linear, 4–6 × 0.2–1.6 cm, sometimes apically recurved or cirrose, distal one much smaller than others. Flower solitary. Tepals yellow, dark red, or reddish yellow, oblong, narrowly obovate, or subspatulate, 1–2 cm × 4–10 mm; outer ones abaxially tinged with purple, green, dark purple, or yellowish green; inner ones streaked with dark color. Stamens equal, 7–10 mm; filaments glabrous, gradually dilated from base. Style 1.5–2 mm. Fl. Apr–May.

• Gravelly and sandy places; 1000–1300 m. Xinjiang (N Tian Shan).

9. Tulipa patens C. Agardh ex Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 384. 1829.

垂蕾郁金香 chui lei yu jin xiang

Bulb ovoid, slightly elongate apically, 1–1.5 cm in diam.; tunic brown, papery, ± appressed hairy inside, sometimes glabrous toward base. Stem 10–25 cm, glabrous. Leaves 2 or 3, spaced, linear-lanceolate or lanceolate, scarcely or slightly overtopping flower, 0.4–2 cm wide. Flower solitary, nodding in bud or when withered. Tepals white, yellow at base, oblong to lanceolate, 1.5–3 cm × 4–10 mm; outer ones abaxially tinged with purplish green or pale green; inner ones longitudinally streaked with purplish green or pale green at center, ca. 2 × as wide as outer, clawed and pubescent at base. Inner stamens longer than outer ones; filaments hairy and dilated at base. Style 1–2 mm. Capsule oblong, 2–2.5 × ca. 1.5 cm, Fl. and fr. Apr–May. 2*n* = 24.

Thickets, shady slopes; 1400–2000 m. NW Xinjiang [Kazakstan, Russia].

10. Tulipa biflora Pallas, Reise Russ. Reich. 3: 727. 1776.

柔毛郁金香 rou mao yu jin xiang

Tulipa buhseana Boissier.

Bulb ovoid, slightly elongate apically, 1–1.5 cm in diam.; tunic brown, woolly-pubescent inside distally. Stem 10–15 cm, usually glabrous. Leaves 2, spaced, linear, not overtopping flower, 5–10 mm wide, margin crisped. Flowers solitary or paired, very rarely more. Tepals milky white, bright yellow at base,

oblong to lanceolate, 2–2.5 cm × 6–12 mm; outer ones abaxially tinged with purplish green or yellowish green; inner ones longitudinally streaked with purplish green or yellowish green at center, hairy at base. Inner stamens slightly longer than outer ones; filaments dilated proximally, hairy at base. Style ca. 1 mm. Capsule subglobose, ca. 1.5 cm in diam. Fl. and fr. Apr–Jun. 2*n* = 24.

Grassy slopes, *Artemisia* deserts. N and W Xinjiang [Afghanistan, Kazakstan, Pakistan, Russia, Turkmenistan, Uzbekistan; NE Africa (Egypt), SW Asia, SE Europe].

11. Tulipa dasystemon (Regel) Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 507. 1880.

毛蕊郁金香 mao rui yu jin xiang

Orithyia dasystemon Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 261. 1877.

Bulb ovoid, 1–1.2(–1.5) cm in diam.; tunic papery, ± appressed hairy inside distally, rarely glabrous. Stem 10–15 cm, glabrous. Leaves 2, spaced, linear, 0.5–1.5 cm wide. Flower solitary. Tepals milky white or pale yellow, lanceolate to oblong-ovate, 2–2.2 cm × 5–10 mm; outer ones abaxially tinged with purplish green; inner ones abaxially longitudinally streaked with purplish green at center, clawed and hairy at base. Inner stamens slightly longer than outer ones; filaments wholly hairy, rarely so only at base. Style ca. 2 mm. Fl. Apr. 2*n* = 24, 48.

Sunny slopes; 1800–3200 m. W Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan, Uzbekistan].

12. Tulipa heterophylla (Regel) Baker, J. Linn. Soc., Bot. 14: 295. 1874.

异叶郁金香 yi ye yu jin xiang

Orithyia heterophylla Regel in Regel & Herder, Bull. Soc. Imp. Naturalistes Moscou 41(1): 440. 1868.

Bulb ovoid, slightly elongate apically, 1–1.4 cm in diam.; tunic brown or blackish brown, papery, glabrous inside. Stem 9–15 cm, glabrous. Leaves 2, opposite, linear or linear-lanceolate, not overtopping flower, 4.5–5.5 cm × 2–4 mm, glabrous. Bracts absent. Flower solitary. Tepals yellow, lanceolate, 2–3 cm × 4–8 mm; outer ones abaxially tinged with purplish green; inner ones abaxially broadly streaked with purplish green at center. Stamens equal; filaments glabrous. Style 4–6 mm. Capsule narrowly ellipsoid, 2.5–3 cm × 6–8 mm, apex long beaked. Fl. Jun, fr. Jul.

Gravelly slopes, sunny places; 2100–3100 m. Xinjiang [Kazakstan, Kyrgyzstan].

13. Tulipa uniflora (Linnaeus) Besser ex Baker, J. Linn. Soc., Bot. 14: 295. 1874.

单花郁金香 dan hua yu jin xiang

Ornithogalum uniflorum Linnaeus, Syst. Nat., ed. 12, 2: 242; Mant. Pl. 1: 62. 1767; *Gagea uniflora* (Linnaeus) Schultes & J. H. Schultes; *Orithyia nutans* Trautvetter; *O. uniflora* (Linnaeus) D. Don; *Tulipa nutans* (Trautvetter) B. Fedtschenko.

Bulb ovoid, 1–2 cm in diam.; tunic blackish brown, papery, appressed hairy inside distally. Stem 10–20 cm, glabrous. Leaves 2(or 3), much spaced or ± crowded, narrowly linear-lanceolate or linear, not or slightly overtopping flower, 0.2–1.5 cm wide, glabrous. Flower solitary. Tepals yellow; outer ones abaxially tinged with purplish green or dark violet, oblanceolate to obovate or lanceolate to oblong, 1.5–3 cm × 4–8 mm; inner tepals abaxially longitudinally streaked with purplish green at center, wider than outer ones, clawed at base. Inner stamens slightly longer than outer ones; filaments dilated proximally, gradually attenuate toward apex, glabrous. Style ca. 4 mm. Fl. May–Jun. 2*n* = 24.

Thickets, sunny gravelly slopes; 1200–2400 m. Nei Mongol, Xinjiang [Kazakstan, Mongolia, Russia].

Reports of *Tulipa heteropetala* Ledebour from China (e.g., in FRPS) are based on misidentified plants of *T. uniflora.*

16. ERYTHRONIUM Linnaeus, Sp. Pl. 1: 305. 1753.

猪牙花属 zhu ya hua shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, bulbiferous. Bulb deep seated, usually cylindric or narrowly oblong; tunic membranous. Stem simple. Leaves 2, borne near middle of stem, apparently opposite, petiolate, unequal, usually ± reticulate veined. Inflorescence 1- to several flowered, racemose or umbellate; bracts usually absent. Flowers bisexual, nodding, rather large. Tepals 6, free, spreading, recurved, or reflexed. Stamens 6, inserted at base of tepals; filaments filiform to slightly flattened, usually unequal; anthers basifixed. Ovary 3-loculed; ovules several to numerous per locule. Style filiform or slightly thickened distally; stigma 3-lobed. Fruit a capsule, subglobose to ellipsoid, 3-angled, loculicidal. Seeds compressed or somewhat swollen.

Twenty-four species: temperate regions of the N hemisphere, mainly in North America; two species in China.

1a. Filaments filiform to subulate, not flattened, less than 1 mm wide; leaf blade 2.5–6.5 cm wide ..... 1. *E. japonicum*
1b. Filaments flattened near middle, flattened portion ca. 1.5 mm wide; leaf blade 1–2.5 cm wide ..... 2. *E. sibiricum*

1. Erythronium japonicum Decaisne, Rev. Hort., sér. 4, 3: 284. 1854.

猪牙花 zhu ya hua

Erythronium dens-canis Linnaeus var. *japonicum* Baker;

E. japonicum f. *album* C. F. Fang; *E. japonicum* f. *immaculatum* P. Y. Fu & Q. S. Sun.

Plants 16–20 cm tall, ca. 1/3 length underground. Bulb 5–6 × ca. 1 cm, basally often with several bulbels. Petiole 3–4 cm; leaf blade elliptic to broadly lanceolate, 10–11 × 2.5–6.5 cm, glabrous, base cuneate, apex obtuse, acute, or mucronate. Flower solitary, long pedunculate. Tepals rose purple, adaxially with a blackish, 3-toothed mottle proximally, lanceolate, 3.5–5 cm × 7–11 mm; inner tepals with 4 small calli near base adaxially and 2 spreading, ovate-semiorbicular auricles laterally. Filaments filiform to subulate, less than 1 mm wide, unequal; anthers suboblong, 5–7 mm. Style slightly thickened distally, longer than stamens; stigma short, 3-lobed. Fl. Apr–May. 2*n* = 24.

Moist places in forests. S Jilin, Liaoning [Japan, Korea].

2. Erythronium sibiricum (Fischer et al.) Krylov, Fl. Sibir. Occid. 3: 641. 1929.

新疆猪牙花 xin jiang zhu ya hua

Erythronium dens-canis Linnaeus var. *sibiricum* Fischer et al., Index Sem. Hort. Petrop. 7: 47. 1841.

Plants 16–20 cm tall, ca. 1/3 length underground. Bulb 3–4 cm × 6–8 mm, basally often with several bulbels. Petiole 1.5–2.5 cm; leaf blade lanceolate to suboblong, 7–10 × 1–2.5 cm, glabrous, base cuneate, apex acuminate. Flower solitary, long pedunculate. Tepals white proximally, rose purple distally, oblong-lanceolate, ca. 3 cm × 5 mm, apex obtuse; inner tepals with 4 small, crowded calli near base adaxially and 2 spreading, lanceolate auricles laterally. Filaments flattened near middle, flattened portion ovate, ca. 1.5 mm wide. Anthers suboblong, ca. 3 mm. Style slightly thickened distally; stigma 3-lobed. 2*n* = 24.

Forests, thickets, subalpine grasslands; 1100–2500 m. N Xinjiang [Kazakstan, Russia].

17. FRITILLARIA Linnaeus, Sp. Pl. 1: 303. 1753.

贝母属 bei mu shu

Chen Xinqi (陈心启 Chen Sing-chi); Helen V. Mordak

Herbs perennial, bulbiferous. Bulbs with (1 or)2 or 3(or more) fleshy, farinaceous scales, often covered with a translucent tunic, sometimes also with numerous small bulbels. Stem erect, simple, leafy. Basal leaves petiolate; cauline leaves sessile, spirally alternate, opposite, or whorled; leaf blade oblong to lanceolate. Inflorescence 1- to several flowered, racemose or umbellate; bracts (floral leaves) usually present. Flowers bisexual, usually nodding, campanulate to saucer-shaped. Tepals 6, free, often tessellated with dark and light colors, with a nectary near base adaxially. Stamens 6, inserted at base of tepals; anthers basifixed, rarely dorsifixed. Style 3-lobed or subentire, caducous; stigmas linear or very short. Fruit a capsule, erect, 3-loculed, 6-angled, winged or wingless, loculicidal. Seeds arranged in 2 rows in each valve, flat.

About 130 species: temperate regions of the N hemisphere, mainly in C Asia and the Mediterranean region; 24 species (15 endemic) in China.

Some species are cultivated for their bulbs, which are used medicinally.

1a. Bulb of 3–10 fleshy scales and numerous small bulbels.
  2a. Leaves basal; bracts petaloid; tepals papillose-tuberculate adaxially ..... 24. *F. davidii*
  2b. Leaves cauline; bracts not petaloid; tepals not papillose-tuberculate adaxially.
    3a. Leaves 6–18, basal usually opposite, middle and distal whorled or alternate ..... 22. *F. anhuiensis*
    3b. Leaves in 1(or 2) whorls of 3–6 ..... 23. *F. maximowiczii*
1b. Bulb of 2–4 fleshy, farinaceous scales, ± covered by marcescent remains of old scales, without bulbels.
  4a. Stem and pedicels papillose-pubescent; leaves of 2 shapes, basal 2 different from and much larger than others; flowers slightly zygomorphic; nectary on 1 outer tepal much larger than others and spurred abaxially ..... 21. *F. karelinii*
  4b. Stem and pedicels glabrous; leaves similar to or slightly different from each other; flowers actinomorphic; nectaries similar.
    5a. Bracts ovate to elliptic, 3–5 × as long as wide, apex obtuse or rounded.
      6a. Anthers basifixed; capsule narrowly winged, ± enclosed by persistent tepals ..... 19. *F. delavayi*
      6b. Anthers subdorsifixed; capsule neither winged nor enclosed by persistent tepals ..... 20. *F. fusca*
    5b. Bracts linear to linear-lanceolate, 8–20 × as long as wide, apex acuminate or cirrose.
      7a. Style subentire or slightly 3-lobed apically; lobes less than 1 mm.
        8a. Filaments shorter than anthers; ovary longer than style ..... 18. *F. dajinensis*
        8b. Filaments equaling or longer than anthers; ovary shorter than style.
          9a. Leaves 9–11, opposite, whorled, and alternate; bracts 3, apex cirrose ..... 15. *F. yuminensis*
          9b. Leaves 4–7, opposite and alternate, never whorled; bract 1, apex acuminate or curved.
            10a. Tepals pale yellow, with a few blackish speckles ..... 16. *F. przewalskii*
            10b. Tepals blackish purple, tessellated with yellowish brown ..... 17. *F. unibracteata*
      7b. Styles 3-lobed apically; lobes (2–)3–8 mm.
        11a. Bracts usually 1 per flower.
          12a. Leaves 2–4 cm wide; inflorescence usually 2–5-flowered ..... 1. *F. pallidiflora*

12b. Leaves 0.5–1 cm wide; inflorescence usually 1-flowered.
13a. Leaves all alternate; capsule wingless ..... 2. *F. meleagroides*
13b. Leaves opposite and alternate, sometimes also whorled; capsule narrowly winged ..... 3. *F. sichuanica*
11b. Bracts 2 or 3 per flower.
14a. Tepals white, sometimes tessellated with reddish color.
15a. Basal leaves much wider than others, ± spirally twisted basally ..... 13. *F. tortifolia*
15b. Basal leaves slightly wider than others, not twisted basally ..... 11. *F. verticillata*
14b. Tepals greenish or yellowish, usually tessellated with purple or brown.
16a. Leaves rather broad, basal ones 1.5–3 cm wide; tepals more than 4 cm.
17a. Nectaries 6–10 mm; style lobes 3–8 mm; bracts slightly cirrose at apex ..... 9. *F. monantha*
17b. Nectaries 2–3 mm; style lobes 2–3 mm; bracts not cirrose at apex.
18a. Tepals yellow or greenish yellow, slightly tessellated with purple adaxially; leaves 10–18 ..... 7. *F. crassicaulis*
18b. Tepals olive green, marked and tessellated with deep purple; leaves 3–8 ..... 8. *F. sinica*
16b. Leaves narrow, basal ones less than 1.5 cm wide; tepals often less than 4 cm.
19a. Distal leaves and bracts strongly cirrose; leaves mostly whorled.
20a. Tepals greenish, tessellated with pink or purple; capsule winged ..... 10. *F. walujewii*
20b. Tepals dark purple, heavily tessellated; capsule wingless ..... 14. *F. ussuriensis*
19b. Distal leaves and bracts curled or slightly cirrose; leaves mostly opposite or alternate, rarely whorled.
21a. Inflorescence 1–6-flowered; tepals yellowish white, veined with green, 2.5–3 cm ..... 12. *F. thunbergii*
21b. Inflorescence 1- or 2-flowered; tepals green to blackish purple, 3–5 cm.
22a. Bracts not cirrose at apex; tepals with dense, irregular, purple spots often merging to form larger mottling ..... 5. *F. taipaiensis*
22b. Bracts slightly cirrose at apex; tepals with regular, purple spots and tessellations not merging.
23a. Nectaries elliptic to ovate, 3–5 × 2–3 mm; filaments sometimes papillose ..... 4. *F. cirrhosa*
23b. Nectaries suborbicular, ca. 2 × 2 mm; filaments glabrous ..... 6. *F. yuzhongensis*

1. Fritillaria pallidiflora Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 5. 1841.

伊贝母 yi bei mu

Fritillaria bolensis G. Z. Zhang & Y. M. Liu; *F. halabulanica* X. Z. Duan & X. J. Zheng; *F. pallidiflora* var. *plena* X. Z. Duan & X. J. Zheng.

Bulb of 2 scales, ovoid or oblong-ovoid, 1–4 cm in diam.; tunic rather thick. Stem 15–45(–60) cm. Leaves 8–13, alternate, sometimes also subopposite or subwhorled; leaf blade broadly lanceolate or oblong-lanceolate, 5–7(–12) × 2–4 cm, apex obtuse. Inflorescence (1 or)2–5-flowered; bract solitary, apex acuminate. Flowers nodding, campanulate; pedicel 2–4.5 cm. Tepals pale yellow, with darker veins and some dark red spots, oblong-obovate or oblong-spatulate, 3–5 × 1.5–2 cm; nectaries ovate-oblong, deeply concave adaxially, projecting at a right angle abaxially. Stamens 2–3.5 cm; filaments glabrous; anthers subdorsifixed. Style 3-lobed; lobes ca. 2 mm. Capsule broadly winged; wings 4–7 mm wide. Fl. May–Jun, fr. Sep. 2*n* = 24*.

Forests, thickets, meadows, grassy slopes, mountain steppes; 1300–2500 m. NW Xinjiang [Kazakstan].

This species is cultivated in NE China, and the bulbs are used medicinally.

2. Fritillaria meleagroides Patrin ex Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 395. 1829.

额敏贝母 e min bei mu

Fritillaria meleagroides var. *flavovirens* X. Z. Duan & X. J. Zheng; *F. meleagroides* var. *plena* X. Z. Duan & X. J. Zheng; *F. meleagroides* var. *rhodantha* X. Z. Duan & X. J. Zheng.

Bulb of 2 or 3 scales, subglobose, 0.5–1.5 cm in diam. Stem 20–40 cm. Leaves 3–7, alternate; leaf blade linear, 5–15 cm × 1–5 mm, apex sometimes curved. Inflorescence usually 1-flowered; bract solitary, apex acuminate. Flower nodding, campanulate; pedicel variable in length. Tepals deep purple or dark brownish violet, slightly tessellated or speckled; outer ones oblong-elliptic, 2–3.5 cm × 5–8 mm; inner ones obovate, 2–3.5 × 0.7–1.2 cm; nectaries linear, ca. 15 × 2 mm. Stamens ca. 2/3 as long as tepals; filaments papillose. Style 3-lobed; lobes 4–8 mm. Capsule wingless. Fl. May–Jun. 2*n* = 18, 24*.

Mud flats, wet meadows, swampy fields; 900–2400 m. NW Xinjiang [Kazakstan, Russia; E Europe].

Chinese records of *Fritillaria meleagris* Linnaeus (e.g., in FRPS) are referable to *F. meleagroides*.

3. Fritillaria sichuanica S. C. Chen, Acta Bot. Yunnan. 5: 371. 1983.

华西贝母 hua xi bei mu

Fritillaria chuanbeiensis Y. K. Yang et al.; *F. chuanbeiensis* var. *huyabeimu* Y. K. Yang & D. H. Jiang; *F. cirrhosa* D. Don var. *ecirrhosa* Franchet; *F. fujiangensis* Y. K. Yang et

al.; *F. glabra* (P. Y. Li) S. C. Chen var. *qingchuanensis* (Y. K. Yang & J. K. Wu) S. Y. Tang & S. C. Yueh; *F. mellea* S. Y. Tang & S. C. Yueh; *F. pingwuensis* Y. K. Yang & J. K. Wu; *F. przewalskii* Maximowicz var. *longistigma* Y. K. Yang & J. K. Wu; *F. qingchuanensis* Y. K. Yang & J. K. Wu; *F. taipaiensis* P. Y. Li var. *zhouquensis* S. C. Chen & G. D. Yu; *F. wenxianensis* Y. K. Yang & J. K. Wu; *F. xibeiensis* Y. K. Yang et al.

Bulb of 2 or 3 scales, ovoid-globose, 1–2 cm in diam. Stem 20–50 cm. Leaves 4–10, basal ones generally opposite, middle and distal ones usually alternate and opposite, very rarely also whorled; leaf blade linear to linear-lanceolate, 3–14 cm × 2–8 mm, apex not cirrose. Inflorescence 1- or 2(or 3)-flowered; bract solitary. Flowers nodding, campanulate; pedicel 0.8–2.5 cm. Tepals yellowish green, spotted and tessellated with purple (sometimes very densely so to become purple), oblong or obovate-elliptic, 2.5–4 cm × 5–13 mm; nectaries ovate to oblong, slightly projecting abaxially. Stamens 1.5–2.5 cm; filaments glabrous or papillose. Style 3-lobed; lobes 2–4 mm. Capsule narrowly winged. Fl. May–Jun, fr. Aug–Oct. $2n = 24$*.

• Hill thickets, grassy slopes; 2000–4000 m. S Gansu, S Qinghai, W Sichuan.

The bulbs are used medicinally.

4. Fritillaria cirrhosa D. Don, Prodr. Fl. Nepal. 51. 1825.

川贝母 chuan bei mu

Fritillaria cirrhosa var. *bonatii* (H. Léveillé) S. C. Chen; *F. cirrhosa* var. *dingriensis* Y. K. Yang & J. Z. Zhang; *F. cirrhosa* var. *viridiflava* S. C. Chen; *F. duilongdeqingensis* Y. K. Yang & Gesan; *F. lhiinzeensis* Y. K. Yang et al.; *F. zhufenensis* Y. K. Yang & J. Z. Zhang; *Lilium bonatii* H. Léveillé.

Bulb of 2 scales, 1–2 cm in diam. Stem 15–60 cm. Leaves 7–11, opposite or sometimes also 3- or 4-whorled and alternate; leaf blade linear to linear-lanceolate, 4–12 cm × 3–5(–15) mm, apex often curved or cirrose. Inflorescence 1(–3)-flowered; bracts 3, apex curved or cirrose. Flower nodding, campanulate or narrowly so; pedicel much shorter than tepals. Tepals yellow or yellowish green, slightly or heavily spotted or tessellated with purple, usually oblong-elliptic, 3–5 × 1.2–1.8 cm; nectaries elliptic to ovate, 3–5 × 2–3 mm, projecting abaxially. Stamens 2–3 cm; filaments sometimes slightly papillose. Style 3-lobed; lobes 3–5 mm. Capsule narrowly winged; wings 1–1.5 mm wide. Fl. May–Jul, fr. Aug–Oct. $2n = 24$*.

Forests, alpine thickets, meadows, flood lands, moist places; 3200–4600 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

The bulbs are used medicinally.

5. Fritillaria taipaiensis P. Y. Li, Acta Phytotax. Sin. 11: 251. 1966.

太白贝母 tai bai bei mu

Fritillaria cirrhosa D. Don f. *glabra* P. Y. Li; *F. glabra* (P. Y. Li) S. C. Chen; *F. shaanxiica* Y. K. Yang et al.; *F. taipaiensis* var. *fengxianensis* Y. K. Yang & J. K. Wu; *F. taipaiensis* f. *platyphylla* Y. K. Yang & S. X. Zhang.

Bulb of 2 scales, ovoid, 1–1.5 cm in diam. Stem 20–50 (–100) cm. Leaves 5–10(–20), usually opposite, sometimes middle and distal ones also whorled and alternate; leaf blade linear to linear-lanceolate, 5–13 cm × 3–7(–12) mm, apex sometimes curved. Inflorescence 1(or 2)-flowered; bracts 3, apex often curved. Flower nodding, campanulate; pedicel 2–4 cm. Tepals yellowish green, densely spotted purple, narrowly oblong or obovate-oblong, 2.5–5 × 0.6–1.8 cm; nectaries slightly projecting abaxially. Stamens ca. 3/5 as long as tepals; filaments slightly papillose distally. Style 3-lobed; lobes 2–4 mm. Capsule winged; wings 0.5–2 mm wide. Fl. May–Jun, fr. Jun–Jul. $2n = 24$*.

• Hill thickets, grassy slopes; 2000–3200 m. Gansu, Hubei, Shaanxi, Sichuan.

The bulbs are used medicinally.

6. Fritillaria yuzhongensis G. D. Yu & Y. S. Zhou in S. C. Chen et al., Acta Bot. Yunnan. 7: 146. 1985.

榆中贝母 yu zhong bei mu

Fritillaria cirrhosa D. Don var. *brevistigma* Y. K. Yang & J. K. Wu; *F. glabra* (P. Y. Li) S. C. Chen var. *shanxiensis* S. C. Chen; *F. lanzhouensis* Y. K. Yang et al.; *F. lishiensis* Y. K. Yang & J. K. Wu; *F. lishiensis* var. *yichengensis* Y. K. Yang & P. P. Ling; *F. taipaiensis* P. Y. Li var. *ningxiaensis* Y. K. Yang & J. K. Wu; *F. taipaiensis* var. *yuxiensis* Y. K. Yang et al.

Bulb of 2 or 3 scales, ovoid, 0.7–1.3 cm in diam. Stem 20–50 cm. Leaves 6–9, basal 2 opposite, others alternate or sometimes subopposite; leaf blade linear to narrowly lanceolate, 3–8 cm × 2–4(–6) mm, apex usually curved or cirrose. Inflorescence 1(or 2)-flowered; bracts 3, apex cirrose. Flower nodding, campanulate; pedicel 7–10 mm. Tepals yellowish green, slightly tessellated with purple, suboblong to subovate, 2–4 × 0.6–1.8 cm; nectaries suborbicular, projecting abaxially. Stamens 1.2–2.4 cm; filaments sometimes laxly papillose. Style 3-lobed; lobes 2–4 mm. Capsule narrowly winged. Fl. Jun. $2n = 24$*.

• Grassy slopes; 1800–3500 m. Gansu, Henan, Ningxia, Shaanxi, Shanxi.

The bulbs are used medicinally.

7. Fritillaria crassicaulis S. C. Chen in S. C. Chen & K. C. Hsia, Acta Phytotax. Sin. 15(2): 36. 1977.

粗茎贝母 cu jing bei mu

Fritillaria omeiensis S. C. Chen; *F. wabuensis* S. Y. Tang & S. C. Yueh.

Bulb of 2 scales, ovoid, 2–5 cm in diam.; tunic rather thick. Stem 30–80 cm, usually white farinose distally. Leaves 10–18, basal 2 usually opposite, middle and distal ones whorled, opposite, or alternate; leaf blade oblong-lanceolate to lanceolate, 7–13 × 1–2.6 cm, apex acuminate. Inflorescence 1(–3)-flowered; bracts 3, apex acuminate. Flower nodding, campanulate; pedicel 2–2.5 cm. Tepals yellow or greenish yellow, spotted or slightly tessellated with purple, suboblong, 4–5 × 1.3–1.8 cm; nectaries brownish yellow. Stamens ca. 2 cm; filaments slightly papillose; anthers 8–10 mm. Style 3-lobed; lobes 2–3 mm. Capsule narrowly winged. Fl. May–Jun, fr. Jul–Aug.

• Forests, alpine grasslands; 2500–3400 m. SW Sichuan, NW

Yunnan.

The bulbs are used medicinally.

8. Fritillaria sinica S. C. Chen, Acta Phytotax. Sin. 19: 500. 1981.

中华贝母 zhong hua bei mu

Bulb of 2 or 3 scales, ovoid, ca. 1.5 cm in diam. Stem to 30 cm. Leaves 3–8, opposite or sometimes also whorled, distal ones occasionally alternate; leaf blade broadly linear to oblong-lanceolate, 3–8 × 0.5–2 cm, apex acuminate, not cirrose. Inflorescence 1(or 2)-flowered; bracts (1–)3, apex acuminate. Flower campanulate; pedicel 1.4–2 cm. Tepals olive green, marked and tessellated with deep purple, oblong-elliptic to obovate, 2.5–4.5 × 1.3–2 cm; nectaries ovate or orbicular. Stamens 1.2–2.4 cm; filaments glabrous. Style 3-lobed; lobes ca. 3 mm. Capsule narrowly winged, with persistent tepals. Fl. May–Jun, fr. Jul–Aug.

• Open thickets, hill grasslands; 3400–3600 m. W Sichuan.

The bulbs are used medicinally.

9. Fritillaria monantha Migo, J. Shanghai Sci. Inst., Sect. 3, 4: 139. 1939.

天目贝母 tian mu bei mu

Fritillaria guizhouensis Y. K. Yang et al.; *F. huangshanensis* Y. K. Yang & C. J. Wu; *F. huangshanensis* f. *tonglingensis* (S. C. Chen & S. F. Yin) Y. K. Yang & Y. H. Zhang; *F. hupehensis* P. K. Hsiao & K. C. Hsia; *F. lichuanensis* P. Li & C. P. Yang; *F. monantha* var. *ningguoica* Y. K. Yang & M. M. Fang; *F. monantha* var. *tonglingensis* S. C. Chen & S. F. Yin; *F. ningguoensis* S. C. Chen & S. F. Yin; *F. puqiensis* G. D. Yu & C. Y. Chen; *F. qimenensis* D. C. Zhang & J. Z. Shao; *F. thunbergii* Miquel var. *puqiensis* (G. D. Yu & C. Y. Chen) P. K. Hsiao & S. C. Yu; *F. wanjiangensis* Y. K. Yang et al.

Bulb of 2 or 3 scales, 1.2–2 cm in diam. Stem 20–60 (–100) cm. Leaves opposite, whorled, and alternate; leaf blade oblong-lanceolate to lanceolate, 5–12 × 1.5–3 cm, apex slightly cirrose. Inflorescence 1(–4)-flowered; bracts (1–)3, apex often slightly or strongly cirrose. Flower nodding, tubular-campanulate; pedicel 1–3.5 cm or more. Tepals greenish yellow to pale purple, tessellated or spotted with yellowish brown or dark purple, sometimes very heavily so, oblong-obovate to oblong, 3.5–5 × 1–2 cm, apex obtuse; nectaries projecting abaxially. Stamens ca. 2 mm; filaments glabrous or slightly papillose. Style 3-lobed; lobes 3–8 mm. Capsule broadly winged; wings 6–8 mm wide. Fl. Apr–Jun, fr. Jun–Jul. $2n = 24$*.

• Forests, moist places on limestone hills, flood lands; 100–1600 m. Anhui, Henan, Hubei, Jiangxi, Sichuan, Zhejiang.

The bulbs are used medicinally.

10. Fritillaria walujewii Regel, Gartenflora 28: 353. 1879.

新疆贝母 xin jiang bei mu

Fritillaria tianshanica Y. K. Yang & L. R. Hsu; *F. walujewii* var. *plena* X. Z. Duan & X. J. Zheng; *F. walujewii* var. *shawanensis* X. Z. Duan & X. J. Zheng; *F. xinyuanensis* Y. K. Yang & J. K. Wu.

Bulb of 2 scales, 1–2.5 cm in diam. Stem 20–50 cm. Leaves 7–13, basal 2 opposite, middle ones commonly in whorls of 3–5, distal ones opposite or alternate; leaf blade linear to lanceolate, 5.5–10 cm × 2–9 mm, attenuate to a sharp and slightly cirrose point. Inflorescence 1-flowered (or with 2 or more flowers on robust plants); bracts 3, apex strongly cirrose. Flower nodding, campanulate; pedicel 2–3 cm. Tepals usually purple, occasionally whitish green, spotted and slightly tessellated with purple, suboblong or oblong-elliptic, 3–5 × 1–1.5 cm; nectaries projecting at a right angle abaxially. Stamens 1/2–2/3 as long as tepals; filaments glabrous. Style 3-lobed; lobes 2–3 mm. Capsule broadly winged; wings 4–5 mm wide. Fl. May–Jun, fr. Jul–Aug. $2n = 24$*.

Openings in *Picea* forests, thickets, meadows, steppes; 1300–2000 m. Xinjiang [Kazakstan].

Chinese records of *Fritillaria ferganensis* Losinskaja (e.g., in FRPS) are referable to *F. walujewii*.

Fritillaria walujewii is a vulnerable species in China.

11. Fritillaria verticillata Willdenow, Sp. Pl. 2: 91. 1799.

黄花贝母 huang hua bei mu

Fritillaria albidoflora X. Z. Duan & X. J. Zheng; *F. albidoflora* var. *jimunaica* (X. Z. Duan & X. J. Zheng) X. Z. Duan & X. J. Zheng; *F. albidoflora* var. *purpurea* X. Z. Duan & X. J. Zheng; *F. albidoflora* var. *rhodanthera* X. Z. Duan & X. J. Zheng; *F. amoena* C. Y. Yang; *F. borealixingjiangensis* Y. K. Yang et al.; *F. heboksarensis* X. Z. Duan & X. J. Zheng; *F. tortifolia* X. Z. Duan & X. J. Zheng var. *albiflora* X. Z. Duan & X. J. Zheng; *F. tortifolia* var. *citrina* X. Z. Duan & X. J. Zheng; *F. tortifolia* var. *parviflora* X. Z. Duan & X. J. Zheng; *F. verticillata* var. *jimunaica* X. Z. Duan & X. J. Zheng.

Bulb of 2 scales, ca. 2 cm in diam. Stem 15–50 cm. Leaves rather densely arranged, basal 2 opposite, others in whorls of 4–7; leaf blade narrowly lanceolate to linear, 5–9 cm × 2–10 mm, apex strongly cirrose. Inflorescence 1–5-flowered; bracts 2 or 3, apex strongly cirrose. Flowers nodding, campanulate; pedicel 1–2 cm. Tepals white or pale yellow, occasionally tinged with pale purple, oblong-elliptic, 2–5 × 1.5–2 cm; nectaries ovate, projecting at a right angle abaxially. Stamens 1–2.5 cm; filaments dilated proximally, glabrous. Style 3-lobed, lobes 2–4 mm. Capsule winged; wings 2–4 mm wide. Fl. Apr–Jun, fr. Jul. $2n = 24$*.

Hill thickets, gravelly meadows; 1300–2000 m. NW Xinjiang [Kazakstan, Russia (W Siberia)].

Martyn Rix (pers. comm.) notes that *Fritillaria verticillata* commonly has an inflorescence with only one flower, and that reports of several-flowered plants are the result of longstanding confusion between this species and *F. thunbergii*. Rix also notes that *F. albidoflora* may be distinct from *F. verticillata*, differing as follows: flowers opening nearly flat (vs. campanulate), tepals 2–3 cm (vs. 3–5 cm), and nectaries orbicular (vs. ovate), ca. 6 mm above base of tepal.

12. Fritillaria thunbergii Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 157. 1867.

浙贝母 zhe bei mu

Bulb of 2 or 3 scales, ovoid or globose, 1–3 cm in diam.

Stem 15–80 cm. Leaves 12–20, opposite, alternate, or sometimes also 3-whorled; leaf blade linear-lanceolate to lanceolate, 7–11 × 1–2.5 cm, apex usually slightly cirrose. Inflorescence 1–6-flowered; bracts 2–4, apex cirrose. Flowers nodding, campanulate; pedicel 1–3.5 cm. Tepals pale yellow, sometimes tinged with pale purple or slightly tessellated with purplish brown, oblong-elliptic to narrowly obovate-oblong, 2.5–3.5 × 1–1.8 cm; nectaries small. Stamens 1–1.5 cm; filaments glabrous. Style 3-lobed; lobes 1.5–2 mm. Capsule broadly winged; wings 6–8 mm wide. Fl. Mar–Apr, fr. May–Jun.

• Bamboo forests, shady and moist places; near sea level to 600 m. Anhui, Jiangsu, Zhejiang.

This species was originally described from Japan (as *Uvularia cirrhosa*), where it is not native but cultivated and occasionally naturalized.

1a. Bulb of 2(or 3) scales, 1.5–3 cm in diam.; stem 50–80 cm; leaves mostly alternate ..... 12a. var. *thunbergii*
1b. Bulb of 3 scales, ca. 1 cm in diam.; stem 15–30 cm; leaves mostly opposite ..... 12b. var. *chekiangensis*

12a. Fritillaria thunbergii var. **thunbergii**

浙贝母(原变种) zhe bei mu (yuan bian zhong)

Uvularia cirrhosa Thunberg, Fl. Jap. 136. 1784; *Fritillaria austroanhuiensis* Y. K. Yang & J. K. Wu; *F. collicola* Hance; *F. verticillata* Willdenow var. *thunbergii* (Miquel) Baker.

Bulb of 2(or 3) scales, 1.5–3 cm in diam. Stem 50–80 cm. Leaves mostly alternate. 2*n* = 24*.

• Bamboo forests, shady and moist places; near sea level to 600 m. Anhui, Jiangsu, Zhejiang.

Widely cultivated in China for its bulbs, which are used medicinally.

12b. Fritillaria thunbergii var. **chekiangensis** P. K. Hsiao & K. C. Hsia in S. C. Chen & K. C. Hsia, Acta Phytotax. Sin. 15(2): 42. 1977.

东阳贝母 dong yang bei mu

Fritillaria chekiangensis (P. K. Hsiao & K. C. Hsia) Y. K. Yang et al.; *F. xiaobeimu* Y. K. Yang et al.

Bulb of 3 scales, ca. 1 cm in diam. Stem 15–30 cm. Leaves mostly opposite.

• C Zhejiang (Dongyang Xian).

Cultivated in Zhejiang for its bulbs, which are used medicinally.

13. Fritillaria tortifolia X. Z. Duan & X. J. Zheng, Acta Phytotax. Sin. 25: 59. 1987.

托里贝母 tuo li bei mu

Fritillaria tortifolia var. *barlikensis* X. Z. Duan & X. J. Zheng; *F. tortifolia* var. *plena* X. Z. Duan & X. J. Zheng; *F. tortifolia* var. *wusunica* X. Z. Duan & X. J. Zheng.

Bulb of 2 or 3 scales, ovoid, 1–3 cm or more in diam. Stem 20–40(–100) cm. Leaves 8–11, basal opposite or in a whorl of 3, others whorled and opposite; leaf blade linear to lanceolate, 5–5.5 × 0.8–2 cm, base spirally twisted, apex usually cirrose. Inflorescence 1(or more)-flowered; bracts 3, narrowly lanceolate, apex twisted, cirrose. Flower nodding, campanulate; pedicel 2.5–3 cm. Tepals whitish or yellowish, tessellated with purple or brown, suboblong, ca. 3 × 1–2 cm; nectaries projecting at a right angle abaxially. Stamens ca. 1.8 cm; filaments white, glabrous; anthers purplish, ca. 8 mm. Style 3-lobed; lobes ca. 3 mm. Capsule broadly winged; wings ca. 5 mm wide. Fl. Apr–May, fr. Jun. 2*n* = 24*.

• Thickets, alpine grassy slopes; 1500–2100 m. NW Xinjiang.

14. Fritillaria ussuriensis Maximowicz in Trautvetter et al., Decas Pl. Nov. 9. 1882.

平贝母 ping bei mu

Fritillaria ussuriensis f. *lutosa* C. F. Fang.

Bulb of 2 scales, 1–1.5 cm in diam., usually with a few bulbels around it. Stem 50–60(–100) cm. Leaves 14–17, basal ones usually in a whorl of 3, middle and distal ones whorled or opposite, sometimes also alternate; leaf blade linear to lanceolate, 7–14 × 3–6.5 cm, apex sometimes slightly cirrose. Inflorescence 1(–3)-flowered; bracts 2 per flower (often with 4 or 5 extra bracts on extension of stem above flower), apex strongly cirrose. Flower nodding, tubular-campanulate; pedicel 2.5–3.5 cm. Tepals purple adaxially, brownish violet abaxially, tessellated with yellow, oblong-obovate to subelliptic, ca. 3.5 × 1.5 cm; nectaries projecting at a right angle abaxially. Filaments papillose, longer than anthers. Style 3-lobed, ± papillose; lobes ca. 5 mm. Capsule wingless. Fl. May–Jun, fr. Jul. 2*n* = 24*.

Forests, thickets, meadows, streamsides, shady and moist places; near sea level to 500 m. Heilongjiang, Jilin, Liaoning [Korea, Russia (Far East)].

Fritillaria ussuriensis is cultivated in China for its bulbs, which are used medicinally. It is a vulnerable species in China.

15. Fritillaria yuminensis X. Z. Duan, Acta Phytotax. Sin. 19: 257. 1981.

裕民贝母 yu min bei mu

Fritillaria tachengensis X. Z. Duan & X. J. Zheng; *F. tachengensis* var. *nivea* Y. K. Yang & S. X. Zhang; *F. yuminensis* var. *albiflora* X. Z. Duan & X. J. Zheng; *F. yuminensis* var. *roseiflora* X. Z. Duan & X. J. Zheng; *F. yuminensis* var. *varians* Y. K. Yang & G. J. Liu.

Bulb of 2 or 3 scales, subglobose, ca. 1.5 cm in diam. Stem 30–50 cm. purple. Leaves 9–11, basal 2 opposite, middle ones in a whorl of 3 or 4, distal ones opposite or alternate; leaf blade lanceolate to linear, 5–5.5 × 0.8–2 cm, apex cirrose. Inflorescence 1(or more)-flowered; bracts 3, apex cirrose. Flower nodding, campanulate; pedicel 1–2 cm. Tepals pink, light blue, or dark blue, not tessellated, oblong or ovate-oblong, 1.5–2.2 × 0.6–1.5 cm; nectaries projecting at a right angle abaxially. Style scarcely 3-lobed; lobes less than 1 mm. Capsule broadly winged; wings 3–4 mm wide. Fl. Apr–May, fr. Jun–Jul. 2*n* = 24*.

• Forest margins, open gravelly slopes; 1700–2800 m. NW Xinjiang.

The bulbs are used medicinally.

16. Fritillaria przewalskii Maximowicz in Trautvetter et al., Decas Pl. Nov. 9. 1882.

甘肃贝母 gan su bei mu

Fritillaria gansuensis S. C. Chen & G. D. Yu; *F. przewalskii* var. *discolor* Y. K. Yang & Y. S. Zhou; *F. przewalskii* f. *emacula* Y. K. Yang & J. K. Wu; *F. przewalskii* var. *gannanica* Y. K. Yang & J. Z. Ren; *F. przewalskii* var. *tessellata* Y. K. Yang & Y. S. Zhou.

Bulb of 2 scales, ovoid-globose, 6–13 mm in diam. Stem 15–50 cm. Leaves 4–7, basal 2 usually opposite, others alternate or occasionally subopposite; leaf blade linear to narrowly lanceolate, 3–9 cm × 3–6 mm, apex sometimes slightly curved. Inflorescence 1(or 2)-flowered; bract 1, apex slightly curved. Flower nodding, campanulate or narrowly so; pedicel 2–3 cm. Tepals pale yellow, speckled with blackish purple, narrowly oblong to obovate, 2–3 × 0.6–1.3 cm; nectaries inconspicuous. Stamens ca. 2/3 as long as tepals; filaments papillose. Style scarcely 3-lobed; lobes less than 1 mm. Capsule narrowly winged; wings ca. 1 mm wide. Fl. Jun–Jul, fr. Aug.

• Thickets, grasslands; 2800–4400 m. S Gansu, E Qinghai, Sichuan.

The bulbs are widely used medicinally.

17. Fritillaria unibracteata P. K. Hsiao & K. C. Hsia in S. C. Chen & K. C. Hsia, Acta Phytotax. Sin. 15(2): 39. 1977.

暗紫贝母 an zi bei mu

Bulb of 2 scales, 6–8 mm in diam. Stem 15–40 cm. Leaves 5–7, basal 2 usually opposite, others alternate or also opposite; leaf blade linear to linear-lanceolate, 3.6–5.5 cm × 3–5 mm, apex not cirrose. Inflorescence 1- or more flowered; bract 1, apex acuminate. Flowers campanulate; pedicel rather long. Tepals blackish purple, tessellated with yellowish brown or sometimes with a colored, V-shaped stripe near apex, suboblong, ca. 2.6 × 1 cm; nectaries inconspicuous or strongly projecting abaxially. Stamens 1.2–1.4 cm; filaments sometimes papillose. Style scarcely or shortly lobed; lobes 0.5–2 mm. Capsule narrowly winged; wings ca. 1 mm wide. Fl. May–Jun, fr. Aug.

• Thickets, meadows; 3200–4700 m. S Gansu, SE Qinghai, NW Sichuan.

1a. Flowers narrowly campanulate; nectaries ca. 2.5 × 2 mm, inconspicuous ..... 17a. var. *unibracteata*

1b. Flowers campanulate; nectaries 6–11 × 1–3 mm, strongly projecting abaxially ..... 17b. var. *longinectarea*

17a. Fritillaria unibracteata var. **unibracteata**

暗紫贝母(原变种) an zi bei mu (yuan bian zhong)

Fritillaria lixianensis Y. K. Yang & J. K. Wu; *F. sulcisquamosa* S. Y. Tang & S. C. Yueh; *F. unibracteata* var. *ganziensis* Y. K. Yang & J. K. Wu; *F. unibracteata* var. *maculata* S. Y. Tang & S. C. Yueh.

Flowers narrowly campanulate. Nectaries ca. 2.5 × 2 mm, inconspicuous. $2n = 24$*.

• Thickets, meadows; 3200–4500 m. S Gansu, SE Qinghai, NW Sichuan.

The bulbs are used medicinally.

17b. Fritillaria unibracteata var. **longinectarea** S. Y. Tang & S. C. Yueh in J. M. Xu, Fl. Sichuan. 7: 60. 1991.

长腺贝母 chang xian bei mu

Flowers campanulate. Nectaries 6–11 × 1–3 mm, strongly projecting abaxially. $2n = 24$*.

• Thickets, meadows; 3200–4700 m. NW Sichuan.

18. Fritillaria dajinensis S. C. Chen, Acta Bot. Yunnan. 5: 369. 1983.

大金贝母 da jin bei mu

Bulb of 2 or 3 scales, ovoid, ca. 1 cm in diam. Stem 20–50 cm. Leaves 4–10, basal 2 opposite, middle and distal ones alternate or opposite; leaf blade linear to linear-lanceolate, 3.5–11 cm × 2–10 mm, apex not cirrose. Inflorescence 1(–4)-flowered; bract 1, apex acuminate. Flower campanulate; pedicel 1.5–2 cm. Tepals yellowish green, spotted with purple near base abaxially, oblong or obovate-oblong, 1.8–2.3 cm × 5–6 mm, apex obtuse; inner ones much wider; nectaries not projecting abaxially. Stamens 7–9 mm; filaments 2–3 mm, papillose; anthers 6–10 mm. Style scarcely lobed. Capsule narrowly winged, with persistent tepals. Fl. Jun, fr. Jul. $2n = 24$*.

• Thickets, meadows; 3600–4400 m. NW Sichuan.

19. Fritillaria delavayi Franchet, J. Bot. (Morot) 12: 222. 1898.

梭砂贝母 suo sha bei mu

Fritillaria delavayi var. *banmaensis* Y. K. Yang & J. K. Wu.

Bulb of 2 or 3 scales, subglobose or ovoid, 1–2 cm in diam. Stem 15–35 cm, often covered with a waxlike layer near base. Leaves 3–5, closely arranged in middle or distal part of stem, alternate or subopposite; leaf blade ovate or ovate-elliptic, 2–7 × 1–3 cm, apex obtuse or rounded. Inflorescence 1-flowered. Flower campanulate; pedicel long. Tepals yellowish, spotted or tessellated with reddish brown, narrowly elliptic or oblong-elliptic, 3.2–4.5 × 1.2–1.8 cm; nectaries inconspicuous. Stamens 1.6–2.2 cm; filaments glabrous; anthers basifixed. Style 3-lobed; lobes 0.5–4 mm. Capsule narrowly winged, ± enclosed by persistent tepals. Fl. Jun–Jul, fr. Aug–Sep.

Sandy and gravelly places, flood lands; 3400–5600 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, Sikkim].

20. Fritillaria fusca Turrill, Hooker's Icon. Pl. 35: t. 3427, f. 8–11. 1943.

高山贝母 gao shan bei mu

Fritillaria himalaica Y. K. Yang et al.

Bulb of 2 scales, ovoid. Stem 8–22 cm. Leaves 2 or 3, subopposite or alternate; leaf blade elliptic to suboblong, 1.9–3.3 × 0.7–2 cm, apex obtuse. Inflorescence 1-flowered. Flower nodding. Tepals yellowish, heavily tessellated with purplish brown, ca. 1.7 × 0.7 cm. Stamens ca. 1/2 as long as tepals; filaments glabrous; anthers dorsifixed. Style 3-lobed; lobes ca. 2.5 mm. Capsule wingless. Fl. Jul.

• Moist and gravelly places, open flood lands; 5000–5100 m. S

Xizang.

21. Fritillaria karelinii (Fischer ex D. Don) Baker, J. Linn. Soc., Bot. 14: 268. 1874.

砂贝母 sha bei mu

Rhinopetalum karelinii Fischer ex D. Don in Sweet, Brit. Fl. Gard., ser. 2, t. 283. 1835; *Fritillaria karelinii* var. *albiflora* X. Z. Duan & X. J. Zheng.

Bulb of 2 scales, ca. 1 cm in diam. Stem 12–35 cm, papillose-pubescent. Leaves 5–8, basal 2 subopposite, lanceolate, 4–6 × 0.8–1.5 cm, distal ones alternate, linear, 2.5–3 cm × 1–5 mm, minutely papillose-pubescent. Inflorescence 3–13-flowered; bracts usually 2, linear. Flowers slightly zygomorphic; pedicel 7–12 mm. Tepals rose violet, spotted or tessellated with dark color, oblong-ovate, 1–1.5 cm × 3–5 mm; nectary on 1 outer tepal much larger than others and spurred abaxially. Stamens slightly shorter than tepals; filaments usually papillose-ciliate proximally; anthers subglobose or broadly ovate, ca. 1.2 mm in diam. Style scarcely lobed. Capsule wingless. Fl. Apr, fr. May–Jun. 2*n* = 24*.

Sandy soil, stony slopes, gravelly screes. NW Xinjiang [Afghanistan, Kazakstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

22. Fritillaria anhuiensis S. C. Chen & S. F. Yin in S. F. Yin, Acta Phytotax. Sin. 21: 100. 1983.

安徽贝母 an hui bei mu

Fritillaria anhuiensis var. *albiflora* S. C. Chen & S. F. Yin; *F. anhuiensis* f. *jinzhaiensis* Y. K. Yang & J. Z. Shao; *F. ebeiensis* G. D. Yu & G. Q. Ji; *F. ebeiensis* var. *purpurea* G. D. Yu & P. Li; *F. hupehensis* P. K. Hsiao & K. C. Hsia var. *dabieshanensis* M. B. Deng & K. Yao; *F. shuchengensis* Y. K. Yang et al.; *F. wuyangensis* Z. Y. Gao.

Bulb of 2 or 3 subreniform scales, 1–2 cm in diam., with many smaller bulbels inside; bulbels ricelike, ovoid, obtusely conical or somewhat rhombic, varying in size. Stem 10–50 cm. Leaves 6–18, basal ones usually opposite or whorled, middle and distal ones vertilcillate, opposite, or alternate; leaf blade oblong-lanceolate, 10–15 × 0.5–2(–3.5) cm, apex acuminate. Inflorescence 1- or 2(–4)-flowered; bracts usually 3, apex acuminate. Flowers nodding, tubular-campanulate; pedicel 1–3 cm. Tepals commonly yellowish white or yellowish green spotted or tessellated with purple, rarely pure white or purple, oblong to elliptic, 3–5 × 1–1.5 cm; nectaries projecting abaxially. Filaments ca. 2 mm, glabrous. Style 3-lobed; lobes 2–6 mm. Capsule broadly winged; wings 5–10 mm wide. Fl. Mar–Apr, fr. May–Jun. 2*n* = 24*.

• Forests, thickets, grassy slopes; 600–900 m. Anhui, Henan.

Cultivated in Anhui for its bulbs, which are used medicinally.

23. Fritillaria maximowiczii Freyn, Oesterr. Bot. Z. 53: 21. 1903.

轮叶贝母 lun ye bei mu

Fritillaria maximowiczii f. *flaviflora* Q. S. Sun & H. C. Lo.

Bulb of 4–6 or more scales, 1–2 cm in diam., surrounded by many small bulbels usually detached during flowering. Stem 27–55 cm, slender, glabrous. Leaves 3–6 in 1 whorl (very rarely in 2 whorls) and occasionally 1 or 2 smaller leaves between whorl and flower; leaf blade linear to linear-lanceolate, 4.5–10 cm × 3–13 mm, apex not cirrose. Inflorescence usually 1-flowered; bract 1. Flower nodding, campanulate; pedicel long. Tepals reddish adaxially, purplish violet abaxially, slightly or markedly tessellated with yellow, lanceolate-elliptic or ovate-elliptic, 3.5–4 × 1–1.4 cm, margin erose, papillose; nectaries projecting abaxially. Stamens 2–2.5 cm; filaments glabrous. Style 3-lobed; lobes 6–8 mm. Capsule winged; wings ca. 4 mm wide. Fl. Jun. 2*n* = 24.

Broad-leaved deciduous forests, moist and sandy places on forest margins, thickets, grassy slopes; 1400–1500 m. Hebei, Heilongjiang, Jilin, Liaoning [Russia (Far East, E Siberia)].

24. Fritillaria davidii Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 93. 1887.

米贝母 mi bei mu

Bulb of 3–10 globose scales, 1–2 cm in diam., surrounded by many small bulbels. Stem 10–33 cm, glabrous. Basal leaves 1–4; petiole 10–24 cm, slender; leaf blade elliptic or ovate, 3–5.5 × 2–2.8 cm, apex acute. Inflorescence 1-flowered; bracts 3 or 4, crowded, suboblong, 2–3 cm × 5–8 mm. Flowers campanulate; pedicel short. Tepals yellow, tessellated with purple, suboblong-elliptic, 3–4 × 0.7–1.4 cm, papillose-tuberculate adaxially, apex obtuse; nectaries inconspicuous. Stamens 1.5–2 cm; filaments glabrous; anthers subdorsifixed. Style 3-lobed; lobes 5–6 mm. Fl. Mar–May.

• *Betula alnoides* forests, grassy slopes, loose peaty soil with ferns, rocky moist places along streams, crevices of cliffs; 1600–2600 m. W Sichuan.

18. NOTHOLIRION Wallich ex Boissier, Fl. Orient. 5: 190. 1882.

假百合属 jia bai he shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, bulbiferous. Bulb narrowly ovoid or cylindric; tunic black-brown, scarious; bulbels many, with several fleshy scales and hard tunics. Stem erect, stout, glabrous or subglabrous. Leaves basal and cauline, alternate, sessile, linear to linear-lanceolate. Inflorescence a terminal raceme, few to many flowered; bracts linear. Flowers bisexual, campanulate to funnelform; pedicel usually rather short. Tepals 6, free, usually blue, purple, or red. Stamens 6, inserted at base of tepals; filaments filiform, slightly widened toward base; anthers dorsifixed, versatile, ellipsoid to narrowly so. Ovary 3-loculed; ovules many per locule. Style columnar,

rather long, slender; stigma 3-lobed, lobes slightly recurved. Fruit a loculicidal capsule. Seeds many, flat, narrowly or scarcely winged all round.

Five species: Afghanistan, Bhutan, China, India, Myanmar, Nepal, Sikkim; SW Asia (Iran, Iraq); three species in China.

1a. Plants 18–35 cm tall; raceme 2–4(–6)-flowered; cauline leaves 4–8(–17) mm wide ..... 3. *N. macrophyllum*
1b. Plants 60–150 cm tall; raceme 10–24-flowered; cauline leaves 10–25 mm wide.
2a. Tepals pale purple or blue-purple, 2.5–3.6 × 0.8–1.2 cm ..... 1. *N. bulbuliferum*
2b. Tepals red, dark red, pink, or sometimes red-purple, 3.5–5 × 1–2 cm ..... 2. *N. campanulatum*

1. Notholirion bulbuliferum (Lingelsheim ex H. Limpricht) Stearn, Kew Bull. 5: 421. 1950.

假百合 jia bai he

Paradisea bulbuliferum Lingelsheim ex H. Limpricht, Repert. Spec. Nov. Regni Veg. Beih. 12: 316. 1922; *Lilium hyacinthinum* E. H. Wilson; *Notholirion hyacinthinum* (E. H. Wilson) Stapf.

Bulbels many, pale brown, ovoid, 3–5 mm in diam. Stem 60–150 cm, subglabrous. Basal leaves several, lorate, 10–25 × 1.5–2 cm; cauline leaves linear-lanceolate, 10–18 × 1–2 cm. Raceme laxly 10–24-flowered; bracts leaflike, linear, 2–7.5 cm × 3–4 mm. Flowers horizontal; pedicel slightly curved, 5–7 mm. Tepals usually spreading, pale purple or blue-purple, tinged with green apically, obovate or oblanceolate, 2.5–3.6 × 0.8–1.2 cm. Stamens scarcely shorter than tepals. Ovary pale purple, 1–1.5 cm. Style 1.5–2 cm. Capsule oblong to obovoid-oblong, 1.6–2 × ca. 1.5 cm, obtusely angular. Fl. Jul, fr. Aug. 2*n* = 24*.

Thickets, alpine grassy slopes; 3000–4500 m. Gansu, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, Nepal, Sikkim].

2. Notholirion campanulatum Cotton & Stearn, Lily Year Book 3: 19. 1934.

钟花假百合 zhong hua jia bai he

Bulbels many, pale brown, ovoid, 5–6 mm in diam. Stem 60–100 cm, subglabrous. Basal leaves many, lorate, 22–24 × 2–2.5 cm, membranous; cauline leaves linear-lanceolate, 10–20 × 1–2.5 cm. Raceme laxly 10–16-flowered; bracts leaflike, linear-lanceolate, 3–7 cm × 4–9 mm. Flowers nodding, campanulate; pedicel slightly curved, 4–7 mm. Tepals usually spreading, red, dark red, pink, or sometimes red-purple, tinged with green apically, obovate-oblanceolate, 3.5–5 × 1–2 cm. Stamens slightly shorter than tepals. Ovary cylindric, 1–1.3 cm × 2–3 mm. Style ca. 2 cm. Capsule brownish, oblong, 2–2.5 × 1.6–1.8 cm. Fl. Jun–Aug, fr. Sep. 2*n* = 24.

Forest margins, grassy slopes; 2800–4500 m. Sichuan, NW Yunnan [Bhutan, Myanmar].

3. Notholirion macrophyllum (D. Don) Boissier, Fl. Orient. 5: 190. 1882.

大叶假百合 da ye jia bai he

Fritillaria macrophylla D. Don, Prodr. Fl. Nepal. 51. 1825; *Lilium macrophyllum* (D. Don) Voss.

Stem 18–35 cm, glabrous. Basal leaves lorate, 30–40 × ca. 2 cm; cauline leaves 5–10, linear, 6.5–15 × 0.4–0.8(–1.7) cm. Raceme laxly 2–4(–6)-flowered; bracts narrowly linear, 1.2–1.5 cm, apex curved. Flowers funnelform; pedicel slightly curved, 0.6–1.5 cm. Tepals pale purple-red or purple, oblanceolate-oblong, 2.5–5 × 0.6–1.5 cm, base narrowed, apex obtuse or rounded. Stamens slightly shorter than tepals; filaments 2–3.5 cm; anthers ca. 5 mm. Ovary oblong, 7–8 × ca. 4 mm. Style 1.5–3.2 cm. Fl. Aug. 2*n* = 24.

Rocky places in *Quercus* forests, grassy slopes, meadows; 2800–3400 m. Sichuan, Xizang, Yunnan [Bhutan, Nepal, Sikkim].

19. CARDIOCRINUM (Endlicher) Lindley, Veg. Kingd. 205. 1846.

大百合属 da bai he shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Lilium [unranked] *Cardiocrinum* Endlicher, Gen. Pl. 141. 1836.

Herbs perennial, bulbiferous. Bulb formed by swollen base of usually deciduous basal leaves; bulbels several, ovoid, covered with tunics. Stem very tall, stout, glabrous. Leaves basal and cauline, petiolate, usually ovate-cordate, reticulate veined. Inflorescence a terminal raceme, several to many flowered; bracts persistent or caducous. Flowers bisexual, tubular-funnelform, large; pedicel rather short. Tepals 6, free, ± connivent. Stamens 6, inserted at base of tepals; filaments flat; anthers dorsifixed, versatile, narrowly ellipsoid. Ovary cylindric, 3-loculed; ovules many per locule. Style elongate; stigma slightly 3-lobed. Fruit a loculicidal capsule. Seeds reddish brown, flat, narrowly winged all round.

Three species: Bhutan, China, India, Japan, Myanmar, Nepal, Sikkim; two species (one endemic) in China.

1a. Raceme 10–16-flowered; bracts caducous ..... 1. *C. giganteum*
1b. Raceme 3–5-flowered; bracts persistent ..... 2. *C. cathayanum*

1. Cardiocrinum giganteum (Wallich) Makino, Bot. Mag. (Tokyo) 27: 125. 1913.

大百合 da bai he

Bulbels 3.5–4 × 1.2–2 cm. Stem erect, green or dark green,

1–3 m × 3–5 cm, hollow. Leaves on proximal 1/2 of stem larger, those on distal 1/2 much smaller, sometimes bractlike; petiole 15–20 cm; leaf blade ovate-cordate, 15–20 × 12–15 cm. Raceme 10–16-flowered; bracts caducous. Tepals white or tinged with green, streaked with purple or purple-red adaxially, linear-oblanceolate, 12–15 × 1.5–2 cm, apex obtuse. Stamens 6.5–7.5 cm; filaments slightly widened toward base; anthers ca. 8 × 2 mm. Ovary 2.5–3 cm × 4–5 mm. Style 5–6 cm. Capsule subglobose, 3.5–4 cm in diam.; apex beaked. Seeds ovate-deltoid, 4–5 × 2–3 mm. Fl. Jun–Jul, fr. Sep–Oct.

Forests, hillsides; 1200–3600 m. Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, S Xizang, Yunnan [Bhutan, NE India, Myanmar, Nepal, Sikkim].

1a. Stem green, 1.5–3 m; tepals adaxially streaked with purple, abaxially greenish ..... 1a. var. *giganteum*
1b. Stem dark green, 1–2 m; tepals adaxially streaked with purple-red, abaxially white ..... 1b. var. *yunnanense*

1a. Cardiocrinum giganteum var. **giganteum**

大百合(原变种) da bai he (yuan bian zhong)

Lilium giganteum Wallich, Tent. Fl. Napal. 21. 1824.

Stem green, 1.5–3 m. Tepals adaxially streaked with purple, abaxially greenish. 2*n* = 24*.

Forests, hillsides; 2300–2900 m. S Xizang [Bhutan, NE India, Myanmar, Nepal, Sikkim].

1b. Cardiocrinum giganteum var. **yunnanense** (Leichtlin ex Elwes) Stearn, Gard. Chron., ser. 3, 124: 4. 1948.

云南大百合 yun nan da bai he

Lilium giganteum Wallich var. *yunnanense* Leichtlin ex Elwes, Gard. Chron., ser. 3, 60: 49. 1916; *L. mirabile* Franchet.

Stem dark green, 1–2 m. Tepals adaxially streaked with purple-red, abaxially white. 2*n* = 24*.

Forests; 1200–3600 m. Gansu, Guangdong, Guangxi; Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [Myanmar].

2. Cardiocrinum cathayanum (E. H. Wilson) Stearn, Gard. Chron., ser. 3, 124: 4. 1948.

荞麦叶大百合 qiao mai ye da bai he

Lilium cathayanum E. H. Wilson, Lilies East. Asia, 99. 1925.

Bulbels ca. 2.5 × 1.2–1.5 cm. Stem erect, 0.5–1.5 m × 2–3 cm, hollow. Leaves absent in proximal part of stem except basal ones, crowded in middle part, laxly spirally alternate in distal part; petiole 6–20 cm; leaf blade ovate to ovate-cordate, 10–22 × 6–12 cm. Raceme 3–5-flowered; bracts oblong, 4–5.5 × ca. 1.6 cm, persistent. Tepals white or greenish, purple streaked adaxially, linear-oblanceolate, 13–15 × 1.5–2 cm. Stamens 8–10 cm, ca. 2/3 as long as tepals; anthers 8–9 mm. Ovary 3–3.5 cm × 5–7 mm. Style 6–6.5 cm. Capsule subglobose, 4–5 × 3–3.5 cm. Seeds 4.5–2.5 mm, reddish brownish winged all round. Fl. Jul–Aug, fr. Aug–Sep. 2*n* = 24*.

• Moist and shady places on forested slopes; 600–2200 m. Anhui, Fujian, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang.

20. LILIUM Linnaeus, Sp. Pl. 1: 302. 1753.

百合属 bai he shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, bulbiferous. Bulb of many imbricate, fleshy scales, without tunic. Stem erect, leafy. Leaves alternate, rarely whorled, sessile or subsessile, usually linear to linear-lanceolate. Bulblets sometimes present in leaf axils. Inflorescence terminal, a raceme or solitary flower, very rarely an umbel or corymb; bracts leaflike. Flowers often funnelform or campanulate, sometimes tubular or cupular. Tepals 6, free, usually connivent, sometimes strongly recurved or revolute, white, yellow, greenish, or reddish to purplish, nectariferous near base adaxially; nectaries usually narrowly grooved, sometimes fringed with papillae or hairs, rarely flat on outer tepals. Stamens 6; filaments subulate or filiform, sometimes pubescent; anthers dorsifixed, versatile. Ovary 3-loculed; ovules many per locule. Style elongate, slender; stigma swollen, usually 3-lobed. Fruit a loculicidal capsule. Seeds many, arranged like a pile of coins in each valve, flat, narrowly winged all round.

About 115 species: temperate and alpine regions of the N hemisphere, especially in E Asia; 55 species (35 endemic, one introduced) in China.

The status of *Lilium puerense* Y. Y. Qian (Guihaia 11: 125. 1991) and *L. rockii* R. H. Miao (Acta Scient. Nat. Univ. Sunyatseni 34(3): 81. 1995) is unclear. *Lilium puerense* was described from S Yunnan (Pu'er Xian), based on specimens collected in 1987 (holotype: *Y. Y. Qian 1774*, SMAO). It is said to be similar to *L. sulphureum*, but with leaf margin papillose, bracts ovate, and ovary greenish (vs. purple). *Lilium rockii* was described from Yunnan, based on a single specimen collected in 1932 (*J. F. Rock 25129*, SYS). It is said to be close to *L. concolor*, but with stem, leaf margin, and leaf veins on both surfaces shortly hirsute (vs. papillose), flowers larger, tepals yellowish (vs. deep red), and style longer (vs. shorter) than ovary. *Lilium pyi* is also an unclear species, of which no specimens were seen by the present authors. It is briefly described at the end of this account (no. 55), but could not be included in the key because insufficient details are known. *Lilium apertum* and *L. saluenense* are temporarily treated as *Nomocharis aperta* and *N. saluenensis*, respectively. At present, *Nomocharis* consists of six species. However, further studies are needed to clarify whether *Nomocharis* should be regarded as an independent genus or included within *Lilium*.

1a. Leaves whorled.
2a. Flowers campanulate; stamens converging.
3a. Tepals purple, narrowly elliptic or rarely narrowly ovate, 25–35 × 10–14 mm ..... 6. *L. paradoxum*
3b. Tepals yellow, elliptic, 50–60 × 20–24 mm ..... 7. *L. medogense*

2b. Flowers not campanulate, tepals spreading, recurved, or revolute; stamens diverging.
4a. Flowers erect; tepals spreading or slightly recurved ..... 3. *L. tsingtauense*
4b. Flowers nodding to horizontal; tepals revolute.
5a. Nectaries papillose on both surfaces.
6a. Bulb scales not articulate; tepals purple-red, with deeply colored spots ..... 2. *L. martagon*
6b. Bulb scales articulate; tepals pale orange-red, with purple-red spots ..... 4. *L. distichum*
5b. Nectaries not papillose.
7a. Bulb scales articulate; tepals apricot-colored to scarlet, with black spots, scarcely thickened ..... 5. *L. medeoloides*
7b. Bulb scales not articulate; tepals yellow or red-orange, with brown spots, thickened ..... 1. *L. hansonii*
1b. Leaves alternate.
8a. Flowers funnelform or campanulate; stamens distally curved upward or converging.
9a. Flowers horizontally spreading or nodding, funnelform; tepals white, unspotted; stamens curved upward distally.
10a. Nectaries papillose on both surfaces; leaf axils without bulblets.
11a. Bracts lanceolate, not curved apically; style glabrous ..... 45. *L. brownii*
11b. Bracts linear-lanceolate, curved apically; style densely pubescent proximally ..... 46. *L. anhuiense*
10b. Nectaries not papillose; leaf axils sometimes with bulblets in distal part of stem.
12a. Leaf axils in distal part of stem with bulblets.
13a. Filaments glabrous; bulblets brown ..... 52. *L. sulphureum*
13b. Filaments densely pubescent proximally; bulblets green ..... 53. *L. sargentiae*
12b. Leaf axils without bulblets.
14a. Bulb scales articulate ..... 47. *L. wenshanense*
14b. Bulb scales not articulate.
15a. Leaves linear, 2–7 mm wide.
16a. Leaves 2–3 mm wide, papillose at margin and on midvein abaxially ..... 48. *L. regale*
16b. Leaves 4–13 mm wide, smooth at margin and on midvein abaxially ..... 49. *L. formosanum*
15b. Leaves lanceolate or oblong-lanceolate, 6–18 mm wide.
17a. Filaments glabrous ..... 50. *L. longiflorum*
17b. Filaments pubescent ..... 51. *L. leucanthum*
9b. Flowers campanulate, spotted or unspotted; stamens converging.
18a. Nectaries of inner tepals papillose or with fimbriate projections on both surfaces.
19a. Nectaries of inner tepals papillose on both surfaces; flowers erect.
20a. Leaves not white woolly basally; stem papillose; style slightly shorter than ovary; tepals 2–6 cm ..... 11. *L. concolor*
20b. Leaves with a cluster of white woolly hairs basally; stem smooth; style more than 2 × as long as ovary; tepals 7–9 cm ..... 12. *L. dauricum*
19b. Nectaries of inner tepals with fimbriate projections on both surfaces; flowers nodding or horizontal.
21a. Tepals yellow, pale yellow, or greenish yellow, lanceolate or ovate-lanceolate ..... 8. *L. lophophorum*
21b. Tepals pale purple, purple-red, or yellow, rarely white, often spotted purplish, elliptic or ovate-elliptic.
22a. Style 4–6 mm; bulb scales white ..... 9. *L. nanum*
22b. Style ca. 1 mm; bulb scales purple ..... 10. *L. brevistylum*
18b. Nectaries of inner tepals neither papillose nor with fimbriate projections.
23a. Leaves 12–15 cm; flowers usually 5 or 6; tepals white, with a dark purple-red blotch at base adaxially ..... 13. *L. henrici*
23b. Leaves 2.5–8 cm; flowers usually 3 or 4; tepals variable in color, without a dark purple-red blotch at base adaxially.
24a. Stem papillose.
25a. Leaves papillose at margin and on midvein abaxially; flowers 6.5–8.3 × 5.5–6 cm ..... 14. *L. bakerianum*
25b. Leaves smooth; flowers 3.5–4 × 3–3.5 cm.
26a. Tepals white, with purple-red speckles basally ..... 15. *L. sempervivoideum*
26b. Tepals purple-red or rose purple, with red spots ..... 16. *L. amoenum*
24b. Stem smooth.
27a. Leaves narrowly linear or subulate, 1–2(–3) mm wide ..... 17. *L. pinifolium*
27b. Leaves ovate-lanceolate, narrowly elliptic, or lanceolate, 6–24 mm wide.
28a. Leaves 7–8 × 1.6–2.4 cm; tepals pale red ..... 20. *L. huidongense*
28b. Leaves 2–6 × 0.6–1.5 cm; tepals purple-red.
29a. Tepals adaxially not speckled, basally not saccate ..... 18. *L. souliei*
29b. Tepals adaxially speckled, basally saccate ..... 19. *L. saccatum*
8b. Flowers neither funnelform nor campanulate (slightly funnelform in *L. nepalense*); tepals revolute or not; stamens diverging apically.
30a. Nectaries not papillose, sometimes with fimbriate projections.

31a. Leaves shortly petiolate; nectaries with fimbriate projections on both surfaces.
32a. Leaves similar in shape; tepals white, with purple-red blotches and spots on proximal 1/3–1/2, margin undulate ..... 21. *L. speciosum*
32b. Leaves conspicuously dimorphic; tepals yellow or orange, margin entire.
33a. Leaves oblong-lanceolate, 20–27 mm wide; capsule brown, oblong, 4–4.5 × ca. 3.5 cm ..... 22. *L. henryi*
33b. Leaves linear-lanceolate, 8–10 mm wide; capsule brownish green, narrowly oblong, 5.5–6.5 × 1.4–1.8 cm ..... 23. *L. rosthornii*
31b. Leaves sessile; nectaries without fimbriate projections.
34a. Tepals primrose yellow, greenish yellow, or pale yellow, rarely yellowish white or orange-yellow, unspotted.
35a. Leaves lanceolate, 3-veined ..... 24. *L. primulinum*
35b. Leaves oblong-lanceolate, 5-veined ..... 25. *L. nepalense*
34b. Tepals white, pale purple-red, pink, or greenish yellow, with purple-red spots.
36a. Tepals pale purple-red or pink; style at least 3 × as long as ovary; leaves narrowly lanceolate, with 3 impressed veins adaxially ..... 26. *L. wardii*
36b. Tepals equaling or slightly longer than ovary; leaves linear or linear-lanceolate, without 3 impressed veins adaxially.
37a. Flower solitary.
38a. Tepals white, tinged pale brown ..... 27. *L. matangense*
38b. Tepals greenish or greenish yellow.
39a. Tepals greenish yellow, with deep red spots; filaments much longer than anthers ..... 28. *L. stewartianum*
39b. Tepals greenish, with purple spots throughout; filaments slightly shorter than anthers ..... 29. *L. habaense*
37b. Flowers 2–5(–13) in a raceme.
40a. Leaves narrowly oblong or ovate-lanceolate, 5–11 × 1.5–3 cm ..... 32. *L. lijiangense*
40b. Leaves linear, linear-lanceolate, or lanceolate, 5–10 × 0.8–1.5 cm.
41a. Tepals white, with purple spots; style subequaling or slightly longer than ovary ..... 30. *L. taliense*
41b. Tepals white or yellow, purple at base and with purple spots apically; style ca. 2 × as long as ovary ..... 31. *L. jinfushanense*
30b. Nectaries papillose on both surfaces.
42a. Leaf axils in distal part of stem with bulblets ..... 44. *L. tigrinum*
42b. Leaf axils without bulblets.
43a. Leaves narrowly lanceolate to oblong.
44a. Tepals red, with black or purple spots and fimbriate projections.
45a. Plants white hispidulous ..... 35. *L. amabile*
45b. Plants not white hispidulous, white woolly when young ..... 36. *L. leichtlinii*
44b. Tepals white or pink, with purple spots, without fimbriate projections.
46a. Leaf axils with a cluster of white hairs; leaf veins not elevated abaxially; tepals white, with purple-red spots ..... 33. *L. duchartrei*
46b. Leaf axils without hairs; leaf veins elevated abaxially; tepals pink, with deep red spots ..... 34. *L. lankongense*
43b. Leaves linear.
47a. Nectaries papillose and crested on both surfaces.
48a. Bulb yellow, 4.5 × 4–5 cm ..... 43. *L. xanthellum*
48b. Bulb white, 2–3 × 1.5–2.5 cm
49a. Tepals purple-red to reddish brown, unspotted ..... 41. *L. papilliferum*
49b. Tepals greenish white, with purple or purple-brown spots ..... 42. *L. fargesii*
47b. Nectaries only papillose on both surfaces, not crested.
50a. Bracts thickened apically ..... 40. *L. callosum*
50b. Bracts not thickened apically.
51a. Tepals bright red or white, usually unspotted, occasionally with a few spots near base.
52a. Tepals bright red, not minutely papillose adaxially ..... 37. *L. pumilum*
52b. Tepals white, minutely papillose adaxially ..... 54. *L. tianschanicum*
51b. Tepals pale purple-red or orange, darker purple spotted proximally.
53a. Stem densely papillose; tepals orange, 5–6 cm ..... 38. *L. davidii*
53b. Stem not papillose; tepals pale purple-red, 3.5–4.5 cm ..... 39. *L. cernuum*

1. Lilium hansonii Leichtlin ex D. T. Moore, Moore's Rural New Yorker 24: 60. 1871.

竹叶百合 zhu ye bai he

Lilium medeoloides A. Gray var. *obovata* Franchet & Savatier.

Bulb ovoid-globose or subglobose, 3–7 cm in diam.; scales white to yellowish white, ovate to subdeltoid, not articulate. Stem 1–1.5 m. Leaves 4–12-whorled plus a few scattered

between apical whorl and basal bract, oblong-oblanceolate, 10–18 × 2–4 cm, apex acuminate. Flowers 4–12 in a raceme, nodding, fragrant. Tepals revolute, yellow or red-orange, with brown spots, lanceolate or oblanceolate, 3–4 cm × 1–1.5 cm, very thick, apex thickened and papillose; nectaries not papillose. Stamens shorter than tepals; filaments glabrous; anthers purplish. Ovary 1–2 cm. Capsule subglobose, 2.5–3.5 cm in diam., 6-winged. Fl. and fr. Jul–Aug. 2*n* = 24.

Possibly naturalized on river banks. S Jilin [native to Korea (Ullung Island)].

Lilium hansonii, *L. distichum*, and *L. medeoloides* seem to be related to one another, and grow allopatrically.

Lilium hansonii is grown as an ornamental.

2. Lilium martagon Linnaeus var. **pilosiusculum** Freyn, Oesterr. Bot. Z. 40: 224. 1890.

新疆百合 xin jiang bai he

Lilium martagon subsp. *pilosiusculum* (Freyn) E. Pritzel; *L. pilosiusculum* (Freyn) Misczenko.

Bulb broadly ovoid, ca. 5 mm in diam.; scales oblong, 2–2.5 cm × 8–10 mm, apex acute, not articulate. Stem with purple streaks, 45–90 cm, glabrous. Leaves whorled, rarely scattered, lanceolate, 6.5–11 × 1–2 cm, abaxially sometimes with white hairs. Bracts 2–4 cm × 5–6 mm, with white hairs in axil, at margin, and abaxially. Flowers 2–7 in a raceme, nodding. Tepals purple-red, spotted, narrowly elliptic, 3.2–3.8 cm × 8–9 mm, abaxially with white, curly, long hairs; nectaries papillose on both surfaces. Filaments 2.2–2.4 cm; anthers ca. 9 mm. Ovary 8–9 × 2–3 mm. Style ca. 1.5 cm. Capsule obovoid-oblong. 2–2.8 cm. Fl. Jun–Jul, fr. Aug.

Forests, thickets, shady slopes; 200–2500 m. N Xinjiang [Mongolia, Russia].

Rudolf Kamelin (pers. comm.) believes that *Lilium martagon* var. *martagon*, which differs in having glabrous tepals, also occurs in China. Its distribution extends westward to Europe.

3. Lilium tsingtauense Gilg., Bot. Jahrb. Syst. 34 (Beibl. 75): 24. 1904.

青岛百合 qing dao bai he

Lilium miquelianum Makino.

Bulb subglobose, 2.5–4 cm in diam.; scales white, lanceolate, 2–2.5 cm × 6–8 mm, not articulate. Stem 40–85 cm, not papillose. Leaves in 1 or 2 whorls of 5–14 plus a few scattered, shortly petiolate, oblong-oblanceolate to narrowly elliptic, 10–15 × 2–4 cm, glabrous. Bracts 4–5.5 × 0.8–1.5 cm. Flowers solitary or 2–7 in a raceme, erect. Tepals orange or vermilion, with purple-red spots, narrowly elliptic, 4.8–5.2 × 1.2–1.4 cm; nectaries not papillose. Filaments ca. 3 cm, glabrous; anthers orange. Ovary 0.8–1.2 cm × 3–4 mm. Style ca. 2 × as long as ovary. Fl. Jun, fr. Aug. 2*n* = 24*.

Sunny forested slopes, bushy and grassy places; 100–400 m. Anhui, Shandong [Korea].

4. Lilium distichum Nakai ex Kamibayashi, Chosen Yuri Dzukai, t. 7. 1915.

东北百合 dong bei bai he

Bulb ovoid, (2.5–)3.5–4 cm in diam.; scales white, lanceolate, 1.5–2 cm × 4–6 mm, articulate. Stem 60–120 cm, papillose. Leaves in a whorl of 7–9(–20) near middle of stem plus a few scattered, obovate-oblanceolate to narrowly oblong-lanceolate, (5–)8–15 × (1–)2–4 cm, glabrous. Bracts 2–2.5 cm × 3–6 mm. Flowers (1 or)2–12 in a raceme, nodding to horizontal. Tepals slightly revolute, pale vermilion, with purple-red spots, ovate-lanceolate, 3.5–4.5 cm × 6–13 mm; nectaries not papillose. Stamens shorter than tepals; filaments 2–2.5 cm, glabrous; anthers to 1 cm. Ovary 8–9 × 2–3 mm. Style ca. 2 × as long as ovary. Capsule obovoid, ca. 2 × 1.5 cm. Fl. Jul–Aug, fr. Sep. 2*n* = 24*.

Forested slopes, forest margins, hillsides along streams; 200–1800 m. Heilongjiang, Jilin, Liaoning [Korea, Russia (Primorskiy Kray)].

5. Lilium medeoloides A. Gray, Mem. Amer. Acad. Arts, ser. 2, 6: 415. 1858.

浙江百合 zhe jiang bai he

Lilium avenaceum Fischer ex Regel.

Bulb subglobose, 2–2.5 cm in diam.; scales white, oblong-lanceolate, 1–2 cm × 3–4 mm, articulate. Stem 30–75(–100) cm, smooth, rarely slightly papillose proximally. Leaves usually in a whorl of 7–12(–20) plus a few scattered, lanceolate-oblong, lanceolate, or oblanceolate, 5–12(–17) × 1.5–4 cm, glabrous, rarely slightly scabrous at margin, apex acute to acuminate. Flowers solitary or 2–4(–10) in an umbel or raceme, nodding, rarely to ascending, not fragrant. Tepals strongly revolute, apricot-colored to bright red, with black spots, lanceolate, (3–)3.5–4(–4.5) cm × 5–10 mm, rather thick, apex papillose; nectaries not papillose. Stamens shorter than tepals; filaments glabrous; anthers ca. 1 cm. Ovary ca. 1 cm. Style sometimes thickened toward apex. Capsule obovoid, 1.5–2 cm, 3-ribbed. Fl. Jul–Aug. 2*n* = 24*.

Forests, subalpine grasslands, limestone and serpentine areas. Zhejiang [Japan, Korea (Cheju Island), Russia (Kamchatka, Kurile Islands, Sakhalin)].

6. Lilium paradoxum Stearn, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 78. 1956.

藏百合 zang bai he

Bulb subglobose, 1–2.5 cm in diam.; scales ovate, ca. 2.5 cm × 8 mm, not articulate. Stem 20–45 cm, papillose. Leaves whorled plus sometimes a few scattered, obovate-oblanceolate or elliptic, 4.5–5.5 × 1.8–2 cm, glabrous, 5–7-veined. Flower solitary, campanulate. Tepals spreading, purple, unspotted, narrowly elliptic or rarely narrowly ovate, 2.5–3.5 cm × 1–1.4 cm; nectaries not papillose. Stamens shorter than tepals; filaments ca. 1.6 cm, glabrous; anthers linear, 6–8 mm. Ovary purple, 6–8 mm. Style ca. 1.7 cm. Fl. Jul.

• Among bushes, grassy slopes, rocky places; 3200–3900 m. SE Xizang.

7. Lilium medogense S. Yun Liang, Acta Phytotax. Sin. 23: 392. 1985.

墨脱百合 mo tuo bai he

Bulb subglobose, ca. 2.2 cm in diam.; scales purple-red, lanceolate, 1.7–2.2 cm × ca. 6 mm. Stem 35–50 cm, papillose. Leaves 5–8-whorled plus a few scattered, obovate-oblanceolate or elliptic, 4.5–6 × 1.7–2.2 cm. Flowers 1–3, campanulate. Tepals yellow, dark purple at base adaxially, unspotted, elliptic, 5–6 × 2–2.4 cm, smooth. Stamens much shorter than tepals; filaments ca. 2.5 cm, glabrous; anthers oblong, ca. 1.3 cm × 2 mm. Ovary ca. 1.4 cm × 3 mm. Style ca. 2.5 cm; stigma capitate, ca. 8 mm in diam. Fl. Jun.

• Rocky openings in *Abies* forests. SE Xizang (Mêdog Xian).

8. Lilium lophophorum (Bureau & Franchet) Franchet, J. Bot. (Morot) 12: 221. 1898.

尖被百合 jian bei bai he

Bulb subovoid, 1.5–3.5 cm in diam.; scales rather lax, white, lanceolate, 3.5–4 cm × 6–7 mm. Stem 10–45 cm. Leaves highly variable, clustered to scattered, linear, narrowly lanceolate, lanceolate, or oblong-lanceolate, 5–12 × 0.3–2 cm, margin papillose. Bracts 5–13 cm × 3–10 mm. Flowers usually solitary, occasionally 2 or 3, nodding. Tepals yellow, pale yellow, or pale yellowish green, with purple-red spots or unspotted, lanceolate or narrowly ovate-lanceolate, 4.5–5.7 × 0.9–1.6 cm; inner ones with fimbriate projections on both surfaces of nectaries. Stamens converging, 1.5–2 cm; filaments glabrous; anthers 7–10 mm. Ovary 1–1.2 cm × 3–4 mm. Style ca. 1 cm. Capsule 2–3 × 1.5–2 cm. Fl. Jun–Jul, fr. Aug–Sep.

• Forests, bushy slopes, alpine grasslands; 2500–4500 m. Sichuan, Xizang, Yunnan.

1a. Leaves narrowly lanceolate, lanceolate, or oblong-lanceolate; tepals with extremely sparse, purple-red spots or unspotted ..... 8a. var. *lophophorum*
1b. Leaves linear; tepals with obvious, purple-red spots ..... 8b. var. *linearifolium*

8a. Lilium lophophorum var. **lophophorum**

尖被百合(原变种) jian bei bai he (yuan bian zhong)

Fritillaria lophophora Bureau & Franchet, J. Bot. (Morot) 5: 153. 1891; *Lilium lophophorum* f. *latifolium* Sealy; *L. lophophorum* f. *wardii* (I. B. Balfour) Sealy; *Nomocharis lophophora* (Bureau & Franchet) W. E. Evans; *N. lophophora* var. *wardii* (I. B. Balfour) W. W. Smith & W. E. Evans; *N. wardii* I. B. Balfour.

Leaves narrowly lanceolate, lanceolate, or oblong-lanceolate. Tepals yellow to pale yellowish green, with extremely sparse, purple-red spots or unspotted.

• Forests, bushy slopes, alpine grasslands; 2500–4500 m. Sichuan, Xizang, Yunnan.

8b. Lilium lophophorum var. **linearifolium** (Sealy) S. Yun Liang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 129. 1980.

线叶百合 xian ye bai he

Lilium lophophorum subsp. *linearifolium* Sealy, Kew Bull. 5: 294. 1950.

Leaves linear. Tepals yellow, with obvious, purple-red spots.

• Alpine grasslands; 3500–4000 m. NW Yunnan (Lijiang Naxi Zu Zizhixian).

9. Lilium nanum Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar, 53. 1862.

小百合 xiao bai he

Bulb oblong, 1.5–2.3 cm in diam.; scales white, lanceolate, 2–2.5 cm × 5–8 mm. Stem 10–30 cm. Leaves scattered, linear, 6–11 × 4–8.5 cm. Flower solitary, nodding, campanulate. Tepals pale purple, purplish red, or yellow, rarely white, usually with deep purple spots adaxially; outer ones elliptic, 2.5–2.7 × 1–1.2 cm; inner ones slightly wider than outer; nectaries with fimbriate projections on both surfaces. Stamens converging; filaments 1–12 mm, glabrous; anthers ca. 6 mm. Ovary ca. 1 cm × 3–6 mm. Style 4–6 mm; stigma 3–4 mm in diam. Capsule yellow, tinged purple on ribs, 2.8–3.5 × 2–2.5 cm. Fl. Jun, fr. Sep.

Forest margins, thickets, grassy slopes, alpine grasslands; 3500–4500 m. Sichuan, Xizang, Yunnan [Bhutan, Myanmar, Nepal, Sikkim].

1a. Tepals pale purple or purplish red, rarely white, with deep purple spots adaxially ..... 9a. var. *nanum*
1b. Tepals yellow, unspotted ..... 9b. var. *flavidum*

9a. Lilium nanum var. **nanum**

小百合(原变种) xiao bai he (yuan bian zhong)

Nomocharis nana (Klotzsch) E. H. Wilson.

Tepals pale purple or purplish red, rarely white, with deep purple spots adaxially. 2*n* = 48.

Forest margins, thickets, grassy slopes; 3500–4500 m. Sichuan, Xizang, Yunnan [Bhutan, Myanmar, Nepal, Sikkim].

9b. Lilium nanum var. **flavidum** (Rendle) Sealy, Bot. Mag. 169: t. 218. 1952.
黄斑百合 huang ban bai he

Fritillaria flavida Rendle, J. Bot. 44: 45. 1906; *Lilium euxanthum* (W. W. Smith & W. E. Evans) Sealy; *L. nanum* f. *flavidum* (Rendle) H. Hara; *Nomocharis euxantha* W. W. Smith & W. E. Evans.

Tepals yellow, unspotted.

Forest margins, alpine grasslands; 3800–4300 m. SE Xizang, Yunnan [N Myanmar, Sikkim].

Henry Noltie (pers. comm.) considers *Lilium euxanthum* (from SE Xizang and Yunnan) to be distinct from *L. nanum* var. *flavidum* (from S Xizang (Chumbi valley), N Myanmar, and Sikkim). The former has oblong leaves, which do not overtop the flower, and golden yellow tepals; the latter has linear, finely tapering leaves, which overtop the flower, and pale lemon-colored tepals.

10. Lilium brevistylum (S. Yun Liang) S. Yun Liang in F. T. Wang et al., Acta Bot. Yunnan. 8: 52. 1986.

短柱小百合 duan zhu xiao bai he

Lilium nanum Klotzsch var. *brevistylum* S. Yun Liang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 283. 1980.

Bulb oblong, 1.5–2 cm in diam.; scales purple, lanceolate, 2–3 cm × 5–7 mm. Stem 20–35 cm, glabrous. Leaves scattered, linear or narrowly lanceolate, 3–5 cm × 2–5 mm. Flower solitary, nodding, campanulate. Tepals yellow, tinged pale purplish and with purple spots adaxially; outer ones elliptic-lanceolate, 2–2.2 cm × 5–8 mm; inner ones somewhat wider; nectaries with fimbriate projections on both surfaces. Stamens converging apically; filaments 8–10 mm, glabrous; anthers 4–5 mm. Ovary ca. 1 cm × 4 mm. Style very short, ca. 1 mm. Fl. Jun.

• Forest margins; ca. 4300 m. SE Xizang (Zayü Xian).

11. Lilium concolor Salisbury, Parad. Lond. 1: t. 47. 1806.

渥丹 wo dan

Bulb ovoid, (1.5–)2–3.5 cm in diam.; scales white, ovate or ovate-lanceolate, 2–2.5(–3.5) × 1–1.5(–3) cm. Stem occasionally tinged purple near base, 30–50(–80) cm, papillose, rooting near bulb. Leaves scattered, sessile, linear, (2–)3–7(–10) cm × 2–10 mm, veins and margin papillose, apex acute. Flowers 1–5 in a subumbel or raceme, erect. Tepals stellately spreading, deep red, spotted or unspotted, oblong-lanceolate to oblanceolate, 2.2–5.2 cm × 4–14 mm; nectaries papillose on both surfaces. Stamens converging; filaments 1.8–2 cm, glabrous; anthers ca. 7 mm. Ovary 1–1.2 cm × 2–3 mm. Style 7–9 mm. Capsule oblong, (1.5–)3–3.5 × ca. 2.2 cm. Fl. May–Jul, fr. Aug–Sep.

Moist places in forests, thickets, moist meadows, grassy slopes, hillsides, sunny grasslands; 300–2200 m. Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Yunnan [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

1a. Tepals unspotted ..... 11a. var. *concolor*
1b. Tepals spotted.
2a. Tepals (25–)28–35(–40) × (5–)6–9 (–10) mm ..... 11b. var. *pulchellum*
2b. Tepals 50–52 × 8–14 mm ..... 11c. var. *megalanthum*

11a. Lilium concolor var. **concolor**

渥丹(原变种) wo dan (yuan bian zhong)

Lilium concolor var. *sinicum* (Lindley & Paxton) J. D. Hooker; *L. concolor* var. *uniflorum* Spae; *L. mairei* H. Léveillé; *L. sinicum* Lindley & Paxton.

Leaves 3.5–7 cm × 3–6 mm. Tepals unspotted, 2.2–4 cm × 4–7 mm. 2*n* = 24*.

• Thickets, grassy slopes, hillsides; 300–2000 m. Hebei, Henan, Hubei, Jilin, Shaanxi, Shandong, Shanxi, Yunnan.

The bulbs are medicinal and edible.

11b. Lilium concolor var. **pulchellum** (Fischer) Regel, Gartenflora 25: 354. 1876.

有斑百合 you ban bai he

Lilium pulchellum Fischer in Fischer et al., Index Sem. Hort. Petrop. 6: 56. 1840; *L. buschianum* Loddiges; *L. concolor* var. *buschianum* (Loddiges) Baker.

Leaves (2–)3–4.5(–7) cm × 2–3(–6) mm. Tepals spotted, (2.5–)2.8–3.5(–4) cm × (5–)6–9(–10) mm. 2*n* = 24.

Moist places in forests, sunny grasslands; 600–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

11c. Lilium concolor var. **megalanthum** F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 283. 1980.

大花百合 da hua bai he

Lilium megalanthum (F. T. Wang & Tang) Q. S. Sun.

Leaves 5–8.5 cm × 5–10 mm. Tepals with purple spots, 5–5.2 × 0.8–1.4 cm.

• Moist meadows; ca. 500 m. Jilin.

12. Lilium dauricum Ker Gawler, Bot. Mag. 30: t. 1210. 1809.

毛百合 mao bai he

Lilium maculatum Thunberg subsp. *dauricum* (Ker Gawler) H. Hara; *L. pensylvanicum* Ker Gawler; *L. pseudodahuricum* M. Fedossejew & S. Fedossejew.

Bulb ovoid-globose, ca. 2 cm in diam.; scales white, broadly lanceolate, 1–1.4 cm × 5–6 mm, articulate or not. Stem (30–)50–70(–120) cm, not papillose. Leaves scattered plus 4 or 5 in a whorl at apex of stem, sessile, linear, rarely to lanceolate, 4–5 cm × 3–4(–25) mm, 3–5-veined, margin papillose, sometimes also sparsely white woolly, base with a cluster of white woolly hairs. Flowers 1 or 2(–6). Tepals vermilion or red, with purple-red spots, rarely with yellow claws; outer ones oblanceolate, (3–)7–9 × 1.5–2.3 cm, abaxially white woolly, sometimes glabrous; inner ones slightly narrower; nectaries deep purple papillose on both surfaces. Stamens converging; filaments ca. 5 cm; anthers ca. 1 cm. Ovary ca. 1.8 cm. Style ca. 4 cm. Capsule oblong, ca. 5 × 3 cm. Fl. Jun–Jul, fr. Aug–Sep. 2*n* = 24*.

Open forests, bushy slopes, hillsides, moist meadows; 400–1500 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

13. Lilium henrici Franchet, J. Bot. (Morot) 12: 220. 1898.

墨江百合 mo jiang bai he

Bulb ovoid or subglobose, ca. 4 cm in diam.; scales lanceolate, 2.5–4 × 0.8–1.5 cm. Stem 60–120 cm. Leaves scattered, narrowly lanceolate, 12–15 × 0.9–1.4 cm, glabrous, 3-veined. Flowers usually 5 or 6 in a raceme, open campanulate. Tepals white, with an obvious, purple-red or deep purple-red blotch at base adaxially, sometimes also with purple-red speckles, suboblong-lanceolate, 3.5–5 × 1.2–1.4(–2) cm; nectaries green, not papillose. Stamens converging apically; filaments ca. 2 cm, glabrous; anthers ca. 1 cm. Ovary 0.9–1.3 cm × 2–3 mm. Style 1.5–2.2 cm. Fl. Jun–Jul.

• Mixed forests; ca. 2800 m. W Sichuan, NW Yunnan.

1a. Tepals with an obvious, deep purple-red blotch at base adaxially ..... 13a. var. *henrici*
1b. Inner tepals with a large, purple-red blotch

at base adaxially and a few purple-red speckles, outer ones each with a purple-red blotch only ..... 13b. var. *maculatum*

13a. Lilium henrici var. **henrici**

墨江百合(原变种) mo jiang bai he (yuan bian zhong)

Lilium franchetianum H. Léveillé; *Nomocharis henrici* (Franchet) E. H. Wilson.

Tepals with an obvious, deep purple-red blotch at base adaxially.

• Mixed forests; ca. 2800 m. W Sichuan, NW Yunnan.

13b. Lilium henrici var. **maculatum** (W. E. Evans) Woodcock & Stearn, Lilies World, 226. 1950.

斑块百合 ban kuai bai he

Nomocharis henrici (Franchet) E. H. Wilson f. *maculata* W. E. Evans, Notes Roy. Bot. Gard. Edinburgh 15: 194. 1926.

Inner tepals with a large, purple-red blotch at base adaxially and a few purple-red speckles; outer ones each with a purple-red blotch only.

• NW Yunnan.

14. Lilium bakerianum Collett & Hemsley, J. Linn. Soc., Bot. 28: 138. 1890.

滇百合 dian bai he

Bulb broadly ovoid to subglobose, ca. 2.5 cm in diam.; scales white, ovate or ovate-lanceolate, 2–2.2 cm × 7–10 mm. Stem 60–90 cm, papillose. Leaves scattered, linear or linear-lanceolate, 4–7.5 cm × 4–7 mm, papillose at margin and on midvein abaxially, sometimes white pubescent on both surfaces. Flowers 1–3, nodding or suberect, campanulate. Tepals white, greenish, yellow, pink, or purple, often with purple to red spots; outer ones lanceolate, 6.5–8.3 × 1.4–1.8 cm; inner ones slightly wider; nectaries not papillose. Stamens converging; filaments ca. 3 cm; anthers ca. 1.6 cm. Ovary 1.7–2 cm × 2–4 mm. Style 2.2–2.6 cm. Capsule oblong, ca. 3.5 × 2.5 cm. Fl. Jun–Sep, fr. Sep–Oct.

Pinus forests, forested and grassy slopes, forest and thicket margins, grasslands, hillsides along streams; 1500–3800 m. Guizhou, Sichuan, Yunnan [Myanmar].

1a. Leaves white pubescent on both surfaces ..... 14e. var. *yunnanense*
1b. Leaves glabrous.
  2a. Tepals white ..... 14a. var. *bakerianum*
  2b. Tepals not white.
    3a. Tepals purple-red to pink ..... 14d. var. *rubrum*
    3b. Tepals pale yellow, yellow, brownish yellow, purplish yellow, yellowish green, or greenish.
      4a. Tepals pale yellow, yellow, brownish yellow, or purplish yellow, with purple or purple-red spots adaxially ..... 14b. var. *aureum*
      4b. Tepals yellowish green, pale yellow-green, greenish, or pale green, with purple or bright red spots adaxially ..... 14c. var. *delavayi*

14a. Lilium bakerianum var. **bakerianum**

滇百合(原变种) dian bai he (yuan bian zhong)

Leaves glabrous. Tepals white, with purple-red spots adaxially.

Forest margins; ca. 2800 m. W Sichuan, NW Yunnan [Myanmar].

14b. Lilium bakerianum var. **aureum** Grove & Cotton, Lily Year Book 8: 127. 1939.

金黄花滇百合 jin huang hua dian bai he

Leaves glabrous. Tepals pale yellow, yellow, brownish yellow, or purplish yellow, with purple or purple-red spots adaxially.

• Thicket margins, grassy slopes; 2000–2500 m. SW Sichuan, NW Yunnan.

14c. Lilium bakerianum var. **delavayi** (Franchet) E. H. Wilson, Lilies East. Asia 43. 1925.

黄绿花滇百合 huang lu hua dian bai he

Lilium delavayi Franchet, J. Bot. (Morot) 6: 314. 1892.

Leaves glabrous. Tepals yellowish green, pale yellow-green, greenish, or pale green, with purple or bright red spots adaxially.

Forested or grassy slopes; 2500–3800 m. Guizhou, Sichuan, Yunnan [Myanmar].

14d. Lilium bakerianum var. **rubrum** Stearn, Gard. Chron., ser. 3, 124: 4. 1948.

紫红花滇百合 zi hong hua dian bai he

Lilium linceorum H. Léveillé & Vaniot.

Leaves glabrous. Tepals purple-red or pink, with purple or red spots adaxially.

• Forest margins, hillsides along streams, grassy slopes; 1500–2000 m. Guizhou, Yunnan.

14e. Lilium bakerianum var. **yunnanense** (Franchet) Sealy ex Woodcock & Stearn, Lilies World, 151. 1950.

无斑滇百合 wu ban dian bai he

Lilium yunnanense Franchet, J. Bot. (Morot) 6: 314. 1892.

Leaves white pubescent on both surfaces. Tepals white or pale rose, unspotted.

• *Pinus* forests, grasslands; 2000–2800 m. SW Sichuan, NW Yunnan.

15. Lilium sempervivoideum H. Léveillé, Bull. Acad. Int. Géogr. Bot. 25: 38. 1915.

蒜头百合 suan tou bai he

Lilium bakerianum Collett & Hemsley subsp. *sempervivoideum* (H. Léveillé) McKean.

Bulb subglobose, 2.3–3 cm in diam.; scales lanceolate,

2.5–3 cm × 5–10 mm. Stem 20–30 cm, papillose. Leaves 16–30, scattered, linear, 2.5–5.5 cm × 2–4 mm, 1-veined. Flower solitary, campanulate. Tepals white with purple-red speckles; outer ones lanceolate, 3.5–4 cm × 5–10 mm; inner ones 1.2–1.5 cm wide; nectaries not papillose. Stamens converging; filaments 1.2–1.5 cm, glabrous; anthers 5.5–6.5 cm. Ovary purple-black, ca. 8 × 1.5–2.5 mm. Style ca. 1.5 cm; stigma 3–4 mm in diam. Fl. Jun.

• Grassy slopes; 2400–2600 m. Sichuan, Yunnan.

16. Lilium amoenum E. H. Wilson ex Sealy, Bot. Mag. 166: t. 73. 1949.

玫红百合 mei hong bai he

Lilium sempervivoideum H. Léveillé subsp. *amoenum* (E. H. Wilson ex Sealy) S. Yun Liang.

Bulb ovoid, 2–22 cm in diam.; scales white, lanceolate, 1.5–1.8 cm × 6–8 mm. Stem 15–30 cm, papillose. Leaves 8–12, scattered, narrowly elliptic or narrowly oblong, 2.8–4.5 cm × 2–7 mm, 1-veined. Flower solitary, nodding, campanulate, fragrant. Tepals purple-red or rose purple, with deep red spots; outer ones lanceolate, 3–4 cm × 9–10 mm, slightly revolute apically; inner ones ovate-lanceolate or elliptic, 1.4–1.5 cm wide; nectaries green, not papillose. Stamens converging; filaments ca. 1.4 cm, glabrous; anthers 5–6.5 cm. Ovary ca. 8 × 2 mm. Style 1.2–1.6 cm; stigma ca. 3 mm in diam. Fl. Jun. 2*n* = 24*.

• Forested slopes, grassy places in thickets; 1800–3000 m. Yunnan.

17. Lilium pinifolium L. J. Peng, Acta Bot. Yunnan. 7: 317. 1985.

松叶百合 song ye bai he

Lilium sempervivoideum H. Léveillé subsp. *pinifolium* (L. J. Peng) S. Yun Liang.

Bulb subglobose, 3–3.5 in diam.; scales white, ovate, 2.5–3.5 × 2–2.5 cm. Stem 70–80 cm. Leaves scattered, narrowly linear or subfiliform, 3–4 cm × 1–2(–3) mm, abaxially sometimes scabrous, margin minutely papillose. Flowers usually 2, nodding, campanulate. Tepals white, green at base, with red spots; outer ones linear, ca. 4 × 1.2 cm; inner ones narrowly oblong, ca. 1.5 cm wide; nectaries blackish green, not papillose. Stamens ca. 2 cm; filaments greenish white; anthers 5–7 mm. Ovary green, ca. 1.5 cm × 3 mm. Style 1.7–2 cm; stigma small. Fl. Jun.

• Forests; 3300–3400 m. NW Yunnan.

18. Lilium souliei (Franchet) Sealy, Kew Bull. 5: 296. 1950.

紫花百合 zi hua bai he

Fritillaria souliei Franchet, J. Bot. (Morot) 12: 221. 1898; *Nomocharis souliei* (Franchet) W. W. Smith & W. E. Evans.

Bulb narrowly ovoid, 1.3–1.8 cm in diam.; scales white, lanceolate. 1.5–3 cm × 6–10 mm. Stem 10–30 cm. Leaves 5–8, scattered, narrowly elliptic, lanceolate, or linear, 3–6 × 0.6–1.5 cm, margin sometimes sparsely papillose. Flower solitary, nodding, campanulate. Tepals purple-red, usually paler toward base, unspotted; outer ones elliptic, 2.5–3.5 × 0.9–1.2 cm, apex shortly pointed; inner ones 1–1.8 cm wide; nectaries not papillose. Stamens converging; filaments 1.2–1.4 cm, glabrous; anthers purple-black, 5–7 mm. Style to 1.2 cm; stigma small. Capsule subglobose, 1.5–2 cm in diam. Fl. Jun–Jul, fr. Aug–Oct. 2*n* = 24*.

• Thicket margins, grassy slopes; 1200–1400 m. Sichuan, SE Xizang, Yunnan.

19. Lilium saccatum S. Yun Liang in C. Y. Wu, Fl. Xizang. 5: 540. 1987.

囊被百合 nang bei bai he

Bulb ovoid, ca. 2 cm in diam.; scales pale brown, lanceolate, ca. 2.5 cm × 7 mm. Stem 20–30 cm. Leaves scattered, occasionally several crowded and subwhorled, ovate or elliptic-lanceolate, 2–4 × 0.8–1.2 cm. Flower solitary, nodding, campanulate. Tepals purple-red, with dark spots adaxially, narrowly elliptic, 2.3–2.5 cm × 8–9 mm, basally saccate; nectaries not papillose. Stamens converging; filaments 1–1.2 cm, glabrous; anthers ca. 6 mm. Ovary purple-red, cylindric, 8–10 × 2–3 mm. Style 8–9 mm; stigma swollen, shallowly 3-lobed. Fl. Jul.

• Bushy and grassy slopes; ca. 3900 m. SE Xizang (Mainling Xian).

20. Lilium huidongense J. M. Xu, Acta Phytotax. Sin. 23: 232. 1985.

会东百合 hui dong bai he

Stem to 50 cm, smooth, rooting near base. Leaves scattered, ovate-lanceolate to lanceolate, 7–8 × 1.6–2.4 cm, 5–7-veined, axil with a cluster of white, curly hairs, margin minutely papillose. Flowers usually 4 in a raceme, nodding, campanulate. Tepals pale red, with purple spots adaxially, oblong to oblong-ovate, ca. 4 × 1.3 cm, apex minutely papillose; nectaries not papillose. Stamens converging; filaments ca. 2 cm, glabrous; anthers linear, ca. 7 mm. Ovary cylindric, ca. 8 × 2 mm. Style ca. 2.5 cm; stigma swollen. Fl. Jun.

• About 3200 m. SW Sichuan (Huidong Xian).

21. Lilium speciosum Thunberg var. **gloriosoides** Baker, Gard. Chron., n.s., 14: 198. 1880.

药百合 yao bai he

Lilium kanahirae Hayata; *L. konishii* Hayata.

Bulb flattened subglobose, ca. 5 cm in diam.; scales white, broadly lanceolate, ca. 2 × 1.2 cm. Stem 60–120 cm. Leaves scattered, shortly petiolate, lanceolate, oblong-lanceolate, or ovate-lanceolate, 7–18 × 1–5 cm, 3–5-veined, margin papillose, apex acuminate. Flowers 1–5 in a raceme or subumbel, nodding. Tepals recurved, white, with purple-red blotches and spots on proximal 1/3–1/2, lanceolate to narrowly oblong, 6–7.5 × 1–2 cm, margin undulate; nectaries with red, fimbriate projections and papillae on both surfaces. Stamens diverging; filaments green, 5–6 cm; anthers crimson, 1.5–1.8 cm. Ovary 1.2–1.7 cm. Style 3–5 cm. Capsule subglobose, ca. 3 cm in diam. Fl. Jul–Aug, fr. Oct. 2*n* = 24*.

• Shaded and moist places in forests, grassy slopes; 600–900 m. Anhui, Guangxi, Hunan, Jiangxi, Taiwan, Zhejiang.

Lilium speciosum var. *speciosum* occurs in SW Japan (Kyushu, Shikoku).

The bulbs are edible and medicinal.

22. Lilium henryi Baker, Gard. Chron., ser. 3, 2: 660. 1888.

湖北百合 hu bei bai he

Bulb subglobose, ca. 7 cm in diam.; scales white, oblong, 3.5–4.5 ×1.4–1.6 cm. Stem streaked with purple, 1–2 m. Leaves dimorphic, proximal and middle ones oblong-lanceolate, 7.5–15 × 2–2.7 cm, distal ones ovate, 2–4 × 1.5–2.5 cm. Flowers 2–12 in a raceme, paired on each pedicel. Tepals recurved, orange, with sparse, black spots, lanceolate, 5–7 × ca. 2 cm; nectaries with numerous fimbriate projections on both surfaces. Stamens diverging; filaments 4–4.5 cm, glabrous; anthers deep vermilion. Ovary ca. 1.5 cm. Style ca. 5 cm. Capsule oblong, 4–4.5 × ca. 3.5 cm. Fl. Jul, fr. Sep. 2*n* = 24*.

• Mountain slopes; 700–1000 m. Guizhou, Hubei, Jiangxi.

23. Lilium rosthornii Diels, Bot. Jahrb. Syst. 29: 243. 1900.

南川百合 nan chuan bai he

Stem 40–100 cm. Leaves scattered, dimorphic, proximal and middle ones shortly petiolate, linear-lanceolate, 8–15 cm × 8–10 mm, distal ones ovate, 3–4.5 × 1–1.2 cm. Flowers usually several to 9 in a raceme, very rarely solitary. Tepals recurved, yellow or orange, with purple-red spots, sublanceolate, 6–6.5 × 0.9–1.1 cm; nectaries with many fimbriate projections on both surfaces. Stamens diverging; filaments 6–6.5 cm; anthers 1.2–1.4 cm. Ovary cylindric, 1.5–2 × ca. 2 mm. Style 4–4.5 cm. Capsule brownish green, narrowly oblong, 5.5–6.5 × 1.4–1.8 cm. Fl. Jul–Aug, fr. Sep.

• Forests, hillsides along valleys or streams; 300–900 m. Guizhou, Hubei, Sichuan.

24. Lilium primulinum Baker, Bot. Mag. 118: t. 7227. 1892.

报春百合 bao chun bai he

Bulb subglobose, 3.5–6 cm in diam.; scales lanceolate, 3–4.5 × 1–1.5 cm. Stem 0.6–2 m, scabrous. Leaves many, scattered, lanceolate or oblong-lanceolate, 3–12 × 0.8–1.4 cm, glabrous, abaxially 3-veined. Flowers 4–9 in a raceme, nodding. Tepals revolute, primrose yellow or greenish yellow, rarely yellowish white, sometimes with purple blotches at base, oblong, narrowly oblong, or oblong-oblanceolate, 3–9 × 1–1.7 cm; inner ones slightly wider; nectaries not papillose. Filaments 4.5–5.5 cm, glabrous; anthers 1–1.2 cm. Ovary 1.5–1.7 cm × 2–3 mm. Style 4.2–5 cm. Capsule brownish, oblong, 4–7 × 2.8–3 cm.

Forests, forest margins, thickets, grassy slopes; hillsides along ravines; 1100–3100 m. Guizhou, Sichuan, Yunnan [Myanmar, Thailand].

Two varieties occur in China. *Lilium primulinum* var. *primulinum* occurs only in Myanmar and has primrose yellow tepals without blotches.

1a. Bulb 5–6 cm in diam.; tepals oblong, 6.5–9 × 1.3–1.7 cm ..... 24a. var. *burmanicum*
1b. Bulb ca. 3.5 cm in diam.; tepals oblong to oblong-oblanceolate, 3.5–6.5 × 1–1.3 cm ..... 24b. var. *ochraceum*

24a. Lilium primulinum var. **burmanicum** (W. W. Smith) Stearn, Gard. Chron., ser. 3, 124: 13. 1948.

紫喉百合 zi hou bai he

Lilium nepalense D. Don var. *burmanicum* W. W. Smith, Trans. Bot. Soc. Edinburgh 28: 135. 1922; *L. ochraceum* Franchet var. *burmanicum* (W. W. Smith) Cotton.

Bulb 5–6 cm in diam. Leaves lanceolate, 5.5–12 × 0.8–1.4 cm. Tepals oblong, 6.5–9 × 1.3–1.7 cm. Fl. Jul–Oct, fr. Sep–Dec. 2*n* = 24.

Forests, forest margins, thickets, grassy slopes; hillsides along ravines; 1200–2700 m. Yunnan [Myanmar, Thailand].

24b. Lilium primulinum var. **ochraceum** (Franchet) Stearn, Gard. Chron., ser. 3, 124: 13. 1948.

川滇百合 chuan dian bai he

Lilium ochraceum Franchet, J. Bot. (Morot) 6: 319. 1892; *L. majoense* H. Léveillé; *L. nepalense* D. Don var. *ochraceum* (Franchet) S. Yun Liang; *L. tenii* H. Léveillé.

Bulb ca. 3.5 cm in diam. Leaves lanceolate to oblong-lanceolate, 3–5.5(–10) × 0.8–1(–2) cm. Tepals oblong to oblong-oblanceolate, 3.5–6.5 × 1–1.3 cm. Fl. Jul–Aug, fr. Oct–Nov.

• Forests, grassy slopes; 1100–3100 m. Guizhou, Sichuan, NW Yunnan.

25. Lilium nepalense D. Don, Mem. Wern. Nat. Hist. Soc. 3: 412. 1820.

紫斑百合 zi ban bai he

Bulb subglobose, ca. 2 cm in diam.; scales white, lanceolate or ovate-lanceolate, 2–2.5 × 1–1.2 cm. Stem 40–120 cm, papillose. Leaves scattered, lanceolate or oblong-lanceolate, 5–10 × 2–3 cm, glabrous, 5-veined, margin papillose. Flowers solitary or 3–5 in a raceme, nodding, somewhat trumpet-shaped. Tepals revolute, pale yellow or greenish yellow, rarely orange-yellow, tinged purplish in throat, suboblong, 6–9(–13) × 1.6–1.8 cm; nectaries not papillose. Filaments 5–5.5 cm, glabrous; anthers 8–9(–25) mm. Ovary cylindric, 1.5–1.8 cm. Style 4–5 cm; stigma swollen, ca. 4 mm in diam. Fl. Jun–Jul. 2*n* = 24.

Bushy places in mixed forests, hillsides; (2100–)2600–2900 m. S Xizang, SE and W Yunnan [Bhutan, N India, Myanmar, Nepal, Sikkim].

26. Lilium wardii Stapf ex F. C. Stern, J. Roy. Hort. Soc. 57: 291. 1932.

卓巴百合 zhuo ba bai he

Bulb subglobose, 2.5–4 cm in diam.; scales ovate, 1.5–2 cm × 7–9 mm. Stem purplish brown, 60–100 cm, papillose. Leaves scattered, narrowly lanceolate, 3–5.5 cm × 6–7 mm, adaxially with 3 obviously impressed veins, margin papillose. Flowers 2–10 in a raceme, rarely solitary, nodding. Tepals pale purple-red or pink, with deep purple spots, oblong or lanceolate,

5.5–6 cm × 8–10 mm, margin revolute; nectaries neither papillose nor with fimbriate projections. Filaments 4–4.5 cm; anthers purple. Ovary cylindric, ca. 1 cm. Style ca. 3 cm. Capsule oblong, 2.5–3 × 1.6–2.6 cm. Fl. Jun–Aug, fr. Aug. 2*n* = 24*.

• Thickets, rocky places at forest margins, grassy slopes; 2000–3400 m. Guizhou, Sichuan, SE Xizang.

27. Lilium matangense J. M. Xu, Acta Phytotax. Sin. 23: 233. 1985.

马塘百合 ma tang bai he

Bulb ovoid or narrowly so, 1–1.5 cm in diam.; scales white, lanceolate, 2–2.5 cm × 5–10 mm. Stem greenish, 23–35 cm, basally minutely papillose, rooting near bulb. Leaves scattered, linear, 6–11 cm × 1–4 mm, 1-veined, margin minutely papillose. Flower solitary, nodding. Tepals white, tinged pale brown, with purple-brown spots, lanceolate, 2.5–3.5 cm × 5–7 mm, margin revolute; nectaries not papillose. Filaments pale green, 1.2–1.5 cm, glabrous; anthers yellow, oblong, 4–5 mm. Ovary pale green, 1–1.5 cm × ca. 2 mm. Style pale green, 1–1.3 cm. Fl. Jun.

• 3200–3300 m. NW Sichuan (Barkam Xian).

28. Lilium stewartianum I. B. Balfour & W. W. Smith in W. W. Smith, Trans. Bot. Soc. Edinburgh 28: 127. 1922.

单花百合 dan hua bai he

Bulb ovoid, ca. 2 cm in diam.; scales white, ovate-lanceolate. Stem green, sometimes with purple-red spots, 20–50 cm. Leaves scattered, linear, 2.5–7 cm × 3–4 mm, 1-veined, margin sparsely papillose. Flower solitary, nodding, fragrant. Tepals greenish yellow, with deep red spots, oblanceolate-oblong, 4.5–5 cm × 7–9 mm, revolute distally; nectaries neither papillose nor with fimbriate projections. Filaments ca. 3 cm, glabrous. Ovary purple, cylindric, 2–2.2 cm × ca. 3 mm. Style subequaling ovary. Capsule brown, oblong or ellipsoid, 2–2.5 × 1.5–2 cm. Fl. Jul–Aug, fr. Oct.

• Forest margins, open and rocky grasslands, rocky places on limestone mountains; 3600–4300 m. NW Yunnan.

29. Lilium habaense F. T. Wang & Tang in F. T. Wang et al., Acta Bot. Yunnan. 8: 51. 1986.

哈巴百合 ha ba bai he

Bulb ovoid, 1.5–2.2 cm in diam.; scales lanceolate, 2–2.5 cm × 5–10 mm. Stem 45–60 cm, smooth. Leaves scattered, linear, 5.5–8 cm × 2–4 mm, glabrous, margin recurved. Flower solitary. Tepals green, with dense, purple spots, lanceolate, 3–3.5 cm × 5–6 mm; nectaries neither papillose nor with fimbriate projections. Filaments 6–10 mm, glabrous; anthers narrowly oblong, 9–10 mm. Ovary cylindric, ca. 6 × 1 mm. Style nearly as thick as ovary, ca. 3.5 mm. Fl. Jun.

• Open and rocky places. NW Yunnan (Zhongdian Xian).

30. Lilium taliense Franchet, J. Bot. (Morot) 6: 319. 1892.

大理百合 da li bai he

Lilium feddei H. Léveillé.

Bulb ovoid, ca. 2.5 cm in diam.; scales white, lanceolate, 2–2.5 cm × 5–8 mm. Stem 0.7–1.5 m, sometimes with purple spots, papillose. Leaves scattered, linear or linear-lanceolate, 8–10 cm × 6–8 mm, 1-veined, margin papillose. Flowers 2–5(–13) in a raceme, nodding. Tepals white, with purple spots, oblong or oblong-lanceolate, 4.5–5 × ca. 1 cm; inner ones slightly wider than outer; nectaries neither papillose nor with fimbriate projections. Filaments ca. 3 cm; anthers 8–10 mm. Ovary 1.4–1.6 cm × 3–4 mm. Style 1.5–1.7 cm. Capsule brown, oblong, ca. 3.5 × 2 cm. Fl. Jul–Aug, fr. Sep. 2*n* = 24*.

• Forests, grassy slopes; 2600–3600 m. Sichuan, ?Xizang, Yunnan.

31. Lilium jinfushanense L. J. Peng & B. N. Wang, Acta Bot. Yunnan. 8: 225. 1986.

金佛山百合 jin fo shan bai he

Bulb yellowish red, subglobose, 1–1.5 cm in diam. Stem with purple spots or streaks, 0.7–1.3 m. Leaves scattered, lanceolate, 5–10 × 0.8–1.5 cm, 3–5-veined, margin papillose. Flowers 3–7(–15) in a raceme, nodding, campanulate, fragrant. Tepals white or yellowish, tinged purple at base and in proximally 1/2, with purple spots distally, narrowly oblong or oblanceolate, 5–6 × 1–1.2 cm, margin revolute; inner ones slightly wider than outer; nectaries green, smooth. Filaments 4–4.5 cm; anthers 5–7 mm. Ovary 1.2–1.5 cm. Style 3.2–3.5 cm. Capsule obovoid, 2.5–3 × 1.5–2 cm. Fl. Jun–Jul, fr. Sep.

• Forests; 1800–2200 m. SE Sichuan (Nanchuan Xian).

32. Lilium lijiangense L. J. Peng, Acta Bot. Yunnan. 6: 189. 1984.

丽江百合 li jiang bai he

Lilium ningnanense J. M. Xu.

Bulb subglobose, 2.5–4 cm in diam.; scales white, tinged purple, lanceolate, 2.5–5 × 1–2 cm. Stem 55–60 cm, with purple spots or streaks. Leaves scattered, elliptic, suboblong, ovate-lanceolate, or lanceolate, 5–11 × 1.5–3 cm, 7–9-veined, axil with a cluster of white hairs. Flowers solitary or 2–5 in a raceme, nodding, fragrant. Tepals yellow, with purple or brown spots, oblong to lanceolate, 4–4.5 × 0.8–1.5 cm, apex slightly papillose, revolute; nectaries blackish or red, not papillose. Stamens diverging; filaments 2.5–3 cm; anthers ca. 7 mm. Ovary 7–10 × ca. 2 mm. Style 3–3.5 cm. Fl. Jul–Aug.

• 3300–3400 m. W Sichuan, NW Yunnan.

33. Lilium duchartrei Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 90. 1887.

宝兴百合 bao xing bai he

Lilium farreri Turrill; *L. forrestii* W. W. Smith.

Bulb ovoid, 1.5–4 cm in diam.; scales white, ovate to lanceolate, 1–2 × 0.5–1.8 cm. Stem 0.5–1.5 m, sometimes slightly papillose. Leaves scattered, lanceolate to oblong-lanceolate, 4.5–5 × ca. 1 cm, papillose abaxially and at margin, 3–5-veined, axil with a cluster of white hairs. Flowers solitary or several in an umbel, nodding, fragrant. Tepals white, with red-purple spots, 4.5–6 × 1.2–1.4 cm, margin revolute; nectaries papillose on both surfaces. Filaments ca. 3.5 cm; anthers yellow, narrowly

oblong, ca. 1 cm. Ovary ca. 1.2 × 1.5–4 cm. Style 3–4 cm. Capsule ellipsoid, 2.5–3 × ca. 2.2 cm. Seeds with a 1–2 mm wide wing. Fl. Jul–Aug, fr. Sep. 2*n* = 24*.

• Forest margins along valleys, grassy slopes, hillsides; 1500–3800 m. Gansu, Hubei, ?S Shaanxi (Qin Ling), Sichuan.

34. Lilium lankongense Franchet, J. Bot. (Morot) 6: 317. 1892.

匍茎百合 pu jing bai he

?*Lilium ninae* Vrishcz.

Bulb ovoid-globose, 2.5–4 cm in diam., stoloniferous; scales white, ovate or ovate-lanceolate, 1.5–2 × 1–1.4 cm. Stem pale purple-brown, 40–150 cm, papillose. Leaves scattered, oblong, oblong-lanceolate, or lanceolate, 3–10 × 0.5–1.7 cm, slightly papillose abaxially and at margin, veins 3–7, raised abaxially. Flowers solitary or several in a raceme, nodding, fragrant. Tepals pink, with deep red spots, 5–5.5 cm × 8–10 mm, margin revolute; nectaries papillose on both surfaces. Filaments ca. 3.5 cm, glabrous; anthers purplish, ca. 1 cm. Ovary 1–1.3 cm × 2–3 mm. Style 3–4 cm. Capsule ellipsoid, 1.5–2.5 × 1.2–2 cm. Seeds with a ca. 1 mm wide wing. Fl. Jun–Jul, fr. Aug–Oct.

• Alpine grasslands; 1800–3200 m. SE Xizang, NW Yunnan.

35. Lilium amabile Palibin, Trudy Imp. S.-Peterburgsk. Bot. Sada 19: 113. 1901.

秀丽百合 xiu li bai he

Lilium fauriei H. Léveillé & Vaniot.

Bulb ovoid-globose, 2.5–3 cm in diam.; scales white, lanceolate or lanceolate-ovate, ca. 4 × 2.5 cm. Stem 40–80 cm, with white, short, stiff hairs. Leaves scattered, narrowly lanceolate, 2–7.5 cm × 5–8 mm, both surfaces with dense, white, stiff hairs, margin ciliate. Flowers solitary or 3 in a raceme, nodding. Tepals strongly revolute, red, sometimes dark red-orange or yellow, densely speckled black, 3.5–5 cm; outer ones 8–10 mm wide; inner ones 1.4–1.6 cm wide; nectaries papillose on both surfaces. Ovary ca. 12 × 3 mm. Style ca. 2 mm. Fl. Jul. 2*n* = 24*.

SE Liaoning [Korea].

36. Lilium leichtlinii J. D. Hooker var. **maximowiczii** (Regel) Baker, Gard. Chron. 1871: 1422. 1871.

大花卷丹 da hua juan dan

Lilium maximowiczii Regel, Gartenflora 17: 322. 1868; *L. pseudotigrinum* Carrière.

Bulb white, globose, (2–)4 cm in diam. Stem 0.5–2 m, with purple spots, papillose, white woolly when young. Leaves scattered, sessile or shortly petiolate, narrowly lanceolate to oblong-lanceolate, 3–10(–14) × 0.6–1.2(–1.6) cm, white woolly when young, glabrous when mature, 3–7-veined, axil without bulblets, margin papillose, apex acute-acuminate. Flowers 2–8(–10) in a raceme, rarely solitary, nodding. Tepals revolute, red, with purple spots, lanceolate, 4.5–6.5(–8.5) × 0.9–1.5 cm; nectaries papillose and with fimbriate projections on both surfaces, densely so proximally on adaxial surface. Stamens diverging; filaments 3.5–4 cm, glabrous; anthers vermilion, ca. 1.1 cm. Ovary cylindric, 1.2–1.3 cm × 2–3 mm. Style ca. 3 cm. Capsule ellipsoid, ca. 3 cm. Fl. Jul–Aug. 2*n* = 24*.

Sandy places along valleys, mountain grasslands, limestone or serpentine areas; near sea level to 1300 m. Hebei, Jilin, Liaoning, Shaanxi [Japan, Korea, Russia (Primorskiy Kray)].

Lilium leichtlinii var. *leichtlinii* occurs in Japan (except Hokkaido).

37. Lilium pumilum Redouté, Liliac. 7: t. 378. 1812.

山丹 shan dan

Lilium potaninii Vrishcz; *L. pumilum* var. *potaninii* (Vrischz) Y. Z. Zhao; *L. sinensium* Gandoger; *L. tenuifolium* Fischer ex Hooker.

Bulb ovoid or conical, 2–3 cm in diam.; scales white, oblong or narrowly ovate, 2–3 × 1–1.5 cm. Stem sometimes streaked with purple, 15–60 cm, papillose. Leaves scattered near middle of stem, linear, 3.5–9 × 1.5–3 cm, midvein prominent abaxially, margin papillose. Flowers solitary or several in a raceme, nodding. Tepals revolute, bright red, usually unspotted, occasionally with a few spots near base, 4–4.5 cm × 8–11 mm, not minutely papillose adaxially; nectaries papillose on both surfaces. Filaments 1.2–2.5 cm, glabrous; anthers yellow, with reddish pollen, ca. 1 cm. Ovary 8–10 mm. Style 1–2 cm. Capsule oblong, ca. 2 × 1.2–1.8 cm. Fl. Jul–Aug, fr. Sep–Oct. 2*n* = 24*.

Forest margins, grassy slopes; 400–2600 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Korea, Mongolia, Russia (C and E Siberia)].

The bulbs are edible and medicinal.

38. Lilium davidii Duchartre ex Elwes, Monogr. *Lilium*, t. 24. 1877.

川百合 chuan bai he

Bulb flattened globose or broadly ovoid, 2–4.5 cm in diam.; scales white, broadly ovate to ovate-lanceolate, 2–3.5 × 1–1.5 cm. Stem sometimes tinged purple, 50–100 cm, densely papillose. Leaves scattered, but relatively crowded at middle of stem, linear, 7–12 cm × 2–3(–6) mm, axil sometimes with white woolly hairs, margin recurved, conspicuously papillose. Flowers solitary or 2–8 in a raceme, nodding. Tepals orange, with dark purple spots on proximal 2/3; outer ones 5–6 × 1.2–1.4 cm; inner ones 1.6–1.8 cm wide; nectaries papillose on both surfaces and with a few fimbriate projections abaxially. Filaments 4–5.5 cm; anthers 1.4–1.6 cm. Style 2–3 cm. Capsule ca. 3.5 × 1.6–2 cm. Fl. and fr. Jun–Sep.

• Moist places in forests, forest margins, grassy slopes; 800–3200 m. Gansu, Guizhou, Henan, W Hubei, S Shaanxi, Shanxi, Sichuan, Yunnan.

Widely cultivated in China for its edible bulbs.

1a. Leaves usually 1-veined, axil with a cluster of white woolly hairs ..... 38a. var. *davidii*

1b. Leaves usually 3-veined, axil without white

woolly hairs ..... 38b. var. *willmottiae*

38a. Lilium davidii var. **davidii**

川百合(原变种) chuan bai he (yuan bian zhong)

Lilium biondii Baroni; *L. cavaleriei* H. Léveillé & Vaniot; *L. sutchuenense* Franchet; *L. thayerae* E. H. Wilson.

Leaves usually 1-veined, axil with a cluster of white woolly hairs. 2*n* = 24*.

• Moist places in forests, forest margins, grassy slopes; 1600–3200 m. Guizhou, Sichuan, NW Yunnan.

38b. Lilium davidii var. **willmottiae** (E. H. Wilson) Raffill, Gard. Chron., ser. 3, 104: 231. 1938.

兰州百合 lan zhou bai he

Lilium willmottiae E. H. Wilson, Bull. Misc. Inform. Kew 1913: 266. 1913; *L. chinense* Baroni.

Leaves usually 3-veined, axil without white woolly hairs. 2*n* = 24*.

• W Hubei, S Shaanxi, E Sichuan, Yunnan.

39. Lilium cernuum Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 20: 461. 1901.

垂花百合 chui hua bai he

Lilium cernuum var. *atropurpureum* Nakai; *L. changbaishanicum* J. J. Chien; *L. graminifolium* H. Léveillé & Vaniot; *L. palibinianum* Y. Yabe.

Bulb oblong or ovoid, (2.5–)4 cm in diam.; scales white, lanceolate or ovate. Stem to 65 cm, smooth. Leaves scattered, sessile, narrowly linear, (4–)8–12(–18) cm × (1–)2–4(–5) mm, margin slightly recurved, papillose. Flowers solitary or 2–6 in a raceme, nodding, fragrant. Tepals pale purple-red, with deep purple spots toward base, lanceolate to oblong, 3.5–4.5 cm × 8–10 mm, margin revolute; nectaries densely papillose on both surfaces. Filaments ca. 2 cm; anthers dark purple, ca. 1.4 cm. Ovary cylindric, 8–10 × ca. 2 mm. Style 1.5–1.7 cm. Capsule globose to obovoid, 1.2–2 × 1–1.5 cm. Fl. Jul. 2*n* = 24*, 25.

Thickets, grassy slopes. Jilin, Liaoning [Korea, Russia (Primorskiy Kray)].

40. Lilium callosum Siebold & Zuccarini, Fl. Jap. 1: 86. 1839.

条叶百合 tiao ye bai he

Lilium callosum var. *stenophyllum* Baker; *L. mandshuricum* Gandoger; *L. talanense* Hayata; *L. taquetii* H. Léveillé & Vaniot; *L. tenuifolium* Fischer var. *stenophyllum* (Baker) Elwes.

Bulb flattened globose, 1.5–3 cm in diam.; scales white to pale yellow, ovate to lanceolate, 1.5–2 cm × 6–12 mm. Stem (20–)50–90(–100) cm. Leaves scattered, sessile, linear, (3–)5–10(–13) cm × (1–)2–5(–8) mm, 3-veined, margin papillose, apex acute to acuminate. Bracts linear, thickened apically. Flower solitary, rarely up to 9 in a raceme, nodding. Tepals red or light red, nearly unspotted, oblanceolate-spatulate, 3–4.5 cm × 4–8 mm, sometimes with curly hairs proximally on adaxial surface, middle part and apex revolute; nectaries sparsely papillose. Filaments 2–2.5 cm; anthers ca. 7 mm. Ovary cylindric, 1–2 cm × 1–3 mm. Style shorter than or equaling ovary. Capsule narrowly oblong, 2.5(–4) cm × 6–7(–20) mm. Fl. Jul–Aug, fr. Aug–Sep. 2*n* = 24*.

Grassy slopes, limestone areas; 100–900 m. Anhui, Guangdong, Guangxi, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Taiwan, Zhejiang [Japan, Korea, Russia (Primorskiy Kray)].

41. Lilium papilliferum Franchet, J. Bot. (Morot) 6: 316. 1892.

乳头百合 ru tou bai he

Bulb ovoid, ca. 2.5 cm in diam.; scales white, ovate or lanceolate-ovate. Stem to 60 cm, tinged purple, densely papillose. Leaves scattered, mostly in middle and distal parts of stem, linear, 5.5–7 cm × 2–4 mm. Flowers several (usually 5) in a raceme, nodding, fragrant. Tepals purple-red or reddish brown, unspotted, oblong, slightly narrowed basally, 3.5–3.8 × 1–1.3 cm; nectaries papillose and with cristate projections on both surfaces. Filaments ca. 2 cm, glabrous; anthers light brown, with orange pollen. Ovary cylindric, ca. 1 cm × 4 mm. Style ca. 1.3 cm. Capsule oblong, 2–2.5 × 1.5–2 cm. Fl. Jul, fr. Sep.

• Bushy slopes; 1000–1300 m. Shaanxi, Sichuan, Yunnan.

42. Lilium fargesii Franchet, J. Bot. (Morot) 6: 317. 1892.

绿花百合 lu hua bai he

Lilium cupreum H. Léveillé.

Bulb ovoid, ca. 1.5 cm in diam.; scales white, lanceolate, 1.5–2 × ca. 6 mm. Stem 20–70 cm, papillose. Leaves scattered, mostly in middle and distal parts of stem, linear, 10–14 cm × 2–5 mm, margin recurved. Flowers solitary or several in a raceme, nodding. Tepals greenish white, with dense, purple or purple-brown spots, lanceolate, 3–3.5 cm × 7–10 mm, margin revolute; nectaries with cristate projections on both surfaces. Filaments 2–2.2 cm, glabrous; anthers orange, narrowly oblong, 7–9 × ca. 2 mm. Ovary cylindric, 1–1.5 cm × ca. 2 mm. Style 1.2–1.5 cm. Capsule oblong, ca. 2 × 1.5 cm. Fl. Jul–Aug, fr. Sep–Oct.

• Forested slopes; 1400–2300 m. Hubei, Shaanxi, Sichuan, Yunnan.

43. Lilium xanthellum F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 283. 1980.

乡城百合 xiang cheng bai he

Bulb subglobose, 4–5 cm in diam.; scales yellow, lanceolate, 4–4.5 × 1.2–1.5 cm. Stem 35–55 cm, with dense, small scales (visible with magnification). Leaves scattered, linear, 4–8 × 0.2–0.3 mm, margin slightly recurved, papillose. Flowers solitary or paired. Tepals yellow, with or without purple spots, narrowly elliptic-oblanceolate, ca. 3.5 cm × 6 mm; nectaries with cristate projections on both surfaces. Filaments 1.6–3 cm, glabrous; anthers linear, 1–1.2 cm. Ovary 1.3–1.5 cm × 2–3 mm. Style 1.2–1.6 cm. Fl. Jun.

• Sunny shrubby slopes, rocky places along valleys; 3200–3600 m. W Sichuan.

1a. Tepals unspotted ..... 43a. var. *xanthellum*
1b. Tepals with purple spots ..... 43b. var. *luteum*

43a. Lilium xanthellum var. **xanthellum**

乡城百合(原变种) xiang cheng bai he (yuan bian zhong)

Tepals unspotted.

• Sunny shrubby slopes; ca. 3200 m. W Sichuan (Xiangcheng Xian).

43b. Lilium xanthellum var. **luteum** S. Yun Liang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 283. 1980.

黄花百合 huang hua bai he

Tepals with purple spots.

• Rocky places along valleys; ca. 3600 m. W Sichuan (Xiangcheng Xian).

44. Lilium tigrinum Ker Gawler, Bot. Mag. 31: t. 1237. 1809.

卷丹 juan dan

Bulb broadly subglobose, 4–8 cm in diam.; scales white or yellowish white, broadly ovate, 2.5–3 × 1.4–2.5 cm. Stem streaked with purple, 0.8–1.5(–2) m, minutely white woolly, sparsely papillose proximally. Leaves scattered, sessile, oblong-lanceolate to linear-lanceolate, (3–)6.5–9(–18) × (0.5–)1–1.8 cm, white woolly, 5–7-veined, axil with bulblets (on distal leaves), margin papillose, apex acuminate. Flowers 3–6(–20) in a raceme, horizontal to nodding. Tepals vermilion, with dark purple spots; outer ones lanceolate to oblong-lanceolate, 6–10 × 1–2 cm; inner ones broadly lanceolate to narrowly ovate, slightly wider; nectaries papillose and with fimbriate projections on both surfaces, densely so proximally on adaxial surface. Stamens diverging; filaments light red, 5–7 cm, glabrous; anthers ca. 2 cm. Ovary 1.5–2 cm. Style 4.5–6.5 cm. Capsule (in diploid plants) narrowly ovate-oblong, 3–4 cm. Fl. Jul–Aug, fr. Sep–Oct. 2*n* = 24*, 36.

Thickets, grassy slopes, hillsides, river banks; 400–2500 m. Anhui, Gansu, Guangxi, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Zhejiang [Japan, Korea].

The present authors follow the suggestion of Woodcock and Stearn (Lilies World, 353. 1950) to use the name *Lilium tigrinum* Ker Gawler (1809) for this species, rather than *L. lancifolium* Thunberg (1794), because the latter name is ambiguous, having been long and consistently applied in the sense of *L. speciosum*.

Lilium tigrinum is widely cultivated in China for its edible bulbs and medicinal uses.

45. Lilium brownii F. E. Brown ex Miellez, Cat. Expos. Soc. Hort. Lille, 1841.

野百合 ye bai he

Bulb globose, 2–4.5 cm in diam.; scales white, lanceolate, 1.8–4 × 0.8–1.4 cm. Stem 0.7–2 m, smooth or papillose. Leaves scattered, frequently distal ones gradually becoming smaller, lanceolate, linear, oblanceolate, or obovate, 7–15 × (0.6–)1–2 cm, 5–7-veined. Flowers solitary or several in a subumbel, funnelform, fragrant. Tepals spreading distally and recurved apically, milk white, suffused purplish, unspotted; outer ones oblong-oblanceolate, 13–18 × 2–4.3 cm; inner ones spatulate, 3.4–5 cm wide; nectaries papillose on both surfaces. Stamens curved upward; filaments 10–13 cm, densely pilose to glabrous. Style 8.5–11 cm. Capsule 4.5–6 × ca. 3.5 cm. Fl. Jun–Aug, fr. Sep–Oct.

• Sparse forests, thickets, grassy slopes, rocky hillsides along ravines or streams,wastelands around villages; 100–2200 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang.

Often cultivated in China for its edible bulbs and medicinal uses.

1a. Leaves lanceolate to linear ..... 45a. var. *brownii*
1b. Leaves oblanceolate to obovate ..... 45b. var. *viridulum*

45a. Lilium brownii var. **brownii**

野百合(原变种) ye bai he (yuan bian zhong)

Lilium australe Stapf; *L. brownii* var. *australe* (Stapf) Stearn.

Leaves lanceolate to linear. 2*n* = 14*, 24*, 25*.

• Thickets, rocky hillsides along streams; 100–2200 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

45b. Lilium brownii var. **viridulum** Baker, Gard. Chron., n.s., 24: 134. 1885.

百合 bai he

Lilium aduncum Elwes; *L. brownii* var. *colchesteri* Van Houtte ex Stapf; *L. brownii* var. *ferum* Stapf ex Elwes; *L. brownii* var. *odorum* (Planchon) Baker; *L. brownii* var. *platyphyllum* Baker; *L. longiflorum* Thunberg var. *purpureoviolaceum* H. Léveillé; *L. odorum* Planchon.

Leaves oblanceolate to obovate. 2*n* = 23*, 24*.

• Sparse forests, grassy slopes, hillsides along ravines, wastelands around villages; 300–1000 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang.

46. Lilium anhuiense D. C. Zhang & J. Z. Shao, Acta Phytotax. Sin. 29: 475. 1991.

安徽百合 an hui bai he

Bulb subglobose, 2–4 cm in diam.; scales white, ovate-lanceolate to lanceolate, 1.5–2.5 × 1–1.5 cm. Stem 60–120 cm, proximally minutely papillose. Leaves scattered, linear-lanceolate, 8–14 cm × 7–11 mm, distal ones apically recurved or cirrose. Flowers usually 2, funnelform, fragrant. Tepals white; outer ones oblong-spatulate, ca. 16 × 3–4 cm, basally conspicuously narrowed; inner ones spatulate, 4–5.5 cm wide; nectaries sparsely papillose on both surfaces. Filaments 9–12 cm, proximally pilose; anthers brown, 1.2–1.5 cm. Ovary 3–3.5 cm × 5–8 mm. Style 10–12 cm. Fl. Jun.

• About 800 m. S Anhui (Shitai Xian).

47. Lilium wenshanense L. J. Peng & F. X. Li, Acta Bot. Yunnan., Suppl. 3: 33. 1990.

文山百合 wen shan bai he

Bulb subglobose, 2.5–4 cm in diam.; scales white, articulate. Stem gray-white, 1.2–1.8 m, smooth. Leaves scattered, lanceolate or very narrowly ovate, 9–10 × 1–1.2 cm, glabrous,

3–5-veined, margin papillose. Flowers solitary or 2–7 in a raceme, funnelform. Tepals spreading distally and recurved apically; outer ones lanceolate, ca. 1.8 × 2.5 cm; inner ones spatulate, ca. 3 cm wide; nectaries greenish, neither papillose nor with fimbriate projections. Filaments ca. 13 cm, base densely tomentose; anthers ca. 1 cm, with yellow pollen. Ovary ca. 3 cm. Style ca. 10 cm. Capsule subcylindric, Fl. Jun–Jul, fr. Aug–Sep.

• Meadows; 1000–2000 m. SE Yunnan (Wenshan Xian).

48. Lilium regale E. H. Wilson, Gard. Chron., ser. 3, 53: 416. 1913.

岷江百合 min jiang bai he

Lilium myriophyllum E. H. Wilson, Fl. & Sylva 3: 330. 1905, not Franchet (1892).

Bulb broadly ovoid, ca. 3.5 cm in diam.; scales lanceolate, 4–5 × 1–1.5 cm. Stem to 50 cm, papillose. Leaves scattered, narrowly linear, 6–8 cm × 2–3 mm, papillose on midvein abaxially and at margin, 1-veined. Flowers solitary or several, funnelform, very fragrant. Tepals white, tinged yellow at base; outer ones lanceolate, 9–11 × 1.5–2 cm; inner ones obovate, slightly wider; nectaries neither papillose nor with fimbriate projections. Filaments 6–7.5 cm, scarcely papillose; anthers ellipsoid, 0.9–1.2 cm. Ovary cylindric, ca. 2.2 cm × 3 mm. Style ca. 6 cm. Fl. Jun–Jul. 2*n* = 24*.

• Rocky slopes, river banks; 800–2500 m. Sichuan.

49. Lilium formosanum Wallace, Garden (London) 40: 442. 1891.

台湾百合 tai wan bai he

Bulb subglobose or broadly ellipsoid, 2–4 cm in diam.; scales white or tinged yellow, lanceolate-ovate to lanceolate. Stem sometimes tinged purple-red, 20–55 cm, smooth or papillose. Leaves scattered, linear or narrowly lanceolate, 2.5–15 cm × 4–13 mm. Flowers solitary or sometimes several in a subumbel, fragrant, funnelform, with a slender tube gradually expanding toward apex. Tepals white, tinged purple-red abaxially; outer ones oblanceolate, 11.5–14.5 × 2.1–2.3 cm; inner ones spatulate, to 3 cm wide; nectaries green, rarely indistinctly papillose on both surfaces. Filaments ca. 10 cm, with minute protuberances near base. Style ca. 6.5 cm. Capsule 7–9 × ca. 2 cm. Fl. and fr. Jun–Dec.

• Grassy slopes, seashores; near sea level to 3500 m. Taiwan.

1a. Leaves 8–15 × 1–1.3 cm, midvein conspicuous; tepals 12–15 cm ..... 49a. var. *formosanum*
1b. Leaves 2.5–3 × 0.4–0.5 cm, midvein inconspicuous; tepals 7–8 cm ..... 49b. var. *microphyllum*

49a. Lilium formosanum var. **formosanum**

台湾百合(原变种) tai wan bai he (yuan bian zhong)

Lilium formosanum var. *pricei* Stoker; *L. longiflorum* Thunberg var. *formosanum* Baker; *L. philippinense* Baker var. *formosanum* (Wallace) E. H. Wilson.

Leaves 8–15 × 1–1.3 cm, midvein conspicuous. Tepals 12–15 cm. 2*n* = 24*.

• Grassy slopes; near sea level to 3500 m. Taiwan.

49b. Lilium formosanum var. **microphyllum** Tang S. Liu & S. S. Ying in H. L. Li et al., Fl. Taiwan 5: 61. 1978.

小叶百合 xiao ye bai he

Leaves 2.5–3 cm × 4–5 mm, midvein inconspicuous. Tepals 7–8 cm.

• Seashores. N Taiwan.

50. Lilium longiflorum Thunberg var. **scabrum** Masamune, Trans. Nat. Hist. Soc. Taiwan 26: 218. 1936.

糙茎百合 cao jing bai he

Bulb globose or subglobose, 2.5–5 cm in diam.; scales white. Stem 45–90 cm, green, light red at base, scabrous-pubescent. Leaves scattered, linear-lanceolate, 20–25 × 0.8–1.2 cm. Flowers solitary or several, horizontal or somewhat nodding, long tubular, very fragrant. Tepals white, slightly tinged green toward base abaxially, oblanceolate, 13–18 × 2.5–4 cm; inner ones slightly wider than outer; nectaries not papillose. Filaments 8–9 cm, glabrous; anthers purple or yellow, 5–8 mm. Ovary 4–4.5 cm. Style 6–7 cm. Fl. May–Jul.

• Near sea level to 500 m. Taiwan.

Lilium longiflorum var. *longiflorum* is endemic to Japan (Osumi Islands to Ryukyu Islands).

51. Lilium leucanthum (Baker) Baker, J. Roy. Hort. Soc. 26: 337. 1901.

宜昌百合 yi chang bai he

Bulb subglobose, 3.5–4 cm in diam.; scales brownish yellow or purple when dried, lanceolate, ca. 3.5 × 1 cm. Stem 0.6–1.5 m, papillose. Leaves scattered, lanceolate, 8–17 cm × 6–10 mm. Flowers 1–4, funnelform, slightly fragrant. Tepals white, tinged pale yellow adaxially, tinged pale green-yellow or purple or brownish along midvein abaxially; outer ones lanceolate, 12–15 × 1.2–2.8 cm; inner ones spatulate, 2.6–3.8 cm wide; nectaries not papillose. Filaments 10–22 cm, densely pubescent proximally; anthers pale yellow, ca. 1 cm. Ovary 3.5–4 cm. Style to 10 cm, basally pubescent. Fl. Jun–Jul.

• Grassy places along rivers, hillsides along ravines; 400–2500 m. S Gansu, Hubei, Sichuan.

1a. Tepals tinged pale green-yellow along midvein abaxially ..... 51a. var. *leucanthum*
1b. Tepals tinged purple or brownish along midvein abaxially ..... 51b. var. *centifolium*

51a. Lilium leucanthum var. **leucanthum**

宜昌百合(原变种) yi chang bai he (yuan bian zhong)

Lilium brownii F. E. Brown ex Miellez var. *leucanthum* Baker, Gard. Chron., ser. 3, 16: 180. 1894; *L. leucanthum* var. *leiostylum* Stapf ex Elwes; *L. leucanthum* var. *primarium* Stapf.

Tepals tinged pale green-yellow along midvein abaxially.

• Grassy places along rivers, hillsides along ravines; 400–1500 m.

Hubei, Sichuan.

51b. Lilium leucanthum var. **centifolium** (Stapf ex Elwes) Stearn in Woodcock & Coutts, Lilies, 213. 1935.

紫脊百合 zi ji bai he

Lilium centifolium Stapf ex Elwes, Gard. Chron., ser. 3, 70: 101. 1921.

Tepals tinged purple or brownish along midvein abaxially.

• Hillsides along ravines; ca. 2500 m. S Gansu (Zhugqu Xian).

52. Lilium sulphureum Baker ex J. D. Hooker, Fl. Brit. India 6: 351. Jul 1892.

淡黄花百合 dan huang hua bai he

Lilium myriophyllum Franchet (Sep 1892), not E. H. Wilson (1905).

Bulb globose, ca. 5.5 cm in diam.; scales ovate-lanceolate or lanceolate, 2.5–5 × 0.8–1.6 cm. Stem 0.8–1.2 m, papillose. Leaves scattered, lanceolate, 7–13 × 1.3–1.8(–3.2) cm, axil with bulblets (on distal leaves). Flowers usually 2, funnelform, fragrant. Tepals white; outer ones oblong-oblanceolate, 17–19 × 1.8–2.2 cm; inner ones spatulate, 3.2–4 cm wide; nectaries not papillose. Filaments 13–15 cm, glabrous, rarely sparsely pubescent; anthers narrowly oblong, ca. 2 cm. Ovary purple, cylindric, 4–4.5 cm × 2–5 mm. Style 11–12 cm. Fl. Jun–Jul. 2*n* = 36*.

Shaded places in forests, grassy slopes, hillsides; 100–1900 m. Guangxi, Guizhou, Sichuan, Yunnan [Myanmar].

The bulbs are used medicinally.

53. Lilium sargentiae E. H. Wilson, Gard. Chron., ser. 3, 51: 385. 1912.

泸定百合 lu ding bai he

Lilium formosum Franchet; *L. leucanthum* Baker var. *sargentiae* (E. H. Wilson) Stapf; *L. omeiense* Z. Y. Zhu.

Bulb subglobose or broadly ovoid, 5–6 cm in diam.; scales lanceolate, 3.5–4 × 1.5–1.7 cm. Stem 45–160 cm, papillose. Leaves scattered, lanceolate or oblong-lanceolate, 5.5–12 × 1–3 cm; axil with green bulblets (on distal leaves). Flowers solitary or 2–4 in a subumbel, funnelform. Tepals white, pale green toward base; outer ones oblanceolate, 14–17 × 2–2.8 cm; inner ones narrowly obovate-spatulate, wide; nectaries yellowish green, not papillose. Filaments 11–13 cm, densely pubescent proximally; anthers 1.4–2 cm, with brownish yellow pollen. Ovary purple, 3.5–4.5 cm × 3–5 mm. Style 10–11 cm. Capsule oblong, 6–7 × ca. 3.5 cm. Fl. Jul–Aug, fr. Oct. 2*n* = 24*.

• Thicket margins, grassy slopes; 500–2000 m. Sichuan, ?Yunnan.

54. Lilium tianschanicum N. A. Ivanova ex Grubov in Grubov & T. V. Egorova, Rast. Tsent. Azii, Mater. Bot. Inst. Komarova 7: 70. 1977.

天山百合 tian shan bai he

Bulb white, subglobose, ca. 3 cm in diam.; scales many, fleshy. Stem straight, ca. 25 cm, sparsely papillose proximally. Leaves linear, 8–10 cm × 2–5 mm, apex acute. Flower solitary, nodding. Tepals white, oblong-lanceolate, ca. 4.5 × 1.2–1.5 cm, apex thickened, minutely papillose adaxially; nectaries densely papillose on both surfaces. Stamens nearly as long as tepals; anthers yellow. Fl. Aug.

• Clay-gravelly steppes. Xinjiang (Tian Shan).

55. Lilium pyi H. Léveillé, Repert. Spec. Nov. Regni Veg. 6: 263. 1909.

毕氏百合 bi shi bai he

Stem 40–60 cm, slender. Leaves linear, 4–7 cm × 3–5 mm. Flower solitary, nodding. Tepals with dark reddish brown spots only on margin, narrowly oblong-lanceolate; nectaries blackish, glabrous.

• W Yunnan (Binchuan Xian).

This is an unclear species; no specimens have been seen by the present authors.

21. NOMOCHARIS Franchet, J. Bot. (Morot) 3: 113. 1889.

豹子花属 bao zi hua shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, bulbiferous. Bulb of many imbricate, fleshy scales, white, without a tunic. Stem erect. Cauline leaves alternate or whorled, sessile, linear-lanceolate to elliptic-lanceolate. Inflorescence a terminal, 1- to several-flowered raceme; bracts 1–3. Tepals 6, free, usually with dark spots or blotches, usually papillose at apex; inner ones with nectary processes on both sides (rarely on 1 or neither side) of a short, median channel at base adaxially. Stamens 6, inserted at base of tepals; filaments often swollen, fleshy and cylindric proximally, sometimes subulate; anthers versatile. Ovary cylindric, 3-loculed; ovules many per locule. Style clavate, widened apically; stigma capitate. Fruit a capsule. Seeds narrowly winged all round.

Seven species: China, India, Myanmar; six species (two endemic) in China.

1a. Leaves alternate; filaments nearly subulate, tapering from flat, widened base to filiform apex; inner tepals entire at margin.
  2a. Style 6.5–12 mm, longer than ovary ..... 1. *N. aperta*
  2b. Style 2.5–4 mm, shorter than ovary ..... 2. *N. saluenensis*
1b. Leaves whorled, at least distal ones; filaments swollen, cylindric, and fleshy proximally, abruptly narrowed to a filiform portion distally; inner tepals entire or erose to lacerate at margin.

3a. Inner tepals neither spotted nor blotched with deep color, margin entire ..... 3. *N. basilissa*
3b. Inner tepals spotted or blotched with deep color, margin erose to lacerate.
4a. Inner tepals ovate to elliptic, more than 1.5 × as long as broad; anthers 3–3.5 × ca. 1 mm ..... 6. *N. meleagrina*
4b. Inner tepals ovate to orbicular, scarcely or slighty longer than broad; anthers 4–6 × 1.5–2 mm.
5a. Leaves elliptic to lanceolate-elliptic, 10–30 mm wide ..... 4. *N. pardanthina*
5b. Leaves linear to narrowly lanceolate, 5–8 mm wide ..... 5. *N. farreri*

1. Nomocharis aperta (Franchet) E. H. Wilson, Lilies East. Asia 13. 1925.

开瓣豹子花 kai ban bao zi hua

Lilium apertum Franchet, J. Bot. (Morot) 12: 220. 1898; *Fritillaria oxypetala* Royle; *L. oxypetalum* (Royle) Baker; *Nomocharis forrestii* I. B. Balfour.

Bulb ovoid, 1.5–2.5 × 1–2 cm. Stem 25–50 cm. Leaves alternate, broadly lanceolate to linear-lanceolate, 3–5.5 × 0.8–1.2 cm. Flowers usually 1 or 2(–6). Tepals spreading, rose or pink, with a deep maroon or purplish crimson blotch at base, and a few or more crimson spots mostly in proximal part, margin entire; outer tepals elliptic, ovate, or lanceolate, 2.2–4.5 × 1.2–1.5 cm; inner ones broadly elliptic or broadly ovate, 2.2–4.4 × 1.3–2.2 cm; nectary processes 2, of fleshy, cushionlike projections of tissue, rarely 1 or absent. Filaments 5–10 mm, nearly subulate, tapering from flat base to filiform apex, fleshy. Ovary 5–9 mm. Style 6.5–12 mm. Capsule green-brown, oblong-ovoid, 1–2.5 × 1.2–2 cm. Fl. Jun–Jul, fr. Aug–Oct. 2*n* = 24*.

Broad-leaved forests, bamboo scrub, alpine grasslands; 3000–3900 m. SW Sichuan, Xizang, NW Yunnan [N Myanmar].

2. Nomocharis saluenensis I. B. Balfour, Trans. Bot. Soc. Edinburgh 27: 294. 1919.

云南豹子花 yun nan bao zi hua

Lilium apertum Franchet var. *thibeticum* Franchet; *L. saluenense* (I. B. Balfour) S. Yun Liang.

Bulb white, ovoid, 2–4 × 2–2.5 cm. Stem 30–90 cm. Leaves alternate, usually lanceolate, 3.5–7 × 1–1.5 cm. Flowers 1–7. Tepals spreading, white to pink, with a dark purple blotch at base and well spotted or blotched crimson proximally, margin entire; outer tepals elliptic to narrowly so, 3.5–5.2 × 1.6–2 cm; inner ones elliptic to broadly ovate, 3–4.5 × 1.7–2.5 cm; nectary processes 2, of fleshy, cushionlike projections of tissue. Filaments nearly subulate, 8–11 mm, tapering from slightly widened base to filiform apex; anthers 7.5–8 mm. Ovary 6–7 × 2.5–3 mm. Style 2.5–4 mm, usually shorter than ovary. Capsule oblong, 1.7–1.8 × ca. 1.8 cm. Fl. Jun–Aug, fr. Aug–Sep. 2*n* = 24*.

Forest margins, shrubby and grassy slopes; 2800–4500 m. Sichuan, Xizang, NW Yunnan [N Myanmar].

3. Nomocharis basilissa Farrer ex W. E. Evans, Notes Roy. Bot. Gard. Edinburgh 15: 25. 1925.

美丽豹子花 mei li bao zi hua

Bulb ovoid, small; scales laxly arranged, lanceolate to ovate-lanceolate. Stem 35–95 cm. Proximal leaves alternate, distal ones whorled, linear to lanceolate, 5.5–9 cm × 5–7 mm. Flowers 1–5, ± nodding. Tepals red, sometimes flushed purple or blackish purple basally, margin entire; outer ones ovate to elliptic, 3.5–4.5 × 1.5–1.8 cm; inner ones broadly elliptic or broadly ovate, 3.5–4.5 × 2–2.5 cm; nectary processes 2, of purplish black, thin flanges of tissue arranged in a fan shape. Filaments 7–8 mm, swollen, cylindric, and fleshy proximally, abruptly narrowed to a filiform portion distally; anthers 6–7 mm. Ovary 6–7 mm. Style 8–10 mm; stigma rather large, 3-lobed. Fl. Jul–Aug. 2*n* = 24*.

Alpine bamboo scrub, alpine grasslands; 3900–4300 m. NW Yunnan [N Myanmar].

4. Nomocharis pardanthina Franchet, J. Bot. (Morot) 3: 113. 1889.

豹子花 bao zi hua

Nomocharis leucantha I. B. Balfour; *N. mairei* H. Léveillé; *N. mairei* f. *candida* W. E. Evans; *N. mairei* f. *leucantha* (I. B. Balfour) W. E. Evans; *N. pardanthina* f. *punctulata* Sealy.

Bulb ovoid-globose, 2.5–3.5 × 2–3.5 cm. Stem 25–90 cm. Proximal leaves alternate, distal ones whorled, elliptic to lanceolate-elliptic, 2.5–7 × 1–3 cm. Flowers 1 to several. Tepals white or pink, usually with a dark purple blotch at base; outer ones laxly spotted purple-red, ovate, 2.5–3.5 × 1.2–2 cm, margin entire; inner ones densely or laxly spotted or blotched purple-red, ovate to orbicular, 2–3 × 1.5–2 cm, margin usually erose or lacerate; nectary processes 2, of purple-red, fleshy ridges of tissue arranged in a fan shape. Filaments swollen, cylindric, 6.5–7 mm, and fleshy proximally, abruptly narrowed to a filiform, 2–2.5 mm long portion distally. Style 6–8 mm. Fl. May–Jul, fr. Jul–Aug. 2*n* = 24*.

• Forest margins, grassy slopes; 2700–4100 m. SW Sichuan, NW Yunnan.

5. Nomocharis farreri (W. E. Evans) Harrow, New Fl. & Silva 1: 76. 1928.

滇西豹子花 dian xi bao zi hua

Nomocharis pardanthina Franchet var. *farreri* W. E. Evans.

Bulb ovoid, 1.8–2 × 1.5–1.8 cm. Stem 25–75 cm. Proximal leaves alternate, distal ones whorled, linear to narrowly lanceolate, 3–9 cm × 5–8 mm. Flowers 1 or 2, horizontal or suberect. Tepals white, rose, or pink; outer ones elliptic, 2.5–3.5 × 1.2–1.4 cm, margin entire; inner ones densely spotted purple-red or dark brown-red, ovate to orbicular, 2.5–3.5 × 2.2–3 cm, margin shallowly erose; nectary processes 2, of narrow flanges of tissue arranged in a fan shape. Filaments swollen, cylindric, 6–7 mm, and fleshy proximally, abruptly narrowed to a filiform, 2.5–3.5 mm long portion distally. Style ca. 1 cm. Capsule oblong, 2–2.5 × ca. 2 cm, 6-angular. Fl. Jun–Jul, fr. Aug–Oct. 2*n* = 24*.

Forests, bamboo forest margins, grassy places; 2700–3400 m. W Yunnan [N Myanmar].

6. Nomocharis meleagrina Franchet, J. Bot. (Morot) 12: 196. 1898.

多斑豹子花 duo ban bao zi hua

Nomocharis biluoensis S. Yun Liang.

Bulb white, ovoid, 2.5–3 × 2–2.8 cm. Stem 35–100 cm. Leaves 5–8-whorled, narrowly lanceolate to elliptic, 4.5–11 × 1–3 cm, margin sometimes conspicuously papillose. Flowers 1–4, nodding. Tepals white or tinged pale pink abaxially; outer ones blotched purple-red, elliptic to ovate-elliptic, 4–5 × (1–)2–2.5 cm, margin entire; inner ones spotted or mainly in distal part blotched purple-red, ovate to elliptic, 4–5 × (1–)2.5–3 cm, margin erose-serrate; nectary processes 2, of low ridges of tissue arranged in a fan shape. Filaments swollen, cylindric, 6–7 mm, and fleshy proximally, abruptly narrowed to a filiform, 2–2.5 mm long portion distally. Style 7–9 mm. Capsule oblong-ovoid. Fl. Jun–Jul, fr. Aug–Sep. 2*n* = 24*.

• *Abies* forests, broad-leaved forests, forest margins, grassy slopes; 2800–4000 m. Sichuan, SE Xizang, NW Yunnan.

22. CLINTONIA Rafinesque, Amer. Monthly Mag. & Crit. Rev. 2: 266. 1818.

七筋菇属 qi jin gu shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, with a short rhizome. Leaves several, basal, entire. Scape erect, often leafless. Inflorescence terminal, umbellate or racemose, rarely 1-flowered; rachis and pedicels usually elongate in fruit. Flowers small. Tepals 6, free, ascending to spreading, subequal. Stamens 6, inserted at base of tepals; filaments filiform; anthers pseudobasifixed, ellipsoid, semiextrorse. Ovary ovoid-globose, (2 or)3-loculed; ovules several to many per locule. Style columnar; stigma obscurely 3-lobed. Fruit a berry. Seeds 2 or more; testa usually brownish.

Five species: temperate to subarctic regions of E Asia and North America; one species in China.

Although Tamura (in Kubitzki, Fam. Gen. Vasc. Pl. 3: 350. 1998) placed *Clintonia* in the Liliaceae *sensu stricto*, Wu Zhengyi (editor's note) believes it should be treated in the segregate family Medeoloaceae. Takhtajan (Diversity Classific. Fl. Pl. 487. 1997) recognized Medeoloaceae but placed *Clintonia* in the Uvulariaceae (pp. 482–483).

1. Clintonia udensis Trautvetter & C. A. Meyer in Middendorff, Reise Sibir. 1(Theil 2, Bot. Lief. 3): 92. 1856.

七筋菇 qi jin gu

Clintonia alpina Kunth ex Baker; *C. udensis* var. *alpina* (Kunth ex Baker) H. Hara.

Rhizome stiff, ca. 5 mm in thick, covered with fibrous sheaths. Leaves 3–5, ± petiolate, obovate, elliptic-obovate, or oblanceolate, 8–25 × 3–16 cm, margin pubescent when young. Scape 10–20 cm, usually to 60 cm in fruit, leafless, densely white pubescent. Raceme 3–12-flowered; bracts caducous; pedicels densely pubescent, 1–7 cm in fruit. Tepals white or sometimes bluish, oblong, 7–12 × 3–4 mm, puberulent abaxially. Stamens 4–6(–8) mm. Pistil 6–8 mm; style 3–5 mm. Berry blackish blue, globose or ellipsoid, 7–12 × 7–10 mm, many seeded. Fl. May–Jun, fr. Jul–Oct. 2*n* = 14, 28.

Sparse forests, alpine forests; 1600–4000 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Japan, Korea, Myanmar, Russia (Far East, Siberia), Sikkim].

23. TRICYRTIS Wallich, Tent. Fl. Napal. 61. 1826, nom. cons.

油点草属 you dian cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Hiroshi Takahashi

Compsoa D. Don, nom. rej.

Herbs perennial, with short or sometimes long and creeping rhizomes. Stems usually erect or ascending, sometimes branched distally. Leaves cauline, alternate, subsessile, usually ± amplexicaul. Inflorescence a thyrse or thyrsoid, rarely a raceme. Flowers bisexual, solitary, showy. Perianth campanulate or trumpet-shaped. Tepals 6, free, white or yellow with purplish spots, usually recurved or reflexed distally, usually caducous; outer ones saccate or shortly spurred. Stamens 6, inserted at base of tepals; filaments slightly flattened, proximally connivent to form a short tube; anthers dorsifixed, versatile, extrorse. Ovary 3-loculed; ovules many per locule. Style columnar; stigmatic lobes 3, spreading, apically cleft. Fruit a capsule, broadly cylindric, 3-angled, septicidal. Seeds many, ovate to orbicular, flattened, small.

About 18 species: from the Himalayas to E Asia; nine species (six endemic) in China.

1a. Flowers or inflorescences all axillary ..... 7. *T. suzukii*
1b. Flowers or inflorescences terminal or sometimes also axillary.
2a. Ovary and capsule densely pubescent ..... 4. *T. lasiocarpa*
2b. Ovary and capsule glabrous or subglabrous.

3a. Stems subglabrous.
4a. Flowers pale yellow with red-purple spots ..... 9. *T. latifolia*
4b. Flowers white or greenish white with purple spots.
5a. Tepals spreading obliquely outward ..... 5. *T. ovatifolia*
5b. Tepals spreading horizontally or at an angle of ca. 45° ..... 8. *T. viridula*
3b. Stems mostly pubescent; leaves not usually ovate, apex acute or acuminate.
6a. Leaves (4–)6–10 cm wide, adaxially hispidulous, proximal leaves rounded or cordate at base.
7a. Tepals reflexed at full anthesis ..... 1. *T. macropoda*
7b. Tepals spreading horizontally or at an angle of ca. 45° ..... 2. *T. pilosa*
6b. Leaves 2.5–4(–5) cm wide, adaxially glabrescent, proximal leaves narrowed and subcuneate at base.
8a. Plants with creeping, long rhizomes; leaves elliptic ..... 6. *T. stolonifera*
8b. Plants without creeping, long rhizomes; leaves oblanceolate to obovate ..... 3. *T. formosana*

1. Tricyrtis macropoda Miquel, Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch., ser. 2, 2: 86. 1868.

油点草 you dian cao

Stem to 1 m, sparsely or densely hispidulous distally. Leaves ovate-elliptic, oblong, or oblong-lanceolate, (6–)8–16 (–19) × (4–)6–10 cm, hispidulous on both surfaces, base cordate or rounded and amplexicaul, margin hispidulous-ciliate, apex acute or acuminate. Cymes terminal and usually also axillary in distal part of stem, several to many flowered; rachis and pedicels brownish hispidulous; pedicels 1.4–3 cm. Tepals reflexed, greenish white or white, with purple-red spots, ovate-elliptic to lanceolate, 1.5–2 cm × 5–7 mm; outer ones wider than inner ones, basally saccate. Stamens 1.5–2 cm; filaments with purple spots. Ovary glabrous. Stigmatic lobes 1–1.5 cm. Capsule 2–3 cm. Fl. and fr. Jun–Oct. 2*n* = 26.

Forests, grassy slopes, rock crevices; 800–2400 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, ?S Shaanxi (Qin Ling), Zhejiang [Japan].

2. Tricyrtis pilosa Wallich, Tent. Fl. Napal. 62. 1826.

黄花油点草 huang hua you dian cao

Compsoa maculata D. Don; *Corchorus polygonatum* H. Léveillé; *Disporum esquirolii* H. Léveillé; *Tricyrtis maculata* (D. Don) J. F. Macbride.

Stem 50–90 cm, hispidulous distally. Leaves ovate-oblong to oblong-lanceolate, 8–14 × 6–9 cm, hispidulous on both surfaces, base cordate or rounded and amplexicaul, apex acuminate. Cymes terminal and sometimes also axillary in distal part of stem, laxly several to many flowered; rachis and pedicels hispidulous. Tepals spreading horizontally, at an angle of ca. 45°, or subascending, greenish white, with black-purple or purple-brown spots, ovate-oblong to lanceolate, 1.2–1.8 cm × 5–6 mm; outer ones slightly wider than inner ones, basally saccate. Stamens subequaling tepals. Ovary glabrous. Capsule 2–3 cm. Fl. and fr. Jul–Sep. 2*n* = 26*.

Forests, hillsides; 300–2300 m. Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [Bhutan, India, Nepal].

3. Tricyrtis formosana Baker, J. Linn. Soc., Bot. 17: 465. 1879.

台湾油点草 tai wan you dian cao

Stem sometimes branched, usually flexuous, 25–80 cm, glabrous or slightly pubescent distally. Leaves oblanceolate or narrowly elliptic-oblanceolate to obovate, 8–13 × 2.5–4.5 cm, adaxially glabrescent, abaxially pubescent particularly along veins, base usually narrowed and subcuneate, margin ciliate, apex acuminate. Cymes terminal and also axillary in distal part of stem, laxly several flowered; pedicels 1–6 cm, pubescent or glabrous. Flowers trumpet-shaped. Tepals purple-white, with purple spots adaxially, lanceolate, oblanceolate, or oblong, 2–4 cm × 4–11 mm, abaxially usually laxly pubescent; outer ones basally saccate. Stamens usually included. Ovary glabrous. Style subequaling stigmatic lobes. Capsule 2.5–3.5 × 5–6 mm. Fl. and fr. (?Apr–)Oct–Nov.

• Forests, thickets, shaded places, roadsides; near sea level to 3000 m. Taiwan.

1a. Stem usually less than 30 cm; inflorescence glandular ..... 3b. var. *glandosa*
1b. Stem 45–80 cm; inflorescence pubescent or glabrous.
2a. Tepals 2–2.5 cm; pedicel pubescent ..... 3a. var. *formosana*
2b. Tepals 3–4 cm; pedicel glabrous ..... 3c. var. *grandiflora*

3a. Tricyrtis formosana var. **formosana**

台湾油点草(原变种) tai wan you dian cao (yuan bian zhong)

Stem 45–80 cm. Inflorescence pubescent on rachis and pedicels. Tepals lanceolate or oblanceolate, 2–2.5 cm. 2*n* = 26*.

• Forests, thickets, shaded places; near sea level to 3000 m. Taiwan.

3b. Tricyrtis formosana var. **glandosa** (Simizu) Tang S. Liu & S. S. Ying in H. L. Li et al., Fl. Taiwan 5: 79. 1978.

小型油点草 xiao xing you dian cao

Tricyrtis formosana f. *glandosa* Simizu, Bot. Bull. Acad. Sin., n.s., 3: 37. 1962.

Stem less than 30 cm. Inflorescence glandular. 2*n* = 26*.

• 800–1400 m. C and NE Taiwan.

No specimens have been seen by the present authors.

3c. Tricyrtis formosana var. **grandiflora** S. S. Ying, Colored Illustr. Fl. Taiwan 3: 619. 1988.

大花油点草 da hua you dian cao

Stem 45–70 cm. Inflorescence glabrous. Tepals oblong to broadly lanceolate, 3–4 cm.

• Roadsides; ca. 1500m. E Taiwan (Hualian Xian).

No specimens have been seen by the present authors.

4. Tricyrtis lasiocarpa Matsumura, Bot. Mag. (Tokyo) 11: 79. 1897.

毛果油点草 mao guo you dian cao

Tricyrtis formosana Baker var. *lasiocarpa* (Matsumura) Masamune.

Stem erect or slightly prostrate. Leaves ovate-lanceolate, 7–12 × 2.5–4 cm, glabrous or subglabrous, base sheathed, margin ciliate, apex acuminate. Cymes terminal, laxly several flowered. Flowers trumpet-shaped. Tepals 1.5–2.5 cm, adaxially pubescent. Stamens included; filaments slender. Ovary densely pubescent. Style subequaling stigmatic lobes. Capsule 2.5–3 cm, densely pubescent. Fl. and fr. Jul–Sep.

• Near sea level to 1600 m. Taiwan.

No specimens have been seen by the present authors.

5. Tricyrtis ovatifolia S. S. Ying, Quart. J. Chinese Forest. 6(1): 169. 1972.

卵叶油点草 luan ye you dian cao

Rhizome creeping, thickened, ca. 5 mm thick. Stem erect or ascending, 25–50 cm, glabrous. Leaves ovate, 9–12 × 6.5–8.5 cm, base rounded and slightly amplexicaul, apex acute, caudate. Cymes terminal, 10–15 cm; pedicels 1.5–2.5 cm, pubescent. Tepals white, with red spots, oblanceolate, 2–2.5 cm × 5–8 mm; outer ones basally shortly spurred. Filaments filiform, slightly flattened, 1.5–2.5 cm. Ovary glabrous. Capsule 3–3.5 cm × 5–8 mm. Seeds many, brown, spindlelike, 1–1.5 mm.

• Forests, roadsides; 800–1000 m. S Taiwan (Pingdong Xian).

No specimens have been seen by the present authors.

6. Tricyrtis stolonifera Matsumura, Bot. Mag. (Tokyo) 11: 78. 1897.

山油点草 shan you dian cao

Tricyrtis formosana Baker var. *stolonifera* (Matsumura) Masamune.

Rhizome creeping, long. Stem erect, flexuous distally, 40–60 cm, pubescent. Leaves elliptic, 6–12 × 3–4 cm, abaxially ± pubescent, especially along veins, base narrowed, slightly cuneate. Cymes terminal, laxly 3–5-flowered; pedicels 2.5–3 cm, softly pubescent. Flowers trumpet-shaped. Tepals light purple, with purple spots, often whitish yellow at base, ca. 2.2 cm; outer ones subovate; inner ones linear. Stamens subequaling tepals; filaments often with purplish spots, slender. Ovary ca. 1.5 cm, glabrous. Style shorter than stigmatic lobes. Capsule glabrous. Fl. and fr. Jun–Jul. 2*n* = 24*, 26*.

• Thickets, roadsides. Taiwan.

No specimens have been seen by the present authors.

7. Tricyrtis suzukii Masamune, J. Soc. Trop. Agric. 3: 21. 1931.

侧花油点草 ce hua you dian cao

Rhizome creeping, stolonlike. Stem branched, 70–100 cm, glabrous. Leaves lanceolate or ovate-oblong, 5–8 × 1.5–2.5 cm, base deeply cordate, amplexicaul, apex caudate-acuminate. Cymes axillary, laxly several flowered or reduced to a solitary flower; pedicels 3–5 cm, densely hirsute. Tepals white, usually with purple spots, oblong-ovate, 2–2.5 cm, glabrous. Stamens subequaling tepals; filaments slender. Ovary glabrous. Style ca. 5 mm. Capsule 2–2.5 cm. Seeds brown, minute. Fl. and fr. May–Oct.

• Moist and shaded places; 800–1600m. E and N Taiwan.

No specimens have been seen by the present authors.

8. Tricyrtis viridula Hir. Takahashi, Acta Phytotax. Geobot. 48: 123. 1997.

绿花油点草 lu hua you dian cao

Rhizome short, stoloniferous. Stem solitary, erect, simple, scarcely flexuous, (20–)40–100 cm, glabrous. Leaves narrowly elliptic, ovate, or sometimes obovate, (7–)10–17 × (3–)4–7 cm, adaxially glabrous except for setose main veins at base, abaxially glabrous or with dispersed setae on main veins, base amplexicaul, ciliate, apex acuminate or cuspidate. Inflorescence terminal or sometimes also axillary in distal part of stem, with 2–4 cymose branches; peduncle and pedicels with both short, conical hairs and long, glandular hairs; peduncle 3–10 cm, with up to 2 bracteoles; pedicels 8–15(–20) mm. Flowers (2 or)3–7(or 8) per cyme. Tepals horizontally spreading in distal 2/3, white in proximal 1/2, greenish white in distal 1/2, with small, purple spots adaxially and a pale orange spot just below spreading point; outer tepals ovate, 1.4–1.7 cm × 4–5 mm, abaxially with slender, glandular hairs, base saccate, conspicuously foveolate, apex acuminate, often with purple spots on sac; inner tepals lanceolate, auriculiform, 1.4–1.7 cm × 3–3.5 mm, glandular hairy on midvein abaxially. Stamens 6; filaments recurved distally, with small, purple spots on proximal 1/2, 1.6–1.8 cm, base papillose; anthers purplish to yellowish, thinly rectangular, ca. 3 mm. Ovary trigonous or narrowly trigonous-pyramidal, 7–8 × 2.5 mm, glabrous. Style 3-fid; branches recurved-spreading, deeply incised, with small, purple spots and glandular protuberances. Capsule trigonous, glabrous, base cuneate, apex acuminate-attenuate. Seeds black-purple, 1.5 × 1–1.5 mm. Fl. and fr. Jun–Oct. 2*n* = 26*.

• Forests, forest margins; 1000–1800 m. Guangxi, Guizhou, Jiangxi, Yunnan, Zhejiang.

9. Tricyrtis latifolia Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 11: 435. 1867.

宽叶油点草 kuan ye you dian cao

Tricyrtis bakeri Koidzumi; *T. puberula* Nakai & Kitagawa.

Stem 40–100 m, usually glabrous. Leaves obovate to ovate-elliptic, 1–1.5 cm × 4–8 mm, adaxally glabrous, abaxially sparsely to rather densely pubescent, base deeply cordate, amplexicaul, apex acuminate to cuspidate. Cymes terminal and sometimes also axillary in distal part of stem, several to many flowered; rachis and pedicels papillose; pedicel 1.5–3 cm.

Tepals obliquely outward spreading, pale yellow, with purple-red spots, obanceolate to narrowly elliptic, 1.6–2 cm × 4–5 mm; outer ones basally saccate. Stamens 1.5–2 cm. Ovary glabrous. Capsule 3–3.5 cm. Fl. and fr. Jun–Sep. 2*n* = 26.

Forests, forest margins. Hebei, Henan, Hubei, Shaanxi, Sichuan [Japan].

24. STREPTOPUS Michaux, Fl. Bor.-Amer. 1: 200. 1803.

扭柄花属 niu bing hua shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, with a creeping rhizome. Stem erect, simple or distally branched. Leaves alternate, sessile, ovate to lanceolate, thin, many veined, base sometimes amplexicaul. Flowers usually 1 or 2 on an axillary, slender peduncle partly adnate to stem, rarely 2–4 flowers in a terminal inflorescence. Flowers campanulate or subrotate. Tepals 6, free, outer ones usually slightly wider than inner. Stamens 6, inserted at or near base of tepals; filaments usually flat at base; anthers basifixed. Ovary 3-loculed; ovules (2 or 3 or)6–8 per locule. Style columnar or very short. Fruit a berry, globose, several to many seeded.

About ten species: temperate regions of the N hemisphere; five species (two endemic) in China.

1a. Flowers (2 or)3 or 4 in a terminal inflorescence; tepals cuspidate-caudate at apex ..... 1. *S. ovalis*
1b. Flowers 1 or 2, on an axillary, slender peduncle partly adnate to stem; tepals acuminate at apex.
2a. Leaves ciliate-denticulate at margin.
3a. Style very short or indistinct; stigma subentire; peduncle curved but not geniculate ..... 2. *S. koreanus*
3b. Style distinct, columnar, 3–4 mm; stigma deeply 3-lobed; peduncle geniculate near middle ..... 3. *S. obtusatus*
2b. Leaves entire at margin.
4a. Tepals 8–10 × 3–4 mm; anthers longer than filaments ..... 4. *S. simplex*
4b. Tepals 6.5–8 × 1–2 mm; anthers shorter than filaments ..... 5. *S. parviflorus*

1. Streptopus ovalis (Ohwi) F. T. Wang & Y. C. Tang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 49. 1978.

卵叶扭柄花 luan ye niu bing hua

Disporum ovale Ohwi, Bot. Mag. (Tokyo) 45: 385. 1931; *Prosartes ovalis* (Ohwi) M. N. Tamura.

Rhizome elongate, slender, ca. 2 mm thick. Stem sometimes branched distally, ± flexuous, 20–45 cm, pubescent. Leaves oblong, ovate-lanceolate, or ovate-elliptic, 4–11 × 2–4 cm, thinly papery, base cordate, margin ciliate-denticulate, apex long acuminate. Flowers (2 or)3 or 4 in a terminal, umbel-like inflorescence, suberect; pedicel 1.5–3 cm, pubescent. Tepals white, spotted with purple, ovate-lanceolate, 8–9 × 2–3 mm, apex cuspidate-caudate. Filaments ca. 3 mm; anthers elliptic. Ovary globose, winged along angles. Style 3.5–4 mm, much longer than ovary; stigma distinctly 3-lobed. Berry 2- or 3-seeded. Seeds suborbicular, furrowed. Fl. May, fr. Aug.

Forests. SW Liaoning [Korea].

Tamura (in Kubitzki, Fam. Gen. Vasc. Pl. 3: 171. 1998) included this species in the American genus *Prosartes* D. Don. Further studies are needed in order to ascertain whether this species should be included in *Prosartes* or *Streptopus*.

2. Streptopus koreanus (Komarov) Ohwi, Bot. Mag. (Tokyo) 45: 189. 1931.

丝梗扭柄花 si geng niu bing hua

Streptopus ajanensis Tiling var. *koreanus* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 20: 476. 1901.

Rhizome elongate, slender, ca. 1 mm thick. Stem simple or branched distally, 15–40 cm, sparsely hispidulous. Leaves ovate-lanceolate to ovate-elliptic, 3–10 × 1–3 cm, thinly papery, base rounded, margin ciliate-denticulate, apex mucronate. Flowers 1 or 2 on an axillary peduncle; peduncle wirelike, ca. 1.5 cm, not geniculate, elongate in fruit. Tepals yellowish green, narrowly ovate, 2–3 × ca. 1 mm, minutely tuberculate adaxially, base connate, apex acuminate. Filaments very short, flat; anthers obcordate, minutely tuberculate basally. Ovary globose, smooth. Style indistinct; stigma subentire. Berry 6–9 mm in diam. Seeds many, oblong, slightly curved. Fl. May, fr. Jul–Aug.

Forests; 800–2000 m. Heilongjiang, Jilin, Liaoning [Korea].

3. Streptopus obtusatus Fassett, Rhodora 37: 102. 1935.

扭柄花 niu bing hua

Streptopus geniculatus F. T. Wang & Tang.

Rhizome elongate, slender, 1–2 mm thick, with numerous hairy roots. Stem simple or branched distally, 15–35 cm, glabrous. Leaves ovate-lanceolate or oblong-lanceolate, 5–8 × 2.5–4 cm, base cordate, margin ciliate-denticulate, apex mucronate. Peduncle axillary, 2–2.5 cm, jointed and geniculate near middle, with a swollen gland at joint, 1-flowered. Flowers nodding. Tepals yellowish, sometimes spotted with purple adaxially, oblong-lanceolate to lanceolate, 8–9 × 1–2 mm. Stamens 3.5–4.5 mm; filaments short, broad; anthers 3–4 mm. Ovary smooth. Style 3–4 mm; stigma deeply 3-lobed. Berry 6–8 mm in diam. Seeds elliptic. Fl. Jul, fr. Aug–Sep.

• Coniferous forests; 2000–3600 m. Gansu, W Hubei, Shaanxi, Sichuan, Yunnan.

4. Streptopus simplex D. Don, Prodr. Fl. Nepal. 48. 1825.

腋花扭柄花 ye hua niu bing hua

Rhizome 1.5–2 mm thick. Stem simple or branched distally, 20–50 cm, glabrous. Leaves grayish glaucous abaxially, lanceolate to ovate-lanceolate, 2.5–8 × 1.5–3 cm, base rounded or cordate, margin entire, apex acuminate. Peduncle axillary, 2.5–4.5 cm, neither jointed nor geniculate, glabrous, 1-flow-

ered. Flowers nodding. Tepals pink or white, spotted with purple, ovate-oblong, 8–10 × 3–4 mm. Stamens 3–3.5 mm; filaments flat, basally widened, 1–1.5 mm; anthers ca. 2 mm. Style slender, 5–6 mm; stigma 3-lobed, lobes revolute, ca. 1 mm. Berry 5–6 mm in diam. Fl. Jun, fr. Aug–Sep. 2*n* = 16, 32*.

Forests, bamboo thickets, hillsides along streams, alpine grasslands; 1700–4000 m. S Xizang, Yunnan [Bhutan, Myanmar, Nepal, Sikkim].

5. Streptopus parviflorus Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 89. 1887.

小花扭柄花 xiao hua niu bing hua

Streptopus mairei H. Léveillé.

Rhizome short, thickened. Stem usually branched distally, 20–50 cm, glabrous. Leaves lanceolate to ovate-lanceolate, 4–8 × 1.5–4 cm, thinly papery, base cordate, margin entire, apex acuminate. Peduncle 2.5–4 cm, glabrous, neither jointed nor geniculate, 1- or 2-flowered. Flowers nodding. Tepals white, lanceolate, 6.5–8 × 1–2 mm. Stamens 3–3.5 mm; filaments 1.8–2.2 mm; anthers ca. 1 mm. Style ca. 2.5 mm, slightly longer than ovary; stigma 3-lobed. Berry 5–8 mm in diam., many seeded. Seeds oblong, curved. Fl. Jun, fr. Aug–Sep.

• Forests, thickets, alpine grasslands; 2000–3500 m. SW Sichuan, NW Yunnan.

25. DISPORUM Salisbury ex D. Don, Prodr. Fl. Nepal. 50. 1825.

万寿竹属 wan shou zhu shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Drapiezia Blume.

Herbs perennial, often shortly rhizomatous, sometimes long stoloniferous, often glabrous, sometimes scabrous. Roots fleshy. Stem erect, simple or branched in distal part, with 1 to several sheaths proximally. Leaves concentrated in distal part of stem, alternate, often shortly petiolate, sometimes sessile, linear to suborbicular, 3–7-veined. Inflorescences terminal or pseudolateral (terminal on a short, lateral branchlet opposite a leaf), umbellate or with flowers paired or solitary; bract absent. Flowers bisexual, often nodding, sometimes horizontal, tubular-campanulate to opening flat. Tepals 6, free, white, greenish, yellow, pink, dark red, or dark purple, often saccate or spurred at base. Stamens 6, inserted at base of tepals; filaments usually slightly flat; anthers basifixed to innate, extrorse. Ovary 3-loculed; ovules 2–6 per locule. Style filiform, 3-lobed to 3-fid apically with ± recurved lobes. Fruit a berry, dark blue to black, 2(–6)-seeded. Seeds globose or ovoid.

Twenty species: Bhutan, China, India, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Russia, Sikkim, Thailand, Vietnam; 14 species (eight endemic) in China.

The North American genus *Prosartes* D. Don has often been included in *Disporum*, but recent micromorphological, karyological, phytochemical, and molecular phylogenetic studies indicate that separation of the two genera is appropriate.

1a. Inflorescences all or at least partly pseudolateral (terminal on a short, lateral branchlet opposite a leaf).
  2a. Tepals long spurred, spurs cylindric, often slightly recurved, 4–5(–8) mm ..... 11. *D. calcaratum*
  2b. Tepals shortly spurred, spurs gibbous, 1–3 mm.
    3a. Flowers semiopen campanulate, 2.5–3.8 cm, narrowed to base; stamens 2–2.8 cm; tepal spurs ca. 1 mm ..... 5. *D. megalanthum*
    3b. Flowers tubular-campanulate to campanulate, 1.5–2.5(–2.8) cm; stamens 0.8–2 cm; tepal spurs 2–3 mm.
      4a. Pedicel usually papillose-scabrous; tepals not densely papillose apically ..... 7. *D. cantoniense*
      4b. Pedicel subsmooth; tepals densely papillose apically ..... 8. *D. kawakamii*
1b. Inflorescences all truly terminal (at apex of a stem or branches).
  5a. Tepals minutely puberulent on both surfaces ..... 6. *D. acuminatissimum*
  5b. Tepals glabrous or sometimes minutely papillose or pilose near base adaxially.
    6a. Leaves rather thick, subleathery, with distinct cross veins ..... 9. *D. trabeculatum*
    6b. Leaves thinner, papery or herbaceous, without distinct cross veins.
      7a. Tepals slightly saccate at base, long attenuate at apex.
        8a. Tepals greenish white, (1.2–)1.5–2 cm, nearly 3 × as long as stamens; filaments equaling or slightly longer than anthers; ovary globose, slightly shorter than or equaling style ..... 1. *D. viridescens*
        8b. Tepals white, 1.1–1.3(–1.6) cm, slightly longer than stamens; filaments ca. 2 × as long as anthers; ovary obovoid, ca. 1/2 as long as style ..... 2. *D. smilacinum*
      7b. Tepals spurred at base, rounded to subacute at apex.
        9a. Stamens and pistil longer than tepals.
          10a. Tepals 10–17 mm, subacute at apex ..... 4. *D. longistylum*
          10b. Tepals 5–9 mm, rounded at apex ..... 10. *D. hainanense*
        9b. Stamens and pistil shorter than or equaling tepals.
          11a. Flowers funnelform to broadly obconical, 1–1.2 cm ..... 3. *D. bodinieri*
          11b. Flowers tubular-campanulate to open campanulate, 1.5–3 cm.

12a. Tepals white to cream, spotted with violet distally, apex yellowish green ..... 13. *D. nantouense*
12b. Tepals yellow, apex rarely green.
13a. Flowers cylindric-campanulate, 2–3 cm; filaments minutely papillose proximally ..... 12. *D. uniflorum*
13b. Flowers open campanulate, 1.5–2.3 cm; filaments glabrous or sparsely papillose ..... 14. *D. shimadae*

1. Disporum viridescens (Maximowicz) Nakai, J. Coll. Sci. Imp. Univ. Tokyo 31: 246. 1911.

宝珠草 bao zhu cao

Uvularia viridescens Maximowicz, Prim. Fl. Amur. 273. 1859; *Disporum smilacinum* A. Gray var. *viridescens* (Maximowicz) Maximowicz; *Prosartes viridescens* (Maximowicz) Regel.

Rhizome short, usually with long, creeping stolon; roots densely tufted. Stem often branched distally, sometimes simple, 30–80 cm. Petiole very short; leaf blade ellitpic to ovate-oblong, 5–12 × 2–5 cm, abaxially slightly scabrous on veins, cross veins indistinct, margin minutely scabrous. Inflorescences terminal, 1- or 2-flowered; pedicels 1.5–2.5 cm. Flowers widely opening. Tepals greenish white, oblong-lanceolate to lanceolate, (1.2–)1.5–2 cm × 3–4 mm, 7-veined, base slightly saccate, apex long attenuate. Stamens 4.5–7 mm, included; filaments slightly dilated proximally, 3–4 mm; anthers 2–3 mm. Ovary globose, 2.5–3.5 mm. Style 3–4 mm. Berries black, globose, ca. 1 cm in diam., 2- or 3-seeded. Seeds red-brown, ca. 4 mm in diam. Fl. May–Jun, fr. Jul–Oct. 2*n* = 16.

Forests, grassy slopes; near sea level to 600 m. Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia (Far East)].

2. Disporum smilacinum A. Gray in Perry, Exped. Jap. 2: 321. 1857.

山东万寿竹 shan dong wan shou zhu

Disporum smilacinum var. *album* Maximowicz; *D. smilacinum* var. *ramosum* Nakai; *D. smilacinum* var. *rotundatum* Satake; *D. smilacinum* var. *variegatum* Nakai.

Rhizome short, often with long, creeping stolon. Stem usually simple, rarely branched, 15–35 cm. Petiole distinct, 1–2 mm; leaf blade ovate to elliptic, 3–7 × 1.5–3 cm, base subrounded and slightly conduplicate, margin scabrous, apex acute to acuminate. Inflorescences terminal, 1(or 2)-flowered; pedicel 1–1.5(–2.2) cm. Flowers opening. Tepals white, broadly lanceolate to lanceolate, 1.1–1.3(–1.6) cm × 2–4 mm, base slightly saccate, apex long attenuate. Stamens 7–9 mm, included; filaments dilated proximally, 5–6 mm; anthers 2–3 mm. Ovary obovoid, 2–3 mm. Style 5–7 mm. Berries black, globose or broadly ellipsoid, ca. 1 cm in diam. Seeds ovoid, ca. 4 mm. Fl. Apr–May, fr. Sep–Oct. 2*n* = 16.

Forests; near sea level to 400(–1600) m. NE Shandong (Yantai Shi) [Japan, Korea, Russia (S Kurile Islands, S Sakhalin)].

3. Disporum bodinieri (H. Léveillé & Vaniot) F. T. Wang & Tang, Contr. Inst. Bot. Natl. Acad. Peiping 6: 20. 1949.

短蕊万寿竹 duan rui wan shou zhu

Tovaria bodinieri H. Léveillé & Vaniot, Mem. Pontif. Accad. Romana Nuovi Lincei 23: 360. 1905; *Disporum brachystemon* F. T. Wang & Tang; *D. pullum* Salisbury var. *ovalifolium* H. Léveillé.

Rhizome creeping, rather thick. Stem usually branched distally, 30–70(–100) cm. Petiole 5–10 mm; leaf blade elliptic to ovate-lanceolate, 5–15 × 2–6 cm, often scabrous at margin and on veins abaxially. Inflorescences terminal, umbellate, 2–6-flowered; pedicels 1.5–2.5 cm, usually papillose. Flowers funnelform to broadly obconical. Tepals white or yellowish green, rarely purple, obovate-oblanceolate to elliptic-lanceolate, 1–1.2 cm × 3–5 mm, base gibbous-spurred; spurs ca. 1 mm. Stamens 6–11 mm, included or equaling tepals; filaments 3–5 mm; anthers ca. 3 mm. Ovary 2–3 mm. Style 4–7 mm. Berries subglobose, 5–10 mm in diam., 3–6-seeded. Fl. May–Jun, fr. Aug–Oct. 2*n* = 16*.

• Forests, thickets, rocky places; 1200–3000 m. Guizhou, Hunan, Sichuan, Xizang, Yunnan.

Hara (Bull. Univ. Mus. Univ. Tokyo 31: 180. 1988) reported *Disporum leucanthum* H. Hara from China based on specimens from Sichuan (*Hsieh 40064; Xiong & Li 90719*) and Yunnan (*Ward 215*), but these specimens seem to be *D. bodinieri*. Further studies are needed in order to ascertain whether or not the two taxa are conspecific.

4. Disporum longistylum (H. Léveillé & Vaniot) H. Hara, J. Jap. Bot. 59: 40. 1984.

长蕊万寿竹 chang rui wan shou zhu

Tovaria longistyla H. Léveillé & Vaniot, Mem. Pontif. Accad. Romana Nuovi Lincei 23: 361. 1905; *Disporum cavaleriei* H. Léveillé.

Rhizome without creeping stolon. Stem usually branched distally, 30–90 cm. Petiole 3–10 mm; leaf blade lanceolate to elliptic, 3–15 × 1–4(–6) cm, base subrounded, apex usually long acuminate. Inflorescences terminal, umbellate, 2–8-flowered; pedicels 0.7–2.4 cm. Tepals green or greenish yellow, rarely purplish, spatulate-oblanceolate to obovate, 1–1.7 cm × 2–4(–8) mm, base gibbous-spurred, apex subacute; spurs 1–1.5 mm. Stamens 1.2–1.9 cm, exserted; filaments filiform, 1–1.6 cm, very minutely scabrous-puberulent proximally; anthers 2.5–4.5 mm. Ovary 2–3 mm. Style 0.8–1.7 cm, exserted. Berries black, subglobose, 6–9 mm in diam. Fl. Mar–Jun, fr. Sep–Dec. 2*n* = 16*.

• Forests, rocky places; 400–1800 m. Gansu, Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

5. Disporum megalanthum F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 250. 1978.

大花万寿竹 da hua wan shou zhu

Rhizome short, with fleshy roots 2–3 mm thick. Stem often slightly branched distally, 30–60 cm. Petiole, 2–4 mm;

leaf blade elliptic to broadly lanceolate, 6–12 × 2–5(–8) cm, base subrounded and slightly conduplicate, margin papillose-scabrous, apex acuminate. Inflorescences terminal and pseudolateral, (2–)4–8-flowered; peduncle often distinct; pedicels 1–2 cm, ridged. Flowers semiopening, narrowed to base. Tepals white or cream, obovate-oblanceolate, 2.5–3.8 cm × 5–8 mm, base shortly gibbous-spurred; spurs ca. 1 mm. Stamens 2–2.8 cm, included; filaments 1.4–2.2 cm; anthers 4–6 mm. Ovary 2–3 mm. Style 1.2–1.8 cm. Berries 0.6–1.5 cm in diam., 4–6-seeded. Fl. May–Jul, fr. Aug–Oct. 2*n* = 16*.

• Forests, forest margins, grassy slopes; 1600–2500 m. Gansu, Hubei, Shaanxi, Sichuan.

6. Disporum acuminatissimum W.L. Sha, Guihaia 5: 13. 1985.

尖被万寿竹 jian bei wan shou zhu

Rhizome short. Stem branched distally, to 80 cm. Petiole 3–5 mm; leaf blade elliptic to ovate-oblong, 5–9.5 × 1.5–5 cm. Inflorescences terminal, umbellate, 3- or 4-flowered; pedicels 1.1–2.2 cm. Flowers semiopening. Tepals white, lanceolate or narowly rhomboidal-lanceolate, 2–3.5 cm × 3–6 mm, minutely puberulent on both surfaces, papillose at margin proximally and at base adaxially, apex long acuminate, base shortly spurred; spurs ca. 1 mm. Stamens 1.5–2 cm, included; filaments 1.1–1.5 cm, puberulent-scabrous; anthers 4–6 mm. Ovary 3–4 mm. Style ca. 1.5 cm, puberulent. Fl. Apr–May.

• C Guangxi (Du'an Yao Zu Zizhixian).

7. Disporum cantoniense (Loureiro) Merrill, Philipp. J. Sci. 15: 229. 1919.

万寿竹 wan shou zhu

Fritillaria cantoniensis Loureiro, Fl. Cochinch. 1: 206. 1790; *Disporum cantoniense* var. *brunneum* (C. H. Wright) Handel-Mazzetti; *D. cantoniense* f. *brunneum* (C. H. Wright) H. Hara; *D. chinense* (Ker Gawler) Kuntze; *D. pullum* Salisbury ex J. D. Hooker; *D. pullum* var. *brunneum* C. H. Wright; *Streptopus chinensis* (Ker Gawler) Smith; *Uvularia chinensis* Ker Gawler.

Rhizome creeping, thick, without stolon. Stem usually branched distally, 50–100(–150) cm. Petiole 2–4 mm; leaves lanceolate to narrowly oblong-lanceolate, 5–12 × 1–5 cm. Inflorescences terminal and pseudolateral, (2 or)3–10-flowered; peduncle usually distinct; pedicels 1–4 cm, usually papillose-scabrous. Flowers slightly opening. Tepals purplish, oblanceolate, 1.5–2.5(–2.8) cm × 4–5 mm, base gibbous-spurred, apex subacute and without dense papillae; spurs 2–3 mm. Stamens 0.8–1.5 cm, included; filaments 8–11 mm; anthers 3–4 mm. Ovary ca. 3 mm. Style 0.7–1.5 cm. Berries 8–10 mm in diam., 2- or 3(–5)-seeded. Fl. May–Jul, fr. Aug–Oct. 2*n* = 14, 16.

Forests, thickets; 700–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Sikkim, Thailand, Vietnam].

8. Disporum kawakamii Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 365. 1911.

台湾万寿竹 tai wan wan shou zhu

Disporum cantoniense (Loureiro) Merrill var. *kawakamii* (Hayata) H. Hara; *D. taiwanense* S. S. Ying.

Herbs rhizomatous. Stem branched distally, 50–120 cm. Petiole 3–4 mm; leaf blade lanceolate to ovate, 10–17 × 1–5 cm, base broadly cuneate to rounded, margin slightly scabrous, apex acuminate. Inflorescences terminal and pseudolateral, 2–5-flowered; peduncle occasionally distinct; pedicels 2–4 cm, subsmooth. Flowers tubular-campanulate. Tepals cream or greenish tinged with purple near both ends, oblanceolate, 1.8–2.2 cm × 4–6 mm, somewhat pubescent abaxially, densely papillose apically, base gibbous-spurred; spurs ca. 2 mm. Stamens 1–2 cm, included; filaments 0.8–1.2 cm; anthers 3–4 mm. Ovary ca. 3 mm. Style 0.8–1.4 cm. Fl. Mar–May. 2*n* = 16*.

• Evergreen forests; 300–1700 m. Taiwan.

9. Disporum trabeculatum Gagnepain, Bull. Soc. Bot. France 81: 286. 1934.

横脉万寿竹 heng mai wan shou zhu

Disporum austrosinense H. Hara; *Tovaria esquirolii* H. Léveillé.

Rhizome hard. Stem simple or branched distally, sometimes tufted, 20–80 cm. Petiole 3–10 mm; leaf blade ovate-lanceolate to elliptic, 6–14 × 2–5.5 cm, subleathery, cross veins distinct, base rounded to broadly cuneate, apex acute to acuminate. Inflorescences terminal, umbellate, 2–5-flowered; pedicels 1–3 cm. Tepals whitish, yellowish, or purplish, spatulate-oblanceolate, 1–2 cm × 3–7 mm, minutely pilose at margin and near base adaxially. Stamens slightly shorter than or equaling tepals; filaments 5–9 mm, minutely papillose proximally; anthers 3–5 mm. Ovary 2–2.5 mm. Style 5–14 mm. Fl. Mar–Jun.

Forests; 900–2000 m. Guangdong, Guangxi, Guizhou, Yunnan [Vietnam].

10. Disporum hainanense Merrill, Philipp. J. Sci. 21: 338. 1922.

海南万寿竹 hai nan wan shou zhu

Disporum senpomonticolum Yamamoto.

Stem simple or branched distally, 15–100 cm. Petiole 7–10 mm; leaf blade elliptic to broadly lanceolate, 6–13 × 2–5.5 cm, cross veins indistinct, base obtuse to cuneate, apex acuminate. Inflorescences terminal, umbellate, 3–5-flowered; pedicels 0.5–2.2 cm. Flowers semiopening, fragrant. Tepals white, rose, or yellow, obovate-oblanceolate, 5–9 × 2–4 mm, base saccate, apex rounded. Stamens 6–9(–10) mm, slightly exserted; filaments 4–8 mm; anthers 3–4 mm. Ovary 2–2.5 mm. Style 3–7 mm, usually slightly exserted. Berries black, subglobose, 6–9 mm in diam. Fl. Dec–May, fr. Aug–Oct.

• Forests along ravines; 500–1000 m. Hainan.

11. Disporum calcaratum D. Don, Proc. Linn. Soc. London 1: 45. 1839.

距花万寿竹 ju hua wan shou zhu

Disporum calcaratum var. *hamiltonianum* (D. Don) Baker; *D. hamiltonianum* D. Don; *D. jiangchengense* Y. Y. Qian; *D.*

latipetalum Collett & Hemsley; *D. pedunculatum* H. Li & J. L. Huang.

Rhizome creeping, slightly flexuous. Stem usually branched distally, 30–100 cm. Petiole 3–5 mm; leaf blade elliptic to ovate-lanceolate, 5–8 × 2–5 cm. Inflorescences pseudolateral, umbellate, 3–10-flowered; peduncle sometimes distinct; pedicels 1–2 cm, ridged, usually minutely papillose on ridges. Flowers campanulate. Tepals often purple, sometimes pink to dark red, oblanceolate, 1.2–2 cm × 3–5 mm, base long spurred; spurs straight or sometimes slightly recurved, cylindric, 4–5(–8) mm. Stamens 1.1–1.8 cm, nearly included; filaments 0.7–1.3 cm; anthers 4–5 mm. Ovary 2.5–3 mm. Style 5–9 mm. Berries subglobose, ca. 1.1 cm in diam. Fl. Jun–Jul, fr. Aug–Nov. 2*n* = 14, 16.

Forests; 1200–2400 m. S Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim, Thailand, Vietnam].

12. Disporum uniflorum Baker ex S. Moore, J. Bot. 13: 230. 1875.

少花万寿竹 shao hua wan shou zhu

Disporum flavens Kitagawa; *D. sessile* D. Don ex Schultes subsp. *flavens* (Kitagawa) Kitagawa; *D. sessile* var. *pachyrrhizum* Handel-Mazzetti.

Rhizome shortly creeping, 4–7 mm thick, with stolon 1–5 cm × 3–6 mm. Stem simple or branched distally, 20–80 cm. Petiole 5–10 mm; leaf blade broadly elliptic to oblong-ovate, 4–9 × 1–6.5 cm, glabrous, base subrounded to broadly cuneate, apex shortly acuminate to acute; Inflorescences terminal, 1–3-flowered; pedicels 3–5 mm. Flowers cylindric-campanulate. Tepals yellow, spatulate-oblanceolate to obovate, 2–3 cm × 5–10 mm, base gibbous-spurred; spurs 1–2 mm. Stamens 1.8–2.8 cm, nearly included; filaments 1.5–2 cm, minutely papillose proximally; anthers 4–8 mm. Ovary 4–5 mm. Style 1.5–2.3 cm. Berries blue-black, subglobose, 8–10 mm in diam. Fl. Mar–Jun, fr. Jul–Nov. 2*n* = 16*.

Forests; 100–2500 m. Anhui, Hebei, Hubei, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Sichuan [Korea].

13. Disporum nantouense S. S. Ying, Mem. Coll. Agric. Natl. Taiwan Univ. 30: 59. 1990.

南投万寿竹 nan tou wan shou zhu

Disporum sessile D. Don ex Schultes var. *shimadae* (Hayata) H. Hara f. *intermedium* H. Hara; *D. taipingense* M. N. Tamura & Kawano.

Herbs stoloniferous. Stem simple or 1–5-branched distally, 15–60 cm. Petiole 0.3–2.5 mm; leaf blade lanceolate to ovate, 5.5–8.5 × 0.9–3.0 cm, 3 longitudinal veins prominent, base rounded, apex attenuate-acuminate. Inflorescences terminal, 1–3-flowered; pedicels 0.9–2.1 cm. Flowers tubular-campanulate. Tepals white to cream, spotted with violet distally, yellowish green apically, spatulate, 1.5–2.2 cm × 2.5–8 mm, densely papillose proximally adaxially, base gibbous-spurred, apex acute; spurs 1.2–1.5 mm. Stamens 1.0–1.7 cm, included; filaments minutely papillose proximally; anthers innate, 2.0–3.5 mm. Ovary 2.0–3.5 mm. Style 1.0–1.6 cm. Berries globose, 7.8–9.2 mm in diam. Seeds brown, ca. 3 mm. Fl. Apr–May. 2*n* = 16*.

• Coniferous or mixed forests; 1200–2700 m. C Taiwan.

This taxon is quite similar, both morphologically and karyologically, to *Disporum sessile* D. Don ex Schultes, which is distributed in Japan, Korea (Cheju and Ullung Islands), and Russia (S Kurile Islands and S Sakhalin); see Tamura et al. (Pl. Spec. Biol. 7: 103–120. 1992). A molecular phylogeny by Shinwari et al. (Pl. Spec. Biol. 9: 11–18. 1994) suggests a relationship of the two taxa. Further studies are needed in order to clarify whether *D. nantouense* is conspecific with *D. sessile* or not. *Disporum sessile*, as circumscribed in FRPS, corresponds mainly to *D. uniflorum* in the present account, but also to *D. hainanense* and *D. shimadae*.

14. Disporum shimadae Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 367. 1911.

山万寿竹 shan wan shou zhu

Disporum sessile D. Don ex Schultes var. *shimadae* (Hayata) H. Hara.

Rhizome short. Stem simple or branched distally, 15–50 cm. Petiole absent to 2 mm; leaf blade linear-lanceolate to oblong-lanceolate, 4–7 × 1–1.5 cm, base cuneate to rounded, apex acute. Inflorescences terminal, (1 or)2–5-flowered; pedicels 0.7–1.8 cm. Flowers open campanulate. Tepals yellow, rarely green apically, ovate-oblong to ovate-spatulate, 1.5–2.3 cm × 4–6 mm, very minutely papillose at margin proximally and at base adaxially, base spurred; spurs ca. 2 mm. Stamens 1.2–1.7 cm, included; filaments 0.9–1.4 cm, glabrous or sparsely papillose; anthers 2–3 mm. Ovary 2.5–3 mm. Style 1.1–1.7 cm. Fl. Mar–Apr. 2*n* = 14*.

• Grasslands; 500–1100 m. N Taiwan.

26. IPHIGENIA Kunth, Enum. Pl. 4: 212. 1843, nom. cons.

山慈菇属 shan ci gu shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Aphoma Rafinesque, nom. rej.

Herbs perennial, cormous. Corm covered with a tunic. Stem erect, leafy. Leaves several, scattered, sessile, linear. Flowers solitary or several in a terminal corymb, small; bracts leaflike; pedicels long. Tepals 6, free, spreading, rather narrow, clawed, usually caducous. Stamens 6, inserted at base of tepals; filaments short, slightly flat; anthers versatile, extrorse. Ovary 3-loculed, ovoid to oblong; ovules many per locule. Style short, apically 3-lobed, adaxially stigmatic. Fruit a loculicidal capsule. Seeds many, subglobose; testa brown, thin.

About ten species: Africa (including Madagascar), tropical Asia, Australia, Pacific Islands (New Zealand); one species in China.

1. Iphigenia indica Kunth, Enum. Pl. 4: 213. 1843.

山慈菇 shan ci gu

Lloydia melanantha H. Léveillé.

Corm globose, 0.5–1.5 cm in diam. Stem 10–25 cm, usually minutely papillose. Leaves linear, 7–15 cm × 3–9 mm, midvein conspicuous, base sheathing and clasping. Corymb 2–10-flowered; bracts linear, 1.5–2.5 cm; pedicels 2–4 cm. Tepals dark purple, linear to narrowly oblanceolate, 7–10 × 0.7–1 mm. Stamens 2–3 mm; filaments papillose; anthers ca. 1 mm. Stigma lobes recurved. Capsule obovoid to oblong, 6–8 × 3–3.5 mm. Fl. and fr. Jun–Jul. 2*n* = 22, (26, 33), 44.

Pinus forests, moist grasslands, open fields; near sea level to 2100 m. Hainan, Yunnan [Cambodia, India, Indonesia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; N Australia].

27. GLORIOSA Linnaeus, Sp. Pl. 1: 305. 1753.

嘉兰属 jia lan shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, with a stout, tuberous rhizome. Stem sometimes branched, usually elongate and scandent. Leaves cauline, alternate, opposite, or whorled, subsessile, apex bearing a tendril. Flowers few, long pedicellate, sometimes in a corymb, large, showy. Tepals 6, free, spreading or reflexed, persistent. Stamens 6, inserted at base of tepals; filaments filiform; anthers versatile. Ovary 3-loculed; ovules many per locule. Style long, filiform, apically 3-lobed, adaxially stigmatic. Fruit a capsule. Seeds subglobose; testa bright red, spongy.

About five species: S and tropical Africa, tropical Asia; one species in China.

1. Gloriosa superba Linnaeus, Sp. Pl. 1: 305. 1753.

嘉兰 jia lan

Rhizome usually forked, ca. 1 cm in diam., fleshy. Stem scandent, 2–3 m or more, rather slender. Leaves alternate or occasionally also opposite, sessile or shortly petiolate, lanceolate to ovate-lanceolate, 7–13 cm, apex long caudate with a tendril. Flowers nodding; pedicel 10–15 cm. Tepals reflexed, bright red, proximally tinged with yellow, linear-oblanceolate, 4.5–5 cm × 7–9 mm, base slightly clawed, margin much crisped. Filaments 3–4 cm; anthers ca. 1 cm. Style 2.5–3.5 cm; stigma lobes 6–7 mm. Fl. Jul–Aug. 2*n* = 22, 88, 90.

Forests, thickets; 900–1300 m. S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; S and tropical Africa].

The rhizomes are rich in the alkaloid colchicine.

28. EREMURUS Marschall von Bieberstein, Fl. Taur.-Caucas. 3: 269. 1819.

独尾草属 du wei cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Henningia Karelin & Kirilov.

Herbs perennial, with vertical, short, stout rhizome, surrounded at neck by leaf bases and sometimes also fibers from old, disintegrated leaf bases. Roots numerous, long, thickened, fleshy. Leaves several, all basal, tufted, linear. Scape simple, erect, exceeding leaves, with sterile bracts distally and a terminal raceme. Raceme usually densely many flowered, usually elongate in fruit; bracts membranous, margin often minutely serrulate, fimbriate, or ciliate, apex often long filiform acuminate. Flowers bisexual, 1 per bract axil, pedicellate; pedicel articulate or not. Perianth campanulate, tubular, or cupular; segments 6, free or connate at base, with 1, 3, or 5 veins. Stamens 6, often exserted; filaments filiform or dilated toward base; anthers dorsifixed near base, base with 2 lobes to 0.5 mm. Ovary 3-loculed; seeds several per locule. Style filiform, long, often conspicuously persistent in fruit; stigma very small. Fruit a capsule, globose or subglobose, loculicidal. Seeds irregularly 3-angled, sometimes winged along angles.

About 45 species: C and W Asia, extending E to China and W to Turkey and Ukraine; four species (one endemic) in China.

1a. Bract margin entire or densely and minutely serrulate to fimbriate; pedicels spreading or slightly ascending, 1–3.5 cm, slender ..... 4. *E. chinensis*
1b. Bract margin sparsely or densely long ciliate; pedicels ascending to suberect, stout (or, if slender, only 1–1.5 cm).
2a. Perianth broadly campanulate, segments ca. 1.5 × 0.8 cm; capsule 1.5–2 cm in diam., valves thick and hard or spongy; pedicels 2–4 cm ..... 3. *E. anisopterus*
2b. Perianth narrowly campanulate or ± tubular, segments 0.8–1.2 × 0.2–0.45 cm; capsule 0.6–1 cm in diam., valves rather thin and soft; pedicels 0.6–1.5 cm.
3a. Perianth narrowly campanulate, segments pale yellow to brownish, obviously involute immediately after anthesis; stamens conspicuously exserted from perianth by up to 8 mm; pedicels ascending, not subappressed to rachis, slender; bract margin sparsely long ciliate ..... 1. *E. altaicus*
3b. Perianth ± tubular, segments pale purple, scarcely or not involute immediately after anthesis; stamens

only slightly exserted from perianth by ca. 2 mm; pedicels suberect, subappressed to rachis, stout; bract margin densely long ciliate ..... 2. *E. inderiensis*

1. Eremurus altaicus (Pallas) Steven, Bull. Soc. Imp. Naturalistes Moscou 4: 255. 1832.

阿尔泰独尾草 a er tai du wei cao

Asphodelus altaicus Pallas, Acta Acad. Sci. Imp. Petrop. 1779(2): 258. 1783.

Leaves 20–35 × 0.5–2(–4) cm, glabrous, margin smooth. Scape 60–120 cm, glabrous or sparsely pubescent. Raceme 20–30 cm at anthesis, densely many flowered; bracts lanceolate, 1–2 cm, midvein dark brown, margin pale, membranous, sparsely long ciliate, apex long filiform acuminate. Pedicels ascending, not subappressed to rachis, 1–1.5 cm, slender. Perianth narrowly campanulate; segments yellow or pale yellow, sometimes turning brownish or yellow-brown, narrowly elliptic-oblong or narrowly oblong-lanceolate, 0.8–1.2 × 0.2–0.25 cm, darker and 3-veined proximally, 1-veined distally, involute immediately after anthesis, persistent and recurved in fruit. Stamens conspicuously exserted from perianth by up to 8 mm. Capsule usually greenish brown, subglobose, 0.6–1 cm in diam., smooth; valves rather thin and soft. Seeds narrowly winged at both ends. Fl. May–Jul, fr. Jul–Aug. 2*n* = 14.

Barren lands, sunny, gravelly, and rocky slopes; 1300–2200 m. Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan].

Several infraspecific taxa have been described from outside China. The plants in Xinjiang may well belong to f. *fuscus* O. Fedtschenko (Zap. Imp. Akad. Nauk Fiz.-Mat. Otd. 23: 44. 1909), which has also been treated at the rank of species (*E. fuscus* (O. Fedtschenko) Vvedensky ex V. V. Nikitin, Fl. Kirghiz. SSR 3: 31. 1951), and is characterized by its yellow or partly brown perianth segments.

2. Eremurus inderiensis (Steven) Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 427. 1873.

粗柄独尾草 cu bing du wei cao

Asphodelus inderiensis Steven, Bull. Soc. Imp. Naturalistes Moscou 4: 257. 1832.

Leaves 15–30 × 0.5–2 cm, glabrous, margin usually scabrid. Scape 40–80 cm, minutely pubescent. Raceme 20–40 cm at anthesis, usually densely many flowered; bracts narrowly ovate, 0.7–1.2 cm, membranous, midvein brown, margin densely long ciliate, apex obtuse to long filiform acuminate. Pedicels suberect, subappressed to rachis, 0.6–1.2 cm, stout. Perianth ± tubular; segments pale purple, linear-oblong, ca. 1 × 0.2–0.3 cm, with 1 green stripe overlaid by 3 brown veins, scarcely or not involute after anthesis, persistent and reflexed in fruit. Stamens slightly exserted from perianth by ca. 2 mm. Capsule subglobose, 0.7–1 cm in diam., smooth; valves rather thin and soft. Seeds brown, 5–6 × 3–3.5 mm including ca. 1 mm wings along angles. Fl. May, fr. May–Jun. 2*n* = 14.

Sand hills, deserts, dry water courses; 400–600 m. N Xinjiang [Afghanistan, Kazakstan, Mongolia, Pakistan, Russia, Turkmenistan, Uzbekistan; SW Asia (Iran)].

3. Eremurus anisopterus (Karelin & Kirilov) Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 429. 1873.

异翅独尾草 yi chi du wei cao

Henningia anisoptera Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 517. 1842.

Leaves to 35 × 0.4–0.6 cm, glabrous, margin smooth or minutely and remotely serrulate. Scape 50–100 cm, glabrous. Raceme laxly many flowered; bracts narrowly lanceolate, 2.5–3.5 cm × 2–5 mm, membranous, midvein brown, margin long and flexuous ciliate, apex long filiform acuminate. Pedicels ascending, 2–4 cm, stout. Perianth broadly campanulate; segments white or pale rose, yellow-brown at base, ovate-oblong, ca. 1.5 × 0.6–0.8 cm, with 1 dark brown vein from base, persistent and spreading to reflexed in fruit. Stamens ca. 2/5 as long as perianth. Capsule globose, 1.5–2 cm in diam., smooth or distally wrinkled; valves thick and hard or spongy, septa conspicuous, golden yellow. Seeds light grayish brown mottled dark brown, 6–8 × 4–5 mm including unequal (to 2 mm) wings along angles. Fl. Apr–May, fr. May–Jun. 2*n* = 14.

Sand hills. N Xinjiang (Shawan Xian) [Kazakstan].

4. Eremurus chinensis O. Fedtschenko, Gard. Chron., ser. 3, 41: 199. 1907.

独尾草 du wei cao

Leaves 15–55 × 0.3–2.2 cm, glabrous, margin minutely crenulate or serrulate, sometimes obscurely so. Scape 45–120 cm, glabrous. Raceme 10–40 cm at anthesis, densely many flowered; bracts lanceolate, 0.4–2(–3.5) cm, midvein dark brown, margin pale, membranous, entire or densely and minutely serrulate to fimbriate, apex long filiform acuminate. Pedicels spreading or slightly ascending, 1–3.5 cm, slender. Perianth narrowly campanulate; segments white, narrowly elliptic or oblanceolate-linear, 1–1.2 × 0.2–0.45 cm, with 1 dark vein from base, scarcely involute after anthesis, not persistent in fruit. Stamens shorter than perianth. Capsule erect (pedicel bent at apex), green or greenish yellow to brown, subglobose, 0.6–1 cm in diam., usually wrinkled. Seeds brown, 4–5.5 × 2.5–3 mm including 0.1–0.8 mm wings along angles. Fl. May–Sep, fr. Jul–Sep.

• Scrub, alpine meadows, stony pastures, dry open hillsides, gravelly slopes, among rocks and boulders, crevices and ledges of cliffs, on acidic or limestone substrates; 1000–3800 m. S Gansu, Sichuan, Xizang, Yunnan.

29. ALOE Linnaeus, Sp. Pl. 1: 319. 1753.

芦荟属 lu hui shu

Chen Xinqi (陈心启 Chen Sing-chi); Michael G. Gilbert[1]

Herbs, shrubs, or trees, usually with dense rosettes of very fleshy leaves. Stems often very reduced but sometimes well developed or even with secondary thickening. Leaves rosulate, amplexicaul, thick, succulent, always glabrous, margin mostly hard dentate or spiny, apex sharply pointed. Inflorescence a subterminal, ascending to erect raceme, often branched; peduncle usually well developed; bracts persistent, scarious. Pedicel usually much shorter than perianth. Perianth usually red, orange, or yellow, rarely greenish or whitish, cylindric to 3-sided, sometimes slightly curved or with swollen base; segments usually connate to form a tube, very rarely nearly free, usually glabrous, apex spreading. Stamens 6, inserted at base of perianth tube, usually exserted; filaments subulate; anthers dorsifixed. Ovary 3-loculed; ovules many per locule. Style filiform; stigma small. Fruit a loculicidal capsule. Seeds 3-angled or flattened, often winged.

Between 350 and 400 species: S and tropical Africa (including Madagascar), tropical Arabia; one species (introduced) in China.

1. Aloe vera (Linnaeus) N. L. Burman, Fl. Indica, 83. 1768.

芦荟 lu hui

Aloe perfoliata Linnaeus var. *vera* Linnaeus, Sp. Pl. 1: 320. 1753; *A. barbadensis* Miller var. *chinensis* Haworth; *A. chinensis* (Haworth) Baker; *A. vera* var. *chinensis* (Haworth) A. Berger.

Herbs succulent. Stems short, suckering freely to form dense clumps. Leaves sub-basal, slightly distichous in seedlings and new shoots, erect, pale green, sometimes with pale spots in very young plants, linear-lanceolate, 15–35(–50) × 4–5(–7) cm, margin sparsely spiny-dentate, apex 2- or 3-dentate-pointed. Inflorescence erect, 60–90 cm; peduncle to 2 cm thick; raceme 30–40 × 5–6 cm, sometimes with 1 or 2 ascending branches, numerous flowered; bracts whitish, broadly lanceolate, ca. 10 × 5–6 mm, veins 5–7, apex acute. Flowers reflexed; pedicel ca. 1/2 as long as bract. Perianth pale yellow mottled with red, slightly ventricose, 2.5(–3) cm, outer lobes free for ca. 1.8 cm, slightly recurved at apex. Stamens exserted by 4–5 mm. Style conspicuously exserted. $2n = 14$*.

Cultivated for medicinal uses, and perhaps naturalized in the hot, dry Yuan Jiang valley in S Yunnan [probably originated in Mediterranean region; widely cultivated and occasionally naturalized elsewhere].

Chinese material is smaller in all parts than typical *Aloe vera,* but not strikingly so, and there does not seem adequate reason to treat it as anything other than a cultivar of the very widely grown species. The origins of *A. vera* are obscured by the long history of cultivation and the absence of definite wild populations. *Aloe indica* Royle (Ill. Bot. Himal. Mts. 1: 390. 1840), from N India, Nepal, and Thailand, is closely related, apparently differing only in having reddish flowers. Flower color is variable in many species of *Aloe* and it is likely that this species is conspecific with *A. vera*. All other related taxa are native to NE tropical Africa and Arabia.

30. DIANELLA Lamarck, Encycl. 2: 276. 1786.

山菅属 shan jian shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, sometimes subshrubby, evergreen. Rhizome generally branched, stout. Stem simple or branched. Leaves sub-basal, distichous, basally often equitant, grasslike, rigid, midvein raised abaxially. Scape usually relatively tall, to 2 m, with few linear-lanceolate cauline leaves and a terminal panicle. Panicle laxly branched, usually large, with several to many racemes or smaller panicles; bracts rather small. Flowers usually nodding, rather small; pedicel articulate apically. Tepals 6, free, 3–7-veined. Stamens 6, inserted at base of tepals; filaments thickened; anthers basifixed, dehiscing by terminal pores. Ovary 3-loculed; ovules 4–8 per locule. Style slender; stigma small. Fruit a berry. Seeds black, often flattened.

About 20 species: mainly in tropical Asia, also in Africa (Madagascar), Australia, and Pacific Islands; one species in China.

Although Clifford et al. (in Kubitzki, Fam. Gen. Vasc. Pl. 3: 251. 1998) placed *Dianella* in the Hemerocallidaceae, Wu Zhengyi (editor's note) believes it should be treated in the segregate family Phormiaceae. Takhtajan (Diversity Classific. Fl. Pl. 512. 1997) recognized Phormiaceae but placed *Dianella* in the Dianellaceae.

1. Dianella ensifolia (Linnaeus) Redouté, Liliac. 1: t. 1. 1802.

山菅 shan jian

Dracaena ensifolia Linnaeus, Syst. Nat., ed. 12, 2: 246; Mant. Pl. 1: 63. 1767; *Dianella ensifolia* f. *albiflora* Tang S. Liu & S. S. Ying; *D. ensifolia* f. *racemulifera* (Schlitter) Tang S. Liu & S. S. Ying; *D. nemorosa* Lamarck; *D. nemorosa* f. *racemulifera* Schlitter.

Rhizome creeping, 5–8 mm thick. Leaves sword-shaped, gradually narrowed at both ends, 30–80 × 1–2.5 cm, leathery, midvein abaxially and margin usually scabrous, apex obtuse. Scape 1–2 m, with several bractlike stem leaves 3–8 cm. Panicle laxly branched, 10–40 cm, usually with flowers borne distally. Pedicel 0.7–2 cm, usually arcuate. Tepals spreading, white, greenish white, yellowish, or bluish purple, linear-lanceolate to narrowly oblong, 6–7 × 3–3.5 mm. Stamens shorter than tepals; filaments geniculate near middle, dilated distally. Style ca. 6 mm. Berries deep blue, subglobose, ca. 6 mm in diam., 5- or 6-seeded. Fl. and fr. Mar–Aug. $2n = 32$*.

Forests, grassy slopes; near sea level to 1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, S Japan, Laos, Ma-

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laysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Africa (Madagascar), E Australia, Pacific Islands].

31. HEMEROCALLIS Linnaeus, Sp. Pl. 1: 324. 1753.

萱草属 xuan cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Junko Noguchi[1]

Herbs perennial, with short rhizomes. Roots fleshy or ropelike, usually with globose, fusiform, or oblong, swollen, tuberous part. Leaves basal, distichous, sessile, basally equitant, linear. Scape erect or ascending, sometimes hollow, glabrous; main axis usually distinct, sometimes few or several branched and indistinct; sterile bracts sometimes present. Inflorescences terminating in single or double helicoidal cymes; cymes 1–6(or more)-flowered, rarely capitate and 1–6-flowered. Pedicel short, bracteate, basal pedicel sometimes concaulescent. Flowers fairly large, hypogynous, of short duration. Perianth funnelform, 3-merous; segments 6, petaloid, basally connate into a cylindric tube, often recurved apically, pale lemon yellow to orange or reddish orange, sometimes with a purple or rose, V-shaped patch, all segments similar or inner ones slightly wider than outer. Stamens 6, inserted in perianth tube; filaments free, slightly upcurved-reflexed, slender, glabrous; anthers dorsifixed, yellow or purplish black. Ovary 3-loculed. Style erect, rather long, slender; stigma capitate, small. Fruit a capsule, obtusely trigonous, transversely rugose, loculicidal. Seeds in 2 rows in each valve, black.

About 15 species: E Asia, with *Hemerocallis lilioasphodelus* extending to C Europe; eleven species (four endemic) in China.

In China many species are cultivated as ornamentals and a few for their edible flowers.

1a. Flower opening in afternoon or evening, fragrant, tepals lemon yellow.
2a. Inflorescence simple; roots without swollen, tuberous part; anthers ca. 5 mm ..... 3. *H. minor*
2b. Inflorescence branched; roots with swollen, tuberous part; anthers 8–10 mm.
3a. Scape with distinct main axis; perianth tube 1.5–3 cm; filaments 5–5.5 cm; roots fusiform ..... 2. *H. lilioasphodelus*
3b. Scape without distinct main axis; perianth tube 3–5 cm; filaments 7–8 cm; roots with swollen, tuberous part near tip ..... 1. *H. citrina*
1b. Flower opening in morning, slightly fragrant or unscented, tepals golden yellow or orange to reddish orange.
4a. Flower opening in morning and lasting ca. 24 hours, slightly fragrant; bracts overlapping, ovate to ovate-lanceolate or oblong-ovate, mostly 0.8–3 cm wide.
5a. Inflorescence an apparently simple cyme; flower opening in very early morning; scape ascending; leaves 40–45 × 1.5–2 cm ..... 9. *H. dumortieri*
5b. Inflorescence clearly forked or capitate; flower opening in early morning; scape erect; leaves 35–80 × (0.6–)1–1.8 cm.
6a. Inflorescence clearly forked with a pair of racemelike, helicoidal cymes; bracts oblong-lanceolate; roots with swollen, tuberous tip ca. 10 mm thick ..... 10. *H. esculenta*
6b. Inflorescence capitate with rachis and flower bases concealed by bracts; bracts ovate-cordate; roots uniformly wide, to 3 mm thick ..... 11. *H. middendorffii*
4b. Flower opening in morning and lasting ca. 12 hours, unscented; bracts lanceolate to ovate-lanceolate, sometimes scalelike, (0.2–)0.3–0.7(–1) cm wide.
7a. Inflorescence simple, 1- or 2-flowered; plants to 35 cm tall ..... 8. *H. nana*
7b. Inflorescence forked or branched, more than 2-flowered; plants 40–150 cm tall.
8a. Inflorescence forked with a pair of racemelike, helicoidal cymes; perianth segments orange to reddish orange, inner ones usually with purple or reddish orange patches at middle ..... 5. *H. fulva*
8b. Inflorescence usually branched; perianth segments orange to golden yellow, uniformly colored.
9a. Flower slightly fragrant, purplish black apically in bud; inflorescence many branched, with up to 100 flowers; perianth tube 2.5–3 cm ..... 4. *H. multiflora*
9b. Flower unscented, green or reddish brown apically in bud; inflorescence with up to 20 flowers; perianth tube 1–2.5 cm.
10a. Scape with distinct main axis; roots with large, globose, swollen, tuberous part; anthers 6–8 mm; leaves 10–20 mm wide ..... 6. *H. forrestii*
10b. Scape without distinct main axis; roots with large, oblong, swollen, tuberous part; anthers 3–4 mm; leaves 6–8 mm wide ..... 7. *H. plicata*

1. Hemerocallis citrina Baroni, Nuovo Giorn. Bot. Ital., n.s., 4: 305. 1897.

黄花菜 huang hua cai

Hemerocallis altissima Stout; *H. coreana* Nakai.

Plants to 1 m tall, deciduous in winter. Roots rather stout, fleshy, usually with oblong, swollen, tuberous part near tip. Leaves linear, 50–130 × 0.5–2.5 cm; leaf sheath with reddish margin. Scape usually slightly longer than leaves, solid; main axis indistinct. Inflorescence branched; helicoidal cymes 3–5 or

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more, 2–5-flowered; bracts lanceolate, 3–7 cm × 3–6 mm. Pedicel less than 1 cm. Flowers large, fragrant, opening in afternoon or evening and lasting 12–24 hours, purplish black apically in bud. Perianth lemon-colored; tube long, 3–5 cm; segments (6–) 7–12 cm, inner ones 2–3 cm wide, slightly wider than outer ones. Filaments 7–8 cm; anthers yellow, 8–10 mm. Capsule ellipsoid, 2–2.5 × 1.2–1.5 cm. Fl. May–Aug. 2*n* = 22.

Forest margins, grassy fields, slopes along valleys; near sea level to 2000 m. Anhui, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Nei Mongol, Shaanxi, Shandong, Sichuan, Zhejiang [Japan, Korea].

Widely cultivated for its edible flowers, especially in Hunan.

2. Hemerocallis lilioasphodelus Linnaeus, Sp. Pl. 1: 324. 1753.

北黄花菜 bei huang hua cai

Hemerocallis flava (Linnaeus) Linnaeus; *H. lilioasphodelus* var. *flava* Linnaeus.

Plants 70–80 cm tall, deciduous in winter. Roots slightly fleshy or ropelike, sometimes with a swollen, tuberous part. Leaves linear, 20–70 × 0.3–1.2 cm, apex acuminate. Scape generally slightly shorter than leaves, solid; main axis distinct; sterile bracts present. Inflorescence branched; helicoidal cymes 2–4(or 5), 2–4(or 5)-flowered; bracts lanceolate, 2–6(–8) cm × 5–7 mm. Pedicel 1–2 cm. Flowers fragrant, opening in afternoon and lasting 1–3 days, blackish purple or green apically in bud. Perianth lemon-colored; tube 1.5–2.5 cm; segments spreading, 5–7 × 1.3–1.6 cm, inner ones slightly wider than outer. Filaments 5–5.5 cm; anthers yellow, sometimes purple-black adaxially, ca. 8 mm. Capsule ellipsoid, ca. 2.4 × 1.2 cm. Fl. Jun–Aug. 2*n* = 22.

Forests, thickets, meadows, grasslands, slopes along valleys; 100–2000 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi [Japan, Korea, Mongolia, Russia (Siberia); Europe].

The treatment of this species follows Hylander (Uppsala Univ. Arsskr. 7: 112. 1945).

The flowers are steamed and then dried as a traditional food in China.

3. Hemerocallis minor Miller, Gard. Dict., ed. 8, *Hemerocallis* no. 2. 1768.

小黄花菜 xiao huang hua cai

Hemerocallis flava (Linnaeus) Linnaeus var. *minor* (Miller) M. Hotta.

Plants deciduous in winter. Roots ropelike, 1.5–3(–4) mm thick, sometimes fibrous, without a tuberous part. Leaves linear, 20–60 × 0.3–1.5 cm. Scape slightly shorter than or subequaling leaves, slender, solid; sterile bracts absent. Inflorescence short; axes very short; helicoidal cymes 2(or 3), 1- or 2-flowered; bracts lanceolate or ovate-lanceolate, 0.8–2.5 cm × 3–8 mm. Pedicel 4–18 mm. Flowers fragrant, opening in evening and lasting 1–2 days. Perianth lemon-colored; tube usually greenish, short, 1–2.5(–3) cm; segments spreading, 4–7.5 cm, inner ones 1.5–2.3 cm wide, wider than outer ones. Filaments ca. 4 cm; anthers pale yellow, sometimes purple-black adaxially, ca. 5 mm. Capsule narrowly ellipsoid, 2–3 × 1–2 cm. Fl. May–Jun. 2*n* = 22.

Forests, thickets, grassy slopes, meadows, waste fields, wet places along valleys; 200–2600 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Korea, Mongolia, Russia (Siberia)].

The flowers are steamed and then dried as a traditional food in China.

4. Hemerocallis multiflora Stout, Addisonia 14: 31. 1929.

多花萱草 duo hua xuan cao

Plants deciduous in winter. Roots slightly fleshy, with a swollen, tuberous part near tip. Leaves only slightly equitant basally, linear, 50–70 × 0.7–1 cm, soft. Scape several branched, 80–90 cm, rather slender, solid, many flowered (sometimes more than 100-flowered); bracts lanceolate, 2.5–2.8 cm × 5–7 mm. Pedicel 5–7 mm. Flowers small, slightly fragrant, opening during day, purplish black apically in bud. Perianth orange or golden yellow; tube usually greenish, 2.5–2.8 cm; segments spreading, 5.5–5.8 × 1–1.4 cm, inner ones slightly wider than outer. Filaments ca. 4 cm; anthers blackish or yellow, ca. 6 mm. Capsule ovoid-ellipsoid, ca. 1.5 × 0.8 cm. Fl. Jul–Oct. 2*n* = 22*.

• Hill forests, openings in forests on hilltops; 700–1000 m. Henan.

5. Hemerocallis fulva (Linnaeus) Linnaeus, Sp. Pl., ed. 2, 1: 462. 1762.

萱草 xuan cao

Plants 40–150 cm tall, usually deciduous in winter. Roots fleshy, with globose-ellipsoid, swollen, tuberous part near tip; stolons sometimes to 30 cm. Leaves linear, 50–90 × 1–2.8 cm, apex acute. Scape erect, hollow; sterile bracts present. Helicoidal cymes double, 2–5(–10)-flowered; bracts scalelike or lanceolate. Pedicel ca. 5 mm. Flowers unscented, strictly day opening, opening in morning and closing in evening of same day. Perianth single, occasionally double (stamens petaloid), orange to reddish orange; tube 2–4 cm; segments spreading, with a purple or reddish orange patch, 5–12 × 1–3 cm, margin sometimes crinkly-undulate, inner segments wider than outer ones. Filaments 4–5 cm; anthers purplish black, 7–8 mm. Capsule ellipsoid, 2–2.5 × 1.2–1.5 cm. Fl. Jun–Nov. 2*n* = 22, 33.

Forests, thickets, grasslands, streamsides; 300–2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Russia].

Four varieties may be recognized in China. The status of *Hemerocallis fulva* var. *oppositibracteata* H. Kong & Ching J. Wang (Guihaia 16: 303. 1996), described from Gansu, is uncertain. It supposedly differs in having narrower leaves 5–8 mm wide, subopposite sterile bracts, narrower perianth segments (outer ones 0.6–1 cm wide), and obovoid capsules.

1a. Perianth double (stamens petaloid) ..... 5d. var. *kwanso*
1b. Perianth single (stamens normal).
  2a. Plants evergreen ..... 5b. var. *aurantiaca*
  2b. Plants deciduous.
    3a. Perianth tube rather short, 2–3 cm, stout; inner segments 2–3.5 cm wide ..... 5a. var. *fulva*

3b. Perianth tube longer, to 4 cm, rather slender; inner segments 1–2.5 cm wide ..... 5c. var. *angustifolia*

5a. Hemerocallis fulva var. **fulva**

萱草(原变种) xuan cao (yuan bian zhong)

Hemerocallis lilioasphodelus Linnaeus var. *fulva* Linnaeus, Sp. Pl. 1: 324. 1753.

Plants deciduous in winter. Scape 100–140 cm, stout. Flowers large. Perianth single, reddish orange; tube rather short, 2–3 cm, stout; segments with a strong rose patch, broad, margin usually crinkly-undulate, outer segments 1.5–2.5 cm wide, inner ones 2–3.5 cm wide. 2*n* = 33.

Forests, thickets, grasslands, streamsides; 300–2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Korea].

5b. Hemerocallis fulva var. **aurantiaca** (Baker) M. Hotta, Acta Phytotax. Geobot. 37: 21. 1986.

常绿萱草 chang lu xuan cao

Hemerocallis aurantiaca Baker, Gard. Chron., ser. 3, 8: 94. 1890.

Plants evergreen. Perianth single, orange to reddish orange. 2*n* = 22, 33.

Thickets, grasslands, streamsides; 300–1000 m. Guangdong, Guangxi, Taiwan [Japan, Korea].

5c. Hemerocallis fulva var. **angustifolia** Baker, J. Linn. Soc., Bot. 11: 359. 1871.

长管萱草 chang guan xuan cao

Hemerocallis disticha Donn ex Sweet; *H. fulva* var. *longituba* (Miquel) Maximowicz; *H. longituba* Miquel.

Plants deciduous in winter. Perianth single, orange to reddish orange or rose; tube to 4 cm, rather slender; segments 5–11 cm, outer ones 0.5–2.0 cm wide, inner ones slightly longer than outer, 1–2.5 cm wide. 2*n* = 22.

Long cultivated. Not known in the wild in China [Japan, Korea].

5d. Hemerocallis fulva var. **kwanso** Regel, Gartenflora 15: 66. 1866.

长瓣萱草 chang ban xuan cao

Plants deciduous in winter. Perianth double (stamens petaloid). 2*n* = 33.

Long cultivated. Not known in the wild in China but probably originated there [Japan, Korea].

6. Hemerocallis forrestii Diels, Notes Roy. Bot. Gard. Edinburgh 5: 298. 1912.

西南萱草 xi nan xuan cao

Plants 40–70 cm tall. Roots slightly fleshy, with large, globose, swollen, tuberous part near tip 1.5–2.5 × 3.5–4.5 cm. Leaves linear, 30–70 × 1–2 cm, rather stout, base surrounded by fibrous remains of older leaves, apex obtuse. Scape slender, nearly as long as leaves, hollow; main axis indistinct; sterile bracts absent. Inflorescence branches 4–6, each with 1 double helicoidal cyme dichotomously or trichotomously branched; cymes 2–4-flowered; bracts lanceolate, 0.5–2.5 cm × 3–10 mm. Pedicel 1.5–3 mm. Flowers rather small, opening during day. Perianth orange or golden yellow; tube short, ca. 1 cm; segments 5–9 cm, outer ones ca. 5 mm wide, inner ones slightly wider than outer, 1.2–1.5 cm wide. Filaments 3–4.5 cm; anthers yellow or slightly blackish, ca. 7 mm. Capsule ellipsoid, ca. 3.8 × 1.5–2 cm. Fl. May–Jun. 2*n* = 22*.

• Forests, grassy slopes, limestone cliffs; 2300–3200 m. SW Sichuan, NW Yunnan.

7. Hemerocallis plicata Stapf, Bot. Mag. 148: t. 8968. 1923.

折叶萱草 zhe ye xuan cao

Plants 40–80 cm tall. Roots slightly fleshy, with large, oblong, swollen, tuberous part near tip 0.8–1.5 × 2.5–5 cm. Leaves linear, 45–50 cm × 6–8 mm, usually folded, base surrounded by fibrous remains of older leaves. Scape nearly as long as leaves, hollow or solid; main axis distinct; sterile bracts linear, long. Inflorescence branches 3–7; helicoidal cymes 2- or 3-flowered, with 1 cyme usually oppositely branched, 2–20-flowered; bracts lanceolate, 0.5–2.5 cm × 5–7 mm. Pedicel 2–6 cm. Flowers small, opening during day. Perianth orange; tube 1.5–2.5 cm; segments 4–5.5 × 1–1.4 cm. Filaments 3–3.5 cm; anthers 3–4 mm. Capsule unknown. Fl. Jul–Sep.

• *Pinus* forests, forest margins, thinly forested hilltops, grassy slopes; 1500–3200 m. Sichuan, Yunnan.

8. Hemerocallis nana Forrest & W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 39. 1917.

矮萱草 ai xuan cao

Plants dwarf, 5–35 cm tall. Roots slightly fleshy, with small, globose, swollen, tuberous part 1.5–2 × 1–1.5 cm. Leaves linear, 6–28(–34) cm × 4–8 mm, base surrounded by fibrous remains of older leaves. Scape slender, hollow; sterile bracts absent. Inflorescence very short, a 1- or rarely 2-flowered helicoidal cyme; bracts lanceolate, 5–14(–25) × 3–4 mm. Pedicel 1–3 cm. Flowers opening during day. Perianth reddish orange or golden yellow, usually slightly purplish abaxially; tube short, 9–12(–13) mm; segments spreading, 5–7 cm, outer ones 0.5–0.6 cm wide, inner ones slightly wider than outer, 1.2–1.5 cm wide. Filaments 2.5–4 cm; anthers yellow, purple-black abaxially, ca. 9 mm. Capsule oblong, ca. 3 × 1.4 cm. Fl. Jun. 2*n* = 22*.

• Stony grassy openings in alpine *Pinus* forests, forest margins, moist pastures, stony places; 2100–3400 m. NW Yunnan.

9. Hemerocallis dumortieri C. Morren, Hort. Belge 2: 195. 1834.

小萱草 xiao xuan cao

Plants small, 25–50 cm tall, deciduous in winter. Roots slightly fleshy, with oblong, swollen, tuberous part near tip. Leaves linear, narrow, nearly as long as scape, 40–45 × 1.5–2 cm. Scape ascending. Inflorescence short, a 2–4-flowered helicoidal cyme; basal pedicel usually concaulescent; bracts oblong-ovate, apex subacute. Flowers rather small, slightly fragrant, opening in very early morning and closing in very early

morning of following day, reddish brown apically in bud. Perianth orange-yellow; tube rather short, ca. 1 cm; segments narrow, 5–7 cm, outer ones 0.7–1 cm wide, inner ones slightly wider than outer, 1–1.5 cm wide. Anthers black. Capsule subovoid. Fl. May–Jun. 2*n* = 22.

?S Jilin [Japan, Korea, Russia (E Siberia)].

This species was reported from S Jilin by Kitagawa (Lin. Fl. Manshur. 136. 1939) and Noda (Fl. N-E. Prov. (Manchuria) China 280. 1971). However, the present authors have not seen any specimens in Chinese herbaria. *Hemerocallis dumortieri* is closely related to *H. esculenta* and *H. middendorffii*, both of which have been treated by some authors as varieties of *H. dumortieri*.

10. Hemerocallis esculenta Koidzumi, Bot. Mag. (Tokyo) 39: 28. 1925.

北萱草 bei xuan cao

Hemerocallis dumortieri C. Morren var. *esculenta* (Koidzumi) Kitagawa; *H. middendorffii* Trautvetter & C. A. Meyer var. *esculenta* (Koidzumi) Ohwi.

Roots slightly fleshy, usually with a fusiform, swollen, tuberous part near tip 2–4 × ca. 1 cm. Leaves linear, 40–80 × (0.6–)1–1.8 cm, soft. Scape erect, generally slightly shorter than leaves, hollow; sterile bract absent. Inflorescences short, 0.2–6 cm, usually with 1 double helicoidal cyme; cyme somewhat densely 1–3(or 4)-flowered, basal pedicel sometimes concaulescent; bracts ovate-lanceolate, 1–2(–4) × 0.8–1.5 cm. Pedicel 3–6 mm. Flowers slightly fragrant. Perianth golden yellow; tube 1.5–2.5 cm; segments spreading, 5–6.5 cm, inner ones slightly wider than outer, 1–2 cm wide. Filaments ca. 5 cm; anthers purplish black, ca. 6 mm. Capsule subellipsoid, 2–2.5 × 1.2–1.4 cm. Fl. May–Jun. 2*n* = 22*.

Forests, forest margins, grassy slopes, stony places, roadsides; 500–2500 m. Gansu, Hebei, Henan, Hubei, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi [Japan, Russia (Sakhalin)].

11. Hemerocallis middendorffii Trautvetter & C. A. Meyer in Middendorf, Reise Sibir. 1(2), Fl. Ochot. Phaenog.: 94. 1856.

大苞萱草 da bao xuan cao

Plants 40–80 cm tall. Roots ropelike, 1.5–3 mm thick, slightly fleshy, sometimes fibrous, without a tuberous part. Leaves linear, 35–80 × 0.8–1.6 cm, base surrounded by fibrous remains of older leaves. Scape stout, hollow. Inflorescence subcapitate, 0.1–0.5 cm, densely 2- or 3(–6)-flowered; bracts green or slightly pink, ovate to ovate-lanceolate, large, 2–6 × 1–3 cm, apex catkinlike. Pedicel 1–3 mm. Flowers slightly fragrant. Perianth golden yellow or orange; tube 0.9–1.7 cm, enclosed by bracts for at least 1/3 its length; segments 6–7.5 cm, inner ones wider than outer, 1–2 cm wide. Filaments ca. 4.5 cm; anthers purplish black, yellow abaxially, ca. 5 mm. Capsule broadly ellipsoid, 1.5–2.3 × 1–1.4 cm. Fl. May–Jun.

Forests, forest margins, meadows, wet grasslands; near sea level to 2000 m. Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia].

1a. Scape 50–60 cm; bracts ovate, 2–2.5 cm ..... 11a. var. *middendorffii*

1b. Scape 20–35 cm; bracts ovate-lanceolate, 3–6 cm ..... 11b. var. *longibracteata*

11a. Hemerocallis middendorffii var. **middendorffii**

大苞萱草(原变种) da bao xuan cao (yuan bian zhong)

Hemerocallis dumortieri C. Morren var. *middendorffii* (Trautvetter & C. A. Meyer) Kitamura.

Scape 50–60 cm. Bracts ovate, 2–2.5 × 2–2.4 cm. Fl. May–Jun. 2*n* = 22*.

Forests, forest margins, meadows, wet grasslands; near sea level to 2000 m. Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia].

11b. Hemerocallis middendorffii var. **longibracteata** Z. T. Xiong, Bull. Bot. Res., Harbin 13: 122. 1993.

长苞萱草 chang bao xuan cao

Scape 20–35 cm. Bracts ovate-lanceolate, 3–6 × 1–1.8 cm. 2*n* = 22*.

• Forests; ca. 800 m. E Jilin.

32. ALLIUM Linnaeus, Sp. Pl. 1: 294. 1753.

葱属 cong shu

Xu Jiemei (许介眉); Rudolf V. Kamelin[6]

Caloscordum Herbert.

Herbs perennial, bulbiferous, sometimes with well-developed, thick or thin rhizomes, rarely with stolons or tuberous roots, usually with onionlike, leeklike, or garliclike odor when fresh. Bulb covered with a tunic. Leaves sessile, very rarely narrowed into a petiole, with a closed leaf sheath at base, linear, linear-lanceolate, or lorate to orbicular-ovate, cross section flat, angled, or semiterete to terete, fistulose or solid. Scape terminal or lateral, sheathed or naked. Inflorescence a terminal umbel, sometimes with bulblets, rarely flowerless and with bulblets only, enclosed in a spathelike bract before anthesis. Pedicels with or without basal bracteoles. Flowers bisexual, very rarely degenerating into unisexual (when plants dioecious). Perianth segments free or united into a tube at base. Filaments usually connate at base and adnate to perianth segments, entire or toothed. Ovary with 1 to several ovules per locule; septa often containing nectaries opening by pores at base of ovary. Style simple; stigma entire or 3-cleft. Capsule loculicidal. Seeds black, rhomboidal or spheroidal.

[6] Herbarium: Higher Plants, V. L. Komarov Botanical Institute, Russian Academy of Sciences, Prof. Popov Street 2, St. Petersburg 197376, Russia.

About 660 species: N hemisphere, mainly in Asia, some species in Africa and Central and South America; 138 species (50 endemic, five introduced) in China.

Most Eurasian species have the base chromosome number $x = 8$, whereas North American species predominantly have $x = 7$. Nearly all species with $x = 10$ and 11 occur in SW China.

Most species of *Allium* are edible, and some have long been cultivated in China and elsewhere, e.g., *A. cepa*, *A. chinense*, *A. fistulosum*, *A. porrum*, *A. sativum*, and *A. tuberosum*.

1a. Leaves 1–3, linear to orbicular-ovate, base usually narrowed into a petiole; ovary base often constricted into a short stipe; ovules 1 per locule.
2a. Leaf 1, long petiolate, ovate to broadly elliptic-ovate, base cordate ..... 4. *A. funckiifolium*
2b. Leaves 2 or 3.
3a. Outer perianth segments narrower than inner ones.
4a. Base of leaf blade cuneate, decurrent ..... 1. *A. victorialis*
4b. Base of leaf blade rounded to cordate, not decurrent ..... 2. *A. listera*
3b. Outer perianth segments as wide as or wider than inner ones.
5a. Scape shorter than leaves, 2–5 cm, covered with leaf sheaths for 3/4–4/5 its length ..... 5. *A. nanodes*
5b. Scape longer than leaves, 10–60 cm, covered with leaf sheaths only at base.
6a. Leaves lanceolate-oblong to ovate-oblong, base rounded to cordate, petiole distinct ..... 3. *A. ovalifolium*
6b. Leaves linear, linear-lanceolate, elliptic-lanceolate, elliptic-oblanceolate, or rarely narrowly elliptic, base narrowed, petiole indistinct ..... 6. *A. prattii*
1b. Leaves several, lorate or linear, cross section semiterete or terete, solid or fistulose, base usually not narrowed into a petiole; ovules 2 to several per locule; if leaf base narrowed into a petiole or ovules 1 per locule then bulb tunic never distinctly reticulate.
7a. Roots thick and fleshy, sometimes subtuberous; leaves with distinct midvein; scape usually 2- or 3-angled; ovules 1 or 2 per locule.
8a. Ovules 1 per locule (in *A. omeiense* a few ovaries in same umbel with 2 ovules per locule).
9a. Umbel laxly fascicled, few flowered; pedicels unequal; style much shorter than ovary; stigma 3-cleft .... 16. *A. trifurcatum*
9b. Umbel hemispheric to globose, many flowered; pedicels equal; style equaling or longer than ovary; stigma entire, punctiform.
10a. Scape terminal ..... 7. *A. guanxianense*
10b. Scape lateral.
11a. Leaves lanceolate to linear-lanceolate, distinctly contracted at base; filaments longer than perianth segments ..... 8. *A. xiangchengense*
11b. Leaves linear or lorate to lorate-oblanceolate, not contracted at base; filaments shorter than to subequaling perianth segments.
12a. Perianth segments 4–7.5 mm, free; filaments slightly shorter than to subequaling perianth segments ..... 9. *A. hookeri*
12b. Perianth segments 9–11 mm, connate at base into a tube ca. 1 mm; filaments ca. 1/2 as long as perianth segments ..... 10. *A. omeiense*
8b. Ovules 2 per locule.
13a. Perianth yellow, segments united for ca. 1 mm at base ..... 11. *A. chienchuanense*
13b. Perianth white, red, purple-red, or dark purple, segments free.
14a. Filaments connate into a tube for 2/3–3/4 their length ..... 15. *A. cyathophorum*
14b. Filaments connate only at base.
15a. Perianth white, segments lanceolate, apex acuminate or irregularly 2-lobed ..... 12. *A. fasciculatum*
15b. Perianth red, purple-red, or dark purple, rarely whitish, segments oblong, narrowly so, or ovate-oblong, apex retuse, truncate, or obtuse.
16a. Perianth stellately spreading, reflexed after anthesis, inner and outer segments similar; pedicels straight ..... 13. *A. wallichii*
16b. Perianth campanulate, not reflexed after anthesis, inner segments somewhat longer and narrower than outer ones; pedicels nodding at apex ..... 14. *A. macranthum*
7b. Roots thin; leaves without distinct midvein; scape terete or several angled; ovules 2 to several per locule.
17a. Bulb usually solitary, globose, ovoid-globose, or ovoid (if cylindric to ovoid-cylindric, then leaves thick, terete, and fistulose); rhizomes obscure.
18a. Leaves usually thick, terete, fistulose, smooth.
19a. Bulb flattened globose, globose, or ovoid-globose, rarely cylindric with thickened base; base of inner filaments 1-toothed on each side (if entire, then scape often undeveloped).
20a. Scape solid ..... 100. *A. galanthum*
20b. Scape fistulose.

21a. Scape developed; plants propagated by seeds or bulblets ..... 98. *A. cepa*
21b. Scape usually undeveloped; plants propagated by bulbs.
22a. Bulb ovoid-globose to ovoid ..... 99. *A. cepiforme*
22b. Bulb narrowly ovoid or cylindric-ovoid ..... 98. *A. cepa*
19b. Bulb cylindric to ovoid-cylindric; filaments entire.
23a. Filaments shorter than perianth segments, connate into a tube for 1/3–3/4 their length ..... 102. *A. atrosanguineum*
23b. Filaments shorter or longer than perianth segments, connate only at base.
24a. Perianth pale red, pale purple, or purple-red.
25a. Pedicels unequal, shorter than to nearly as long as perianth; filaments 1/3–1/2(–2/3) as long as perianth segments ..... 103. *A. schoenoprasum*
25b. Pedicels subequal, 1.5–3 × as long as perianth; filaments slightly shorter than to longer than perianth segments.
26a. Perianth rose pink or dark pink; filaments slightly shorter than to equaling perianth segments ..... 105. *A. maximowiczii*
26b. Perianth pale purple; filaments longer than perianth segments ..... 106. *A. ledebourianum*
24b. Perianth yellow to white.
27a. Leaves and scape ± thin, to 5 mm thick; perianth yellow or pale yellow ..... 95. *A. chrysanthum*
27b. Leaves and scape robust, more than 5 mm thick; perianth white or yellowish white.
28a. Bulb ovoid-cylindric, robust, tunic red-brown, thinly leathery; perianth yellowish white; pedicels slightly shorter than to 2 × as long as perianth ..... 96. *A. altaicum*
28b. Bulb cylindric, tunic usually white, rarely light red-brown, membranous; perianth white; pedicels 2–3 × as long as perianth ..... 97. *A. fistulosum*
18b. Leaves slender, flat, triangular-flat, semiterete, or rarely terete, fistulose.
29a. Ovules 4 or more per locule.
30a. Perianth segments united into a tube proximally.
31a. Scape (15–)20–50 cm; pedicels (4.5–)7–11 cm; perianth segments 7–10 mm; ovules (5 or)6(–8) per locule ..... 137. *A. neriniflorum*
31b. Scape 15–30(–40) cm; pedicels 0.8–4(–7) cm; perianth segments 5–7(–8) mm; ovules (3 or)4 per locule, rarely 1 or 2 locules with 5 or 6 ovules.
32a. Perianth red to purple ..... 135. *A. tubiflorum*
32b. Perianth white ..... 136. *A. inutile*
30b. Perianth segments free.
33a. Filaments connate and adnate to perianth segments for 1/2–2/3 their length.
34a. Leaves linear, 4–6(–8) mm wide; perianth cupular, segments broadly elliptic, 8–11 × 4–4.5 mm ..... 129. *A. oreophilum*
34b. Leaves broadly linear, (5–)10–25 mm wide; perianth narrowly campanulate, segments linear-oblong, 7–10(–15) × 2.5–3 mm ..... 134. *A. winklerianum*
33b. Filaments connate and adnate to perianth segments only at base.
35a. Leaves 1(or 2); perianth segments 6–6.5 mm, without strong midvein; ovary stipitate ..... 133. *A. fetisowii*
35b. Leaves (1 or)2 or 3; perianth segments 4.5–5.5 mm, with strong midvein; ovary sessile.
36a. Perianth red to purple-red ..... 132. *A. robustum*
36b. Perianth white or whitish lilac to lilac-pink.
37a. Leaves 1–1.5(–2) cm wide, apex gradually attenuate ..... 130. *A. tulipifolium*
37b. Leaves 0.7–1.5 cm wide, apex acute ..... 131. *A. roborowskianum*
29b. Ovules 2 per locule.
38a. Inner filaments 1-toothed on each side at base, apex of tooth long filiform and longer than anther-bearing cusp of filament.
39a. Umbel with flowers only; filaments longer than perianth segments ..... 127. *A. porrum*
39b. Umbel with both flowers and bulblets; filaments shorter than perianth segments ..... 128. *A. sativum*
38b. Inner filaments entire or, if 1-toothed on each side, apex of tooth not filiform and never longer than anther-bearing cusp of filament.
40a. Perianth blue, usually becoming bluish purple when dried.
41a. Leaves flat, abaxially 1-angled, usually twisted when dried ..... 122. *A. caeruleum*
41b. Leaves semiterete, not twisted when dried ..... 123. *A. caesium*
40b. Perianth white, pale red, red, purple-red, purple, or pale green.
42a. Filaments not more than 2/3 as long as perianth segments.
43a. Pedicels ca. 3 × as long as perianth ..... 126. *A. jacquemontii*
43b. Pedicels shorter than or subequaling perianth.

44a. Scape 10–15(–20) cm; perianth segments obtuse or attenuate at apex; broadened part of inner filaments with 1 small tooth on each side ..... 124. *A. schoenoprasoides*

44b. Scape (15–)25–40 cm; perianth segments acute at apex; broadened part of inner filaments entire ..... 125. *A. sairamense*

42b. Filaments more than 2/3 as long as perianth segments.

45a. Plants dioecious; female flowers 1 per scape; male flowers 2–4(or 5) per scape ..... 138. *A. monanthum*

45b. Plants not dioecious; flowers bisexual, more than 2 per scape.

46a. Pedicels ebracteolate or only a few bracteolate at base.

47a. Pedicels equaling or slightly longer than perianth; ovary without concave nectaries at base; filaments 2/3–3/4 as long as perianth segments ..... 107. *A. grisellum*

47b. Pedicels more than 2 × as long as perianth; ovary with concave nectaries at base; filaments equaling or longer than perianth segments.

48a. Leaves flat; pedicels unequal; inner filaments with a rounded, irregularly denticulate lobe on each side near base ..... 112. *A. songpanicum*

48b. Leaves semiterete; pedicels equal or subequal; inner filaments entire or with an entire tooth on each side near base.

49a. Ovary tuberculate; style slightly exserted ..... 120. *A. pallasii*

49b. Ovary smooth; style conspicuously exserted.

50a. Perianth pink to pale purple-red; filaments slightly longer than perianth segments ..... 115. *A. eusperma*

50b. Perianth white; filaments ca. 2 × as long as perianth segments ..... 116. *A. maowenense*

46b. All pedicels subtended by bracteoles.

51a. Bulb tunic leathery, splitting along veins; perianth segments pale green with green midvein ..... 117. *A. sabulosum*

51b. Bulb tunic membranous or papery, not splitting, or only apex splitting and becoming fibrous or reticulate; perianth segments white, pale red, red, or purple-red to dark purple, rarely pale green.

52a. Bulb ovoid or narrowly so.

53a. Leaves 3–5-angled in cross section, fistulose; scape lateral; base of inner filaments 1-toothed on each side ..... 108. *A. chinense*

53b. Leaves semiterete or triangular in cross section, fistulose at least basally; base of inner filaments entire or occasionally 1-toothed on each side.

54a. Leaves 1–2 mm wide, semiterete; perianth white or pale red, sometimes greenish.

55a. Filaments slightly longer than to 1.5 × as long as perianth segments; ovary with concave nectaries at base covered by hoodlike projections ..... 109. *A. yanchiense*

55b. Filaments shorter or slightly longer than perianth segments; ovary without concave nectaries at base ..... 113. *A. juldusicola*

54b. Leaves 2–5 mm wide, 3-angled or -keeled to obscurely 3-angled; perianth red to purple or lilac-pink to red-violet.

56a. Bulb tunic thinly leathery, split and becoming fibrous and subreticulate, rarely subentire; leaves keeled to obscurely 3-angled, rarely subfistulose near base; umbel globose, densely many flowered; perianth lilac-pink to red-violet ..... 110. *A. sacculiferum*

56b. Bulb tunic membranous to scarious or subpapery, sometimes apex laciniate to fibrous; leaves 3-angled, subfistulose; umbel subfascicled to globose, laxly many flowered; perianth red to purple ..... 111. *A. thunbergii*

52b. Bulb ovoid-globose to subglobose (if ovoid, then ovary with concave nectaries at base without hoodlike projections).

57a. Pedicels equaling to slightly longer than perianth ..... 119. *A. glomeratum*

57b. Pedicels more than 2 × as long as perianth.

58a. Leaves 0.5–1.5 mm wide, terete; scape covered with leaf sheaths for 1/3–1/2 its length; ovary tuberculate ..... 118. *A. delicatulum*

58b. Leaves 1–5 mm wide, flat, semiterete, or triangular-semiterete; scape covered with leaf sheaths for less than 1/3 its length; ovary smooth.

59a. Leaves flat; umbel without bulblets; filaments 1.5–2 × as long as perianth segments ..... 114. *A. tanguticum*

59b. Leaves semiterete or triangular-semiterete; umbel ± with bulblets; filaments shorter than perianth segments ..... 121. *A. macrostemon*

17b. Bulbs usually several in a cluster, cylindric, conical, or ovoid-cylindric, rarely ovoid; rhizomes well developed.

60a. Bulb tunic reticulate, subreticulate, or laxly fibrous.

61a. Perianth pale blue to blue or purplish blue.
62a. Filaments shorter than perianth segments.
63a. Perianth segments narrowly oblong to narrowly ovate-oblong, 11–14(–17) mm, margin entire; filaments usually ca. 4/5 as long as perianth segments; style usually 2–3 × as long as ovary ..... 22. *A. beesianum*
63b. Perianth segments ovate or ovate-oblong, 6–10 mm, at least margin of inner ones irregularly denticulate; filaments usually 1/2–2/3 as long as perianth segments; style shorter than or subequaling ovary.
64a. Perianth segments acuminate at apex, equal, irregularly denticulate at margin, rarely outer ones entire; leaves abaxially keeled, usually twisted when dry ..... 23. *A. yuanum*
64b. Perianth segments obtuse at apex, inner ones longer and wider than outer, only inner ones irregularly denticulate at margin; leaves flat ..... 24. *A. sikkimense*
62b. Filaments longer than perianth segments.
65a. Leaves semiterete ..... 25. *A. cyaneum*
65b. Leaves flat.
66a. Pedicels extremely unequal, 2–4 × as long as perianth ..... 28. *A. heteronema*
66b. Pedicels subequal, 1–2 × as long as perianth.
67a. Bulb tunic reticulate; umbel laxly few flowered; pedicels 1.5–2 × as long as perianth; base of inner filaments with 1 short tooth on each side, apex of tooth entire ..... 27. *A. henryi*
67b. Bulb tunic subreticulate; umbel densely many flowered; pedicels 1–1.5 × as long as perianth; base of inner filaments with 1 long tooth on each side, apex of tooth sometimes denticulate ..... 31. *A. stenodon*
61b. Perianth white, pale red, purple-red, purple, dark purple, or yellow.
68a. Filaments more than 1.3 × as long as perianth segments.
69a. Perianth segments basally united for 1.5–2 mm into a short tube; filaments basally connate for 1.5–2 mm and adnate to perianth segments ..... 43. *A. siphonanthum*
69b. Perianth segments free; filaments connate only at base.
70a. Bulb tunic usually red, distinctly reticulate; inner filaments broadened for 1/3–1/2 their length; ovary without concave nectaries at base ..... 48. *A. przewalskianum*
70b. Bulb tunic never red, reticulate or fibrous; inner filaments broadened for ca. 1/3 their length; ovary with concave nectaries at base.
71a. Perianth pale red or purple-red to purple.
72a. Bulb tunic fibrous, sometimes subreticulate; pedicels ebracteolate ..... 30. *A. plurifoliatum*
72b. Bulb tunic reticulate; pedicels bracteolate at base.
73a. Leaves semiterete ..... 42. *A. clathratum*
73b. Leaves flat.
74a. Inner filaments entire ..... 37. *A. schrenkii*
74b. Inner filaments with 1 or 2 teeth on each side.
75a. Perianth segments with red, slender midvein or without midvein; stigma punctiform ..... 36. *A. lineare*
75b. Perianth segments with purple midvein; stigma capitate or subglobose.
76a. Perianth pale lilac to pinkish lilac ..... 40. *A. splendens*
76b. Perianth pink to pink-red ..... 41. *A. maackii*
71b. Perianth white to pale yellow.
77a. Leaves 2–7 mm wide, flat; teeth of inner filaments entire ..... 44. *A. flavidum*
77b. Leaves 1–5 mm wide, semiterete, fistulose; teeth of inner filaments sometimes irregularly 2–4-denticulate.
78a. Leaves equaling to distinctly longer than scape; pedicels ebracteolate ..... 46. *A. flavovirens*
78b. Leaves shorter than scape; pedicels bracteolate at base ..... 45. *A. leucocephalum*
68b. Filaments less than 1.3 × as long as perianth segments.
79a. Perianth yellow, later becoming red; filaments connate into tube for 3/5–4/5 their length ..... 101. *A. semenovii*
79b. Perianth not yellow; filaments connate only basally or for 1/6–1/2 their length.
80a. Inner filaments toothed at base.
81a. Filaments ca. 1/2 as long as perianth segments ..... 18. *A. forrestii*
81b. Filaments slightly shorter than or equaling perianth segments.
82a. Leaves 3–5 mm wide, flat.
83a. Filaments slightly longer than perianth segments; stigma punctiform ..... 38. *A. amphibolum*
83b. Filaments slightly shorter than or equaling perianth segments ..... 39. *A. strictum*
82b. Leaves 0.25–1 mm wide, semiterete.
84a. Bulb tunic subreticulate; filaments connate into a tube for 1/6–1/2 their length, tube adnate to perianth segments for 1/3–1/2 its length.
85a. Perianth segments 6–8.5 mm; filaments connate for 1/3–1/2 their length ..... 54. *A. subangulatum*

85b. Perianth segments 3–6 mm; filaments connate for 1/6–1/3 their length ..... 55. *A. polyrhizum*
84b. Bulb tunic distinctly reticulate; filaments connate only at base.
86a. Pedicels bracteolate at base; perianth pale purple to purple; ovary without concave nectaries at base ..... 47. *A. eduardii*
86b. Pedicels ebracteolate; perianth pale red; ovary with concave nectaries at base covered by hoodlike projections ..... 26. *A. aciphyllum*
80b. Inner filaments entire at base.
87a. Scape covered with leaf sheaths for 1/4–1/2 its length.
88a. Pedicels subequal; leaves 2–5 mm wide ..... 39. *A. strictum*
88b. Pedicels unequal; leaves 0.5–1 mm wide.
89a. Bulb tunic distinctly reticulate ..... 50. *A. tekesicola*
89b. Bulb tunic subreticulate.
90a. Bulb tunic brown; inner filaments basally ca. 2 × as wide as outer ones, distally abruptly subulate; ovary with concave nectaries at base covered by hoodlike projections ..... 88. *A. korolkowii*
90b. Bulb tunic yellowish brown; inner filaments basally ca. 3 × as wide as outer ones, distally gradually attenuate; ovary with small, concave nectaries at base not covered by hoodlike projections ..... 49. *A. teretifolium*
87b. Scape covered with leaf sheaths only at base.
91a. Bulb tunic reticulate or subreticulate; perianth white to pale red.
92a. Inner filaments broadly triangular, basally ca. 2 × as wide as outer ones; perianth segments with dark purple midvein ..... 34. *A. oreoprasum*
92b. Inner filaments narrowly triangular, basally only slightly wider than outer ones; perianth segments without dark purple midvein.
93a. Scape 5–15 cm; stigma slightly 3-cleft ..... 35. *A. humile*
93b. Scape 25–60 cm; stigma punctiform.
94a. Leaves flat, solid; perianth segments white, usually with green midvein ..... 32. *A. tuberosum*
94b. Leaves triangular, abaxially keeled, fistulose; perianth segments white, rarely pale red, usually with pale red midvein ..... 33. *A. ramosum*
91b. Bulb tunic fibrous or subreticulate at base; perianth dark purple, purple-red, or pale red.
95a. Inner filaments not broadened at base.
96a. Leaves 8–10 mm wide ..... 21. *A. rhynchogynum*
96b. Leaves 1–3 mm wide.
97a. Filaments 1/2–2/3 as long as perianth segments; ovary constricted at apex, without concave nectaries at base ..... 17. *A. mairei*
97b. Filaments slightly shorter or longer than perianth segments; ovary not constricted at apex, with concave nectaries at base covered by narrow, hoodlike projections .... 20. *A. changduense*
95b. Inner filaments broadened at base.
98a. Leaves 1.5–3(–5) mm wide, flat; perianth purple to dark purple ..... 18. *A. forrestii*
98b. Leaves 0.3–1.5 mm wide, semiterete to terete; perianth pale red to purple-red.
99a. Leaves distinctly longer than scape; umbel laxly few flowered; perianth segments 3–3.5 mm; ovary with concave nectaries at base ..... 92. *A. alabasicum*
99b. Leaves shorter than scape; umbel densely many flowered; perianth segments 6–9 mm; ovary without concave nectaries at base ..... 51. *A. mongolicum*

60b. Bulb tunic entire, never reticulate or only apical part becoming fibrous.
100a. Filaments shorter than perianth segments, never more than 4/5 as long as perianth segments.
101a. Perianth blue.
102a. Perianth segments narrowly oblong to narrowly ovate-oblong, 11–14(–17) mm, margin entire; filaments usually ca. 4/5 as long as perianth segments; style usually 2–3 × as long as ovary ..... 22. *A. beesianum*
102b. Perianth segments ovate or ovate-oblong, 6–10 mm, margin of at least inner ones irregularly denticulate; filaments usually 1/2–2/3 as long as perianth segments; style usually shorter than or subequaling ovary.
103a. Perianth segments acuminate at apex, equal, irregularly denticulate at margin, rarely outer ones entire; leaves abaxially keeled, usually twisted when dry ..... 23. *A. yuanum*
103b. Perianth segments obtuse at apex, inner ones longer and wider than outer, only inner ones irregularly denticulate at margin; leaves flat ..... 24. *A. sikkimense*
101b. Perianth white, pale red, purple-red, pale purple, purple, yellow, or bright yellow.
104a. Perianth pale or bright yellow.
105a. Bulb cylindric; leaves slightly falcate, usually ca. 1/2 as long as or rarely subequaling scape, flat ..... 79. *A. chrysocephalum*
105b. Bulb ovoid-globose to ovoid; leaves subequaling scape, semiterete ..... 80. *A. herderianum*

104b. Perianth white, pale red, purple-red, pale purple, or purple.
106a. Filaments connate into an urceolate tube for 3/4–4/5 their length ..... 61. *A. weschniakowii*
106b. Filaments connate only at base or for 1/3–1/2 their length.
107a. Bulb tunic leathery; pedicels bracteolate at base; ovary with concave nectaries at base covered by hoodlike projections.
108a. Bulb tunic brown, apex becoming fibrous and somewhat subreticulate; pedicels unequal, 2–3 × as long as perianth in fruit ..... 88. *A. korolkowii*
108b. Bulb tunic light yellowish brown, apex laciniate; pedicels subequal, 1–2 × as long as perianth in fruit ..... 89. *A. setifolium*
107b. Bulb tunic membranous, papery, or thinly leathery; pedicels ebracteolate; ovary usually without concave nectaries at base (but present in *A. pevtzovii*).
109a. Perianth segments 2.8–5 mm, apex of inner ones truncate or rounded-truncate.
110a. Pedicels unequal, 1.5–3.5 cm; perianth segments 3.9–5 mm ..... 60. *A. anisopodium*
110b. Pedicels subequal, 0.5–1.5 cm; perianth segments 2.8–4.2 mm.
111a. Bulb tunic laciniate; umbel hemispheric to globose, densely many flowered ..... 59. *A. elegantulum*
111b. Bulb tunic splitting at apex; umbel hemispheric to fascicled, laxly flowered ..... 58. *A. tenuissimum*
109b. Perianth segments 6–18 mm, apex of inner ones obtuse or acuminate.
112a. Inner filaments ovate at base, 1-toothed on each side; ovary with concave nectaries at base ..... 87. *A. pevtzovii*
112b. Inner filaments subulate to narrowly ovate at base, entire; ovary without concave nectaries at base.
113a. Leaves 1.5–4 mm wide, flat; perianth segments 13–18 mm; filaments ca. 1/2 as long as perianth segments, all subulate ..... 19. *A. kingdonii*
113b. Leaves 0.5–1 mm wide, semiterete; perianth segments 6–9 mm; filaments 2/3–3/4 as long as perianth segments, inner ones wider than outer.
114a. Bulbs densely clustered; bulb tunic papery, apex becoming fibrous; pedicels ca. 2 × as long as perianth; perianth segments ovate-oblong, 7–9 × 2.5–3 mm; broadened base of inner filaments narrowly triangular ..... 53. *A. yongdengense*
114b. Bulbs laxly clustered; bulb tunic membranous, laciniate; pedicels 1–1.5 × as long as perianth; perianth segments elliptic to ovate, 6–7 × 3–4 mm; broadened base of inner filaments narrowly ovate ..... 52. *A. caespitosum*
100b. Filaments slightly shorter to longer than perianth segments.
115a. Leaves flat or keeled abaxially.
116a. Bulbs attached to a stout, horizontal or oblique rhizome; scape usually 2-angled.
117a. Leaves abaxially keeled; ovary with concave nectaries at base covered by hoodlike projections ..... 65. *A. taishanense*
117b. Leaves flat; ovary without concave nectaries at base.
118a. Perianth white to yellow; pedicels ebracteolate ..... 66. *A. chiwui*
118b. Perianth pale red or pale purple to purple-red; pedicels bracteolate at base.
119a. Leaves straight or spirally tortuous, (1.5–)2–6 mm wide.
120a. Leaves straight, 1.5–4 mm wide ..... 67. *A. spurium*
120b. Leaves spirally tortuous, 4–6 mm wide ..... 68. *A. spirale*
119b. Leaves straight or slightly falcate, 6–15 mm wide.
121a. Inner filaments entire at base ..... 69. *A. senescens*
121b. Inner filaments 1-toothed on each side at base ..... 70. *A. nutans*
116b. Bulbs attached to a vertical rhizome; scape terete.
122a. Perianth yellowish green to pale yellow.
123a. Scape covered with leaf sheaths for ca. 1/2 its length; pedicels 2–4 × as long as perianth, bracteolate at base ..... 71. *A. obliquum*
123b. Scape covered with leaf sheaths at base only; pedicels 1–1.5 × as long as perianth, ebracteolate.
124a. Inner filaments entire at base; umbel globose, densely many flowered; leaves 3–8 mm wide ..... 78. *A. rude*
124b. Inner filaments 1-toothed on each side at base; umbel laxly flowered; leaves 2–3 mm wide ..... 64. *A. brevidentatum*
122b. Perianth white, pale red, purple-red, purple, or blue.
125a. Inner filaments with 1 irregularly denticulate tooth on each side at base; ovary with concave nectaries at base covered by hoodlike projections.
126a. Leaves broadly linear to linear-lanceolate, 5–23 mm wide; spathe with a long beak sometimes to 7 cm; perianth white ..... 29. *A. paepalanthoides*
126b. Leaves linear, 2–6(–8) mm wide; spathe with a short beak; perianth pale red, pale purple, or purple ..... 30. *A. plurifoliatum*

125b. Inner filaments entire at base or, if toothed, teeth never denticulate; ovary with concave nectaries at base not covered by hoodlike projections.
127a. Spathe with long beak ..... 82. *A. kurssanovii*
127b. Spathe with short beak.
128a. Bulb tunic blackish gray to black, papery or membranous.
129a. Leaves falcate; perianth white; ovary without concave nectaries at base ..... 76. *A. phariense*
129b. Leaves straight; perianth pink or pinkish lilac; ovary with concave nectaries at base ..... 77. *A. platyspathum*
128b. Bulb tunic red-brown or brown to yellowish brown, leathery or thinly so.
130a. Leaves 1–1.5(–3) mm wide, margin scabrous-denticulate; ovary without concave nectaries at base ..... 73. *A. kaschianum*
130b. Leaves 2–17 mm wide, margin smooth; ovary with concave nectaries at base.
131a. Bulb tunic red-brown, lustrous ..... 72. *A. hymenorhizum*
131b. Bulb tunic brown to yellowish brown, dull.
132a. Leaves usually falcate; inner filaments broadened at base ..... 74. *A. carolinianum*
132b. Leaves usually not falcate; inner filaments not broadened at base ..... 75. *A. blandum*
115b. Leaves semiterete or terete, solid or fistulose, adaxially channeled.
133a. Inner filaments obtusely 1-toothed on each side at base.
134a. Perianth white or pale yellow; style conspicuously exserted; ovary with concave nectaries at base ..... 46. *A. flavovirens*
134b. Perianth red, pale purple-red, or purple-red; style not exserted; ovary without concave nectaries at base.
135a. Inner filaments broadened for ca. 4/5 their length ..... 56. *A. bidentatum*
135b. Inner filaments broadened for ca. 1/2 their length ..... 57. *A. dentigerum*
133b. Inner filaments entire at base.
136a. Beak of spathe several times as long as limb.
137a. Perianth segments pale yellow with green midvein ..... 84. *A. petraeum*
137b. Perianth segments purple-red to pale red, rarely white, with dark midvein ..... 81. *A. saxatile*
136b. Beak of spathe shorter than or equaling limb.
138a. Perianth white, pale yellow, or greenish yellow.
139a. Leaves solid, margin ciliate-denticulate ..... 85. *A. tianschanicum*
139b. Leaves fistulose, margin smooth.
140a. Bulb tunic red-brown, lustrous; scape solid; pedicels bracteolate at base ..... 93. *A. condensatum*
140b. Bulb tunic light brown to brown, dull; scape fistulose; pedicels ebracteolate ..... 94. *A. xichuanense*
138b. Perianth pale red, red, pale purple, or purple.
141a. Pedicels bracteolate at base.
142a. Ovary with longitudinally convex nectaries along septa; nectary pit at ovary base open ..... 90. *A. subtilissimum*
142b. Ovary without nectaries or only with concave nectaries at base.
143a. Bulbs attached to a robust, horizontal rhizome; filaments equaling or slightly longer than perianth segments; ovary without concave nectaries ..... 62. *A. prostratum*
143b. Bulbs attached to vertical rhizome; filaments 1.25–2 × as long as perianth segments; ovary with concave nectaries.
144a. Bulb tunic red-brown, lustrous, scarious to subleathery; leaves 2–3 mm wide, margin smooth ..... 91. *A. longistylum*
144b. Bulb tunic brown, dull, leathery; leaves 0.5–2 mm wide, margin ciliate- or scabrous-denticulate.
145a. Bulb tunic leathery, entire or laciniate at apex; ovary with concave nectaries covered by hoodlike projections ..... 83. *A. caricoides*
145b. Bulb tunic thinly leathery to papery, splitting; ovary with concave nectaries not covered by hoodlike projections.
146a. Bulbs to 10 cm; tunic yellowish brown; filaments ca. 1/2 as long as perianth segments ..... 86. *A. megalobulbon*
146b. Bulbs shorter; tunic brown; filaments 1.25–1.5 × as long as perianth segments ..... 85. *A. tianschanicum*
141b. Pedicels ebracteolate.
147a. Inner filaments conspicuously broadly ovate or ovate-oblong at base.
148a. Bulb tunic grayish white, sometimes reddish; pedicels 2–3 × as long as perianth; perianth purple-red; style slightly longer than ovary ..... 57. *A. dentigerum*

148b. Bulb tunic brown; pedicels shorter than or equaling perianth; perianth pale red; style shorter than ovary ..... 56. *A. bidentatum*

147b. Inner filaments subulate to narrowly triangular at base, gradually attenuate toward apex.

149a. Scape covered with leaf sheaths for 1/3–1/2 its length; leaves 1 or 2, margin smooth; perianth pink ..... 104. *A. oliganthum*

149b. Scape covered with leaf sheaths only at base; leaves more than 3, margin scabrid; perianth pale purple or red-purple.

150a. Inner perianth segments irregularly denticulate at distal margin and apex; style exserted ..... 62. *A. prostratum*

150b. Inner perianth segments entire; style not exserted ..... 63. *A. rubens*

1. Allium victorialis Linnaeus, Sp. Pl. 1: 295. 1753.

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Allium latissimum Prokhanov; *A. microdictyum* Prokhanov; *A. ochotense* Prokhanov; *A. victorialis* subsp. *platyphyllum* Hultén; *A. wenchuanense* Z. Y. Zhu.

Bulb solitary or clustered, subcylindric; tunic grayish brown to blackish brown, reticulate. Leaves 2 or 3; petiole 2–10 cm; leaf blade oblanceolate-elliptic to elliptic, 8–12 × 3–9.5 cm, base cuneate to broadly so, gradually narrowed into petiole, decurrent, apex acute or acuminate. Scape 25–80 cm, terete, covered with leaf sheaths for 1/4–1/2 its length. Spathe 2-valved, persistent. Umbel globose. Pedicels 2–4 × as long as perianth, ebracteolate. Perianth white or slightly tinged with green, very rarely tinged with red; outer segments boat-shaped, 4–5 × 1.5–2 mm, apex obtuse; inner ones elliptic-ovate, (4.5–)5–6 × 2–3 mm, apex obtuse, usually denticulate. Filaments 1.3–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular, wider, 1–1.5 mm wide at base. Ovary constricted at base into a stipe ca. 1 mm; ovules 1 per locule. Fl. and fr. Jun–Aug. 2*n* = 16, 32*.

Forests, shady and moist slopes, pastures, streamsides; 600–2500 m. Anhui, E Gansu, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Zhejiang [India, Japan, Kazakstan, Korea, Mongolia, Russia; Europe, NW North America].

2. Allium listera Stearn, Bull. Fan Mem. Inst. Biol. 5: 326. 1934.

对叶山葱 dui ye shan cong

Allium victorialis Linnaeus var. *listera* (Stearn) J. M. Xu.

Bulb solitary or clustered, subcylindric; tunic grayish brown to blackish brown, reticulate. Leaves 2; petiole 2–10 cm; leaf blade elliptic to ovate-orbicular, 8–12 × 3–9.5 cm, base cordate to rounded, apex acute or acuminate. Scape 25–80 cm, terete, covered with leaf sheaths for 1/4–1/2 its length. Spathe 2-valved, persistent. Umbel globose. Pedicels 2–4 × as long as perianth, ebracteolate. Perianth white or slightly tinged with green, very rarely tinged with red; outer segments boat-shaped, 4–5 × 1.5–2 mm, apex obtuse; inner ones elliptic-ovate, (4.5–) 5–6 × 2–3 mm, apex obtuse, usually denticulate. Filaments 1.3–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular, 1–1.5 mm wide at base, wider than outer ones. Ovary constricted at base into a stipe ca. 1 mm; ovules 1 per locule. Fl. and fr. Jun–Aug. 2*n* = 16*.

• Forests, shady and moist slopes, pastures; 600–2000 m. Anhui, Hebei, Henan, Jilin, Shaanxi, Shanxi.

3. Allium ovalifolium Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 101. 1924.

卵叶山葱 luan ye shan cong

Bulb solitary or clustered, subcylindric; tunic grayish brown to blackish brown, reticulate. Leaves 2(or 3), subopposite; petiole 1–12 cm; leaf blade lanceolate- to ovate-oblong, (6–)8–15 × (2–)3–7 cm, main veins green or white, base deeply cordate to rounded, apex shortly caudate or acuminate. Scape 30–60 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent or deciduous. Umbel globose, densely many flowered. Pedicels subequal, 1.5–4 × as long as perianth, elongate in fruit, ebracteolate. Perianth white, rarely pale red; outer segments narrowly ovate to ovate or ovate-oblong, 3.5–5 × 1.4–2 mm, apex retuse or obtuse, sometimes denticulate; inner ones lanceolate-oblong to narrowly oblong, (3.5–)4–6 × 1–1.6 mm, apex retuse, obtuse, or acuminate, sometimes irregularly denticulate at least at distal margin. Filaments equal, 1–1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular, 0.8–1.1 mm wide at base. Ovary constricted at base into a stipe ca. 0.5 mm; ovules 1 per locule. Fl. and fr. Jul–Sep.

• Forests, forest margins, thickets, damp places, stream banks, rock crevices; 1500–4000 m. SE Gansu, NE Guizhou, W Hubei, E Qinghai, S Shaanxi, Sichuan, NW Yunnan.

1a. Leaf blade with white main veins .... 3b. var. *leuconeurum*

1b. Leaf blade without white main veins.

2a. Leaf blade base cordate to rounded, rarely deeply cordate; inner perianth segments narrower than outer ones, apex retuse or obtuse, sometimes irregularly denticulate ..... 3a. var. *ovalifolium*

2b. Leaf blade base deeply cordate; inner perianth segments as wide as or slightly wider than outer ones, apex acuminate, sometimes distal margin distantly denticulate ..... 3c. var. *cordifolium*

3a. Allium ovalifolium var. **ovalifolium**

卵叶山葱(原变种) luan ye shan cong (yuan bian zhong)

Allium prattii C. H. Wright var. *latifoliatum* F. T. Wang & Tang.

Leaf blade without white main veins, base cordate to rounded, rarely deeply cordate. Inner perianth segments narrower than outer ones, apex retuse or obtuse, sometimes irregularly denticulate. Fl. and fr. Jul–Sep. 2*n* = 16*, 24*.

• Forests, forest margins, thickets, damp places, stream banks, rock crevices; 1500–4000 m. SE Gansu, NE Guizhou, W Hubei, E Qinghai, S Shaanxi, Sichuan, NW Yunnan.

3b. Allium ovalifolium var. **leuconeurum** J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 283. 1980.

白脉山葱 bai mai shan cong

Leaf blade with white main veins. Perianth segments similar.

• Forests; 2800–3800 m. W Sichuan.

3c. Allium ovalifolium var. **cordifolium** (J. M. Xu) J. M. Xu, Fl. Sichuan. 7: 140. 1991.

心叶山葱 xin ye shan cong

Allium cordifolium J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 284. 1980.

Leaf blade without white main veins, base deeply cordate. Inner perianth segments as wide as or slightly wider than outer ones, apex acuminate, sometimes distal margin distantly denticulate.

• Forests; 3000–3800 m. W Sichuan.

4. Allium funckiifolium Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 175. 1920.

玉簪叶山葱 yu zan ye shan cong

Bulb solitary, subcylindric; tunic grayish brown, reticulate. Leaf 1; petiole 8.5–15 cm; leaf blade ovate to broadly ovate-elliptic, 16–22.8 × 7–15.7 cm, base cordate to deeply so, usually crisped, apex acute or acuminate. Scape 35–65 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose. Pedicels subequal, 2–4 × as long as perianth, ebracteolate. Perianth white; segments subequal, elliptic to narrowly so, 3–4.5 × 1.2–1.5 mm; outer ones boat-shaped. Filaments 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular, wider, ca. 1 mm wide at base. Ovary constricted at base into a stipe ca. 1 mm; ovules 1 per locule. Fl. Jul. 2*n* = 16*.

• Forests, shady and moist slopes, streamsides; 2200–2300 m. W Hubei, E Sichuan.

5. Allium nanodes Airy Shaw, Notes Roy. Bot. Gard. Edinburgh 16: 141. 1931.

短葶山葱 duan ting shan cong

Bulb solitary or clustered, subcylindric; tunic grayish brown, reticulate. Leaves 2, opposite; leaf blade tinged with purple, oblong to narrowly oblong, curved backward, 3.5–9 × 1.5–3 cm, base gradually narrowed into a very short petiole, apex acute. Scape 2–5 cm, terete, covered with leaf sheaths for 3/4–4/5 its length. Spathe 2-valved, persistent or deciduous. Umbel laxly flowered. Pedicels subequal, ca. 2 × as long as perianth, ebracteolate. Perianth white, tinged with red; outer segments boat-shaped, 5–8 × 1.5–2 mm, apex acute; inner ones narrowly oblong to narrowly ovate, 5.5–9 × 1–1.8 mm. Filaments slightly longer than perianth segments, connate at base for ca. 1 mm and adnate to perianth segments; outer ones 0.7–1 mm wide; inner ones 1–1.8 mm wide at base. Ovary constricted at base into an obscure stipe; ovules 1 per locule. Fl. and fr. Jun–Aug. 2*n* = 16*.

• Scrub or meadows in high mountains, gravelly slopes; 3300–5200 m. SW Sichuan, NW Yunnan.

6. Allium prattii C. H. Wright ex Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 36: 124. 1903.

太白山葱 tai bai shan cong

Allium cannifolium H. Léveillé; *A. prattii* var. *ellipticum* F. T. Wang & Tang; *A. prattii* var. *vinicolor* F. T. Wang & Tang; *A. victorialis* Linnaeus var. *angustifolium* J. D. Hooker.

Bulb solitary or clustered, subcylindric; tunic grayish brown to blackish brown, reticulate. Leaves 2, subopposite, rarely 3, linear, linear-lanceolate, elliptic-lanceolate, elliptic-oblanceolate or rarely narrowly elliptic, shorter than to subequaling scape, 0.5–4(–7) cm wide, base gradually narrowed into an obscure petiole, apex acuminate. Scape 10–60 cm, terete, covered with leaf sheaths only at base. Spathe 1- or 2-valved, persistent. Umbel hemispheric. Pedicels subequal, 2–4 × as long as perianth, ebracteolate. Perianth purple-red to pale red, rarely approaching white; outer segments narrowly ovate, oblong-ovate, to oblong, 3.2–5.5 × 1.4–2(–2.9) mm, apex obtuse, retuse, or denticulate; inner ones lanceolate-oblong to narrowly oblong, 4–7 × 1–1.5(–2.5) mm. Filaments slightly longer than to 1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular, 0.8–1.5 mm wide at base. Ovary constricted at base into a short stipe; ovules 1 per locule. Fl. And fr. end of Jun–Sep. 2*n* = 16*, 32*.

Shady and damp forests, thickets, scrub, stream banks, slopes, meadows; 2000–4900 m. Anhui, Gansu, Henan, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

7. Allium guanxianense J. M. Xu, Acta Phytotax. Sin. 31: 376. 1993.

灌县韭 guan xian jiu

Roots thick, fleshy. Bulbs clustered, cylindric, 0.6–1 cm in diam., with short stolons; tunic fibrous. Leaves linear-oblanceolate, shorter than scape, 2–3 cm wide, midvein distinct, base long attenuate, apex obtuse to acuminate. Scape terminal, 40–60 cm, terete, covered with leaf sheaths for ca. 1/4 its length. Spathe deciduous. Umbel globose, laxly flowered. Pedicels equal, 2–3 × as long as perianth, ebracteolate. Perianth white; segments lanceolate to ovate-lanceolate, 8–9 × ca. 2 mm, apex obtuse. Filaments subulate, slightly shorter than perianth segments, connate at base for ca. 1 mm and adnate to perianth segments. Ovary obovoid, base without concave nectaries, constricted into a stipe ca. 1 mm; ovules 1 per locule. Style subequaling ovary; stigma punctiform. Fl. Aug.

• Damp slopes; 1800–2000 m. C Sichuan (Dayi Xian, Guan

Xian).

8. Allium xiangchengense J. M. Xu, Acta Phytotax. Sin. 31: 374. 1993.

乡城韭 xiang cheng jiu

Roots thick, fleshy. Bulbs clustered, cylindric, 0.3–0.4 cm in diam.; tunic white, membranous, entire, with some fibers. Leaves lanceolate to linear-lanceolate, shorter than scape, 1.5–2 cm wide, midvein distinct, base conspicuously attenuate, apex acuminate. Scape lateral, 23–26 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel globose, laxly flowered. Pedicels equal, 2–3 × as long as perianth, ebracteolate. Perianth white; segments lanceolate, 4.5–5 × ca. 1 mm, apex acuminate, sometimes 2-lobed. Filaments subulate, slightly longer than perianth segments, connate at base and adnate to perianth segments. Ovary subglobose, base without concave nectaries, constricted into a stipe ca. 0.5 mm; ovules 1 per locule. Style longer than ovary; stigma punctiform. Fl. Aug.

• Forest margins, shady and damp places; ca. 3300 m. W Sichuan (Xiangcheng Xian).

9. Allium hookeri Thwaites, Enum. Pl. Zeyl. 339. 1864.

宽叶韭 kuan ye jiu

Roots elongate, thick, fleshy. Bulbs clustered, cylindric; tunic membranous, entire. Leaves linear to broadly so, shorter than to subequaling scape, 0.5–1 cm wide, midvein distinct. Scape lateral, usually arising from base of bulb, (10–)20–60 cm, usually without leaf sheaths, sometimes with 1. Spathe 2-valved, usually deciduous. Umbel hemispheric to globose, many flowered. Pedicels subequal, 2–3(–4) × as long as perianth, ebracteolate. Perianth white or greenish yellow to yellow; segments similar, lanceolate, 4–7.5 × 1–1.5 mm, apex acuminate, sometimes unequally 2-lobed. Filaments subulate, slightly shorter than to subequaling perianth segments, connate at base and adnate to perianth segments. Ovary obovoid, smooth, base constricted into a short stipe; ovules 1 per locule. Style longer than ovary; stigma punctiform. Fl. and fr. Jul–Oct. 2*n* = 22*, 44*.

Forests, forest margins, moist places, meadows; 1400–4200 m. SW Sichuan, SE Xizang, NW Yunnan [Bhutan, India, Myanmar, Sri Lanka].

1a. Perianth white ..... 9a. var. *hookeri*
1b. Perianth greenish yellow to yellow ..... 9b. var. *muliense*

9a. Allium hookeri var. **hookeri**

宽叶韭(原变种) kuan ye jiu (yuan bian zhong)

Allium tsoongii F. T. Wang & Tang.

Perianth white.

Forests, moist places; 1400–4000 m. SW Sichuan, SE Xizang, NW Yunnan [Bhutan, India, Myanmar, Sri Lanka].

Cultivated as a vegetable in some parts of S China.

9b. Allium hookeri var. **muliense** Airy Shaw, Notes Roy. Bot. Gard. Edinburgh 16: 139. 1931.

木里韭 mu li jiu

Perianth greenish yellow to yellow.

• Forest margins, meadows, moist places; 2800–4200 m. SW Sichuan, NW Yunnan.

10. Allium omeiense Z. Y. Zhu, Bull. Bot. Res., Harbin 9(4): 65. 1989.

峨眉韭 e mei jiu

Roots elongate, thick, fleshy. Bulbs clustered, cylindric, robust, 1.5–2 cm in diam.; tunic fibrous. Leaves band-shaped to linear-oblanceolate, longer than scape, (1.5–)2–3.5 cm wide, midvein distinct. Scape lateral, 30–65 cm, terete, sometimes slightly compressed, covered with leaf sheaths for ca. 1/3 its length, reflexed after anthesis. Spathe deciduous. Umbel hemispheric, usually with leafing bulblets. Pedicels subequal, slightly longer than to 2 × as long as perianth, ebracteolate. Perianth white; segments linear to linear-lanceolate, 9–11 × 0.5–1.1 mm, apex caudate; inner ones slightly shorter than outer, united into a tube ca. 1 mm, midvein pale green. Filaments subulate, equal, ca. 1/2 as long as perianth segments, connate at base and adnate to perianth segments. Ovary subglobose, smooth; ovules 1(or 2) per locule. Style longer than ovary; stigma punctiform. Fl. and fr. Aug–Oct. 2*n* = 22*.

• Stream banks, slopes; 1000–1200 m. C Sichuan (Emei Shan, Hongya Xian).

Cultivated as vegetable on Emei Shan.

11. Allium chienchuanense J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 284. 1980.

剑川韭 jian chuan jiu

Roots elongate, thick, fleshy. Bulb solitary or clustered, cylindric, robust, 2–3 cm in diam.; tunic fibrous. Leaves band-shaped, shorter than scape, 1.5–3(–5) cm wide, midvein distinct. Scape lateral, 75–80 cm, terete, covered with leaf sheaths for ca. 1/3 its length. Spathe deciduous. Umbel subglobose. Pedicels subequal, 2–3 × as long as perianth, ebracteolate. Perianth yellow; segments all similar, oblong to oblong elliptic, 6–7 × 2–2.2 mm, basally united into a tube ca. 1 mm, apex irregularly denticulate, rarely entire. Filaments subulate, equal, slightly longer than perianth segments, connate at base for ca. 1.5 mm and adnate to perianth segments. Ovary obovoid, smooth, base constricted into a short stipe; ovules 2 per locule. Style longer than ovary; stigma punctiform. Fl. Sep.

• Streamsides, moist places; ca. 3100 m. Yunnan (Jianchuan Xian).

12. Allium fasciculatum Rendle, J. Bot. 44: 42. 1906.

粗根韭 cu gen jiu

Allium gageanum W. W. Smith.

Roots tuberous, short, thick. Bulb solitary or clustered, cylindric; tunic pale brown, fibrous. Leaves linear, usually longer than scape, 2–5 mm wide, midvein obscure. Scape lateral, (5–)15–40 cm, terete, covered with leaf sheaths for 1/4–2/5 its length. Spathe 1- or 2-valved, persistent or deciduous. Umbel globose. Pedicels subequal, 1.5–2 × as long as perianth, ebracteolate. Perianth white; segments lanceolate, 4.5–6 × 1.4–2.2 mm, base usually broadened, rounded, apex acuminate or

irregularly 2-lobed. Filaments subulate, slightly shorter than perianth segments, connate at base and adnate to perianth segments. Ovary applanate-globose, minutely tuberculate, base constricted into a short stipe; ovules 2 per locule. Style equaling to slightly longer than ovary; stigma punctiform. Fl. and fr. Jul–Sep.

Dry slopes, meadows, sandy places; 2200–5400 m. SE Qinghai, W Sichuan, SE Xizang [Bhutan, Nepal, Sikkim].

13. Allium wallichii Kunth, Enum. Pl. 4: 443. 1843.

多星韭 duo xing jiu

Roots elongate, thick. Bulb solitary or clustered, cylindric; tunic yellowish brown, laciniate or fibrous to subreticulate. Leaves linear to oblong-lanceolate or lanceolate, shorter than to subequaling scape, (2–)5–20 mm wide, midvein distinct, base narrowed into a petiole or not. Scape lateral, (10–)20–50(–110) cm, 3-angled, sometimes narrowly 3-winged, covered with leaf sheaths only at base or for ca. 1/2 its length. Spathe 1- or 2-valved, deciduous. Umbel hemispheric, laxly or densely flowered. Pedicels subequal, 2–4 × as long as perianth, ebracteolate. Perianth stellately spreading, recurved after anthesis, pale red, red, or purple to blackish purple, rarely white; segments oblong-elliptic to narrowly so, 5–9 × 1.5–2 mm, apex retuse or obtuse. Filaments subulate, shorter than to subequaling perianth segments, connate at base and adnate to perianth segments. Ovary obovoid-globose, smooth; ovules 2 per locule. Style longer than ovary. Fl. and fr. Jul–Oct.

Forest margins, scrub, meadows, stream banks; 2300–4800 m. Guangxi, Guizhou, S Hunan, SW Sichuan, SE Xizang, NW Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

1a. Leaves linear to broadly so, base not narrowed into a petiole; scape covered with leaf sheaths only at base ..... 13a. var. *wallichii*
1b. Leaves oblong-lanceolate to lanceolate, base narrowed into a petiole; scape covered with leaf sheaths for ca. 1/2 its length ..... 13b. var. *platyphyllum*

13a. Allium wallichii var. **wallichii**

多星韭(原变种) duo xing jiu (yuan bian zhong)

Allium bulleyanum Diels; *A. bulleyanum* var. *tchongchanense* (H. Léveillé) Airy Shaw; *A. feddei* H. Léveillé; *A. liangshanense* Z. Y. Zhu; *A. polyastrum* Diels; *A. praelatitium* H. Léveillé; *A. tchongchanense* H. Léveillé; *A. wallichii* var. *albidum* F. T. Wang & Tang; *Nothoscordum mairei* H. Léveillé.

Leaves linear to broadly so, base not narrowed into a petiole. Scape covered with leaf sheaths only at base. Fl. and fr. Jul–Oct. 2*n* = 14*, 28*.

Forest margins, scrub, moist meadows, stream banks; 2300–4800 m. Guangxi, Guizhou, S Hunan (Mang Shan), SW Sichuan, SE Xizang, NW Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

13b. Allium wallichii var. **platyphyllum** (Diels) J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 211. 1980.

柳叶韭 liu ye jiu

Allium polyastrum Diels var. *platyphyllum* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 300. 1912; *A. lancifolium* Stearn; *A. polyastrum* var. *pallens* F. T. Wang & Tang.

Leaves oblong-lanceolate to lanceolate, base narrowed into a petiole. Scape covered with leaf sheaths for ca. 1/2 its length.

• Meadows, stream banks; 3100–3400 m. NW Yunnan.

14. Allium macranthum Baker, J. Bot. 12: 293. 1874.

大花韭 da hua jiu

Allium oviflorum Regel; *A. simethis* H. Léveillé & Giraudias.

Roots rather short, thick. Bulb solitary, cylindric; tunic membranous, entire, rarely fibrous. Leaves subequaling scape, 4–10 mm wide, midvein distinct. Scape terminal, 20–60 cm, 2- or 3-angled, sometimes narrowly winged, covered with leaf sheaths only at base. Spathe 2- or 3-valved, deciduous. Umbel laxly few flowered. Pedicels subequal, 2–5 × as long as perianth, ebracteolate, apex nodding. Perianth spreading-campanulate, red-purple to purple; outer segments oblong, boat-shaped, shorter and wider than inner ones, 9–11.5 × 5–8 mm, apex truncate or retuse; inner ones narrowly ovate-oblong, 10.2–12 × 4–6 mm. Filaments subulate, equal, equaling to slightly longer than perianth segments, connate at base and adnate to perianth segments. Ovary obovoid-globose, apex sometimes 6-horned; ovules 2 per locule. Style much longer than ovary, exserted; stigma punctiform. Fl. and fr. Aug–Oct. 2*n* = 14, 28.

Meadows, stream banks, damp places; 2700–4200 m. SW Gansu, S Shaanxi, SW Sichuan, S Xizang (Yadong Xian), NW Yunnan [Bhutan, Sikkim].

15. Allium cyathophorum Bureau & Franchet, J. Bot. (Morot) 5: 154. 1891.

杯花韭 bei hua jiu

Roots rather long, thick. Bulb solitary or clustered, cylindric; tunic grayish brown, fibrous, sometimes subreticulate. Leaves linear, usually shorter than scape, 2–5 mm wide, midvein distinct. Scape lateral, 13–15 cm, terete, usually 2-angled, covered with leaf sheaths only at base. Spathe 1(–3)-valved, persistent. Umbel hemispheric, laxly flowered. Pedicels 1–3 × as long as perianth, ebracteolate. Perianth purple to dark purple; segments elliptic-oblong, 7–9 × 3–4 mm, apex retuse to obtuse or acuminate; inner ones slightly longer than outer. Filaments ca. 2/3 as long as perianth segments, connate into a tube for 2/3–3/4 their length; outer ones narrowly triangular; inner ones broadened at base, shoulder-shaped or triangular. Ovary ovoid-globose, tuberculate; ovules 2 per locule. Style shorter than ovary; stigma 3-cleft. Fl. and fr. Jun–Aug.

• Slopes, meadows, rock crevices; 2700–4600 m. SE Gansu, S Qinghai, W Sichuan, E Xizang, NW Yunnan.

1a. Perianth segments retuse to obtuse at apex; inner filaments shoulder-shaped at base ..... 15a. var. *cyathophorum*
1b. Perianth segments acuminate at apex;

inner filaments triangular at base ..... 15b. var. *farreri*

15a. Allium cyathophorum var. **cyathophorum**
杯花韭(原变种) bei hua jiu (yuan bian zhong)

Allium venustum C. H. Wright.

Perianth segments retuse to obtuse at apex. Inner filaments shoulder-shaped at base. $2n = 16$*.

• Slopes, meadows, rock crevices; 3000–4600 m. S Qinghai (Yushu Xian), SW Sichuan, E Xizang, NW Yunnan.

15b. Allium cyathophorum var. **farreri** (Stearn) Stearn, Bot. Mag. 170: t. 252. 1955.

川甘韭 chuan gan jiu

Allium farreri Stearn, J. Bot. 64: 342. 1930.

Perianth segments acuminate at apex. Inner filaments triangular at base. $2n = 16$*.

• Slopes, meadows; 2700–3600 m. SE Gansu, NW Sichuan.

16. Allium trifurcatum (F. T. Wang & Tang) J. M. Xu, Fl. Sichuan. 7: 145. 1991.

三柱韭 san zhu jiu

Allium humile Kunth var. *trifurcatum* F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 284. 1980.

Roots elongate, relatively thick. Bulbs clustered, cylindric, attached to horizontal rhizome; tunic grayish black, thinly leathery, laciniate or fibrous. Leaves broadly linear, shorter than scape, 4–10 mm wide, midvein distinct. Scape lateral, (14–)20–30 cm, terete, narrowly 2-winged, covered with leaf sheaths only at base. Spathe 2-valved, usually persistent. Umbel broom-like, laxly few flowered. Pedicels unequal, elongate at anthesis, 1.5–2 × as long as perianth, ebracteolate. Perianth white, spreading funnelform; segments narrowly oblong to oblong-lanceolate, rarely ovate, (4–)6–8 × 1.7–2 mm; inner ones slightly longer than outer. Filaments 1/3–1/2 as long as perianth segments, base broadly triangular, connate and adnate to perianth segments, apex attenuate, subulate; inner ones slightly shorter than outer. Ovary obovoid, smooth; ovules 1 per locule. Style much shorter than ovary, sometimes absent; stigma 3-cleft. Fl. and fr. end of May–Aug.

• Forests, scrub, damp slopes, stream banks; 3000–4000 m. SW Sichuan, NW Yunnan.

17. Allium mairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 7: 339. 1909.

滇韭 dian jiu

Allium amabile Stapf; *A. giraudiasii* H. Léveillé; *A. mairei* H. Léveillé (loc. cit.: 384, not 339); *A. pyrrhorrhizum* Airy Shaw; *A. pyrrhorrhizum* var. *leucorrhizum* F. T. Wang & Tang; *A. yunnanense* Diels.

Bulbs usually clustered, cylindric, slightly thickened at base; tunic yellowish brown to grayish brown, fibrous, sometimes slightly reticulate. Leaves shorter than to subequaling scape, 1–1.5(–2) mm wide, semiterete-flat to semiterete or subterete, finely angled, angles scabrous. Scape usually tinged with purple, 10–30(–40) cm, terete, 2-angled, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbels 2, each with a basal bract, or umbel 1 and ebracteate. Pedicels unequal, 1.5–2 × as long as perianth, rarely slightly longer, elongate in fruit, ebracteolate. Perianth pale red to purple-red; segments linear, narrowly oblong, oblanceolate-oblong, or elliptic-oblong, 8–12(–15) × 1.5–4 mm, apex obtuse or acute, sometimes conduplicate and reflexed; inner ones slightly narrower. Filaments subulate, equal, 1/2–2/3 as long as perianth segments, rarely shorter, connate at base and adnate to perianth segments for ca. 1 mm. Ovary constricted at both ends, without concave nectaries at base, apex rarely constricted into a beak. Style not exserted; stigma slightly 3-cleft. Fl. and fr. Aug–Oct. $2n = 16$*, 32*,

• Forests, slopes, meadows, rock crevices; 1200–4200 m. SW Sichuan, SE Xizang, Yunnan.

18. Allium forrestii Diels, Notes Roy. Bot. Gard. Edinburgh 5: 302. 1912.

梭沙韭 suo sha jiu

Bulbs clustered, cylindric, 0.4–0.7 cm in diam.; tunic grayish brown, fibrous, usually subreticulate at base, rarely laciniate. Leaves linear, shorter than scape, 1.5–3(–5) mm wide. Scape usually purple-red, 15–30 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, deciduous. Umbel few flowered. Pedicels subequal, shorter than to equaling perianth, ebracteolate. Perianth purple to dark purple; segments elliptic to ovate- or obovate-elliptic, 8–13 × 4–4.5 mm, apex obtuse or attenuate into an obtuse point. Filaments equal, ca. 1/2 as long as perianth segments, connate at base and adnate to perianth segments for ca. 1 mm; outer ones subulate; inner ones usually broadened at base, rarely 1-toothed on each side. Ovary subglobose, with concave nectaries at base. Style shorter than to subequaling ovary; stigma usually 3-cleft. Fl. and fr. Aug–Oct. $2n = 16$*.

• Meadows, gravelly slopes; 2700–4200 m. SW Sichuan, E Xizang, NW Yunnan.

19. Allium kingdonii Stearn, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 175. 1960.

钟花韭 zhong hua jiu

Bulb usually solitary, cylindric, ca. 0.6 cm in diam.; tunic dull yellowish red, thinly leathery, laciniate. Leaves linear, shorter than scape, 1.5–4 mm wide, apex obtuse. Scape 10–30 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent or deciduous. Umbel few flowered. Pedicels unequal, shorter to slightly longer than perianth, ebracteolate. Perianth purple-red; segments narrowly oblong, 13–18 × 3–4.2 mm, apex obtuse; inner ones slightly longer and narrower than outer. Filaments subulate, equal, ca. 1/2 as long as perianth segments, connate at base for ca. 1 mm; outer ones adnate to perianth segments for ca. 1 mm; inner ones adnate for ca. 2 mm. Ovary globose, without concave nectaries at base. Style longer than ovary; stigma slightly 3-cleft. Fl. and fr. Jun–Aug.

• Scrub, moist places; 4500–5000 m. SE Xizang.

20. Allium changduense J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 285. 1980.

昌都韭 chang du jiu

Bulb solitary or clustered, cylindric, 0.5–1 cm in diam.; tunic brown, subreticulate. Leaves linear, shorter than scape, 2–3 mm wide. Scape 15–20 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel few flowered. Pedicels unequal, 0.2–2.5 cm, ebracteolate. Perianth purple-red; outer segments narrowly oblong, 6.5–14.5 × 2.5–4 mm, apex obtuse; inner ones 7.2–15.5 × 2–4.5 mm. Filaments subulate, subequal, slightly shorter to slightly longer than perianth segments, connate at base and adnate to perianth segments. Ovary ovoid, with concave nectaries covered by short, hoodlike projections at base. Style slightly longer than ovary; stigma punctiform. Fl. Aug–Sep.

• Scrub, slopes; 3200–4500 m. NW Sichuan (Dêgê Xian), E Xizang (Jomda Xian, Qamdo Xian).

21. Allium rhynchogynum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 302. 1912.

宽叶滇韭 kuan ye dian jiu

Bulb probably solitary, narrowly cylindric; tunic fibrous. Leaves broadly linear, shorter than scape, 8–10 mm wide, flat, apex rounded. Scape lateral, 16–22 cm, with 1 leaf sheath at base. Spathe thinly leathery, persistent. Umbel few flowered. Pedicels unequal, 1–2.5 cm, ebracteolate. Perianth pinkish red; segments narrowly lanceolate, 10–12 × 2.5–3 mm, apex acuminate. Filaments subulate, equal, ca. 1/2 as long as perianth segments, connate at base and adnate to perianth segments. Ovary constricted at base into a stipe, without concave nectaries at base. Style shorter than ovary, persistent; stigma globose. Fl. Aug.

• Cliffs, valleys; 2700–3200 m. NW Yunnan.

22. Allium beesianum W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 176. 1914.

蓝花韭 lan hua jiu

Bulbs clustered, cylindric, 0.5–1 cm in diam.; tunic brown, fibrous, subreticulate at base, sometimes laciniate. Leaves linear, shorter than scape, 3–8 mm wide. Scape (20–)30–50 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, deciduous. Umbel hemispheric, laxly few flowered. Pedicels subequal, shorter than to equaling perianth, ebracteolate. Perianth blue; outer segments narrowly ovate-oblong, 11–14(–17) × 3–5.5 mm, margin entire, apex obtuse; inner ones slightly longer and narrower than outer. Filaments subequal, usually ca. 4/5 as long as perianth segments, connate at base and adnate to perianth segments for ca. 1 mm; outer ones subulate; inner ones broadened at base, sometimes 1-toothed on each side. Ovary obovoid-globose, with concave nectaries at base. Style 2–3 × as long as ovary; stigma punctiform. Fl. and fr. Aug–Oct.

• Slopes, meadows; 3000–4200 m. SW Sichuan (Yanbian Xian), NW Yunnan (Heqing Xian, Lijiang Naxi Zu Zizhixian).

23. Allium yuanum F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 295. 1937.

齿被韭 chi bei jiu

Bulb solitary or clustered, cylindric, 0.2–0.4 cm in diam.; tunic brown, subreticulate. Leaves linear, usually twisted when dried, shorter or slightly longer than scape, 1.5–3 mm wide, abaxially keeled. Scape 17–55 cm, terete, covered with leaf sheaths only at base. Spathe (1 or)2(or 3)-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels subequal, shorter to longer than perianth, ebracteolate. Perianth blue; segments ovate, 7.5–10 × 3–4 mm, margin irregularly denticulate or (on outer segments) entire, apex acuminate. Filaments subulate, ca. 1/2 as long as perianth segments, connate at base and adnate to perianth segments; inner ones sometimes broadened at base, entire. Ovary subglobose, with concave nectaries covered by hoodlike projections at base. Style equaling to slightly longer than ovary, not exserted; stigma slightly 3-cleft. Fl. and fr. Aug–Sep.

• Forest margins, meadows in forests, slopes; 2800–3500 m. NW Sichuan.

24. Allium sikkimense Baker, J. Bot. 12: 292. 1874.

高山韭 gao shan jiu

Allium cyaneum Regel var. *brachystemon* Regel; *A. kansuense* Regel; *A. tibeticum* Rendle.

Bulbs clustered, cylindric, 0.3–0.5 cm in diam.; tunic dark brown, fibrous, subreticulate at base, rarely laciniate. Leaves linear, shorter than scape, 2–5 mm wide, flat. Scape (5–)15–40 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, deciduous. Umbel hemispheric, densely many flowered. Pedicels subequal, shorter than to equaling perianth, ebracteolate. Perianth blue; segments ovate to ovate-oblong, 6–10 × 3–4.5 mm, apex obtuse; inner ones usually slightly longer and wider than outer, margin usually irregularly remotely denticulate. Filaments equal, 1/2–2/3 as long as perianth segments, connate and adnate to perianth segments for ca. 1 mm, usually all broadened at base, sometimes 1-toothed on each side. Ovary subglobose, with concave nectaries covered by short, hoodlike projections at base. Style shorter than to subequaling ovary, not exserted; stigma punctiform. Fl. and fr. Jul–Sep. 2*n* = 32, 48*.

Forest margins, scrub, slopes, meadows; 2400–5000 m. S Gansu, S Ningxia, E and S Qinghai, SW Shaanxi, W Sichuan, SE Xizang, NW Yunnan [Bhutan, India, Nepal, Sikkim].

25. Allium cyaneum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 174. 1875.

天蓝韭 tian lan jiu

Allium hugonianum Rendle; *A. szechuanicum* F. T. Wang & Tang; *A. tui* F. T. Wang & Tang.

Bulbs clustered, cylindric, 0.2–0.4(–0.6) cm in diam.; tunic dark brown, usually not distinctly reticulate. Leaves shorter or longer than scape, 1.5–2.5 mm wide, semiterete, adaxially channeled. Scape 10–30(–45) cm, terete, covered with leaf sheaths only at base. Spathe 1- or 2-valved, deciduous. Umbel subfascicled, sometimes hemispheric. Pedicels subequal, 1–2 × as long as perianth, ebracteolate. Perianth blue; segments ovate

to oblong-ovate, 4–6.5 × 2–3 mm; inner ones slightly longer than outer. Filaments equal, 1.3–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, base sometimes 1-toothed on each side. Ovary subglobose, with concave nectaries covered by short, hoodlike projections at base. Style exserted. Fl. and fr. Aug–Oct. 2*n* = 32*.

Forest margins, slopes, meadows; 2100–5000 m. Gansu, W Hubei, Ningxia, Qinghai, Shaanxi, Sichuan, Xizang [Korea].

Allium cyaneum var. *deltoides* S. O. Yu et al. (J. Korean Pl. Taxon. 11(1–2): 29. 1981) was described from Korea, but no material has been seen by the present authors.

26. Allium aciphyllum J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 284. 1980.

针叶韭 zhen ye jiu

Bulbs clustered, cylindric, thickened at base, 0.8–1 cm in diam.; tunic dark brown, reticulate. Leaves subequaling scape, ca. 1 mm wide, adaxially channeled. Scape 15–25 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel few flowered. Pedicels subequal, ca. 2 × as long as perianth, ebracteolate. Perianth pale red; outer segments ovate, ca. 3.5 × 1.8 mm; inner ones oblong, ca. 4 × 2 mm. Filaments equal, ca. 1.25 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base for ca. 1 mm, 1-toothed on each side. Ovary obovoid-globose, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. Aug–Oct.

• Slopes; 2000–2100 m. N Sichuan (Jinchuan Xian).

27. Allium henryi C. H. Wright, Bull. Misc. Inform. Kew 1895: 119. 1895.

疏花韭 shu hua jiu

Bulbs clustered, cylindric, sometimes slightly thickened at base, 0.4–1.2 cm in diam.; tunic dark brown, reticulate. Leaves linear, longer than scape, 2–5 mm wide, flat, apex long acuminate. Scape 11–25 cm, terete, finely angled, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel few flowered. Pedicels subequal, 1.5–2 × as long as perianth, ebracteolate. Perianth purple-blue to blue; segments ovate, 5.5–7 × ca. 3 mm; inner ones sometimes slightly longer than outer. Filaments slightly longer than to 1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side. Ovary obovoid-globose, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Sep–Oct.

• Sunny slopes; 1300–2300 m. W Hubei, E Sichuan.

28. Allium heteronema F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 285. 1980.

异梗韭 yi geng jiu

Bulb cylindric, slightly thickened at base, 0.8–1 cm in diam.; tunic dark brown, reticulate. Leaves subequaling scape, 3–7 mm wide, apex long acuminate. Scape 25–30 cm, terete, angled, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel few flowered. Pedicels very unequal, 2–4 × as long as perianth, ebracteolate. Perianth purple-blue; outer segments narrowly ovate, 7–7.5 × 2–2.7 mm; inner ones narrowly oblong, ca. 8 × 2.5–2.7 mm. Filaments slightly longer than perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened for ca. 2.5 mm and oblong at base, 1-toothed on 1 or both sides. Ovary obovoid-globose, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. Aug.

• Slopes; 1600–2300 m. E Sichuan (Chengkou Xian, Nanchuan Xian).

29. Allium paepalanthoides Airy Shaw, Notes Roy. Bot. Gard. Edinburgh 16: 142. 1931.

天蒜 tian suan

Allium albostellerianum F. T. Wang & Tang.

Bulb solitary, narrowly ovoid-cylindric, 0.5–1.5 cm in diam.; tunic yellowish brown to blackish brown, sometimes tinged with red, papery, laciniate, sometimes subfibrous. Leaves broadly linear to linear-lanceolate, shorter than to subequaling scape, 5–15(–23) mm wide, apex acuminate. Scape (15–)30–50 cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 1-valved, persistent or deciduous; beak to 7 cm. Umbel laxly many flowered. Pedicels subequal, 2–4 × as long as perianth, ebracteolate. Perianth white; segments with green midvein; outer ones ovate, boat-shaped, 3–4.5 × 1.5–2.5 mm; inner ones ovate-oblong, 3.2–5 × 1.5–2.5 mm, apex truncate or obtuse. Filaments equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side, teeth 1.5–2 mm, irregularly denticulate at apex. Ovary obovoid, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Aug–Sep. 2*n* = 16*.

• Forests, shady and moist slopes, streamsides; 1400–2000 m. W Henan, S Nei Mongol (Yin Shan), S Shaanxi, Shanxi, Sichuan.

30. Allium plurifoliatum Rendle, J. Bot. 44: 43. 1906.

多叶韭 duo ye jiu

Bulbs usually clustered, cylindric, thickened at base, 0.3–1 cm in diam.; tunic blackish brown to yellowish brown, fibrous, sometimes subreticulate. Leaves subequaling scape, 2–6(–8) mm wide, abaxially glaucous, margin revolute, apex long acuminate. Scape 15–40 cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 1-valved, persistent or deciduous; beak short. Umbel laxly flowered. Pedicels subequal, 2–4 × as long as perianth, ebracteolate. Perianth pale red or pale purple to purple; outer segments ovate, boat-shaped, 3.5–4.5(–6.5) × 1.5–2.4(–3.4) mm; inner ones ovate-oblong, 4–5(–7) × 1.5–2.4(–3.4) mm, apex truncate or obtuse. Filaments equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones subulate and entire at base or broadened and 1-toothed on each side at base, teeth (1–)2–3 mm, irregularly denticulate at apex. Ovary obovoid, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Jul–Oct.

• Forests, slopes, pastures; 1600–3300 m. SE Anhui, Gansu, NW Hubei, Shaanxi, Sichuan.

1a. Inner filaments broadened at base, 1-toothed on each side, teeth irregularly denticulate at apex ..... 30a. var. *plurifoliatum*
1b. Inner filaments subulate, entire at base ..... 30b. var. *zhegushanense*

30a. Allium plurifoliatum var. **plurifoliatum**

多叶韭(原变种) duo ye jiu (yuan bian zhong)

Inner filaments broadened at base, 1-toothed on each side, teeth irregularly denticulate at apex. Fl. and fr. Aug–Oct. 2*n* = 16*, 32*.

• Forests, slopes, pastures; 1600–3300 m. SE Anhui (Huang Shan), Gansu, NW Hubei, Shaanxi, Sichuan.

30b. Allium plurifoliatum var. **zhegushanense** J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 285. 1980.

鹧鸪韭 zhe gu jiu

Inner filaments subulate, entire at base. Fl. and fr. Jul–Sep.

• Forests, slopes, pastures; 3200–3300 m. NC Sichuan (Li Xian).

31. Allium stenodon Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. 4, 1: 18. 1934.

雾灵韭 wu ling jiu

Allium plurifoliatum Rendle var. *stenodon* (Nakai & Kitagawa) J. M. Xu.

Bulbs usually clustered, cylindric, slightly thickened at base, 0.3–0.8 cm in diam.; tunic blackish brown, fibrous, sometimes subreticulate. Leaves linear, shorter than to subequaling scape, 2–3 mm wide, flat. Scape 20–50 cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 1-valved, persistent; beak short. Umbel hemispheric to subglobose, densely many flowered. Pedicels 1–1.5 × as long as perianth, ebracteolate. Perianth blue to purple-blue; outer segments ovate, boat-shaped, 4–5 × 2–3 mm; inner ones ovate-oblong, 4.5–5.5 × 2–3 mm. Filaments equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, with 1 long tooth on each side, teeth sometimes denticulate at apex. Ovary obovoid, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Jul–Sep.

• Forest margins, slopes, pastures; 1600–3000 m. Hebei, Henan, Nei Mongol, Shanxi.

32. Allium tuberosum Rottler ex Sprengel, Syst. Veg. 2: 38. 1825.

韭 jiu

Allium argyi H. Léveillé; *A. chinense* Maximowicz (1859), not G. Don (1827); *A. clarkei* J. D. Hooker; *A. roxburghii* Kunth; *A. sulvia* Buchanan-Hamilton ex D. Don; *A. tuberosum* Roxburgh (1832); *A. uliginosum* G. Don (1827), not Ledebour (1830); *A. yesoense* Nakai.

Bulbs clustered, cylindric; tunic dull yellow to yellowish brown, reticulate to subreticulate. Leaves linear, shorter than scape, 1.5–8 mm wide, flat, solid, margin smooth. Scape 25–60 cm, terete, usually 2-angled, covered with leaf sheaths only at base. Spathe 2- or 3-valved, persistent. Umbel hemispheric to subglobose, laxly many flowered. Pedicels subequal, 2–4 × as long as perianth, bracteolate and several covered with a common bract at base. Perianth white; segments usually with green or yellowish green midvein; outer ones oblong-ovate to oblong-lanceolate, 4–7(–8) × 1.8–3 mm; inner ones oblong-obovate, 4–7(–8) × 2.1–3.5 mm. Filaments narrowly triangular, equal, 2/3–4/5 as long as perianth segments, connate at base and adnate to perianth segments; inner ones slightly wider than outer at base. Ovary obconical-globose, minutely tuberculate, without concave nectaries at base. Fl. and fr. Jul–Sep. 2*n* = 16*, 24*, 32*.

Among shrubs, also widely cultivated as a vegetable; 1000–1100 m. Native in SW Shanxi (Yongji Xian); naturalized S China [tropical Asia].

Allium tuberosum is generally regarded as a cultivated species with a tetraploid chromosome number (2*n* = 32), although a wild population was recently discovered in Shanxi Province with a diploid number (2*n* = 16; Yang et al., Acta Phytotax. Sin. 36: 36–46. 1998). This species has leaves solid and perianth segments usually with a green or yellowish green midvein, whereas its close wild relative, *A. ramosum*, differs in having leaves fistulose and perianth segments with a pale red midvein. One of us (Xu) agrees with Stearn (Herbertia 11: 238. 1946) that the name *A. tataricum* Linnaeus f. (Suppl. Pl. 196. 1782) should be regarded as a synonym of *A. ramosum*. On the other hand, Kamelin regards *A. tataricum* as a synonym of *A. tuberosum*, over which name it would have priority. He bases his opinion on two specimens (LE), labeled as *A. tataricum* and made from plants cultivated during the 1790s in the St. Petersburg Botanical Garden, and on his belief that only *A. tuberosum*, never *A. ramosum*, has been cultivated. However, Kamelin has observed that these two specimens have fistulose leaves, which suggests that they are *A. ramosum*, unless this character is not diagnostic for the two species. Xu has not seen the specimens but notes that they could be cultivated *A. ramosum* because, as noted by Stearn (loc. cit.: 229), *A. ramosum* was already in cultivation in Europe by 1750. Therefore, *A. tataricum* is here treated as a synonym of *A. ramosum*, based on Xu's opinion. The nomenclature of the two species remains unstable because, although the type of *A. tuberosum* (B) supports the current application of that name, no type has yet been designated for either *A. ramosum* or *A. tataricum*. Further studies are required in order to resolve the classification.

33. Allium ramosum Linnaeus, Sp. Pl. 1: 296. 1753.

野韭 ye jiu

Allium lancipetalum Y. P. Hsu; *A. odorum* Linnaeus; *A. potaninii* Regel; *A. tataricum* Linnaeus f.; *A. weichanicum* Palibin.

Bulbs clustered, subcylindric; tunic dull yellow to yellowish brown, reticulate to subreticulate. Leaves linear, shorter than scape, 1.5–8 mm wide, 3-angled, 1-keeled abaxially, fistulose, margin and angles scabrous-denticulate or smooth. Scape 25–60 cm, terete, obscurely angled, covered with leaf sheaths only at base. Spathe 1- or 2-valved. Umbel hemispheric to subglobose, many flowered. Pedicels subequal, 2–4 × as long as perianth, bracteolate and several covered with a common bract at base. Perianth white, sometimes slightly tinged with

pale red; segments with pale red midvein; outer ones oblong-ovate to oblong-lanceolate, usually slightly narrower than inner, (4.5–)5.5–9(–11) × 1.5–2.9 mm; inner ones oblong-obovate, (4.5–)5.5–9(–11) × 1.8–3.1 mm. Filaments narrowly triangular, equal, 1/2–3/4 as long as perianth segments, connate at base and adnate to perianth segments; inner ones slightly wider than outer at base. Ovary obconical-globose, minutely tuberculate, without concave nectaries at base. Fl. and fr. Jun–Sep. 2*n* = 16*, 32*.

Sunny hills, pastures; 500–2100 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Kazakstan, Mongolia, Russia].

34. Allium oreoprasum Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 10: 354. 1842.

滩地韭 tan di jiu

Bulbs clustered, narrowly ovoid-cylindric, 0.5–1 cm in diam.; tunic yellowish brown, reticulate. Leaves narrowly linear, shorter than (sometimes 1/2 as long as) scape, 1–3(–4) mm wide. Scape 11–30(–40) cm, terete, covered with leaf sheaths only at base. Spathe 1- or 2-valved, persistent. Umbel fascicled to hemispheric, few flowered. Pedicels subequal, 1.5–3 × as long as perianth, bracteolate. Perianth pale red to white; segments with dark purple midvein, obovate-elliptic to broadly so, 4.2–7 × 2.5–4 mm, apex with a conduplicate and reflexed point; inner ones usually shorter and wider than outer. Filaments 1/2–3/4 as long as perianth segments, connate at base and adnate to perianth segments for 1.2–1.5 mm; outer ones narrowly triangular, slightly shorter than inner and ca. 1/2 as wide at base; inner ones broadly triangular. Ovary subglobose, without concave nectaries at base. Style not exserted; stigma slightly 3-cleft. Fl. and fr. Jun–Aug. 2*n* = 16, 48.

Sunny slopes, stony shores of rivers; 1200–2700 m. Xinjiang, W Xizang [Afghanistan, Kazakstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

35. Allium humile Kunth, Enum. Pl. 4: 443. 1843.

雪韭 xue jiu

Allium gowanianum Wallich ex Baker; *A. nivale* Jacquemont ex J. D. Hooker & Thomson.

Bulb solitary, cylindric; tunic brown, reticulate or subreticulate. Leaves 4–7, linear, 4–5 mm wide, flat, solid, fleshy, apex obtuse. Scape 5–15 cm, slightly compressed, covered with leaf sheaths only at base. Umbel hemispheric, many flowered. Pedicels subequal, 1.5–2 × as long as perianth. Perianth broadly exposed, white; segments with yellowish green midvein, lanceolate, 7–8(–10) × ca. 2 mm. Filaments equal, ca. 1/2 as long as perianth segments. Ovary obconical-globose. Style short; stigma slightly 3-cleft. Fl. Jun.

Slopes at high elevations; 4000–4500m. NW Xizang, NW Yunnan [India, Pakistan].

36. Allium lineare Linnaeus, Sp. Pl. 1: 295. 1753.

北韭 bei jiu

Bulb solitary or paired, cylindric-conical, 0.5–1.5 cm in diam.; tunic grayish brown, reticulate. Leaves linear, shorter than scape, 3–5 mm wide, flat, margin smooth. Scape 40–60 cm, terete, covered with leaf sheaths for 1/3–1/2 its length. Umbel usually globose, many flowered. Pedicels subequal, slender, bracteolate. Perianth pink-red; outer segments oblong-elliptic, slightly shorter than inner ones, 3.5–4 × ca. 2 mm; inner ones 4–5 × ca. 2 mm. Filaments 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side. Ovary obovoid-globose, with concave nectaries at base. Style exserted; stigma punctiform. Fl. Jun. 2*n* = 16.

Stony slopes, mostly in scrub; 1800–2400 m. NW Xinjiang [Kazakstan, Mongolia, Russia].

37. Allium schrenkii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 172. 1875.

单丝辉韭 dan si hui jiu

Allium bogdoicola Regel.

Bulb solitary, cylindric, 0.5–0.8 cm; tunic grayish brown, reticulate. Leaves linear, shorter than scape, 2–5 mm wide, flat, margin smooth. Scape 20–40 cm, covered with leaf sheaths for ca. 1/3 its length. Umbel globose, many flowered. Pedicels equal, slender, bracteolate. Perianth pink or pinkish lilac; segments with purple midvein, oblong-linear, 3–4.5 mm. Filaments ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones subulate from broadened base, entire. Ovary obovoid-globose, with concave nectaries at base. Style exserted; stigma punctiform. Fl. Jul. 2*n* = 32.

Stony slopes in high mountains; 2400–2800 m. W Xinjiang [Kazakstan, Mongolia, Russia].

38. Allium amphibolum Ledebour, Fl. Altaic. 2: 5. 1830.

直立韭 zhi li jiu

Bulbs densely clustered, cylindric-conical, 1–1.5 cm in diam.; tunic yellowish brown, reticulate. Leaves linear, shorter than scape, 3–5 mm wide, flat, margin smooth. Scape 20–30 cm, covered with leaf sheaths for 1/4–1/3 its length. Umbel hemispheric, densely many flowered. Pedicels equal, very short, bracteolate. Perianth rose lilac or purplish red; segments with dark purple midvein; outer ones lanceolate, 5–6 mm, apex usually hooded. Filaments dark red, slightly longer than perianth segments; inner ones broadened at base, with 1 short, rounded tooth on each side. Ovary subglobose, with concave nectaries at base. Style very long, exserted; stigma punctiform. Fl. Jul. 2*n* = 48.

Slopes; 2500–3000 m. W Xinjiang [Kazakstan, Mongolia, Russia].

39. Allium strictum Schrader, Hort. Gott. 7. 1809.

辉韭 hui jiu

Bulb solitary or paired, subcylindric, 0.5–0.8 cm in diam.; tunic grayish brown, reticulate. Leaves linear, shorter than scape, 3–5 mm wide, flat, margin scabrous-denticulate. Scape

(40–)50–80 cm, terete, covered with leaf sheaths for 1/3–1/2 its length. Spathe usually persistent. Umbel globose, densely many flowered. Pedicels subequal, straight, 1–2 × as long as perianth, not slender, bracteolate. Perianth dark rose pink to pale purple-red; segments usually with dark purple midvein, elliptic, 4–5 × 2–2.3 mm, apex rounded. Filaments slightly shorter than to equaling perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, with 1 short, rounded tooth on each side, teeth very rarely with 2 rounded teeth at apex. Ovary obovoid-globose, with concave nectaries at base. Style exserted; stigma usually subcapitate. Fl. Jun. 2*n* = 32*, 40, 48.

Stony slopes, cliffs; 400–1500 m. NW Gansu, Nei Mongol, Xinjiang (Altay Shan, Tian Shan) [Kazakstan, Kyrgyzstan, Mongolia, Russia; Europe].

40. Allium splendens Willdenow ex Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 1025. 1830.

丽韭 li jiu

Bulb solitary or paired, narrowly cylindric or cylindric-conical, 0.4–0.7 cm in diam.; tunic grayish brown, reticulate. Leaves linear or narrowly linear, shorter than scape, 1–3(–4) mm wide, flat, margin scabrous-denticulate. Scape 20–35(–50) cm, slender, terete. Spathe persistent. Umbel hemispheric, many flowered. Pedicels subequal, ca. 2 × as long as perianth, very slender, bracteolate. Perianth pale lilac or pinkish lilac; segments with purple midvein, lanceolate to narrowly elliptic, 3.5–4 × ca. 1.5 mm, apex rounded. Filaments 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones with enlarged base wider than long, with 1 or 2 teeth on each side. Ovary subglobose, with concave nectaries at base. Style long exserted; stigma capitate. Fl. Jun. 2*n* = 16, 32, (40).

Forests, scrub, meadows, moist slopes; 100–1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia].

41. Allium maackii (Maximowicz) Prokhanov ex Komarov & Alissova-Klobukova, Key Pl. Far East. USSR 1: 366. 1931.

马克韭 ma ke jiu

Allium lineare Linnaeus var. *maackii* Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 282. 1859; *A. prokhanovii* (Voroschilov) Barkalov; *A. splendens* Willdenow ex Schultes & J. H. Schultes subsp. *prokhanovii* Voroschilov.

Bulb solitary or clustered, cylindric-obovoid, to 1.5 cm wide; outer tunic yellowish brown, reticulate; inner layers leathery, ± neither laciniate nor fibrous. Leaves linear or narrowly so, shorter than scape, 2–3 mm wide, flat, margin scabrous-denticulate or smooth. Scape 20–50 cm, terete, furrowed, covered with leaf sheaths for 1/4–1/3 its length. Spathe persistent. Umbel hemispheric or globose, many flowered. Pedicels subequal, 1.5–2 × as long as perianth, bracteolate. Perianth rose pink; segments with purple midvein, oblong or oblong elliptic, 4–5 × 1.5–2 mm, apex obtuse. Filaments 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side, teeth sometimes forked. Ovary subglobose, with concave nectaries at base. Style long exserted; stigma subglobose. Fl. Jun. 2*n* = 32.

Dry slopes and cliffs; 200–500 m. Heilongjiang [Russia].

42. Allium clathratum Ledebour, Fl. Altaic. 2: 18. 1830.

细叶北韭 xi ye bei jiu

Bulb solitary or paired, cylindric-conical, 0.7–1 cm wide; tunic grayish brown, reticulate. Leaves usually shorter than scape, 0.5–1.5 mm wide, semiterete, margin smooth. Spathe persistent; beak very short. Umbel usually hemispheric, many flowered. Pedicels subequal, very slender, 2–3(or more) × as long as perianth, bracteolate. Perianth pink or pale pink; segments with dark red midvein, broadly linear or narrowly lanceolate, 4–5 × 1–1.5 mm, apex obtusely triangular. Filaments 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, entire or with 1 or 2 teeth on each side. Ovary subglobose, with concave nectaries at base. Style long exserted; stigma punctiform. Fl. Jun. 2*n* = 16, 32.

Mostly dry slopes, cliffs; 400–2000 m. Xinjiang [Kazakstan, Mongolia, Russia].

43. Allium siphonanthum J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 284. 1980.

管花韭 guan hua jiu

Bulb solitary or clustered, cylindric, 1–1.5 cm in diam.; tunic yellowish brown, subreticulate. Leaves subequaling scape, 1.5–3 mm wide. Scape 18–60 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, shorter than perianth, ebracteolate. Perianth purple red; segments obovate-oblong, 5.5–7.8 × 1.8–3 mm, basally united into a tube 1.5–2 mm, apex obtuse, sometimes retuse; inner ones slightly longer than outer, apex obtuse, irregularly denticulate. Filaments equal, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments for 1.5–2 mm; outer ones subulate; inner ones 3.2–4.5 mm wide at base, entire or 1-toothed on each side. Ovary obovoid-globose, without concave nectaries at base. Style much longer than ovary, exserted. Fl. and fr. Sep–Oct.

- Slopes; ca. 2800 m. NW Yunnan.

44. Allium flavidum Ledebour, Fl. Altaic. 2: 7. 1830.

新疆韭 xin jiang jiu

Bulb solitary or paired, narrowly ovoid-cylindric, 0.4–1 cm in diam.; tunic grayish brown to yellowish brown, reticulate. Leaves linear, shorter than scape, 2–5(–7) mm wide, margin scabrous-denticulate, apex obtuse. Scape 10–45 cm, terete, covered with leaf sheaths for 1/3–1/2 its length. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, usually subequaling perianth (rarely ca. 2 × as long), bracteolate. Perianth white to pale yellow, lustrous; segments oblong to ovate-oblong, 4–6 × 1.2–2 mm; inner ones 1.2–1.25 × as long as outer. Filaments equal, 1.2–1.5 × as long as perianth segments, connate at base and adnate to perianth segments; inner ones with an enlarged base

longer than wide, 1-toothed on each side. Ovary obovoid-globose, with concave nectaries at base. Style exserted. Fl. and fr. Jul–Aug.

Rock crevices in forests, sunny slopes. N Xinjiang [Kazakstan, Mongolia, Russia].

45. Allium leucocephalum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 27(2): 123. 1854.

白头韭 bai tou jiu

Bulb solitary or paired, subcylindric, 0.6–1.3 cm in diam.; tunic dark yellowish brown, reticulate. Leaves shorter than scape, (1–)2–5 mm wide, semiterete, fistulose, adaxially channeled, smooth. Scape 20–50(–60) cm, terete, covered with leaf sheaths for ca. 1/3 its length. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, slightly less than to 1.5 × as long as perianth, bracteolate. Perianth white or slightly tinged with yellow; inner segments oblong-ovate, 3.5–5.5 × 1.4–2 mm. Filaments equal, slightly longer than to 2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side, teeth sometimes irregularly 2–4-denticulate at apex. Ovary obovoid, with concave nectaries at base. Style exserted. Fl. and fr. Jul–Aug. 2*n* = 16*, 32.

Sandy places. Gansu, Heilongjiang, Nei Mongol [Mongolia, Russia].

46. Allium flavovirens Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 344. 1887.

阿拉善韭 a la shan jiu

Allium alaschanicum Y. Z. Zhao.

Bulb solitary or in clusters of 2 or 3, cylindric, 0.8–2 cm in diam.; tunic yellowish brown to dark brown, laciniate or fibrous. Leaves subequaling to conspicuously longer than scape, 2–4 mm wide, adaxially channeled. Scape 15–25 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent; beak long. Umbel hemispheric to globose, many flowered. Pedicels subequal, 1.5–2 × as long as perianth, ebracteolate. Perianth white or pale yellow; segments oblong to ovate-oblong, 4–6 × 1.7–2.5 mm; outer ones pale purple-red abaxially; inner ones slightly longer than outer. Filaments equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, base longer than wide, with 1 obtuse or acute tooth on each side. Ovary subglobose, with concave nectaries at base. Style exserted. Fl. and fr. Aug–Sep.

• Rock crevices, calcareous slopes, dry places; 1800–3100 m. W Nei Mongol (Helan Shan).

47. Allium eduardii Stearn in Airy Shaw, Herbertia 11: 102. 1946.

贺兰韭 he lan jiu

Allium fischeri Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 161. 1875, not Besser (1830).

Bulbs densely clustered, narrowly ovoid-cylindric, 0.5–1 cm in diam., usually covered with a common tunic; tunic yellowish brown, reticulate. Leaves shorter than scape, ca. 1 mm wide, semiterete, adaxially channeled. Scape 11–30 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent; beak ca. 3 × as long as limb. Umbel hemispheric. Pedicels subequal, 1.5–3 × as long as perianth, bracteolate. Perianth pale purple to purple; segments oblong-ovate to oblong-lanceolate, 5–6.5 × 2–2.5 mm, apex with a reflexed point; inner ones ca. 1 mm longer than outer. Filaments equal, equaling or slightly longer than perianth segments, connate at base and adnate to perianth segments for ca. 1 mm; outer ones subulate; inner ones broadened for 1/5–1/4 their length, with 1 sharp tooth on each side. Ovary subglobose, without concave nectaries at base. Style much longer than ovary, exserted. Fl. Aug. 2*n* = 32*.

Dry slopes, plains. N Hebei, SW Nei Mongol, N Ningxia, N Xinjiang [Mongolia, Russia].

48. Allium przewalskianum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 164. 1875.

青甘韭 qing gan jiu

Allium jacquemontii Regel (1875), not Kunth (1843); *A. junceum* Jacquemont ex Baker (1874), not Smith (1809); *A. stoliczkii* Regel.

Bulbs clustered, narrowly ovoid-cylindric, 0.5–1 cm in diam., sometimes covered with common tunic; tunic red, rarely light brown, reticulate. Leaves shorter or slightly longer than scape, 0.5–1.5 mm wide, semiterete to terete, 4- or 5-angled. Scape 10–40 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent; beak usually equaling limb. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, 2–3 × as long as perianth, ebracteolate, rarely a few bracteolate. Perianth pale red to dark purple; outer segments ovate to narrowly so, 3–6 × 1.5–2.5 mm; inner ones oblong to oblong-lanceolate, 4–6.5 × 1.5–2.5 mm. Filaments equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened for 1/3–1/2 their length, 1-toothed on each side. Ovary globose, without concave nectaries at base. Style much longer than ovary, exserted. Fl. and fr. Jun–Sep. 2*n* = 32*.

Scrub, dry slopes, plains, rock crevices; 2000–4800 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, NW Yunnan [India, Nepal, Pakistan].

49. Allium teretifolium Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 629. 1878.

西疆韭 xi jiang jiu

Allium grimmii Regel.

Bulbs usually clustered, narrowly ovoid, ca. 1 cm in diam.; tunic yellowish brown, subreticulate to reticulate. Leaves 3 or 4, shorter than to equaling scape, 0.5–1 mm wide, nearly semiterete, adaxially channeled, smooth. Scape 10–50 cm, terete, covered with leaf sheaths for 1/4–1/2 its length. Spathe 2-valved. Umbel nearly hemispheric. Pedicels unequal, 1.5–2 × as long as perianth, bracteolate. Perianth pale purple to pale red; segments subequal, 6–7(–9) × 2–2.5(–3) mm. Filaments equal,

2/3–5/6 as long as perianth segments, connate at base and adnate to perianth segments for ca. 1/5 their length; inner ones broadly triangular at base, ca. 3 × as wide as outer and gradually attenuate distally. Ovary narrowly ovoid, with small, concave nectaries at base. Style not exserted. Fl. and fr. Jul–Aug.

Dry and gravelly slopes. Xinjiang (Tian Shan) [Kazakstan, Kyrgyzstan].

50. Allium tekesicola Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 350. 1887.

荒漠韭 huang mo jiu

Allium deserticola M. Popov.

Bulb usually solitary, rarely paired, narrowly ovoid, 0.7–1 cm in diam.; outer tunic chestnut brown or pale brown, scarious, finely subreticulate; inner layers scarious, yellowish brown. Leaves subulate to narrowly linear, shorter than scape, 0.5–1 mm wide, semiterete, adaxially channeled. Scape 20–60 cm, terete, covered with leaf sheaths for ca. 1/3 its length, smooth. Spathe 2-valved, persistent; beak 2–3 × as long as limb. Umbel laxly few flowered. Pedicels unequal, 2–7 × as long as perianth, bracteolate. Perianth pale red; segments with dark red midvein, equal, oblong-lanceolate, 6–8 × ca. 2 mm, apex acute. Filaments subequal, 2/3–3/4 as long as perianth segments, connate at base and adnate to perianth segments for 1–1.5 mm; outer ones subulate; inner ones subulate from triangular base. Ovary conical-ovoid, with very small, concave nectaries at base. Style not exserted, 2–3(–4) mm; stigma capitate, small. Fl Jun–Jul.

Dry slopes. W Xinjiang (basin of Ili He) [Kazakstan (middle part of basin of Ili River)].

51. Allium mongolicum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 160. 1875.

蒙古韭 meng gu jiu

Bulbs densely clustered, cylindric; tunic brownish yellow, fibrous. Leaves shorter than scape, 0.5–1 mm wide, semiterete to terete. Scape 10–30 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel hemispheric to globose, densely many flowered. Pedicels 1–2 × as long as perianth, ebracteolate. Perianth pale red or pale purple-red to purple-red; segments ovate-oblong, 6–9 × 3–5 mm, apex obtuse; inner ones usually slightly longer than outer. Filaments subequal, 1/2–2/3 as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones ovate for ca. 1/2 their length. Ovary obovoid-globose, without concave nectaries at base. Style not exserted. Fl. and fr. Jul–Sep. $2n = 16$*.

Deserts, sandy places, dry slopes; 800–2800 m. Gansu, W Liaoning, Nei Mongol, N Ningxia, N Qinghai, N Shaanxi, NE Xinjiang [Kazakstan, Mongolia, Russia].

52. Allium caespitosum Sievers ex Bongard & C. A. Meyer, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 8: 341. 1841.

疏生韭 shu sheng jiu

Bulbs laxly clustered, cylindric, attached to a horizontal, elongate rhizome; tunic grayish brown, membranous, laciniate. Leaves shorter than scape, ca. 1 mm wide, semiterete. Scape 9–20 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel hemispheric. Pedicels 1–1.5 × as long as perianth, ebracteolate. Perianth white, usually tinged with pink; segments elliptic to ovate, 6–7 × 3–4 mm, apex obtuse; inner ones slightly longer than outer. Filaments subequal, 2/3–3/4 as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly ovate for ca. 1/2 their length. Ovary subglobose, without concave nectaries at base. Style not exserted. Fl. and fr. Jun–Aug.

Deserts, sandy places. N Xinjiang [Kazakstan].

53. Allium yongdengense J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 284. 1980.

永登韭 yong deng jiu

Bulbs clustered, cylindric, 0.3–0.5 cm in diam.; tunic grayish brown, papery, subfibrous at apex. Leaves shorter than scape, 0.5–1 mm wide, semiterete. Scape 13–17 cm, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel few flowered. Pedicels subequal, ca. 2 × as long as perianth, ebracteolate. Perianth purple-red; segments ovate-oblong, 7–9 × 2.5–3 mm; inner ones slightly longer than outer. Filaments subequal, 2/3–3/4 as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, narrowly triangular. Ovary narrowly ovoid, without concave nectaries at base. Style not exserted. Fl. and fr. Aug–Sep.

• Sunny and dry slopes. Gansu (Yongdeng Xian), E Qinghai (Ledu Xian).

54. Allium subangulatum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 340. 1887.

紫花韭 zi hua jiu

Bulbs densely clustered, cylindric, 0.5–1 cm in diam.; tunic yellowish brown to dark chestnut brown, subreticulate to reticulate. Leaves shorter than scape, ca. 1 mm wide, semiterete, margin scabrous-denticulate, rarely smooth. Scape 15–35 cm, terete, covered with leaf sheaths only at base. Spathe 2- or 3-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels 1–1.5 × as long as perianth, bracteolate, rarely ebracteolate. Perianth purple-red to pale purple-red; segments with red midvein; outer ones ovate to narrowly so, 6–8.5 × 2.5–3 mm; inner ones oblong-ovate, slightly longer than outer ones. Filaments equal, slightly shorter than perianth segments, connate at base for 1/3–1/2 their length, adnate to perianth segments for 1/3–1/2 of connate part; outer ones subulate; inner ones broadened at base, 1-toothed on each side. Ovary ovoid, without concave nectaries at base. Style longer than ovary, exserted. Fl. and fr. Jun–Aug.

• Sunny and dry slopes. Gansu, Ningxia, Qinghai.

55. Allium polyrhizum Turczaninow ex Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 162. 1875.

碱韭 jian jiu

Allium polyrhizum var. *przewalskii* Regel.

Bulbs densely clustered, cylindric, 0.5–1 cm in diam.; tunic yellowish brown to dark chestnut brown, subreticulate to reticulate. Leaves shorter than scape, 0.3–1 mm wide, semiterete, scabrous-denticulate or rarely smooth on margin. Scape 7–30 cm, terete, covered with leaf sheaths only at base. Spathe 2- or 3-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels 1–2 × as long as perianth, bracteolate or rarely ebracteolate. Perianth purple-red to pale purple-red, rarely white; segments with red midvein; outer ones ovate to narrowly so, 3–5 × 1.5– 2.5 mm; inner ones oblong-ovate, 4–6 × 1.5–2 mm. Filaments equal, equaling or slightly longer than perianth segments, connate at base for 1/6–1/3 their length, adnate to perianth segments for 1/3–1/2 of connate part; outer ones subulate; inner ones broadened at base, 1-toothed on each side. Ovary ovoid, without concave nectaries at base. Style longer than ovary, exserted. Fl. and fr. Jun–Aug. 2*n* = 32*.

Sunny slopes, pastures, saline-alkaline soils, gravelly places, desert steppes; 1000–3700 m. Gansu, N Hebei, W Heilongjiang, W Jilin, N Liaoning, Nei Mongol, N Ningxia, Qinghai, N Shaanxi, N Shanxi, Xinjiang [Kazakstan, Mongolia, Russia].

56. Allium bidentatum Fischer ex Prokhanov & Ikonnikov-Galitzky, Mater. Comm. Étude Republ. Mongol. Tannou-Touva 2: 83. 1929.

砂韭 sha jiu

Allium bidentatum var. *andaense* Q. S. Sun; *A. edentatum* Y. P. Hsu; *A. omiostema* Airy Shaw; *A. polyrhizum* Turczaninow ex Regel var. *potaninii* Regel.

Bulbs usually densely clustered, cylindric, sometimes slightly thickened at base, 0.3–0.4 cm in diam.; tunic brown to grayish brown, thinly leathery, laciniate, apex sometimes fibrous. Leaves shorter than scape (usually ca. 1/2 as long), 1–1.5 mm wide, semiterete. Scape 10–30 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels 1(–1.5) × as long as perianth, ebracteolate. Perianth red to pale purple-red; outer segments oblong-ovate to ovate, 4–5.5 × 1.5–2.8 mm; inner ones narrowly oblong to oblong-elliptic, 5–6.5 × 1.5–3 mm, apex subtruncate, usually irregularly denticulate. Filaments equal, slightly shorter than perianth segments, connate at base and adnate to perianth segments for 0.6–1 mm; outer ones subulate; inner ones ovate-oblong for ca. 4/5 their length, with 1 obtuse tooth on each side, rarely entire. Ovary ovoid-globose, minutely or inconspicuously tuberculate, without concave nectaries. Style not exserted. Fl. and fr. Jul–Sep. 2*n* = 32*.

Sunny slopes, pastures, meadows, saline places; 600–2000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, NE Xinjiang [Kazakstan, Mongolia, Russia].

57. Allium dentigerum Prokhanov, Izv. Glavn. Bot. Sada SSSR 29: 563. 1930.

短齿韭 duan chi jiu

Bulbs clustered, cylindric, slightly thickened at base, 0.3–0.6 cm in diam.; tunic grayish white, sometimes slightly tinged with red, papery, laciniate, apex sometimes fibrous. Leaves ca. 1/2 as long as scape, 0.5–1 mm wide, semiterete. Scape 15–35 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, 2–3 × as long as perianth, ebracteolate. Perianth purple-red; outer segments ovate, 3–3.5 × 1.8 mm; inner ones ovate-oblong, 3.8–4.2 × 1.8–2.2 mm, apex obtuse, usually irregularly denticulate. Filaments equal, slightly shorter than to equaling perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadly ovate at base, with 1 obtuse tooth on each side, rarely entire. Ovary ovoid-globose, minutely tuberculate, without concave nectaries at base. Style slightly longer than ovary, not exserted. Fl. Aug.

• Slopes, pastures, sandy soils; 1500–2500 m. Gansu, NW Shaanxi.

58. Allium tenuissimum Linnaeus, Sp. Pl. 1: 301. 1753.

细叶韭 xi ye jiu

Allium tenuissimum var. *nalinicum* Shan Chen.

Bulbs clustered, subcylindric; tunic grayish violet or grayish brown to blackish brown, membranous, apex splitting; inner layers usually pinkish lilac. Leaves shorter than scape, 0.5–1 (–2) mm wide, semiterete to subterete, smooth, rarely scabrous along ribs and at margin. Scape 10–35(–50) cm, terete, finely angled, smooth, covered with leaf sheaths for ca. 1/4 its length. Umbel hemispheric to fascicled, laxly flowered. Pedicels subequal, 1.5–3 × as long as perianth, smooth, rarely scabrous along angles, ebracteolate. Perianth white or pinkish white, rarely purple-red; segments with dark purple, fine midvein; outer ones ovate-oblong to broadly so, 2.8–4 × 1.5–2 mm, apex obtuse; inner ones obovate-oblong, 3–4.2 × 1.8–2.7 mm, apex truncate to truncate-obtuse. Filaments ca. 2/3 as long as perianth segments, connate at base and adnate to perianth segments; outer ones ± subulate; inner ones with basal ca. 2/3 broadened, ovate-orbicular, entire. Ovary subglobose, without concave nectaries at base. Style not exerted. Fl. and fr. Jul–Sep. 2*n* = 16*.

Slopes, pastures, sandy places; near sea level to 2000 m. Gansu, Hebei, Heilongjiang, Henan, N and S Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, N Xinjiang (Altay Shan), Zhejiang [Kazakstan, Mongolia, Russia].

Allium tenuissimum differs in only a few characters from *A. elegantulum*, which was treated as a synonym of the former in FRPS.

59. Allium elegantulum Kitagawa in Nakai et al., Rep. Exped. Manchoukuo Sect. 4, 2: 98. 1935.

雅韭 ya jiu

Bulbs clustered, cylindric, 0.3–0.5 cm wide; tunic whitish yellow or yellowish brown to dark gray, membranous, laciniate. Leaves subulate to narrowly linear, (1–)3–4 mm wide, semiterete, margin smooth. Scape 10–16(–20) cm × (0.5–)1–1.5 mm, terete, smooth, covered with leaf sheaths only at base. Umbel hemispheric to globose, densely many flowered. Pedicels 1–1.5 × as long as perianth, ebracteolate. Perianth white to pinkish white; segments with red midvein; outer ones elliptic to ovate, ca. 3 × 1.8–2 mm; inner ones obovate, 3.5–4 × 1.8–2 mm, apex truncate, sometimes obscurely denticulate.

Filaments shorter than perianth segments, connate at base; outer ones ± subulate; inner ones subulate from obovate base. Ovary subglobose. Style short; stigma punctiform. Fl. Jul–Aug.

• Sandy or stony places, cliffs. Liaoning.

60. Allium anisopodium Ledebour, Fl. Ross. 4: 183. 1852.

矮韭 ai jiu

Bulbs clustered, subcylindric; tunic violet-brown, or blackish brown to grayish brown, membranous, irregularly splitting, apex sometimes subfibrous. Leaves subequaling scape, 1–2(–4) mm wide, smooth or scabrous along angles. Scape (20–)30–50(–65) cm, terete, finely angled, smooth or scabrous, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel subfascicled, laxly flowered. Pedicels unequal, especially in fruit, 1.5–3.5 cm, smooth or scabrous angled, ebracteolate. Perianth pale purple to purple-red; outer segments ovate-oblong to broadly so, 4–5 × 2–3 mm, apex obtuse; inner ones obovate-oblong, 4–5 × 2.2–3.2 mm, apex truncate to obtuse-truncate. Filaments ca. 2/3 as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate, sometimes slightly broadened at base, slightly shorter than inner; inner ones ovate-orbicular for ca. 2/3 their length, rarely with 1 small tooth on each side. Ovary ovoid-globose, without concave nectaries at base. Style not exserted. Fl. and fr. Jul–Sep.

Slopes, pastures, sandy places; near sea level to 2200 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, N Xinjiang [Kazakstan, Korea, Mongolia, Russia].

1a. Leaves and pedicels smooth, rarely scabrous; scape smooth ..... 60a. var. *anisopodium*

1b. Leaves, scape, and pedicels scabrous along angles ..... 60b. var. *zimmermannianum*

60a. Allium anisopodium var. **anisopodium**

矮韭(原变种) ai jiu (yuan bian zhong)

Allium tchefouense Debeaux; *A. tenuissimum* Linnaeus var. *purpureum* Regel.

Leaves and pedicels smooth, rarely scabrous. Scape smooth. 2*n* = 16*, 32*.

Slopes, pastures, sandy places; near sea level to 1300 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong, N Xinjiang [Kazakstan, Korea, Mongolia, Russia].

60b. Allium anisopodium var. **zimmermannianum** (Gilg) F. T. Wang & Tang, Contr. Inst. Bot. Natl. Acad. Peiping 2(8): 260. 1934.

糙葶韭 cao ting jiu

Allium zimmermannianum Gilg, Bot. Jahrb. Syst. 34 (Beibl. 75): 23. 1904; *A. tenuissimum* Linnaeus f. *zimmermannianum* (Gilg) Q. S. Sun.

Leaves, scape, and pedicels scabrous along angles. Fl. and fr. Jun–Sep. 2*n* = 16*, 32*.

• Slopes, pastures, sandy places; near sea level to 2200 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi.

61. Allium weschniakowii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 531. 1880.

坛丝韭 tan si jiu

Bulbs clustered, cylindric, 0.3–0.5 cm in diam.; tunic dirty gray, sometimes tinged with brown, membranous, ± entire. Leaves 3 or 4, slender, shorter than scape, 0.5–1 mm wide, semiterete, adaxially channeled. Scape 9–16 cm, slender, terete, finely angled, covered with leaf sheaths only at base. Spathe 1- or 2-valved, persistent. Umbel laxly few flowered. Pedicels subequal, 1.5–2 × as long as perianth, ebracteolate. Perianth pale red to pinkish lilac; segments with dark violet midvein; outer ones ovate-elliptic, 5–6 × 2–2.5 mm; inner ones oblong-elliptic, 6–7 × 2–2.5 mm. Filaments urceolate, 2/3–3/4 as long as perianth segments, connate for 3/4–4/5 their length, basally adnate to perianth segments; outer ones subulate, free part shorter than that of inner ones; inner ones adnate to perianth segments for nearly 1/2 their length, free part narrowly triangular or shoulder-shaped, sometimes 1-toothed on each side. Ovary ellipsoid to ovoid-globose, without concave nectaries. Style not exserted. Fl. Aug.

Dry slopes, gravelly places. NW Xinjiang [Kazakstan, Kyrgyzstan].

62. Allium prostratum Treviranus, Allii Sp. 16. 1822.

蒙古野韭 meng gu ye jiu

Allium congestum G. Don; *A. declinatum* Willdenow; *A. deflexum* Fischer ex Schultes & J. H. Schultes; *A. fischeri* Besser ex Schultes & J. H. Schultes; *A. satoanum* Kitagawa.

Bulb solitary or paired, subcylindric, 0.5–1 cm in diam., attached to a horizontal, robust rhizome; tunic light brown, sometimes tinged with black, subleathery, apex usually entire, sometimes laciniate. Leaves shorter than scape, 0.7–1.5 mm wide, semiterete, adaxially channeled, margin scabrous. Scape 10–25 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel hemispheric. Pedicels subequal, 2–3 × as long as perianth, bracteolate or ebracteolate. Perianth pale purple to purple-red; outer segments ovate, 3.2–5 × 1.8–2.9 mm; inner ones oblong to oblong-ovate, 4–5.5 × 2.2–3.2 mm, apex obtuse, distal margin and apex irregularly crenulate. Filaments equal, equaling to slightly longer than perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular-subulate, 2–3 × as wide as outer ones. Ovary obovoid, minutely tuberculate, without concave nectaries at base. Style exserted. Fl. and fr. Jul–Aug.

Stony slopes, steppes. N Nei Mongol (Hulun Buir, Manzhouli Shi), N Xinjiang (Tacheng Xian, Toli Xian) [Mongolia, Russia].

63. Allium rubens Schrader ex Willdenow, Enum. Pl. 1: 360. 1809.

红花韭 hong hua jiu

Bulbs clustered, narrowly conical, 0.5–1 cm in diam., attached to a horizontal rhizome; tunic light brown, subleathery, subentire. Leaves subequaling scape, 1–1.5(–2) mm wide,

adaxially channeled, margin ± scabrous. Scape 10–25 cm, terete, slightly angled, covered with leaf sheaths only at base. Spathe persistent. Umbel hemispheric to globose, few flowered. Pedicels equal, 2(–3) × as long as perianth, ebracteolate. Perianth purple-red; segments with conspicuous midvein, broadly elliptic to ovate, (4–)5 mm, apex obtuse; outer ones boat-shaped; inner ones slightly longer than outer. Filaments subulate, subequal, 1–2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary subglobose, without concave nectaries at base. Style not exserted. Fl. and fr. Jun–Aug. 2*n* = 16.

Scrub, stony slopes, steppes. NW Xinjiang (Toli Xian) [Kazakstan, Mongolia, Russia].

64. Allium brevidentatum F. Z. Li, Bull. Bot. Res., Harbin 6(1): 170. 1986.

矮齿韭 ai chi jiu

Bulb usually solitary, cylindric; tunic brown, pale brown inside, usually irregularly splitting at apex. Leaves linear, longer than scape, 2–3 mm wide, flat. Scape 20–30 cm, terete, finely angled near apex. Spathe 2-valved, persistent. Umbel laxly flowered. Pedicels subequal, ca. 2 × as long as perianth, ebracteolate. Perianth pale yellowish green; outer segments oblong, boat-shaped, ca. 5 mm; inner ones oblong, ca. 5.5 mm. Filaments equal, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side. Ovary ovoid, with concave nectaries covered by hoodlike projections at base. Style exserted, ca. 4 mm. Fl. Jul.

• Sunny slopes. C Shandong (Tai Shan).

65. Allium taishanense J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 285. 1980.

泰山韭 tai shan jiu

Bulb solitary or clustered, subcylindric, ca. 0.5 cm in diam., attached to an oblique, stout rhizome; tunic grayish black, membranous, entire. Leaves broadly linear, shorter than to subequaling scape, 7–10 mm wide, attenuate at both ends, abaxially 1-angled, scabrous-denticulate along angle and margin. Scape 22–27 cm, 2-angled, scabrous-denticulate along angles, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel nearly hemispheric, many flowered. Pedicels subequal, 2–3 × as long as perianth, ebracteolate. Perianth pale red to white; segments ovate-oblong; outer ones 3.2–3.8 × 1.7–1.9 mm; inner ones 3.7–4.6 × 2.2–2.5 mm. Filaments equal, slightly longer than perianth segments, connate at base and adnate to perianth segments for ca. 0.6 mm; outer ones ca. 1/2 as wide at base as inner; inner ones with a broadened, triangular base. Ovary obovoid-globose, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. Sep.

• Slopes; 300–600 m. C Shandong (Tai Shan).

66. Allium chiwui F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 294. 1937.

冀韭 ji jiu

Bulb solitary or clustered, subcylindric, 0.7–1.3 cm in diam., attached to a horizontal, stout rhizome; tunic grayish black, sometimes tinged with purple, membranous, entire. Leaves linear, shorter than to subequaling scape, 2–5 mm wide, flat, smooth, apex obtuse. Scape 13–30 cm, terete, 2-angled, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels subequaling perianth, ebracteolate. Perianth white to yellow; outer segments ovate, boat-shaped, 4–6 × 2–2.5 mm; inner ones ovate-oblong, 4.5–7 × 2.2–2.9 mm. Filaments equal, equaling to slightly longer than perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones triangular. Ovary obovoid-globose, without concave nectaries at base. Style longer than ovary, exserted. Fl. Jul.

• Slopes; 2100–2500 m. WC Hebei (Huailai Xian, Xiaowutai Shan).

67. Allium spurium G. Don, Mem. Wern. Nat. Hist. Soc. 6: 59. 1827.

岩韭 yan jiu

Allium dauricum Frizen; *A. saxicola* Kitagawa.

Bulb solitary or paired, cylindric to conical-cylindric, 0.5–1.5 cm in diam., attached to a subterranean, normally not thick rhizome; tunic whitish gray, membranous, apex splitting. Leaves narrowly linear, straight, shorter or longer than scape, (1.5–)2–4 mm wide, flat to convex-flat, fleshy, margin minutely scabrous, apex acute to gradually attenuate, truncate. Scape (20–)30–40 cm, terete, not angled, wingless, covered with leaf sheaths only at base. Spathe 2-valved, usually caducous, apex acuminate. Umbel laxly hemispheric, many flowered. Pedicels (2–)3–4 × as long as perianth, usually ebracteolate. Perianth whitish pink or rose pink to pink-lilac, lustrous; segments with red, fine midvein or without midvein, narrowly elliptic or oblong-elliptic, 4.5–5.5(–6) × 1.5–2 mm, apex truncate to acute; outer ones boat-shaped. Filaments subulate, subequal, slightly longer than perianth segments, connate at base and adnate to perianth segments; inner ones wider than outer. Ovary ovoid, without concave nectaries. Style exserted. Fl. Jul–Jug. 2*n* = 32.

Saline meadows, steppes, sandy places, sometimes stony places and cliffs. Hebei, Heilongjiang, Jilin, Liaoning, E Nei Mongol [Mongolia, Russia].

Allium spurium, *A. spirale*, and *A. senescens* are closely related taxa, and have been united under the name *A. senescens* in treatments in other floras, e.g., FRPS and Fl. URSS.

68. Allium spirale Willdenow, Enum. Pl., Suppl. 17. 1814.

扭叶韭 niu ye jiu

Allium austrosibiricum Frizen; *A. burjaticum* Frizen; *A. glaucum* Schrader ex Poiret.

Bulbs clustered, conical-cylindric, 0.5–1.5 cm in diam., attached to a subterranean, horizontal rhizome; tunic grayish white to yellowish brown or pale lilac-gray, membranous or scarious, usually entire. Leaves linear, spirally tortuous, shorter than scape, 4–6 mm wide, flat, main veins and margins minutely scabrous-denticulate, rarely smooth, apex obtuse. Scape (15–)20–40 cm, terete, subangular, narrowly 2-winged beneath

umbel, covered with leaf sheaths only at base. Spathe 2-valved, persistent, apex acuminate. Umbel usually hemispheric, many flowered. Pedicels 1.5–2 × as long as perianth, ebracteolate or a few with a small bracteoles. Perianth pink to pale red; segments with dark red midvein, oblong ovate, 3.5–5.5 × 2–2.5 mm, apex obtuse, sometimes with unequal, very small denticles; outer ones boat-shaped, shorter than inner. Filaments subequal, usually subequaling to slightly longer than perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular. Ovary broadly ovoid, without concave nectaries. Style exserted. Fl. Jul–Aug. 2*n* = 16, 32.

Dry slopes, steppes, stony and gravelly places, sands and loess. Gansu, Hebei, Heilongjiang, N Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [N Korea, Mongolia, Russia].

69. Allium senescens Linnaeus, Sp. Pl. 1: 299. 1753.

山韭 shan jiu

Allium baicalense Willdenow; *A. senescens* f. *albiflorum* Q. S. Sun.

Bulb solitary or paired, ovate-cylindric or conical, 1–2 cm in diam., attached to a horizontal or oblique rhizome, sometimes developed above ground; outer tunic usually blackish gray or black, scarious, entire or slightly splitting. Leaves spirally arranged, never distichous, broadly linear, sometimes slightly falcate, shorter than scape, 7–10(–12) mm wide, flat, thick, smooth or minutely scabrous, apex obtuse. Scape (25–) 30–60 cm, 2-angled or narrowly 2-winged, covered with leaf sheaths only at base. Spathe 2-valved, persistent, apex acuminate. Umbel hemispheric to globose, many flowered. Pedicels equal, 2–3 × as long as perianth, a few bracteolate. Perianth pink to pale red, later becoming whitish; segments subovate, 4–6(–7) × 2–2.5 mm, apex obtuse, sometimes minutely denticulate; outer ones boat-shaped. Filaments subequal, to 1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular. Ovary globose, without concave nectaries. Style long exserted. Fl. Jul–Aug. 2*n* = 16*, 32*, (40), 48.

Forests, dry stony slopes, steppes, saline meadows, gravelly places; 500–800 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, N Xinjiang [Korea, Mongolia, Russia].

70. Allium nutans Linnaeus, Sp. Pl. 1: 299. 1753.

齿丝山韭 chi si shan jiu

Bulb solitary or paired, narrowly cylindric to subconical, 1.5–2 cm in diam., attached to a horizontal or oblique, stout rhizome; tunic blackish, membranous, ± entire. Leaves broadly linear, subfalcate, ca. 1/2 as long as scape, 6–10(–15) mm wide, flat, thick, smooth, apex obtuse. Scape 30–60 cm, 2-angled, narrowly 2-winged, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, 2–3 × as long as perianth, bracteolate. Perianth pale red to pale purple; outer segments narrowly ovate, boat-shaped, 4.5–5.5 × 1.5–2 mm; inner ones ovate, 5–6.5 × 2.2–3 mm, apex obtuse. Filaments subequal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base for 2.5–3 mm, 1-toothed on each side. Ovary oblong-globose, without concave nectaries at base. Style exserted. Fl. and fr. Jun–Aug. 2*n* = 16, 17, 24, 28, 32*, 44, 48*, 56, 64*, 72*.

Meadows, damp places. N Xinjiang (Altay Shan) [Kazakstan, Mongolia, Russia].

71. Allium obliquum Linnaeus, Sp. Pl. 1: 296. 1753.

高葶韭 gao ting jiu

Bulb solitary, ovoid-cylindric, 2–3 cm in diam.; tunic pale brown to brown, hard, leathery, entire. Leaves broadly linear, shorter than scape, 5–20 mm wide, gradually attenuate toward apex. Scape 60–100 cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 1- or 2-valved, persistent; beak short. Umbel globose, densely many flowered. Pedicels subequal, 2–4 × as long as perianth, bracteolate. Perianth pale yellow to greenish yellow; outer segments oblong to oblong-ovate, 4–5 × 1.5–2 mm; inner ones ovate, 4.5–5.5 × 2–2.5 mm. Filaments subulate, equal, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary ovoid, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Jun–Jul. 2*n* = 16.

Forests, meadows. NW Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia; E Europe].

72. Allium hymenorhizum Ledebour, Fl. Altaic. 2: 12. 1830.

北疆韭 bei jiang jiu

Bulb solitary or clustered, subcylindric, ca. 1.5 cm in diam.; tunic red-brown, lustrous, leathery, splitting. Leaves linear, shorter than scape, 2–6 mm wide, flat, smooth. Scape 30–90 cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 1-valved, persistent or deciduous. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, 1.5–2 × as long as perianth, ebracteolate. Perianth pale red to purple-red; outer segments lanceolate to elliptic-lanceolate, 4–4.5 × 1.1–1.2 mm; inner ones narrowly oblong-elliptic, 4.6–5.5 × 1.3–1.6 mm. Filaments subulate, 1.25–1.5 × as long as perianth segments, connate at base and adnate to perianth segments; inner ones entire or 1-toothed on each side at base. Ovary obovoid to subglobose, with concave nectaries at base. Style exserted. Fl. Aug.

Meadows, dry pastures, high plains, mountain slopes; 1100–2700 m. N and W Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].

1a. Inner filaments entire ..... 72a. var. *hymenorhizum*
1b. Inner filaments 1-toothed on each side at base ..... 72b. var. *dentatum*

72a. Allium hymenorhizum var. **hymenorhizum**

北疆韭(原变种) bei jiang jiu (yuan bian zhong)

Allium macrorrhizum Boissier (1854), not *A. macrorhizon* Regel (1875).

Inner filaments entire. Fl. Aug.

Meadows, high plains, mountain slopes; 1100–2700 m. N Xin-

jiang [Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].

72b. Allium hymenorhizum var. **dentatum** J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 285. 1980.

旱生韭 han sheng jiu

Inner filaments 1-toothed on each side at base. Fl. Aug.

• Dry pastures, plains; 1100–1700 m. N and W Xinjiang (Fuyun Xian, Zhaosu Xian).

73. Allium kaschianum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 338. 1887.

草地韭 cao di jiu

Bulbs clustered, cylindric, 0.5–1(–1.5) cm in diam.; tunic brown, thinly leathery, usually laciniate. Leaves narrowly linear, slightly shorter to longer than scape, 1–1.5(–3) mm wide, scabrous-denticulate at margin. Scape 15–40 cm, terete, covered with leaf sheaths for 1/4–1/2 its length. Spathe 1- or 2-valved, persistent. Umbel hemispheric to globose, usually densely many flowered. Pedicels subequal, shorter than to equaling perianth, ebracteolate. Perianth pale purple; segments narrowly oblong to narrowly obovate-oblong, 3–5 × 1–1.8 mm, apex obtuse or retuse; inner ones slightly longer than outer. Filaments equal, subulate, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary globose, without concave nectaries at base. Style much longer than ovary, exserted. Fl. and fr. Jul–Sep.

Meadows, gravelly plains, slopes; 2400–3000 m. NW Xinjiang [Kazakstan, Kyrgyzstan].

74. Allium carolinianum Redouté, Liliac. 2: t. 101. 1804.

镰叶韭 lian ye jiu

Allium aitchisonii Baker (1882), not Regel (1879); *A. obtusifolium* Klotzsch; *A. platyspathum* Schrenk var. *falcatum* Regel; *A. platystylum* Regel; *A. polyphyllum* Karelin & Kirilov; *A. thomsonii* Baker.

Bulbs usually paired, ovoid to ovoid-cylindric, 1–2.5 cm in diam.; tunic brown to yellowish brown, leathery, apex separated, usually fibrous. Leaves broadly linear, usually falcate, shorter than scape, (3–)5–15 mm wide, flat, smooth, apex obtuse. Scape 20–40(–60) cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, slightly shorter than to 2 × as long as perianth, bracteolate or ebracteolate. Perianth pale red to purple-red or white; segments oblong to narrowly so, (4.5–)6–8(–9.4) × 1.5–3 mm, apex obtuse, sometimes retuse; inner ones subequaling to slightly longer than outer. Filaments subulate, slightly shorter than than to 2 × as long as perianth segments, connate at base and adnate to perianth segments for ca. 1 mm; inner ones wider than outer at base. Ovary subglobose, with concave nectaries at base. Style exserted. Fl. and fr. Jun–Sep. 2*n* = 32.

Gravelly or stony slopes; 3000–5000 m. Xinjiang, N and W Xizang [Afghanistan, ?Bhutan, India, Kazakstan, Kyrgyzstan, W Nepal, Pakistan, Tajikistan, Uzbekistan].

75. Allium blandum Wallich, Pl. Asiat. Rar. 3: 38. 1832.

白韭 bai jiu

Bulb usually solitary, rarely paired, narrowly ovoid, 1.5–2 cm in diam.; tunic brown, leathery, usually entire. Leaves broadly linear, shorter than scape, (5–)7–10 mm wide, flat, smooth, apex obtuse or gradually attenuate to obtuse tip. Scape 25–30 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, membranous, persistent; beak very short. Umbel globose, densely many flowered. Pedicels subequal, usually subequaling perianth, ebracteolate or a few bracteolate. Perianth pinkish red; segments oblong, 5.5–7 mm, apex obtuse. Filaments subulate, equal, ca. 2 × as long as perianth segments, not connate but slightly adnate to base of perianth segments; inner ones not broadened at base. Ovary subglobose, with concave nectaries at base. Style exserted. Fl. and fr. Jul–Aug.

Moist slopes in high mountains; 3500–5000 m. NW Xinjiang [Afghanistan, India, Pakistan, Tajikistan].

76. Allium phariense Rendle, J. Bot. 44: 42. 1906.

帕里韭 pa li jiu

Bulb solitary or in clusters of 2 or 3, narrowly ovoid, 0.7–1.5 cm in diam.; tunic grayish black, membranous or papery, entire or apex separated. Leaves linear, falcate, equaling to slightly longer than scape, rarely shorter, 2–5(–7) mm wide, flat. Scape usually nodding distally, 6–15 cm, terete, covered with leaf sheaths only at base. Spathe 1- or 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, 1.5–2 × as long as perianth, ebracteolate. Perianth white; segments with purple midvein when dried, narrowly ovate to obovate-oblong, 4.5–6 × 2–2.5 mm; inner ones sometimes slightly longer and narrower than outer, apex obtuse, sometimes slightly retuse. Filaments subulate, equal, 1.25–1.5 as long as perianth segments, connate at base and adnate to perianth segments for ca. 1 mm. Ovary subglobose, without concave nectaries at base. Style exserted. Fl. and fr. Jul–Aug.

Meadows, gravelly slopes; 4400–5200 m. NW Sichuan (Dêgê Xian), S Xizang [Bhutan].

77. Allium platyspathum Schrenk, Enum. Pl. Nov. 1: 7. 1841.

宽苞韭 kuan bao jiu

Bulb solitary or rarely paired, cylindric to ovoid-cylindric, 1–2 cm in diam.; tunic blackish gray to black, thinly papery, decaying quickly; inner layers grayish lilac or light pinkish white, membranous. Leaves broadly linear, shorter to slightly longer than scape, 2–17 mm wide, flat, apex obtuse or gradually acute. Scape 10–60(–100) cm, terete, covered with leaf sheaths only at base or for 1/3–1/2 its length. Spathe 2-valved, persistent; beak very short. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, equaling to 2 × as long as perianth, ebracteolate. Perianth pink or pinkish lilac; segments lanceolate to linear-lanceolate, 6–8 × 1.5–2 mm; inner ones slightly longer than outer. Filaments 1–1.5 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary subglobose, with concave nectaries at base. Style exserted. Fl. and fr. Jun–Aug. 2*n* = 16.

Forest margins, subalpine or alpine meadows, stony slopes, river

shores; 1900–3700 m. Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan].

1a. Scape to 25 cm, covered with leaf sheaths only at base; leaves 2–7 mm wide; perianth pinkish lilac, segments (5–)6–8 mm ..... 77a. subsp. *platyspathum*

1b. Scape (35–)40–70(–100) cm, covered with leaf sheaths for 1/3–1/2 its length; leaves 10–17 mm wide; perianth rose pink, segments 7–8 mm ..... 77b. subsp. *amblyophyllum*

77a. Allium platyspathum subsp. **platyspathum**

宽苞韭(原亚种) kuan bao jiu (yuan ya zhong)

Leaves 2–7 mm wide. Scape to 25 cm, covered with leaf sheaths only at base. Perianth pinkish lilac; segments (5–)6–8 mm. Fl. Jul–Aug.

Alpine meadows, stony slopes; 2700–3700 m. Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan].

77b. Allium platyspathum subsp. **amblyophyllum** (Karelin & Kirilov) Frizen in Malyschev & Peschkova, Fl. Sibir. 4: 81. 1987.

钝叶韭 dun ye jiu

Allium amblyophyllum Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 510. 1842; *A. alataviense* Regel.

Leaves 10–17 mm wide. Scape (35–)40–70(–100) cm, covered with leaf sheaths for 1/3–1/2 its length. Perianth rose pink; segments 7–8 mm. Fl. Jun–Jul.

Forest margins, subalpine meadows, river shores; 1900–2500 m. Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia].

78. Allium rude J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 286. 1980.

野黄韭 ye huang jiu

Bulb solitary, cylindric, sometimes narrowly ovoid-cylindric, 0.5–1(–1.5) cm in diam.; tunic brown to pale brown, thinly leathery, splitting. Leaves linear, sometimes slightly falcate, shorter than to subequaling scape, 3–10 mm wide, flat. Scape 20–70 cm, terete, covered with leaf sheaths only at base. Spathe 2- or 3-valved, persistent. Umbel globose, densely many flowered. Pedicels 1–1.5 × as long as perianth, ebracteolate. Perianth pale yellow to greenish yellow; segments oblong-elliptic to oblong-ovate, 5–6 × 2–2.5(–3) mm; inner ones sometimes slightly longer than outer. Filaments subulate, equal, 1.25–1.35 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary ovoid to ovoid-globose, with concave nectaries covered by short, hoodlike projections at base. Style exserted. Fl. and fr. Jul–Sep.

• Damp slopes, meadows; 2700–5000 m. S Gansu, SE Qinghai, W Sichuan, E Xizang.

79. Allium chrysocephalum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 335. 1887.

折被韭 zhe bei jiu

Bulb solitary, cylindric, sometimes thickened at base, 0.5–1 cm in diam.; tunic pale brown to brown, thinly leathery, apex laciniate. Leaves linear to broadly so, slightly falcate, usually ca. 1/2 as long as or rarely subequaling scape, 3–10 mm wide, flat. Scape 5–25 cm, terete, covered with leaf sheaths only at base. Spathe 2- or 3-valved, persistent. Umbel hemispheric to globose, densely many flowered. Pedicels subequaling to slightly longer than perianth, ebracteolate. Perianth bright yellow; outer segments oblong-ovate, boat-shaped, 5.5–6.5 × 2.2–3 mm; inner ones oblong-lanceolate, 7–8 × 2–2.7 mm, apex recurved. Filaments subulate, ca. 2/3 as long as inner perianth segments, connate at base and adnate to perianth segments for ca. 1 mm. Ovary ovoid to ovoid-globose, with concave nectaries at base. Style not exserted. Fl. and fr. Jul–Sep.

• Damp slopes, meadows; 3400–4800 m. Gansu, Qinghai, NW Sichuan.

80. Allium herderianum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 324. 1887.

金头韭 jin tou jiu

Bulb solitary, ovoid-globose to ovoid, 1–1.5 cm in diam.; tunic grayish brown, thinly leathery, apex splitting or laciniate. Leaves subequaling scape, 2–4 mm wide. Scape (12–)20–40 cm, terete, covered with leaf sheaths only at base. Spathe 2- or 3-valved, persistent. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, equaling to slightly longer than perianth, ebracteolate. Perianth pale to bright yellow; outer segments oblong-ovate, boat-shaped, 5–6 × 2.5–3 mm; inner ones oblong-lanceolate, 7–8 × 2–2.5 mm, apex recurved. Filaments subulate, 1/2–2/3 as long as inner perianth segments, connate at base and adnate to perianth segments for ca. 1 mm. Ovary ovoid, with concave nectaries at base. Style not exserted. Fl. and fr. Jul–Sep.

• Sunny slopes, dry plains; 2900–3900 m. Gansu, Qinghai.

81. Allium saxatile Marschall von Bieberstein, Tabl. Prov. Mer. Casp. 114. 1798.

长喙韭 chang hui jiu

Allium caucasicum Marschall von Bieberstein; *A. dshungaricum* Vvedensky; *A. globosum* Marschall von Bieberstein ex Redouté; *A. gmelinianum* Misczenko ex Grossheim; *A. stevenii* Ledebour.

Bulbs usually clustered, ovoid-cylindric, 0.7–1.5 cm in diam.; tunic brown to red-brown, leathery, entire or splitting. Leaves shorter than scape, 0.5–1.5 mm wide, semiterete, adaxially channeled, smooth, sometimes scabrous-denticulate along angles. Scape 20–60 cm, terete, solid, smooth, covered with leaf sheaths for ca. 1/3 its length; outermost leaf sheath usually scabrous. Spathe 1- or 2-valved, persistent; beak ca. 2 × as long as limb, sometimes to 6 cm. Umbel globose, densely many flowered. Pedicels subequal, 1.5–2(–4) × as long as perianth, elongate in fruit, bracteolate. Perianth purple-red to pale red, rarely white; segments with darker midvein, oblong-ovate, 4–5 × 2–2.5 mm, apex shortly pointed; inner ones slightly longer than outer. Filaments subulate, equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments.

Ovary subglobose, with concave nectaries at base. Style exserted. Fl. and fr. Jul–Sep. 2*n* = 16, 32.

Dry slopes; 1100–3100 m. Xinjiang (Altay Shan, Tarbagatay Shan, Tian Shan) [Kazakstan, Russia; C Europe].

82. Allium kurssanovii M. Popov, Bjull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., 47: 85. 1938.

条叶长喙韭 tiao ye chang hui jiu

Allium pseudoglobosum M. Popov ex Gamajunova.

Bulbs clustered, cylindric to cylindric-ovoid, very long, 10–15 × 2–3 cm; tunic dark brown, hard, leathery, entire or splitting. Leaves linear, slightly shorter or longer than scape, 3–4 mm wide, flat, margin smooth, rarely scabrous. Scape 50–70(–90) cm, terete, smooth, covered with leaf sheaths for ca. 1/2 its length. Spathe 2-valved, persistent; beak ca. 2 × as long as limb. Umbel globose, 2–3 cm in diam., many flowered. Pedicels equal, to 2 × as long as perianth, bracteolate. Perianth pink-lilac to dark violet-red; segments with dark purple midvein, oblong-ovate, 3.5–4 mm, apex acute; inner ones ovate, apex truncate. Filaments subulate, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary conical-subglobose. Style exserted.

Stony slopes, cliffs; 2200–2700 m. W Xinjiang (Tian Shan) [Kazakstan, Kyrgyzstan].

83. Allium caricoides Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 532. 1880.

石生韭 shi sheng jiu

Allium hoeitzeri Regel.

Bulbs clustered, cylindric, 0.5–1 cm in diam.; tunic brown, leathery, apex entire or laciniate. Leaves 3 or 4, subequaling scape, 0.5–1(–1.5) mm wide, semiterete or subterete, adaxially channeled, margin ciliate-denticulate or scabrous-denticulate. Scape 5–20 cm, slender, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel hemispheric, densely flowered. Pedicels subequal, 0.5–1 × as long as perianth, bracteolate. Perianth pale red to pale purple; segments oblong to ovate, 3.5–5.8 × 1.5–2.5 mm, apex usually shortly pointed; inner ones slightly longer than outer. Filaments subulate, equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary obovoid to subglobose, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Jul–Aug.

Gravelly slopes, rock crevices; 1800–3300 m. Xinjiang (Tian Shan) [Kazakstan, Kyrgyzstan].

84. Allium petraeum Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 512. 1842.

石坡韭 shi po jiu

Bulbs clustered, narrowly conical to subcylindric, 0.8–1.5 cm in diam.; tunic grayish or yellowish white, thinly leathery to subpapery, splitting; inner layers pinkish lilac. Leaves slightly shorter than scape, 0.5–1 mm wide, semiterete, adaxially channeled, usually smooth. Scape (20–)30–50 cm, terete, smooth or scabrous, covered with leaf sheaths for 1/4–1/3 its length. Spathe persistent; beak 2–4 × as long as limb. Umbel globose, densely many flowered. Pedicels equal, ca. 1.5 × as long as perianth, bracteolate. Perianth pale to lemon yellow; segments with green or greenish pink midvein, oblong-ovate, ca. 4 mm, apex acute; inner ones slightly longer than outer. Filaments subulate, equal, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary subglobose, with small, concave nectaries at base. Style exserted. Fl. Jul. 2*n* = 16.

Stony slopes, cliffs. NW Xinjiang [Kazakstan].

85. Allium tianschanicum Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 14(4): 33. 1869.

天山韭 tian shan jiu

Allium globosum Marschall von Bieberstein ex Redouté var. *albidum* Regel; *A. hymenorhizum* Ledebour var. *tianschanicum* (Ruprecht) Regel; *A. macrorhizon* Regel (1875), not *A. macrorrhizum* Boissier (1854).

Bulbs clustered, cylindric-conical to subcylindric, (0.8–)1–2 cm in diam.; tunic brown, thinly leathery, splitting, Leaves narrowly linear, usually shorter than scape, 1–1.5 mm wide, adaxially channeled, margin ciliate-denticulate. Scape 15–25 cm, terete, covered with leaf sheaths only at base. Spathe persistent; beak equaling limb. Umbel hemispheric to subglobose, usually densely many flowered. Pedicels equal, slightly shorter to slightly longer than perianth, bracteolate. Perianth pale yellow or white and becoming red; segments ovate, 5–6 mm, apex obtuse; outer ones sometimes retuse at apex; inner ones ca. 1.2 × as long as outer. Filaments subulate, equal, 1.25–1.5 as long as perianth segments, connate at base and adnate to perianth segments. Ovary subglobose, with small, concave nectaries at base. Style exserted. Fl. and fr. Jul–Sep. 2*n* = 16.

Scrub in subalpine zone, meadows. W Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan].

86. Allium megalobulbon Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 526. 1880.

大鳞韭 da lin jiu

Bulbs paired or clustered, cylindric, very long, to 10 × 1–1.5 cm; tunic yellowish brown, thinly leathery to papery, splitting; inner layers pinkish white. Leaves subulate to linear, 1–2 mm wide, semiterete to flat, margin scabrous-denticulate. Scape 25–35(–40) cm, terete, covered with leaf sheaths for ca. 1/4 its length. Spathe thinly leathery; beak small. Umbel globose, densely many flowered. Pedicels subequal, shorter than perianth, bracteolate. Perianth rose pink, becoming whitish when dried; segments with red midvein, lanceolate, 5–6 × 1.5–2 mm, apex acute. Filaments ca. 1/2 as long as perianth segments, base slightly broadened, connate and adnate to perianth segments, free part subulate. Ovary conical-ovoid, with concave nectaries at base. Style short, not exserted. Fl. Jul.

- Stony slopes. W Xinjiang (Borohoro Shan, Tian Shan).

87. Allium pevtzovii Prokhanov, Izv. Glavn. Bot. Sada SSSR 29: 561. 1930.

昆仑韭 kun lun jiu

Bulbs clustered, cylindric; tunic brown, thinly leathery, ± entire. Leaves linear, equaling to slightly longer than scape, 2–3 mm wide, subfistulose. Scape 20–25 cm, terete, fistulose, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels subequal, slightly shorter than to equaling perianth, ebracteolate. Perianth pale red, lustrous; segments linear-lanceolate, 6–8 × 1–2 mm, apex acuminate with a reflexed point. Filaments equal, ca. 2/3 as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones ovate at base, 1-toothed on each side. Ovary with concave nectaries at base. Style not exserted. Fl. and fr. Jun–Jul.

• Slopes; 1300–1400 m. SW Xinjiang (Kunlun Shan, Yecheng Xian).

88. Allium korolkowii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 158. 1875.
褐皮韭 he pi jiu

Allium moschatum Linnaeus var. *brevipedunculatum* Regel; *A. moschatum* var. *dubium* Regel; *A. oliganthum* Karelin & Kirilov var. *elongatum* Karelin & Kirilov.

Bulb solitary or clustered, ovoid, 0.5–1 cm in diam.; tunic brown, sometimes lustrous, leathery, prominently reticulate veined, apex fibrous or subreticulate. Leaves 2–4, much shorter than scape, ca. 0.5 mm wide, semiterete, adaxially channeled, smooth or scabrous along ribs. Scape 10–30 cm, terete, covered with leaf sheaths for ca. 1/3 its length. Spathe 2-valved, persistent; beak 1/3–1/2 as long as limb. Umbel nearly hemispheric, few flowered. Pedicels unequal, especially in fruit, 2–3 × as long as perianth, bracteolate. Perianth white to pinkish white or pale red; segments with purple midvein, oblong-lanceolate, equal, 5–6.5 × 1.2–1.8 mm, apex shortly pointed. Filaments equal, 1/2–2/3 × as long as perianth segments, connate at base and adnate to perianth segments for 1/4–1/3 their length; outer ones triangular; inner ones ca. 2 × as wide as outer at base and abruptly subulate distally. Ovary ovoid, with concave nectaries covered by hoodlike projections at base. Style not exserted. Fl. and fr. Jul–Aug.

Dry slopes, basins, river shores; 1500–2500 m. Xinjiang (Tian Shan) [Kazakstan, Kyrgyzstan].

89. Allium setifolium Schrenk, Enum. Pl. Nov. 1: 6. 1841.

丝叶韭 si ye jiu

Bulbs clustered, narrowly ovoid to ovoid-cylindric, 0.5–1 cm in diam.; tunic usually 1-valved, pale brown, leathery, entire or splitting, apex laciniate. Leaves 2 or 3, hairlike, shorter than to subequaling scape, 0.2–0.3 mm wide. Scape 5–10 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent; beak very short. Umbel laxly few flowered. Pedicels subequal, 1–2 × as long as perianth, bracteolate. Perianth pale red to red; segments with purple midvein, lanceolate to oblong-lanceolate, 5–7 × 1.2–1.6 mm, apex obtuse. Filaments subequal, ca. 2/3 as long as perianth segments, connate at base and adnate to perianth segments for 1/3–1/2 their length, base triangular, free part subulate; inner ones wider than outer. Ovary ellipsoid-globose, with concave nectaries covered by hoodlike projections at base. Style not exserted. Fl. and fr. Jun–Aug. $2n$ = 16.

Calcareous slopes, deserts; 400–1000 m. NW Xinjiang [Kazakstan, Kyrgyzstan, Mongolia].

90. Allium subtilissimum Ledebour, Fl. Altaic 2: 22. 1830.

蜜囊韭 mi nang jiu

Bulbs clustered, narrowly ovoid-cylindric to narrowly conical, 0.5–0.6(–1) cm in diam.; tunic grayish brown or gray, slightly tinged with red, membranous to thinly scarious, entire or splitting at apex. Leaves 3–5, usually shorter than scape, ca. 0.5 mm wide, slender, subterete, adaxially channeled. Scape 5–20 cm, terete, covered with leaf sheaths for ca. 1/4 its length. Spathe 2-valved, persistent; beak equaling limb. Umbel laxly few flowered. Pedicels subequal, 2–3(–4) × as long as perianth, bracteolate. Perianth pale red to pale purple-red; segments with purple midvein; outer ones ovate-elliptic, boat-shaped, 3–4.5 × 1.2–1.8 mm, apex shortly pointed; inner ones oblong-elliptic, 3.8–5 × 1.5–2.1 mm, apex obtuse or shortly pointed. Filaments equal, slightly longer than perianth segments, rarely slightly shorter, connate at base and adnate to perianth segments. Ovary subglobose, with longitudinally convex nectaries along septa; nectary pit at ovary base open. Style exserted. Fl. Jul–Aug. $2n$ = 16.

Dry stony slopes, cliffs, gravelly saline places along rivers; 700–1500 m. SW Nei Mongol (Longshou Shan), NW Xinjiang [Kazakstan, Mongolia, Russia].

91. Allium longistylum Baker, J. Bot. 12: 294. 1874.

长柱韭 chang zhu jiu

Allium hopeiense Nakai; *A. jeholense* Franchet.

Bulbs usually clustered, cylindric, 0.4–0.8 cm in diam.; tunic red-brown, lustrous, scarious to subleathery, laciniate. Leaves subequaling to slightly longer than scape, 2–3 mm wide, adaxially channeled. Scape (10–)30–50 cm, terete, covered with leaf sheaths only at base. Spathe 3-valved. Umbel globose, many flowered or sometimes few flowered. Pedicels 1–3 × as long as perianth, bracteolate. Perianth red to purple-red; outer segments oblong, 3.5–4.5 × 1.8–2.3 mm; inner ones ovate, 4–5 × 2–2.5 mm. Filaments subulate, equal, ca. 2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary obovoid, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Aug–Sep.

• Slopes, plains; 1500–3000 m. Hebei, Nei Mongol (Daqing Shan), Shanxi.

92. Allium alabasicum Y. Z. Zhao, Acta Sci. Nat. Univ. Intramongol. 23: 555. 1992.

鄂尔多斯韭 e er duo si jiu

Bulbs clustered, cylindric; tunic brown, fibrous. Leaves conspicuously longer than scape, ca. 0.3 mm wide, semiterete or terete. Scape 3–5 cm, ± terete, usually 2-angled, covered with leaf sheaths only at base. Spathe 1-valved, persistent.

Umbel usually 4- or 5-flowered. Pedicels subequal, 1.5–2 × as long as perianth, ebracteolate. Perianth purple-red; segments ovate-oblong, 3–3.5 × ca. 2 mm, apex obtuse; inner ones slightly longer than outer. Filaments subequaling perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones triangular-ovate for ca. 1/4 their length. Ovary ovoid-globose, with concave nectaries covered by hoodlike projections at base. Style not exserted. Fl. Aug.

• Dry slopes. Nei Mongol (Arbas Shan).

93. Allium condensatum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 27(2): 121. 1854.

黄花韭 huang hua jiu

Bulb usually solitary, rarely paired, narrowly ovoid-cylindric to subcylindric, 1–2(–2.5) cm in diam.; tunic red-brown, lustrous, thinly leathery, laciniate. Leaves shorter than scape, 1–2.5 mm wide, terete to semiterete, fistulose, adaxially channeled. Scape 30–80 cm, terete, solid, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, 2–4 × as long as perianth, ebracteolate. Perianth pale yellow to white; segments ovate-oblong, 4–5 × 1.8–2.2 mm; inner ones slightly longer. Filaments subulate, equal, 1/4–1/2 as long as perianth segments, connate at base and adnate to perianth segments. Ovary obovoid, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Jul–Sep. 2*n* = 16*.

Slopes, meadows; near sea level to 2000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi [Korea, Mongolia, Russia].

94. Allium xichuanense J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 285. 1980.

西川韭 xi chuan jiu

Bulb solitary, ovoid or narrowly so to ovoid-cylindric, 0.8–1.2 cm in diam.; tunic pale brown to brown, thinly leathery, splitting. Leaves equaling to slightly longer than scape, 1.5–4 mm wide, semiterete to semiterete-angled, fistulose. Scape (10–)20–40 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels equal, 1–1.5 × as long as perianth, ebracteolate. Perianth pale yellow to greenish yellow; segments oblong-elliptic to oblong-ovate, 5–6 × 2–2.5(–3) mm; inner ones sometimes slightly longer than outer. Filaments equal, equaling to 1.3 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary ovoid-globose, with concave nectaries covered by short, hoodlike projections at base. Style exserted. Fl. and fr. Aug–Oct.

• Slopes, meadows; 3100–4400 m. W Sichuan, NW Yunnan.

95. Allium chrysanthum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 91. 1875.

野葱 ye cong

Bulb cylindric to narrowly ovoid-cylindric, 0.5–1(–1.5) cm in diam.; tunic red-brown to brown, thinly leathery, usually laciniate. Leaves shorter than scape, 1.5–4 mm wide, terete, fistulose. Scape 20–50 cm, terete, fistulose, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, slightly shorter than to 1.5 × as long as perianth, ebracteolate. Perianth yellow to pale yellow; segments ovate-oblong, 5–6.5 × 2–3 mm; inner ones slightly longer than outer. Filaments subulate, equal, 1.3–2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary obovoid, without concave nectaries at base. Style exserted. Fl. and fr. Jul–Sep. 2*n* = 16*.

• Slopes, plains; 2000–4500 m. Gansu, W Hubei, E Qinghai, S Shaanxi, Sichuan, SE Xizang, NW Yunnan.

96. Allium altaicum Pallas, Reise Russ. Reich. 2: 737. 1773.

阿尔泰葱 a er tai cong

Allium ceratophyllum Besser ex Schultes & J. H. Schultes; *A. sapidissimum* Pallas ex Schultes & J. H. Schultes.

Bulb solitary, ovoid-cylindric, 2–4 cm in diam.; tunic red-brown, thinly leathery or hard and leathery, entire or outer layer splitting. Leaves 1/3–1/2 as long as scape, 0.5–2 cm wide, terete, fistulose. Scape 40–100 cm, terete, fistulose, covered with leaf sheaths for 1/4–1/2 its length. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, slightly shorter than to 1.5(–2) × as long as perianth, stout, ebracteolate. Perianth white tinged with yellow; outer segments ovate 6–9 × 2.8–4 mm, apex acute or acuminate; inner ones ovate-oblong, equaling or slightly longer than outer. Filaments subulate, equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary obovoid, with narrow, concave nectaries at base. Style exserted. Fl. and fr. Aug–Sep. 2*n* = 16*.

Slopes, plains. W Heilongjiang, Nei Mongol, N Xinjiang [Kazakstan, Mongolia, Russia].

97. Allium fistulosum Linnaeus, Sp. Pl. 1: 301. 1753.

葱 cong

Bulb solitary or clustered, cylindric, rarely ovoid-cylindric, 1–2(–4.5) cm in diam.; tunic white, rarely pale red-brown, membranous to thinly leathery, entire. Leaves subequaling scape, 0.5–1.5 cm wide. Scape 30–50(–100) cm, terete, fistulose, covered with leaf sheaths for ca. 1/3 its length. Spathe 2-valved, persistent. Umbel globose, many flowered. Pedicels subequal, slender, 1–3 × as long as perianth, ebracteolate. Perianth white; segments ovate, 6–8.5 × 2.5–3 mm, apex acuminate, with a reflexed point; inner ones slightly longer than outer. Filaments equal, 1.5–2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary obovoid, with inconspicuous nectaries at base. Style exserted. Fl. and fr. Apr–Aug. 2*n* = 16*.

Cultivated as a vegetable since ancient times [possibly native to W China, but no wild plants have been collected; widely cultivated elsewhere].

98. Allium cepa Linnaeus, Sp. Pl. 1: 300. 1753.

洋葱 yang cong

Bulb solitary or clustered, applanate-globose to cylindric-ovoid; tunic purple-red, brown-red, pale brown-red, or yellow to pale yellow, papery to thinly leathery, entire. Leaves shorter than scape, 0.5–2 cm wide, terete, fistulose. Scape developed or not, if developed then to 1 m, terete, conspicuously inflated below middle, fistulose, covered with leaf sheaths only at base. Spathe 2- or 3-valved, persistent. Umbel globose, densely many flowered or with bulblets and a few flowers. Pedicels equal, ca. 5 × as long as perianth, bracteolate. Perianth chalk white or white; segments with green or pale red midvein, oblong-ovate, 4–5 × ca. 2 mm. Filaments equal, slightly longer than perianth segments, connate at base for ca. 1/5 their length, adnate to perianth segments for 1/2 of connate part; outer ones subulate; inner ones broadened at base, 1-toothed on each side. Ovary subglobose, with concave nectaries covered by hoodlike projections at base. Style slightly exserted. Fl. and fr. May–Jul. 2*n* = 16*, 32.

Cultivated as a vegetable. Throughout China [widely cultivated elsewhere].

1a. Bulbs clustered; scape not developed (plants propagated by bulbs) ..... 98c. var. *aggregatum*
1b. Bulb solitary; scape developed (plants propagated by seeds or bulblets).
2a. Umbel without bulblets; perianth chalk white, segments with green midvein ... 98a. var. *cepa*
2b. Umbel with bulblets; perianth white, segments with pale red midvein ..... 98b. var. *proliferum*

98a. Allium cepa var. **cepa**

洋葱(原变种) yang cong (yuan bian zhong)

Bulb solitary, applanate globose to subglobose. Scape developed. Umbel without bulblets. Perianth chalk white; segments with green midvein. Fl. and fr. May–Jul. 2*n* = 16*, 32.

Cultivated as a vegetable. Throughout China [widely cultivated elsewhere].

98b. Allium cepa var. **proliferum** (Moench) Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 93. 1875.

楼子葱 lou zi cong

Cepa prolifera Moench, Methodus, 244. 1794; *Allium proliferum* (Moench) Schrader ex Willdenow.

Bulb solitary, ovoid to oblong-ovoid. Scape developed. Umbel with many bulblets and few flowers, bulblets leafing on umbel. Perianth white; segments with pale red midvein.

Cultivated as a vegetable. Gansu, Hebei, Henan, Ningxia, Shaanxi, Sichuan [widely cultivated elsewhere].

The Chinese name 红葱 (hong cong) was given to this variety in FRPS. However, this name was also used for *Eleutherine plicata* Herbert in the Iridaceae.

98c. Allium cepa var. **aggregatum** G. Don, Mem. Wern. Nat. Hist. Soc. 6: 27. 1827.

火葱 huo cong

Bulbs clustered, narrowly ovoid or cylindric-ovoid. Scape not developed (plants propagated by bulbs). 2*n* = 16.

Cultivated as a vegetable. Anhui, Fujian, Guangdong, Guangxi, Hainan, Henan, Hubei, Hunan, Jiangxi, Zhejiang [widely cultivated elsewhere].

The name *Allium ascalonicum* Linnaeus (Fl. Palaest. 17. 1756) has been persistently applied to this variety, although the type of *A. ascalonicum* belongs to a SW Asian species currently known as *A. hierochuntinum* Boissier (1882). *Allium ascalonicum* could be rejected to prevent the displacement of *A. hierochuntinum* for the SW Asian species, or it could be conserved with a conserved type to permit its traditional usage as well as to protect *A. hierochuntinum*. Article 57 of the ICBN would prevent any nomenclatural disruption for the time being.

99. Allium cepiforme G. Don, Mem. Wern. Nat. Hist. Soc. 6: 31. 1827

香葱 xiang cong

Allium ascalonicum Linnaeus var. *chinense* Kunth.

Bulb ovoid-globose to ovoid; tunic red-brown to yellowish brown, scarious, entire. Leaves deep green, narrower than those of *Allium cepa* and *A. fistulosum*, terete, fistulose. Scape usually not developed (plants propagated by bulbs), if developed then fistulose, inflated. Spathe 2- or 3(or 4)-valved. Umbel globose. Pedicels slender, longer than perianth. Perianth white; segments with green midvein, oblong, apex obtuse, sometimes with reflexed point. Filaments subulate, subequal, ca. 2 × as long as perianth segments. 2*n* = 16.

Cultivated. Mostly in E China, also Xinjiang [widely cultivated elsewhere].

Allium cepiforme originated in cultivation, probably as a result of hybridization between *A. cepa* and *A. fistulosum*.

100. Allium galanthum Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 508. 1842.

实葶葱 shi ting cong

Allium pseudocepa Schrenk.

Bulbs clustered, cylindric, slightly inflated at base, 1.5–3 cm in diam.; tunic brown-red, lustrous, thinly leathery, entire. Leaves 1/2–2/3 as long as scape, 3–10 mm wide, terete, fistulose. Scape (20–)30–60 cm, terete, solid, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels equal, 2–4 × as long as perianth, bracteolate. Perianth white; segments oblong to ovate-oblong, 3.2–5 × 1.8–2.2 mm; outer ones slightly shorter than or equaling inner. Filaments slightly longer than perianth segments, rarely slightly shorter, connate at base for 1–1.3 mm, adnate to perianth segments for ca. 1/2 of connate part; outer ones subulate; inner ones broadened at base, 1-toothed on each side, rarely teeth inconspicuous. Ovary conical, with concave nectaries covered by hoodlike projections at base. Style not exserted. Fl. and fr. Aug–Oct. 2*n* = 16.

Dry stony and gravelly slopes, cliffs, valleys; 500–1500 m. N Xinjiang [Kazakstan, Mongolia, Russia].

101. Allium semenovii Regel in Regel & Herder, Bull. Soc.

Imp. Naturalistes Moscou 41(1): 449. 1868.

管丝葱 guan si cong

Allium tristylum Regel.

Bulb solitary or clustered, cylindric, 0.5–1.5 cm in diam.; tunic dirty brown to dark gray, fibrous, usually subreticulate. Leaves broadly linear, often falcate, usually longer than scape, rarely shorter, 5–15 mm wide, often plicate. Scape 8–25(–50) cm, terete, covered with leaf sheaths for ca. 1/3 its length. Spathe 2-valved, persistent. Umbel ovoid-globose to globose, densely many flowered. Pedicels unequal; outer ones much shorter than perianth; inner ones subequaling or slightly longer than perianth, ebracteolate. Perianth yellow, becoming red to purple-red; segments lanceolate to ovate-lanceolate, 10–17 × 3–5 mm, margin sometimes irregularly denticulate, apex acuminate; inner ones slightly shorter than outer. Filaments 1/4–1/3 as long as perianth segments, connate for 3/5–4/5 their length, adnate to perianth segments for 1/3–1/2 of connate part; inner ones broadened at base, 1-toothed on each side. Ovary subglobose, with concave nectaries covered by hoodlike projections at base. Style shorter than ovary; stigma 3-cleft. Fl. and fr. May–Aug.

Forest margins, damp slopes, meadows; 2000–3000 m. Xinjiang (Tian Shan) [Kazakstan, Kyrgyzstan].

The specific epithet was misspelled as *"semenori"* in the protologue.

102. Allium atrosanguineum Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 10: 355. 1842.

蓝苞葱 lan bao cong

Bulb solitary or clustered, cylindric, 0.5–1 cm in diam.; tunic grayish brown, laciniate, slightly fibrous. Leaves shorter than to subequaling scape, 2–4 mm wide, terete, fistulose. Scape 7–60 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, blue, persistent. Umbel globose, densely many flowered. Pedicels unequal; outer ones usually shorter than perianth; inner ones usually longer than perianth, ebracteolate. Perianth purple-red, minutely black dotted, and later becoming yellowish white to grayish pink, or else whitish yellow to pink with yellowish base and later becoming yellowish white, or else brass yellow to copper red, lustrous, and later becoming pale yellow with pinkish base and apex; segments oblong-obovate, oblong, or oblong-lanceolate, 7–16 × 3–4 mm, margin sometimes minutely denticulate, apex rounded, subacute, or attenuate; inner ones slightly shorter than or rarely equaling outer. Filaments 5.5–8 mm, shorter than perianth segments, connate into a tube for 1/3–3/4 their length, adnate to perianth segments for 1/2–2/3 of connate part; outer ones subulate; inner ones triangular or shoulder-shaped at base. Ovary obovoid, base usually constricted into a short stipe, with concave nectaries. Style 3.5–7 mm; stigma entire or 3-cleft. Fl. and fr. Jun–Sep. $2n = 16$, 32.

Meadows, high mountain bogs, streamsides, moist places; 2400–5400 m. Gansu, Qinghai, W Sichuan, Xinjiang, E and NW Xizang, NW Yunnan [Afghanistan, India, Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Uzbekistan].

1a. Perianth purple-red, minutely black dotted, later becoming yellowish white to grayish pink ..... 102a. var. *atrosanguineum*

1b. Perianth whitish yellow to pink with yellowish base and later becoming yellowish white, or brass yellow to copper red, lustrous, and later becoming pale yellow with pinkish base and apex.

2a. Perianth whitish yellow to pink with yellowish base, later becoming yellowish white, segments attenuate at apex ..... 102b. var. *fedschenkoanum*

2b. Perianth brass yellow to copper red, lustrous, later becoming pale yellow with pinkish base and apex, segments rounded at apex ..... 102c. var. *tibeticum*

102a. Allium atrosanguineum var. **atrosanguineum**

蓝苞葱(原变种) lan bao cong (yuan bian zhong)

Allium monadelphum Turczaninow ex Karelin & Kirilov.

Perianth purple-red, minutely black dotted, later becoming yellowish white to grayish pink; segments oblong-obovate, oblong, or oblong-lanceolate, 7–9 mm, apex subacute, never attenuate. Fl. Jun. $2n = 16$.

Meadows, streamsides; 2500–3000 m. Qinghai, W Sichuan, Xinjiang (Tarbagatay Shan, Tian Shan) [NE Afghanistan, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].

102b. Allium atrosanguineum var. **fedschenkoanum** (Regel) G. Zhu & Turland, Novon 10: 181. 2000.

费葱 fei cong

Allium fedschenkoanum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 82. 1875; *A. fedschenkoanum* var. *elatum* Regel; *A. kaufmannii* Regel; *A. monadelphum* var. *fedschenkoanum* (Regel) Regel; *A. monadelphum* var. *kaufmannii* (Regel) Regel.

Perianth whitish yellow to pink with yellowish base, later becoming yellowish white; segments oblong-lanceolate, 10–15 mm, margin sometimes minutely denticulate, apex attenuate. Fl. Jun–Jul. $2n = 16$.

Meadows, high mountain bogs, streamsides; 2400–3500 m. Xinjiang (Tian Shan), NW Xizang [Afghanistan, India, Kazakstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

102c. Allium atrosanguineum var. **tibeticum** (Regel) G. Zhu & Turland, Novon 10: 182. 2000.

藏葱 zang cong

Allium monadelphum var. *tibeticum* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 311. 1887; *A. chalcophengos* Airy Shaw.

Perianth brass yellow to copper red, lustrous, later becoming pale yellow with pinkish base and apex; segments oblong-obovate, 10–16 mm, apex rounded. Fl. Jul–Aug.

• Meadows, moist places; 3500–5400 m. Gansu, Qinghai, W Sichuan, E Xizang, NW Yunnan.

103. Allium schoenoprasum Linnaeus, Sp. Pl. 1: 301. 1753.

北葱 bei cong

Bulbs usually clustered, ovoid-cylindric, 0.5–1 cm in diam.; tunic grayish brown or tinged with yellow, papery, laciniate, sometimes fibrous at apex. Leaves 1 or 2, slightly shorter than scape, 2–6 mm wide, terete, fistulose, smooth or scabrous-denticulate. Scape 10–40(–60) cm, terete, covered with leaf sheaths for 1/3–1/2 its length, smooth or scabrous-denticulate. Spathe 2-valved, purple-red, persistent. Umbel subglobose, densely many flowered. Pedicels usually unequal, shorter than perianth, ebracteolate. Perianth purple-red to pale red; segments lanceolate or oblong-lanceolate to oblong, equal, 7–11(–17) × 3–4 mm, apex acute or acuminate. Filaments 1/3–1/2(–2/3) as long as perianth segments, connate at base and adnate to perianth segments for 1–1.5 mm; inner ones with triangular base, ca. 1/2 as wide as outer. Ovary subglobose, with concave nectaries at base. Style not exserted. Fl. and fr. Jul–Sep.

Meadows, valleys, damp slopes, along streams; 2000–3000 m. Xinjiang [India, Japan, Kazakstan, Korea, Mongolia, Pakistan, Russia; SW Asia, Europe, North America].

1a. Leaves, leaf sheaths, and scape smooth ..... 103a. var. *schoenoprasum*
1b. Leaves, leaf sheaths, and scape scabrous-denticulate along angles ..... 103b. var. *scaberrimum*

103a. Allium schoenoprasum var. **schoenoprasum**

北葱(原变种) bei cong (yuan bian zhong)

Allium raddeanum Regel; *Allium sibiricum* Linnaeus.

Leaves, leaf sheaths, and scape smooth. Fl. and fr. Jul–Sep. 2*n* = 16, 24, 32.

Meadows, valleys, damp slopes; 2000–3000 m. N Xinjiang (Altay Shan) [India, Japan, Kazakstan, Korea, Mongolia, Pakistan, Russia; SW Asia, Europe, North America].

103b. Allium schoenoprasum var. **scaberrimum** Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 80. 1875.

糙葶北葱 cao ting bei cong

Allium karelinii Poljakov; *A. scabrellum* Boissier & Buhse.

Leaves, leaf sheaths, and scape scabrous-denticulate along angles. Fl. Aug.

Meadows, along streams; 2000–2500 m. Xinjiang (Altay Shan, Tarbagatay Shan, Tian Shan) [Kazakstan, Mongolia, Russia].

104. Allium oliganthum Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 856. 1841.

少花葱 shao hua cong

Allium stenophyllum Schrenk.

Bulbs clustered, ovoid, ca. 1 cm in diam.; tunic light brown or violet-brown, membranous to scarious, ± splitting into fibers. Leaves 1 or 2, shorter than scape, 1–2 mm wide, semiterete, adaxially channeled. Scape 8–15(–35) cm, terete, covered with leaf sheaths for 1/3–1/2 its length. Spathe persistent; beak short. Umbel hemispheric to globose, many flowered. Pedicels subequal, 2–3 × as long as perianth, ebracteolate. Perianth pink; segments with darker midvein, oblong, 5–6 × 1–1.5 mm, apex acute. Filaments subequal, slightly shorter than perianth segments, connate at base and adnate to perianth segments. Style slightly exserted. Fl. and fr. Jun–Jul.

Saline meadows, lake shores, along rivers; near sea level to 2000 m. N Xinjiang [Kazakstan, Mongolia, Russia].

105. Allium maximowiczii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 153. 1875.

马葱 ma cong

Allium schoenoprasum Linnaeus var. *orientale* Regel.

Bulb usually solitary or paired, rarely clustered, tunic gray or yellowish brown, papery, subentire. Leaves 1 or 2, shorter than scape, semiterete to terete, fistulose, smooth. Scape 20–40(–70) cm, covered with leaf sheaths for 1/3–1/2 its length, smooth. Spathe 2-valved, persistent; beak short. Umbel hemispheric, densely many flowered. Pedicels 2–3 × as long as perianth, ebracteolate. Perianth rose pink or dark pink; segments with red, fine midvein, oblong-lanceolate, 5–7 mm, apex acute. Filaments subequal, slightly shorter than or equaling perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones narrowly triangular, ca. 2 × as wide as outer ones at base. Ovary globose. Style exserted. Fl. Jul. 2*n* = 16.

Meadows, riversides; 100–500 m. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia].

106. Allium ledebourianum Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 1029. 1830.

硬皮葱 ying pi cong

Allium uliginosum Ledebour, Fl. Altaic. 2: 16. 1830, not G. Don (1827).

Bulbs clustered, narrowly ovoid-cylindric, 0.8–2 cm in diam.; tunic grayish violet to grayish black, membranous to scarious, ± entire, quickly withered. Leaves 1 or 2, shorter than scape, 5–7(–10) mm wide, terete, fistulose. Scape 70–80(–100) cm, terete, covered with leaf sheaths for 1/3–1/2 its length. Spathe 2-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels subequal, 1.5–3 × as long as perianth, ebracteolate. Perianth pale purple; segments ovate-lanceolate to lanceolate, equal, 6–8(–10) × 1.5–2 mm; inner ones with purple midvein, sometimes slightly longer than outer ones, apex acute, shortly pointed. Filaments subequal, longer than perianth segments, connate at base and adnate to perianth segments for ca. 1 mm; outer ones subulate; inner ones narrowly triangular, ca. 2 × as wide as outer ones at base; anthers purple-red. Ovary ovoid-globose, with concave nectaries at base. Style exserted. Fl. and fr. Jun–Sep. 2*n* = 16.

Mountains, moist meadows, river banks, gravelly and sandy places; 100–1800 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, N Xinjiang (Altay Shan) [Kazakstan, Mongolia, Russia].

107. Allium grisellum J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 286. 1980.

灰皮薤 hui pi xie

Bulbs clustered, narrowly ovoid, 0.7–1 cm in diam.; tunic black-gray, papery, apex fibrous. Leaves subequaling scape, 1–1.5 mm wide, adaxially channeled. Scape 11–20 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel few flowered. Pedicels equal, slightly longer than perianth, ebracteolate. Perianth white, slightly tinged with red; segments with purple midvein, oblong, 5.5–6 × ca. 2 mm, apex with a short, slightly reflexed point. Filaments equal, 2/3–3/4 as long as perianth segments, connate and adnate to perianth segments for ca. 1 mm, base broadly triangular, free part subulate; inner ones 1/2 as wide as outer. Ovary ovoid, without concave nectaries at base, apex slightly constricted. Style not exserted. Fl. Jun.

- Meadows; ca. 300 m. C Xinjiang (Toksun Xian).

108. Allium chinense G. Don, Mem. Wern. Nat. Hist. Soc. 6: 83. 1827.

头 jiao tou

Allium bakeri Regel; *A. bodinieri* H. Léveillé & Vaniot; *A. martini* H. Léveillé & Vaniot; *Caloscordum exsertum* Lindley.

Bulbs clustered, narrowly ovoid, (0.5–)1–1.5(–2) cm in diam.; tunic white, sometimes tinged with red, membranous, entire. Leaves subequaling scape, 1–3 mm wide, 3–5-angled, fistulose. Scape lateral, 20–40 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel nearly hemispheric, laxly flowered. Pedicels subequal, 2–4 × as long as perianth, bracteolate. Perianth pale purple to dull purple; segments broadly elliptic to suborbicular, 4–6 × 3–4 mm; inner ones slightly longer than outer. Filaments equal, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side. Ovary obovoid-globose, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Oct–Nov. 2*n* = 24*, 32*.

- Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangxi, Zhejiang.

Cultivated as a vegetable in tropical and subtropical China.

109. Allium yanchiense J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 286. 1980.

白花薤 bai hua xie

Bulb solitary or clustered, narrowly ovoid, 1–2 cm in diam.; tunic dirty gray, papery, apex fibrous. Leaves shorter than scape, 1–2 mm wide, semiterete, fistulose, smooth or minutely scabrous-denticulate along angles. Scape terminal, 20–40 cm, terete, smooth or minutely scabrous-denticulate, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels 1–2 × as long as perianth, bracteolate. Perianth white to pale red, sometimes greenish; segments usually with pale red midvein; outer ones oblong-ovate, 4–5.2 × 1.8–2.7 mm, apex obtuse; inner ones oblong to ovate-oblong, 4–6 × 2–2.9 mm, apex obtuse or retuse, sometimes irregularly denticulate. Filaments subulate, equal, 1/5–1/2 as long as perianth segments, connate at base and adnate to perianth segments. Ovary ovoid-globose, with concave nectaries covered by hoodlike or sometimes tongue-shaped projections at base. Style exserted. Fl. and fr. Aug–Sep.

- Shady and damp slopes, valleys; 1300–2000 m. Gansu, WC Hebei (Xiaowutai Shan), W Nei Mongol (Helan Shan), E and N Ningxia (Helan Shan, Yanchi Xian), Qinghai (Jigzhi Xian), N Shaanxi (Jingbian Xian), W Shanxi (Wuzhai Xian, Zhongyang Xian).

110. Allium sacculiferum Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 281. 1859.

朝鲜薤 chao xian xie

Allium komarovianum Vvedensky; *A. pseudojaponicum* Makino; *A. yuchuanii* Y. Z. Zhao & J. Y. Chao.

Bulb solitary or often paired, cylindric or ovoid-cylindric, 0.7–1.5(–2) cm in diam.; outer tunic dark brown to brownish black, thinly leathery, split into fibers and subreticulate, rarely subentire. Leaves 3–5(–7), linear, shorter than scape, (2–)3–4(–5) mm wide, rarely subfistulose near base, keeled to nearly 3-angled, margin smooth, apex subattenuate. Scape 30–60(–70) cm, terete, covered with leaf sheaths for 1/4–1/2 its length. Spathe 1- or 2-valved, persistent; beak ca. 1/2 as long as limb. Umbel globose, densely many flowered. Pedicels 1.5–3 × as long as perianth, bracteolate. Perianth lilac-pink to red-violet; segments with dark red or purple midvein; outer ones elliptic, boat-shaped, 4–4.5 × ca. 2 mm, apex obtuse; inner ones elliptic, 4.5–5(–5.5) × 2–2.5 mm, apex truncate. Filaments equal, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary obovoid-globose. Style long exserted. Fl. Aug–Sep. 2*n* = 16.

Meadows, riversides, lakesides; 100–500 m. Heilongjiang, Jilin, Liaoning, NE Nei Mongol [N Japan, Korea, Russia].

111. Allium thunbergii G. Don, Mem. Wern. Nat. Hist. Soc. 6: 84. 1827.

球序薤 qiu xu xie

Allium odorum Thunberg, Fl. Jap. 132. 1784, not Linnaeus (1767); *A. bakeri* Regel var. *morrisonense* (Hayata) Tang S. Liu & S. S. Ying; *A. japonicum* Regel; *A. morrisonense* Hayata; *A. taquetii* H. Léveillé.

Bulb solitary, rarely paired, ovoid to ovoid-cylindric, 1–2 cm in diam.; outer tunic whitish black-brown to dirty black, membranous to scarious or subpapery, apex sometimes laciniate to fibrous. Leaves linear, longer than scape, 2–4 mm wide, 3-angled, subfistulose, margin smooth, apex attenuate. Scape 25–40(–50) cm, covered with leaf sheaths for 1/4–1/3 its length. Spathe 1- or 2-valved, persistent; beak short. Umbel subfascicled to globose, laxly many flowered. Pedicels subequal, 3–4 × as long as perianth, bracteolate. Perianth red to purple; segments with dark midvein, ovate-elliptic, 5–6 × 2.5–3.5 mm, apex obtuse; outer ones boat-shaped, shorter than inner. Filaments subulate, ca. 1.5 × as long as perianth segments, connate at base and adnate to perianth segments; inner ones sometimes with 1 very small tooth on each side. Ovary subglobose. Style long exserted. Fl Aug–Oct. 2*n* = 16*, 32.

Forest margins, slopes, pastures; near sea level to 1300 m. Hebei, Heilongjiang, Henan, E Hubei, Jiangsu, Jilin, Liaoning, E Nei Mongol, S Shaanxi, Shandong, Shanxi, Taiwan [Japan, Korea].

112. Allium songpanicum J. M. Xu in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 286. 1980.

松潘薤 song pan xie

Bulb solitary or clustered, ovoid to narrowly so, 0.5–1.5 cm in diam.; tunic dirty brown, papery, apex fibrous. Leaves narrowly linear, slightly longer than scape, 1.5–3 mm wide. Scape 12–20 cm, slender, terete, finely angled, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel few flowered. Pedicels unequal, 3–5 × as long as perianth, ebracteolate. Perianth purple-red; segments subequal; outer ones ovate-oblong, 4–4.5 × 1.9–2.5 mm; inner ones ovate to broadly so, 4–4.5 × 2.3–2.9 mm. Filaments equal, ca. 2 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side, teeth 2.2–2.5 mm, irregularly denticulate at apex. Ovary obovoid, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Oct–Nov.

• Forest, scrub; 1600–1700 m. N Sichuan (Nanping Xian, Songpan Xian).

113. Allium juldusicola Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 523. 1880.

尤尔都斯薤 you er du si xie

Bulb solitary, ovoid, 1.5 cm in diam.; tunic delicately reticulate. Leaves narrowly linear, flat, solid, margin scabrous-denticulate. Scape 20–30 cm, terete, smooth, covered with leaf sheaths only at base. Spathe 1-valved; beak short. Umbel globose, densely many flowered. Pedicels subequaling perianth, bracteolate. Perianth white; segments oblong-lanceolate, 3–4 × ca. 1.5 mm, apex subacute. Filaments linear-subulate, slightly shorter or longer than perianth segments, connate at base and adnate to perianth segments. Ovary applanate-globose, without concave nectaries at base. Style very short, not exserted. Fr. Sep.

• High plains, steppes. W Xinjiang (Youerdusi).

Only fruiting type material has been seen by the present authors.

114. Allium tanguticum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 317. 1887.

唐古薤 tang gu xie

Bulb solitary, ovoid to ovoid-globose, 1–1.5 cm in diam.; tunic grayish brown to grayish yellow, papery, usually fibrous at apex. Leaves linear, shorter than scape, 1–3(–4) mm wide, flat, adaxially channeled, scabrous-denticulate along angles. Scape 15–40 cm or more, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel hemispheric, densely many flowered. Pedicels subequal, 2–3 × as long as perianth, bracteolate. Perianth purple to purple-red; segments narrowly lanceolate to ovate-lanceolate, (3–)4–5 × 1–1.8 mm, apex acuminate. Filaments equal, 1.5(–2) × as long as perianth segments, connate at base and adnate to perianth segments; inner ones narrowly triangular at base, distinctly wider than outer. Ovary subglobose, with concave nectaries at base. Style slightly exserted. Fl. and fr. Jul–Sep. $2n = 32^*, 48^*$.

• Dry slopes, sandy places, plains; 2000–3500 m. Gansu, Qinghai, Xizang (Lholong Xian).

115. Allium eusperma Airy Shaw, Notes Roy. Bot. Gard. Edinburgh 16: 137. 1931.

真籽薤 zhen zi xie

Bulb solitary, ovoid-globose, 1–2 cm in diam.; tunic yellow-brown to grayish brown, usually tinged with red, membranous to papery, entire or fibrous at apex. Leaves 3/4 as long as to slightly longer than scape, (0.5–)1.5–3 mm wide, semiterete, fistulose, smooth. Scape 20–50 cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 2-valved, persistent. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, 2–3 × as long as perianth, ebracteolate, rarely a few bracteolate. Perianth pink to pale purple-red; segments ovate-oblong to ovate-lanceolate, 4–5 × 1–1.5 mm. Filaments equal, 1.3–1.5 × as long as perianth segments, connate at base and adnate to perianth segments; inner ones slightly longer than outer, base narrowly triangular, sometimes with 1 short tooth on each side. Ovary subglobose, with concave nectaries at base. Style exserted. Fl. and fr. Aug–Sep.

• Forest margins, slopes; 2000–2800 m. W Sichuan (Sêrxü Xian, Xiangcheng Xian), NW Yunnan (Dêqên Xian).

116. Allium maowenense J. M. Xu in J. M. Xu et al., Acta Phytotax. Sin. 32: 356. 1994.

茂汶薤 mao wen xie

Bulb solitary or clustered, ovoid to narrowly so, 1–2 cm in diam.; tunic pale brown, thinly leathery, apex subfibrous. Leaves shorter than scape, 2–5 mm wide, semiterete, fistulose, adaxially channeled, smooth. Scape 16–30(–60) cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, deciduous. Umbel globose, densely many flowered. Pedicels equal, ca. 2 × as long as perianth, ebracteolate. Perianth white; segments with greenish or pale red midvein; outer ones narrowly ovate, boat-shaped, 3–5 × 1.5–2 mm; inner ones ovate, 4–5.5 × 2–3 mm. Filaments subulate, equal, ca. 2 × as long as perianth segments, connate at base and adnate to perianth segments. Ovary green, subglobose, with concave nectaries covered by short, hoodlike projections at base. Style exserted; stigma punctiform. Fl. and fr. Sep–Nov. $2n = 16^*$.

• Dry slopes; 1100–1500 m. NC Sichuan (Mao Xian, Wenchuan Xian).

117. Allium sabulosum Steven ex Bunge in Goebel, Reise Steppen Russl. 2: 311. 1838.

沙地薤 sha di xie

Bulb solitary, cylindric ovoid to ovoid, 1.5–2 cm in diam., with pale brown, sometimes yellowish brown, irregularly tuberculate-pitted bulbels; tunic grayish to pale brown, leathery, with parallel veins, usually splitting along veins. Leaves shorter than scape, 1–2 mm wide, semiterete, fistulose, adaxially channeled, smooth, rarely scabrous-denticulate. Scape 20–60 cm, stout, fistulose, covered with leaf sheaths for ca. 1/4 its length. Spathe quickly deciduous; beak long. Umbel hemispheric to globose, densely many flowered. Pedicels 3–5 × as long as

perianth, bracteolate. Perianth greenish; segments with green midvein in fruit, elliptic, equal, ca. 3 mm; outer ones boat-shaped; inner ones retuse at apex. Filaments subulate, equal, slightly longer than perianth segments, connate at base and adnate to perianth segments. Ovary globose, with very small nectaries. Style exserted. Fl. and fr. May–Jun. $2n = 16$.

Sandy places. W Xinjiang (Huocheng Xian) [Kazakstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan].

118. Allium delicatulum Sievers ex Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 1133. 1830.

迷人薤 mi ren xie

Allium dolonkarense Regel; *A. willdenowii* Kunth.

Bulb solitary, ovoid-globose, 0.8–1.5 cm in diam., sometimes with yellowish white, smooth bulbels; tunic gray to nearly black, membranous to papery. Leaves 2 or 3, shorter than scape, 0.5–1.5 mm wide, semiterete, adaxially channeled, smooth, rarely scabrous-denticulate. Scape 15–25 cm, terete, covered with leaf sheaths for 1/3–1/2 its length. Spathe 2-valved, persistent; beak short or long, rarely to 3 × as long as limb. Umbel fascicled to subglobose, few or many flowered. Pedicels subequal, 2–3(–4) × as long as perianth, bracteolate, rarely ebracteolate. Perianth white to red; segments with purple-red midvein, lanceolate to ovate-lanceolate, equal, (3–)4–6 × 1.5–2 mm, apex obtuse to subacute; inner ones somewhat wider than outer. Filaments triangular-subulate, 3/4 as long as to subequaling perianth segments, connate at base and adnate to perianth segments for ca. 1/5 their length; inner ones ca. 1.5 × as wide as outer at base. Ovary ovoid-globose, minutely tuberculate. Style short, but elongate after anthesis, scarcely exserted; stigma punctiform. Fl. and fr. Jun–Jul.

Pastures, dry slopes, deserts, sands and saline places. N Xinjiang [Kazakstan, Russia].

119. Allium glomeratum Prokhanov, Izv. Glavn. Bot. Sada SSSR 29: 560. 1930.

头花薤 tou hua xie

Bulb solitary, ovoid-globose, 0.8–1.5(–2) cm in diam.; tunic gray to grayish yellow, membranous to papery, subentire to slightly fibrous. Leaves 2 or 3, narrowly linear, shorter than scape, 0.5–1.5 mm wide, adaxially channeled, scabrous-denticulate along angles. Scape 6–30 cm, terete, covered with leaf sheaths for ca. 1/3 its length. Spathe 2-valved, persistent; beak short. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, equaling to slightly longer than perianth, bracteolate. Perianth pale purple; segments ovate-lanceolate, 4–6 × 1.5–2 mm, apex acute; inner ones slightly narrower than outer. Filaments equal, slightly shorter than to subequaling perianth segments, connate and adnate to perianth segments, base narrowly triangular, free part subulate. Ovary globose, without concave nectaries at base. Style exserted. Fl. and fr. Jul–Aug.

Slopes, valleys; 1500–3000 m. Xinjiang (Kunlun Shan, Tian Shan) [Kyrgyzstan].

120. Allium pallasii Murray, Novi Comment. Soc. Regiae Sci. Gott. 6: 32. 1775.

小山薤 xiao shan xie

Allium albertii Regel; *A. caricifolium* Karelin & Kirilov; *A. lepidum* Ledebour; *A. semiretschenskianum* Regel; *A. tenue* G. Don.

Bulb solitary, ovoid-globose to subglobose, 0.7–1.5(–2) cm in diam.; tunic grayish white to pinkish white, membranous, transparent, with parallel veins, entire. Leaves 3–5, shorter than scape, 0.5–1.5(–2.5) mm wide, semiterete, adaxially channeled. Scape 15–30 cm, terete, covered with leaf sheaths for 1/4–1/2 its length. Spathe 2-valved, persistent. Umbel hemispheric to globose, laxly or densely many flowered. Pedicels subequal, 2–4 × as long as perianth, ebracteolate or a few bracteolate. Perianth pale red to pale purple; segments lanceolate to oblong lanceolate, equal, 2–4 × 0.8–1.8 mm; inner ones usually narrower than outer. Filaments 1–1.5 × as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, sometimes 1-toothed on each side. Ovary subglobose, minutely tuberculate, with concave nectaries at base. Style slightly exserted; stigma globose. Fl. and fr. Apr–Jul. $2n = 16$.

Deserts, dry slopes; 600–2300 m. N Xinjiang (Altay Shan, Tarbagatay Shan) [Kazakstan, Mongolia, Russia].

One of us (Kamelin) believes that plants with bracteolate pedicels represent another species, *Allium semiretschenskianum* Regel (Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 630. 1878), and limits *A. pallasii* to plants with ebracteolate pedicels. *Allium albertii* Regel (loc. cit.: 632) was described from plants collected on sands in W Xinjiang between Huocheng Xian and Ili He, and is regarded by Kamelin as an uncertain species, similar to *A. semiretschenskianum*, but only 20–30 cm high, with a membranous and finely reticulate-veined tunic, and ebracteolate pedicels. Xu believes that both *A. albertii* and *A. semiretschenskianum* are synonymous with *A. pallasii*, and notes that other species exhibit both bracteolate and ebracteolate pedicels, e.g., *A. eusperma* and *A. sairamense*.

121. Allium macrostemon Bunge, Enum. Pl. China Bor. 65. 1833.

薤白 xie bai

Allium chanetii H. Léveillé; *A. grayi* Regel; *A. grayi* var. *chanetii* (H. Léveillé) H. Léveillé; *A. iatasen* H. Léveillé; *A. nereidum* Hance; *A. nipponicum* Franchet & Savatier; *A. ouensanense* Nakai; *A. uratense* Franchet.

Bulb solitary, subglobose, 0.7–1.5(–2) cm in diam., usually with bulbels at base; tunic blackish, papery or membranous, entire. Leaves shorter than scape, 2–5 mm wide, semiterete or 3-angled-semiterete, abaxially strongly 1-angled, fistulose, adaxially channeled. Scape 30–70 cm, terete, covered with leaf sheaths for 1/4–1/3 its length. Spathe 2-valved, persistent. Umbel hemispheric to globose, densely many flowered, bearing bulblets and flowers or bulblets only. Pedicels subequal, 3–5 × as long as perianth, bracteolate. Perianth pale purple to pale red; segments oblong-ovate to oblong-lanceolate, equal, 4–5.5 × 1.2–2 mm; inner ones usually shorter than outer. Filaments equal, 1/2 as long as to slightly shorter than perianth segments, connate and adnate to perianth segments, base triangular; inner ones ca. 1/2 as wide as outer at base. Ovary subglobose, with concave nectaries covered by hoodlike projections at base.

Style exserted. Fl. and fr. May–Jul. 2*n* = 16, 24, 32*, 40*, 48.

Hills, slopes, valleys, plains; near sea level to 1600 m (to 3000 m in Xizang and Yunnan). Throughout China except Hainan, Qinghai, and Xinjiang [Japan, Korea, Mongolia, Russia (Far East)].

122. Allium caeruleum Pallas, Reise Russ. Reich. 2: 737. 1773.

棱叶薤 leng ye xie

Allium azureum Ledebour; *A. coerulescens* G. Don; *A. viviparum* Karelin & Kirilov.

Bulb solitary, subglobose, 1–2 cm in diam., usually bearing bulbels at base; tunic dull gray, papery, entire, Leaves linear, twisted when dried, shorter than scape, (1–)2–5 mm wide, fistulose, abaxially angled, smooth or scabrous-denticulate along angles. Scape 25–35 cm, terete, smooth or scabrous-denticulate along angles, covered with leaf sheaths for ca. 1/3 its length. Spathe 2-valved, persistent. Umbel hemispheric to globose, densely many flowered, sometimes with bulblets or with bulblets only. Pedicels subequal, 2–6 × as long as perianth, bracteolate. Perianth azure; segments oblong to oblong-lanceolate, equal, 3–5 × 0.8–1.8 mm; inner ones narrower than outer. Filaments equal, slightly shorter to slightly longer than perianth segments, connate and adnate to perianth segments, base triangular; inner ones 1.5–2 × as wide as outer, sometimes 1-toothed on each side at base. Ovary subglobose, with concave nectaries covered by hoodlike projections at base. Style exserted. Fl. and fr. Jun–Aug. 2*n* = 16.

Dry slopes, plains; 1100–2300 m. Xinjiang (Altay Shan, Tian Shan) [Kazakstan, Kyrgyzstan, Russia, Tajikistan, Uzbekistan].

123. Allium caesium Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 2: 113. 1844.

知母薤 zhi mu xie

Allium renardii Regel; *A. urceolatum* Regel.

Bulb solitary, ovoid-globose, 1–1.5 cm in diam., with grayish brown or violet bulbels at base; tunic gray, subleathery to papery. Leaves 2 or 3, slightly shorter to slightly longer than scape, 1–3 mm wide, semiterete, sometimes fistulose, adaxially channeled, scabrous-denticulate, rarely subsmooth. Scape 15–65 cm, scabrous-denticulate or rarely subsmooth, covered with leaf sheaths for 1/4–1/2 its length. Spathe persistent. Umbel hemispheric to globose, densely many flowered, sometimes with a few bulblets, never with bulblets only. Pedicels equal, 2–3(–5) × as long as perianth, bracteolate. Perianth azure, rarely white; segments with darker midvein, oblong to oblong-lanceolate, equal, 4–6 mm, apex subobtuse; inner ones slightly wider than outer. Filaments 3/4 as long as to equaling perianth segments, connate at base and adnate to perianth segments; outer ones narrowly triangular; inner ones broadened for ca. 2/3 their length, to 2 × as wide as outer ones, with 1 obtuse tooth on each side. Style slightly exserted. Fl. and fr. May–Jun. 2*n* = 16, 32.

Deserts, dry pastures; 700–2000 m. N and W Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan, Uzbekistan].

124. Allium schoenoprasoides Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 630. 1878.

类北薤 lei bei xie

Bulb solitary, broadly ovoid to subglobose, 0.8–1.5 cm in diam.; tunic purple-black to black, membranous, entire. Leaves 2 or 3, shorter than scape, 1–3 mm wide, semiterete, sometimes fistulose, adaxially channeled. Scape 10–15(–20) cm, terete, covered with leaf sheaths for 1/3–1/2 its length. Spathe deciduous. Umbel globose, densely many flowered. Pedicels subequal, shorter than to subequaling perianth, ebracteolate. Perianth purple-red; segments oblong-lanceolate to oblong-ovate, 4.5–8 × 2–3 mm, apex obtuse or attenuate. Filaments equal, 1/3–1/2 as long as perianth segments, connate at base and adnate to perianth segments for ca. 1 mm; outer ones subulate; inner ones with basal 2/3–3/4 broadened, ovate-oblong, with 1 small tooth on each side. Ovary ovoid-globose, without concave nectaries at base. Style not exserted. Fl. and fr. Jul–Aug. 2*n* = 16.

Slopes, pastures; 2700–3000 m. Xinjiang (Tian Shan) [Kazakstan, Kyrgyzstan, Tajikistan].

125. Allium sairamense Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 520. 1880.

赛里木薤 sai li mu xie

Bulb solitary, subglobose, 1–1.5 cm in diam.; tunic whitish lilac to brownish violet, membranous, entire. Leaves 2, usually shorter than scape, 1–3 mm wide, semiterete, solid, margin minutely scabrous-denticulate. Scape (15–)25–40 cm, terete, covered with leaf sheaths for ca. 1/3 its length. Spathe 2-valved; beak very short. Umbel hemispheric to globose, many flowered. Pedicels shorter than or subequaling perianth, ebracteolate or a few bracteolate. Perianth pale purple to purple-red, lustrous; segments elliptic-lanceolate, 6–7 mm, apex acute. Filaments ca. 1/3 as long as perianth segments, connate at base and adnate to perianth segments; outer ones narrowly triangular; inner ones wider than outer, entire. Ovary applanate-globose, without concave nectaries. Style short, not exserted. Fl. Jun–Jul.

Slopes in *Picea* forests, meadows, subalpine to alpine slopes; 2400–3400 m. W Xinjiang (Tian Shan) [Kazakstan (basin of Ili River)].

126. Allium jacquemontii Kunth, Enum. Pl. 4: 399. 1843.

高原薤 gao yuan xie

Bulb solitary, ovoid, ca. 1 cm in diam.; tunic lilac-brown to brown-black, scarious. Leaves 2(or 3), 0.7–1.5 mm wide, semiterete, fistulose, margin glabrous. Scape (15–)25–40 cm, slender, terete. Spathe 2-valved, persistent; beak very short. Umbel hemispheric, many flowered. Pedicels ca. 3 × as long as perianth, ebracteolate. Perianth pale red to pale purple; segments with darker midvein, elliptic-lanceolate, 4.5–5 × 2–2.5 mm, apex acute. Filaments triangular, 1/2–2/3 as long as perianth segments, connate at base and adnate to perianth segments, entire; inner ones 1.5–2 × as wide as outer. Ovary globose, without concave nectaries. Style not exserted. Fl. Jul.

High plateaus, gravelly places; 4200–4600 m. SW Xinjiang (upper reaches of Karakax He), S and W Xizang (Gar Zangbo, Raka Zangbo, Rutog Xian) [India, Pakistan].

127. Allium porrum Linnaeus, Sp. Pl. 1: 295. 1753.

韭葱 jiu cong

Bulb solitary, cylindric ovoid to subglobose, sometimes bearing bulbels; tunic white, membranous, entire. Leaves broadly linear to linear-lanceolate, shorter than scape, 1–5 cm wide or more, slightly conduplicate, abaxially keeled. Scape 60–80 cm or more, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe 1-valved, deciduous; beak long. Umbel globose, densely many flowered. Pedicels subequal, several times as long as perianth, bracteolate. Perianth white to pale purple; segments with green midvein, suboblong, 4.5–5 × 2–2.3 mm, apex acute; outer ones denticulate along midvein abaxially. Filaments slightly longer than perianth segments, connate at base and adnate to perianth segments; outer ones narrowly triangular to linear-triangular, margin denticulate toward base; inner ones oblong, as wide as perianth segments for ca. 2/3 their length, 1-toothed on each side, teeth with apex elongated into a twisted, filiform cusp much longer than anther-bearing cusp. Ovary ovoid-globose, with transversely convex nectaries near middle of septa. Style exserted. Fl. and fr. May–Jul. 2*n* = 32.

Cultivated as a vegetable [native to SW Asia and Europe; also widely cultivated].

128. Allium sativum Linnaeus, Sp. Pl. 1: 296. 1753.

蒜 suan

Allium pekinense Prokhanov.

Bulb solitary, globose to applanate-globose, usually consisting of several bulbels covered with a common tunic; tunic white to purple, membranous, entire. Leaves broadly linear to linear-lanceolate, shorter than scape, to 2.5 cm wide, apex acuminate. Scape 25–50 cm, terete, covered with leaf sheaths for ca. 1/2 its length. Spathe deciduous; beak 7–20 cm. Umbel with many bulblets and few flowers. Pedicels slender, longer than perianth; bracteoles ovate, rather large, membranous, apex acute. Perianth usually pale red; outer segments ovate-lanceolate, ca. 4 × 1.4 mm; inner ones ovate, ca. 3 × 1.4 mm. Filaments shorter than perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones broadened at base, 1-toothed on each side, teeth with apex filiform and longer than perianth segments. Ovary globose. Style not exserted. Fl. Jul. 2*n* = 16*, 48.

Cultivated as a vegetable [native to Asia; also widely cultivated].

129. Allium oreophilum C. A. Meyer, Verzeichn. Pfl. Cauc. 37. 1831.

高地蒜 gao di suan

Allium ostrowskianum Regel; *A. platystemon* Karelin & Kirilov.

Bulb solitary, ovoid-globose, 1.5–2 cm in diam.; tunic grayish, papery. Leaves 2, linear, longer than scape, 4–6(–8) mm wide, margin scabrous. Scape (5–)15–20 cm, terete, covered with leaf sheaths only at base. Spathe 2- or 3-valved, sometimes reddish, scarious, apex acuminate. Umbel subglobose, laxly 10–15-flowered. Pedicels equaling or a few longer than perianth, rarely shorter, ebracteolate. Perianth red, cupular; segments with dark midvein, broadly elliptic, 8–11 × 4–4.5 mm, apex obtuse or gradually attenuate, not acute. Filaments unequal, ca. 1/2 as long as perianth segments, connate and adnate to perianth segments for ca. 1/2 their length; inner ones ± lanceolate-ovate, wider than outer ones. Ovary ovoid, without concave nectaries. Style short; stigma 3-cleft. Fl. Jul–Aug. 2*n* = 14, 16.

Gravelly slopes; 2500–3000 m. N and W Xinjiang (Altay Shan, Tian Shan) [Afghanistan, Kazakstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia].

130. Allium tulipifolium Ledebour, Fl. Altaic. 2: 9. 1830.

郁金叶蒜 yu jin ye suan

Bulb ovoid-globose, 1.5–2 cm in diam.; outer tunic gray, quickly lost; inner layers milk white, subpapery, entire. Leaves 2 or 3, glaucous, broadly linear, much shorter than scape, 1–1.5(–2) cm wide, margin dark green or whitish red, papillose-denticulate, apex gradually attenuate. Scape 20–30(–40) cm, terete, covered with leaf sheaths only at base. Spathe 2(or 3)-valved, laciniate, partly persistent, apex acuminate. Umbel hemispheric, many flowered. Pedicels ca. 3 × as long than perianth, ebracteolate. Perianth stellate, recurved and withered after anthesis, white; segments with green or purple-violet, fine midvein, narrowly elliptic, 4.5–5 × 1.5–2 mm, apex subacute. Filaments subequaling perianth segments, connate and adnate to perianth segments, base broadened; inner ones nearly 2 × as wide as outer. Ovary ovoid, without concave nectaries at base; ovules 4–6 per locule. Fl. May. 2*n* = 16.

Scrub, slopes, steppes; 600–1000 m. NW Xinjiang [Kazakstan, Russia].

In FRPS, a broad species concept was adopted, with *Allium tulipifolium* and *A. roborowskianum* treated as synonyms of *A. decipiens* Fischer ex Schultes & J. H. Schultes, under which name all specimens in Chinese herbaria are filed. In the present account, a narrow species concept is adopted, with *A. tulipifolium* and *A. roborowskianum* treated separately from *A. decipiens*, which was described from Ukraine and does not occur in China.

131. Allium roborowskianum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 359. 1887.

新疆蒜 xin jiang suan

Allium sinkiangense F. T. Wang & Y. C. Tang.

Bulb solitary, subglobose, 1.5–2.5 cm in diam., tunic whitish gray to grayish black, quickly lost; inner layers milk white, papery, entire. Leaves (1 or)2, linear, shorter than scape, 7–15 mm wide, margin minutely scabrous-denticulate or smooth, apex acute. Scape 30–50 cm, terete, covered with leaf sheaths only at base. Spathe 2- or 3-valved, partly persistent, apex acuminate. Umbel hemispheric, many flowered. Pedicels 1.5–2 × as long as perianth, ebracteolate. Perianth recurved or erect after anthesis, white or whitish lilac to lilac-pink, persistent; segments with green or purple midvein, ovate-elliptic to elliptic, 4–5 × 1.5–2 mm, apex obtuse. Filaments 2/3 as long as to slightly shorter than perianth segments, connate at base and adnate to perianth segments; outer ones narrowly triangular from broadened base; inner ones triangular from higher, broadly triangular-ovate base. Ovary obovoid-globose, densely papillose, without concave nectaries at base; ovules ca. 4 per locule. Fl. May.

Forests on shady slopes, sands, sandy mud; 1000–1300 m. W Xinjiang (Huocheng Xian) [Mongolia].

132. Allium robustum Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 753 [“853”]. 1841.

健蒜 jian suan

Allium robustum var. *alpestre* Karelin & Kirilov.

Bulb solitary, subglobose, 1–2 cm in diam.; tunic blackish, papery, quickly lost; inner layers yellowish white. Leaves 2–4, linear, much shorter than scape, 2–10 mm wide, smooth. Scape 40–60 cm, terete, slightly ribbed, covered with leaf sheaths only at base. Spathe 2/3 as long as to slightly shorter than umbel, apex shortly acuminate. Umbel hemispheric to subglobose, densely many flowered. Pedicels equal, 1.5–2(–3) × as long as perianth, ebracteolate. Perianth stellately spreading or rotate, recurved and twisted after anthesis, red to purple-red; segments with dark purple midvein, linear-lanceolate to obovate-oblanceolate, 5–5.5 × ca. 2 mm, apex subobtuse. Filaments equaling perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones with triangular base, ca. 2 × as wide as outer ones. Ovary applanate-globose, minutely tuberculate, with small, concave nectaries at base; ovlues 4 or more per locule. Fl. and fr. May–Jun.

Scrub, steppes, stony and dry slopes; 600–1000 m. N Xinjiang (Qinghe Xian, Tacheng Xian) [E Kazakstan].

133. Allium fetisowii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 631. 1878.

多籽蒜 duo zi suan

Allium simile Regel; *A. tschimganicum* B. Fedtschenko.

Bulb solitary, globose, 1–2.5 cm in diam.; tunic grayish black, papery, splitting at apex. Leaves broadly linear, much shorter than scape, 2–15 mm wide. Scape 30–70 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent. Umbel hemispheric to globose, densely many flowered. Pedicels subequal, 2–3 × as long as perianth, ebracteolate. Perianth stellately spreading, recurved and twisted after anthesis, purple-red; segments linear to linear-lanceolate, (4–)5–7 × 1–1.2 mm, without strong midvein. Filaments equal, 3/4–4/5 as long as perianth segments, connate at base and adnate to perianth segments; outer ones subulate; inner ones with broadened part subsquare and with 1 or 2 teeth on each side, rarely triangular and entire. Ovary subglobose, minutely tuberculate, with cracklike nectaries at base; ovules 4–6 per locule. Fl. and fr. Apr–Jun. $2n = 16$.

Among shrubs in meadows, exposed places. W Xinjiang (Xinyuan Xian) [Kyrgyzstan, Tajikistan].

One of us (Kamelin) believes that plants with basally entire inner filaments represent a new, as yet undescribed species; however, further study is required to ascertain their true status.

134. Allium winklerianum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 8: 661. 1884.

伊犁蒜 yi li suan

Bulb globose, 0.75–2 cm in diam.; tunic blackish gray, usually papery. Leaves (1 or)2–4, broadly linear, shorter than scape, (5–)10–25 mm wide, margin smooth or scabrous-denticulate, apex acute. Scape subterranean, 15–40 cm, terete, covered with leaf sheaths only at base. Spathe 2-valved, persistent; beak short. Umbel hemispheric, densely many flowered. Pedicels equal, ca. 1.5 × as long as perianth, ebracteolate. Perianth pinkish lilac to red-lilac, faded after anthesis, campanulate; segments without strong midvein, linear-oblong, 7–10(–15) × 2.5–3 mm, apex rounded. Filaments ca. 1/2 as long as perianth segments, connate for 1/2–2/3 their length and adnate to perianth segments, apex triangular; inner ones wider than outer. Ovary ovoid, without concave nectaries; ovules 4 or more per locule. Style short. Fl. May–Jun. $2n = 16$.

Forests, scrub, moist slopes; 1000–2500 m. W Xinjiang (basin of Ili He) [C Afghanistan, Kyrgyzstan, Tajikistan].

135. Allium tubiflorum Rendle, J. Bot. 44: 44. 1906.

合被韭 he bei jiu

Caloscordum tubiflorum (Rendle) Traub.

Plants without onionlike or garliclike odor. Bulb solitary, ovoid-globose to subglobose, 1–2 cm in diam.; tunic grayish black, membranous, entire. Leaves equaling to longer than scape, 1–3 mm wide, terete to subterete, fistulose, scabrous-denticulate along angles. Scape 15–30(–40) cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel few flowered. Pedicels unequal, 0.8–4(–7) cm, bracteolate. Perianth stellately spreading, red to purple; segments ovate-oblong, 5–7(–8) × 1.5–2(–2.4) mm, connate at base into a ca. 2 mm tube, apex obtuse or acute; inner ones equaling or slightly longer than outer. Filaments subulate, ca. 1/2 as long as perianth segments, connate at base and adnate to perianth segments for ca. 2 mm. Ovary conical, without concave nectaries at base; ovules (3 or)4(–6) per locule. Stigma 3-cleft. Fl. and fr. Jul–Oct. $2n = 16^*, 32^*$.

• Shrubby areas, slopes, rock crevices; near sea level to 2000 m. Gansu, Hebei, Henan, Hubei, Shaanxi, Shanxi, NE Sichuan.

136. Allium inutile Makino, Bot. Mag. (Tokyo) 12: 104. 1898.

齿棱茎合被韭 chi leng jing he bei jiu

Caloscordum inutile (Makino) Okuyama & Kitagawa.

Plants without onionlike or garliclike odor. Bulb solitary, ovoid or obovoid to subglobose, 1.1–1.3 cm in diam.; tunic pale brown, membranous, longitudinally veined. Leaves to 30 cm, semiterete, midvein raised abaxially. Scape 18–28 cm × 1–1.5 mm, terete, ribbed, covered with 3–5 leaf sheaths at base; ribs with short, thick, triangular teeth. Spathe 1-valved, pale brown, 9–12 mm, membranous, longitudinally striate when dry, persistent. Umbel 4–7-flowered. Pedicels unequal, 1.5–4 cm, thickened in fruit, with short teeth along ribs. Perianth stellately spreading, white; segments linear-oblanceolate, 5–7 mm, 1-veined, connate at base into a 1–1.5 mm tube. Filaments 2–2.5 mm, connate to middle and adnate to perianth segments, entire. Ovary flattened globose; ovules 3 or 4 per locule. Style 1–1.5 mm; stigma (2 or)3-lobed.

Forests. Anhui (Chu Xian) [Japan].

137. Allium neriniflorum (Herbert) G. Don in Loudon, Encycl. Pl., ed. 1855, 1342. 1855.

长梗合被韭 chang geng he bei jiu

Caloscordum neriniflorum Herbert, Edward's Bot. Reg. 30 (Misc. Matter): 67. 1844; *Nothoscordum neriniflorum* (Herbert) Bentham & J. D. Hooker; *N. neriniflorum* var. *albiflorum* Kitagawa.

Bulb solitary, ovoid-globose to subglobose, 1–2 cm in diam.; tunic grayish black, membranous, entire. Leaves equaling to longer than scape, 1–3 mm wide, terete to subterete, fistulose, scabrous-denticulate along angles. Scape (15–)20–50 cm, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel few flowered. Pedicels unequal, (4.5–)7–11 cm, bracteolate. Perianth stellately spreading, red to purple, rarely white; segments ovate-oblong or narrowly ovate to obovate-oblong, 7–10 × 2–3.2 mm, connate at base into a 2–3 mm tube, apex obtuse or with a point; inner ones usually longer and wider than outer. Filaments subulate, ca. 1/2 as long as perianth segments, connate at base and adnate to perianth segments for 2–3 mm. Ovary conical-globose, without concave nectaries at base; ovules (5 or)6(–8) per locule. Stigma 3-cleft. Fl. and fr. Jul–Aug. 2*n* = 16*.

Slopes, damp places, meadows, sandy places on coasts; near sea level to 2000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Mongolia, Russia (Far East)].

138. Allium monanthum Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 31: 109. 1886.

单花薤 dan hua xie

Allium monanthum var. *floribundum* Z. J. Zhong & X. T. Huang.

Plants dioecious. Bulb solitary, globose, 0.5–1 cm in diam.; tunic yellowish brown, sometimes tinged with red, entire or apex finely reticulate. Leaves 1 or 2, broadly linear, 1.5–2 × as long as scape, 3–8 mm wide, adaxially flat, abaxially convex, nearly semicircular in cross section, thick, attenuate at both ends. Scape 5–10 cm, slender, terete, covered with leaf sheaths only at base. Spathe 1-valved, persistent. Umbel 2–4(or 5)-flowered in male plants, 1-flowered in female plants. Pedicels subequaling perianth. Perianth white or pale red to dark red. Male flowers: pedicels nearly as thick as scape; perianth segments narrowly oblong or oblong to ovate-oblong, ca. 4 × 1.4–2(–2.4) mm, apex obtuse, inner ones narrower than outer; filaments narrowly triangular, equaling perianth segments, connate at base and adnate to perianth segments, inner ones wider than outer at base; ovules absent or rarely 1 locule with 1 sterile ovule. Female flowers: pedicels thicker than scape, dilated at apex; perianth segments ovate to ovate-lanceolate, 4–5 × 1.2–2 mm, apex acute, inner ones narrower than outer; stamens sterile; ovary ellipsoid-globose, without concave nectaries at base; stigma 3-cleft. Fl. May. 2*n* = 16, 32.

Forests, slopes. Hebei, Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia (Far East)].

33. MILULA Prain, Ann. Roy. Bot. Gard. (Calcutta) 5: 164. 1896.

穗花韭属 sui hua jiu shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Herbs perennial, with strong, onionlike odor. Bulb cylindric, enveloped by fibers derived from disintegrated leaf sheaths, usually with a short rhizome at base. Leaves linear, base sheathing. Inflorescence a terminal spike, many flowered, enveloped while young by a membranous spathe. Flowers crowded, small. Perianth segments usually 6, connate for 1/3–2/3 their length into a tube. Stamens 6, inserted at base of perianth tube, exserted; inner ones strongly dilated in basal 1/2, with 1 tooth on each side; anthers subdorsifixed. Ovary 3-loculed; ovules 2 per locule. Style columnar, slender; stigma small. Fruit a capsule, several seeded, loculicidal.

One species: China, Nepal.

Some authors consider that *Milula* should be included within *Allium*.

1. Milula spicata Prain, Ann. Roy. Bot. Gard. (Calcutta) 5: 165. 1896.

穗花韭 sui hua jiu

Plants (5–)10–25(–60) cm tall. Bulb 4–10 cm. Leaves usually 10–20 cm × 2–4 mm. Scape erect, hollow, subequaling leaves, naked. Spathe broken and pendulous at anthesis, 2–3 cm. Spike 1.5–3.5 × 0.8–1.2 cm, very densely flowered. Perianth pale purple, campanulate, 2.5–3.5 mm, persistent; lobes broadly ovate to orbicular, 1–1.2 × ca. 1.2 mm. Stamens 5.5–6.5 mm, much longer than perianth. Style 2.5–4 mm, slightly exserted. Capsule subglobose, 3–4 mm in diam., obtusely 3-angled. Seeds black, narrowly ovate, 2–2.5 mm. Fl. and fr. Aug–Oct. 2*n* = 16.

Pinus forests, thickets, grassy slopes, sandy grasslands; 2900–4800 m. S Xizang [Nepal].

34. BARNARDIA Lindley, Bot. Reg. 12: t. 1029. 1826.

绵枣儿属 mian zao er shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, bulbiferous. Bulb covered with a tunic. Leaves basal, sessile, linear to subovate. Scape erect, simple, naked. Inflorescence a terminal raceme, usually many flowered; bracts small, membranous. Pedicels articulate. Perianth segments 6, ascending or spreading, free to slightly connate at base. Stamens 6, inserted at base or near middle of perianth segments; filaments slender or slightly dilated toward base; anthers dorsifixed, introrse. Ovary 3-loculed; ovules 1 or 2(or 8–10) per locule. Style filiform;

stigma small. Fruit a capsule, globose to obovoid, loculicidal. Seeds black, sometimes angular.

Two species: one in China, Japan, Korea, and Russia, the other in NW Africa and SW Europe.

1. Barnardia japonica (Thunberg) Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 555. 1829.

绵枣儿 mian zao er

Ornithogalum japonicum Thunberg in Murray, Syst. Veg., ed. 14, 328. 1784; *Barnardia alboviridis* (Handel-Mazzetti) Speta; *B. bispatha* (Handel-Mazzetti) Speta; *B. borealijaponica* (M. Kikuchi) Speta; *B. pulchella* (Kitagawa) Speta; *B. scilloides* Lindley; *B. sinensis* (Loureiro) Speta; *O. sinense* Loureiro; *Scilla alboviridis* Handel-Mazzetti; *S. bispatha* Handel-Mazzetti; *S. borealijaponica* M. Kikuchi; *S. chinensis* Bentham, nom. illeg. (included *B. scilloides*); *S. chinensis* var. *mounsei* H. Léveillé; *S. japonica* Baker (1873), not Thunberg (1784); *S. scilloides* (Lindley) Druce; *S. scilloides* f. *albida* Y. N. Lee; *S. scilloides* var. *alboviridis* (Handel-Mazzetti) F. T. Wang & Y. C. Tang; *S. scilloides* var. *mounsei* (H. Léveillé) McKean; *S. scilloides* var. *pulchella* (Kitagawa) Kitagawa; *S. sinensis* Merrill (1919), not *S. chinensis* Bentham (1861); *S. sinensis* var. *pulchella* (Kitagawa) Kitagawa; *S. thunbergii* Miyabe & Kudô; *S. thunbergii* var. *pulchella* Kitagawa.

Bulb ovoid to globose, 2–5 × 1–3 cm; tunic blackish brown. Leaves usually 4 or 5, (10–)15–40 cm × 2–9 mm, soft, smooth. Scape longer than leaves. Raceme (2–)7–20 cm, densely many flowered; bracts narrowly lanceolate. Pedicels 5–12 mm. Perianth segments rose purple, pink, or white, obovate, elliptic, or narrowly elliptic, 2.5–4 × ca. 1.2 mm, slightly connate and discoid at base. Stamens 2–3.5 mm; filaments sublanceolate, papillose-puberulent or glabrous. Ovary 1.5–2 mm, papillose-puberulent; ovules 1 or 2 per locule. Style 1–1.3 mm. Capsule subobovoid, 3–6 × 2–4 mm. Seeds 1–3, 2.5–5 mm. Fl. and fr. Jul–Nov. 2*n* = 16, 18, 26, 27, 34*, 35, 36, 43.

Forest margins, hillsides, open slopes, grasslands; near sea level to 2600 m. Guangdong, Guangxi, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shanxi, Sichuan, Taiwan, Yunnan [Japan (including Ryukyu Islands), Korea, E Russia].

35. THYSANOTUS R. Brown, Prodr. 282. 1810, nom. cons.

异蕊草属 yi rui cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Chlamysporum Salisbury, nom. rej.

Herbs perennial, with a short or elongate rhizome. Leaves basal or nearly so, grasslike, sometimes very narrow, flat or terete. Scape axillary. Inflorescence usually a terminal raceme or panicle, less often an umbel or solitary flower; bracts small. Flowers bisexual; pedicel articulate proximally. Tepals 6, free, persistent; outer ones entire; inner ones usually fimbriate-ciliate at margin. Stamens 6, included, inner ones sometimes reduced; filaments rather short; anthers basifixed, inner ones usually longer. Ovary 3-loculed; ovules 2 per locule. Style filiform; stigma small. Fruit a loculicidal capsule. Seeds few, black.

About 50 species: mainly in Australia, a few species in tropical Asia; one species in China.

1. Thysanotus chinensis Bentham, Fl. Hongk. 372. 1861.

异蕊草 yi rui cao

Halongia purpurea Jeanplong; *Thysanotus chrysantherus* F. Mueller.

Rhizome short, stout. Leaves many, tufted, narrowly linear or flattened filiform, 15–20 cm × ca. 1 mm, rigid, glabrous. Scape erect, 20–30 cm, slender, bearing a terminal umbel. Umbel 4–10-flowered; bracts ovate or lanceolate, 3–5 mm, membranous. Pedicels 1–1.5 cm, articulate near base. Tepals blue, suboblong, 7–8 × 1–2 mm, membranous, 3–5-veined; inner ones sometimes fimbriate-denticulate at margin proximally. Stamens 4–5 mm; outer anthers ca. 1.2 mm, inner ones ca. 2.2 mm. Capsule ellipsoid, ca. 4 × 3 mm. Seeds subglobose, ca. 1 mm. Fl. and fr. Jun–Jul.

SE Fujian, Guangdong, Guangxi, Taiwan [Indonesia, Malaysia, Philippines, Thailand, Vietnam; Australia].

36. CORDYLINE Commerson ex R. Brown, Prodr. 280. 1810, nom. cons.

朱蕉属 zhu jiao shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Taetsia Medikus, nom. rej.

Plants treelike or shrubby. Stems ± woody, usually few branched, with conspicuous leaf scars distally. Leaves crowded at apex of stems, petiolate (or sessile); petiole 10–30 cm, base amplexicaul; leaf blade elliptic-lanceolate to sword-shaped, veins essentially parallel but with lateral veins branching from midvein in proximal 1/2. Inflorescence arising from axils of distal leaves, usually paniculate, large, many branched. Flowers bisexual, solitary, usually tubular-campanulate or subcylindric; pedicel usually short, articulate at or near apex. Perianth with short tube; lobes in 2 whorls of 3. Stamens 6, inserted in tube or throat of perianth; anthers versatile. Ovary 3-loculed; ovules 2 to many per locule. Style slender; stigma capitate, small. Fruit a capsule, leathery, 1- to several

seeded. Seeds black, coated with phytomelanin.

About 20 species: S and SE Asia, Australia, Pacific Islands, South America; one species (introduced) in China.

1. Cordyline fruticosa (Linnaeus) A. Chevalier, Cat. Pl. Jard. Bot. Saigon, 66. 1919.

朱蕉 zhu jiao

Convallaria fruticosa Linnaeus, Herb. Amb. 16. 1754; *Aletris chinensis* Lamarck; *Asparagus terminalis* Linnaeus, nom. illeg. (included *C. fruticosa*); *Cordyline terminalis* (Linnaeus) Kunth; *C. terminalis* var. *ferrea* (Linnaeus) Baker; *Dracaena ferrea* Linnaeus, nom. illeg. (included *C. fruticosa*); *D. terminalis* (Linnaeus) Linnaeus; *Taetsia ferrea* (Linnaeus) Medikus; *T. fruticosa* (Linnaeus) Merrill; *T. terminalis* (Linnaeus) W. Wight ex Safford.

Plants erect, shrubby. Stems simple or sometimes branched, 1–3 m × 1–3 cm. Leaves petiolate; petiole 10–30 cm, channeled adaxially, base dilated, clasping stem and other petiole bases; leaf blade green or variously colored, oblong-lanceolate, elliptic-lanceolate, or narrowly oblong, 25–50 × 5–10 cm, midvein distinct and raised abaxially, apex aristate. Panicle 30–60 cm; branches spreading, 6–13 cm, many flowered. Flowers subsessile or shortly pedicellate; pedicel (if distinct) to 4 mm, subtended by 3 bracteoles; bracteoles ovate, 2–3 mm, margin broadly membranous, apex cuspidate. Perianth reddish, yellowish, or bluish purple; tube 5–6 mm; lobes erect or recurved, nearly as long as tube. Stamens inserted in throat of perianth, scarcely exserted. Fruit reddish, several seeded. Fl. Nov–Mar.

Widely cultivated, sometimes naturalized. Fujian, Guangdong, Guangxi, Hainan [probably native to Pacific Islands but cultivated pantropically].

Some authors have adopted the name *Cordyline terminalis* instead of *C. fruticosa* because of the apparent earlier homonym *C. fruticosa* Goeppinger (1855); however, the latter name was not validly published.

37. HOSTA Trattinnick, Arch. Gewächsk. 1: 55. 1812, nom. cons.

玉簪属 yu zan shu

Chen Xinqi (陈心启 Chen Sing-chi); David E. Boufford[7]

Herbs perennial, rhizomatous. Rhizome horizontal, large, sometimes with stolons. Leaves numerous, basal, spiral, long petiolate. Scape terminal, usually with a few bractlike cauline leaves. Inflorescence a terminal raceme, few to many flowered; bracts green or white. Flowers bisexual, solitary, rarely in clusters of 2 or 3; pedicel short. Perianth white to blue or lavender, tubular-campanulate or nearly funnelform; segments 6, connate. Stamens 6, free or rarely adnate to perianth tube near base; filaments filiform; anthers dorsifixed, introrse, dehiscing longitudinally. Ovary 3-loculed; ovules many per locule. Style filiform; stigma capitate, small. Fruit a loculicidal capsule. Seeds many, black.

About 45 species: mainly in Japan, a few species in China, Korea, and Russia; four species (three endemic) in China.

1a. Perianth white, 10 cm or more; flowers fragrant, subtended by 2 bracts; filaments adnate to perianth tube near base; capsule ca. 6 cm ..... 1. *H. plantaginea*
1b. Perianth purplish red, purple, or white with purple streaks, 4–6.5 cm; flowers not fragrant, subtended by 1 bract; filaments free; capsule less than 6 cm.
2a. Petiole winged at least in distal 1/2, wings 2–5 mm wide; bracts 0.5–0.7 cm ..... 4. *H. ensata*
2b. Petiole scarcely winged; bracts 1–3.5 cm.
3a. Plants green, glabrous, not white powdery; base of leaf blade usually cordate or truncate; perianth purple-red; bracts 1–2 cm ..... 2. *H. ventricosa*
3b. Plants white powdery particularly on abaxial surface of leaves; base of leaf blade cuneate; perianth white, with purple streaks; bracts 1–3.5 cm ..... 3. *H. albofarinosa*

1. Hosta plantaginea (Lamarck) Ascherson, Bot. Zeitung (Berlin) 21: 53. 1863.

玉簪 yu zan

Hemerocallis plantaginea Lamarck, Encycl. 3: 103. 1789; *Hosta plantaginea* f. *stenantha* F. Maekawa.

Plants green, glabrous. Rhizome 1.5–2 cm thick, stout. Petiole 20–40 cm; leaf blade ovate-cordate, -orbicular, or ovate, 14–25 × 8–16 cm, glabrous, veins in 6–10 pairs, base cordate, margin slightly undulate, apex abruptly acute. Scape 40–80 cm. Raceme several to more than 10-flowered; bracts 2 subtending each flower, outer one ovate or lanceolate, 2.5–7 × 1–1.5 cm, inner one very small. Flowers solitary or sometimes in clusters of 2 or 3, fragrant; pedicel ca. 1 cm. Perianth white, funnelform, 10–13 cm. Stamens slightly shorter than or subequaling perianth; filaments adnate to perianth tube near base. Capsule cylindric, ca. 6 × 1 cm, 3-angled. Fl. and fr. Aug–Oct. 2*n* = 60*.

• Forests, grassy slopes, rocky places; near sea level to 2200 m. Anhui, Fujian, Guangdong, Guangxi, ?Hebei, Hubei, Hunan, Jiangsu, ?Liaoning, ?S Shaanxi (Qin Ling), Sichuan, ?Yunnan, ?Zhejiang.

Widely cultivated as an ornamental.

2. Hosta ventricosa (Salisbury) Stearn, Gard. Chron., ser. 3,

[7] Harvard University Herbaria, 22 Divinity Avenue, Cambridge, Massachusetts 02138-2020, U.S.A.

90: 27. 1931.

紫萼 zi e

Bryocles ventricosa Salisbury, Trans. Hort. Soc. London 1: 335. 1812.

Plants green, glabrous. Rhizome 0.3–1 cm thick, stout. Petiole 6–30 cm; leaf blade ovate-cordate, -orbicular, or ovate, 4–19 × 4–17 cm, glabrous, veins in 7–11 pairs, base subcordate or subtruncate, very rarely slightly cuneate, apex abruptly acute or nearly shortly caudate. Scape 60–100 cm. Raceme 10–30-flowered; bracts 1 subtending each flower, white, oblong-lanceolate, 1–2 cm, membranous. Flowers solitary, not fragrant; pedicel 7–10 mm. Perianth purple-red, funnelform, 4–6 cm. Stamens slightly longer than perianth, exserted; filaments free. Capsule cylindric, 2.5–4.5 cm × 6–7 mm, 3-angled. Fl. and fr. Jun–Sep. 2*n* = 60*, ca. 102*.

• Forests, grassy slopes, hillsides; 500–2400 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan.

Widely cultivated as an ornamental.

3. Hosta albofarinosa D. Q. Wang, Guihaia 9: 297. 1989.

白粉玉簪 bai fen yu zan

Plants white powdery. Petiole 14–20 cm; leaf blade ovate to narrowly so, 13–30 × 6–9 cm, abaxially strongly white powdery, veins in 5–7 pairs, base cuneate, apex acuminate. Scape 40–45 cm. Raceme usually ca. 10-flowered; bracts 1 subtending each flower, greenish white, ovate or lanceolate, 1–3.5 × 0.6–1.1 cm. Flowers solitary, not fragrant; pedicel ca. 1 cm. Perianth white with purple streaks, funnelform, ca. 5.5 cm. Stamens subequaling or slightly longer than perianth; filaments free. Style ca. 5 cm, exserted. Fl. Jun.

• Grassy slopes; ca. 800 m. SE Anhui (Xiuning Xian).

4. Hosta ensata F. Maekawa, J. Jap. Bot. 13: 900. 1937.

东北玉簪 dong bei yu zan

Hosta clausa Nakai var. *ensata* (F. Maekawa) W. G. G. Schmid; *H. clausa* var. *normalis* F. Maekawa; *H. ensata* var. *foliata* P. Y. Fu & Q. S. Sun; *H. ensata* var. *normalis* (F. Maekawa) Q. S. Sun.

Plants green, glabrous. Rhizome ca. 1 cm thick, stout, usually with a long, creeping stolon. Petiole 5–25 cm, winged at least in distal 1/2, wings 2–5 mm wide; leaf blade oblong-lanceolate to ovate-elliptic, 10–15 × 2–7 cm, glabrous, veins in 5–8 pairs, base cuneate or obtuse, apex subacuminate. Scape 33–55 cm. Raceme several to more than 20-flowered; bracts 1 subtending each flower, broadly lanceolate, 0.5–0.7 cm, membranous. Flowers solitary; pedicel 5–10 mm. Perianth purple, subfunnelform, 4–4.5 cm. Stamens slightly exserted; filaments free. Fl. Aug.

Forest margins, moist places; near sea level to 500 m. S Jilin, S Liaoning [Korea, Russia].

38. CHLOROPHYTUM Ker Gawler, Bot. Mag. 27: t. 1071. 1807.

吊兰属 diao lan shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, rhizomatous. Rhizome often short, inconspicuous, sometimes thick, elongate. Roots usually ± thick or slightly fleshy. Leaves basal, subdistichous or fasciculate, sessile or petiolate, usually linear to elliptic-lanceolate, conduplicate, base sheathing. Scape axillary, proximally with bractlike cauline leaves. Inflorescence a terminal raceme or panicle; bracts small. Flowers bisexual; pedicel articulate. Perianth usually white; tepals 6, free, 3–7-veined, persistent or marcescent. Stamens 6, inserted at base of tepals; filaments filiform, usually slightly widened near middle; anthers nearly basifixed, introrse. Ovary 3-loculed; ovules 1 to several per locule. Style slender; stigma small. Fruit a capsule, acutely 3-angled, loculicidal. Seeds black coated, flattened.

Between 100 and 150 species: mainly in tropical areas of Africa, Asia, and Australia, also in South America; four species (one endemic) in China.

In addition to the following species, *Chlorophytum comosum* (Thunberg) Jacques, native to S Africa, is cultivated in China as an ornamental.

1a. Leaves subdistichous; tepals 2–3 mm ..... 4. *C. laxum*
1b. Leaves fasciculate; tepals more than 8 mm.
2a. Leaves grasslike, 0.2–0.4 cm wide; flowers solitary ..... 2. *C. chinense*
2b. Leaves not grasslike, 0.6–5 cm wide; at least some flowers in clusters of 2 or 3.
3a. Rhizome short, inconspicuous; roots nearly clustered; inflorescence simple or few branched ..... 1. *C. nepalense*
3b. Rhizome ascending, elongate, rather thick; roots scattered; inflorescence many branched ..... 3. *C. malayense*

1. Chlorophytum nepalense (Lindley) Baker, J. Linn. Soc., Bot. 15: 320. 1876.

西南吊兰 xi nan diao lan

Phalangium nepalensis Lindley, Trans. Hort. Soc. London 6: 277. 1826; *Chlorophytum flaccidum* W. W. Smith; *C. khasianum* J. D. Hooker; *C. mekongense* W. W. Smith; *C. oreogenes* W. W. Smith.

Rhizome short, inconspicuous. Roots 1–2 mm thick, slightly thickened. Leaves fasciculate, sessile or slightly narrowed and petiolelike basally, linear to sublanceolate, 8–60 × 0.6–2(–5) cm, glabrous. Scape erect, 30–60(–90) cm. Raceme sometimes few branched and paniculate, many flowered; bracts linear-lanceolate, shorter than flowers. Flowers solitary or in clusters of 2 or 3; pedicel ca. 1 cm, articulate near middle or distally. Tepals white, narrowly oblong-elliptic, 1–1.4 cm × 2–3 mm. Stamens slightly shorter than tepals; anthers usually longer than filaments. Capsule obovoid, rarely subglobose, 6–9 mm; seeds several per valve. Fl. and fr. Jul–Sep. 2*n* = 42, 56.

Forest margins, grassy slopes, rocky places along valleys; 1300–

2800 m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, NE India, Myanmar, Nepal, Sikkim].

2. Chlorophytum chinense Bureau & Franchet, J. Bot. (Morot) 5: 154. 1891.

狭叶吊兰 xia ye diao lan

Chlorophytum platystemon Diels.

Rhizome short, inconspicuous. Roots cylindric or subfusiform, 2–3 mm thick, fleshy. Leaves fasciculate, sessile, grasslike, 10–30 × 0.2–0.4 cm, glabrous. Scape erect, 20–40 cm, rather slender. Raceme sometimes few branched and paniculate, several to many flowered; bracts very small. Flowers solitary; pedicel 7–11 mm, usually articulate proximally. Tepals white with pink veins, oblong-elliptic, 9–10 × 3–4 mm, 3–5-veined. Stamens slightly shorter than tepals; anthers usually connivent, 5–6 mm, ca. 2 × as long as filaments. Style ca. 8 mm. Fl. Jun–Aug.

• Forest margins, grassy slopes, river banks; 2600–3000 m. SW Sichuan, NW Yunnan.

3. Chlorophytum malayense Ridley, Fl. Malay Penins. 5: 341. 1925.

大叶吊兰 da ye diao lan

Rhizome ascending, cylindric, elongate, 1–2 cm thick, with some scattered roots. Leaves fasciculate, basally gradually narrowed into a long petiole; leaf blade narrowly oblong-lanceolate to lanceolate, 45–55 × 2–5 cm, glabrous, turning blackish when dry. Scape erect, 50–80 cm. Raceme sometimes many branched and paniculate; bracts small. Flowers usually paired, rarely solitary or in clusters of 3; pedicel 3–5 mm, articulate near middle. Tepals white, elliptic-oblong, 8–10 × 3–4 mm. Stamens shorter than tepals; anthers 3–4 mm, slightly longer than filaments. Capsule subglobose, 6–7 × 7–9 mm; seeds ca. 4 per valve. Fl. and fr. Apr–May.

Forests, thickets, hillsides along valleys; 400–1500 m. Guangxi, S Yunnan [Laos, Malaysia, Thailand, Vietnam].

4. Chlorophytum laxum R. Brown, Prodr. 277. 1810.

小花吊兰 xiao hua diao lan

Anthericum parviflorum (Wight) Bentham; *Chlorophytum parviflorum* (Wight) Dalzell; *Phalangium parviflorum* Wight.

Rhizome short, inconspicuous. Roots clustered. Leaves subdistichous, sessile, grasslike, usually falcate, 10–20(–37) cm × 3–6 mm, glabrous. Scape usually 2 or 3, erect or arching, 10–20 cm. Raceme sometimes few branched and paniculate, several to many flowered; bracts narrowly deltoid to lanceolate, very small. Flowers solitary or paired; pedicel 2–5 mm, articulate proximally. Tepals greenish white, ovate, 2–3 × ca. 1 mm, closely 3-veined. Stamens shorter than tepals; anthers subglobose, ca. 0.4 mm, 1/3–1/2 as long as filaments. Capsule broadly globose to broadly obcordate, ca. 3 × 5(–7.5) mm; seeds usually 1 per valve. Fl. and fr. Oct–Apr. 2*n* = 14, 16, 32.

Shady places, rocky slopes; near sea level to 200 m. S Guangdong, Hainan [India, Indonesia, Malaysia, Myanmar, Sri Lanka, Thailand; tropical Africa, Australia].

39. DIURANTHERA Hemsley, Hooker's Icon. Pl. 28: t. 2734. 1902.

鹭鸶兰属 lu si lan shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Herbs perennial, rhizomatous. Rhizome vertical, very short. Roots numerous, thickened, fleshy. Leaves several, all basal, tufted or arranged in a lax rosette, narrowly linear to linear-oblanceolate. Scape simple or few branched, longer than leaves, proximally with a few sterile bracts, terminating in a lax raceme. Bracts ovate to linear-lanceolate, usually shorter than flowers, membranous or ± so, veined. Flowers bisexual, usually paired, shortly pedicellate; pedicel articulate or not. Tepals 6, spreading or ± so, free, linear, 3–20-veined; outer ones slightly narrower or sometimes shorter than inner ones. Stamens 6, slightly shorter than tepals; filaments filiform; anthers dorsifixed at base, linear, base with 2 prominent, caudate appendages 1–3 mm. Ovary 3-loculed. Style filiform, long; stigma very small. Fruit a capsule, obovoid or ellipsoid, 3-angled, loculicidal. Seeds black, orbicular, flattened, base cordate.

• Four species: China.

Except for its prominently appendaged anthers, *Diuranthera* is very similar to *Chlorophytum*, the similarity extending to the karyotypes, and some authors treat the former genus as a highly specialized member of the latter. However, the two are here distinguished at generic level.

1a. Leaves densely white powdery abaxially; tepals yellow, ca. 20-veined, inner ones much longer than outer .... 2. *D. chinglingensis*
1b. Leaves glabrous abaxially; tepals white, 3–5-veined, inner ones nearly as long as outer.
2a. Pedicels not articulate ..... 1. *D. inarticulata*
2b. Pedicels articulate.
3a. Leaves linear-oblanceolate, 15–65 × 0.7–3 cm, margin often somewhat undulate; tepals 3(–5)-veined; basal appendages of anthers 2–3 mm, apex acute ..... 3. *D. major*
3b. Leaves usually narrowly linear, 8–40 × 0.3–1 cm, margin flat; tepals 5-veined; basal appendages of anthers 1–1.5 mm, apex obtuse-rounded ..... 4. *D. minor*

1. Diuranthera inarticulata F. T. Wang & K. Y. Lang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 282. 1980.

南川鹭鸶兰 nan chuan lu si lan

Leaves linear-oblanceolate, 30–50 × 1.5–3 cm, glabrous, margin serrulate, apex acuminate. Scape 33–40 cm. Bracts 1–2 cm. Flowers usually paired; pedicel 0.8–1.1 cm, not articulate.

Tepals white, linear, membranous; outer ones ca. 2 × 0.2 cm, 5-veined; inner ones ca. 2.2 × 0.2 cm, 3-veined. Filaments white, 0.8–0.9 cm. Anthers ca. 1.3 cm; basal appendages ca. 3 mm, apex acute. Style 1.4–1.6 cm. Fl. Jul–Aug.

• Grassy slopes; ca. 1800 m. SE Sichuan (Nanchuan Xian).

2. Diuranthera chinglingensis J. Q. Xing & T. C. Cui, Acta Bot. Bor.-Occid. Sin. 7: 203. 1987.

秦岭鹭鸶兰 qin ling lu si lan

Leaves linear-oblanceolate, 40–60 × 1.5–2.6 cm, abaxially densely white powdery, margin sparsely serrulate, apex long acuminate. Scape 70–85 cm. Raceme 25–30 cm; bracts 0.7–2.2 cm. Flowers solitary or paired; pedicel 1.7–2 cm, not articulate. Tepals yellow, membranous, ca. 20-veined; outer ones narrowly ovate, ca. 1.7 × 0.4 cm; inner ones linear, ca. 4 × 0.5 cm. Filaments pale yellow, ca. 0.35 cm. Anthers ca. 0.8 cm; basal appendages ca. 1.5 mm, apex acute. Style longer than stamens. Fl. Jun.

• About 1200 m. S Shaanxi (Ningshan Xian).

3. Diuranthera major Hemsley, Hooker's Icon. Pl. 28: t. 2734. 1902.

鹭鸶兰 lu si lan

Chlorophytum majus (Hemsley) Marais & Reilly.

Leaves linear-oblanceolate, 15–65 × 0.7–3 cm, soft, glabrous,margin often somewhat undulate, minutely serrulate, apex acuminate. Scape 20–80 cm. Raceme sometimes few branched; bracts ovate to linear-lanceolate, 0.4–2.5(–5) cm, apex acuminate. Flowers usually paired, cylindric in bud; pedicel 0.5–1.8 cm, articulate proximally. Tepals white, linear, 1.5–3 × 0.1–0.3 cm, 3(–5)-veined; outer ones generally slightly narrower than inner. Filaments 0.5–1.2 cm. Anthers 1.1–1.6 cm (including appendages); basal appendages 2–3 mm, apex acute. Style 1.1–2.4 cm. Capsule ellipsoid or obovoid, 6–10 × 5–8 mm. Fl. and fr. Jun–Oct.

• Forests, grassy slopes, hillsides, ledges of cliffs, moist hard-packed red soil, gardens, sometimes cultivated and naturalized; 1200–3000 m. Guizhou, Sichuan, Yunnan.

4. Diuranthera minor (C. H. Wright) C. H. Wright ex Hemsley, Hooker's Icon. Pl. 28: t. 2734. 1902.

小鹭鸶兰 xiao lu si lan

Paradisea minor C. H. Wright, Bull. Misc. Inform. Kew 1895: 118. 1895.

Leaves usually narrowly linear, sometimes linear-oblanceolate, 8–40 × 0.3–1 cm, soft, glabrous, margin flat, minutely serrulate, apex gradually long acuminate. Scape 30–85 cm. Raceme usually simple; bracts ovate to linear-lanceolate, 0.3–1.8 cm, apex acuminate. Flowers usually paired, narrowly ellipsoid to cylindric in bud; pedicel 0.5–1 cm, articulate proximally. Tepals white, linear, 1.5–2 × 0.2–0.4 cm, 5-veined. Filaments 0.5–1.2 cm. Anthers 0.8–1.2 cm (including appendages); basal appendages 1–1.5 mm, apex obtuse-rounded. Style 1.4–2 cm. Capsule ellipsoid or obovoid, 0.8–1 × 0.7–0.9 cm. Fl. and fr. Apr–Oct.

• *Pinus* and *Quercus* forests, plantations, grasslands, hillsides; 1100–3200 m. Guizhou, Sichuan, Yunnan.

Diuranthera minor is somewhat similar to *Chlorophytum nepalense*, but the latter species differs as follows: leaves longer, often linear-oblanceolate; flowers smaller, often ellipsoid in bud; anthers with small, rounded basal lobes ca. 0.5 mm.

40. ANEMARRHENA Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 140. 1833.

知母属 zhi mu shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Herbs perennial, rhizomatous. Rhizome horizontal, creeping, stout, covered on upper side with fibers from old, disintegrated leaf bases. Roots emerging from lower side of rhizome, thickened, fleshy. Leaves several, all basal, tufted, grasslike, gradually narrowed into a filiform, distal part. Scape erect, simple, longer than leaves, bearing a few sterile bracts and a terminal raceme. Raceme many flowered; bracts small, membranous, apex acute to filiform acuminate. Flowers bisexual, solitary or in clusters of 2 or 3, subsessile to shortly pedicellate. Perianth narrowly funnelform; segments 6, slightly connate at base, 3-veined. Stamens 3, inserted near middle of inner perianth segments, not exserted; filaments short, flattened; anthers nearly basifixed. Ovary 3-loculed; ovules 2 per locule. Style short; stigma small. Fruit a capsule, narrowly ovoid-ellipsoid, loculicidal. Seeds flattened, narrowly winged along angles.

One species: China, Korea, Mongolia.

1. Anemarrhena asphodeloides Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 140. 1833.

知母 zhi mu

Rhizome to 10 × 0.5–1.7 cm. Leaves 10–60 × 0.15–1 cm, glabrous, margin scabrid. Scape (20–)35–100 cm, glabrous. Raceme 10–50 cm; bracts ovate or ovate-orbicular, apex often long acuminate. Perianth segments pink, pale purple, or white, linear or narrowly oblong, 5–10 × 1–1.5 mm, persistent in fruit. Ovary ovoid, ca. 1.5 × 1 mm. Style ca. 1 mm. Capsule 0.8–1.5 × 0.3–0.6 cm including beaked apex, prominently 6-angled. Seeds black, narrowly oblong-elliptic, slightly curved, 7–12 × 2.5–3 mm. Fl. and fr. Jun–Sep. $2n = 22$*.

Scrub, grassy slopes, steppes, sunny and sandy hillsides, also cultivated; near sea level to 1500 m. Gansu, Guizhou, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan; cultivated in Taiwan [Korea, Mongolia].

The rhizomes are used medicinally.

41. ASPARAGUS Linnaeus, Sp. Pl. 1: 313. 1753.

天门冬属 tian men dong shu

Chen Xinqi (陈心启 Chen Sing-chi); Kamilla G. Tamanian[1]

Herbs perennial or subshrubs, dioecious or hermaphroditic, usually with short rhizomes. Main stems erect or climbing, generally branched, with cladodes (leaflike stems) in axils of main stems and branches. Cladodes borne in clusters, rarely solitary, green, flat, 3-angled, or subterete. Leaves appressed to stem, not green, scalelike, base spurred, spurs often extended into spines. Inflorescence an axillary cluster of flowers, rarely a solitary flower, sometimes a raceme or umbel. Pedicel articulate, subtended by membranous bracteoles. Perianth campanulate or subglobose; segments free or occasionally connate at base. Stamens 6; filaments usually adnate to perianth segments in varying degrees; anthers dorsifixed. Ovary 3-loculed; ovules few per locule. Fruit a berry. Seeds 1 to few.

Between 160 and 300 species: widespread in temperate and tropical regions of Africa, Asia, and Europe; 31 species (15 endemic, two introduced) in China.

1a. Inflorescence an axillary raceme; plants hermaphroditic.
2a. Spines 15–20 mm on main stems and 5–10 mm on branches ..... 1. *A. racemosus*
2b. Spines 3–5 mm on main stems and indistinct on branches ..... 2. *A. densiflorus*
1b. Inflorescence a solitary flower or sessile cluster of flowers; plants dioecious (hermaphroditic in *A. setaceus*).
3a. Cladodes flat with a distinct midvein or 3-winged.
4a. Stems without sharp spines.
5a. Plants ± climbing; branches sparsely cartilaginous denticulate ..... 12. *A. subscandens*
5b. Plants erect; branches not cartilaginous denticulate.
6a. Cladodes 3-winged basally; stamens equal, filaments free ..... 7. *A. schoberioides*
6b. Cladodes flat; stamens unequal, filaments adnate to perianth segments for ca. 1/2 their length.
7a. Pedicels 10–20 mm ..... 4. *A. filicinus*
7b. Pedicels 1–6 mm.
8a. Cladodes (1 or)2 or 3 per fascicle, 5–12 × (1–)2–3 mm ..... 5. *A. lycopodineus*
8b. Cladodes 5–10 per fascicle, 3–4 × ca. 0.5 mm ..... 6. *A. yanbianensis*
4b. Stems with sharp spines.
9a. Male flowers subglobose, 1–1.5 mm ..... 13. *A. yanyuanensis*
9b. Male flowers subcampanulate, 1.5–5 mm.
10a. Branches and branchlets generally without sharp spines; flowers developing after cladodes.
11a. Cladodes usually 3 per fascicle; filaments free ..... 8. *A. cochinchinensis*
11b. Cladodes 6–9 per fascicle; filaments adnate to perianth segments for ca. 1/2 their length .... 9. *A. taliensis*
10b. Branches and branchlets with woody, sharp spines; flowers developing before or with cladodes.
12a. Cladodes 2–5(–7) per fascicle; stems not striate-ridged; spines on branches shorter than or equaling pedicels ..... 10. *A. munitus*
12b. Cladodes (3–)6–14 per fascicle; stems distinctly striate-ridged; spines on branches longer than pedicels ..... 11. *A. myriacanthus*
3b. Cladodes subterete, sometimes slightly flattened, but without clear midvein.
13a. Plants hermaphroditic; cladodes 10–13 per fascicle, filiform, 4–5 mm; secondary branches and cladodes arranged in 1 plane, frondlike ..... 3. *A. setaceus*
13b. Plants dioecious (but flowers sometimes with aborted stamens or pistil); cladodes 1–10(–25) per fascicle.
14a. Stems with sharp spines 2–3 mm.
15a. Branches and cladodes ± cartilaginous denticulate.
16a. Plants climbing; roots tuberous, 7–15 mm thick, fleshy ..... 21. *A. brachyphyllus*
16b. Plants erect or suberect; roots sometimes with swollen, tuberous part near tip, 2–4 mm thick, rather slender.
17a. Plants dwarf subshrubs; branches with woody, sharp spines 2–4 mm; pedicels ca. 1 mm; roots with tuberous part ..... 30. *A. kansuensis*
17b. Plants tall herbs; branches without pungent spines; pedicels 7–15 mm; roots without tuberous part.
18a. Branches strongly reflexed basally and ascending distally; pedicels 1.2–1.6 cm ..... 25. *A. trichophyllus*
18b. Branches not as above; pedicels 0.6–1.3 cm ..... 24. *A. longiflorus*
15b. Branches and cladodes generally not cartilaginous denticulate.

[1] Herbarium, Department of Plant Taxonomy and Geography, Botanical Institute, Academy of Sciences, Yerevan, 63, 375063, Armenia.

19a. Male flowers 2–4 mm; branches spiny.
20a. Plants suberect; stem indistinctly striate; perianth of male flowers purplish red, subcampanulate, 3–4 mm in diam.; filaments adnate to perianth segments for ca. 1/4 their length ..... 23. *A. tibeticus*
20b. Plants climbing; stem not striate; perianth of male flowers greenish white, subglobose, 2–2.5 mm in diam.; filaments free ..... 29. *A. acicularis*
19b. Male flowers 6–9 mm; branches unarmed.
21a. Pedicels (1–)1.5–2 cm; perianth yellowish green ..... 26. *A. oligoclonos*
21b. Pedicels 0.5–1.3 cm; perianth purplish.
22a. Plants suberect; stem cartilaginous denticulate distally; spines straight; pedicels 6–13 mm ..... 24. *A. longiflorus*
22b. Plants climbing or nearly so; stem not cartilaginous denticulate; spines curved; pedicels ca. 5 mm ..... 22. *A. sichuanicus*
14b. Stems and branches unarmed or, if spiny, spines very short, not sharp, and appressed to branches.
23a. Plants climbing.
24a. Pedicels 6–25 mm; branches not cartilaginous denticulate ..... 20. *A. breslerianus*
24b. Pedicels 2–6 mm; branches usually cartilaginous denticulate.
25a. Roots tuberous, 7–15 mm thick, fleshy ..... 21. *A. brachyphyllus*
25b. Roots not tuberous, 2–5 mm thick ..... 16. *A. trichoclados*
23b. Plants erect.
26a. Pedicels more than 1 cm.
27a. Branchlets ± cartilaginous denticulate.
28a. Branches strongly reflexed basally and ascending distally; pedicels 1.2–1.6 cm ..... 25. *A. trichophyllus*
28b. Branches not as above; pedicels 0.6–1.3 cm ..... 24. *A. longiflorus*
27b. Branchlets not cartilaginous denticulate.
29a. Male flowers ca. 3 mm; filaments free; stem striate-ridged distally; cladodes slightly tetragonous or sometimes irregularly trigonous ..... 14. *A. mairei*
29b. Male flowers 5–9 mm; filaments adnate to perianth segments for 1/2–3/4 their length; stem not or minutely striate; cladodes indistinctly grooved or angled.
30a. Stems and branches soft, usually ± pendulous apically; male flowers 5–6 mm; anthers 1–1.5 mm ..... 27. *A. officinalis*
30b. Stems and branches rather rigid; male flowers 7–9 mm; anthers ca. 2 mm ..... 26. *A. oligoclonos*
26b. Pedicels less than 1 cm.
31a. Young branches cartilaginous denticulate.
32a. Pedicels usually more than 6 mm ..... 24. *A. longiflorus*
32b. Pedicels 3–5 mm.
33a. Roots with tubers; stem and branches densely cartilaginous denticulate; male flowers ca. 2 mm ..... 15. *A. meioclados*
33b. Roots without tubers; stem and branches not or only slightly cartilaginous denticulate; male flowers more than 3 mm.
34a. Plants dwarf subshrubs; stems strongly zigzagged toward apex, rigid; cladodes rigid, spinescent ..... 18. *A. gobicus*
34b. Plants tall herbs; stems straight or slightly flexuous; cladodes rather soft, never spinescent ..... 17. *A. dauricus*
31b. Young branches not cartilaginous denticulate.
35a. Pedicels more than 8 mm.
36a. Male flowers ca. 3 mm; filaments free; stem striate-ridged distally ..... 14. *A. mairei*
36b. Male flowers 5–6 mm; filaments adnate to perianth segments for ca. 1/2 their length; stem not striate-ridged ..... 27. *A. officinalis*
35b. Pedicels 2–6 mm.
37a. Stems with cladodes (except near base), usually covered with stripelike remains of whitish, hyaline periderm when old ..... 28. *A. neglectus*
37b. Stems with cladodes only near apex, without stripelike remains of periderm when old.
38a. Plants with creeping, stolonlike rhizomes to 2 mm thick; stems usually simple; cladodes in fascicles of 5–7, falcate ..... 31. *A. przewalskyi*
38b. Plants with thick, abbreviated rhizomes 4–20 mm thick; stems always branched; cladodes in fascicles of 1–6, usually straight.
39a. Roots slender, ca. 2 mm thick; cladodes usually

spreading upward at an acute angle ..... 17. *A. dauricus*

39b. Roots rather thick, 4–5 mm thick; cladodes spreading downward at an obtuse angle ..... 19. *A. angulofractus*

1. Asparagus racemosus Willdenow, Sp. Pl. 2: 152. 1799.

长刺天门冬 chang ci tian men dong

Subshrubs hermaphroditic. Stems climbing, branched, to 2 m; branches usually distinctly striate-ridged, ridges ± cartilaginous denticulate. Cladodes in fascicles of 3–6(–8), linear, 1–2.5 cm × ca. 1 mm, flat, midvein distinct. Leaf spur spinescent; spine straight or subrecurved, 1.5–2 cm on main stems, 5–10 mm on branches, woody, sharp. Inflorescences developing after cladodes, axillary, each a many-flowered raceme or panicle 1–4 cm; bracts ca. 1 mm. Pedicel 1.5–3 mm, slender, articulate at middle. Perianth campanulate, 2–3 mm. Stamens equal, ca. 0.7 mm; anthers yellow, minute. Fl. Nov. 2*n* = 20*, 48.

Broad-leaved forests along streams or valleys; 2100–2200 m. S Xizang [Bhutan, India, Malaysia, Myanmar, Nepal, Pakistan, Sikkim; Africa, Australia].

2. Asparagus densiflorus (Kunth) Jessop, Bothalia 9: 65. 1966.

非洲天门冬 fei zhou tian men dong

Asparagopsis densiflora Kunth, Enum. Pl. 5: 96. 1850; *Asparagus sprengeri* Regel.

Subshrubs hermaphroditic. Stems ± climbing, branched, to 1 m; branches distinctly striate-ridged. Cladodes in fascicles of 1–5, linear, 1–3 cm × 1.5–2.5 mm, flat. Leaf spur spinescent; spine slightly hooked, 3–5 mm and sharp on main stems, very short and not sharp on branches, woody. Inflorescences developing after cladodes, solitary or paired, axillary, each a many-flowered raceme or panicle 2–2.5 cm; bracts linear, 2–5 mm. Pedicel ca. 2 mm, articulate at middle. Perianth white; segments oblong-ovate, ca. 2 mm. Stamens shorter than perianth; anthers minute. Berry red, 8–10 mm in diam., 1- or 2-seeded. Fl. throughout year. 2*n* = 40, 60.

Commonly cultivated and occasionally becoming naturalized [native to S Africa].

3. Asparagus setaceus (Kunth) Jessop, Bothalia 9: 51. 1966.

文竹 wen zhu

Asparagopsis setacea Kunth, Enum. Pl. 5: 82. 1850; *Asparagus plumosus* Baker.

Herbs hermaphroditic. Stems climbing, much branched, to several meters, slightly woody near base; branches spreading horizontally, with branchlets and cladodes arranged in 1 plane, frondlike. Cladodes in fascicles of 10–13, 4–5 mm, very slender, slightly trigonous. Leaf spur short, occasionally spinescent on main stems. Inflorescences developing after cladodes. Flowers solitary or in clusters of 2 or 3; pedicel short, articulate at middle. Perianth white; segments widely spreading, lanceolate-oblong, ca. 7 mm. Berry purplish black, 6–7 mm in diam., 1–3-seeded. Fl. Jun. 2*n* = 20*.

Commonly cultivated and occasionally becoming naturalized [native to S Africa].

The foliage is much used by florists.

4. Asparagus filicinus D. Don, Prodr. Fl. Nepal. 49. 1825.

羊齿天门冬 yang chi tian men dong

Asparagus filicinus var. *giraldii* C. H. Wright; *A. filicinus* var. *megaphyllus* F. T. Wang & Tang; *A. qinghaiensis* Y. Wan.

Herbs dioecious. Stems erect, unarmed. Rootstock a short rhizome with a cluster of fusiform roots; roots swollen at base. Stems much branched, 50–70 cm, subsmooth; branches generally striate-ridged, ridges sometimes slightly cartilaginous denticulate. Cladodes in fascicles of 5–8, linear, falcate, 3–15 × 0.8–2 mm, flat, midvein distinct. Leaf spur short, not spinescent. Inflorescences developing with cladodes or very soon afterward. Flowers of both sexes solitary or paired; pedicel 1–2 cm, articulate near middle. Male flowers: perianth pale green or sometimes tinged with pale purple, campanulate, ca. 2.5 mm; filaments free; anthers ovate, ca. 8 mm. Berry deep green, 5–6 mm in diam., 2- or 3- seeded. Fl. May–Jun, fr. Jul–Aug. 2*n* = 18*, 20.

Forests, thickets, shady and moist places along valleys; 1200–3000 m. Gansu, Guizhou, Henan, Hubei, Hunan, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Bhutan, India, Myanmar, Thailand].

5. Asparagus lycopodineus (Baker) F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 291. 1937

短梗天门冬 duan geng tian men dong

Asparagus filicinus D. Don var. *lycopodineus* Baker, J. Linn. Soc., Bot. 14: 605. 1875; *A. lycopodineus* var. *sessilis* F. T. Wang & Tang.

Herbs dioecious. Roots usually with swollen, tuberous part 1.5–3.5 cm × 5–8 mm. Stems erect, 45–100 cm, unarmed, smooth or slightly striate, sometimes narrowly winged distally; branches narrowly winged. Cladodes in fascicles of 3, linear, falcate, (2–)5–12 × 1–3 mm, flat, midvein distinct. Leaf spur short. Inflorescences developing after cladodes. Flowers of both sexes solitary or in clusters of 2–4; pedicel 1–1.5 mm or less. Male flowers: perianth white, campanulate, 3–4 mm; stamens unequal; filaments adnate to perianth segments for ca. 1/4 their length. Female flowers: perianth ca. 2 mm. Berry 5–6 mm in diam., 2- or 3-seeded. Fl. May–Jun, fr. Jul–Aug.

Forests, thickets; 500–2600 m. Gansu, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [Bhutan, India, Myanmar].

6. Asparagus yanbianensis S. C. Chen, Acta Phytotax. Sin. 26: 139. 1988.

盐边天门冬 yan bian tian men dong

Herbs dioecious. Stems erect, to more than 40 cm, unarmed, smooth or indistinctly striate; branches striate-ridged. Cladodes in fascicles of 5–10, linear, falcate, 3–4 × ca. 0.5 mm, flat, midvein distinct. Leaf spur short. Inflorescences developing after cladodes. Female flowers: usually paired, subsessile;

perianth yellowish green, campanulate, ca. 3 mm; aborted stamens 6, outer ones with filaments and anthers, inserted at middle of outer perianth segments, inner ones nearly without filaments, inserted distally on inner segments; style ca. 1 mm. Fl. Jun.

• Evergreen broad-leaved forests along valleys; ca. 2200 m. SW Sichuan.

7. Asparagus schoberioides Kunth, Enum. Pl. 5: 70. 1850.

龙须菜 long xu cai

Asparagus schoberioides var. *subsetaceus* Franchet; *A. sieboldii* Maximowicz.

Herbs dioecious. Roots 2–3 mm thick, slender. Stems erect, to 1 m, unarmed, distinctly striate-ridged distally; branches angled or sometimes narrowly winged. Cladodes usually in fascicles of 3 or 4, linear, falcate, 1–4 cm × ca. 1 mm, flat, basally 3-angled, midvein distinct. Leaf spur short. Inflorescences developing after cladodes, axillary. Flowers of both sexes in clusters of 2–4, subequal; pedicel ca. 1 mm or less. Male flowers: perianth yellowish green, campanulate, 2–2.5 mm; filaments free. Berry red, ca. 6 mm in diam., usually 1- or 2-seeded. Fl. May–Jun, fr. Aug–Sep. 2*n* = 20*.

Forests, grassy slopes; 400–2300 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi, Shandong, Shanxi [Japan, Korea, Mongolia, Russia (Far East, Kurile Islands, Sakhalin, Siberia)].

8. Asparagus cochinchinensis (Loureiro) Merrill, Philipp. J. Sci. 15: 230. 1919.

天门冬 tian men dong

Melanthium cochinchinense Loureiro, Fl. Cochinch. 1: 216. 1790; *Asparagopsis sinica* Miquel; *Asparagus cochinchinensis* var. *longifolius* F. T. Wang & Tang; *A. dauricus* Link var. *elongatus* Pampanini; *A. gaudichaudianus* Kunth; *A. insularis* Hance; *A. lucidus* Lindley; *A. sinicus* (Miquel) C. H. Wright.

Herbs dioecious. Roots with swollen, tuberous part 3–5 × 1–2 cm. Stems climbing, 1–2 m, slightly woody proximally; branches angled or narrowly winged. Cladodes usually in fascicles of 3, subfalcate, 0.5–8 cm × 1–2 mm, flat or slightly 3-angled. Leaf spur sometimes spinescent; spine 2.5–3.5 mm on main stems, minute or indistinct on branches. Inflorescences developing after cladodes, axillary. Flowers of both sexes usually paired, subequal; pedicel 2–6 mm, articulate at middle. Male flowers: perianth greenish, campanulate, 2.5–3 mm; filaments free. Berry green, 6–7 mm in diam., 1- or 2-seeded. Fl. May–Jun, fr. Sep. 2*n* = 20*.

Thinly forested slopes, roadsides, waste fields; near sea level to 1700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Korea, Laos, Vietnam].

The tuberous roots are used medicinally.

9. Asparagus taliensis F. T. Wang & Tang ex S. C. Chen, Acta Phytotax. Sin. 16(1): 91. 1978.

大理天门冬 da li tian men dong

Herbs, sometimes slightly subshrubby, dioecious. Stems climbing, to 1 m, slightly woody proximally, indistinctly striate-ridged; branches angled. Cladodes in fascicles of 6–9, linear, 6–13 × ca. 0.5 mm, acutely 3-angled. Leaf spur spinescent; spine 4–6 mm on main stems, very short or indistinct on branches, woody, sharp. Inflorescences developing after cladodes, axillary. Flowers of both sexes paired, subequal; pedicel ca. 2 mm, articulate at middle. Male flowers: perianth yellowish, campanulate, 3–3.5 mm; filaments adnate to perianth segments for ca. 1/2 their length; aborted ovary shortly rostrate apically. Berry red, 6–7 mm in diam., usually 1-seeded. Fl. Jun–Aug, fr. Jul–Aug.

• Grassy slopes; 1800–2000. Yunnan.

10. Asparagus munitus F. T. Wang & S. C. Chen in S. C. Chen, Acta Phytotax. Sin. 16(1): 91. 1978.

西南天门冬 xi nan tian men dong

Subshrubs dioecious. Stems climbing, to 1 m, becoming yellowish when dried; branches distinctly striate-ridged. Cladodes in fascicles of 2–5(–7), 0.5–1.5 cm × 0.5–0.8 mm, acutely 3-angled. Leaf spur spinescent; spine straight, 5–7 mm on main stems, 1.5–2 mm on branches, rather thick, woody. Inflorescences developing with cladodes. Male flowers: paired; pedicel 3–4.5 mm, articulate above middle or near apex; perianth yellowish, campanulate, 4–5 mm; filaments adnate to perianth segments for ca. 1/2 their length. Berry ca. 7 mm in diam., 1–4-seeded. Fl. Apr–May.

• Forest margins, thickets; 1900–2400 m. SW Sichuan, Yunnan.

11. Asparagus myriacanthus F. T. Wang & S. C. Chen in S. C. Chen, Acta Phytotax. Sin. 16(1): 92. 1978.

多刺天门冬 duo ci tian men dong

Subshrubs dioecious. Roots ca. 3 mm thick, rather slender. Stems slightly diffuse or climbing, 1–2 m, densely striate-ridged; branches angled. Cladodes in fascicles of (3–)6–14, 0.6–2 cm × 0.5–1 mm, acutely 3-angled. Leaf spur spinescent; spine nearly straight, 4.5–8 mm on main stems, 2.5–5 mm on branches, woody, sharp. Inflorescences developing with cladodes. Male flowers: in clusters of 2–4; pedicel 1.5–2.5 mm, articulate above middle; perianth yellowish green, campanulate, 1.5–2.5 mm; filaments adnate to perianth segments for ca. 1/2 their length. Berry 5–6 mm in diam., 2- or 3-seeded. Fl. May, fr. Sep.

• Thickets, open slopes, sandy banks; 2100–3100 m. SE Xizang, NW Yunnan.

12. Asparagus subscandens F. T. Wang & S. C. Chen in S. C. Chen, Acta Phytotax. Sin. 16(1): 92. 1978.

滇南天门冬 dian nan tian men dong

Herbs dioecious. Roots with swollen, tuberous part ca. 5 × 1.2 cm. Stems ± climbing, to 1 m, slightly angled when young; branches angled, slightly cartilaginous denticulate. Cladodes in fascicles of 3–7, falcate, 3–6 × ca. 0.6 mm, flat or slightly 3-angled. Leaf spur not spinescent. Inflorescences developing after cladodes, axillary. Flowers of both sexes solitary or paired, subequal; pedicel 1.5–2 mm, articulate at middle. Male flowers:

perianth yellowish green, campanulate, 3–4 mm; stamens unequal; filaments adnate to perianth segments for ca. 1/2 their length. Berry ca. 5 mm in diam. Fl. Jul–Aug, fr. Aug. 2*n* = 20*.

• Forests, thickets; 800–1700 m. S Yunnan.

13. Asparagus yanyuanensis S. C. Chen, Acta Phytotax. Sin. 19: 501. 1981.

盐源天门冬 yan yuan tian men dong

Herbs dioecious. Roots ca. 3 mm thick, slightly fleshy. Stems climbing, to more than 30 cm, slightly striate; branches angled. Cladodes in fascicles of 4–6, 4–7 × ca. 0.4 mm (immature), 3-angled. Leaf spur spinescent; spine slightly curved, ca. 5 mm on main stems, much shorter on branches. Inflorescences developing with cladodes. Male flowers: paired; pedicel ca. 2 mm, articulate at middle; perianth yellowish green, subglobose, 1–1.5 mm; stamens equal; filaments adnate to perianth segments for ca. 1/2 their length; anthers suboblong, ca. 1 mm. Fl. May.

• Forests along streams. SW Sichuan.

14. Asparagus mairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 7: 339. 1909.

昆明天门冬 kun ming tian men dong

Herbs dioecious. Stems erect, to 60 cm, striate-ridged distally; branches distinctly striate-ridged. Cladodes usually in fascicles of 4–9, 5–12 × ca. 0.7 mm, subterete, slightly flattened, irregularly grooved. Leaf spur shortly spinescent. Inflorescences developing after cladodes. Flowers of both sexes generally paired; pedicel 9–12 mm, articulate distally. Male flowers: perianth campanulate, ca. 3 mm; filaments free. Berry 6–7 mm in diam., 1- or 2-seeded. Fl. May, fr. Aug.

• Yunnan (Kunming Shi).

15. Asparagus meioclados H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 59. 1909.

密齿天门冬 mi chi tian men dong

Asparagus mairei H. Léveillé (Jan 1913 and Jul 1913, not 1910); *A. vaniotii* H. Léveillé; *A. yunnanensis* H. Léveillé.

Herbs dioecious. Roots with tuberous part. Stems erect, to 1 m, angled, densely cartilaginous denticulate; branches strongly angled, cartilaginous denticulate except apically and on branchlets. Cladodes usually in fascicles of 5–10, 3–5(–8) × 0.3–0.5 mm, subterete, slightly flattened, irregularly grooved, generally not cartilaginous denticulate. Leaf spur indistinctly spinescent. Inflorescences developing after cladodes. Male flowers: solitary or in clusters of 2 or 3; pedicel ca. 2 mm; perianth yellowish green, narrowly campanulate, ca. 2 mm; filaments adnate to perianth segments for ca. 1/2 their length. Berry red, 5–6 mm in diam., usually 1- or 2-seeded. Fl. May–Jul, fr. Aug.

• Forests, grassy slopes along valleys and streams; 1300–3500 m. Guizhou, Sichuan, Yunnan.

16. Asparagus trichoclados (F. T. Wang & Tang) F. T. Wang & S. C. Chen in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 111. 1978.

细枝天门冬 xi zhi tian men dong

Asparagus meioclados H. Léveillé var. *trichoclados* F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 290. 1937.

Herbs dioecious. Stems climbing, long, slightly woody proximally, smooth; branches angled, densely cartilaginous denticulate. Cladodes in fascicles of 4–8, filiform, 2–7 × ca. 0.2 mm, slightly flattened, irregularly grooved. Leaf spur indistinctly and shortly spinescent. Inflorescences developing after cladodes. Flowers unknown. Berry 4–5 mm in diam., 1- or 2-seeded; pedicel ca. 2 mm, articulate at middle. Fr. Nov.

• Sparse forests, open grassy slopes; 1100–1400 m. C Yunnan.

17. Asparagus dauricus Link, Enum. Hort. Berol. Alt. 1: 340. 1821.

兴安天门冬 xing an tian men dong

Asparagus gibbus Bunge; *A. tuberculatus* Bunge ex Iljin.

Herbs dioecious. Roots slender. Stems erect, 30–70 cm, unarmed, striate; branches striate, younger ones cartilaginous denticulate. Cladodes in fascicles of 1–6, usually spreading upward at an acute angle, 1–4(–5) cm × ca. 0.6 mm, subterete, slightly flattened, irregularly grooved, rather soft, sometimes cartilaginous denticulate. Leaf spur short, not spinescent. Inflorescences developing after cladodes. Flowers of both sexes paired. Male flowers: pedicel 3–5 mm; perianth yellowish green, ca. 4 mm; filaments adnate to perianth segments for ca. 4/5 their length. Female flowers: pedicel ca. 2 mm; perianth ca. 1.5 mm. Berry 6–7 mm in diam., 2–4(–6)-seeded. Fl. May–Jun, fr. Aug–Sep.

Sandy wastelands, arid slopes; near sea level to 2200 m. Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Korea, Mongolia, Russia (Far East, Siberia)].

18. Asparagus gobicus N. A. Ivanova ex Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Acad. Nauk SSSR 17: 9. 1955.

戈壁天门冬 ge bi tian men dong

Asparagus angulofractus Iljin var. *scabridus* Kitagawa.

Subshrubs dioecious. Roots slender. Stems suberect, usually flexuous distally, 15–45 cm, rigid, ± covered with stripelike remains of whitish, hyaline periderm; branches strongly flexuous, slightly striate-ridged, sparsely cartilaginous denticulate. Cladodes in fascicles of 3–8, usually spreading horizontally or downward at an obtuse angle, 0.5–2.5 cm × ca. 1 mm, subterete, irregularly grooved, rather rigid. Leaf spur short, not spinescent. Inflorescences developing after cladodes. Flowers of both sexes solitary or paired; pedicel 2–4 mm. Male flowers: perianth campanulate, 5–7 mm; filaments adnate to perianth segments for ca. 1/2 their length. Female flowers slightly smaller than male ones. Berry red, 5–7 mm in diam., 3–5-seeded. Fl. May, fr. Jul–Oct.

Sandy wastelands, sands; 1600–2600 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi [Mongolia].

19. Asparagus angulofractus Iljin in Komarov, Fl. URSS 4: 746. 1935.

折枝天门冬 zhe zhi tian men dong

Asparagus soongoricus Iljin.

Herbs dioecious. Roots 4–5 mm thick. Stems erect, 30–80 cm, smooth; branches usually slightly flexuous, sometimes indistinctly striate. Cladodes in fascicles of 1–5, generally spreading horizontally or downward at an obtuse angle, usually straight, 1–2.5 cm × 1–1.5 mm, suberete, slightly flattened, sometimes irregularly grooved. Leaf spur short, not spinescent. Inflorescences developing after cladodes. Flowers of both sexes paired. Male flowers: pedicel 4–6 mm; perianth yellowish green, campanulate, 4–5 mm; filaments adnate to perianth segments for ca. 1/2 their length. Female flowers: pedicel 5–7 mm, articulate at or near apex; perianth 3–4 mm. Fl. May–Jun.

Sandy soil; 1300–2000 m. SW Xinjiang [Kazakstan].

20. Asparagus breslerianus Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 323. 1829.

西北天门冬 xi bei tian men dong

Herbs dioecious. Roots 2–3 mm thick, rather slender. Stems climbing, 30–100 cm; branches not or only slightly striate. Cladodes in fascicles of 4–8, generally straight, 0.5–1.5 (–3.5) cm × 0.4–0.7 mm, subterete, slightly flattened, grooved. Leaf spur short, not or only slightly spinescent. Inflorescences developing after cladodes. Flowers of both sexes in clusters of 2–4; pedicel 6–18 mm, usually articulate above middle. Male flowers: perianth reddish purple or greenish white, campanulate, ca. 6 mm; filaments adnate to perianth segments for ca. 1/2 their length; anthers apiculate. Female flowers: perianth ca. 3 mm. Berry red, ca. 6 mm. in diam., 5- or 6-seeded. Fl. May, fr. Jul–Sep. 2*n* = 40*.

River banks, wastelands, saline soil; near sea level to 2900 m. Gansu, Ningxia, Qinghai, Xinjiang [Kazakstan, Mongolia, Russia, Turkmenistan, Uzbekistan; SW Asia].

This species was misidentified in FRPS as *Asparagus persicus* Baker.

21. Asparagus brachyphyllus Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 13: 78. 1840.

攀援天门冬 pan yuan tian men dong

Asparagus trichophyllus Bunge var. *trachyphyllus* Kunth.

Herbs dioecious. Roots tuberous, subcylindric, 0.7–1.5 cm thick, fleshy. Stems climbing, 20–100 cm; branches striate-ridged, ridges usually cartilaginous denticulate. Cladodes in fascicles of 4–10, 4–12 × ca. 0.5 mm, subterete, slightly flattened, irregularly grooved, usually cartilaginous denticulate. Leaf spur not or only slightly spinescent; spine 1–2 mm. Inflorescences developing after cladodes. Flowers of both sexes in clusters of 2–4; pedicel 3–6 mm. Male flowers: perianth pale purplish brown, campanulate, ca. 7 mm; filaments adnate to perianth segments for ca. 1/2 their length. Female flowers: perianth ca. 3 mm. Berry red, 6–7 mm in diam., 4- or 5-seeded. Fl. May–Jun, fr. Aug. 2*n* = 40*.

Thickets, open grassy slopes, field margins; 800–2000 m. Hebei, Jilin, Liaoning, Ningxia, Shaanxi, Shanxi [Kazakstan, Korea, Mongolia, Tajikistan, Turkmenistan, Uzbekistan].

22. Asparagus sichuanicus S. C. Chen & D. Q. Liu, Acta Phytotax. Sin. 22: 418. 1984.

四川天门冬 si chuan tian men dong

Herbs slightly subshrubby, dioecious. Stems climbing, much branched, to 40 cm or more, slightly striate; branches spreading; branchlets occasionally cartilaginous denticulate. Cladodes in fascicles of 6–8(–16), ± appressed to branches, 5–9 × ca. 0.4 mm, subterete, slightly flattened, occasionally cartilaginous denticulate. Leaf spur spinescent; spine 2–3 mm on main stems, indistinct on branches, sharp. Inflorescences developing with cladodes. Male flowers: paired; pedicel ca. 5 mm; perianth purplish brown, campanulate; filaments adnate to perianth segments for 1/3–3/4 their length; anthers ca. 2 mm. Berry red, 9–10 mm in diam., 4- or 5-seeded. Fl. Apr–May, fr. Aug–Sep.

• Sparse forests, grassy slopes, roadsides; 1500–3300 m. Sichuan, Xizang.

23. Asparagus tibeticus F. T. Wang & S. C. Chen in S. C. Chen, Acta Phytotax. Sin. 16(1): 93. 1978.

西藏天门冬 xi zang tian men dong

Subshrubs dioecious. Stems suberect, 30–60 cm, indistinctly striate, yellowish when dried, ± covered with stripelike remains of whitish, hyaline periderm; branches slightly striate. Cladodes in fascicles of 4–7, slightly curved, 5–10 × ca. 0.5 mm, subterete, slightly flattened, irregularly grooved. Leaf spur spinescent; spine slightly hooked, 4–6 mm on main stems, 3.5–4 mm on branches, woody, sharp. Inflorescences developing with cladodes. Male flowers: in clusters of 2–4; pedicel 3–4 mm, articulate below middle; perianth purplish red, subcampanulate, ca. 3.5 mm; filaments adnate to perianth segments for ca. 1/4 their length. Berry 6–7 mm in diam. Fl. May–Jun, fr. Jul.

• Hillsides, river flats; 3800–4000 m. Xizang.

24. Asparagus longiflorus Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 7: 110. 1884.

长花天门冬 chang hua tian men dong

Herbs dioecious. Roots rather slender. Stems suberect, 20–170 cm, slightly striate-ridged distally; branches distinctly striate-ridged, ridges usually cartilaginous denticulate, particularly on young branches. Cladodes in fascicles of 4–12, straight, 6–15 × ca. 0.6 mm, subterete, slightly flattened, irregularly grooved, usually cartilaginous denticulate. Leaf spur slightly spinescent; spine 1–5 mm on main stems, very short on branches. Inflorescences developing after cladodes. Flowers of both sexes paired; pedicel usually 6–13 mm. Male flowers: perianth purplish, 6–7 mm; filaments adnate to perianth segments for ca. 1/2 their length. Female flowers: perianth ca. 3 mm. Berry red, 7–10 mm in diam., ca. 4-seeded. Fl. Apr–May, fr. Jun–Aug.

• Forests, thickets, grassy slopes; 2400–3300 m. Gansu, Hebei, Henan, Qinghai, Shaanxi, Shandong, Shanxi.

25. Asparagus trichophyllus Bunge, Enum. Pl. China Bor. 65. 1833.

曲枝天门冬 qu zhi tian men dong

Herbs dioecious. Roots rather slender. Stems suberect, strongly flexuous distally, 60–100 cm, sometimes sparsely

cartilaginous denticulate; branches strongly reflexed basally, ascending distally; branchlets ± cartilaginous denticulate. Cladodes in fascicles of 5–8, usually appressed to branches, filiform, 0.7–1.8 cm × ca. 0.3 mm, irregularly grooved. Leaf spur slightly spinescent; spine 1–3 mm on main stems, indistinct on branches. Inflorescences developing after cladodes. Flowers of both sexes paired; pedicel 1.2–1.6 cm. Male flowers: perianth yellowish green, usually tinged with pale purple, campanulate, 6–8 mm; filaments adnate to perianth segments for ca. 1/2 their length. Female flowers: perianth 2.5–3.5 mm. Berry 6–7 mm in diam., 3–5-seeded. Fl. May, fr. Jul–Sep. 2*n* = 30*.

Grassy slopes, roadsides, field margins, waste lands; near sea level to 2100 m. Hebei, Liaoning, Nei Mongol, Shanxi [Mongolia, Russia (E Siberia)].

26. Asparagus oligoclonos Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 286. 1859.

南玉带 nan yu dai

Asparagus oligoclonos var. *purpurascens* X. J. Xue & H. Yao; *A. tamaboki* Yatabe.

Herbs dioecious. Roots 2–3 mm thick, rather slender. Stems erect, 40–80 cm, sometimes slightly striate; branches rather rigid, striate. Cladodes in fascicles of 5–12, 1–3 cm × ca. 0.5 mm, subterete, slightly flattened, irregularly grooved. Leaf spur short or indistinct, rarely shortly spinescent. Inflorescences developing after cladodes. Flowers of both sexes solitary or paired; pedicel (1–)1.5–2 cm. Male flowers: perianth yellowish green, campanulate, 7–9 mm; filaments adnate to perianth segments for ca. 3/4 their length; anthers ca. 2 mm. Female flowers: perianth ca. 3 mm. Berry 8–10 mm in diam. Fl. Apr–May, fr. Jul–Sep. 2*n* = 20.

Forests, meadows, moist places; near sea level to 500 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shandong [Japan, Korea, Mongolia, Russia (Far East, Siberia)].

27. Asparagus officinalis Linnaeus, Sp. Pl. 1: 313. 1753.

石刁柏 shi diao bai

Asparagus officinalis var. *altilis* Linnaeus; *A. polyphyllus* Steven.

Herbs dioecious. Roots 2–3 mm thick, rather slender. Stems suberect, to 1 m, usually slightly pendent apically; branches soft. Cladodes in fascicles of 3–6, 0.5–3 cm × ca. 0.4 mm, subterete, slightly flattened, irregularly grooved. Leaf spur slightly spinescent or indistinct. Inflorescences developing after cladodes. Flowers of both sexes solitary of in clusters of 2–4; pedicel 0.8–1.2(–1.4) cm. Male flowers: perianth yellowish green, campanulate, 5–6 mm; filaments adnate to perianth segments for ca. 1/2 their length; anthers 1–1.5 mm. Female flowers: perianth ca. 3 mm. Berry red, 7–8 mm in diam., 2- or 3-seeded. Fl. May–Jun, fr. Aug. 2*n* = 20*, 40.

Steppes. NW Xinjiang [Kazakstan, Mongolia, Russia; NW Africa, C and SW Asia, Europe, widely cultivated elsewhere].

A very variable species; some cultivars are grown as a vegetable in China.

28. Asparagus neglectus Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 750. 1841.

新疆天门冬 xin jiang tian men dong

Herbs dioecious. Roots slender. Stems suberect, densely branched, to 1 m, usually slightly striate, usually covered with stripelike remains of whitish, hyaline periderm when old; branches slightly striate when young. Cladodes usually in fascicles of 7–25, filiform, 0.5–1.7 cm × ca. 0.3 mm, irregularly grooved, usually several fascicles at each node of stem. Leaf spur slightly spinescent; spine 2–3 mm on main stems, very short or indistinct on branches. Inflorescences developing after cladodes. Flowers of both sexes solitary or paired; pedicel 1–1.5 cm. Male flowers: perianth campanulate, 5–7 mm; filaments adnate to perianth segments for ca. 1/2 their length. Female flowers: perianth ca. 3 mm. Berry red, 6–7 mm in diam., 1–3-seeded. Fl. May–Jun, fr. Aug.

Thickets, grassy slopes, river banks, sandy flats of rivers; 600–1700 m. N Xinjiang [Afghanistan, Kazakstan, Mongolia, Pakistan, Russia (E Siberia), Tajikistan, Turkmenistan, Uzbekistan].

One of us (Tamanian) notes that *Asparagus neglectus* is very similar to, and may be synonymous with, *A. trichophyllus*.

29. Asparagus acicularis F. T. Wang & S. C. Chen in S. C. Chen, Acta Phytotax. Sin. 16(1): 93. 1978.

山文竹 shan wen zhu

Herbs dioecious. Roots 2–4 mm thick basally, thickening toward tip. Stems climbing, to 1 m or more; branches slender. Cladodes in fascicles of 3–7, needlelike, 6–12(–15) × ca. 0.3 mm, irregularly grooved. Leaf spur spinescent; spine 4–6 mm on main stems, 1–2 mm on branches, woody, sharp. Inflorescences developing with cladodes. Male flowers: paired; pedicel 4–5 mm, articulate at middle; perianth greenish white, subglobose, ca. 2 mm in diam.; filaments free. Berry 5–6 mm in diam., usually 1-seeded. Fl. Jun–Jul, fr. Aug.

• Thickets, grasslands, lake margins; near sea level to 200 m. Guangdong, Guangxi, Hubei, Hunan, Jiangxi.

30. Asparagus kansuensis F. T. Wang & Tang ex S. C. Chen, Acta Phytotax. Sin. 16(1): 94. 1978.

甘肃天门冬 gan su tian men dong

Subshrubs dioecious. Roots with subterminal tuber 2–3 cm thick. Stems erect, much branched, 17–27 cm, densely noded; stem and branches striate-ridged, ridges cartilaginous denticulate. Cladodes in fascicles of (3–)5–10, needlelike, 5–8 × ca. 0.4 mm, irregularly grooved. Leaf spur spinescent; spine spreading horizontally, straight, 2–5 mm on main stems, slightly shorter toward base of plant, slender, sharp. Inflorescences developing after cladodes. Flowers of both sexes solitary or paired; pedicel ca. 1 mm. Male flowers: perianth campanulate, 2–2.5 mm; filaments adnate to perianth segments for ca. 1/4 their length. Fl. Jun.

• Slopes; 900–1600 m. S Gansu.

The tuberous roots are edible.

31. Asparagus przewalskyi N. A. Ivanova ex Grubov & T. V. Egorova, Rast. Tsent. Azii, Mater. Bot. Inst. Komarova 7: 81. 1977.

北天门冬 bei tian men dong

Asparagus borealis S. C. Chen; *A. dolichorhizomatus* J. M. Ni & R. N. Zhao.

Herbs dioecious. Rhizomes creeping, stolonlike, 1.2–1.8 mm thick., with spaced roots. Stems erect, usually simple, 10–30 cm, striate or striate-ridged. Cladodes in fascicles of 5–7, spreading, falcate, 0.4–2(–3.2) cm × ca. 0.7 mm, subterete, slightly flattened, indistinctly grooved. Leaves scarcely spurred. Inflorescences developing after cladodes. Flowers of both sexes paired; pedicel 3.5–4 mm, articulate distally. Male flowers: perianth pale purple, ca. 7 mm; stamens unequal, outer ones longer than inner, filaments adnate to perianth segments for ca. 3/4 their length. Female flowers: perianth ca. 4 mm; aborted stamens 6. Berry ca. 7 mm in diam., ca. 3-seeded. Fl. May, fr. Aug.

- Thickets; 2200–2300 m. Qinghai.

42. DRACAENA Vandelli ex Linnaeus, Syst. Nat., ed. 12, 2: 229, 246. 1767; Mant. Pl. 1: 9, 63. 1767.

龙血树属 long xue shu shu

Chen Xinqi (陈心启 Chen Sing-chi); Nicholas J. Turland

Pleomele Salisbury.

Plants treelike, shrubby, or subshrubby. Stems simple or branched, ± woody. Leaves crowded toward apex of stems or spaced along distal part of stems, sessile or petiolate; petiole to 8 cm, base amplexicaul; leaf blade usually sword-shaped to elliptic-lanceolate, veins truly parallel from base, lateral veins absent. Inflorescence terminal, branched, rarely simple. Flowers bisexual, clustered, sometimes solitary; pedicel articulate. Perianth cylindric, campanulate, or funnelform; tube short; lobes 6, similar. Stamens 6, inserted in tube or throat of perianth; anthers versatile. Ovary 3-loculed; ovules 1 or 2 per locule. Style slender; stigma capitate or 3-lobed. Fruit a berry, globose, 1–3-seeded. Seeds not coated with phytomelanin.

About 50 species: mainly in tropical regions of Africa and Asia; six species in China.

Dracaena, as treated in Dracaenaceae by Bos (in Kubitzki, Fam. Gen. Vasc. Pl. 3: 240. 1998), includes the genus *Sansevieria* Thunberg from Africa to S Asia. If this arrangement is accepted, *Dracaena* probably comprises from 100–150 species. *Dracaena* in Asia has been studied very little for several decades. Consequently there are many taxononomic and nomenclatural problems and large numbers of unidentified specimens in herbaria. The present account attempts to identify some of the problems affecting the Chinese species, which can only be properly understood in the context of an in-depth study on the genus throughout tropical Asia.

1a. Plants treelike, 3–15 m tall; leaves crowded toward apex of stems, base completely covering internode; internodes much shorter than wide; flowers in clusters of 2–7, perianth 6–8 mm.
  2a. Branches reddish apically; leaves reddish basally; inflorescence rachis densely papillose-pubescent; filaments reddish brown tuberculate distally ..... 1. *D. cochinchinensis*
  2b. Branches not reddish apically; leaves not reddish basally; inflorescence rachis glabrous or subglabrous; filaments not tuberculate ..... 2. *D. cambodiana*
1b. Plants shrubby or subshrubby, to 5 m tall; leaves spaced along distal part of stems, base usually not completely covering internode; internodes often longer than wide; flowers solitary or in clusters of 2–4, perianth (14–)18–23 mm.
  3a. Leaves subsessile or indistinctly petiolate, petiole to 1 cm, leaf blade nearly sword-shaped to linear-oblanceolate ..... 3. *D. angustifolia*
  3b. Leaves distinctly petiolate, petiole 1–8 cm, leaf blade linear-lanceolate to elliptic or broadly oblanceolate.
    4a. Leaf blade linear-lanceolate or narrowly elliptic-lanceolate, 10–15 × 2–3 cm; base of petiole neither enlarged nor sheathing internode ..... 4. *D. elliptica*
    4b. Leaf blade elliptic-lanceolate, elliptic, or broadly oblanceolate, 20–40 × 6–8 cm; base of petiole enlarged and sheathing internode.
      5a. Plants shrubby, to 5 m tall; inflorescence branched, 30–60 cm; pedicels 8–10 mm, articulate at middle ..... 5. *D. hokouensis*
      5b. Plants subshrubby, less than 1 m tall; inflorescence simple, ca. 15 cm; pedicels 3–4 mm, articulate above middle ..... 6. *D. terniflora*

1. Dracaena cochinchinensis (Loureiro) S. C. Chen in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 14: 276. 1980.

剑叶龙血树 jian ye long xue shu

Aletris cochinchinensis Loureiro, Fl. Cochinch. 1: 204. 1790; *Dracaena loureiroi* Gagnepain, nom. illeg. (included *A. cochinchinensis*); *Pleomele cochinchinensis* (Loureiro) Merrill.

Plants treelike, 5–15 m tall. Stems branched, sometimes to 1 m thick, reddish apically; internodes much shorter than wide; bark grayish white, becoming grayish brown with age, smooth. Leaves crowded at apex of branches, sessile, sword-shaped, 30–100 × 2–5 cm, leathery, base reddish, completely covering internode. Inflorescence terminal, branched, more than 40 cm; rachis densely papillose-pubescent. Flowers in clusters of 2–5;

pedicel 3–6 mm, articulate distally. Perianth milky white, 6–8 mm; tube 1.5–2 mm; lobes 5–6 mm. Filaments flat, 0.5–0.7 mm wide, reddish brown tuberculate distally. Berry orange, subglobose, 0.8–1.2 cm in diam., 1–3-seeded. Fl. Mar, fr. Jul–Aug.

Limestone slopes; 900–1700 m. SW Guangxi, S Yunnan [Cambodia, Vietnam].

There is a nomenclatural problem with the treelike Chinese plants known under this name. The neotype specimen of *Aletris cochinchinensis* (*J. & M. S. Clemens 4048*, designated by Bos in Agric. Univ. Wageningen Papers 84: 121. 1984) was said to be at P with duplicates at BM, K, and MO, but, after searching each herbarium, only the sheet at BM could be found. This appears to be a specimen of the shrubby species traditionally known as *Dracaena angustifolia*, which should therefore take the name *D. cochinchinensis*, leaving the treelike Chinese plants possibly without a name unless they are conspecific with *D. cambodiana*, which is very similar morphologically (see below). The specimen does not conflict with Loureiro's protologue. Rejection of the name *A. cochinchinensis* would maintain the traditional and current application of *D. angustifolia*. Alternatively, conservation of *A. cochinchinensis* with a conserved type could additionally preserve its usage in the sense of the treelike Chinese plants.

The dried resin, called xue jie (血竭) or dragon's blood, is used medicinally. The collection of this resin, together with habitat destruction, has made *Dracaena cochinchinensis* a vulnerable species in China.

2. Dracaena cambodiana Pierre ex Gagnepain, Bull. Soc. Bot. France 81: 286. 1934.

柬埔寨龙血树 jian pu zhai long xue shu

Pleomele cambodiana (Pierre ex Gagnepain) Merrill & Chun.

Plants treelike, 3–4(–10) m tall. Stems usually branched, not reddish apically; internodes much shorter than wide; bark grayish brown. Leaves crowded at apex of branches, sessile, sword-shaped, 60–70 × 1.5–3 cm, leathery, base not reddish, completely covering internode. Inflorescence terminal, branched, 30–40 cm; rachis glabrous or subglabrous. Flowers in clusters of 3–7; pedicel 5–7 mm, articulate distally. Perianth greenish white or pale yellow, 6–7 mm; tube 1.2–1.6 mm; lobes 4.5–5 mm. Filaments flat, ca. 0.5 mm wide, not tuberculate. Style slightly shorter than ovary. Berry ca. 1 cm in diam. Fl. Jul.

Forests, dry and sandy soils; near sea level to 300 m. S Hainan [Cambodia, Laos, Thailand, Vietnam].

Dracaena cambodiana is very similar morphologically to the species here named *D. cochinchinensis*, and J. J. Bos (pers. comm.) notes that the two may be conspecific.

The dried resin can be used medicinally as a substitute for that of *Dracaena cochinchinensis*.

3. Dracaena angustifolia Roxburgh, Fl. Ind., ed. 1832, 2: 155. 1832.

长花龙血树 chang hua long xue shu

Pleomele angustifolia (Roxburgh) N. E. Brown.

Plants shrubby, rhizomatous, 1–3 m tall. Stems simple or few branched; internodes often longer than wide; bark grayish, smooth. Leaves spaced along distal part of stems, subsessile or indistinctly petiolate; petiole to 1 cm, base not completely covering internode; leaf blade nearly sword-shaped to linear-oblanceolate, 20–45 × 1.5–5.5 cm. Inflorescence terminal, branched, 30–50 cm; rachis glabrous. Flowers in clusters of 2 or 3; pedicel 7–8 mm, articulate distally or near apex. Perianth greenish white, 1.9–2.3 cm; tube 7–8 mm; lobes 1.1–1.6 cm. Filaments filiform; anthers 2–3 mm. Style 5–8 × as long as ovary. Berry orange, globose, 0.8–1.2 cm in diam., 1- or 2-seeded. Fl. Mar–May, fr. Jun–Aug. $2n = 40$.

Forests, thickets. Hainan, S Taiwan (including Lan Yu), S Yunnan [Bhutan, Cambodia, India (including Andaman Islands), Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; N Australia].

Dracaena menglaensis G. Z. Ye (in G. Z. Ye et al., Acta Bot. Yunnan. 14: 30. 1992) was described from two collections from the same locality in S Yunnan (Mengla Xian). It is said to differ from *D. angustifolia* in its longer, sword-shaped leaves with bases completely covering internodes, perianth lobes tinged reddish purple distally, and 3-ribbed berry with 4 small, apical projections. However, in all other features, it falls within the range of variation of *D. angustifolia*, and is probably best regarded as a robust plant of that species.

4. Dracaena elliptica Thunberg, *Dracaena*, 6. 1808.

细枝龙血树 xi zhi long xue shu

Dracaena atropurpurea Roxburgh var. *gracilis* (Baker) Baker; *D. elliptica* var. *gracilis* Baker; *D. gracilis* (Baker) J. D. Hooker (1892), not Salisbury (1796, nom. illeg., included *D. marginata* Lamarck).

Plants shrubby, 1–5 m tall. Stems branched; internodes longer than wide. Leaves spaced along distal part of branches, distinctly petiolate; petiole ca. 1 cm, base neither enlarged nor covering internode; leaf blade linear-lanceolate or narrowly elliptic-lanceolate, 10–15 × 2–3 cm, midvein distinct. Inflorescence terminal, branched, 7–10 cm; rachis glabrous. Flowers solitary, rarely paired; pedicel ca. 10 mm, articulate above middle. Perianth greenish, sometimes flushed red or purple, 2–2.3 cm.

S Guangxi [Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

Chinese plants were treated in FRPS as *Dracaena gracilis*, which is an illegitimate name (a later homonym). J. J. Bos (pers. comm.) notes that the type specimen of *D. elliptica* var. *gracilis*, from Penang, Malaysia, differs from typical *D. elliptica* only in having somewhat narrower leaves. He believes that the plant should be treated under *D. elliptica*, but does not support any infraspecific status for it.

5. Dracaena hokouensis G. Z. Ye in G. Z. Ye et al., Acta Bot. Yunnan. 14: 29. 1992.

河口龙血树 he kou long xue shu

Plants shrubby, to 5 m tall. Stem simple; internodes often longer than wide. Leaves spaced along distal part of stem, distinctly petiolate; petiole 4–8 cm, base neither enlarged nor covering internode; leaf blade elliptic-lanceolate or broadly oblanceolate, 25–40 × 6–7 cm, midvein distinct. Inflorescence terminal, branched, 30–60 cm; rachis glabrous. Flowers in clusters of 2–4; pedicel 8–10 mm, articulate at middle. Perianth white, 1.8–2 cm; tube ca. 8 mm; lobes 1–1.2 cm. Filaments filiform; anthers ca. 2 mm. Style filiform, much longer than ovary. Berry orange, globose, 1.5–2 cm in diam., 3-furrowed. Fl. Apr–May,

fr. Sep–Nov.

Forests, bamboo forests, hillsides along valleys; 100–700 m. S Guangxi, SE Yunnan [?Thailand, Vietnam].

Dracaena hokouensis was compared in the protologue with *D. helferiana* Wallich ex Kurz, described from Myanmar, and is also similar to *D. spicata* Roxburgh, described from cultivated plants originating from Chittagong, Bangladesh, except that the latter species has subsessile flowers.

6. Dracaena terniflora Roxburgh, Fl. Ind., ed. 1832, 2: 159. 1832.
矮龙血树 ai long xue shu

Plants subshrubby, less than 1 m tall. Stems somewhat sprawling, simple or few branched; internodes often longer than wide. Leaves spaced along distal part of stem, distinctly petiolate; petiole 3–6 cm, distinctly widened at base to form a persistent sheath normally concealing internode; leaf blade elliptic-lanceolate or elliptic, 20–30 × 6–8 cm. Inflorescence terminal, simple, ca. 15 cm; rachis glabrous. Flowers solitary or in clusters of 2 or 3; pedicel 3–4 mm, articulate above middle. Perianth white, (1.4–)1.8–2.2 cm. Berry globose, 1–1.3 cm in diam., 1–3-seeded. Fr. Aug. $2n = 80$.

Dense forests; 1000–1100 m. SW Yunnan (Jinghong Xian) [Bangladesh, India, Malaysia, Thailand].

There may be a nomenclatural problem with the Chinese plants known under this name. The only locality mentioned in the protologue is Sylhet in Bangladesh. The gathering *Wallich 5147A* (BM, K), labeled *D. terniflora* and from Sylhet, is original material for the name but clearly belongs to the species traditionally known as *D. elliptica*. If one of these specimens were designated as the lectotype of *D. terniflora*, that name would fall into the synonymy of *D. elliptica*, leaving the Chinese plants without a name. However, it is possible that these Chinese plants are less robust individuals of *D. hokouensis*, characterized by smaller stature, simple inflorescence, and shorter pedicels. Further collections are needed to ascertain their true identity.

43. MAIANTHEMUM F. H. Wiggers, Prim. Fl. Holsat. 14. 1780, nom. cons.

舞鹤草属 wu he cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Shoichi Kawano[8]

Oligobotrya Baker; *Polygonastrum* Moench; *Smilacina* Desfontaines; *Tovaria* Necker ex Baker (1875), not Ruiz & Pavón (1794); *Vagnera* Adanson.

Herbs perennial, rhizomatous. Stems erect, simple. Leaves alternate, sessile or petiolate, usually elliptic to ovate, sometimes basal leaf solitary and early withered. Inflorescence a terminal raceme or panicle. Flowers bisexual or sometimes unisexual (when plants dioceous), small. Perianth segments 4 or 6, in 2 whorls, free or proximally ± connate, rarely forming a long tube. Stamens 4 or 6, inserted at base of perianth segments or adnate to perianth tube; filaments filiform; anthers dorsifixed. Ovary 2- or 3-loculed; ovules 1 or 2 per locule. Style columnar, relatively short; stigma entire or 2- or 3-lobed. Fruit a berry, globose or subglobose. Seeds 1–3, globose to ovoid.

About 35 species: mainly in E Asia and North America, also in N Asia, Central America, and N Europe; 19 species (nine endemic) in China.

Wu Zhengyi (editor's note) believes that *Smilacina* would be better kept separate from *Maianthemum* on the basis of morphology and geographic distribution.

1a. Plants with a solitary, early-withered basal leaf, cauline leaves 2 or 3; perianth segments 4, in 2 whorls; stamens 4; ovary 2-loculed, ovules 2 per locule ..... 1. *M. bifolium*
1b. Plants without basal leaf, cauline leaves more than 3; perianth segments 6; stamens 6; ovary 3-loculed, ovules 1 or 2 per locule.
2a. Rhizome (0.7–)1–2 cm thick.
3a. Ovary 3–4 × as long as style ..... 2. *M. fuscum*
3b. Ovary shorter than or subequaling style.
4a. Inflorescence rachis glabrous ..... 3. *M. tatsienense*
4b. Inflorescence rachis pubescent.
5a. Leaves basally cordate and clasping stem ..... 8. *M. forrestii*
5b. Leaves basally neither cordate nor clasping stem.
6a. Perianth funnelform.
7a. Perianth tube 6–10 mm, 2/3–3/4 as long as perianth ..... 9. *M. henryi*
7b. Perianth tube 3–4 mm, nearly 1/2 as long as perianth ..... 10. *M. szechuanicum*
6b. Perianth usually campanulate or rotate.
8a. Style 2–2.5 × as long as ovary ..... 4. *M. oleraceum*
8b. Style nearly as long as ovary.
9a. Perianth tube 1–2 mm, segments connate proximally ..... 7. *M. atropurpureum*
9b. Perianth tube indistinct, segments free to the base or connate for less than 2 mm.
10a. Panicle with only 1 or 2 branches at base; stigma 3-lobed ..... 5. *M. purpureum*
10b. Panicle with 3 or more branches; stigma subentire ..... 6. *M. japonicum*
2b. Rhizome 0.1–0.7 cm thick.

[8] Kyoto University, 303-204 Greentown Makishima, 51-1 Motoyashiki, Makishima-cho, Uji, Kyoto 611-0041, Japan.

11a. Inflorescence a panicle.
12a. Inflorescence 2–2.5 cm; perianth segments ca. 2.3 mm; style ca. 1 mm (Sichuan) ..... 11. *M. nanchuanense*
12b. Inflorescence 4–5 cm; perianth segments 3–4 mm; style ca. 0.5 mm (Taiwan) ..... 12. *M. formosanum*
11b. Inflorescence a raceme.
13a. Flowers mostly in clusters of 2–4 ..... 13. *M. dahuricum*
13b. Flowers all solitary.
14a. Inflorescence rachis pubescent.
15a. Perianth segments violet, free to base ..... 14. *M. fusciduliflorum*
15b. Perianth segments white or tinged violet, connate at base to form a tube 1–3 mm.
16a. Perianth segments forming a long tube 2.5–3 mm; style 2.5–3 mm ..... 15. *M. lichiangense*
16b. Perianth segments forming a short tube 1–2 mm; style 0.5–1 mm ..... 16. *M. tubiferum*
14b. Inflorescence rachis glabrous.
17a. Inner perianth segments obovate, margin ciliate ..... 17. *M. gongshanense*
17b. Inner perianth segments oblong or narrowly lanceolate, margin not ciliate.
18a. Inner perianth segments oblong, 2–3 mm ..... 18. *M. trifolium*
18b. Inner perianth segments narrowly lanceolate, 5–7 mm ..... 19. *M. stenolobum*

1. Maianthemum bifolium (Linnaeus) F. W. Schmidt, Fl. Boem. Cent. 4: 55. 1794.

舞鹤草 wu he cao

Convallaria bifolia Linnaeus, Sp. Pl. 1: 316. 1753; *Smilacina bifolia* (Linnaeus) Desfontaines.

Plants 8–20(–25) cm tall. Rhizome sometimes forked, to 20 cm × 1–2 mm. Stem sometimes scattered papillose-pubescent. Basal leaf withered at anthesis; petiole to 10 cm. Cauline leaves usually 2, borne distally to apically on stem; petiole 1–2 cm, often papillose-pubescent; leaf blade deltoid-ovate, 3–8 (–10) × 1–5(–9) cm, abaxial veins puberulent, base cordate, margin minutely denticulate-papillose or puberulent. Raceme erect, 3–5 cm, 10–25-flowered; rachis papillose-pubescent; bracts minute. Flowers solitary or paired; pedicel ca. 5 mm, slender, articulate apically. Perianth white; segments oblong, 2–2.5 × 1.5–1.8 mm. Stamens 1.6–2.1 mm. Style ca. 1 mm. Berries red at maturity, 3–6 mm in diam. Seeds with yellow testa. Fl. May–Jul, fr. Aug–Sep. 2*n* = 28, 30, 36, 42, 54, 88.

Forests, thickets, moist places, hillsides along streams; 500–2700 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, N Xinjiang [Japan, Korea, Mongolia, Russia; Europe, North America].

Maianthemum dilatatum (A. W. Wood) A. Nelson & J. F. Macbride (Bot. Gaz. 61: 30. 1916), from Japan, Mongolia, E Russia, and NW North America, probably occurs in China. In Russia and Japan, *M. dilatatum* is sympatric with *M. bifolium* and, in Japan, there occur intermediate forms which may have derived from hybridization between the two species (Kawano, pers. obs.). Such plants in the Russian Far East have been called *M. intermedium* Voroschilov (Izv. Glavn. Bot. Sada RSFSR 38, 50. 1960) and may also occur in China.

2. Maianthemum fuscum (Wallich) LaFrankie, Taxon 35: 588. 1986.

西南鹿药 xi nan lu yao

Smilacina fusca Wallich, Pl. Asiat. Rar. 3: 37. 1832; *S. bootanensis* Griffith; *S. finitima* (W. W. Smith) F. T. Wang & Tang; *S. fusca* var. *pilosa* H. Hara; *Tovaria finitima* W. W. Smith; *T. fusca* (Wallich) Baker.

Plants 25–50 cm tall. Rhizome creeping, tuberous-moniliform, ca. 1 cm thick, stout. Stem glabrous or distally pilose. Leaves 4–9; petiole 1–2.5 cm, glabrous or pilose; leaf blade oblong to ovate-lanceolate, 8–17 × 3–6.5 cm, base rounded or subcordate, margin sometimes ciliate, apex cuspidate-caudate. Inflorescence a panicle; rachis zigzagged or straight, sometimes with spreading, stiff hairs. Flowers solitary; pedicel 4–8(–13) mm. Perianth rose; segments nearly free, subelliptic, 3–4 × 2–3 mm. Filaments subdeltoid, ca. 1 mm, flat; anthers small. Ovary 1.5–2 mm, 3–4 × as long as style. Style very short. Berries red at maturity, 5–8 mm in diam., 1–3-seeded. Fl. May–Jul, fr. Sep–Nov. 2*n* = 28, 36, 54*, 66, 72.

Forests, thickets; 1600–2800 m. S Xizang, NW Yunnan [Bhutan, NE India, Myanmar, Nepal, Sikkim].

3. Maianthemum tatsienense (Franchet) LaFrankie, Taxon 35: 589. 1986.

窄瓣鹿药 zhai ban lu yao

Tovaria tatsienensis Franchet, Bull. Soc. Bot. France 43: 47. 1896; *Smilacina paniculata* (Baker) F. T. Wang & Tang (1978), not M. Martens & Galeotti (1842); *S. tatsienensis* (Franchet) H. R. Wehrhahn; *S. tatsienensis* var. *paniculata* (Baker) F. T. Wang & Tang; *S. yunnanensis* (Franchet) Handel-Mazzetti; *Streptopus paniculatus* Baker; *Tovaria delavayi* Franchet; *T. yunnanensis* Franchet; *T. yunnanensis* var. *rigida* Franchet.

Plants 30–80 cm tall. Rhizome subtuberous or slightly moniliform, (2.5–)7–16 mm thick. Stem glabrous. Leaves 6–8, shortly petiolate; leaf blade ovate, oblong-lanceolate, or subelliptic, 2–7 × 2–7.5 cm. Inflorescence a panicle, sometimes a raceme, 2.5–11 cm, glabrous. Flowers solitary; pedicel 2–12 (–18) mm. Perianth greenish or sometimes tinged purple; segments connate at base, narrowly lanceolate, 2.5–5 × 0.6–1.2 mm. Filaments short, flat. Ovary globose, slightly longer than short style. Stigma deeply 3-lobed. Berries red at maturity, 6–7 mm in diam., 1–5-seeded. Fl. May–Jun, fr. Aug–Oct.

Forests, forest margins, grassy slopes; 1500–3500 m. Gansu, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan [Bhutan, India, N Myanmar].

4. Maianthemum oleraceum (Baker) LaFrankie, Taxon 35: 589. 1986.

长柱鹿药 chang zhu lu yao

Tovaria oleracea Baker, J. Linn. Soc., Bot. 14: 569. 1875; *Maianthemum oleraceum* var. *acuminatum* (F. T. Wang & Tang) Noltie; *Smilacina crassifolia* Kawano; *S. mientienensis* F. T. Wang & Tang; *S. oleracea* (Baker) J. D. Hooker & Thomson; *S. oleracea* f. *acuminata* (F. T. Wang & Tang) H. Hara; *S. oleracea* var. *acuminata* F. T. Wang & Tang.

Plants 45–80 cm tall. Rhizome tuberous, 1–2 cm thick. Stem ± zigzagged, distally pubescent or glabrescent. Leaves 4–9; petiole 3–7 mm; leaf blade oblong-ovate, oblong-lanceolate, or broadly lanceolate, 12–21 × 2–6 cm, abaxially laxly pubescent. Inflorescence a panicle, 5–10 cm; rachis pubescent. Flowers solitary; pedicel 5–10 mm. Perianth white or deep purplish red; segments nearly free, obovate-oblong, 4–6 × 2–3.5 mm, usually minutely denticulate on distal margin. Filaments subulate, ca. 1.3 mm; anthers ca. 1 mm. Style 2–2.5 mm; stigma 3-lobed. Berries red at maturity, 6–7 mm in diam., 1–3-seeded. Fl. May–Jul, fr. Aug–Oct. 2*n* = 36.

Forests; 2100–3300 m. Guizhou, Sichuan, SE Xizang, NW Yunnan [Bhutan, N India, Myanmar, Nepal, Sikkim].

5. Maianthemum purpureum (Wallich) LaFrankie, Taxon 35: 589. 1986.

紫花鹿药 zi hua lu yao

Smilacina purpurea Wallich, Pl. Asiat. Rar. 2: 38. 1831; *Jocaste purpurea* (Wallich) Kunth; *S. oligophylla* (Baker) J. D. Hooker; *S. pallida* Royle; *S. purpurea* f. *albiflora* (Wallich) H. Hara; *S. purpurea* var. *albiflora* Wallich; *S. purpurea* f. *oligophylla* (Baker) H. Hara; *S. zhongdianensis* H. Li & Y. Chen; *Tovaria oligophylla* Baker; *T. pallida* (Royle) Baker; *T. purpurea* (Wallich) Baker.

Plants 25–60 cm tall. Rhizome usually moniliform, 1–1.5 cm thick. Stem pubescent distally. Leaves 5–9, subsessile or shortly petiolate; leaf blade oblong or ovate-oblong, 7–13 × 3–6.5 cm, pubescent along abaxial veins. Inflorescence usually a raceme, occasionally with 1 or 2 branches, 1.5–7 cm; rachis pubescent. Flowers solitary; pedicel 2–4 mm, pubescent. Perianth white or sometimes tinged purplish; segments free, ovate-elliptic or ovate, 4–5 × 2–3 mm. Filaments ca. 1.5 mm, dilated to base; anthers small. Style nearly as long as ovary; stigma 3-lobed. Berries red at maturity, 6–7 mm in diam., 1–4-seeded. Fl. Jun–Jul, fr. Sep. 2*n* = 36, 38*.

Forests, thickets; 3200–4000 m. E and S Xizang, NW Yunnan [Bhutan, NE India, Nepal, Sikkim].

6. Maianthemum japonicum (A. Gray) LaFrankie, Taxon 35: 588. 1986.

鹿药 lu yao

Smilacina japonica A. Gray in Perry, Jap. Exped. 2: 321. 1856; *S. hirta* Maximowicz; *S. japonica* var. *mandshurica* Maximowicz; *S. rossii* (Baker) Maximowicz; *Tovaria japonica* (A. Gray) Baker; *T. rossii* Baker.

Plants 30–60 cm tall. Rhizome creeping, subterete or submoniliform, 7–10 mm thick. Stem strigose distally. Leaves 4–9, shortly petiolate; leaf blade ovate-elliptic, elliptic, or oblong, 6–15 × 3–7 cm, both surfaces laxly pubescent or glabrescent. Inflorescence paniculate, with 3–5 branches, 3–6 cm, 10–25-flowered; rachis pubescent. Flowers solitary; pedicel 2–6 mm, pubescent. Perianth white; segments free or slightly connate at base, oblong or oblong-obovate, ca. 3 × 1.5 mm. Filaments filiform, 2–2.5 mm; anthers small. Style 0.5–1 mm, subequaling ovary; stigma subentire. Berries red at maturity, 5–6 mm in diam., 1- or 2-seeded. Fl. May–Jun, fr. Aug–Sep. 2*n* = 36*.

Forests, moist and shaded places, cliffs; 900–2000 m. Anhui, ?Fujian, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Russia].

7. Maianthemum atropurpureum (Franchet) LaFrankie, Taxon 35: 588. 1986.

高大鹿药 gao da lu yao

Tovaria atropurpurea Franchet, Bull. Soc. Bot. France 43: 45. 1896; *Maianthemum wardii* (W. W. Smith) H. Li; *Peliosanthes mairei* H. Léveillé; *Smilacina atropurpurea* (Franchet) F. T. Wang & Tang; *S. prattii* (Franchet) H. R. Wehrhahn; *S. robusta* (Franchet) F. T. Wang & Tang; *S. smithii* K. Krause; *S. wardii* (W. W. Smith) F. T. Wang & Tang; *T. prattii* Franchet; *T. prattii* var. *robusta* Franchet; *T. wardii* W. W. Smith.

Plants 30–60 cm tall. Rhizome creeping, moniliform, 1–1.5 cm thick. Stem ± zigzagged, hispidulous distally. Leaves 5–9; petiole 5–6 mm; leaf blade oblong or ovate-elliptic, 9–11 × 4.5–5.2 cm, both surfaces laxly hispidulous. Inflorescence a panicle, 3–20 cm; rachis pubescent. Flowers solitary; pedicel 2–3 mm, elongate in fruit. Perianth white to purplish red; segments connate proximally, forming a tube 1–2 mm, lobes ovate-lanceolate or oblong, 2–4 × 1.5–2.5 mm. Filaments flat, widened at base, ca. 0.5 mm; anthers small. Style 1–1.5 mm, subequaling ovary; stigma 3-lobed. Berries 5–6 mm in diam., 1- or 2-seeded. Fl. May–Jun, fr. Aug–Sep.

• Forests, moist and shaded places; 1400–3000 m. S Sichuan, N Yunnan.

8. Maianthemum forrestii (W. W. Smith) LaFrankie, Taxon 35: 588. 1986.

抱茎鹿药 bao jing lu yao

Tovaria forrestii W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 209. 1914; *Smilacina forrestii* (W. W. Smith) Handel-Mazzetti.

Plants 50–80 cm tall. Stem glabrous. Leaves 6–9, sessile; leaf blade ovate-elliptic or narrowly elliptic, 11–17 × 3–8 cm, thinly papery, base cordate and clasping stem, apex long acuminate. Inflorescence a panicle or raceme, 8–15 cm, many flowered; rachis laxly pubescent. Flowers solitary; pedicel 3–6 mm, pubescent. Perianth yellow-green, tinged purple; segments basally connate, forming a short tube ca. 1 mm, lobes spreading, subovate or deltoid-lanceolate, 2–3 × 1.4–1.8 mm. Filaments ca. 0.5 mm; anthers small. Style ca. 0.8 mm, nearly as long as ovary. Fl. Jun–Jul.

• Forests; 2800–3200 m. NW Yunnan.

9. Maianthemum henryi (Baker) LaFrankie, Taxon 35: 588. 1986.

管花鹿药 guan hua lu yao

Oligobotrya henryi Baker, Hooker's Icon. Pl. 16: t. 1537. 1886; *O. henryi* var. *violacea* C. H. Wright; *O. limprichtii* Lingelsheim ex H. Limpricht; *Smilacina henryi* (Baker) H. Hara.

Plants 50–80 cm tall. Rhizome submoniliform, 1–2 cm thick. Stem hispidulous or hirsutulous distally, rarely glabrescent.Leaves 5–8, subsessile or shortly petiolate; leaf blade elliptic, ovate, or oblong, 9–22 × 3.5–11 cm, pubescent or glabrescent. Inflorescence a raceme, sometimes a panicle, 3–7(–17) cm; rachis pubescent. Flowers solitary; pedicel 1.5–5 mm, pubescent. Perianth yellowish green to white, funnelform; segments connate except distally, forming a long tube, tube 6–10 mm, lobes spreading, 2–3 × 1.5–2 mm. Stamens short. Style 2–3 mm, slightly longer than ovary; stigma 3-lobed. Berries red at maturity, 7–9 mm in diam., 2–4-seeded. Fl. May–Jun, fr. Aug–Oct. 2*n* = 36*.

Forests, thickets, moist places along streams; 1300–4000 m. Gansu, Henan, Hubei, Hunan, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [N Myanmar, Vietnam].

10. Maianthemum szechuanicum (F. T. Wang & Tang) H. Li, Acta Bot. Yunnan., Suppl. 3: 9. 1990.

四川鹿药 si chuan lu yao

Oligobotrya szechuanica F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 289. 1937; *Maianthemum henryi* (Baker) La Frankie var. *szechuanicum* (F. T. Wang & Tang) H. Li; *Smilacina henryi* (Baker) H. Hara var. *szechuanica* (F. T. Wang & Tang) F. T. Wang & Tang; *S. szechuanica* (F. T. Wang & Tang) H. Hara.

Plants 40–50 cm tall. Rhizome submoniliform, 0.7–1.5 cm thick. Stem hispidulous or hirsutulous distally. Leaves 5–8, subsessile or shortly petiolate; leaf blade oblong, elliptic, or ovate, 6–11 × 3–5(–7.5) cm, pubescent or glabrescent. Inflorescence a raceme, sometimes a panicle, 3–8(–17) cm; rachis pubescent. Flowers solitary; pedicel 1.5–4 mm, pubescent. Perianth purplish to white, funnelform; segments connate proximally, forming a tube 3–4 mm, lobes oblong, 3–4 × 1.5–2 mm. Filaments 1–1.5 mm; anthers small. Style 3–4 mm, nearly 2 × as long as ovary; stigma slightly 3-lobed. Fl. May–Jul.

• Alpine coniferous forests, hillsides, river banks; 2000–3600 m. W Sichuan, NE Yunnan.

11. Maianthemum nanchuanense H. Li & J. L. Huang, Bull. Bot. Res., Harbin 10(3): 51. 1990.

南川鹿药 nan chuan lu yao

Smilacina nanchuanensis (H. Li & J. L. Huang) S. Yun Liang.

Plants 12–22 cm tall. Rhizome creeping, terete, ca. 3 mm thick, slender. Stem yellow-brown hirsute distally. Leaves 3 or 4; petiole 3–4 mm; leaf blade ovate or oblong-ovate, 4.5–7 × 3.2–4.3 cm, abaxially strigose, base rounded or somewhat cordate, margin ciliate. Inflorescence a panicle, 2–2.5 cm; rachis densely hirsute. Flowers solitary; pedicel 3–4 mm, hirsute. Perianth white; segments free, spreading, ca. 2.3 × 0.7–1 mm. Filaments ca. 1.7 mm, slightly flat. Ovary white, ca. 1 mm. Style subequaling ovary; stigma slightly 3-lobed. Fl. May–Jun.

• Forests, hillsides along ravines; 1700–2100 m. SE Sichuan (Nanchuan Xian).

12. Maianthemum formosanum (Hayata) LaFrankie, Taxon 35: 588. 1986.

台湾鹿药 tai wan lu yao

Smilacina formosana Hayata, Icon. Pl. Formos. 9: 141. 1920; *S. nokomonticola* Yamamoto.

Plants 15–35 cm tall. Rhizome creeping, subterete, 2–7 mm thick, sometimes with swollen nodes. Stem hirsute distally, ± zigzagged. Leaves subsessile or shortly petiolate; leaf blade oblong, oblong-ovate, or lanceolate, 3.5–12 × 2–5 cm, papery, sometimes slightly pubescent on veins. Inflorescence usually a panicle, 4–5 cm; rachis hirsute. Flowers solitary; pedicel ca. 2 mm, hirsute. Perianth white; segments ± connate at base, oblong or oblanceolate, 3–4 × 1–2 mm. Filaments 1.5–2 mm; anthers small. Style very short, ca. 0.5 mm, ca. 1/2 as long as ovary; stigma slightly 3-lobed. Fl. Jun–Aug. 2*n* = 36*.

• Forests, wet shaded places; 2000–3700 m. Taiwan.

13. Maianthemum dahuricum (Turczaninow ex Fischer & C. A. Meyer) LaFrankie, Taxon 35: 588. 1986.

兴安鹿药 xing an lu yao

Smilacina dahurica Turczaninow ex Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 38. 1835; *Asteranthemum dahuricum* (Turczaninow ex Fischer & C. A. Meyer) Kunth; *Tovaria dahurica* (Turczaninow ex Fischer & C. A. Meyer) Baker; *Vagnera dahurica* (Turczaninow ex Fischer & C. A. Meyer) Makino.

Plants 30–60 cm tall. Rhizome creeping, 1–2.5 mm thick, slender. Stem glabrous or shortly pubescent distally. Leaves 6–12, sessile; leaf blade oblong-ovate or oblong, 6–13 × 2–4 cm, abaxially densely pubescent. Inflorescence a raceme, 3–4 cm; rachis shortly pubescent. Flowers in clusters of 2–4, very rarely solitary; pedicel 3–5 mm, pubescent. Perianth white; segments ± connate at base, obovate-oblong or oblong, 2–4 × 1–1.5 mm. Filaments 1.5–3 mm; anthers small. Style ca. 1 mm, shorter than ovary; stigma slightly 3-lobed. Berries red or purplish red at maturity, 6–7 mm in diam., 1- or 2-seeded. Fl. Jun, fr. Aug. 2*n* = 36*.

Forests; 400–1000 m. Heilongjiang, Jilin, ?Liaoning, ?Nei Mongol [Korea, Russia].

14. Maianthemum fusciduliflorum (Kawano) S. C. Chen & Kawano, Novon 10: 113. 2000.

褐花鹿药 he hua lu yao

Smilacina fusciduliflora Kawano, J. Jap. Bot. 41: 354. 1966; *Maianthemum dulongense* H. Li.

Plants 3–20 cm tall. Rhizome creeping, moniliform, 3–4 cm × 4–8 mm. Stems sometimes 2–4-crowded, purplish, puberulent. Leaves 4–6, subsessile; leaf blade ovate, 2.5–3.6(–6) × 1–2(–3.5) cm, base cordate, apex acute. Inflorescence a raceme, 5–6 cm, 3–15-flowered; rachis pubescent. Flowers solitary; pedicel 2–4 mm, pubescent. Perianth violet; segments scarcely con-

nate at base, outer ones broadly ovate, ca. 3 × 2.5 mm, inner ones oblong, ca. 1 mm wide. Filaments ca. 1 mm; anthers ca. 1 mm. Style very short; stigma 3-lobed. Fl. Jul.

Forests, thicket meadows; 2200–3600 m. SE Xizang, NW Yunnan [Myanmar].

15. Maianthemum lichiangense (W. W. Smith) LaFrankie, Taxon 35: 589. 1986.

丽江鹿药 li jiang lu yao

Tovaria lichiangensis W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 209. 1914; *Smilacina lichiangensis* (W. W. Smith) W. W. Smith.

Plants 7–20 cm tall. Rhizome subterete, 1–1.5 mm thick, slender. Stem hirsute distally. Leaves 2–4; petiole 3–10(–14) mm; leaf blade ovate, broadly ovate, or oblong-ovate, 2.5–3.5 × 1.6–3.3 cm, both surfaces hispidulous or glabrescent, base obtuse or subcordate. Inflorescence usually a raceme, 1–2(–5) cm, 2–4-flowered; rachis papillose-pubescent. Flowers solitary, fragrant; pedicel 2–3 mm. Perianth white; segments connate proximally, forming a tube 2.5–3 mm, lobes spreading, suboblong, 4–5 × 2.5–3 mm. Filaments deltoid-lanceolate, 1.5–2 mm. Style 2.5–3 mm, longer than ovary; stigma 3-lobed. Berries red at maturity, 5–6 mm in diam., 1- or 2-seeded. Fl. Jun–Jul, fr. Sep–Oct.

• Forests, thickets; 2800–3500 m. S Gansu, ?S Shaanxi (Qin Ling), Sichuan, NW Yunnan.

16. Maianthemum tubiferum (Batalin) LaFrankie, Taxon 35: 589. 1986.

合瓣鹿药 he ban lu yao

Smilacina tubifera Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 104. 1893; *S. fargesii* (Franchet) Diels; *S. souliei* (Franchet) F. T. Wang & Tang; *Tovaria fargesii* Franchet; *T. prattii* Franchet var. *quadrifolia* Franchet; *T. souliei* Franchet; *T. tubifera* (Batalin) C. H. Wright.

Plants 10–30 cm tall. Rhizome subterete, 1(–6) mm thick, usually slender. Stem hispidulous distally. Leaves 2–5, subsessile or shortly petiolate; leaf blade ovate or oblong-ovate, 3–3.5(–9) × 2.5–4.5 cm, both surfaces laxly pubescent or glabrescent, base truncate or subcordate. Inflorescence a raceme, 1–4(–7) cm, 2- or 3(–10)-flowered; rachis pubescent. Flowers solitary; pedicel 1–2(–4) mm. Perianth white or sometimes tinged purple; segments connate proximally, forming a short tube 1–2 mm, lobes oblong, 2.5–3(–5) × 2–2.5 mm. Filaments very short. Style 0.5–1 mm, subequaling ovary. Berries 6–7 mm in diam., 2- or 3-seeded. Fl. May–Jul, fr. Sep.

• Moist places in forests; 2500–3000 m. Gansu, Hubei, Qinghai, Shaanxi, Sichuan.

17. Maianthemum gongshanense (S. Yun Liang) H. Li, Acta Bot. Yunnan., Suppl. 3: 10. 1990.

贡山鹿药 gong shan lu yao

Smilacina gongshanensis S. Yun Liang in F. T. Wang et al., Acta Bot. Yunnan. 5: 261. 1983.

Plants 5–20 cm tall. Rhizome 1.5–2 mm thick, slender. Stem white pubescent distally. Leaves 2, shortly petiolate; leaf blade ovate or oblong-ovate, 2–5 × 1.5–3 cm, both surfaces laxly pubescent, base rounded or subcordate. Inflorescence a raceme, 1–3 cm, 1–4-flowered, glabrous. Flowers solitary; pedicel 5–10 mm. Perianth brownish; segments slightly connate at base, outer ones oblong, ca. 3 × 1.5–2 mm, inner ones obovate, 4–4.5 × 3–3.5 mm. Filaments 0.5–0.8 mm, flat, basally connate; anthers 0.5–0.8 mm. Style short; stigma 3-parted. Fl. Jul.

• Alpine meadows, thickets; 3400–3600 m. NW Yunnan (Gongshan Drung-Nu Zu Zizhixian).

18. Maianthemum trifolium (Linnaeus) Sloboda, Rostlinnictví, 192. 1852.

三叶鹿药 san ye lu yao

Convallaria trifolia Linnaeus, Sp. Pl. 1: 316. 1753; *Asteranthemum trifolium* (Linnaeus) Kunth; *Smilacina trifolia* (Linnaeus) Desfontaines; *Tovaria trifolia* (Linnaeus) Necker ex Baker; *Vagnera trifolia* (Linnaeus) Morong.

Plants 10–20 cm tall. Rhizome 2–2.5 mm thick, slender. Stem glabrous. Leaves usually 3; petiole short, ± clasping stem; leaf blade oblong or narrowly elliptic, 6–13 × 1.5–3.5 cm, papery, glabrous. Inflorescence a raceme, (2–)3.5–6 cm, 4–7-flowered, glabrous. Flowers solitary; pedicel 4–6 mm. Perianth white; segments slightly connate at base, oblong, 2–3 × 1.5–2 mm. Filaments filiform, 2–2.5 mm; anthers small. Style ca. 1 mm, subequaling ovary; stigma slightly 3-lobed. Fl. Jun, fr. Aug. $2n = 36$.

Forests; 400–700 m. Heilongjiang, Jilin, ?Nei Mongol [N Korea, Russia; North America].

19. Maianthemum stenolobum (Franchet) S. C. Chen & Kawano, Novon 10: 113. 2000.

少叶鹿药 shao ye lu yao

Tovaria stenoloba Franchet, Bull. Soc. Bot. France 43: 47. 1896; *Maianthemum tatsienense* (Franchet) LaFrankie var. *stenolobum* (Franchet) H. Li; *Smilacina paniculata* (Baker) F. T. Wang & Tang var. *stenoloba* (Franchet) F. T. Wang & Tang; *S. stenoloba* (Franchet) Diels; *S. tatsienensis* (Franchet) H. R. Wehrhahn f. *stenoloba* (Franchet) H. Hara; *S. tatsienensis* var. *stenoloba* (Franchet) D. M. Liu.

Plants 10–15 cm tall. Rhizome 2–3 mm thick, slender. Stem glabrous. Leaves 3–5; petiole (1–)2–5 mm; leaf blade ovate or ovate-elliptic, 3–4.5 × 1.8–2.6 cm. Inflorescence usually a raceme, 1.5–4 cm, 3–11-flowered, glabrous. Flowers solitary; pedicel 2–3 mm. Perianth green; segments connate at base, narrowly lanceolate, 5–7 × ca. 1 mm. Filaments flat, ca. 1 mm; anthers small. Style very short; stigma 3-parted. Berries 4–5 mm in diam. Fl. May–Jun, fr. Jul.

• Forests, grassy slopes, hillsides along ravines; 2000–3000 m. S Gansu, W Hubei, E Sichuan.

44. HETEROPOLYGONATUM M. N. Tamura & Ogisu in M. N. Tamura et al.,

Kew Bull. 52: 950. 1997.

异黄精属 yi huang jing shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, rhizomatous, sympodial, epiphytic. Rhizome horizontally creeping, often branched, moniliform, fleshy. Stem ascending or pendulous, simple. Leaves cauline, alternate, shortly or indistinctly petiolate, entire. Inflorescences terminal and often also axillary, racemose or subumbellate, often 1- or 2-flowered, sometimes 3–6-flowered. Flowers bisexual, pendulous, ebracteate. Perianth pinkish or whitish, tubular or campanulate; segments 6, imbricate, subequal, connate proximally for 1/5–5/6 their length. Corona absent. Stamens 6, in 2 whorls, outer ones shorter than or equaling inner; filaments filiform, smooth or verrucose, proximally adnate to perianth for most of their length; anthers lanceolate to ovate, introrse. Ovary ellipsoid, 3-loculed. Style slender; stigma capitate or 3-lobed, small. Fruit a berry, orange, globose to ovoid.

• Four species: China.

1a. Stem pendulous, 50–100 cm; leaf blade fasciate-falcate, 20–40 cm ..... 4. *H. pendulum*
1b. Stem ascending, 0.5–40 cm; leaf blade lanceolate, oblong, ovate-oblong, or oblanceolate, 3.5–14 cm.
2a. Stem 20–40 cm; leaves 6–9; outer stamens shorter than inner ones ..... 1. *H. roseolum*
2b. Stem 0.5–14 cm; leaves 1 or 2; outer stamens equaling inner ones.
3a. Inflorescence 2–4-flowered; stem 5–14 cm; leaves 2, thickly papery; perianth 6–8 mm; anthers 0.7–1 mm ..... 2. *H. ginfushanicum*
3b. Inflorescence 1-flowered; stem 0.5–3.5 cm; leaf 1(or 2), leathery; perianth 9–12 mm; anthers 1.5–2 mm ..... 3. *H. xui*

1. Heteropolygonatum roseolum M. N. Tamura & Ogisu in M. N. Tamura et al., Kew Bull. 52: 951. 1997.

异黄精 yi huang jing

Rhizome 1–2 cm thick. Stem ascending, purple speckled, 20–40 cm × 2–4 mm. Leaves 6–9; petiole ca. 5 mm, base ± twisted; leaf blade lanceolate, 8–14 × 1.5–3.6 cm, leathery, 7–9-veined with prominent midvein, base obtuse, apex acuminate with blunt tip. Inflorescence (1 or)2-flowered; peduncle 7–14 mm. Pedicel 7–22 mm. Perianth pinkish, tipped greenish, tubular, 1.4–1.6 cm × 4–5 mm; lobes 6–8 mm. Outer stamens ca. 6 mm, inner ones ca. 8 mm; free part of filaments 1–1.5 mm, smooth; anthers lanceolate, ca. 2 × 1 mm. Ovary ca. 4 × 2.5 mm. Style ca. 2 mm. Berries 0.8–1 cm in diam. Fl. May. 2*n* = 32*.

• Dark mossy evergreen broad-leaved forests; 1200–1300 m. EC Guangxi (Dayao Shan).

2. Heteropolygonatum ginfushanicum (F. T. Wang & Tang) M. N. Tamura et al., Novon 10: 157. 2000.

金佛山异黄精 jin fo shan yi huang jing

Smilacina ginfushanica F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 249. 1978; *Polygonatum ginfushanicum* (F. T. Wang & Tang) F. T. Wang & Tang.

Rhizome pale purple, terete, 1–5 mm thick. Stem ascending, purple, 5–14 cm, slender, glabrous. Leaves 2; petiole very short; leaf blade oblong to ovate-oblong, 3.5–9 × 1.3–3.8 cm, thickly papery, glabrous, base rounded, apex acuminate. Inflorescences terminal and sometimes also axillary, racemose, 2–4-flowered. Pedicel 1–8 mm. Perianth cylindric-campanulate, 6–8 × 3–6 mm; lobes erect, 1–1.5 mm, apically papillose abaxially. Stamens subequal; filaments very short; anthers ovate, 0.7–1 mm. Ovary 2–3 mm. Style 1.5–1.8 mm; stigma capitate. Fl. May–Jun.

• Dense forests, shady rocks; 1300–1800 m. NE Guizhou (Jiangkou Xian), SW Hubei (Lichuan Xian), SE Sichuan (Jinfo Shan, Shizhu Xian).

3. Heteropolygonatum xui W. K. Bao & M. N. Tamura in W. K. Bao et al., Acta Phytotax. Geobot. 49: 143. 1998.

四川异黄精 si chuan yi huang jing

Rhizome 1–5 mm thick. Stem ascending, purple speckled, 0.5–3.5 cm × 0.5–1 mm. Leaf 1(or 2); petiole 1.5–2.5 mm; leaf blade abaxially whitish or occasionally purplish, linear-oblong to oblong or oblanceolate, 3.5–10 × 0.6–3 cm, leathery, 7-veined with prominent midvein, base attenuate to obtuse, apex acuminate with blunt or sharp tip. Flower 1; pedicel 2–4 cm. Perianth whitish pink adaxially, pink abaxially, tubular to campanulate, 0.9–1.2 cm × 3–5 mm; lobes lanceolate, 4.5–9.5 mm, recurved near apex. Stamens subequal; filaments 3–5 mm, free part 0.8–1 mm; anthers lanceolate, 1.5–2 mm, apex mucronate. Ovary 1.8–2.2 mm. Style 1.5–2 mm; stigma capitate. Berries 5–8 mm in diam. Fl. May, fr. Aug.

• Epiphytic in mossy mixed forests dominated by *Abies fabri*; 2600–2700 m. C Sichuan (Hongya Xian).

4. Heteropolygonatum pendulum (Z. G. Liu & X. H. Hu) M. N. Tamura & Ogisu in M. N. Tamura et al., Kew Bull. 52: 951. 1997.

垂茎异黄精 chui jing yi huang jing

Polygonatum pendulum Z. G. Liu & X. H. Hu, Acta Phytotax. Sin. 22: 426. 1984.

Rhizome 1–2 cm thick. Stem pendulous, purple streaked, 50–100 cm × ca. 2 mm, geniculate. Leaves 4–10 or more; petiole indistinct; leaf blade fasciate-falcate, 20–40 × 1.5–2.5 cm, thickly papery, 7–9-veined, base tapered-cuneate, apex obtuse. Inflorescence 2–6-flowered; peduncle 2–3 cm, slender. Pedicel 2–3 cm, articulate in middle part. Perianth white or occasionally pinkish, campanulate, 0.9–1.3 cm; lobes oblong-ovate, 4–5 mm, apex ± truncate and papillose. Outer stamens ca. 6 mm, inner ones ca. 7 mm; free part of filaments 1–2 mm, abaxially verrucose; anthers lanceolate, 2.5–3 × ca. 1 mm. Ovary ca. 4.5 ×

2.5 mm. Style ca. 2 mm; stigma capitate to 3-lobed. Berries 1–1.5 cm in diam., many seeded. Fl. May–Jun, fr. Aug–Sep. $2n = 32$*

• Forests; 2000–2200 m. WC Sichuan (Gongga Shan).

45. POLYGONATUM Miller, Gard. Dict. Abr., ed. 4, [1109]. 1754.

黄精属 huang jing shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, rhizomatous, sympodial, usually terrestrial, rarely epiphytic. Stem erect, arching, or sometimes ± scandent, simple. Leaves cauline, lateral and pseudoterminal, alternate, opposite, or whorled, sessile or shortly petiolate, sometimes cirrose at apex. Inflorescences axillary, umbel-, corymb-, or racemelike, or a solitary flower; bracts present or absent, when present herbaceous, membranous, or scarious, persistent or caducous. Flowers bisexual, usually pendulous, rarely erect; pedicel articulate at apex. Perianth segments 6, valvate, connate proximally and forming a tube usually for at least 1/2 their length. Corona absent. Stamens 6; filaments proximally adnate to perianth tube, free part filiform or flattened, short to long, smooth, papillose or hairy; anthers basifixed to dorsifixed and versatile, introrse, base 2-lobed. Ovary 3-loculed; ovules 2–8 per locule. Style slender; stigma 3-lobed, small. Fruit a berry, globose, several to more than 10-seeded. Seeds subglobose.

About 60 species: temperate regions of the N hemisphere, mainly from the Himalayas to Japan; 39 species (20 endemic) in China.

1a. Bracts ovate to lanceolate, 1–3.5 cm, herbaceous, usually 7- or more veined.
2a. Perianth 3.5–5 mm; rhizome tuberous terete, 15–20 mm thick ..... 4. *P. leiboense*
2b. Perianth 11–25 mm; rhizome terete or ± moniliform, 3–6 mm thick, slender.
3a. Plants laxly pubescent except basal part of stem and flowers; inflorescences 3- or 4-bracteate ..... 3. *P. megaphyllum*
3b. Plants glabrous; inflorescences (1 or)2-bracteate.
4a. Bracts borne at base of pedicel, ovate to broadly ovate-elliptic, 2–3.5 × 1–3 cm; filaments papillose ..... 1. *P. involucratum*
4b. Bracts borne near apex of pedicel, lanceolate to oblong-lanceolate, to 2 × 0.3–0.6 cm; filaments smooth ..... 2. *P. desoulavyi*
1b. Bracts subulate to linear-lanceolate, rarely to 1.2 cm, membranous, scarious, or subherbaceous with scarious margin, 1–5-veined, or veinless, or bracts absent.
5a. Plants hirsutulous except flowers ..... 27. *P. hirtellum*
5b. Plants glabrous, or sometimes scabridulous, papillose, or hirsutulous on stem (glabrous on leaves).
6a. Leaves mostly opposite or whorled.
7a. Perianth (15–)18–25 mm.
8a. Plants large, usually 1–3 m tall; leaves whorled, strongly cirrose at apex; perianth lobes 3–5 mm ..... 17. *P. kingianum*
8b. Plants small, less than 10 cm tall; leaves crowded, or alternate on proximal part of stem, straight at apex; perianth lobes 6–10 mm ..... 18. *P. hookeri*
7b. Perianth 5–12(–15) mm.
9a. Filaments 5–7 mm ..... 28. *P. wardii*
9b. Filaments 0.5–3(–4) mm.
10a. Ovary 4–7 mm; anthers 3–4 mm.
11a. Leaves mostly whorled; pedicel of ripe berry ascending ..... 26. *P. tessellatum*
11b. Leaves mostly opposite; pedicel of ripe berry reflexed.
12a. Leaves strongly cirrose at apex ..... 25. *P. longistylum*
12b. Leaves straight at apex.
13a. Filaments dilated and saccate apically ..... 23. *P. cathcartii*
13b. Filaments not dilated apically.
14a. Style 2–3 × as long as ovary; leaves sessile, linear-lanceolate, papery ..... 24. *P. griffithii*
14b. Style slightly longer than ovary; leaves petiolate, petiole ca. 5 mm, leaf blade ovate-oblong to ovate-lanceolate, subleathery ..... 22. *P. oppositifolium*
10b. Ovary 1.5–3 mm; anthers 1–3(–3.5) mm.
15a. Leaves cirrose or curved at apex.
16a. Style long, 1.5–2 × as long as ovary ..... 36. *P. sibiricum*
16b. Style short, subequaling ovary.
17a. Inflorescences 2–6(–11)-flowered; bracts (1–)2–6 mm, scarious or subherbaceous with scarious margin, 1-veined ..... 39. *P. zanlanscianense*

17b. Inflorescences (1 or)2-flowered; bracts 1–2 mm, scarious, veinless, or bracts absent.
18a. Leaves flaccid, apex usually cirrose at anthesis ..... 37. *P. cirrhifolium*
18b. Leaves stiff, ± leathery, apex hooked at anthesis ..... 38. *P. stewartianum*
15b. Leaves straight at apex.
19a. Leaves ± reflexed at anthesis ..... 32. *P. curvistylum*
19b. Leaves horizontal or ascending.
20a. Leaves elliptic to oblong-lanceolate, 2–6 cm; flowers 6–8 mm; plants small, 8–30 cm tall.
21a. Leaves alternate or opposite, often in whorls of 3 in apical part of stem, apex subobtuse to acute; peduncle 2–6 mm; pedicels (2–)5–6 mm ..... 31. *P. prattii*
21b. Leaves in whorls of 3–6, rarely also scattered between whorls, apex acuminate; peduncle 10–20 mm; pedicels 1–2 mm ..... 33. *P. gracile*
20b. Leaves oblong-lanceolate to linear, 6–12 cm; flowers 8–12 mm; plants large, (20–)40–110 cm tall.
22a. Peduncle 2–4 mm ..... 34. *P. stenophyllum*
22b. Peduncle 10–20 mm.
23a. Rhizome usually tuberous terete, very rarely moniliform, 7–15 mm thick ..... 30. *P. verticillatum*
23b. Rhizome terete, 3–5 mm thick ..... 35. *P. roseum*

6b. Leaves alternate or mostly so.
24a. Perianth 6–9(–11) mm.
25a. Perianth tube short, 1–3 mm, markedly shorter than lobes.
26a. Leaves 2.3–3.6 cm wide, apex straight; peduncle obsolete; plants small, 17–45 cm tall ..... 21. *P. altelobatum*
26b. Leaves 0.8–1.7 cm wide, apex strongly cirrose; peduncle 1–1.5 cm; plants large, 80–170 cm tall ..... 29. *P. alternicirrhosum*
25b. Perianth tube long, 4.5–6 mm, markedly longer than lobes.
27a. Stem hirsutulous; peduncle 2.5–5 cm ..... 20. *P. longipedunculatum*
27b. Stem glabrous or papillose distally; peduncle 0.2–1.2 cm.
28a. Rhizome ± moniliform, 10–15 mm thick; leaves ± acuminate at apex; perianth ± urceolate; peduncle 5–12 mm; plants usually epiphytic ..... 19. *P. punctatum*
28b. Rhizome terete, 3–5 mm thick; leaves subobtuse to acute at apex; perianth cylindric; peduncle 2–6 mm; plants terrestrial ..... 31. *P. prattii*
24b. Perianth (13–)14–30 mm.
29a. Rhizome gingerlike, moniliform or nearly so, with annual knots swollen; annual elongation (distance between knots) short.
30a. Filaments spurred apically; pedicel with a basal bract ca. 5 mm ..... 12. *P. franchetii*
30b. Filaments usually not spurred apically; pedicel with a small, basal bract 1–2 mm or ebracteate.
31a. Leaves shortly pubescent abaxially; peduncle 3–8 cm, very slender ..... 13. *P. filipes*
31b. Leaves glabrous abaxially; peduncle 1–4(–6) cm, relatively thick.
32a. Rhizome 5–7 mm thick; inflorescences 1- or 2-flowered; leaves 5–9 ..... 16. *P. nodosum*
32b. Rhizome 8–25 mm thick; inflorescences (1 or)2–7(–14)-flowered; leaves 10–23.
33a. Filaments thickened distally, slightly compressed or saccate-convex apically, 3–4 mm, papillose or pubescent ..... 14. *P. cyrtonema*
33b. Filaments thickened proximally, filiform apically, 5–10 mm, often wholly smooth, sometimes basally slightly verruculose ..... 15. *P. arisanense*
29b. Rhizome terete; annual elongation long.
34a. Leaves long petiolate, petiole 5–15 mm; perianth tube often with short, cottony hairs inside.
35a. Bracts 8–12 mm, 3–5-veined; leaves 5–9, 7–9 cm wide, abaxially glaucous; rhizome 6–10 mm thick ..... 5. *P. inflatum*
35b. Bracts absent to 8 mm, veinless or 1-veined; leaves 4 or 5, 1.8–3.5 cm wide, abaxially not glaucous; rhizome 3–4 mm thick ..... 6. *P. acuminatifolium*
34b. Leaves sessile or shortly petiolate, petiole to 5 mm; perianth tube not pubescent inside.
36a. Leaves hispidulous abaxially ..... 7. *P. humile*
36b. Leaves glabrous abaxially.
37a. Peduncle not adnate to stem proximally.
38a. Peduncle 3–5 cm; inflorescences (3–)5–12(–17)-flowered ..... 11. *P. macropodum*

38b. Peduncle usually 1–1.5 cm; inflorescences 1–4(–8)-flowered ..... 8. *P. odoratum*

37b. Peduncle adnate to stem proximally (2–15 mm).

39a. Perianth 14–16 mm; filaments glabrous ..... 9. *P. adnatum*

39b. Perianth 20–25 mm; filaments densely white villous ..... 10. *P. omeiense*

1. Polygonatum involucratum (Franchet & Savatier) Maximowicz, Mélanges Biol. Bull. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 11: 844. 1883.

二苞黄精 er bao huang jing

Periballanthus involucratus Franchet & Savatier, Enum. Pl. Jap. 2: 524. 1878; *Polygonatum platyphyllum* Franchet.

Rhizome terete, 3–5 mm thick, slender. Stem arching, 20–50 cm, glabrous. Leaves 4–7, alternate; petiole short or indistinct; leaf blade broadly elliptic to ovate, usually 5–10 × 3–6 cm, glabrous, base rounded or tapering, apex acute to shortly acuminate. Inflorescences 2-flowered; peduncle 1–2 cm, glabrous; bracts 2, borne at base of pedicel, ovate to broadly ovate-elliptic, 2–3.5 × 1–3 cm, leaflike, 7- or more veined, persistent. Flowers pendulous; pedicel 1–2 mm, glabrous. Perianth greenish white, cylindric, 2.3–2.5 cm; lobes ca. 3 × 2 mm. Filaments ± compressed, 2–4 mm, papillose; anthers 3–5 mm. Ovary ca. 5 mm. Style 1.8–2 cm, slightly exserted. Berries ca. 1 cm in diam., 7- or 8-seeded. Fl. May–Jun, fr. Aug–Sep. 2*n* = 18*, (20, 22).

Forests, shaded and moist slopes; 700–1400 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, ?Nei Mongol, ?S Shaanxi (Qin Ling), Shanxi [Japan, Korea, Russia (Far East)].

Polygonatum cryptanthum H. Léveillé & Vaniot (Repert. Spec. Nov. Regni Veg. 5: 282. 1908), from small islands between Korea and Japan (Kyushu), is often considered to be conspecific with *P. involucratum* (e.g., by Jeffrey, Kew Bull. 34: 435–471. 1980). However, the former differs from the latter in its papillose peduncle, pedicels, and abaxial leaf and bract surfaces, shape and size of flowers, shape of filaments, and length of style in relation to perianth. In this treatment, *P. cryptanthum* is regarded as an independent species and is excluded from the synonymy of *P. involucratum.*

2. Polygonatum desoulavyi Komarov in Komarov & Alissova-Klobukova, Key Pl. Far East. USSR 1: 378. 1931.

长苞黄精 chang bao huang jing

Rhizome terete, ca. 3 mm thick, slender. Stem erect, 20–30 cm. Leaves alternate, elliptic to ovate, 6–8 cm, prominently 3–5-veined, apex acute to shortly acuminate. Inflorescences (1 or) 2-flowered; peduncle glabrous; bracts (1 or)2, borne near apex of pedicel, lanceolate to oblong-lanceolate, to 2 × 0.3–0.6 cm, herbaceous, persistent. Flowers pendulous; pedicel glabrous. Perianth white, cylindric, ca. 2.3 cm. Filaments ± compressed, smooth. 2*n* = 18.

Forests; ca. 600 m. Heilongjiang [Korea, Russia (Far East)].

Further research is needed to determine whether or not *Polygonatum mediobracteatum* Ohwi (J. Jap. Bot. 13: 443. 1937) should be included within *P. desoulavyi*.

3. Polygonatum megaphyllum P. Y. Li, Acta Phytotax. Sin. 11: 252. 1966.

大苞黄精 da bao huang jing

Rhizome ± moniliform or terete, 3–6 mm thick. Stem arching, 15–30 cm, laxly pubescent except basally. Leaves 5 or 6, alternate; petiole very short; leaf blade narrowly ovate to ovate-elliptic, 3.5–8 × 2.3–4.6 cm, both surfaces pubescent, base rounded, apex acuminate. Inflorescences usually 2-flowered; peduncle 4–6 mm, pubescent; bracts 3 or 4, borne at apex of peduncle, ovate or ovate-lanceolate, 1–2 × 0.5–1.2 cm, leaflike, 7- or more veined, pubescent, persistent. Flowers pendulous; pedicel 1–2 mm. Perianth pale green, cylindric, 1.1–1.9 cm; lobes ca. 3 × 2 mm. Filaments slightly compressed to filiform, 4–5 mm, basally slightly verruculose, apically smooth; anthers 3–4 mm. Ovary 3–4 mm. Style 6–11 mm, usually slightly exserted. Fl. May–Jun. 2*n* = 22*.

• Forests, grassy slopes; 1700–2500 m. Gansu, Hebei, Shaanxi, Shanxi, Sichuan.

4. Polygonatum leiboense S. C. Chen & D. Q. Liu, Acta Phytotax. Sin. 22: 417. 1984.

雷波黄精 lei bo huang jing

Rhizome tuberous terete, 1.5–2 cm thick. Stem erect, to 1 m, glabrous. Leaves many, alternate or occasionally also opposite; petiole 5–10 mm; leaf blade oblong-lanceolate to lanceolate, (6–)9–11 × 1.5–2.2 cm, prominently 7-veined, glabrous, base tapering, apex long acuminate and obtuse tipped. Inflorescences umbel-like, 2- or 3-flowered; peduncle to 6 cm; bracts 2–4, oblong-lanceolate, 1–2 cm × 3–6 mm, leaflike, 7- or more veined, persistent. Pedicel 1–2 mm. Perianth greenish, cylindric, 3.5–5 × ca. 2 mm; lobes oblong-ovate, ca. 2 × 1.5 mm, slightly shorter than or subequaling tube, apex penicillate-papillose adaxially. Filaments very short, ca. 0.3 mm, smooth; anthers suboblong, ca. 2 mm. Style slightly thickened, ca. 2 mm. Fl. May.

• About 2000 m. S Sichuan (Leibo Xian).

5. Polygonatum inflatum Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 442. 1901.

毛筒玉竹 mao tong yu zhu

Polygonatum inflatum var. *rotundifolium* Hatusima; *P. virens* Nakai.

Rhizome terete, 6–10 mm thick. Stem arching, 50–80 cm, glabrous. Leaves 5–9, alternate; petiole 0.5–1.5 cm; leaf blade ovate to broadly elliptic, 8–16 × 7–9 cm, glabrous, abaxially glaucous, base rounded, apex obtuse to shortly acuminate. Inflorescences 2- or 3-flowered; peduncle 2–4 cm; bracts 2 or 3, borne at base of pedicel, linear-lanceolate, 8–12 × 1.5–3 mm, membranous, 3–5-veined, caducous. Flowers pendulous; pedicel 4–6 mm. Perianth pale green, campanulate-cylindric, slightly constricted near mouth, 1.8–2.3 cm × 5–6 mm; lobes 2–3 × 3–4 mm. Filaments ± compressed, ca. 4 mm, free part cottony with uniseriate, short hairs; anthers ca. 4 mm. Ovary ca. 5 mm. Style ca. 1.5 cm, scarcely exserted. Berries blue-black, 1–1.2

cm in diam., 9–13-seeded. Fl. May–Jul, fr. Aug–Sep. 2*n* = 22*.

Forests, forest margins; near sea level to 1000 m. Heilongjiang, Jilin, Liaoning [Japan, Korea].

6. Polygonatum acuminatifolium Komarov, Izv. Imp. Bot. Sada Petra Velikago 16: 157. 1916.

五叶黄精 wu ye huang jing

Polygonatum quinquefolium Kitagawa.

Rhizome terete, 3–4 mm thick, slender. Stem erect, 20–30 cm, glabrous. Leaves 4 or 5, alternate; petiole 0.5–1.5 cm; leaf blade elliptic to oblong-elliptic, 5–9 × 1.8–3.5 cm, glabrous, abaxially not glaucous, base tapering, apex shortly acuminate and obtuse tipped. Inflorescences (1 or)2-flowered; peduncle 1–2 cm; bracts (1 or)2, subulate, to 8 mm, membranous, veinless or 1-veined, caducous, or bracts absent. Flowers pendulous; pedicel 1–6 mm. Perianth whitish green, cylindric, 2–2.7 cm; lobes 4–5 mm. Filaments compressed, 3.5–4.5 mm, free part papillose or shortly cottony, apex sometimes swollen-saccate; anthers 4–4.5 mm. Ovary ca. 6 mm. Style 1.5–2 cm. Fl. May–Jun. 2*n* = 20.

Forests; 1100–1400 m. Hebei, Jilin, ?Liaoning[Russia (Far East)].

7. Polygonatum humile Fischer ex Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 275. 1859.

小玉竹 xiao yu zhu

Polygonatum humillimum Nakai; *P. officinale* Allioni var. *humile* (Fischer ex Maximowicz) Baker.

Rhizome terete, (2–)3–5 mm thick, slender. Stem erect, (8–)25–50 cm, glabrous. Leaves 7–9(–11), alternate; petiole very short; leaf blade oblong to ovate-elliptic, (4–)5.5–8.5 × 1.5–4 cm, abaxially hispidulous, base obtuse, apex acuminate and obtuse tipped. Inflorescences usually 1-flowered; bracts absent. Flowers pendulous; pedicel 0.8–1.3 cm. Perianth white, tinged with green at apex, cylindric, 1.5–1.7 cm; lobes ca. 2 mm. Filaments slightly compressed, ca. 3 mm, densely verruculose; anthers ca. 3 mm. Ovary ca. 4 mm. Style 1.1–1.3 cm. Berries blue-black, ca. 1 cm in diam., 5- or 6-seeded. Fl. May–Jun, fr. Aug–Sep. 2*n* = 20*, (22, 30, 31).

Forests, grassy slopes; 800–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, ?Nei Mongol, Shanxi [Japan, Korea, Mongolia, Russia (Far East, Siberia)].

8. Polygonatum odoratum (Miller) Druce, Ann. Scott. Nat. Hist. 60: 226. 1906.

玉竹 yu zhu

Convallaria odorata Miller, Gard. Dict., ed. 8, *Convallaria* no. 4. 1768; *C. polygonatum* Linnaeus; *Polygonatum hondoense* Nakai ex Koidzumi; *P. japonicum* C. Morren & Decaisne; *P. langyaense* D. C. Zhang & J. Z. Shao; *P. maximowiczii* F. Schmidt; *P. odoratum* f. *ovalifolium* Y. C. Chu et al.; *P. officinale* Allioni; *P. officinale* var. *papillosum* Franchet; *P. planifilum* Kitagawa & Hir. Takahashi; *P. quelpaertense* Ohwi; *P. simizui* Kitagawa; *P. thunbergii* C. Morren & Decaisne; *P. vulgare* Desfontaines.

Rhizome terete, 5–14 mm thick. Stem arching, 20–50 (–100) cm, glabrous, angled. Leaves 7–12, alternate; petiole short; leaf blade abaxially glaucous, elliptic to ovate-oblong, 5–12(–20) × 3–6(–8) cm, often smooth, sometimes papillose-scabrous on veins, apex acuminate and obtuse tipped. Inflorescences 1–4(–8)-flowered; peduncle usually 1–1.5 cm; bracts small or absent. Flowers pendulous; pedicel 5–10(–20) mm. Perianth yellowish green to white, cylindric to campanulate-cylindric, 1.3–2(–2.5) cm; lobes ca. 3 mm. Filaments filiform, smooth or verruculose; anthers ca. 4 mm. Ovary 3–4 mm. Style 1–1.4 cm, included. Berries blue-black, 7–10(–12) mm in diam., 7–9-seeded. Fl. May–Jun, fr. Jul–Sep. 2*n* = (18*), 20*, (21, 22*, 23, 26, 28, 29, 30, 40*).

Forests, shaded slopes; 500–3000 m. Anhui, Gansu, Guangxi, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Qinghai, ?Shaanxi, Shandong, Shanxi, Taiwan, ?Zhejiang [Japan, Korea, Mongolia, Russia; Europe].

9. Polygonatum adnatum S. Yun Liang, Acta Phytotax. Sin. 25: 65. 1987.

贴梗黄精 tie geng huang jing

Rhizome usually branched, terete, 4–7 mm thick. Stem erect, 12–35 cm, glabrous. Leaves 6, alternate; petiole 2–3 mm; leaf blade abaxially glaucous, ovate to elliptic, 5–9 × 3–3.8 cm, glabrous, base rounded to obtuse, apex obtuse to shortly acuminate. Inflorescences 1-flowered; bracts subulate, ca. 1 mm, caducous. Pedicel 2–3.5 cm, proximal 2–9 mm adnate to stem. Perianth subcylindric, 1.4–1.6 cm; lobes ca. 2 mm. Filaments ca. 7 mm, glabrous; anthers oblong, ca. 3 mm. Style ca. 1 cm. Fl. Jun–Jul.

- Shaded slopes; ca. 2300 m. S Sichuan (Leibo Xian).

10. Polygonatum omeiense Z. Y. Zhu, Bull. Bot. Res., Harbin 12: 267. 1992.

峨眉黄精 e mei huang jing

Rhizome branched, terete, 3–5 mm thick, densely noded. Stem erect, purple-brown spotted, 25–35 cm, glabrous. Leaves 7 or 8, alternate; petiole 2–5 mm; leaf blade oblong-lanceolate to ovate-elliptic, 4–10 × 2–3.5 cm, glabrous, base obtuse-cuneate, apex acute-obtuse to acuminate. Inflorescences 1- or 2-flowered; peduncle 1.5–5 cm; bracts small, caducous. Pedicel 5–10 mm. Perianth yellowish white, cylindric or campanulate-cylindric, 2–2.5 cm; lobes deltoid, 2–3 mm. Filaments compressed, 7–8 mm, densely white-villous; anthers oblong, ca. 4 mm. Ovary ca. 4 mm. Style 1.4–1.6 cm. Fl. May–Jun.

- Forested slopes; ca. 1800 m. C Sichuan (Emei Shan).

11. Polygonatum macropodum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 205. 1832.

热河黄精 re he huang jing

Polygonatum umbellatum Baker.

Rhizome terete, 1–2 cm thick. Stem erect, 30–100 cm, glabrous. Leaves alternate; petiole very short; leaf blade ovate or ovate-elliptic, rarely ovate-oblong, 4–8(–10) × 2–5 cm, glabrous, apex acute to acuminate. Inflorescences corymblike, (3–)

5–12(–17)-flowered; peduncle 3–5 cm; bracts borne on proximal part of pedicel, very small, or absent. Flowers pendulous; pedicel 0.5–1.5 cm. Perianth white or reddish, cylindric-campanulate, 1.5–2 cm; lobes 4–5 mm. Filaments ca. 5 mm, narrowly 3-winged, scurfy-scabrous; anthers ca. 4 mm. Ovary 3–4 mm. Style 1–1.3 cm. Berries deep blue, 7–11 mm in diam., 7- or 8-seeded. Fl. May–Jun, fr. Sep. 2*n* = 22*.

• Forests, shaded slopes; 400–1500 m. Hebei, Liaoning, ?Nei Mongol, Shandong, Shanxi.

12. Polygonatum franchetii Hua, J. Bot. (Morot) 6: 392. 1892.

距药黄精 ju yao huang jing

Rhizome moniliform, 7–10 mm thick. Stem erect, 40–80 cm, glabrous. Leaves alternate; petiole very short; leaf blade oblong-lanceolate or occasionally narrowly oblong, 6–12 × 1.5–3.5 cm, glabrous, apex acuminate. Inflorescences 2(or 3)-flowered; peduncle 2–6 cm; bracts 2(or 3), borne at base of pedicel and enclosing flower bud, subequaling mature pedicel, membranous, deciduous. Flowers pendulous; pedicel ca. 5 mm. Perianth pale green, cylindric-campanulate, ca. 2 cm; lobes ca. 2 mm. Filaments slightly curved, compressed, ca. 3 mm, papillose, apex with a retrorse spur ca. 1.5 mm; anthers 2.5–3 mm. Ovary ca. 5 mm. Style ca. 1.5 cm. Berries purple, 7–8 mm in diam., 4–6-seeded. Fl. May–Jun, fr. Sep–Oct. 2*n* = 22*, 26*.

• Forests; 1100–1900 m. Hubei, Hunan, Shaanxi, Sichuan.

13. Polygonatum filipes Merrill ex C. Jeffrey & McEwan, Kew Bull. 34: 445. 1980.

长梗黄精 chang geng huang jing

Rhizome moniliform, sometimes terete-moniliform, 1–1.5 cm thick. Stem erect, 30–70 cm, glabrous. Leaves alternate; petiole 2–4 mm; leaf blade oblong-lanceolate to elliptic, 6–12 × 3–7 cm, shortly pubescent on veins abaxially. Inflorescences 2–7-flowered; peduncle very slender, 3–8 cm; bracts caducous or absent. Flowers ± pendulous; pedicel 0.5–1.5 cm. Perianth yellowish green, cylindric, 1.5–2 cm; lobes ca. 4 mm. Filaments ca. 4 mm, shortly cottony; anthers 2.5–3 mm. Ovary ca. 4 mm. Style 1–1.4 cm. Berries ca. 8 mm in diam., 2–5-seeded. Fl. Apr–May, fr. Sep–Oct. 2*n* = 16*, 18*.

• Forests, thickets, grassy slopes; 200–600 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Zhejiang.

14. Polygonatum cyrtonema Hua, J. Bot. (Morot) 6: 393. 1892.

多花黄精 duo hua huang jing

Polygonatum brachynema Handel-Mazzetti; *P. henryi* Diels; *P. martini* H. Léveillé; *P. multiflorum* Allioni var. *longifolium* Merrill.

Rhizome usually moniliform or tuberous moniliform, rarely subterete, 1–2 cm thick. Stem erect, 50–100 cm, glabrous. Leaves 10–15, alternate; petiole short; leaf blade elliptic to oblong-lanceolate, occasionally falcate, 10–18 × 2–7 cm, apex usually acuminate. Inflorescences umbel-like, (1 or)2–7(–14)-flowered; peduncle 1–4(–6) cm; bracts borne on proximal part of pedicel, small, or absent. Flowers pendulous; pedicel 0.5–1.5(–3) cm. Perianth yellowish green, campanulate-cylindric, 1.8–2.5 cm; lobes ca. 3 mm. Filaments slightly compressed, 3–4 mm, papillose or shortly cottony, apically slightly dilated or saccate-convex; anthers 3.5–4 mm. Ovary 3–6 mm. Style 1.2–1.5 cm. Berries black, ca. 1 cm in diam., 3–9-seeded. Fl. May–Jun, fr. Aug–Oct. 2*n* = 18*, 20*, 22*.

• Forests, thickets, shaded slopes; 500–2100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, ?S Shaanxi (Qin Ling), Sichuan, Zhejiang.

Polygonatum zhejiangense X. J. Xue & H. Yao (Bull. Bot. Res., Harbin 14: 242. 1994) seems to be related to, or conspecific with, *P. cyrtonema*, but its leaves are cirrose at the apex. No specimens have been seen by the present authors. *Polygonatum jinzhaiense* D. C. Zhang & J. Z. Shao (in D. C. Zhang et al., Guihaia 20: 34. 2000) was recently described from W Anhui (Jinzhai Xian). Although the present authors have not seen the type specimen, it is evident from the description that *P. jinzhaiense* is similar to *P. cyrtonema* and *P. arisanense* in general, but differs from these two species in rhizome shape and the position of the thickening part along the filaments—characters which are usually stable in *Polygonatum*. Further studies are needed to clarify whether or not *P. jinzhaiense* is distinct.

15. Polygonatum arisanense Hayata, Icon. Pl. Formos. 9: 140. 1920.

阿里黄精 a li huang jing

Polygonatum formosanum (Hayata) Masamune & Shimada; *P. officinale* Allioni var. *formosanum* Hayata.

Rhizome moniliform, 0.8–2.5 cm thick. Stem arching, 1–2 m, glabrous. Leaves 12–23, alternate; petiole 2–5 mm; leaf blade ± glaucous abaxially, lanceolate to narrowly oblong, 8–20 × 2–4.5 cm, glabrous, base obtuse, apex acute to acuminate. Inflorescences ± umbel-like, 2–4-flowered; peduncle 1–2 cm; bracts absent. Flowers pendulous; pedicel 0.5–1.5 cm. Perianth yellowish white, campanulate-cylindric, 2–2.8 cm; lobes 5–6 × 3.5–5 mm. Filaments 5–10 mm, basally thickened, occasionally compressed, smooth to slightly verruculose, apically filiform, smooth; anthers 2–5 mm. Ovary 4–5.5 mm. Style 1–1.5 cm. Berries ca. 8 mm in diam., several seeded. Fl. May. 2*n* = 22*, (44*).

• Forests; 600–2100 m. Taiwan.

16. Polygonatum nodosum Hua, J. Bot. (Morot) 6: 394. 1892.

节根黄精 jie gen huang jing

Polygonatum leveilleanum Fedde; *P. mairei* H. Léveillé (1912, not 1909); *P. yunnanense* H. Léveillé.

Rhizome ± moniliform, 5–7 mm thick, rather slender. Stem erect, 15–40 cm, glabrous. Leaves 5–9, alternate; petiole short; leaf blade ovate-elliptic or elliptic. 5–7 × 2–4 cm, glabrous, apex shortly acuminate. Inflorescences 1- or 2-flowered; peduncle and pedicel 1–2 cm; bracts absent. Perianth yellowish green, cylindric, slightly constricted near mouth, 2–3 cm; lobes ca. 3 mm. Filaments slightly curved, compressed, 2–4 mm, free part papillose or shortly cottony; anthers ca. 5 mm. Ovary 4–5 mm. Style 1.7–2 cm. Berries ca. 7 mm in diam., 4–7-seeded. Fl. May–Jun, fr. Sep–Oct.

• Forests, shaded moist places along ravines, shaded rocks; 1600–

2000 m. Gansu, Guangxi, Hubei, ?S Shaanxi (Qin Ling), Sichuan, Yunnan.

17. Polygonatum kingianum Collett & Hemsley, J. Linn. Soc., Bot. 28: 138. 1890.

滇黄精 dian huang jing

Polygonatum agglutinatum Hua; *P. cavaleriei* H. Léveillé; *P. darrisii* H. Léveillé; *P. ericoideum* H. Léveillé; *P. esquirolii* H. Léveillé; *P. huanum* H. Léveillé; *P. kingianum* var. *cavaleriei* (H. Léveillé) C. Jeffrey & McEwan; *P. kingianum* var. *ericoideum* (H. Léveillé) C. Jeffrey & McEwan; *P. kingianum* var. *grandifolium* D. M. Liu & W. Z. Zeng; *P. kingianum* var. *uncinatum* (Diels) C. Jeffrey & McEwan; *P. uncinatum* Diels.

Rhizome subterete or submoniliform, 1–3 cm thick. Stem erect, 1–3 m, glabrous, apex subscandent. Leaves in whorls of 3–10, sessile, linear to lanceolate, 6–20(–25) × 0.3–3 cm, herbaceous or leathery, apex cirrose. Inflorescences (1 or)2–4(–6)-flowered; peduncle 1–2 cm, pendulous; bracts borne usually on proximal part of pedicel, small, membranous. Pedicel 0.5–1.5 cm. Perianth pink or white, cylindric-campanulate, 1.8–2.5 cm; lobes 3–5 mm. Filaments filiform or compressed, 1.7–5 mm, glabrous or slightly papillose; anthers 4–6 mm. Ovary 4–6 mm. Style (0.8–)1–1.4 cm. Berries red, 1–1.5 cm in diam., 7–12-seeded. Fl. Mar–May, fr. Sep–Oct. 2*n* = 26*, 30*, 32*, 64.

Forests, thickets, shaded moist grassy slopes and rocks; 700–3600 m. Guangxi, Guizhou, Sichuan, Yunnan [Myanmar, Thailand, Vietnam].

This species is highly variable. For example, the type of *Polygonatum cavaleriei* (*Cavalerie 2166*, E) is apparently quite different from that of *P. kingianum* in leaves and flowers. Further studies are needed to confirm whether or not the synonyms listed above for *P. kingianum* really belong to this species.

18. Polygonatum hookeri Baker, J. Linn. Soc., Bot. 14: 558. 1875.

独花黄精 du hua huang jing

Polygonatum pumilum Hua.

Rhizome terete, 3–7 mm thick, usually with slightly swollen annual knots; annual elongation (distance between knots) 2–3.5 cm. Stem erect, less than 10 cm, glabrous. Leaves several to more than 10, usually crowded, proximal ones alternate, distal ones opposite or in whorls of 3, sessile, linear to oblong, 2–4.5 cm × 3–8 mm, glabrous. Inflorescence solitary in axil of basal leaf, 1(or 2)-flowered; bracts small, membranous, caducous. Flower erect; pedicel 4–7 mm. Perianth purple or pink, cylindric-funnelform, 1.5–2(–2.5) cm; tube 3–4 mm wide; lobes 6–10 mm. Filaments very short, ca. 0.5 mm; anthers ca. 2 mm. Ovary 2–3 mm. Style 1.5–2 mm. Berry red, 7–8 mm in diam., 5–7-seeded. Fl. May–Jun, fr. Sep–Oct. 2*n* = 30.

Forests, grassy slopes, alluvial soil; 3200–4300 m. Gansu, Qinghai, ?S Shaanxi (Qin Ling) Sichuan, Xizang, Yunnan [N India, Sikkim].

19. Polygonatum punctatum Royle ex Kunth, Enum. Pl. 5: 142. 1850.

点花黄精 dian hua huang jing

Disporopsis mairei H. Léveillé; *Polygonatum anomalum* Hua; *P. marmoratum* H. Léveillé; *P. mengtzense* F. T. Wang & Tang; *P. parcefolium* F. T. Wang & Tang; *P. sinomairei* F. T. Wang & Tang.

Rhizome ± moniliform, 1–1.5 cm thick, with dense, fleshy roots. Stem arching, usually spotted with lilac, (10–)30–70 cm, sometimes papillose distally. Leaves alternate or occasionally also subopposite; petiole short; leaf blade ± shiny, ovate to lanceolate, rarely slightly falcate, 6–14 × 1.5–5 cm, usually with distinct cross veins, apex ± acuminate and obtuse tipped. Inflorescences racemose, 2–6(–8)-flowered; peduncle 5–12 mm; bracts caducous or absent. Flowers pendulous to erect; pedicel 2–10 mm. Perianth white, sometimes greenish spotted with lilac, ± urceolate, 7–9(–11) mm; lobes 1.5–2 mm. Filaments filiform, 0.5–1 mm, smooth to scabrous; anthers 1.5–2 mm. Ovary 2–2.5(–4) mm. Style 1.5–2.5 mm; stigma slightly dilated. Berries red, ca. 7 mm in diam., 8–10-seeded. Fl. Apr–Jun, fr. Sep–Nov. 2*n* = (26), 30.

On rocks or trees in forests; 1100–2700 m. Guangxi, Guizhou, Hainan, ?S Shaanxi (Qin Ling), Sichuan, Xizang, Yunnan [Bhutan, NE India, Myanmar, Nepal, Sikkim, Thailand, Vietnam].

20. Polygonatum longipedunculatum S. Yun Liang, Acta Phytotax. Sin. 25: 64. 1987.

长柄黄精 chang bing huang jing

Rhizome branched, tuberous terete, 5–6 mm thick. Stem erect, ca. 35 cm, hirsutulous. Leaves ca. 11, alternate; petiole short, ca. 2 mm; leaf blade ovate-elliptic, 6–12 × 2.5–7 cm, glabrous, base subrounded, apex shortly acuminate. Inflorescences 5- or 6-flowered; peduncle 2.5–5 cm, laxly pubescent; bracts caducous or absent. Pedicel 0.8–1.5 cm. Perianth ca. 7 mm; lobes lanceolate-ovate, 1.5–2 mm. Filaments very short, ca. 0.7 mm, glabrous; anthers ovate-lanceolate, 1.8–2 mm. Fl. Jul.

- Forested slopes; 1800–1900 m. S Sichuan (Leibo Xian), SE Yunnan (Mengzi Xian).

21. Polygonatum altelobatum Hayata, Icon. Pl. Formos. 5: 229. 1915.

短筒黄精 duan tong huang jing

Rhizome tuberous terete, 1–2 cm thick. Stem erect, 17–45 cm, glabrous. Leaves alternate; petiole ca. 5 mm; leaf blade oblong-lanceolate, sometimes slightly falcate, 6–13 × 2.3–3.6 cm, many veined, glabrous, base acute, apex acuminate, obtuse tipped. Inflorescences 1- or 2-flowered; peduncle obsolete; bracts caducous or absent. Flowers ± pendulous; pedicel 0.7–2 cm. Perianth white, campanulate-cylindric, 6–8 mm; tube 1–2 mm; lobes oblong or oblong-lanceolate, 5–6 mm. Filaments very short, 0.3–1 mm; anthers ovate-oblong, 1–2 mm. Ovary 2–3 mm. Style 1–1.5 mm. Berries blackish brown, 7–10 mm in diam., ca. 16-seeded. Fl. May–Jun, fr. Oct.

- Forests; 600–1900 m. Taiwan.

No specimens of this species have been seen by the present authors.

22. Polygonatum oppositifolium (Wallich) Royle, Ill. Bot.

Himal. Mts. 1: 380. 1839.

对叶黄精 dui ye huang jing

Convallaria oppositifolia Wallich, Asiat. Res. 13: 380. 1820.

Rhizome ± branched, tuberous terete, 1–1.5 cm thick. Stem arching, 40–60 cm, glabrous. Leaves many, opposite; petiole short, ca. 5 mm; leaf blade usually shiny, ovate-oblong to ovate-lanceolate, 6–11 × 1.5–3.5 cm, subleathery, with distinct cross veins, apex acuminate. Inflorescences 3–5-flowered; peduncle pendulous, 5–8 mm; bracts small, membranous, caducous. Pedicel 5–12 mm. Perianth white or pale yellowish green, sometimes spotted with lilac, cylindric, slightly constricted near mouth, 1.1–1.3 cm; lobes ca. 2.5 mm. Filaments filiform, 3.5–4 × ca. 0.25 mm, papillose, sometimes smooth proximally; anthers ca. 4 mm. Ovary ca. 5 mm. Style ca. 6 mm. Fl. May. 2*n* = (24), 30*, (36).

Rocks in forests; 1800–2200 m. S Xizang [Bhutan, NE India, Nepal, Sikkim].

23. Polygonatum cathcartii Baker, J. Linn. Soc., Bot. 14: 559. 1875.

棒丝黄精 bang si huang jing

Rhizome irregularly moniliform, ca. 1.5 cm thick. Stem erect, 0.6–2 m, glabrous. Leaves opposite, occasionally also alternate or in whorls of 3; petiole short or indistinct; leaf blade abaxially grayish glaucous, lanceolate to oblong-lanceolate, 7–15 × 1.5–4 cm, apex acuminate. Inflorescences (1 or)2- or 3-flowered; peduncle pendulous, 1.5–3 cm; bracts small, membranous, caducous. Pedicel 5–10 mm. Perianth pale yellow or white, cylindric or ± campanulate, 1.1–1.5 cm; lobes 2–3 mm. Filaments 2–3 mm, apically dilated and saccate; anthers 3–4 mm. Ovary 5–7 mm. Style ca. 4 mm. Berries orange-red, ca. 7 mm in diam., 2–4-seeded; pedicel reflexed at maturity. Fl. Jun–Jul, fr. Sep–Oct.

Forests; 2400–2900 m. Sichuan, Xizang, Yunnan [Bhutan, Nepal, Sikkim].

24. Polygonatum griffithii Baker, J. Linn. Soc., Bot. 14: 558. 1875.

三脉黄精 san mai huang jing

Stem terete, ca. 90 cm, slender, glabrous. Leaves all opposite, distant, sessile, green adaxially, subglaucous abaxially, linear-lanceolate, 7.5–13 cm, papery, 3-veined, apex acute to acuminate. Peduncle and pedicels 1.2–2 cm. Flowers paired. Perianth tube white, constricted above ovary; lobes green, deltoid, very short. Stamens inserted at mouth of perianth tube; filaments very short, naked; anthers small. Style filiform, 2–3 × as long as the ovary. 2*n* = ?36*.

About 1700 m. Xizang [Nepal].

One of us (Tamura) has not seen specimens of this species which, according to Chen (Fl. Xizang. 5: 572. 1987), is related to *P. cathcartii*. The chromosome number 2*n* = 36 was reported for *P. griffithii* from SE Xizang (Mêdog Xian) by Gu and Sun (Acta Bot. Yunnan. 20: 207–210. 1998), but judging from the photograph of the chromosomes in the paper, the karyotype corresponds well with that of *Maianthemum*.

25. Polygonatum longistylum Y. Wan & C. Z. Gao, Guihaia 10: 177. 1990.

百色黄精 bai se huang jing

Rhizome tuberous terete, 1.7–2.6 cm thick. Stem suberect, to 1.3 m, glabrous. Leaves opposite or subopposite, sometimes also alternate or in whorls of 3 or 4; petiole 3–6 mm; leaf blade elliptic-lanceolate, 13–19 × 3.5–5 cm, glabrous, base obtuse-rounded, apex strongly cirrose. Inflorescences 1- or 2-flowered; peduncle 2–2.7 cm; bracts 2, white, lanceolate, 2–2.5 mm, membranous. Pedicel 7–9 mm. Perianth cylindric, ca. 1.5 cm; lobes oblong-ovate, 4–5 mm. Filaments ca. 2 mm, glabrous; anthers 3–4 mm. Ovary ca. 4 mm. Style 7–8 mm. Fl. Jun.

• W Guangxi (Bose Xian); also cultivated in Guangxi (Nanning Shi).

26. Polygonatum tessellatum F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 85. 1936.

格脉黄精 ge mai huang jing

Rhizome moniliform, ca. 1.5 cm thick. Stem erect to arching, 50–80 cm, glabrous. Leaves in whorls of 3–5, occasionally also opposite, sessile, oblong-lanceolate to lanceolate, 7–12 × 1.5–2.5 cm, leathery, with 3 distinct, longitudinal veins and cross veins, apex acuminate. Inflorescences 1–3-flowered; peduncle very short; bracts caducous or absent. Pedicel 1.5–3.5 cm. Perianth pale yellow, 1–1.2 cm; lobes ca. 2.5 mm. Filaments slightly compressed, ca. 3 mm, papillose-scabrous; anthers 3–3.5 mm. Ovary ca. 4 mm. Style subequaling ovary. Berries red, ca. 8 mm in diam., 9–12-seeded; pedicel ascending at maturity. Fl. May, fr. Sep–Nov. 2*n* = 60.

Rocks, trees in forests; 1600–2200 m. Guangxi, W Yunnan [Myanmar, Thailand].

27. Polygonatum hirtellum Handel-Mazzetti, Symb. Sin. 7: 1209. 1936.

粗毛黄精 cu mao huang jing

Polygonatum alternicirrhosum Handel-Mazzetti var. *piliferum* P. Y. Li.

Rhizome moniliform, 1–2 cm thick, with ovoid-globose annual knots. Stem erect, 30–100 cm, hirsutulous. Leaves alternate or in whorls of 3, sometimes also opposite, sessile, oblong-lanceolate to lanceolate, 3–10 × 0.7–1.5 cm, hirsutulous particularly on abaxial veins, margin slightly crisped, apex slightly curved to strongly cirrose. Inflorescences (1 or)2- or 3-flowered; peduncle (1–)4–10 mm, hirsutulous; bracts lanceolate, very small, membranous, caducous, or absent. Flowers pendulous; pedicel 2–4 mm, hirsutulous. Perianth white, cylindric-campanulate, 7–8 mm; lobes 1.5–2 mm. Filaments very short, ca. 0.5 mm; anthers ca. 1.5 mm. Ovary ca. 2 mm. Style ca. 1 mm. Fl. Jun.

• Forests, open slopes; 1000–2900 m. S Gansu, ?S Shaanxi (Qin Ling), Sichuan.

28. Polygonatum wardii F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 284. 1937.

西藏黄精 xi zang huang jing

Rhizome unknown. Stem erect, dull crimson striate, to 40 cm. Leaves opposite or whorled except basal ones alternate; petiole very short or indistinct; leaf blade abaxially glaucous, ovate- or oblong-elliptic, 3.8–6 × 1.4–3.2 cm, glabrous, apex acuminate. Inflorescences 2-flowered; peduncle curved, 1.1–2.7 cm; bracts lanceolate, small, caducous. Flowers pendulous; pedicel 0.5–1.6 cm. Perianth pale yellow to dull orange, 1–1.4 cm; lobes ca. 2 mm. Filaments 3–5 mm; anthers ca. 2 mm. Fruit unknown.

Bamboo thickets; 3000–3600 m. Xizang [NE India].

No specimens of this species were seen by the present authors.

29. Polygonatum alternicirrhosum Handel-Mazzetti, Symb. Sin. 7: 1209. 1936.

互卷黄精 hu juan huang jing

Polygonatum racemosum F. T. Wang & Tang.

Rhizome moniliform, thick. Stem erect, usually flexuous distally, 0.8–1.7 m, glabrous. Leaves alternate; petiole 3–5 mm; leaf blade oblong-lanceolate to lanceolate, 5–10 × 0.8–1.7 cm, glabrous, margin slightly crisped, apex strongly cirrose. Inflorescences racemelike, 1–5-flowered; peduncle 1–1.5 cm, slender, ascending and apically recurved; bracts small, scarious. Pedicel 3–8 mm. Perianth white, cylindric, 7–8 mm; tube 2–3 mm; lobes 4–5 mm. Filaments short, less than 1 mm, glabrous; anthers ca. 1.2 mm. Ovary ca. 2.5 mm. Style ca. 1.5 mm. Fl. May–Jul.

• Rocks in limestone areas; 1700–1800 m. SW Sichuan.

30. Polygonatum verticillatum (Linnaeus) Allioni, Fl. Pedem. 1: 131. 1785.

轮叶黄精 lun ye huang jing

Convallaria verticillata Linnaeus, Sp. Pl. 1: 315. 1753; *Polygonatum erythrocarpum* Hua; *P. kansuense* Maximowicz ex Batalin; *P. minutiflorum* H. Léveillé.

Rhizome usually shortly branched, usually tuberous terete, very rarely moniliform, 0.7–1.5 cm thick. Stem erect, (20–)40–80 cm, glabrous. Leaves in whorls of 3, occasionally alternate near base of stem, sometimes opposite near apex of stem, subsessile, oblong-lanceolate to linear, 6–10 × 0.5–3 cm, apex acute to acuminate, not cirrose. Inflorescences 1- or 2(–4)-flowered; peduncle 1–2 cm; bracts small or absent. Flowers pendulous; pedicel 3–10 mm. Perianth pale purple (or white or pale yellow, but probably only when dry), cylindric, 0.8–1.2 cm; lobes 2–3 mm. Filaments 0.5–1(–2) mm, papillose; anthers ca. 2.5 mm. Ovary ca. 3 mm. Style 2.5–3 mm. Berries red, 6–9 mm in diam., 6–12-seeded. Fl. May–Jun, fr. Aug–Oct. 2*n* = (24), 28, 30, (56*), 60, (64, 66, 84), ca. 90.

Forests, grassy slopes; 2100–4000 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, Nepal, Pakistan, Russia, Sikkim; SW Asia, Europe].

Rudolf Kamelin (pers. comm.) believes that *Polygonatum verticillatum* is absent from China, and that the plants there are instead *P. kansuense* (*P. erythrocarpum*). In SW Asia and Europe, *P. verticillatum* has leaves in whorls of 5–7, inflorescences mostly 3- or 4-flowered, perianth white, and berries dark blue-green (although one of us (Tamura) has collected *P. verticillatum* with orange berries in S Denmark: *Tamura & Kubitzki 3425* (KYO)). Tamura considers that *P. verticillatum* of the present sense may be a species in which different lineages are lumped. However, Chen and Tamura together decided to maintain the present circumscription until sufficient morphological variation data have accumulated. Kamelin also notes that *Polygonatum minutiflorum*, regarded here as a synonym of *P. verticillatum*, may instead be synonymous with *P. gracile*, in which case the former name, published in 1915, would have priority.

31. Polygonatum prattii Baker, Hooker's Icon. Pl. 23: t. 2217. 1892.

康定玉竹 kang ding yu zhu

Polygonatum delavayi Hua; *P. gentilianum* H. Léveillé.

Rhizome terete, 3–5 mm thick, slender. Stem erect, 8–30 cm, slender, glabrous. Leaves 4–15, alternate, sometimes also opposite in proximal part of stem, mostly opposite in distal part of stem, often in whorls of 3 in apical part of stem; petiole very short; leaf blade elliptic to oblong, 2–6 × 1–2 cm, apex subobtuse or acute. Inflorescences 2(or 3)-flowered; peduncle 2–6 mm; bracts very small, caducous. Flowers pendulous; pedicel (2–)5–6 mm. Perianth white or pale purple, cylindric, 6–8 mm; tube smooth or papillose-scabrous inside; lobes 1.5–2.5 mm. Filaments very short, papillose; anthers ca. 1.5 mm. Ovary ca. 1.5 mm. Style ca. 1.5 mm. Berries purple-red to brown, 5–7 mm in diam., 1- or 2-seeded. Fl. May–Jun, fr. Aug–Oct. 2*n* = 28*, 56*.

• Forests, thickets, grassy slopes; 2500–3300 m. W Sichuan, NW Yunnan.

32. Polygonatum curvistylum Hua, J. Bot. (Morot) 6: 424. 1892.

垂叶黄精 chui ye huang jing

Rhizome usually shortly branched, subterete, sometimes submoniliform due to many short branches, 5–10 mm thick. Stem erect, 15–35 cm, glabrous. Leaves many, in whorls of 3–6, occasionally also alternate or opposite, sessile, linear-lanceolate to linear, 3–7 cm × 1–5 mm, apex acuminate, ascending before anthesis, ± pendulous after anthesis. Inflorescences 1- or 2-flowered; peduncle 7–9 mm; bracts caducous or absent. Flowers pendulous; pedicel 2–4 mm. Perianth pale purple, cylindric, 6–8 mm; lobes 1.5–2 mm. Filaments very short, ca. 0.7 mm, slightly scabrous; anthers ca. 1.5 mm. Ovary ca. 2 mm. Style subequaling ovary. Berries red, 6–8 mm in diam., 3–7-seeded. Fl. May–Jul, fr. Sep–Oct. 2*n* = 28*.

• Forests, grasslands; 2700–3900 m. W Sichuan, NW Yunnan.

33. Polygonatum gracile P. Y. Li, Acta Phytotax. Sin. 11: 252. 1966.

细根茎黄精 xi gen jing huang jing

Rhizome terete, 2–3 mm thick, slender. Stem 10–30 cm, slender, glabrous. Leaves in (1 or)2(or 3) whorls of 3–6, rarely also a few scattered between whorls; petiole very short; leaf blade oblong to oblong-lanceolate, 3–6 × 0.8–2 cm, glabrous, apex acuminate. Inflorescences usually 2-flowered; peduncle slender, 1–2 cm; bracts membranous, 2–3 mm. Pedicel 1–2

mm. Perianth pale yellow, cylindric, 6–8 mm; lobes ca. 1.5 mm. Filaments very short, ca. 0.5 mm; anthers ca. 1.5 mm. Ovary ca. 1.5 mm. Style slightly shorter than ovary. Berries 5–7 mm in diam., 2–4-seeded. Fl. Jun, fr. Aug.

• Forests, grassy slopes; 2100–2400 m. Gansu, Shaanxi, Shanxi.

34. Polygonatum stenophyllum Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 274. 1859.

狭叶黄精 xia ye huang jing

Polygonatum verticillatum (Linnaeus) Allioni var. *stenophyllum* (Maximowicz) Baker.

Rhizome terete, 4–6 mm thick, with slightly swollen annual knots. Stem erect, 60–110 cm, glabrous. Leaves many, in whorls of 4–6, sessile, abaxially slightly glaucous, linear-lanceolate, 6–10 cm × 3–8 mm, glabrous, apex acuminate. Inflorescences 2-flowered; peduncle reflexed, 2–4 mm; bracts white, 2–3 mm, membranous. Pedicel 2–3 mm. Perianth white, cylindric, slightly constricted near mouth, 0.8–1.2 cm; lobes 2–3 mm. Filaments filiform, ca. 1 mm; anthers ca. 2 mm. Ovary ca. 2.5 mm. Style ca. 3.5 mm. Fl. Jun. 2*n* = 24, 30.

Forests, thickets. ?Hebei, Heilongjiang, Jilin, Liaoning, ?Nei Mongol [Korea, Russia (Far East)].

35. Polygonatum roseum (Ledebour) Kunth, Enum. Pl. 5: 144. 1850.

新疆黄精 xin jiang huang jing

Convallaria rosea Ledebour, Icon. Pl. 3: t. 1. 1829.

Rhizome terete, 3–5 mm thick, slender. Stem erect, 40–80 cm, glabrous. Leaves in whorls of 3 or 4, sometimes also alternate or opposite in proximal part of stem, sessile, lanceolate to linear-lanceolate, 7–12 × 1–1.6 cm, apex acute. Inflorescences 1- or 2-flowered; peduncle 1–1.5 cm; bracts very small. Pedicel 1–4 mm. Perianth pale purple, cylindric, 1–1.2 cm; lobes 1.5–2 mm. Filaments very short, less than 1 mm, glabrous; anthers 1.5–1.8 mm. Ovary ca. 2 mm. Style ca. 2 mm. Berries 7–11 mm in diam., 2–7-seeded. Fl. May, fr. Oct. 2*n* = 28.

Shaded slopes; 1400–1900 m. Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan, Russia].

36. Polygonatum sibiricum Redouté, Liliac. 6: t. 315. 1811.

黄精 huang jing

Polygonatum chinense Kunth.

Rhizome usually shortly branched, subterete or tuberous terete, 1–2 cm thick. Stem erect or sometimes subscandent, 50–90(–140) cm, glabrous. Leaves in whorls of 4–6, sessile, abaxially glaucous, linear-lanceolate, 8–15 cm × 4–16 mm, glabrous, apex strongly cirrose or curved. Inflorescences umbellike, usually 2–4-flowered; peduncle 1–2 cm; bracts borne at base of pedicel, subulate to linear-lanceolate, 3–5 mm, membranous, 1-veined, persistent. Flowers pendulous; pedicel (2.5–) 4–10 mm. Perianth milky white to pale yellow, cylindric, slightly constricted in middle, 0.9–1.2 cm; lobes ca. 4 mm. Filaments 0.5–1 mm; anthers 2–3 mm. Ovary ca. 3 mm. Style 5–7 mm. Berries black, 7–10 mm in diam., 4–7-seeded. Fl. May–Jun, fr. Aug–Sep. 2*n* = 20, 21, 22*, 24*, 26, 28, 36.

Forests, thickets, shaded slopes; 800–2800 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Zhejiang [Korea, Mongolia, Russia (Siberia)].

37. Polygonatum cirrhifolium (Wallich) Royle, Ill. Bot. Himal. Mts. 1: 380. 1839.

卷叶黄精 juan ye huang jing

Convallaria cirrhifolia Wallich, Asiat. Res. 13: 382. 1820; *Polygonatum bulbosum* H. Léveillé; *P. cirrhifoliodes* D. M. Liu & W. Z. Zeng; *P. fargesii* Hua; *P. fuscum* Hua; *P. lebrunii* H. Léveillé; *P. mairei* H. Léveillé (1909, not 1912); *P. souliei* Hua; *P. strumulosum* D. M. Liu & W. Z. Zeng; *P. trinerve* Hua.

Rhizome moniliform or tuberous terete, 1–2 cm thick. Stem erect or scandent, 30–90 cm, glabrous. Leaves in whorls of 3–6, rarely also a few alternate in proximal part of stem, sessile, narrowly linear to linear-lanceolate, very rarely oblong-lanceolate, 4–9(–12) cm × 2–8(–15) mm, apex usually cirrose at anthesis. Inflorescences usually 2-flowered; peduncle 3–10 mm; bracts 1–2 mm, scarious, veinless, or bract absent. Flowers pendulous; pedicel 3–8 mm. Perianth white, greenish, or pale purple, subcylindric, slightly constricted in middle, 8–11 mm; lobes ca. 2 mm. Filaments 0.6–0.8 × ca. 0.15 mm, papillose; anthers 2–2.5 mm. Ovary ca. 2.5 mm. Style ca. 2 mm. Berries red or purple-red, 8–9 mm in diam., 4–9-seeded. Fl. May–Jul, fr. Sep–Oct. 2*n* = (20*, 24*), 30* (38).

Forests, grassy slopes; 2000–4000 m. Gansu, Guangxi, Ningxia, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

Rudolf Kamelin (pers. comm.) believes that both *Polygonatum fargesii* and *P. fuscum* differ from *P. cirrhifolium*: *P. fargesii* has leaves not cirrose apically, perianth white, and is distributed in Bhutan, China, and Sikkim; *P. fuscum* has stems 30–35 cm tall, never scandent, leaves not cirrose apically, perianth green (or dark green or brown-green), and is endemic to China. One of us (Tamura) considers that *P. cirrhifolium* of the present sense may be a species in which different lineages are lumped. However, Chen and Tamura together decided to maintain the present circumscription until sufficient morphological variation data have accumulated.

38. Polygonatum stewartianum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 298. 1912.

西南黄精 xi nan huang jing

Polygonatum kalapanum Handel-Mazzetti.

Rhizome ± thick. Stem erect or semiscandent, sometimes minutely spotted with lilac, 30–80 cm, glabrous. Leaves (except basal ones) in whorls of 3 or 4, occasionally opposite, sessile, abaxially glaucous, linear to lanceolate, 5–11 cm × 5–16 mm, ± leathery, abaxially scaberulose on veins, apex hooked at anthesis. Inflorescences (1 or)2-flowered; peduncle 0.5–1.5 cm; bracts very small. Flowers pendulous; pedicel 3–10 mm. Perianth purplish pink, pale greenish purple, or greenish crimson, cylindric, 5–12 mm; lobes 1–3 mm. Filaments 0.6–1.5 mm, papillose; anthers 1–3.5 mm. Ovary ca. 3 mm. Style 2–2.5 mm. Berries 5–7 mm in diam., 2- or 3-seeded. Fl. May. 2*n* = 28*.

• Forests, thickets, dry shaded slopes; 2700–3300 m. Sichuan, Yunnan.

39. Polygonatum zanlanscianense Pampanini, Nuovo Giorn. Bot. Ital., n.s., 22: 267. 1915.

湖北黄精 hu bei huang jing

Polygonatum anhuiense D. C. Zhang & J. Z. Shao; *P. kungii* F. T. Wang & Tang.

Rhizome moniliform or gingerlike, 1–2.5 cm thick. Stem erect or slightly scandent distally, to over 1 m, glabrous. Leaves in whorls of 3–6; petiole very short or indistinct; leaf blade variable, elliptic to oblong-lanceolate, rarely to linear, (5–)8–15 × (0.4–)1.3–2.8(–3.5) cm, glabrous, apex strongly cirrose to curved. Inflorescences umbel-like, 2–6(–11)-flowered; peduncle 0.5–2(–4) cm; bracts borne at base of pedicel, (1–)2–6 mm, scarious or subherbaceous with scarious margin, 1-veined, persistent. Pedicel (2–)4–7(–10) mm. Perianth white, yellowish green, or pale purple, slightly constricted at middle, 6–9 mm; lobes ca. 1.5 mm. Filaments 0.7–1 mm; anthers 2–2.5 mm. Ovary ca. 2.5 mm. Style 1.5–2 mm. Berries purple-red or black, 6–7 mm in diam., 2–4-seeded. Fl. Jun–Jul, fr. Aug–Oct. 2*n* = 22*, 28*, 30*, 32*.

• Forests, shady and moist slopes; 800–2700 m. Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, ?Zhejiang.

46. DISPOROPSIS Hance, J. Bot. 21: 278. 1883.

竹根七属 zhu gen qi shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Aulisconema Hua.

Herbs perennial, rhizomatous, sympodial, terrestrial. Rhizome horizontally creeping, terete or moniliform, fleshy. Stem usually arching, rarely erect, simple, glabrous. Leaves cauline, lateral and pseudoterminal, usually alternate, rarely subopposite, shortly petiolate, glabrous. Inflorescences axillary, each a solitary flower or cluster of 2 to several flowers; bracts usually absent, rarely present. Flowers bisexual; pedicel articulate apically. Perianth campanulate; segments 6, imbricate, ± fleshy, proximally connate and forming a tube for up to 1/2 their length. Corona attached near apex of perianth tube, fleshy or membranous; lobes 6, alternate to or opposite perianth segments, apex often 2-cleft into lobelets, sometimes emarginate, rarely entire. Anthers 6, opposite perianth segments, attached at lobe sinus, lobelet sinus, or lobe apex of corona, dorsifixed, introrse. Ovary 3-loculed; ovules 4–6 per locule. Style short; stigma capitate to slightly 3-lobed. Fruit a berry, several seeded.

Six species: China, Laos, Philippines, Thailand, Vietnam; six species (four endemic) in China.

Hayata (Icon. Pl. Formos. 5: 230–233, 1915) interpreted the corona of *Disporopsis* as a product of fusion of dilated filaments.

1a. Flowers in clusters of 5–10; corona lobes not exceeding anthers, fleshy; berries white; plants 60–100 cm tall; perianth 0.8–1 cm ..... 1. *D. longifolia*
1b. Flowers solitary or in clusters of 2 or 3; corona lobes exceeding anthers, membranous; berries purplish; plants 6–50(–90) cm tall; perianth (0.8–)1–2.2 cm.
2a. Rhizome moniliform; perianth 1.5–2.2 cm ..... 6. *D. fuscopicta*
2b. Rhizome terete; perianth (0.8–)1–1.5(–2) cm.
3a. Plants 6–10 cm tall; leaves (1 or)2(or 3); apex of corona lobes often entire, sometimes slightly emarginate ..... 2. *D. jinfushanensis*
3b. Plants (10–)20–40(–90) cm tall; leaves more than 3; apex of corona lobes ± 2-cleft.
4a. Leaf margin undulate ..... 4. *D. undulata*
4b. Leaf margin entire.
5a. Corona lobes usually opposite perianth segments, rarely alternate to them; leaf base rounded to obtuse; perianth white abaxially ..... 5. *D. pernyi*
5b. Corona lobes alternate to perianth segments; leaf base usually slightly cordate to truncate; perianth greenish yellow abaxially, ± spotted with lilac ..... 3. *D. aspersa*

1. Disporopsis longifolia Craib, Bull. Misc. Inform. Kew 1912: 410. 1912.

长叶竹根七 chang ye zhu gen qi

Polygonatum laoticum Gagnepain; *P. tonkinense* Gagnepain.

Rhizome moniliform, 1–2 cm thick. Stem arching, (30–)60–100(–110) cm. Leaves alternate; petiole 5–8 mm; leaf blade lanceolate to elliptic, 10–20(–30) × 2.5–6(–10) cm, base cuneate-rounded to cuneate-obtuse, apex attenuate-acuminate. Bracts absent. Flowers in clusters of 5–10; pedicel 1.2–1.5 cm. Perianth white, 8–10 mm; tube 3–5 mm, slightly constricted near mouth; lobes narrowly elliptic, 4–7 × 1.6–4.5 mm. Corona lobes opposite perianth lobes, 1.5–2 × ca. 0.8 mm, fleshy, apex slightly emarginate. Anthers attached at hollowed point of corona lobe apex, oblong, 2.5–3 mm, base emarginate-cordate. Ovary ovoid, ca. 3 mm. Style 1–2 mm, base constricted. Berries white at maturity, ovoid-globose, 1.2–1.5 cm in diam., 2–5-seeded. Fl. May–Jun, fr. Oct–Dec. 2*n* = 40*.

Forests, forest margins, thickets; 100–1800 m. Guangxi, S Yun-

nan [Laos, Thailand, Vietnam].

2. Disporopsis jinfushanensis Z. Y. Liu, Acta Phytotax. Sin. 25: 67. 1987.

金佛山竹根七 jin fo shan zhu gen qi

Rhizome terete, 3–5 mm thick. Stem erect, lilac spotted, 6–10 cm. Leaves (1 or)2(or 3), subopposite; petiole lilac spotted, 3–6 mm; leaf blade ovate-elliptic, 3.5–4.5 × 1.5–2.5 cm, subleathery, base slightly cordate or obtuse-rounded, apex cuspidate-acuminate. Bracts absent. Flower solitary; pedicel 4–8 mm. Perianth white, tinged with yellowish green, ca. 10 mm; tube ca. 2.5 mm, not constricted; lobes narrowly elliptic, ca. 7.5 × 3–4 mm. Corona lobes alternate to perianth lobes, ovate, ca. 1 mm, membranous, apex acute and entire or occasionally slightly emarginate. Anthers attached at corona lobe sinus, ca. 1 mm. Ovary subglobose, ca. 3 mm. Style ca. 2 mm. Berries brown-purple at maturity, subglobose, 7–8 mm in diam., 2–4-seeded. Fl. May–Jun, fr. Jul–Sep.

• Broad-leaved forests; 1600–1700 m. SE Sichuan (Nanchuan Xian).

3. Disporopsis aspersa (Hua) Engler in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 370. 1930.

散斑竹根七 san ban zhu gen qi

Aulisconema aspersa Hua, J. Bot. (Morot) 6: 471. 1892.

Rhizome terete, 3–11 mm thick. Stem arching, 10–40(–90) cm. Leaves alternate; petiole 5–12 mm; leaf blade ovate-lanceolate to ovate-elliptic, 3–9 × 1–5 cm, base usually slightly cordate to truncate, apex acuminate to attenuate-acuminate. Bracts absent. Flowers solitary or paired; pedicel 1–1.4 cm. Perianth yellowish green, ± spotted with blackish lilac, (8–)10–14 mm; tube 3–5 mm, not constricted; lobes suboblong, 7–10 × 3–4 mm. Corona lobes alternate to perianth lobes, lanceolate, 3–4 mm, membranous, apex ± 2-cleft. Anthers attached at corona lobe sinus, ca. 1 mm. Ovary ovoid-globose, 2–3 mm. Style equaling ovary. Berries blue-purple at maturity, subglobose, ca. 8 mm in diam., 2–4-seeded. Fl. May–Jun, fr. Sep–Oct. 2*n* = 40*.

• Forests, shady places along valleys or streams; 700–2900 m. Guangxi, Hubei, Hunan, Sichuan, Yunnan.

4. Disporopsis undulata M. N. Tamura & Ogisu, Acta Phytotax. Geobot. 49: 34. 1998.

峨眉竹根七 e mei zhu gen qi

Rhizome terete, 0.8–1.3 cm thick. Stem arching, mottled with lilac basally, 20–30 cm. Leaves alternate; petiole longitudinally lilac striped, 2–7 mm; leaf blade adaxially often dark green checkered along longitudinal and transverse veinlets, oblong-lanceolate to ovate, 5–7 × 1.9–3.7 cm, base slightly cordate to truncate, margin undulate, apex acuminate to slightly aristate. Bracts linear, to 7 mm, or absent. Flowers solitary or in clusters of 2 or 3; pedicel 5–8 mm. Perianth cream, distally dark reddish purple adaxially and often yellowish green or reddish purple abaxially, 1.1–1.2 cm; tube ca. 3 mm, slightly constricted near mouth; lobes oblong, 8–9 × 4.5–6 mm. Corona lobes opposite perianth lobes, 3–5 × 2.1–2.7 mm, membranous, apex deeply 2-cleft into lobelets. Anthers attached at corona lobelet sinus, ovoid, ca. 2 mm. Ovary depressed ovoid, ca. 2.7 mm, with 3 shallow grooves along sutures. Style ca. 1.6 mm. Fl. May.

• Stony places in evergreen broad-leaved forests; 1000–1100 m. Sichuan (Emei Shan).

5. Disporopsis pernyi (Hua) Diels, Bot. Jahrb. Syst. 29: 239. 1900.

深裂竹根七 shen lie zhu gen qi

Aulisconema pernyi Hua, J. Bot. (Morot) 6: 472. 1892; *Disporopsis arisanensis* Hayata; *D. leptophylla* Hayata; *D. taiwanensis* S. S. Ying; *Polygonatum bodinieri* H. Léveillé; *P. ensifolium* H. Léveillé; *P. ensifolium* var. *didymocarpum* H. Léveillé.

Rhizome terete, 4–10 mm thick. Stem arching, purple spotted, 20–40(–80) cm. Leaves alternate; petiole 0.5–1.5 cm; leaf blade lanceolate to elliptic, 5–14 × 1.2–6 cm, base rounded to obtuse, apex acuminate to attenuate-acuminate. Bracts absent. Flowers usually solitary, occasionally in clusters of 2 or 3; pedicel (0.2–)1–2 cm. Perianth white, occasionally dark reddish adaxially, (0.9–)1.2–1.5(–2) cm; tube 3–6(–9) mm, not constricted; lobes suboblong, (2–)8–10(–12) × 3–5 mm. Corona lobes usually opposite perianth lobes, rarely alternate to them, lanceolate to linear-lanceolate, 3–4(–5) mm, membranous, apex deeply 2-cleft into lobelets. Anthers attached usually at corona lobelet sinus, rarely at corona lobe sinus, suboblong-lanceolate, 1.5–3 mm. Ovary subglobose, 3–5 mm. Style (1.5–)2.5–3.5(–5) mm. Berries dark purple or brown-purple at maturity, subglobose, rarely slightly depressed, 4–10 mm in diam., 1–3-seeded. Fl. Apr–May, fr. Nov–Dec. 2*n* = 40*.

• Rocky places in forests, shady places along valleys or streams; 300–2500 m. Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

6. Disporopsis fuscopicta Hance, J. Bot. 21: 278. 1883.

竹根七 zhu gen qi

Disporum luzoniense Merrill.

Rhizome moniliform, (0.4–)1–1.5 cm thick. Stem arching, 25–50(–80) cm. Leaves alternate; petiole 0.5–1.5 cm; leaf blade ovate or elliptic to oblong-lanceolate, 4–11(–15) × 1.6–5 cm, base obtuse to subcuneate, rarely slightly cordate, apex acuminate. Bracts absent. Flowers solitary or paired; pedicel 7–14 (–25) mm. Perianth white, purple tinged adaxially, (1.3–)1.5–2.2 cm; tube 4–9 mm, not constricted; lobes suboblong, 0.8–1.3 cm × 4–4.5 mm. Corona lobes alternate to perianth lobes, ovate-lanceolate, (4–)5 mm, membranous, apex usually 2- or 3-denticulate or 2-lobed. Anthers attached at corona lobe sinus, (1–)2–2.5 mm. Ovary ovoid, 4–4.5 mm. Style slightly shorter than or equaling ovary. Berries purplish at maturity, subglobose, 0.7–1.4 cm in diam., 2–8-seeded. Fl. Apr–May, fr. Nov. 2*n* = 40*.

Forests, hillsides along valleys; 500–1400(–2500) m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan [Philippines].

47. THEROPOGON Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 15: 89. 1870.

夏须草属 xia xu cao shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, shortly rhizomatous, with several membranous sheaths surrounding leaf bases. Roots thick, densely hairy. Leaves basal, tufted, sessile, grasslike. Scape erect, angled and narrowly winged. Inflorescence a terminal raceme, many flowered; bracts 2 at base of each pedicel. Flowers solitary or rarely paired; pedicel usually curved, articulate apically. Tepals 6, free. Stamens 6, inserted at base of tepals; filaments flattened, membranous, slightly connate basally; anthers basifixed. Ovary ovoid, 3-loculed; ovules 6–10 per locule. Style slender, elongate; stigma small. Fruit a berry. Seeds several, subglobose, thinly coated.

One species: Bhutan, China, India, Nepal, Sikkim.

1. Theropogon pallidus Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 15: 90. 1870.

夏须草 xia xu cao

Rhizome ca. 1 cm thick. Leaves 6–10, suberect or arching, abaxially glaucous, 15–40 cm × 4–12 mm, glabrous, midvein conspicuous, apex acuminate. Scape 30–35 cm, usually shorter than leaves. Raceme 4.5–7 cm, 9–14-flowered; bracts green, lanceolate-linear to linear, larger one 0.7–1.3 cm, smaller one 3.5–6 mm. Pedicel 0.8–1.5 cm, usually very narrowly winged. Perianth white, campanulate; tepals oblong-ovate, 5–8 × 3–4 mm, 1-veined, apex obtuse. Filaments 1.5–2 mm; anthers subcordate, 2–2.5 mm. Ovary ca. 2.5 mm. Style ca. 5 mm. Fl. May–Jun. $2n = 40$*.

Thickets, shady rocky slopes; 2300–2600 m. S Xizang, W Yunnan [Bhutan, India, Nepal, Sikkim].

48. SPEIRANTHA Baker, J. Linn. Soc., Bot. 14: 562. 1875.

白穗花属 bai sui hua shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, rhizomatous, with several sheaths surrounding leaf bases. Rhizome subascending, thick, with creeping, long, slender stolons. Leaves several, basal, slightly tufted, petiolate, gradually narrowed to base, many veined. Scape axillary, suberect, naked. Inflorescence a terminal raceme; bracts submembranous. Flowers bisexual; pedicel articulate apically. Tepals 6, free. Stamens 6, inserted at base of tepals; filaments filiform; anthers versatile. Ovary ovoid-globose, 3-loculed; ovules 3 or 4 per locule. Style slender; stigma small. Fruit a berry.

• One species: China.

1. Speirantha gardenii (Hooker) Baillon, Hist. Pl. 12: 524. 1894.

白穗花 bai sui hua

Albuca gardenii Hooker, Bot. Mag. 81: t. 4842. 1855; *Speirantha convallarioides* Baker.

Rhizome terete, 2–12 cm or longer × 3–15 mm. Leaves 4–8; petiole 3–5 cm; leaf blade narrowly elliptic to elliptic-oblanceolate, 7–15 × 3–5 cm, glabrous, apex acuminate. Scape 13–20 cm. Raceme 4–6 × 2.5–4 cm, 12–18-flowered; bracts white or sometimes tinged reddish, 3–9 mm, shorter than pedicel. Pedicel 0.7–1.7 cm. Tepals spreading, lanceolate, 4–6 × 1.5–2.4 mm, 1-veined, apex obtuse. Stamens 3–5 mm; filaments filiform, ca. 3 mm; anthers elliptic, ca. 2 mm. Ovary ca. 2 mm. Style ca. 2 mm. Berries subglobose, ca. 5 mm in diam. Fl. May–Jun, fr. Jul. $2n = 38$*.

• Broad-leaved forests, hillsides along valleys or streams; 600–900 m. Anhui, Jiangsu, Jiangxi, Zhejiang.

49. CONVALLARIA Linnaeus, Sp. Pl. 1: 314. 1753.

铃兰属 ling lan shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, rhizomatous. Rhizome short, with 1 or 2 creeping stolons. Roots rather slender. Leaves 2(or 3), basal, long petiolate; petiole erect, equitant, forming a pseudostem, proximally enveloped by several cylindric, membranous sheaths. Scape arising from a sheath axil, naked. Inflorescence a terminal raceme, laxly few to many flowered, 1-sided; bracts membranous, caducous. Flowers bisexual, nodding, long pedicellate. Perianth broadly campanulate; segments connate to form a tube; lobes very short. Stamens 6, inserted at base of perianth tube, included; filaments short; anthers basifixed. Ovary ovoid-globose, 3-loculed; ovules several per locule. Style long; stigma small. Fruit a berry. Seeds several, small.

One species: temperate regions of the N hemisphere.

1. Convallaria majalis Linnaeus, Sp. Pl. 1: 314. 1753. 铃兰 ling lan

Convallaria keiskei Miquel; *C. keiskei* var. *trifolia* Y. C. Chu et al.; *C. majalis* var. *manshurica* Komarov.

Plants 18–30 cm tall, glabrous. Petiole 8–20 cm; leaf blade abaxially glaucescent, elliptic to ovate-lanceolate, 7–20 × 3–8.5 cm, base cuneate, apex subacute to acuminate. Scape slightly arching, 15–30 cm. Bracts lanceolate, 3–6 mm, much shorter than pedicel. Pedicel slightly curved, 0.6–1.5 cm, articulate apically. Perianth white, 5–7 × 5–7 mm; lobes ovate-deltoid, ca. 2 × 2 mm, 1-veined, apex obtuse. Stamens ca. 4 mm; filaments widened gradually toward base; anthers suboblong. Style columnar, 2.5–3 mm. Berry red at maturity, globose, 6–12 mm in diam. Fl. May–Jun, fr. Jul–Sep. 2*n* = 38*.

Moist places in forests, shady hillsides along ravines; 800–2500 m. Gansu, Hebei, Heilongjiang, Henan, Hunan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea, Mongolia, Myanmar, Russia; Europe, North America].

50. REINECKEA Kunth, Abh. Königl. Akad. Wiss. Berlin 1842: 29. 1844, nom. cons.

吉祥草属 ji xiang cao shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, rhizomatous, evergreen. Rhizome prostrate on ground, laxly many noded. Leaves tufted at rhizome tip, inconspicuously petiolate, gradually narrowed toward base. Scape arising from a leaf axil, erect, shorter than leaves, naked. Inflorescence a terminal spike, few to many flowered; bracts brownish or purplish, membranous. Flowers bisexual, sessile. Perianth segments proximally connate to form a tube, distally free. Stamens 6, inserted in throat of perianth tube; filaments filiform, proximally adnate to perianth tube; anthers dorsifixed. Ovary 3-loculed; ovules 2 per locule. Style columnar, slender; stigma capitate to 3-lobed. Fruit a berry, globose, several seeded.

One species: China, Japan.

The identity of *Reineckea incurva* H. Léveillé & Vaniot (Mem. Pontif. Accad. Romana Nuovi Lincei 23: 362. 1905), described from Guizhou, is uncertain. The present authors as well as McKean (Notes Roy. Bot. Gard. Edinburgh 44: 195. 1986) did not see the type and therefore could not assess its status.

1. Reineckea carnea (Andrews) Kunth, Abh. Königl. Akad. Wiss. Berlin 1842: 29. 1844.

吉祥草 ji xiang cao

Sansevieria carnea Andrews, Bot. Repos. 6: t. 361. 1804; *Reineckea carnea* var. *rubra* H. Léveillé; *R. ovata* Z. Y. Zhu; *R. yunnanensis* W. W. Smith; *S. sessiliflora* Ker Gawler.

Rhizome terete, elongate, 2–4 mm thick, slender. Leaves 3–8, linear, narrowly oblanceolate, or lanceolate, 10–40 × 0.5–3.5 cm, glabrous, apex acuminate. Scape 5–15 cm. Spike 2–6.5 cm; bracts ovate-deltoid, 5–7 mm. Flowers fragrant, sometimes male flowers borne distally on spike. Perianth pink or pale rose, 0.8–1.3 cm; tube 4–6 mm; lobes reflexed, oblong, 5–7 mm, slightly fleshy. Filaments with free part 3–4 mm; anthers suboblong, 2–2.5 mm, emarginate at both ends. Ovary narrowly ovoid, ca. 3 mm. Style 7–10 mm. Berry red at maturity, 6–10 mm in diam. Fl. and fr. Jul–Nov. 2*n* = 38*.

Dense forests, shady and moist slopes, hillsides along valleys; 100–3200 m. Anhui, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [Japan].

51. CAMPYLANDRA Baker, J. Linn. Soc., Bot. 14: 582. 1875.

开口箭属 kai kou jian shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Tilcusta Rafinesque.

Herbs perennial, rhizomatous, monopodial. Rhizome ascending or less often creeping, thick, stout, sometimes slightly woody. Stem very short or sometimes slightly elongate. Leaves basal or on short stem, usually distichous equitant, sometimes spaced, basally distinctly petiolate or not; leaf blade lorate to ovate-elliptic. Scape axillary. Inflorescence a terminal spike, several to many flowered, sometimes with several sterile bracts apically; fertile bracts lanceolate to ovate, often longer than flowers, sometimes shorter. Perianth segments 6, connate into a tube for 1/2–2/3 their length, fleshy, sometimes with a ringlike, fleshy appendage in throat; lobes often spreading, sometimes incurved, sometimes fimbriate at margin. Stamens 6; filaments proximally adnate to perianth tube, free part short to long; anthers positioned as high as or higher than stigma, dorsifixed. Ovary 3-loculed; ovules 2–4 per locule. Style 1, to 1 (–3.5) mm; stigma small, 3-lobed. Fruit a berry, 1–3-seeded.

Sixteen species: Bhutan, China, India, Nepal, Sikkim; 16 species (13 endemic) in China.

1a. Perianth throat with a cushionlike, ringed, fleshy appendage.
  2a. Flower subtended by 2 bracts; free part of filaments 1.5–2.5 mm.
    3a. Perianth lobes ca. 5 mm, smooth abaxially; filaments 2–2.5 mm ..... 15. *C. annulata*
    3b. Perianth lobes 6–8 mm, densely verruculose abaxially; filaments 1.5–2 mm ..... 16. *C. verruculosa*
  2a. Flower subtended by 1 bract; free part of filaments less than 1 mm.

4a. Perianth lobes entire at margin ..... 12. *C. urotepala*
4b. Perianth lobes erose at margin.
5a. Leaves 2–3.5 cm wide; perianth tube with brown dots adaxially ..... 13. *C. tui*
5b. Leaves 0.4–1.2 cm wide; perianth tube without brown dots adaxially ..... 14. *C. lichuanensis*
1b. Perianth throat without a cushionlike appendage, but sometimes with a thin ring formed from by fusion of widened filaments.
6a. Leaves sessile, leaf blade lorate, apex long acuminate.
7a. Perianth tubular-campanulate, 5–5.5 mm; fertile bracts longer than flowers, margin denticulate ..... 10. *C. ensifolia*
7b. Perianth subcampanulate, 6.5–8 mm; fertile bracts shorter than flowers, margin entire ..... 11. *C. jinshanensis*
6b. Leaves gradually narrowed basally into a distinct or indistinct petiole, leaf blade varying in shape, apex acute or acuminate.
8a. Rhizome stemlike, elongate, nodes spaced; leaves cauline, slightly spaced.
9a. Spike with several sterile bracts apically ..... 1. *C. wattii*
9b. Spike without sterile bracts apically ..... 2. *C. emeiensis*
8b. Rhizome short or slightly elongate, nodes dense (sometimes spaced in *C. chinensis*); leaves basal or nearly so, usually crowded.
10a. Bracts and perianth lobes fimbriate at margin ..... 9. *C. fimbriata*
10b. Bracts and perianth lobes not fimbriate at margin.
11a. Widened part of filaments denticulate at margin ..... 3. *C. aurantiaca*
11b. Widened part of filaments entire at margin.
12a. Anther connective protruding from locules, recurved, ca. 1.5 mm ..... 4. *C. liangshanensis*
12b. Anther connective included.
13a. Leaves crisped at margin; bracts in proximal 1/2 of spike usually with 1 or 2 teeth at middle of margin ..... 5. *C. yunnanensis*
13b. Leaves not crisped at margin; bracts without teeth at margin.
14a. Perianth tubular, 7–11 mm ..... 6. *C. delavayi*
14b. Perianth campanulate, 4.5–7.5 mm.
15a. Peduncle 1–6(–15) mm; perianth 5–7 mm ..... 7. *C. chinensis*
15b. Peduncle 15–40 mm; perianth 4.5–5 mm ..... 8. *C. longipedunculata*

1. Campylandra wattii C. B. Clarke, J. Linn. Soc., Bot. 25: 78. 1890.

弯蕊开口箭 wan rui kai kou jian

Campylandra cauliflora Chun; *C. longibracteata* F. T. Wang & Tang; *Tupistra tonkinensis* Baillon; *T. wattii* (C. B. Clarke) J. D. Hooker.

Rhizome yellow-brown when dried, stemlike, elongate, terete, ± curved, 0.8–1.2 cm thick; nodes spaced. Stem elongate. Leaves 3–10, spaced; petiole 3–9 cm, basally widened and clasping; leaf blade ovate-elliptic to elliptic-lanceolate, 6.5–20 × 3–7 cm, papery. Spike 2.5–6 × 1–1.5 cm, several to many flowered, with several sterile bracts apically; peduncle 1.5–2.5 cm; fertile bracts lanceolate, 1.2–1.8(–5) cm × 2–4 mm. Perianth tube 3–5 mm; lobes red-brown or yellowish green, broadly ovate, 3.5–4 × 2–4 mm, fleshy. Filaments proximally widened and adnate to perianth tube, free part incurved, 1.5–2 mm. Ovary globose. Style inconspicuous; stigma 3-lobed. Berry red at maturity, globose, 0.9–1.1 cm in diam. Fl. Feb–May, fr. Jan–Apr of following year. $2n = 38$*.

Moist places in dense forests, hillsides along valleys or streams; 800–2800 m. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [Bhutan, India].

2. Campylandra emeiensis (Z. Y. Zhu) M. N. Tamura et al., Novon 10: 159. 2000.

峨眉开口箭 e mei kai kou jian

Tupistra emeiensis Z. Y. Zhu, Acta Bot. Yunnan. 4: 271. 1982.

Rhizome stemlike, elongate, to 24–32 cm × 2–4 mm; nodes spaced. Stem elongate. Leaves 5 or 6, spaced; petiole 2–2.5 cm, basally widened and clasping; leaf blade subelliptic or ovate, 5–6.5 × 2.5–3.5 cm, papery or subleathery. Spike 4–5 cm, 6–9-flowered, without sterile bracts apically; peduncle ca. 1 cm; fertile bracts elliptic-ovate or elliptic-lanceolate, 6–8 × ca. 2.5 mm. Perianth yellow-green; tube ca. 3 mm, throat with a thin, undulate-crenate ring of connate, widened filament bases; lobes narrowly ovate-oblong, 3–4 × ca. 2 mm. Filaments with incurved free part ca. 1 mm. Ovary obovoid-globose. Style inconspicuous; stigma 3-lobed. Fl. Jun–Jul.

• Bamboo forests, moist places in thickets, hillsides along valleys or streams; 1800–2500 m. C Sichuan (Emei Shan).

3. Campylandra aurantiaca Baker, J. Linn. Soc., Bot. 14: 582. 1875.

橙花开口箭 cheng hua kai kou jian

Rhizome ascending, short, 1.2–2 cm thick; nodes dense. Leaves 4–6, basal, slightly distichous equitant, shortly petiolate; leaf blade lanceolate or linear, 18–60 × 2–6 cm, subleathery. Spike 2.5–4 cm, densely many flowered, with several sterile bracts apically; peduncle 1–2 cm; fertile bracts lanceolate, 1.5–3 cm × 5–8 mm, margin denticulate. Perianth campanulate, 0.8–1.2 cm; tube 5–7 mm; lobes yellow or orange, deltoid-ovate, 3–5 × 2–4 mm, fleshy. Filaments proximally widened and adnate to perianth tube, widened part denticulate at

margin, free part very short. Ovary ovoid-globose, ca. 2 mm in diam. Style distinct, ca. 1 mm; stigma 3-lobed. Fl. Apr–May. 2*n* = 38*.

Dense forests, mixed forests along valleys, shady rocky slopes; 1800–2900 m. S Xizang, NW Yunnan [India, Nepal, Sikkim].

4. Campylandra liangshanensis (Z. Y. Zhu) M. N. Tamura et al., Novon 10: 159. 2000.

凉山开口箭 liang shan kai kou jian

Tupistra liangshanensis Z. Y. Zhu in Z. Y. Zhu & J. L. Zhang, Acta Phytotax. Sin. 19: 521. 1981.

Rhizome terete, ca. 3 cm thick, stout; nodes dense. Leaves 5 or 6, basal, slightly distichous equitant; petiole 8–12 cm; leaf blade narrowly elliptic to elliptic-lanceolate, ca. 22 × 7–12 cm. Spike 5–6 × 2–3 cm, densely many flowered, with several sterile bracts apically; peduncle 1–3 cm; fertile bracts 2 per flower, ovate-lanceolate, 1–1.7 cm × 3–7 mm. Perianth subcampanulate, 8–11 mm; tube 4–6 mm; lobes yellowish white, suborbicular or broadly ovate, 4–5 × 5–6 mm, fleshy. Filaments proximally widened and adnate to perianth tube, widened part entire, free part 1–1.5 mm; anther connective protruding from locules, recurved, ca. 1.5 mm. Ovary globose, ca. 2 mm in diam. Style 0.5–1 mm or inconspicuous; stigma white, 3-lobed. Fl. Nov.

• Moist places in thickets along valleys or streams; ca. 2500 m. SW Sichuan (Puge Xian).

5. Campylandra yunnanensis (F. T. Wang & S. Yun Liang) M. N. Tamura et al., Novon 10: 160. 2000.

云南开口箭 yun nan kai kou jian

Tupistra yunnanensis F. T. Wang & S. Yun Liang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 249. 1978.

Rhizome ascending, yellow-brown, terete, 1–2.5 cm thick, stout; nodes dense. Leaves 3–5, basal, nearly distichous equitant; petiole indistinct; leaf blade lorate-lanceolate, 40–95 × 3–5.5 cm, margin crisped, apex acuminate. Spike 4.5–11 cm, many flowered; peduncle 8–12 cm; fertile bracts lanceolate, 6.5–9 × 1.5–3 mm, those in proximal 1/2 of spike usually with 1 or 2 teeth at middle of margin. Perianth subcampanulate, 7–8 mm; tube 4.5–5 mm, throat with a thin ring of widened filaments; lobes white, deltoid-lanceolate, 2.5–3 mm, fleshy, apex cuspidate-acuminate. Filaments with very short free part. Ovary ovoid, 2–2.5 × ca. 2 mm. Style inconspicuous. Berry red at maturity, ovoid-globose, 0.9–1.4 cm × 7–9 mm. Fl. May, fr. Oct–Nov. 2*n* = 38*.

• Forests; 1200–2800 m. NE Yunnan.

6. Campylandra delavayi (Franchet) M. N. Tamura et al., Novon 10: 159. 2000.

筒花开口箭 tong hua kai kou jian

Tupistra delavayi Franchet, Bull. Soc. Bot. France 43: 40. 1896.

Rhizome brownish, terete, 1–1.5 cm thick, stout; nodes dense. Leaves 3 or 4, basal, slightly distichous equitant; petiole 8–12 cm; leaf blade lorate-lanceolate, 25–45 × 5–9 cm, subleathery. Spike 5–6 × 1.5–1.7 cm, densely many flowered; peduncle 4.5–10 cm; fertile bracts white or pale brown, ovate to deltoid-lanceolate, 4–7 × 4–5 mm, membranous, margin not fimbriate. Perianth yellow, tubular-campanulate, 7–11 mm, fleshy; tube 4–6 mm; lobes ovate or suborbicular, 2–3 × 2.5–3 mm. Ovary oblong-ovoid, ca. 4.5 mm. Style usually very short or inconspicuous; stigma 3-lobed. Berry purple-red at maturity, subglobose, 6–10 mm in diam. Fl. Apr, fr. Aug. 2*n* = 38*.

• Moist places in broad-leaved forests, thickets; 1000–1500 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

7. Campylandra chinensis (Baker) M. N. Tamura et al., Novon 10: 159. 2000.

开口箭 kai kou jian

Tupistra chinensis Baker, Hooker's Icon. Pl. 19: t. 1867. 1889; *Campylandra kwangtungensis* Dandy; *C. pachynema* F. T. Wang & Tang; *C. viridiflora* (Franchet) Handel-Mazzetti; *C. watanabei* (Hayata) Dandy; *Rohdea japonica* (Thunberg) Roth var. *watanabei* (Hayata) S. S. Ying; *R. watanabei* Hayata; *T. chlorantha* Baillon; *T. fargesii* Baillon; *T. heensis* Y. Wan & X. H. Lu; *T. kwangtungensis* S. S. Ying; *T. lorifolia* Franchet; *T. sparsiflora* S. C. Chen & Y. T. Ma; *T. viridiflora* Franchet.

Rhizome slightly elongate, terete, 1–1.5 cm thick. Leaves 4–8(–12), basal, distichous equitant; petiole 3–8 cm, usually conduplicate; leaf blade linear-lanceolate to oblanceolate, 15–65 × 1.5–9.5 cm. Spike 2.5–14 cm, with several sterile bracts apically; peduncle 1–6(–15) cm; fertile bracts green, 4–7 mm. Perianth campanulate, 5–7 mm; tube 2–2.5 mm; lobes ovate, 3–5 × 2–4 mm. Filaments proximally widened and adnate to perianth tube, widened part sometimes connate into a thin ring in perianth tube or throat, apical part incurved, 1–2 mm. Ovary subglobose, 2–2.5 mm in diam. Style to 1 mm; stigma 3-lobed. Berries purple-red at maturity, globose, 8–10 mm in diam. Fl. Apr–Jun, fr. Sep–Nov. 2*n* = 38*.

• Moist places in forests, hillsides along streams; 600–3000 m. Anhui, Fujian, Guangdong, Guangxi, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan.

8. Campylandra longipedunculata (F. T. Wang & S. Yun Liang) M. N. Tamura et al., Novon 10: 160. 2000.

长梗开口箭 chang geng kai kou jian

Tupistra longipedunculata F. T. Wang & S. Yun Liang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 249. 1978.

Rhizome yellow-brown, short, terete, 1.5–1.7 cm thick; nodes dense. Leaves 3–5, basal, distichous equitant; petiole 5–12 cm; leaf blade usually linear-oblanceolate, 40–80 × 3–6.5 cm, papery or subleathery. Spike 5.5–8 × 1–1.5 cm, densely many flowered; peduncle 15–40 cm, much longer than spike; fertile bracts green, ovate, 3.5–5.5 × 2.5–3 mm, margin white. Perianth subcampanulate, 4.5–5 mm; tube 2.5–3 mm; lobes yellow, deltoid-ovate, 2–2.5 × 1.5–2.5 mm, fleshy. Filaments with very short free part. Ovary ovoid, ca. 3.5 mm. Style inconspicuous; stigma 3-lobed. Fl. Jun. 2*n* = 38*.

• Forests, hillsides along streams, shady limestone slopes; 500–1700 m. Yunnan.

9. Campylandra fimbriata (Handel-Mazzetti) M. N. Tamura et al., Novon 10: 159. 2000.

齿瓣开口箭 chi ban kai kou jian

Tupistra fimbriata Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 59: 253. 1922; *T. fimbriata* var. *breviloba* H. Li & J. L. Huang.

Rhizome yellow-brown or green, terete, 0.6–1.5 cm thick; nodes dense. Leaves 3–6(–8), basal, nearly distichous equitant; petiole usually distinct, 3–5 cm; leaf blade linear-lanceolate or oblanceolate, 30–65 × 3.5–6.5 cm, margin crisped. Spike 2–6 × 1–1.8 cm, densely many flowered; peduncle 6–15(–25) cm; fertile bracts pale green or pale brown, membranous, margin white, fimbriate. Perianth campanulate, 6–8 mm; tube 3–6 mm; lobes green, broadly ovate, 2–3 × 3–3.5 mm, fleshy, margin white, membranous, irregularly dentate or fimbriate. Filaments with suberect free part 2–3 mm. Ovary ovoid-globose, ca. 2 mm in diam. Style 1–3.5 mm; stigma 3-lobed. Fl. Apr–May. 2*n* = 38*.

Dense forests, broad-leaved forests along ravines, shady rocky slopes; 1200–2900 m. S Xizang, NW Yunnan [India, Nepal].

10. Campylandra ensifolia (F. T. Wang & Tang) M. N. Tamura et al., Novon 10: 159. 2000.

剑叶开口箭 jian ye kai kou jian

Tupistra ensifolia F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 86. 1936.

Rhizome brown or green, stemlike, elongate, terete; nodes spaced. Stem elongate, to 10 cm; nodes many. Leaves many, cauline, distichous, sessile, lorate, 35–50 cm × 5–12 mm. Spike 4–5.5 cm, densely many flowered, with several sterile bracts apically; peduncle 4–5 cm; fertile bracts green or pale brown, 7–12 mm. Perianth tubular-campanulate, 5–5.5 mm; tube 2–2.5 mm; lobes spreading, brownish or green, ovate, 2–2.5 × 1.5–2 mm, fleshy, margin white, membranous, erose. Filaments basally widened and corrugated, free part very short. Ovary ovoid. Style inconspicuous. Berries red-black at maturity, subglobose, 5–8 mm in diam. Fl. Jun, fr. Oct. 2*n* = 38*.

• Broad-leaved forests, shady rocky slopes; 1000–3200 m. Yunnan.

11. Campylandra jinshanensis (Z. L. Yang & X. G. Luo) M. N. Tamura et al., Novon 10: 159. 2000.

金山开口箭 jin shan kai kou jian

Tupistra jinshanensis Z. L. Yang & X. G. Luo, Acta Bot. Yunnan. 6: 389. 1984.

Rhizome yellowish brown, slightly curved, 1–3 cm thick, stout; nodes dense. Stem short. Leaves many, distichous equitant, sessile, lorate, 30–45 × 1.2–2 cm. Spike 2–4 × ca. 1.5 cm, densely many flowered, sometimes with several sterile bracts apically; peduncle ca. 4 cm; fertile bracts green-white, 3–4 × 1.5–2.5 mm, margin membranous and entire. Perianth subcampanulate, 6.5–8 mm, fleshy; tube 2.5–3 mm; lobes ovate-lanceolate or broadly ovate, 4–5 × 3–4 mm, margin white, membranous, entire, apex shortly cuspidate. Filaments basally widened and corrugated, free part incurved, ca. 2 mm. Ovary ovoid-globose, 2–3 mm in diam. Style less than 1 mm. Fl. Apr.

• Forests; ca. 1800 m. SE Sichuan (Nanchuan Xian).

12. Campylandra urotepala (Handel-Mazzetti) M. N. Tamura et al., Novon 10: 160. 2000.

尾萼开口箭 wei e kai kou jian

Rohdea urotepala Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 272. 1920; *Tupistra urotepala* (Handel-Mazzetti) F. T. Wang & Tang.

Rhizome slightly elongate, 1–1.5 cm thick, stout; nodes dense. Leaves 5–7, basal, slightly distichous equitant or subtufted, sessile, usually narrowly oblong-lanceolate, gradually narrowed toward base, 30–45 × 2–4 cm, margin crisped. Spike 3–4.5 × 1–1.5 cm; peduncle 1–6 cm; fertile bracts white or greenish, ovate, 3.5–6.5 × 3.5–5 mm, membranous. Perianth 5–10 mm, with a cushionlike, ringed, fleshy, smooth appendage in throat; tube 2–5 mm; lobes spreading, yellow, deltoid-ovate, 3–5 × 3–4.5 mm, fleshy, margin thin, entire. Filaments very short; anthers 1–1.5 mm. Ovary ovoid, ca. 3 × 2 mm. Style ca. 1 mm; stigma 3-lobed. Fl. May–Jun. 2*n* = 38*.

• Forests, rocky wastelands; 1700–3000 m. SW Sichuan.

13. Campylandra tui (F. T. Wang & Tang) M. N. Tamura et al., Novon 10: 160. 2000.

碟花开口箭 die hua kai kou jian

Rohdea tui F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 284. 1937; *Tupistra tui* (F. T. Wang & Tang) F. T. Wang & S. Yun Liang.

Rhizome slightly elongate, terete, 0.8–1.3 cm thick; nodes dense. Leaves 4–6, basal or nearly so, nearly distichous equitant, sessile, usually linear-lanceolate, 25–50 × 2–3.5 cm. Spike 3–4.5 × 1–1.8 cm, densely many flowered; peduncle 6–15 cm; fertile bracts pale green, 2.5–4 × 2.5–3.5 mm, shorter than flowers, membranous. Perianth 4.5–5.5 mm, with a cushionlike, ringed, fleshy, papillose appendage in throat; tube adaxially brown spotted, 2–3 mm; lobes slightly spreading, yellow, ovate-deltoid, 2.5–3 × 2.5–3 mm, fleshy, margin white, membranous, erose. Filaments with very short free part. Ovary ovoid, 3.5–4 × 2–2.5 mm. Style very short; stigma scarcely 3-lobed, small. Fl. Jun.

• Forests, thickets; 1000–2500 m. S and W Sichuan.

14. Campylandra lichuanensis (Y. K. Yang et al.) M. N. Tamura et al., Novon 10: 160. 2000.

利川开口箭 li chuan kai kou jian

Tupistra lichuanensis Y. K. Yang et al., J. Wuhan Bot. Res. 9: 40. 1991.

Rhizome slightly curved, subterete, 1–2.5 cm thick, stout; nodes dense. Leaves (4–)6–9, nearly distichous equitant, sessile, strap-shaped, 24–35 × 0.4–1.2 cm, subleathery, base obviously dilated and clasping, apex acuminate. Spike 1–3.2 × 0.6–1.2 cm, densely (2–)8–14-flowered, usually with 3–7 sterile bracts apically; peduncle 1.7–10 cm; fertile bracts pale yellow,

sometimes greenish, ovate to lanceolate, 2.5–5 × 0.7–1.2 mm, membranous. Perianth yellowish green, subcampanulate, fleshy, with a cushionlike, ringed, fleshy appendage in throat; tube without brown spots, 2–3.5 × 2–3 mm; lobes ± spreading, ovate-deltoid to ovate-elliptic, 2–3.5 × 2–2.5 mm, margin white, membranous, erose, apex usually caudate, rarely subobtuse. Filaments with free part 0.2–0.4 mm; anthers subovate, 1–1.4 mm. Ovary ovoid, 2–2.5 mm in diam. Style to 0.5 mm; stigma obtusely 3-angled, distinctly 3-lobed. Berries red at maturity, ovoid, 5–7 mm in diam. Fl. Apr.

• 1100–1500 m. SW Hubei (Lichuan Xian).

15. Campylandra annulata (H. Li & J. L. Huang) M. N. Tamura et al., Novon 10: 159. 2000.

环花开口箭 huan hua kai kou jian

Tupistra annulata H. Li & J. L. Huang, Acta Bot. Yunnan., Suppl. 3: 51. 1990.

Rhizome terete, 2.5–3 cm thick; nodes dense. Leaves 6–8, basal or nearly so, slightly or scarcely distichous equitant, gradually narrowed into indistinct petiole; leaf blade oblanceolate-oblong, 15–40 × 2.5–4 cm. Spike ca. 5 cm, densely many flowered, with several sterile bracts apically; peduncle ca. 4 cm; fertile bracts 2 per flower, green, larger one 1.1–1.3 cm, smaller one 4–5 mm. Perianth green, subcampanulate, with a cushionlike, ringed, fleshy, smooth appendage in throat; tube 4–5 mm; lobes ovate-lanceolate, ca. 5 mm, apex incurved, acuminate-cuspidate. Filaments with free part 2–2.5 mm. Ovary globose, ca. 2.5 mm in diam. Style very short. Fl. Mar–May. 2*n* = 38*.

• Yunnan.

Described from a cultivated plant.

16. Campylandra verruculosa (Q. H. Chen) M. N. Tamura et al., Novon 10: 160. 2000.

疣点开口箭 you dian kai kou jian

Tupistra verruculosa Q. H. Chen, Acta Phytotax. Sin. 25: 69. 1987.

Rhizome brown, terete, 1.5–2 cm thick; nodes dense. Leaves 5–12, basal or nearly so, distichous equitant; petiole 4–12 cm; leaf blade 21–40 × 6–8 cm. Spike 10–12 × 1.5–2 cm, densely many flowered; peduncle ca. 15 cm; fertile bracts 2 per flower, pale green, membranous, larger one 5–9 × 3–4 mm, smaller one 3–6 × 1–1.5 mm. Perianth pale yellow-green, subcampanulate, 8–11 mm, with a cushionlike, ringed, fleshy, sparsely papillose appendage in throat; tube 2–3 mm; lobes ovate, 6–8 × 4–5 mm, fleshy, abaxially densely verruculose, apex cuspidate. Filaments with free part 1.5–2 mm. Ovary globose, ca. 3 mm in diam. Style 0.5–1 mm, 3-angled; stigma 3-lobed. Fl. May.

• Forests on limestone slopes; ca. 700 m. C and S Guizhou (Pingtang Xian, Weng'an Xian).

52. ROHDEA Roth, Nov. Pl. Sp. 196. 1821.

万年青属 wan nian qing shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Herbs perennial, rhizomatous. Rhizome ascending, thick, stout. Leaves basal, tufted, usually slightly distichous equitant, sessile, base dilated. Scape axillary, suberect, much shorter than leaves. Inflorescence a terminal spike, densely flowered, fleshy; bracts short, membranous. Flowers bisexual. Perianth segments connate except at apex into a globose-campanulate tube; lobes incurved, short, fleshy. Stamens 6; filaments nearly wholly adnate to perianth tube; anthers positioned distally in perianth tube, dorsifixed. Ovary globose, 3-loculed; ovules 2 per locule. Style very short or inconspicuous; stigma 3-lobed. Fruit a berry, 1-seeded.

One species: China, Japan.

1. Rohdea japonica (Thunberg) Roth, Nov. Pl. Sp. 197. 1821.

万年青 wan nian qing

Orontium japonicum Thunberg in Murray, Syst. Veg., ed. 14, 340. 1784; *Rohdea esquirolii* H. Léveillé; *R. sinensis* H. Léveillé.

Rhizome suberect, 1.5–2.5 cm thick. Leaves 3–8(–12), dark green, lanceolate-oblong, oblanceolate, or lanceolate, gradually narrowed to both ends, 15–50 × 2.5–7 cm, thickly papery, apex acute to subacuminate. Scape 2.5–4(–10) cm, stout. Spike suboblong, 3–4 × 1.2–1.7 cm, densely many flowered; bracts ovate, 2.5–6 × 2–4 mm. Perianth pale yellow, 4–5 × ca. 6 mm; lobes small, thick. Anthers ovate, 1.3–1.5 mm. Berries red at maturity, globose, ca. 8 mm in diam. Fl. May–Jun, fr. Sep–Oct. 2*n* = 14, 36, 38, ca. 72*.

Moist places in forests, grassy slopes; 700–1700 m. Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Zhejiang [Japan].

Widely cultivated as an ornamental.

53. TUPISTRA Ker Gawler, Bot. Mag. 40: t. 1655. 1814.

长柱开口箭属 chang zhu kai kou jian shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Macrostigma Kunth.

Herbs perennial, rhizomatous, monopodial. Rhizome usually ascending, rarely creeping, thick, stout, sometimes slightly woody.

Stem very short. Leaves basal, alternate fasciculate or distichous equitant, distinctly petiolate or not; leaf blade narrowly lanceolate to ovate. Scape axillary. Inflorescence a terminal spike, 2- to many flowered, without sterile bracts apically; bracts deltoid to ovate, usually shorter than flowers. Perianth segments 6 or 8, connate for 1/2–2/3 their length into a tube, fleshy; lobes spreading. Stamens 6 or 8; filaments nearly wholly adnate to perianth tube; anthers positioned lower than stigma, dorsifixed. Ovary 3- or 4-loculed; ovules 2 per locule. Style 1, cylindric, 4–12 mm; stigma peltate to mushroom-shaped, 2–7 mm in diam., fleshy. Fruit a berry, 1-seeded.

Fourteen species: Bhutan, China, India, Indonesia, Malaysia, Myanmar, Nepal, Sikkim, Thailand, Vietnam; four species (three endemic) in China.

The syntype specimens of *Tupistra cavaleriei* H. Léveillé can be identified as *Amischotolype hispida* (A. Richard) D. Y. Hong (Commelinaceae). *Tupistra esquirolii* H. Léveillé & Vaniot is referable to *Curculigo capitulata* (Loureiro) Kuntze (Amaryllidaceae). The identity of *Tupistra bambusifolia* H. Léveillé & Vaniot and *T. bambusifolia* var. *rubromaculosa* H. Léveillé & Vaniot (in H. Léveillé, Mem. Pontif. Accad. Romana Nuovi Lincei 24: 349. 1906) remains uncertain. The types, from Guizhou, have not been seen by the present authors but were said by McKean (Notes Roy. Bot. Gard. Edinburgh 44: 176. 1986) to resemble *Zingiber pleiostachyum* K. Schumann (Zingiberaceae), which is endemic to Taiwan.

1a. Flower subtended by 1 bract; style ca. 12 mm ..... 1. *T. grandistigma*
1b. Flower subtended by 2 or 3 bracts; style 4–8 mm.
2a. Spike 18–25(–35) cm; peduncle slightly longer than spike; stigma 5–7 mm in diam. ..... 2. *T. longispica*
2b. Spike 2.5–10 cm; peduncle shorter than spike; stigma 2–3 mm in diam.
3a. Stigma mushroom-shaped; rhizome ascending; spike 6–10 cm ..... 3. *T. fungilliformis*
3b. Stigma peltate; rhizome creeping; spike 2.5–4.5 cm ..... 4. *T. pingbianensis*

1. Tupistra grandistigma F. T. Wang & S. Yun Liang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 249. 1978.

长柱开口箭 chang zhu kai kou jian

Rhizome rather short, 1.5–2 cm thick, stout; nodes dense. Leaves 3–5 or more, basal, distichous equitant; petiole 2–5 cm; leaf blade oblong-oblanceolate, 65–110 × 7.5–12 cm, glabrous, apex acuminate. Spike 6–16 cm, several to many flowered; peduncle 5–15 cm; bracts 1 per flower, deltoid, ca. 1.8 × 1 mm. Perianth campanulate, ca. 1.4 cm; tube ca. 5 mm; lobes black-purple, lanceolate, 8–10 × 3–4 mm, fleshy. Filaments with very short free part; anthers elliptic, 2–2.5 mm. Ovary subglobose, 3–5 mm. Style ca. 1.2 cm; stigma capitate, dilated, 6–7 mm in diam. Berries globose, 1.2–2 cm in diam. Fl. Mar, fr. Jun. $2n = 38$*.

Forests; ca. 1600 m. Guangxi, S Yunnan [Vietnam].

2. Tupistra longispica Y. Wan & X. H. Lu in Y. Wan, Bull. Bot. Res., Harbin 4(4): 168. 1984.

长穗开口箭 chang sui kai kou jian

Rhizome 2–3 cm thick, stout; nodes dense. Leaves 4–6, basal, nearly distichous equitant; petiole 10–20 cm; leaf blade oblanceolate, 90–150 × 12.5–18 cm, glabrous, apex acuminate. Spike 18–25(–35) × 1.5–2 cm, densely many flowered; peduncle 20–33 cm; bracts 2 per flower, pink, 3–7 × 3–6 mm, membranous. Perianth adaxially white turning yellow, abaxially pale purple, shortly campanulate, 1–1.3 × 1.3–1.8 cm, fleshy; tube 3–4 mm; lobes recurved, oblong-ovate, 7–9 × 3–4 mm. Filaments basally widened, free part ca. 1 mm. Ovary subglobose. Style 7–8 mm; stigma peltate, suborbicular, dilated, 5–7 mm in diam., 3-lobed. Fl. Nov.

• Forests on limestone slopes along valleys; 300–400 m. WC Guangxi (Long'an Xian).

3. Tupistra fungilliformis F. T. Wang & S. Yun Liang in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 249. 1978.

伞柱开口箭 san zhu kai kou jian

Rhizome ascending, short, 1–2 cm thick, stout; nodes dense. Leaves 2 or more, basal; petiole 14–16 cm; leaf blade linear-lanceolate, 4–20 × 1–1.5 cm, papery, glabrous, apex acuminate. Spike 6–10 × 1.2–2 cm, usually laxly several flowered; peduncle 1.5–3 cm; bracts 2(or 3) per flower, brownish yellow, 4–7 × 4–11 mm, membranous. Perianth subcampanulate, 1–1.5 cm; tube 3–7 mm; lobes purple, ovate, 5–8 × 4–6 mm, fleshy. Filaments with very short free part. Ovary ovoid, 1.5–2 × ca. 2 mm. Style 4–5 mm, 3-angled; stigma mushroom-shaped, ca. 2 mm in diam. Berries ovoid-globose, ca. 12 × 5 mm. Fl. Dec–Jan, fr. Dec–Jan of following year. $2n = 38$*.

• Rocks in forests; 1000–1600 m. Guangxi, SE Yunnan.

4. Tupistra pingbianensis J. L. Huang & X. Z. Liu, Acta Phytotax. Sin. 34: 592. 1996.

屏边开口箭 ping bian kai kou jian

Rhizome creeping, short, 2–3 cm thick, stout. Leaves basal, tufted or spaced, petiolate, oblong-lanceolate, 40–90 × 4.5–7 cm, thickly papery, apex acuminate. Spike procumbent, 2.5–4.5 cm, 2–7-flowered; peduncle recurved, 0.5–2.5 cm, fleshy; bracts 2 or 3 per flower, brownish yellow, broadly deltoid-ovate, 4–12 × 5–12 mm, subleathery. Perianth purple, 1.2–1.5 × ca. 1.5 cm, fleshy; tube white adaxially, 5–7 mm; lobes broadly deltoid-ovate, 5–7 × 5–6 mm, apex acute. Filaments with very short free part; anthers suborbicular, ca. 1.5 mm in diam. Ovary spheroidal, ca. 1.5 mm in diam. Style ca. 7 mm; stigma peltate, slightly inflated, ca. 3 mm in diam. Fl. Nov–Dec.

• Dense forests; ca. 1700 m. SE Yunnan (Pingbian Miao Zu Zizhixian).

54. ASPIDISTRA Ker Gawler, Bot. Reg. 8: t. 628. 1822.

蜘蛛抱蛋属 zhi zhu bao dan shu

Liang Songyun (梁松筠 Liang Song-jun); Minoru N. Tamura

Antherolophus Gagnepain; *Colania* Gagnepain; *Evrardiella* Gagnepain; *Macrogyne* Link & Otto; *Plectogyne* Link.

Herbs perennial, rhizomatous. Rhizome creeping, elongate; nodes dense. Leaves solitary or 2–4-tufted, basal, erect, long petiolate; leaf blade many veined. Scape usually very short, with 2–8 scales, 1(or 2)-flowered. Flowers bisexual, terminal, generally embraced by 1 or 2 bracts at perianth base. Perianth campanulate, urceolate, or cupular, fleshy, apically (4–)6–8(–10)-lobed. Stamens as many as and opposite perianth lobes, usually inserted in proximal part of perianth tube; filaments very short or absent; anthers dorsifixed. Ovary 3- or 4-loculed; ovules several per locule. Style short, sometimes articulate; stigma usually peltate or mushroom-shaped, large, entire or lobed at margin. Fruit a berry, globose to ovoid-ellipsoid, usually 1-seeded.

About 55 species: China, India, Japan, Laos, Thailand, Vietnam; 49 species (46 endemic, one introduced) in China.

Aspidistra has never been well studied so, for the convenience of later criticisms, we use the narrowest species concept in this treatment. Accordingly, the key to the species may not function completely in some cases. Further studies are needed in order to understand the precise species variation and to establish an adequate species concept in the genus.

1a. Leaves 2–5-tufted (at least mostly so in a clone).
2a. Perianth urceolate.
3a. Perianth surface with many deep, longitudinal grooves ..... 49. *A. hekouensis*
3b. Perianth surface ± flat, not deeply grooved.
4a. Scapes usually tufted; leaf blade rounded or nearly so at base ..... 45. *A. typica*
4b. Scape solitary.
5a. Stigma 10–12 mm in diam., margin slightly 3-lobed ..... 46. *A. caespitosa*
5b. Stigma 1.5–2.5 mm in diam., margin 3-lobed or (4 or)6-crenate.
6a. Leaf blade oblong to oblong-lanceolate; stigma strongly convex centrally, margin 3-lobed ..... 47. *A. urceolata*
6b. Leaf blade lorate to lorate-oblanceolate; stigma not strongly convex centrally, margin (4 or)6-crenate ..... 48. *A. minutiflora*
2b. Perianth campanulate or subcupular.
7a. Perianth subcupular; lobes deltoid, erect and smooth ..... 38. *A. cyathiflora*
7b. Perianth campanulate; lobes oblong, oblong-ovate, or deltoid-ovate, recurved and/or papillose.
8a. Leaf blade ovate to ovate-lanceolate; perianth white; anthers 5–6 mm ..... 39. *A. dolichanthera*
8b. Leaf blade lorate, linear, linear-lanceolate, or narrowly oblanceolate; perianth blackish purple, purple, purple-red, pale green, or pale yellow-green, not white; anthers 1.5–4 mm.
9a. Leaf blade spotted with pale yellow on both surfaces, narrowly oblanceolate; perianth lobes with 4 papillose keels adaxially ..... 40. *A. yingjiangensis*
9b. Leaf blade without yellow spots, lorate, linear, or linear-lanceolate; perianth lobes with 2, 4, or 6 keels, or sometimes without a keel.
10a. Stamens inserted at middle of perianth tube, positioned nearly as high as stigma ..... 41. *A. muricata*
10b. Stamens inserted near base or proximally in perianth tube, positioned lower than stigma.
11a. Perianth lobes with 4 smooth keels adaxially ..... 42. *A. hainanensis*
11b. Perianth lobes with 4–6 papillose keels adaxially.
12a. Stigma with white convex markings adaxially; perianth lobes 7–8 mm ..... 43. *A. omeiensis*
12b. Stigma purple, with 3–6 minute grooves adaxially; perianth lobes 15–19 mm ..... 44. *A. linearifolia*
1b. Leaves solitary, spaced.
13a. Perianth urceolate.
14a. Perianth tube with fleshy keels on both surfaces; ovary keeled ..... 34. *A. carinata*
14b. Perianth tube and ovary without keels.
15a. Perianth lobes narrowly oblong ..... 37. *A. marginella*
15b. Perianth lobes deltoid-ovate or ovate.
16a. Leaf blade oblong or narrowly oblong-lanceolate; perianth lobes purple, deltoid ..... 35. *A. leshanensis*
16b. Leaf blade oblanceolate-oblong; perianth lobes yellow, ovate ..... 36. *A. fenghuangensis*
13b. Perianth campanulate (including urceolate-campanulate in plants in Taiwan).
17a. Perianth white or yellow (at least abaxial surface wholly white or yellow).
18a. Perianth white ..... 1. *A. cavicola*
18b. Perianth yellow (at least mostly so).
19a. Scape 10.5–22.5 cm; perianth lobes 8–15 mm ..... 2. *A. longipedunculata*
19b. Scape 0.5–2.5 cm; perianth lobes 4.5–7 mm.
20a. Perianth lobes narrowly ovate-lanceolate, ca. 4.5 mm, not keeled adaxially; stamens inserted at middle of perianth tube, positioned higher than stigma ..... 3. *A. triloba*
20b. Perianth lobes lanceolate, 5–7 mm, with 2 fleshy keels adaxially; stamens inserted in proximal part of perianth tube, positioned lower than stigma ..... 4. *A. flaviflora*

17b. Perianth pink, red, purple, blue, or pale green.
21a. Perianth pale green with purplish brown speckles.
22a. Leaf blade lanceolate, 25–30 × 4.5–5.5 cm; perianth lobes with 2 keels adaxially ..... 5. *A. punctata*
22b. Leaf blade narrowly oblanceolate or lorate-lanceolate, 2.5–3.0 × 4.5–5.5 cm; perianth lobes with 4 keels adaxially ..... 6. *A. fasciaria*
21b. Perianth pink, red, purple, or blue (sometimes tube white), sometimes with colored speckles.
23a. Scapes usually 2–5-tufted; perianth lobes smooth adaxially ..... 33. *A. saxicola*
23b. Scape solitary.
24a. Perianth lobes basally expanded inward forming toothlike, subulate, or oblong appendages.
25a. Perianth lobes 0.3–1 cm, shorter than or nearly as long as tube.
26a. Perianth lobes 0.3–0.4 cm, shorter than tube ..... 28. *A. oblongifolia*
26b. Perianth lobes 0.7–1 cm, nearly as long as tube ..... 29. *A. longanensis*
25b. Perianth lobes 2.4–7.5 cm, much longer than tube.
27a. Perianth tube villous, lobes 7–7.5 cm, appendages papillose ..... 32. *A. longiloba*
27b. Perianth tube glabrous, lobes 2.4–4.5 cm, appendages not papillose.
28a. Perianth pale purple; perianth lobes less than 2 × as long as tube; berry softly prickly ..... 30. *A. patentiloba*
28b. Perianth red-pink; perianth lobes ca. 3 × as long as tube; berry glabrous ..... 31. *A. luodianensis*
24b. Perianth lobes without appendages basally.
29a. Stamens inserted at or above middle of perianth tube, positioned as high as or higher than stigma.
30a. Perianth 0.9–1.2 cm ..... 7. *A. claviformis*
30b. Perianth 1.7–2.5 cm.
31a. Stamens inserted above middle of perianth tube, positioned much higher than stigma; perianth lobes (5 or)6 ..... 8. *A. retusa*
31b. Stamens inserted at middle of perianth tube, positioned slightly higher than stigma; perianth lobes 7 or 8.
32a. Perianth tubular-campanulate, lobes ovate-deltoid, not keeled adaxially ..... 9. *A. attenuata*
32b. Perianth urceolate-campanulate, lobes narrowly deltoid, 2-keeled adaxially ..... 10. *A. daibuensis*
29b. Stamens inserted nearly at base of or proximally in perianth tube, positioned lower than stigma.
33a. Perianth pink ..... 13. *A. mushaensis*
33b. Perianth not pink (at least in Chinese plants).
34a. Stigma subglobose or mushroom-shaped, 1–1.9 cm in diam.
35a. Style articulate; stigma mushroom-shaped, 1–1.2 cm in diam. ..... 11. *A. fungilliformis*
35b. Style not articulate; stigma subglobose, to 1.9 cm in diam. ..... 12. *A. subrotata*
34b. Stigma peltate, orbicular to cross-shaped, sometimes convex adaxially, 5–14 mm in diam.
36a. Perianth lobes equaling or longer than tube.
37a. Scape 1–4 cm; perianth 1–1.8 cm ..... 15. *A. austrosinensis*
37b. Scape 0.3–0.5 cm; perianth 3–3.5 cm ..... 17. *A. longipetala*
36b. Perianth lobes shorter than tube.
38a. Stigma cross-shaped ..... 26. *A. cruciformis*
38b. Stigma usually orbicular, not cross-shaped.
39a. Perianth 3–3.5 cm ..... 16. *A. tonkinensis*
39b. Perianth 1–2.5 cm.
40a. Stigma with 3 or 4 globose, fleshy projections at center adaxially ..... 14. *A. acetabuliformis*
40b. Stigma without globose projections.
41a. Stigma with 4 hollows at center adaxially ..... 27. *A. leyeensis*
41b. Stigma without hollows.
42a. Fleshy keels on adaxial surface of perianth lobes fimbriate ..... 18. *A. fimbriata*
42b. Fleshy keels on adaxial surface of perianth lobes not fimbriate.
43a. Leaf blade oblanceolate, or at least partly so.
44a. Leaf blade 5–9 cm wide; perianth lobes subdeltoid; stigma 3(or 4)-lobed at margin ..... 21. *A. xilinensis*
44b. Leaf blade 2–4 cm wide; perianth lobes narrowly lanceolate or narrowly oblong; stigma 4- or 8-lobed at margin.
45a. Perianth lobes narrowly lanceolate; stigma 1–1.2 cm in diam., 4-lobed at margin ..... 19. *A. ebianensis*
45b. Perianth lobes narrowly oblong; stigma 0.5–0.6 cm in diam., 8-lobed at margin ..... 20. *A. oblanceifolia*
43b. Leaf blade narrowly lanceolate to elliptic, never oblanceolate.
46a. Leaf blade subrounded or broadly cuneate at base; stigma 6-lobed at margin,

lobes with a white hollow on adaxial surface ..... 25. *A. zongbayi*

46b. Leaf blade cuneate at base; stigma 4-lobed at margin, lobes without a hollow on adaxial surface.

47a. Keels of perianth lobes strongly fleshy, not papillose ..... 22. *A. elatior*

47b. Keels of perianth lobes not fleshy, papillose.

48a. Stigma strongly convex, lobes entire ..... 23. *A. lurida*

48b. Stigma slightly convex, lobes emarginate at apex ..... 24. *A. sichuanensis*

1. Aspidistra cavicola D. Fang & K. C. Yen in D. Fang et al., Acta Phytotax. Sin. 31: 180. 1993.

洞生蜘蛛抱蛋 dong sheng zhi zhu bao dan

Rhizome subterete, ca. 3 mm thick, densely covered with scales. Leaves solitary; petiole 7.5–25 cm; leaf blade elliptic to elliptic-ovate, 5–14 × 2.2–4.4 cm, base rounded or broadly cuneate, distal margin denticulate, apex acuminate, mucronate. Scape 0.7–1.5 cm; bracts ca. 4. Flower solitary, erect. Perianth white, campanulate, 5- or 6-lobed apically; tube ca. 5 × 5 mm; lobes broadly ovate, ca. 3.5 × 4 mm, 3-veined. Stamens 5 or 6, inserted in proximal part of perianth tube, subsessile; anthers oblong, ca. 2.5 mm. Pistil ca. 4.5 mm; stigma scarcely or slightly enlarged, ca. 2.5 mm in diam., slightly exceeding anthers. Berry pale purple, subglobose or depressed globose, 7–10 mm in diam., ca. 3-seeded. Fl. and fr. Jun–Jul. 2*n* = 36*.

• Limestone caverns; 500–600 m. NW Guangxi (Fengshan Xian).

2. Aspidistra longipedunculata D. Fang in X. X. Chen & D. Fang, Guihaia 2: 78. 1982.

长梗蜘蛛抱蛋 chang geng zhi zhu bao dan

Rhizome subterete, 4–10 mm thick, densely covered with scales. Leaves solitary; petiole 4–45 cm; leaf blade narrowly elliptic to oblong-lanceolate, 17–50 × 3.5–13.5 cm, base cuneate, apex acuminate. Scape purple-brown, 10.5–22.5 cm; bracts 6–9. Flower solitary, nodding, slightly fragrant. Perianth yellow, campanulate, (6–)8(–10)-lobed apically; tube ca. 7 × 10 mm; lobes reflexed, suboblong, 0.8–1.5 cm × 7(–9) mm, slightly fleshy, smooth adaxially. Stamens 6–10, inserted at or slightly below middle of perianth tube, subsessile; anthers subreniform, ca. 5 mm. Pistil 7–8 mm; stigma slightly enlarged, ca. 1 mm in diam., exceeding anthers, inconspicuously 3-lobed at margin. Fl. Apr–May. 2*n* = 36*.

• Forests along ravines. SW Guangxi (Longzhou Xian, Ningming Xian).

3. Aspidistra triloba F. T. Wang & K. Y. Lang in K. Y. Lang, Acta Phytotax. Sin. 19: 380. 1981.

湖南蜘蛛抱蛋 hu nan zhi zhu bao dan

Rhizome subterete, ca. 4 mm thick, densely covered with scales. Leaves solitary; petiole 7–9 cm, rigid; leaf blade slightly spotted with yellow, oblong-lanceolate to narrowly elliptic, 11.5–23 × 3–5 cm, base cuneate, apex acuminate. Scape 1.5–2.5 cm; bracts 2–4. Flower solitary. Perianth yellow, campanulate, 6- or 7-lobed apically; tube ca. 1.3 × 1 cm; lobes ± recurved, narrowly ovate-lanceolate, ca. 4.5 × 3 mm, slightly fleshy. Stamens 6 or 7, inserted at middle of perianth tube, positioned higher than stigma; filaments 1–1.5 mm; anthers broadly elliptic, ca. 1 mm. Pistil ca. 3 mm; style articulate; stigma slightly enlarged, ca. 1.7 mm in diam., 3-parted at margin. Fl. Apr. 2*n* = 36*.

• Sparse forests along valleys; 300–400 m. SC Hunan (Qiyang Xian), W Jiangxi (Jinggangshan).

4. Aspidistra flaviflora K. Y. Lang & Z. Y. Zhu, Acta Phytotax. Sin. 20: 485. 1982.

黄花蜘蛛抱蛋 huang hua zhi zhu bao dan

Rhizome terete, 3–7 mm thick. Leaves solitary; petiole 10–26 cm; leaf blade spotted with yellow-white, oblong-lanceolate to narrowly elliptic, 19–30 × 3–6 cm. Scape 0.5–1.5 cm, bracts 1 or 2. Flower solitary, fragrant. Perianth yellow, tinged purplish adaxially and whitish abaxially, campanulate, 5- or 6-lobed apically; tube 7–13 × 5–7 mm; lobes reflexed, lanceolate, 5–7 × 2–4 mm, with 2 fleshy keels adaxially. Stamens 6, inserted proximally in perianth tube, positioned lower than stigma, subsessile; anthers elliptic, ca. 2 mm. Pistil 3–8 mm; stigma purple, 3–4 mm in diam., adaxially concave, slightly 3- or 6-lobed at margin. Berry ovoid, 1–1.5 cm in diam., tuberculate. Fl. Sep–Oct, fr. Jan–Jul. 2*n* = 38*.

• Forested slopes; ca. 800 m. SC Sichuan (Muchuan Xian).

5. Aspidistra punctata Lindley, Bot. Reg. 12: t. 977. 1826.

紫点蜘蛛抱蛋 zi dian zhi zhu bao dan

Rhizome terete. Leaves solitary; petiole 7.5–50 cm, rigid; leaf blade lanceolate, 25–30 × 4.5–5.5 cm. Scape rather short; bracts ca. 5, speckled with purplish brown. Flower solitary, nodding. Perianth pale green, densely speckled with purplish brown, campanulate, fleshy, 8-lobed apically; tube hemispheric; lobes ovate, with 2 fleshy keels adaxially, keels dark purple, densely and minutely papillose. Stamens 8, inserted at middle of perianth tube, positioned lower than stigma, subsessile; anthers oblong. Ovary with deeply colored speckles, ovoid, angled; stigma white, orbicular, large, adaxially with 4 radial, fork-tipped ridges from center to margin. Fl. Mar.

• Damp places along streams. Guangdong (Yunan Xian, Zengcheng Xian), Hong Kong.

6. Aspidistra fasciaria G. Z. Li in K. Y. Lang et al., Acta Phytotax. Sin. 37: 484. 1999.

带叶蜘蛛抱蛋 dai ye zhi zhu bao dan

Rhizome creeping, terete, covered with scales. Leaves solitary, spaced; leaf blade narrowly oblanceolate or lorate-lanceolate, 50–60 × 2.5–4.5 cm, leathery, base gradually narrowed, margin entire, apex acuminate. Scape 1.8–2.5 cm; bracts 4–6. Flower solitary, erect. Perianth yellow-green, speckled with purple, campanulate, 15–16 × 1.5–2.5 mm, fleshy, 6–8(–10)-lobed apically; tube 7–8 × 1.2–1.5 mm; lobes

dark purple, deltoid-ovate, 7–8 × 3–4 mm, with 4 keels adaxially, papillose. Stamens 6–8(–10), inserted at base of perianth tube; anthers broadly ovate, ca. 3 × 2.5 mm. Pistil ca. 5 mm; style short, not articulate; stigma peltate, enlarged, ca. 1.3 cm in diam., convex and purple-red adaxially, 6–8(–10)-lobed at margin, lobes suborbicular at apex. Fl. Jun.

• ?Guangxi.

Aspidistra fasciaria was described from a plant cultivated at the Guilin Botanical Garden, Yanshan, NE Guangxi, but no details of a wild origin were cited.

7. Aspidistra claviformis Y. Wan, Bull. Bot. Res., Harbin 4(4): 166. 1984.

棒蕊蜘蛛抱蛋 bang rui zhi zhu bao dan

Rhizome subterete, 6–8 mm thick, densely covered with scales. Leaves solitary, much spaced; petiole (15–)25–50 cm; leaf blade elliptic, 17.5–30 × 5.5–8.5 cm, apex long acuminate. Scape 0.9–3.5 cm; bracts 3–5, white, speckled with purple. Flower solitary. Perianth campanulate, 6-lobed apically; tube white, sometimes speckled with purple, 8–11 × 6–7 mm; lobes reflexed, purple, ovate, 4–5 × 3–4 mm. Stamens 6, inserted just above middle of perianth tube, positioned nearly level with stigma, subsessile; anthers oblong, 4.5–5.5 mm. Pistil purple, 7–9 mm; stigma scarcely enlarged, slightly concave and white adaxially, 3-lobed at margin. Fl. Nov. 2*n* = 36*.

• Forests on limestone hillsides. W Guangxi (Long'an Xian, Napo Xian).

8. Aspidistra retusa K. Y. Lang & S. Z. Huang in K. Y. Lang, Acta Phytotax. Sin. 19: 379. 1981.

广西蜘蛛抱蛋 guang xi zhi zhu bao dan

Rhizome subterete, ca. 5 mm thick, densely covered with scales. Leaves solitary; petiole 16–33 cm; leaf blade oblong to oblong-lanceolate, base cuneate, apex acuminate. Scape 2.5–4.5 cm; bracts 5 or 6. Flower solitary. Perianth campanulate, (5 or) 6-lobed; tube 1.3–1.5 × 0.9–1 cm; lobes ± recurved, deltoid-ovate, ca. 4 × 3 mm, rather thick. Stamens (5 or)6, inserted distally in perianth tube, positioned much higher than stigma, subsessile; anthers ovate, ca. 1.8 mm. Pistil ca. 4 mm; style obviously articulate; stigma slightly enlarged, ca. 1.5 mm in diam., 6-lobed or undulate-lobed at margin. Fl. Apr. 2*n* = 36*.

• NE Guangxi (Jinxiu Yao Zu Zizhixian, Lingui Xian, Yangshuo Xian).

9. Aspidistra attenuata Hayata, Icon. Pl. Formos. 2: 145. 1912.

薄叶蜘蛛抱蛋 bo ye zhi zhu bao dan

Rhizome terete, thickened, ca. 1 cm thick, usually covered with scales. Leaves solitary; petiole 30–40 cm; leaf blade oblanceolate, 45–50 × 7–10 cm. Scape erect, 3–5 cm; bracts 3–5. Flower solitary. Perianth tubular-campanulate, 2–2.5 cm, 7- or 8-lobed apically; lobes reflexed, speckled with black, ovate-deltoid, 7–8 mm. Stamens 7 or 8, inserted at middle of perianth tube, subsessile; anthers narrowly oblong, ca. 2.5 mm. Pistil 4–5 mm; ovary broadly conical, ca. 2 mm; style ca. 2 mm; stigma peltate, large. Berry green, globose, 2–2.5 cm in diam. Fl. Jun, fr. Jun. 2*n* = 36*.

• Mountains; 1000–2000 m. Taiwan.

10. Aspidistra daibuensis Hayata, Icon. Pl. Formos. 9: 143. 1920.

大武蜘蛛抱蛋 da wu zhi zhu bao dan

Rhizome stout, densely covered with scales. Leaves solitary; petiole 10–13 cm; leaf blade green and sometimes with white or yellowish white spots adaxially, oblong-lanceolate to lanceolate, 45–50 × 8–12 cm, base cuneate, apex acute to acuminate. Scape erect, 2–2.5 cm; bracts 4 or 5. Flower solitary. Perianth urceolate-campanulate, 2–2.5 cm, 8-lobed apically; lobes narrowly deltoid, ca. 10 × 5 mm, thickened, adaxially with 2 fleshy keels at middle. Stamens 8, inserted at middle of perianth tube; anthers yellow. Ovary cylindric. Berry globose, 1–1.5 cm in diam. Fl. Jan. 2*n* = 36*.

• Forests; 700–1800 m. Taiwan.

11. Aspidistra fungilliformis Y. Wan, Bull. Bot. Res., Harbin 4(4): 165. 1984.

伞柱蜘蛛抱蛋 san zhu zhi zhu bao dan

Rhizome subterete, 3–5 mm thick. Leaves solitary, spaced; petiole 5–17 cm, rather slender; leaf blade generally yellowish white spotted, ovate-elliptic to elliptic-lanceolate, 8.5–14 × 2.8–6.5 cm. Scape 1–4 cm; bracts 4–6, white, speckled with purple. Flower solitary. Perianth campanulate, 6-lobed apically; tube purple-black adaxially, purple abaxially, 1.2–1.6 × 1.1–1.3 cm; lobes spreading or reflexed, white adaxially, purple abaxially, broadly oblong, 6–10 × 5–8 mm. Stamens 6, inserted at base of perianth tube; filaments ca. 1 mm; anthers subreniform, 2–2.5 mm. Pistil 1–1.2 cm; style articulate; stigma hemispheric, mushroom-shaped, very large, 5–6 mm × 1–1.2 cm, exceeding anthers. Fl. Nov. 2*n* = 36*.

• Forests in limestone ravines; 300–400 m. W Guangxi (Long'an Xian, Tian'e Xian).

12. Aspidistra subrotata Y. Wan & C. C. Huang, Guihaia 7: 223. 1987.

辐花蜘蛛抱蛋 fu hua zhi zhu bao dan

Rhizome subterete, 8–10 mm thick, densely covered with scales. Leaves solitary; petiole 22–28 cm, rigid; leaf blade oblong-oblanceolate, 25–45 × 5.5–8 cm. Scape ca. 5.5 cm; bracts 3 or 4, white, speckled with purple. Flower solitary. Perianth dark purple, 6-lobed apically; tube ca. 8 × 18 mm; lobes horizontally spreading, ovate-lanceolate, 1.8–2.3 cm × 8–10 mm, adaxially minutely papillose, 4-keeled, keels papillose, central 2 extending to tube and fused with those of other lobes. Stamens 8, inserted at middle of perianth tube; filaments ca. 2 mm. Stigma subglobose, to 1.3 × 1.9 cm. Fl. Nov. 2*n* = 38*.

• S and W Guangxi (Dongxing Xian, Napo Xian).

13. Aspidistra mushaensis Hayata, Icon. Pl. Formos. 9: 144. 1920.

雾社蜘蛛抱蛋 wu she zhi zhu bao dan

Rhizome terete, ca. 6 mm thick, covered with scales. Leaves solitary; petiole 20–50 cm; leaf blade lanceolate to line-

ar-lanceolate, 30–40 × 3–5 cm, leathery, base cuneate, apex acute to acuminate. Scape 1–2 cm; bracts triangular-ovate. Perianth pink, broadly campanulate, ca. 1 cm, 8-lobed apically; lobes deltoid-lanceolate, adaxially distinctly 2-keeled, margin often folded. Stamens 8, subsessile; anthers ovate, ca. 2 mm. Ovary cylindric, 5–6 mm; stigma broadly peltate, mushroom-shaped, large. Berry globose, 1–2 cm in diam. Fl. Apr. 2*n* = 36*.

• 800–1900 m. C and N Taiwan.

No material of this species has been seen by the present authors.

14. Aspidistra acetabuliformis Y. Wan & C. C. Huang in Y. Wan, Acta Phytotax. Sin. 25: 396. 1987.

碟柱蜘蛛抱蛋 die zhu zhi zhu bao dan

Rhizome subterete, 4–7 mm thick. Leaves solitary, spaced; petiole 9–11 cm; leaf blade spotted with yellowish white, oblong-lanceolate to narrowly oblong, ca. 25 × 4–5 cm. Scape 1–2.7 cm; bracts ca. 4. Flower solitary. Perianth campanulate, 8-lobed apically; tube purple adaxially, white abaxially, 9–10 mm × 1.2–1.4 cm; lobes recurved, purple, deltoid, ca. 5 × 5 mm, adaxially with 2 or 3 fleshy, papillose keels. Stamens 8, inserted proximally in perianth tube; filaments ca. 1.5 mm; anthers oblong, ca. 2.6 mm. Pistil ca. 4 mm; stigma large, ca. 7 mm in diam., with 3 or 4 fleshy, globose projections at center adaxially, 8-lobed at margin. Fl. Oct.

• Guangxi.

Described from a cultivated plant originating from Guangxi, without precise locality.

15. Aspidistra austrosinensis Y. Wan & C. C. Huang, Guihaia 7: 221. 1987.

华南蜘蛛抱蛋 hua nan zhi zhu bao dan

Rhizome subterete, 5–8 mm thick. Leaves solitary, spaced; petiole 45–55 cm, stiff; leaf blade oblong-lanceolate, 40–45 × ca. 5.5 cm, margin denticulate. Scape 1–4 cm; bracts 4 or 5, white, speckled with purple. Flower solitary. Perianth campanulate, 6-lobed apically; tube pale yellow, 7–8 mm × 1–1.2 cm; lobes slightly recurved, purple, subdeltoid, 8–10 × 6–7 mm. Stamens 6, inserted proximally in perianth tube; filaments ca. 1 mm; anthers ovate, 3.5–4 mm. Pistil ca. 7 mm; stigma large, ca. 5 mm in diam., obviously exceeding anthers, undulate at margin. Fl. Oct.

• Guangxi.

Described from a cultivated plant originating from Guangxi, without precise locality.

16. Aspidistra tonkinensis (Gagnepain) F. T. Wang & K. Y. Lang in K. Y. Lang, Acta Phytotax. Sin. 16(1): 77. 1978.

大花蜘蛛抱蛋 da hua zhi zhu bao dan

Colania tonkinensis Gagnepain, Bull. Mus. Hist. Nat. (Paris), sér. 2, 6: 190. 1934.

Rhizome terete, 4–5 mm thick. Leaves solitary, spaced; petiole 10–13 cm; leaf blade lanceolate-oblong, 13–20 × 4–5.5 cm, margin slightly undulate. Scape ca. 3 cm; bracts ca. 5. Flower solitary. Perianth campanulate, 6-lobed apically; tube dull purple, speckled with dark purple-red adaxially and pale purple abaxially, 2–2.3 × 1.6–1.8 cm; lobes white adaxially, dull purple with pale purple speckles abaxially, ovate to semi-orbicular, 1–1.2 × ca. 1.2 cm. Stamens 6, inserted near base of perianth tube, subsessile; anthers reniform. Style white, articulate; stigma peltate, large. Fl. Oct–Nov. 2*n* = 36*.

Forests; ca. 1800 m. NW Guangxi (Tian'e Xian), S Guizhou (Luodian Xian), SE Yunnan (Pingbian Miao Zu Zizhixian) [Vietnam].

17. Aspidistra longipetala S. Z. Huang, Guihaia 6: 273. 1986.

长瓣蜘蛛抱蛋 chang ban zhi zhu bao dan

Rhizome subterete, 5–7 mm thick. Leaves solitary; petiole 6–7 cm, rather slender; leaf blade ovate to elliptic, 13–17 × 5–6 cm. Scape 3–5 mm; bracts 5 or 6. Flower solitary. Perianth pale yellow adaxially, purple-red abaxially, 6-parted apically; tube ca. 1 × 1.8 cm; lobes suberect, ovate-lanceolate, (1.7–)2–2.5 cm × ca. 5 mm, rather thick. Stamens 6, inserted at base of perianth tube, subsessile; anthers oblong, ca. 2 mm. Pistil ca. 7 mm; style ca. 5 mm, thickened, 12-ribbed; stigma peltate, large, 1–1.2 cm in diam., slightly 12-lobed at margin. Fl. Mar–Apr.

• Forests in ravines. C Guangxi (Liucheng Xian, Wuming Xian).

18. Aspidistra fimbriata F. T. Wang & K. Y. Lang in K. Y. Lang, Acta Phytotax. Sin. 16(1): 76. 1978.

流苏蜘蛛抱蛋 liu su zhi zhu bao dan

Rhizome 4–6 mm thick. Leaves solitary; petiole 25–35 cm, stiff; leaf blade oblong-lanceolate, 30–45 × 3.5–6 cm. Scape 3–10 mm; bracts 4 or 5. Flower solitary. Perianth campanulate, 8–10-lobed apically; tube 7–9 mm × 1–1.5 cm; lobes slightly recurved, purple speckled abaxially, ovate-deltoid, 6–8 × 3.5–5 mm, with 4 fleshy, fimbriate keels adaxially. Stamens 8–10, inserted proximally in perianth tube, subsessile; anthers broadly ovate, ca. 1.8 mm. Pistil ca. 4 mm; stigma purple, peltate, large, ca. 7 mm in diam., 4-lobed at margin, lobes emarginate at apex. Fl. Nov–Dec. 2*n* = 38*.

• Forests along ravines; 400–500 m. Fujian, Guangdong, Hainan.

19. Aspidistra ebianensis K. Y. Lang & Z. Y. Zhu in K. Y. Lang et al., Acta Phytotax. Sin. 37: 492. 1999.

峨边蜘蛛抱蛋 e bian zhi zhu bao dan

Rhizome creeping, subterete, covered with scales. Leaves solitary; leaf blade spotted with yellowish white, oblanceolate-oblong, 35–65 × 3–5 cm. Scape 3–5 cm. Flower solitary. Perianth purplish or purplish red, campanulate, 8-lobed apically; tube 1–1.2 cm; lobes purple or purplish red, narrowly lanceolate, rarely deltoid-lanceolate, 8–11 × 2–3 mm, 2–4-keeled to middle of tube. Stamens 8, inserted at base of perianth tube; anthers yellow, oblong, ca. 2 × 1.5 mm. Pistil 3–5 mm; style short; stigma purple, peltate, 1–1.2 cm in diam., convex, 4-ridged at center adaxially, 4-lobed at margin, lobes emarginate at apex. Berry obovoid, 2–6 × ca. 2 cm, scabrous. Fl. May.

• About 800 m. Sichuan.

20. Aspidistra oblanceifolia F. T. Wang & K. Y. Lang in K. Y. Lang & Z. Y. Zhu, Acta Phytotax. Sin. 20: 487. 1982.

棕叶草 zong ye cao

Rhizome subterete, 5–7 mm thick. Leaves solitary; petiole 6–13 cm, stiff; leaf blade sometimes inconspicuously yellowish white spotted, narrowly oblanceolate, 35–50 × 2.5–4 cm. Scape 3–2 mm; bracts several. Flower solitary. Perianth purple-red, campanulate, fleshy, 8-lobed apically; tube 9–11 × 6–10 mm; lobes slightly recurved, oblong, 3–4 × 1.5–2 mm, 2-keeled near base and papillose adaxially, keels fleshy, papillose. Stamens 8, inserted proximally in perianth tube, subsessile; anthers ovate, ca. 1 mm. Pistil 3.5–4 mm; stigma purple, peltate, orbicular, large, 5–6 mm in diam., exceeding anthers, 4-ribbed adaxially, 8-lobed at margin. Fl. Apr. 2*n* = 38*.

• Moist places in forests; 400–1300 m. S Guizhou (Dushan Xian), W Hubei (Badong Xian), Sichuan.

21. Aspidistra xilinensis Y. Wan & X. H. Lu in Y. Wan, Acta Phytotax. Sin. 25: 397. 1987.

西林蜘蛛抱蛋 xi lin zhi zhu bao dan

Rhizome subterete, 5–9 mm thick, covered with scales. Leaves solitary, spaced; petiole 20–37 cm; leaf blade with yellowish white spots, oblanceolate to subelliptic, 25–45 × 5–9 cm. Scape 0.5–5 cm; bracts 4 or 5. Flower solitary. Perianth campanulate, 6-lobed apically; tube pale yellow, 9–10 × 10 mm; lobes slightly recurved, pale purple, subdeltoid, 6–8 × 4–6 mm, adaxially 4-keeled, keels fleshy, papillose. Stamens 6, inserted proximally in perianth tube, subsessile; anthers broadly ovate, ca. 2 mm. Pistil ca. 8 mm; stigma peltate, orbicular, large, ca. 7 mm in diam., obviously exceeding anthers, 3(or 4)-lobed at margin. Fl. Sep.

• NW Guangxi (Xilin Xian).

22. Aspidistra elatior Blume, Tijdschr. Natuuri. Gesch. Physiol. 1: 76. 1834.

蜘蛛抱蛋 zhi zhu bao dan

Aspidistra punctata Lindley var. *albomaculata* Hooker; *Plectogyne variegata* Link.

Rhizome subterete, 5–10 mm thick. Leaves solitary, spaced; petiole 5–35 cm, stiff; leaf blade sometimes with yellowish white markings, oblong-lanceolate, lanceolate, or subelliptic, 20–45 × 6–10 cm. Scape 0.5–2 cm; bracts 2–4. Flower solitary. Perianth purplish to dark-purple, rarely pinkish, campanulate, (6–)8-lobed apically; tube 1–1.2 × 1–1.5 cm; lobes greenish at margin, deltoid, 6–8 × 3.5–4 mm, adaxially 4-keeled, keels purple-red, very thick, fleshy, smooth, central 2 up to 1.5 mm wide. Stamens (6–)8, inserted at base of perianth tube, subsessile; anthers elliptic, ca. 2 mm. Pistil ca. 8 mm; stigma peltate, orbicular, large, 1–1.3 cm in diam., 4-lobed at margin, lobes emarginate at apex. Fl. Jan–Apr. 2*n* = 36*.

Widely cultivated in China [native to Japan (Osumi Islands)].

Aspidistra elatior was said to be of Chinese origin, but no wild plants have been found in China. Sako and Maruno (Bull. Kagoshima Univ. For. 11: 33–78. 1983) and Sako et al. (ibid. 16: 83–108. 1988) noted that the species originated from Kuroshima, Suwanose, and Uji Islands (Osumi Islands, S of Kyushu, Japan). The Uji Islands are largely covered with thickets of *Ardisia sieboldii* Miquel, where *Aspidistra elatior* grows abundantly. Kuroshima Island is largely covered with forests of *Castanopsis sieboldii* (Makino) Hatusima ex T. Yamazaki & Mashiba, the understory of which is occupied by *A. elatior*.

23. Aspidistra lurida Ker Gawler, Bot. Reg. 8: t. 628. 1822.

九龙盘 jiu long pan

Aspidistra kouytchensis H. Léveillé & Vaniot; *A. kouytchensis* var. *aucubimaculata* H. Léveillé; *Macrogyne convallariifolia* Link & Otto.

Rhizome terete, 4–10 mm thick. Leaves solitary; petiole 10–15 cm, stiff; leaf blade narrowly lanceolate, 15–22.5 × 3–5 cm. Scape arching, ca. 3 cm; bracts ca. 5, dark reddish. Flower solitary, nodding. Perianth dark purple, cupular-campanulate, 6-lobed apically; tube basally pale yellow-brown speckled with purple; lobes ovate-deltoid, shorter than tube, adaxially papillose. Stamens 6(–8), inserted proximally in perianth tube, positioned nearly level with stigma, subsessile. Pistil equaling perianth tube; ovary purple speckled; stigma peltate, orbicular, large, strongly convex adaxially, inconspicuously 4-lobed at margin, lobes entire at apex. 2*n* = 36*.

• Rock crevices in limestone mountains; ca. 300 m. Guangdong, NC Guangxi (Liuzhou Shi), SC Guizhou (Guiding Xian).

24. Aspidistra sichuanensis K. Y. Lang & Z. Y. Zhu, Acta Bot. Yunnan. 6: 387. 1984.

四川蜘蛛抱蛋 si chuan zhi zhu bao dan

Rhizome terete, 6–12 mm thick. Leaves solitary; petiole 10–35(–40) cm; leaf blade sometimes with yellowish white spots, lanceolate to elliptic-lanceolate, 20–35 × 4–8 cm. Scape 0.5–5 cm. Flower solitary. Perianth subcampanulate, (6–)8-lobed apically; tube brown-purple adaxially, purple abaxially, 7–9 × 0.9–1.5 cm; lobes recurved, purple-red, deltoid-lanceolate, 3–6 × 2–3 mm, adaxially 4-keeled, keels densely papillose. Stamens (6–)8, inserted proximally in perianth tube, subsessile. Stigma peltate, orbicular, large, 0.8–1.2 cm in diam., slightly convex centrally, 4-ridged, (3 or)4-lobed at margin, lobes emarginate at apex. Berry tuberculate. Fl. and fr. Jan–Mar. 2*n* = 38*.

• Forests, bamboo forests, thickets; 500–1100 m. Guangxi (Jinxiu Yao Zu Zizhixian, Napo Xian, Xing'an Xian), Guizhou (Anlong Xian, Zunyi Xian), W Hunan (Yongshun Xian, Zhijiang Xian), Sichuan, Yunnan (Kunming Shi).

25. Aspidistra zongbayi K. Y. Lang & Z. Y. Zhu, Acta Phytotax. Sin. 20: 486. 1982.

粽粑叶 zong ba ye

Rhizome terete, 3–5 mm thick. Leaves solitary; petiole 5–25 cm, stiff; leaf blade with yellowish white spots basally, elliptic to elliptic-lanceolate, 14–25 × 3–7 cm. Scape 2–3 cm; bracts 1 or 2. Flower solitary. Perianth purple-red, campanulate, 6-lobed apically; tube 5–7 × 8–11 mm; lobes recurved, deltoid-ovate, 4–5 × 2–4 mm, adaxially with 4 fleshy, papillose keels. Stamens 6, inserted proximally in perianth tube, subsessile; anthers ovate. Pistil 4–5 mm; stigma yellowish white or purple, peltate, orbicular, large, ca. 9 mm in diam., 6-lobed at margin, lobes with a white hollow adaxially. Berry ellipsoid-ovoid, 1–1.3 cm in diam., tuberculate. Fl. Jan–Feb, fr. Aug–Dec. 2*n* = 38*.

• Forests; ca. 1200 m. Sichuan.

26. Aspidistra cruciformis Y. Wan & X. H. Lu in Y. Wan & C. C. Huang, Guihaia 7: 217. 1987.

十字蜘蛛抱蛋 shi zi zhi zhu bao dan

Rhizome subterete, 6–12 mm thick. Leaves solitary; petiole 30–50 cm; leaf blade with yellowish white spots, elliptic to oblong-elliptic, 25–35 × 6–9 cm. Scape 0.6–1.5 cm; bracts 2 or 3. Flower solitary. Perianth dark purple, subcampanulate, 8-lobed apically; tube 1.1–1.4 × 1.4–1.6 cm, adaxially papillose; lobes slightly recurved, oblong to deltoid, 5–6.5 × 4–5 mm, adaxially papillose. Stamens 8, inserted proximally in perianth tube; filaments ca. 1.5 mm; anthers ovate, ca. 2 mm. Pistil ca. 5 mm; stigma peltate, cross-shaped, large, 1.2–1.4 cm in diam., 4-lobed at margin. Berry subglobose, ca. 7 mm in diam., scabrous. Fl. Sep.

• NW Guangxi (Longlin Ge Zu Zizhixian, Tian'e Xian).

27. Aspidistra leyeensis Y. Wan & C. C. Huang, Guihaia 7: 219. 1987.

乐业蜘蛛抱蛋 le ye zhi zhu bao dan

Rhizome subterete, 6–10 mm thick. Leaves solitary or occasionally paired; petiole 10–21 cm, stiff; leaf blade usually with yellowish green spots, narrowly lanceolate, 30–55 × 4–6 cm. Scape 1.5–6 cm; bracts 4–6. Flower solitary. Perianth purple except for white base, campanulate, 8-lobed apically; tube 1–1.2 × 1.3–1.5 cm, adaxially papillose; lobes spreading or reflexed, deltoid-ovate to oblong, 7–9 × 4–6 mm, 3- or 4-keeled and papillose adaxially, keels fleshy, papillose. Stamens 8, inserted proximally in perianth tube; filaments ca. 2 mm; anthers ovate, 1.5–2 mm. Pistil 5–6 mm; stigma peltate, orbicular, large, 0.9–1.1 cm in diam., with 4 hollows at center adaxially. Fl. Mar.

• NW Guangxi (Leye Xian, Tian'e Xian).

28. Aspidistra oblongifolia F. T. Wang & K. Y. Lang in K. Y. Lang et al., Acta Phytotax. Sin. 37: 476. 1999.

长圆叶蜘蛛抱蛋 chang yuan ye zhi zhu bao dan

Rhizome creeping, subterete, covered with scales. Leaves solitary; leaf blade oblong or ovate-oblong, 10.5–14 × 4–5 cm. Scape 5–10 mm. Flower solitary. Perianth purple, campanulate, 6-lobed apically; tube 7–8 mm; lobes oblong, 3–4 × ca. 2.5 mm. Stamens 6, inserted proximally in perianth tube; anthers broadly elliptic, 1.2–1.5 × 0.8–1.2 mm. Pistil 6–7 mm; style long, slender; stigma enlarged, ca. 1.7 mm in diam., convex adaxially, 3-ridged. Berry globose, 8–10 mm in diam., scabrous. Fl. Nov.

• N Guangxi (Hechi Xian).

29. Aspidistra longanensis Y. Wan, Acta Phytotax. Sin. 23: 151. 1985.

隆安蜘蛛抱蛋 long an zhi zhu bao dan

Rhizome terete, 3–6 mm thick. Leaves solitary; petiole 9–17.5 cm; leaf blade oblong-elliptic to elliptic-lanceolate, 14–21 × 6–8.5 cm. Scape 1.5–5 cm; bracts ca. 4. Flower solitary. Perianth blue-purple, subcampanulate, 8-lobed apically; tube 0.8–1 × 1.3–1.6 cm; lobes triangular-lanceolate, 9–10 × 6–7 mm, adaxially with 2 papillose keels distally, basally expanded inward forming subulate appendages connate into a ring. Stamens 8, inserted at base of perianth tube, subsessile; anthers ovate, ca. 4 mm. Pistil 8–10 mm; stigma peltate, orbicular, large, 1–1.2 cm in diam., convex at center, 4-parted and 12-lobed at margin. Fl. Jun. 2*n* = 38*.

• Shady and moist places on limestone hillsides. WC Guangxi (Long'an Xian).

30. Aspidistra patentiloba Y. Wan & X. H. Lu in Y. Wan, Bull. Bot. Res., Harbin 9(2): 99. 1989.

柳江蜘蛛抱蛋 liu jiang zhi zhu bao dan

Rhizome subterete, 0.8–1.5 cm thick. Leaves solitary; petiole 22–40 cm; leaf blade narrowly elliptic, 28–60 × 6–13 cm. Scape 2.5–4 cm; bracts ca. 7. Flower solitary. Perianth pale purple, deeply 8-lobed; tube ca. 1.4 × 1.8 cm, glabrous; lobes yellowish adaxially, linear-lanceolate, ca. 2.4 cm × 5–8 mm, basally expanded inward forming toothlike or spurlike appendages. Stamens 8, inserted at middle of perianth tube, subsessile; anthers ovate, ca. 3.5 mm. Pistil ca. 7 mm; stigma purple, orbicular, large, to 1.5 cm in diam., concave adaxially, 16-lobed at margin. Berry purple, subglobose, 1.4–1.7 cm in diam., softly prickly. Fl. Apr, fr. Jun. 2*n* = 38*.

• C Guangxi (Liujiang Xian).

31. Aspidistra luodianensis D. D. Tao, Acta Phytotax. Geobot. 43: 121. 1992.

罗甸蜘蛛抱蛋 luo dian zhi zhu bao dan

Rhizome terete, 2–2.5 cm thick, without scales. Leaves solitary; petiole 30–60 cm; leaf blade lanceolate, 80–110 × 10–13 cm. Scape 1–1.5 cm; bracts 1 or 2, purple. Flower solitary. Perianth red-pink, campanulate, deeply 6-lobed apically; tube 1–1.5 × 2–2.5 cm, glabrous; lobes recurved, linear-lanceolate, ca. 4.5 × 0.5 cm, basally expanded inward forming toothlike or spurlike appendages. Stamens 6, inserted at middle of perianth tube, subsessile; anthers suboblong, ca. 2.5 mm. Pistil 5–9 mm; ovary 3–5-ribbed; stigma purple, orbicular, large, 1–1.5 cm in diam. concave adaxially, slightly 8-lobed at margin. Berry red, globose, ca. 2.5 cm in diam., glabrous. Fl. Apr, fr. Jun. 2*n* = 38*.

• Streamsides in evergreen forests in limestone areas; ca. 500 m. NW Guangxi (Tian'e Xian), S Guizhou (Luodian Xian).

32. Aspidistra longiloba G. Z. Li, Acta Phytotax. Sin. 26: 156. 1988.

巨型蜘蛛抱蛋 ju xing zhi zhu bao dan

Rhizome subterete, ca. 1.5 cm thick. Leaves solitary; petiole purple-brown, 45–75 cm, rigid; leaf blade oblanceolate, 50–70 × 10–15 cm. Scape 5–11 cm; bracts ca. 4. Flower solitary, erect. Perianth purple, deeply 12(–14)-lobed apically; tube 3.5–3.7 × 3.5–4 cm, villous; lobes slightly recurved, linear-lanceolate, 7–7.5 × 1–1.2 cm, basally expanded inward forming oblong, papillose appendages ca.13 × 6 mm. Stamens 12(–14), inserted at base of perianth tube, subsessile; anthers oblong, ca. 6 mm. Pistil ca. 9 mm; style articulate; stigma peltate, orbicular, large, to 2.2 cm in diam., 12(–14)-lobed at margin. Fl. May–Jun. 2*n* = 38*.

• Guangxi.

Described from a cultivated plant originating from Guangxi, without precise locality.

33. Aspidistra saxicola Y. Wan, Guihaia 4: 129. 1984.

石山蜘蛛抱蛋 shi shan zhi zhu bao dan

Rhizome subterete, 5–7 mm thick. Leaves solitary; petiole 5–14 cm, rigid; leaf blade slightly spotted with yellowish white, elliptic to elliptic-lanceolate, 12–23 × 4.5–7(–9.5) cm. Scapes usually 2–5-tufted, 0.5–2.5 cm; bracts 4–6. Flower solitary. Perianth purple, campanulate, 6-lobed apically; tube 8–10 × 6–7 mm; lobes broadly ovate, 4–5 × 4–6 mm, smooth adaxially. Stamens 6, inserted at middle of perianth tube, subsessile; anthers oblong, ca. 4.5 mm. Pistil 7–8.5 mm; stigma purple, peltate, orbicular, large, 4–5 mm in diam. Berry dark purple, trigonous globose, 1–1.4 cm in diam., tuberculate. Fl. Oct. 2*n* = 36*.

• Evergreen forests on limestone slopes; 300–400 m. WC Guangxi (Long'an Xian).

34. Aspidistra carinata Y. Wan & X. H. Lu in Y. Wan, Bull. Bot. Res., Harbin 9(2): 97. 1989.

天峨蜘蛛抱蛋 tian e zhi zhu bao dan

Rhizome subterete, 6–8 mm thick. Leaves solitary; petiole 22–24 cm; leaf blade green with yellowish white spots, linear-lanceolate, 60–70 × 3.5–4.5 cm. Scape 1–2 cm; bracts ca. 4. Flower solitary. Perianth suburceolate, 8-lobed apically; tube ca. 8 × 7 mm, with fleshy keels on both surfaces; lobes reflexed, deltoid-oblong, ca. 3 × 1.5 mm, adaxially with 2 or 3 papillose keels. Stamens 8, inserted proximally in perianth tube, subsessile; anthers oblong, ca. 1.5 mm. Pistil ca. 7 mm; ovary enlarged, ridged; style articulate; stigma peltate, orbicular, ca. 4 mm in diam., convex at center, 8-lobed at margin. Fl. Nov.

• N Guangxi (Jinxiu Yao Zu Zizhixian, Tian'e Xian).

35. Aspidistra leshanensis K. Y. Lang & Z. Y. Zhu, Acta Bot. Yunnan. 6: 385. 1984.

乐山蜘蛛抱蛋 le shan zhi zhu bao dan

Rhizome subterete, 4–8 mm thick. Leaves solitary; petiole 27–45 cm; leaf blade sometimes with yellowish white spots, oblong to oblong-lanceolate, 20–40 × 3–6 cm. Scape 1–6 cm; bracts 4–6. Flower solitary. Perianth urceolate, 6–8(or 9)-lobed apically; tube purple-brown adaxially, purple abaxially, 0.8–1.2 × 1–2 cm; lobes recurved, white or yellowish white adaxially, purple abaxially, deltoid-ovate, 5–6 × 4–5 mm, with 2 short, papillose keels near adaxial base. Stamens 6–8(or 9), inserted at base of perianth tube, subsessile; anthers ca. 2 mm. Pistil 4–6 mm; stigma peltate, orbicular, large, 1–1.5 cm in diam., 6–8(or 9)-lobed at margin. Berry ca. 1.5 cm in diam., tuberculate. Fl. Sep. 2*n* = 38*.

• Moist places in forests; ca. 600 m. SC Sichuan (Leshan Shi).

36. Aspidistra fenghuangensis K. Y. Lang in K. Y. Lang et al., Acta Phytotax. Sin. 37: 494. 1999.

凤凰蜘蛛抱蛋 feng huang zhi zhu bao dan

Rhizome creeping, subterete, covered with scales. Leaves solitary; leaf blade with yellowish white markings, oblanceolate-oblong, 30–50 × 4.5–6.5 cm, margin sparsely denticulate. Scape 0.5–2.5 cm. Flower solitary. Perianth pale yellow, urceolate, 6–8-lobed apically; tube ca. 4 × 8 mm; lobes incurved, ovate, ca. 3 × 2 mm, with 2 keels adaxially, keels fleshy, papillose at base. Stamens 6–8, inserted at middle of perianth tube; anthers long elliptic, ca. 3 × 1.8 mm. Pistil ca. 3 mm; stigma peltate, orbicular, enlarged, ca. 6 mm in diam., convex adaxially, 3- or 4-ridged, 3- or 4-lobed at margin, lobes emarginate at apex. Fl. Sep.

• About 700 m. W Hunan (Fenghuang Xian).

37. Aspidistra marginella D. Fang & L. Zeng in D. Fang et al., Acta Phytotax. Sin. 31: 182. 1993.

啮边蜘蛛抱蛋 nie bian zhi zhu bao dan

Rhizome subterete, 3–5 mm thick. Leaves solitary; petiole 11–17(–25) cm; leaf blade usually ovate, 12–23 × 5.5–9 cm. Scape 2.5–6 cm. Flower solitary, slightly nodding. Perianth pale green, speckled with purple on both surfaces, urceolate, 6- or 8-lobed apically; tube 1–1.3 cm; lobes usually incurved, narrowly oblong, ca. 9 × 2 mm, basally expanded inward forming a crenate appendage, margin erose. Stamens 6–8, inserted proximally in perianth tube, subsessile. Pistil ca. 7 mm; stigma large, ca. 1.2 cm in diam., 16-dentate at margin. Berry dark purple, depressed globose, 1.2–1.4 cm in diam., slightly tuberculate and prickly. Fl. May. 2*n* = 38*.

• Forests in limestone areas; 500–600 m. SW Guangxi (Longzhou Xian).

38. Aspidistra cyathiflora Y. Wan & C. C. Huang in Y. Wan, Bull. Bot. Res., Harbin 9(2): 100. 1989.

杯花蜘蛛抱蛋 bei hua zhi zhu bao dan

Rhizome subterete, 6–11 mm thick. Leaves solitary or 2- or 3-tufted; petiole 2–14 cm; leaf blade linear-oblanceolate, 25–45 × 1.8–3.5 cm. Scape 0.8–2 cm; bracts 3–5. Flower solitary. Perianth pale yellow-green, spotted with purple abaxially, subcupular, 6-lobed apically; tube purple adaxially except for white base, ca. 7 × 13 mm; lobes erect, pale yellow adaxially, deltoid, 5–7 × 5–6 mm, smooth. Stamens usually 6, inserted at base of perianth tube; filaments ca. 1 mm; anthers broadly ovate, 2–3 mm. Pistil ca. 5 mm; stigma purple or with yellow center, peltate, orbicular, 5–8 mm in diam., with 3 white grooves, 3(or 4)-lobed at margin. Fl. Dec.

• Guangxi.

Described from a cultivated plant originating from Guangxi, without precise locality.

39. Aspidistra dolichanthera X. X. Chen in X. X. Chen & D. Fang, Guihaia 2: 77. 1982.

长药蜘蛛抱蛋 chang yao zhi zhu bao dan

Rhizome subterete, 6–9 mm thick. Leaves 2- or 3-tufted; petiole 20–30 cm, rigid; leaf blade green with sparse, yellow spots, ovate to ovate-lanceolate, 18–30 × 8–15 cm, base rounded. Scape 5–15 cm; bracts 3–6. Flower solitary. Perianth white, campanulate, 6- or 7-lobed apically; tube 6–8 × ca. 8 mm; lobes recurved, oblong, ca. 12 × 7–8 mm. Stamens 6–7, inserted at base of perianth tube, subsessile; anthers oblong, 5–6 mm. Stigma slightly enlarged, ca. 1.7 mm in diam., exceeding anthers.

Fl. Apr. 2*n* = 36*.

• SW Guangxi (Longzhou Xian).

40. Aspidistra yingjiangensis L. J. Peng, Acta Bot. Yunnan. 11: 173. 1989.

盈江蜘蛛抱蛋 ying jiang zhi zhu bao dan

Rhizome terete, 4–6 mm thick. Leaves 3-tufted; petiole 11–13 cm; leaf blade green with pale yellow spots, narrowly oblanceolate, 50–80 × 2–4.5 cm. Scape 1–1.5 cm; bracts 2 or 3. Flowers solitary or paired. Perianth campanulate, 6-lobed apically; tube 7–10 × 7–10 mm; lobes oblong-ovate, 7–10 × 3–5 mm, adaxially with 4 fleshy, papillose keels. Stamens 6, inserted at base of perianth tube, subsessile; anthers broadly elliptic, ca. 4 mm. Pistil 4–5 mm; stigma purple, peltate, orbicular, large, 5–7 mm in diam., 6-lobed at margin. Berry purple-red, globose, 5–7 mm in diam. Fl. Oct. 2*n* = 36*.

• Forests; 1500–1600 m. W Yunnan (Yingjiang Xian).

41. Aspidistra muricata How ex K. Y. Lang, Acta Phytotax. Sin. 19: 383. 1981.

糙果蜘蛛抱蛋 cao guo zhi zhu bao dan

Rhizome terete, ca. 5 mm thick. Leaves 2- or 3-tufted; petiole 5–10 cm; leaf blade lorate to linear-lanceolate, 30–50 × 1–1.5 cm. Scape 1–1.3 cm; bracts 4 or 5. Flower solitary. Perianth pale green, campanulate, 6-lobed apically; tube ca. 10 × 6.5 mm; lobes recurved, oblong, ca. 5 × 3 mm. Stamens 6, inserted at middle of perianth tube, positioned nearly level with stigma, subsessile; anthers oblong, ca. 3 mm. Pistil ca. 6 mm; style articulate; stigma orbicular, slightly enlarged, ca. 4 mm in diam., slightly 6-lobed at margin. Berry globose, ca. 1 cm in diam., tuberculate. Fl. and fr. Oct.

• NC and W Guangxi (Luocheng Xian, Napo Xian).

42. Aspidistra hainanensis Chun & How, Fl. Hainan. 4: 533. 1977.

海南蜘蛛抱蛋 hai nan zhi zhu bao dan

Rhizome ca. 8 mm thick, stout. Leaves 2–4-tufted; petiole 3–10 cm; leaf blade lorate, 50–70 × 1–1.5 cm. Scape 5–18 mm; bracts ca. 4. Flower solitary. Perianth purple or tinged with yellow, campanulate, 6(–8)-lobed apically; tube 1–1.2 × 1.3–1.5 cm; lobes recurved, oblong-ovate, 8–10 × ca. 2 mm, 4-keeled adaxially, keels fleshy, smooth, central 2 extending from base of tube to apex of lobes, other 2 short or sometimes inconspicuous. Stamens 6(–8), inserted proximally in perianth tube, subsessile; anthers transversely elliptic, ca. 1.5 × 2 mm. Pistil ca. 8 mm; stigma peltate, orbicular, large, 1–1.3 cm in diam., 3-lobed at margin. Fl. Mar–Apr. 2*n* = 38*.

• Moist places along ravines, forests; ca. 600 m. S Guangdong (Xinyi Xian, Zhuhai Shi), EC Guangxi (Jinxiu Yao Zu Zizhixian), S Hainan (Sanya).

43. Aspidistra omeiensis Z. Y. Zhu & J. L. Zhang, Acta Phytotax. Sin. 19: 386. 1981.

峨眉蜘蛛抱蛋 e mei zhi zhu bao dan

Rhizome 1–2 cm thick, stout. Leaves 3–5-tufted; petiole 5–13 cm; leaf blade lorate, 8–100 × 2–4 cm. Scape 3–12 mm; bracts 3 or 4. Flower solitary. Perianth purple or purple-red, campanulate, 6(–8)-lobed apically; tube 0.8–1.1 × 1.2–1.4 cm; lobes deltoid-ovate, 7–8 × 4–5 mm, 4(–6)-keeled adaxially, keels fleshy, papillose, extending from middle or base of tube to apex of lobes. Stamens 6(–8), inserted proximally in perianth tube; filaments ca. 1 mm; anthers transversely elliptic. Pistil ca. 6 mm; stigma peltate, orbicular, large, 0.9–1.3 cm in diam., exceeding anthers, with white, convex markings. Fl. Mar. 2*n* = 38*.

• Forests, humus-rich places; 600–1100 m. Sichuan.

44. Aspidistra linearifolia Y. Wan & C. C. Huang, Guihaia 7: 220. 1987.

线萼蜘蛛抱蛋 xian e zhi zhu bao dan

Rhizome subterete, 1.3–2 cm thick. Leaves 2–5-tufted; petiole 3–10 cm; leaf blade lorate, 60–100 × 1.5–3.5 cm. Scape 2–5.5 cm; bracts 4 or 5. Flower solitary. Perianth blackish purple, campanulate, 6-lobed apically; tube 0.8–1.3 × 1.8–2.2 cm, papillose adaxially; lobes slightly recurved, deltoid-ovate, 1.5–1.9 cm × 0.8–1.0 mm, 6-keeled adaxially, apex widened, keels fleshy, papillose, central 4 extending from base of tube to apex of lobes. Stamens 6, inserted at base of perianth tube, subsessile; anthers subreniform, ca. 3 mm. Pistil ca. 9 mm; stigma purple, peltate, orbicular, large, ca. 1.4 cm in diam., exceeding anthers, with 3–6 minute grooves and 6 ridges adaxially. Fl. Mar. 2*n* = 36*.

• W Guangxi (Bose Xian).

45. Aspidistra typica Baillon, Bull. Mens. Soc. Linn. Paris 2: 1129. 1894.

卵叶蜘蛛抱蛋 luan ye zhi zhu bao dan

Rhizome subterete, ca. 7 mm thick. Leaves 2- or 3-tufted; petiole 12–21 cm, stiff; leaf blade green, sometimes sparsely yellowish spotted, ovate-lanceolate to ovate, 18–32 × 7–12 cm, baserounded or nearly so. Scapes usually tufted, arching or horizontal, 2.5–4.6 cm; bracts 3–5. Flower solitary. Perianth purple, urceolate, 6-lobed apically; tube 0.9–1.2 × 1.4–1.8 cm; lobes suberect, ovate, 3–5 × 3–5 mm. Stamens 6, inserted at base of perianth tube, subsessile. Stigma peltate, orbicular, large, 0.9–1.5 cm in diam., slightly 6-lobed at margin. Fl. Jun.

Forests. ?SW Guangxi, SE Yunnan (Hekou Yao Zu Zizhixian) [Vietnam].

46. Aspidistra caespitosa C. Pei, Contr. Biol. Lab. Chin. Assoc. Advancem. Sci., Sect. Bot. 12: 101. 1939.

丛生蜘蛛抱蛋 cong sheng zhi zhu bao dan

Rhizome ca. 6 mm thick. Leaves usually 3-tufted; petiole 10–18 cm or shorter; leaf blade lorate, 40–80 × 1–2.5 cm. Scape solitary, arching or horizontal, 2–11 cm, geniculate; bracts 4 or 5. Flower solitary. Perianth purple or tinged with purple, urceolate, 6-lobed apically; tube 1–1.2 × 1.6–2 cm; lobes suberect, ovate-lanceolate, ca. 10 × 4 mm. Stamens 6, inserted near base of perianth tube, subsessile. Stigma peltate, large, 1–1.2 cm in diam., slightly 3-lobed at margin. Berry purple, ovoid, ca. 6 mm in diam., scabrous. Fl. Mar–Apr, fr. Jun–Jul. 2*n* = 38*.

• Forests, bamboo forests; 500–1600 m. Sichuan.

47. Aspidistra urceolata F. T. Wang & K. Y. Lang in K. Y. Lang, Acta Phytotax. Sin. 19: 381. 1981.

坛花蜘蛛抱蛋 tan hua zhi zhu bao dan

Rhizome subterete, ca. 6 mm thick. Leaves 2- or 3-tufted; petiole 8–16 cm, rigid; leaf blade oblong to oblong-lanceolate, 20–25 × 3–4 cm. Scape solitary, ca. 3 cm, slender; bracts ca. 3. Flower solitary. Perianth with many purple speckles, urceolate, 6-lobed apically; tube ca. 5 × 5 mm; lobes slightly incurved, deltoid, ca. 1 × 1 mm. Stamens 6, inserted at base of perianth tube, subsessile; anthers narrowly elliptic, ca. 1 mm. Pistil ca. 2 mm; ovary basally enlarged; stigma ca. 1.5 mm in diam., highly convex at center, 3-lobed at margin, lobes emarginate at apex.

• Guizhou.

Known only from the type specimen (*Anonymous 7128*, IBSC), which was collected in Guizhou without precise locality.

48. Aspidistra minutiflora Stapf, J. Linn. Soc., Bot. 36: 113. 1903.

小花蜘蛛抱蛋 xiao hua zhi zhu bao dan

Rhizome subterete, 5–6 mm thick. Leaves 2- or 3-tufted; leaf blade lorate to lorate-oblanceolate, 26–65 × 1–2.5 cm, basally gradually narrowed into inconspicuous petiole. Scape solitary, 1–2.5 cm, slender; bracts 2–4. Flower solitary, small. Perianth blue-green, tinged and speckled with purple, urceolate, 4.5–5 × 4–6 mm; lobes erect, deltoid, 1–2 × 1–1.5 mm. Stamens (4–)6, inserted at base of perianth tube, subsessile; anthers nearly broadly ovate, 1.2–1.5 mm. Pistil 2.5–3 mm; stigma orbicular, 1.5–2.5 mm in diam., (4–)6-crenate at margin. Fl. Jul–Oct. $2n = 38$*.

• Moist places on hillsides, cliffs; ca. 400 m. N Guangdong (Renhua Xian), Guangxi, ?Guizhou, Hainan (Baoting Xian), Hong Kong, SW Hunan (Xinning Xian).

49. Aspidistra hekouensis H. Li et al., Sendtnera 5: 15. 1998.

河口蜘蛛抱蛋 he kou zhi zhu bao dan

Rhizome 6–13 mm thick. Leaves 2–4-tufted; petiole 10–18 cm; leaf blade dark green with pale green or yellowish spots, elliptic, 12–22 × 8–12.5 cm, leathery, base attenuate to obtuse and decurrent at petiole, apex cuspidate. Scape solitary, 3–4 cm; bracts ca. 3. Flower solitary. Perianth blackish purple, urceolate, 1.5–1.8 × 1.8–2.3 cm, with many deep, longitudinal grooves, adaxially smooth, abaxially slightly verrucose, 6-lobed apically; tube strongly constricted at mouth and opening 4–5 mm wide; lobes reflexed, yellow adaxially, oblong, 5–6 × ca. 3 mm. Stamens 6, inserted at base of perianth tube, positioned lower than stigma, subsessile; anthers oblong, ca. 2.5 mm. Stigma peltate, orbicular, large, 1.5–1.8 cm in diam., radiate rugose adaxially. Berry yellowish green, subglobose, ca. 1.5 cm in diam., with 12 longitudinal wings. Fl. Mar–Jul.

• Dense forests; 200–300 m. SE Yunnan (Hekou Yao Zu Zizhixian).

No material of this species has been seen by the present authors.

55. LIRIOPE Loureiro, Fl. Cochinch. 1: 190, 200. 1790.

山麦冬属 shan mai dong shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Herbs perennial, shortly rhizomatous, often stoloniferous. Roots sometimes with fleshy, tuberous part near tip. Leaves basal, tufted, sessile, grasslike or narrowly linear. Scape simple, naked, terminating in a reduced panicle. Flowers bisexual, often in clusters of 2–4, sometimes solitary, small, subtended by a bract and a few bracteoles; pedicel articulate. Tepals 6, free. Stamens 6, inserted at base of tepals; filaments narrowly linear; anthers basifixed. Ovary superior, 3-loculed; ovules 2 per locule. Style columnar, slightly 3-angled; stigma small. Fruit bursting irregularly at an early stage and exposing young seeds. Seeds deep blue to purple at maturity, berrylike, globose or ellipsoid.

About eight species, E Asia, extending to Japan, the Philippines, and Vietnam; six species (three endemic) in China.

1a. Filaments ca. 2 × as long as anthers; leaves 1–2 mm wide ..... 1. *L. kansuensis*
1b. Filaments equaling or slightly longer than anthers; leaves 2–35 mm wide.
2a. Plants not stoloniferous.
3a. Pedicel (5–)6–8 mm; anthers slightly shorter than filaments ..... 4. *L. longipedicellata*
3b. Pedicel (2–)4–5 mm; anthers equaling filaments ..... 6. *L. muscari*
2b. Plants stoloniferous.
4a. Anthers ca. 2 mm ..... 5. *L. spicata*
4b. Anthers 1–1.5 mm.
5a. Inflorescence 1–3 cm ..... 2. *L. minor*
5b. Inflorescence 6–15 cm ..... 3. *L. graminifolia*

1. Liriope kansuensis (Batalin) C. H. Wright, J. Linn. Soc., Bot. 36: 79. 1903.

甘肃山麦冬 gan su shan mai dong

Ophiopogon kansuensis Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 103. 1893; *Mondo kansuense* (Batalin) Farwell.

Roots without fleshy, tuberous part. Stolons creeping, slender. Leaves filiform-linear, 15–20 cm × 1–2 mm, 3-veined, margin revolute, serrulate. Scape ca. 25 cm. Inflorescence ca. 5.5 cm, 10–12-flowered; bracts setiform, scarious, basal one ca.

2.5 mm. Flowers solitary, sometimes paired; pedicel 5–6 mm, articulate near apex. Tepals purplish, oblong to elliptic-lanceolate, ca. 5 × 2 mm. Filaments filiform, ca. 2 mm; anthers ca. 1 mm. Ovary subglobose. Style ca. 2.8 mm, slender; stigma slightly 3-lobed. Fl. Jun.

• River banks, hillsides along streams. S Gansu, NW Sichuan.

2. Liriope minor (Maximowicz) Makino, Bot. Mag. (Tokyo) 7: 323. 1893.

矮小山麦冬 ai xiao shan mai dong

Ophiopogon spicatus (Thunberg) Ker Gawler var. *minor* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 15: 85. 1871; *Liriope cernua* (Koidzumi) Masamune; *L. graminifolia* (Linnaeus) Baker var. *minor* (Maximowicz) Baker; *L. spicata* (Thunberg) Loureiro var. *minor* (Maximowicz) C. H. Wright; *Mondo cernuum* Koidzumi; *M. tokyoense* Nakai.

Roots with fusiform, fleshy, tuberous part near tip. Stolons creeping, elongate, slender. Leaves narrowly linear, 7–20 cm × 2–3(–4) mm, 5-veined, basally surrounded by many membranous-margined sheaths. Scape 6–7(–15) cm, much shorter than leaves. Inflorescence 1–3(–5) cm, 5–12-flowered; bracts ovate-lanceolate, basal one ca. 4 mm, margin membranous. Flowers solitary, sometimes in clusters of 2 or 3; pedicel 3–4 mm. Tepals purplish, ovate-oblong, ca. 3.5 × 0.7 mm. Filaments ca. 1.5 mm; anthers ca. 1.5 mm. Style ca. 2 mm; stigma small. Seeds dark blue at maturity, subglobose, 4–5 mm in diam. Fl. Jun–Jul, fr. Aug–Sep. 2*n* = 36.

Forests, shady hillsides, grassy slopes; 600–2600 m. Fujian, Guangxi, Henan, Hubei, Jiangsu, Liaoning, Shaanxi, Sichuan, Taiwan, Zhejiang [Japan].

3. Liriope graminifolia (Linnaeus) Baker, J. Linn. Soc., Bot. 14: 538. 1875.

禾叶山麦冬 he ye shan mai dong

Asparagus graminifolius Linnaeus, Sp. Pl., ed. 2, 1: 450. 1762; *Dracaena graminifolia* (Linnaeus) Linnaeus; *Liriope angustissima* Ohwi; *L. crassiuscula* Ohwi; *Mondo graminifolium* (Linnaeus) Koidzumi.

Roots sometimes with fusiform, fleshy, tuberous part near tip. Stolons creeping, slender. Leaves narrowly linear, ca. 60 cm × 2–3(–4) mm, 5-veined, base surrounded by many sheaths and fibers, margin serrulate apically. Scape 20–50 cm. Inflorescence 6–15 cm, many flowered; bracts ovate, scarious, basal one 5–6 mm. Flowers in clusters of 2–4, sometimes solitary; pedicel ca. 4 mm, articulate near apex. Tepals white or purplish, suboblong, 3.5–4 × 1.5–1.8 mm. Filaments 1–1.5 mm, flat; anthers ca. 1 mm. Style ca. 2 mm; stigma as wide as style. Seeds blue-black at maturity, ovoid or subglobose, 4–5 mm in diam. Fl. Jun–Aug, fr. Sep–Nov. 2*n* = 36*, 72*, 108*.

• Forests, thickets, shady places along ravines, grassy and rocky places; near sea level to 2300 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Zhejiang.

4. Liriope longipedicellata F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 251. 1978.

长梗山麦冬 chang geng shan mai dong

Roots without fleshy, tuberous part. Stolons absent. Leaves glaucous abaxially, narrowly linear, 30–50 cm × (3–)4–5 mm, distinctly 5-veined abaxially, base surrounded by many brown, membranous sheaths, margin serrulate. Scape 30–60 cm. Inflorescence 7–12 cm, many flowered; bracts small, 1–2 mm. Flowers in clusters of 2–4; pedicel (5–)6–8 mm, articulate near or above middle. Tepals purplish red or purple, obovate or obovate-oblong, ca. 3 × 1.5 mm. Filaments ca. 1.2 mm, flat; anthers suboblong or ovate, ca. 1 mm. Style ca. 2 mm; stigma as wide as style. Seeds blackish purple at maturity, subglobose or globose-ellipsoid, 5–6 mm in diam. Fl. Jul, fr. Aug–Sep.

• Moist grasslands, shady and moist rocky places; 1400–2000 m. NE Sichuan.

5. Liriope spicata (Thunberg) Loureiro, Fl. Cochinch. 1: 201. 1790.

山麦冬 shan mai dong

Convallaria spicata Thunberg in Murray, Syst. Veg., ed. 14, 334. 1784; *Liriope spicata* var. *humilis* F. Z. Li; *L. spicata* f. *koreana* (Palibin) H. Hara; *L. spicata* var. *prolifera* Y. T. Ma; *Mondo fauriei* (H. Léveillé & Vaniot) Farwell; *Ophiopogon fauriei* H. Léveillé & Vaniot; *O. spicatus* (Thunberg) Ker Gawler; *O. spicatus* var. *koreanus* Palibin.

Roots usually with fusiform, fleshy, tuberous part near tip. Stolons creeping, slender. Leaves glaucous abaxially, narrowly linear, 25–60 cm × 4–8 mm, distinctly 5-veined abaxially, base surrounded by many brownish sheaths, margin serrulate. Scape 25–65 cm. Inflorescence 6–15(–20) cm, many flowered; bracts lanceolate, basal one 5–6 mm. Flowers in clusters of (2 or)3–5; pedicel ca. 4 mm, articulate distally. Tepals purplish or bluish, suboblong, 4–5 × 2–2.5 mm. Filaments ca. 2 mm; anthers ca. 2 mm. Style ca. 2 mm; stigma as wide as style. Seeds subglobose, ca. 5 mm in diam. Fl. May–Jul, fr. Aug–Oct. 2*n* = 36, 72*, (88*), 90*, 108*.

Forests, grassy slopes, hillsides, moist places; near sea level to 1800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Vietnam].

Widely cultivated in China for its tuberous roots, which are used medicinally.

6. Liriope muscari (Decaisne) L. H. Bailey, Gentes Herb. 2: 35. 1929.

阔叶山麦冬 kuo ye shan mai dong

Ophiopogon muscari Decaisne, Fl. Serres Jard. Eur. 17: 181. 1867–1868; *Liriope graminifolia* (Linnaeus) Baker var. *densifolia* Maximowicz ex Baker; *L. muscari* var. *communis* (Maximowicz) P. S. Hsu & L. C. Li; *L. platyphylla* F. T. Wang & Tang; *L. spicata* (Thunberg) Loureiro var. *densifolia* (Maximowicz ex Baker) C. H. Wright; *L. spicata* var. *latifolia* Franchet; *L. yingdeensis* R. H. Miao; *O. spicatus* (Thunberg) Ker Gawler var. *communis* Maximowicz.

Roots sometimes with fleshy, tuberous part near tip. Stolons absent. Leaves linear to narrowly so, (12–)25–65 × (0.2–)0.8–2(–3.5) cm, stiff, (5–)9–11-veined. Scape (12–)45–100 cm. Inflorescence (2–)8–45 cm, many flowered; bracts setiform, 3–4 mm; bracteoles ovate. Flowers in clusters of (3 or)4–8; pedi-

cel (2–)4–5 mm, articulate near middle. Tepals purple or lilac-purple, elliptic-oblong, 3.5–4 × 1.5–1.8 mm. Filaments ca. 1.5 mm; anthers equaling filaments. Style ca. 2 mm; stigma small, slightly 3-lobed. Seeds blackish purple at maturity, globose, 6–7 mm in diam. Fl. Jul–Aug, fr. Sep–Oct. 2*n* = 36*, 72*, 108, (112*).

Forests, bamboo forests, scrub, shady and moist places in ravines and on slopes; 100–1400(–2000) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Zhejiang [Japan].

56. OPHIOPOGON Ker Gawler, Bot. Mag. 27: t. 1063. 1807, nom. cons.

沿阶草属 yan jie cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Chloopsis Blume; *Flueggea* Richard (1807), not Willdenow (1806); *Mondo* Adanson, nom. rej.; *Slateria* Desvaux.

Herbs perennial, rhizomatous, sometimes stoloniferous. Roots occasionally woody or with fleshy, tuberous part near tip. Stem suberect or prostrate, usually simple, elongate or short, sometimes indistinct. Leaves basal or cauline, alternate, tufted or scattered, sessile or petiolate, linear to oblong, usually whitish streaked abaxially. Scape arising from a leaf axil. Inflorescence a raceme or reduced panicle, rarely a panicle, several to many flowered; bracts small. Flowers bisexual, campanulate to opening flat, usually nodding; pedicel articulate. Tepals 6, free, deciduous or persistent in fruit. Stamens 6, inserted at base of tepals; filaments usually very short; anthers basifixed, sometimes connate. Ovary semi-inferior, 3-loculed; ovules 2(–6) per locule, basal. Style 1, columnar; stigma capitate, small. Fruit bursting irregularly at an early stage and exposing young seeds. Seeds usually blue at maturity, berrylike.

About 65 species: warm-temperate, subtropical, and tropical Asia; 47 species (38 endemic) in China.

Several species with elongate stems bearing distant tufts of leaves were recently described. They have not yet been well studied, and are here treated provisionally as different species, although future research is needed to clarify their exact circumscription.

1a. Inflorescence a panicle ..... 47. *O. paniculatus*
1b. Inflorescence a raceme or reduced panicle.
2a. Stem elongate, not rhizomelike, with spaced nodes; leaves in distant tufts (rarely in a single, subterminal tuft) or laxly scattered.
3a. Leaves laxly scattered.
4a. Raceme 5–10-flowered; bracts white, basal one ca. 6 mm; pedicels articulate proximally; tepals white or purplish, ca. 5 mm ..... 14. *O. chingii*
4b. Raceme ca. 60-flowered; bracts pale green, basal one ca. 6 cm; pedicels articulate distally; tepals salmon pink, ca. 3.5 mm ..... 15. *O. filipes*
3b. Leaves in distant tufts, rarely in a single, subterminal tuft.
5a. Stem with a single, subterminal tuft of leaves ..... 23. *O. hongjiangensis*
5b. Stem with distant tufts of leaves.
6a. Leaves distinctly petiolate.
7a. At least some flowers in clusters of 2 or 3 ..... 2. *O. dracaenoides*
7b. Flowers all solitary.
8a. Anthers 2–4 mm, much shorter than tepals.
9a. Stem covered with purple-brown or deep brown sheaths; leaf blade 15–30 mm wide ..... 1. *O. sarmentosus*
9b. Stem covered with greenish to grayish sheaths; leaf blade 4–8 mm wide ..... 5. *O. sylvicola*
8b. Anthers 6–7 mm, slightly shorter than or nearly as long as tepals.
10a. Anthers free; tepals spreading ..... 3. *O. tienensis*
10b. Anthers connate; tepals revolute ..... 4. *O. heterandrus*
6b. Leaves basally attenuate, indistinctly petiolate or subsessile.
11a. Inflorescence densely 110–180-flowered; anthers connate, ca. 1/2 as long as style ..... 8. *O. multiflorus*
11b. Inflorescence laxly several to 60-flowered; anthers free, slightly shorter than or equaling style.
12a. Bracts nearly as long as pedicels.
13a. Leaves 3–4 mm wide; pedicels articulate near middle ..... 7. *O. reptans*
13b. Leaves 7–16 mm wide; pedicels articulate proximally.
14a. Scape and inflorescence (20–)30–45 cm; bracts linear-lanceolate ..... 10. *O. motouensis*
14b. Scape and inflorescence ca. 12 cm; bracts ovate to ovate-lanceolate ..... 11. *O. menglianensis*
12b. Bracts much longer than pedicels.
15a. Tepals white, 7.5–9 mm ..... 6. *O. yunnanensis*
15b. Tepals purplish, 2.5–7 mm.
16a. Tepals ca. 2.5 mm; pedicel 2–3 mm ..... 9. *O. tsaii*
16b. Tepals 4.8–7 mm; pedicel 6–9 mm.
17a. Plants to 70 cm tall; tepals 4.8–5 mm ..... 12. *O. jiangchengensis*

17b. Plants less than 40 cm tall; tepals ca. 7 mm ..... 13. *O. albimarginatus*

2b. Stem indistinct or rhizomelike, with dense nodes; leaves somewhat crowded, densely scattered, or tufted.

18a. Stem rhizomelike, with dense nodes; leaves subterminal, somewhat crowded or densely arranged.

19a. Plants stoloniferous.

20a. Anthers free; leaves 8–24 mm wide; pedicel 3–4 mm ..... 16. *O. amblyphyllus*

20b. Anthers connate; leaves 3–7 mm wide; pedicel 8–10 mm ..... 17. *O. angustifoliatus*

19b. Plants not stoloniferous.

21a. Roots somewhat stiltlike, straight, 3–5 mm thick, stiff, ± woody, glabrescent.

22a. Leaves 4–6 mm wide; pedicel shorter than tepals ..... 18. *O. fooningensis*

22b. Leaves at least partly more than 10 mm wide; pedicel longer than tepals.

23a. Pedicel much longer than bracts, articulate proximally; inflorescence 5–6 cm ..... 19. *O. platyphyllus*

23b. Pedicel shorter than or equaling bracts, articulate distally; inflorescence 10–20 cm ..... 20. *O. latifolius*

21b. Roots not stiltlike, 1–2.5 mm thick, soft, not woody, usually densely hairy.

24a. Anthers free.

25a. Leaves 2–3 mm wide; flowers solitary ..... 27. *O. lushuiensis*

25b. Leaves (4–)7–14 mm wide; at least some flowers paired.

26a. Bract at base of inflorescence 2–4 cm; style ca. 7 mm ..... 21. *O. grandis*

26b. Bract at base of inflorescence 5–7 mm; style ca. 2.5 mm ..... 22. *O. mairei*

24b. Anthers connate.

27a. Anthers 6.5–7 mm; flowers all solitary ..... 28. *O. szechuanensis*

27b. Anthers 2.5–3(–4.5) mm; at least some flowers paired.

28a. Bract at base of inflorescence much shorter than pedicels ..... 26. *O. sinensis*

28b. Bract at base of inflorescence nearly as long as or much longer than pedicels.

29a. Filaments ca. 1 mm; bract at base of inflorescence nearly as long as pedicels ..... 24. *O. stenophyllus*

29b. Filaments indistinct; bract at base of inflorescence much longer than pedicels ..... 25. *O. bockianus*

18b. Stem indistinct; leaves basal or nearly so, tufted.

30a. Leaves oblong to oblanceolate, distinctly petiolate.

31a. Plants stoloniferous; filaments ca. 2 mm; pedicel articulate near apex ..... 30. *O. clavatus*

31b. Plants not stoloniferous; filaments less than 1 mm; pedicel articulate proximally or near middle.

32a. Leaves with pinnate-parallel venation, 4(–6) lateral veins running from midvein, margin ± wrinkled ..... 29. *O. peliosanthoides*

32b. Leaves with parallel venation, veins running from base, margin not wrinkled.

33a. Roots somewhat stiltlike, straight, 3–5 mm thick, stiff, ± woody, not hairy ..... 35. *O. xylorrhizus*

33b. Roots not stiltlike, 1–2 mm thick, soft, not woody, usually hairy.

34a. Inflorescence a raceme, several flowered; flowers solitary; tepals 8–11 mm; anthers ca. 6 mm ..... 31. *O. pingbienensis*

34b. Inflorescence a reduced panicle, 10–35-flowered; at least some flowers in clusters of 2 or 3; tepals 4–8 mm; anthers 3–4 mm.

35a. Tepals oblong-lanceolate, ca. 8 mm; style ca. 8 mm ..... 34. *O. marmoratus*

35b. Tepals ovate to oblong, 4–5 mm; style 3.5–5 mm.

36a. Tepals reflexed distally, white; anthers connate; leaves 1–2.2 cm wide, papery ..... 33. *O. pseudotonkinensis*

36b. Tepals erect, purplish; anthers free; leaves 2.5–3.5(–4.2) cm wide, leathery ..... 32. *O. tonkinensis*

30b. Leaves grasslike or linear, indistinctly petiolate or sessile.

37a. Plants stoloniferous.

38a. Tepals 7–8 mm; filaments distinct, ca. 1.5 mm, ca. 1/3 as long as anthers ..... 46. *O. clarkei*

38b. Tepals 4–6 mm; filaments very short or indistinct.

39a. Style terete, slender, basally not widened; tepals ± spreading; scape and inflorescence usually slightly shorter than leaves ..... 44. *O. bodinieri*

39b. Style somewhat narrowly conical, moderately thick, basally widened; tepals scarcely spreading; scape and inflorescence usually much shorter than leaves ..... 45. *O. japonicus*

37b. Plants not stoloniferous.

40a. Rhizome gingerlike, ca. 3 cm thick, fleshy ..... 36. *O. zingiberaceus*

40b. Rhizome not gingerlike, much thinner.

41a. Leaves 1–1.5 mm wide ..... 43. *O. umbraticola*

41b. Leaves (2–)3–25 mm wide.

42a. Plants basally ± purple-brown; roots yellow-brown hairy; bracts at middle of inflorescence more than 1 cm ..... 37. *O. megalanthus*

42b. Plants basally not purple-brown; roots whitish hairy; bracts at middle of inflorescence less than 1 cm.

43a. Anthers 3–4 mm, ca. 1/2 as long as tepals.
44a. Style basally widened, without a clear line of demarcation between ovary and style ..... 42. *O. reversus*
44b. Style not basally widened, terete, with a clear line of demarcation between ovary and style ..... 41. *O. intermedius*
43b. Anthers 7–8 mm, ca. 2/3 as long as or equaling tepals.
45a. Filaments very short or indistinct; tepals revolute; pedicels articulate near base ..... 38. *O. revolutus*
45b. Filaments distinct, 1–2 mm; tepals spreading; pedicels articulate near or above middle.
46a. Leaves 10–15 mm wide, white streaked abaxially; flowers in clusters of 2–4; anthers free ..... 39. *O. corifolius*
46b. Leaves 4–7(–9) mm wide, not streaked abaxially; flowers solitary; anthers initially connate, later free ..... 40. *O. sparsiflorus*

1. Ophiopogon sarmentosus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 251. 1978.

匍茎沿阶草 pu jing yan jie cao

Stem prostrate, elongate, 3–4 mm thick, slender, with spaced nodes, covered with purple-brown or deep brown, membranous sheaths. Leaves cauline, in distant tufts, 5 or 6 per tuft; petiole 4–11 cm; leaf blade glaucous abaxially, oblong to oblong-elliptic, 5–10 × 1.5–3 cm, apex subacute. Scape arising from an apical leaf axil, 7–10 cm. Inflorescence a raceme, 5- or 6-flowered; bracts lanceolate, basal one 7–10 mm. Flowers solitary; pedicel 7–10 mm, articulate proximally. Tepals purplish, lanceolate to ovate, 7–8 × 2–4 mm. Filaments very short; anthers free, ca. 4 mm. Style nearly exceeding perianth, slender. Seeds ellipsoid, ca. 8 mm in diam. Fl. Aug, fr. Sep–Oct. 2*n* = 36*.

• Dense tropical forests, evergreen broad-leaved forests, river banks; 1000–2700 m. NW Guangxi (Tian'e Xian), S Yunnan [?Vietnam].

This species probably also occurs in Vietnam: one locality is on the border between Yunnan and Vietnam.

2. Ophiopogon dracaenoides (Baker) J. D. Hooker, Fl. Brit. India 6: 268. 1892.

褐鞘沿阶草 he qiao yan jie cao

Flueggea dracaenoides Baker, J. Bot. 12: 174. 1874; *Mondo dracaenoides* (Baker) Farwell.

Stem suberect, elongate, covered with grayish brown sheaths, sometimes with several stiltlike, woody roots near base. Leaves in distant tufts, 4–7 per tuft; petiole 2–7 cm; leaf blade oblong to oblong-oblanceolate, 5.5–14 × 1.8–3.5 cm. Scape arising from an apical leaf axil, 8–12 cm. Inflorescence a reduced panicle, 10–25-flowered; bracts ovate-lanceolate, basal one 0.8–1.2 cm. Flowers solitary or in clusters of 2 or 3; pedicel 4–6 mm, articulate at middle. Tepals white, lanceolate to ovate-lanceolate, 4–6 × 1.5–2.5 mm. Filaments very short; anthers ca. 2.5 mm. Style slightly or scarcely exceeding perianth. Seeds broadly ellipsoid, ca. 1.2 cm in diam. Fl. Aug, fr. Sep–Oct. 2*n* = 36*.

Evergreen broad-leaved forests, bamboo forests, moist places in forests, hillsides along ravines; 200–1800 m. W Guangxi, Guizhou, S Yunnan [NE India, Laos, Sikkim, N Thailand, Vietnam].

3. Ophiopogon tienensis F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 283. 1937.

云南沿阶草 yun nan yan jie cao

Ophiopogon lancangensis H. Li & Y. P. Yang.

Stem prostrate, elongate, 2–4 mm thick, with some aerial roots. Leaves in distant tufts, 3–9 per tuft; petiole (5–)8–18 cm; leaf blade abaxially glaucous, lanceolate to oblong-lanceolate, 7–20 × 0.8–1.5 cm, ca. 11-veined, apex acute or acuminate. Scape arising from an apical leaf axil, 7–12 cm. Inflorescence a raceme, several to 20-flowered; bracts ovate to ovate-lanceolate, 3–12 mm, membranous. Flowers solitary; pedicel 6–10 mm, articulate proximally. Tepals chalk white, ovate to ovate-lanceolate, 8–9 × 2.5–3 mm. Filaments ca. 1 mm; anthers free, 6–7 mm. Style nearly as long as anthers. Seeds ellipsoid, 8–10 mm in diam. Fl. May–Jun, fr. Jul–Aug. 2*n* = 36*.

• Mixed forests, bamboo forests; 1700–2500 m. Guangxi, Yunnan.

4. Ophiopogon heterandrus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 251. 1978.

异药沿阶草 yi yao yan jie cao

Stem prostrate, elongate, 2–3 mm thick, covered with grayish, membranous sheaths, proximally with some aerial roots. Leaves in distant tufts, 2–4 per tuft; petiole 5–8 mm; leaf blade abaxially glaucous, oblong to narrowly so, 4.5–6.5 × 1–1.6 cm, ca. 7-veined. Scape arising from an apical leaf axil. Inflorescence a raceme, 3- or 4-flowered; bracts lanceolate, basal one 3–4 mm. Flowers solitary; pedicel 6–8 mm, articulate at or below middle. Tepals revolute, white, lanceolate, 7–8 × 1.5–2.5 mm. Filaments very short; anthers lanceolate, ca. 7 mm, connate to form a cone. Style slightly longer than anthers. Fl. Jul.

• Forests; 1200–1700 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan.

5. Ophiopogon sylvicola F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 281. 1937.

林生沿阶草 lin sheng yan jie cao

Ophiopogon dielsianus Handel-Mazzetti.

Stem elongate, 3–4 mm thick, covered with grayish sheaths, proximally with some aerial roots. Leaves in distant tufts, 5–8 per tuft; petiole 1.5–5(–10) cm; leaf blade abaxially glaucous, narrowly oblanceolate to linear-lanceolate, 5–20(–30) cm × 4–8 mm, 5–7-veined. Scape arising from an apical leaf axil. Inflorescence a raceme, 4–10-flowered; bracts lanceolate,

basal one 6–8 mm. Flowers solitary; pedicel 4–6 mm, articulate proximally. Tepals bluish, ovate, ca. 5 × 2.5–3 mm. Filaments ca. 0.5 mm; anthers ca. 2 mm. Style ca. 2 × as long as anthers, slender. Fl. Jun. 2*n* = 36*.

• Broad-leaved forests, scrub forests, streamsides, moist and shady places, cliffs; 700–1800 m. N Guizhou, S Sichuan.

6. Ophiopogon yunnanensis S. C. Chen, Acta Phytotax. Sin. 26: 140. 1988.

滇西沿阶草 dian xi yan jie cao

Stem elongate, subterete, 5–7 mm thick, covered with grayish sheaths, with some aerial roots. Leaves in distant tufts 3–4 cm apart, 9–11 per tuft, sessile, long linear, 40–50 cm × 5–9 mm, base somewhat equitant, margin membranous. Scape arising from an apical leaf axil, 17–22 cm. Inflorescence a reduced panicle, more than 10-flowered; bracts lanceolate to linear-lanceolate, 1–2 cm. Flowers paired, rarely also solitary; pedicel much shorter than the bracts, articulate proximally. Tepals white, oblong to subovate, 7.5–9 × 3–5 mm, inner ones slightly wider than outer. Filaments very short; anthers ca. 5 mm. Style slightly exceeding anthers, slender. Fl. Jun.

• Forests along rivers; 1700–2200 m. W Yunnan (Lushui Xian).

7. Ophiopogon reptans J. D. Hooker, Fl. Brit. India 6: 268. 1892.

蔓茎沿阶草 man jing yan jie cao

Mondo dracaenoides (Baker) Farwell var. *reptans* (J. D. Hooker) Farwell.

Stem prostrate, elongate, sometimes with a few somewhat stiltlike roots. Leaves in distant tufts, subsessile, abaxially glaucous, long linear, 10–15 cm × 3–4 mm, ca. 5-veined, margin membranous at base. Scape arising from an apical leaf axil, 4–8 cm, slender. Inflorescence a reduced panicle, several flowered; bracts ovate-lanceolate, 4–6 mm, membranous. Flowers solitary or paired; pedicel 5–8 mm, articulate near middle. Tepals greenish yellow, lanceolate, 5–6 × 1.5–2 mm. Filaments very short; anthers ca. 3 mm. Style nearly as long as anthers. Seeds subglobose, 4–5 mm in diam. Fl. Jun–Jul, fr. Aug. 2*n* = 36.

Forests, sandy soil along streams; 1300–1800 m. SW Guangxi, Hainan [India, Thailand, Vietnam].

8. Ophiopogon multiflorus Y. Wan, Guihaia 8: 235. 1988.

隆安沿阶草 long an yan jie cao

Stem prostrate, distally ascending, elongate, 1–2 cm thick, with a few woody roots. Leaves in distant tufts, indistinctly petiolate, abaxially longitudinally grayish streaked, grasslike, 35–80 × 1.3–2.6 cm, base attenuate, margin membranous. Scape 1(or 2) arising from apical leaf axils. Inflorescence a reduced panicle, densely 110–180-flowered; bracts ovate-lanceolate to lanceolate, basal one 2–3(–5) cm. Flowers usually in clusters of 2–6; pedicel 1.2–1.8 cm, articulate near middle. Tepals recurved, purplish blue, ovate, ca. 6 × 2.5 mm. Filaments very short; anthers 2.5–3 mm, connate. Style ca. 5 mm. Seeds ellipsoid, ca. 13 × 9 mm. Fl. Oct, fr. Nov.

• Forests on rocky slopes. WC Guangxi (Long'an Xian).

9. Ophiopogon tsaii F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 282. 1937.

簇叶沿阶草 cu ye yan jie cao

Stem prostrate, distally ascending, elongate, ca. 4 mm thick, covered with grayish brown sheaths, proximally with some white-hairy roots. Leaves in distal tufts, 8–12 per tuft, sessile, grasslike, 4–35 cm × 4–6 mm, margin membranous at base. Scape arising from an apical leaf axil, 13–19 cm. Inflorescence a reduced panicle, 10–25-flowered; bracts setiform, ca. 1 cm, basal one to 3.5 cm. Flowers solitary or in clusters of 2–4; pedicel 2–3 mm. Tepals purplish, oblong to subelliptic, ca. 2.5 × 1.5 mm. Filaments short; anthers ca. 2 mm. Style ca. 3 mm, slender. Seeds ellipsoid to globose, 8–10 mm in diam. Fl. Jun–Jul, fr. Aug–Oct. 2*n* = 36*.

• Forests, hillsides along ravines; 800–1800 m. S Yunnan.

10. Ophiopogon motouensis S. C. Chen, Acta Phytotax. Sin. 17(4): 111. 1979.

墨托沿阶草 mo tuo yan jie cao

Stem prostrate, distally usually suberect, occasionally branched, elongate, 10–30 cm × 4–8 mm, covered with purplish brown sheaths. Leaves in distant tufts 5–10 cm apart, usually 4–8 per tuft, sessile, long linear, 40–60 × 0.7–1.2 cm, 9–15-veined, base somewhat distichous equitant, margin purplish brown at base. Scape arising from an apical leaf axil, (20–)30–45 cm. Inflorescence a reduced panicle, more than 10-flowered; rachis slightly flat and narrowly 2-winged; bracts linear-lanceolate, 5–9 mm. Flowers usually paired; pedicel 5–9 mm, articulate proximally. Tepals white, narrowly ovate to oblong-lanceolate, 8–9 × 1.5–3 mm. Filaments very short; anthers 6–7 mm. Style 6–8 mm, slender. Fl. Aug.

• Forests, shady places; 800–1700 m. SE Xizang (Mêdog Xian).

11. Ophiopogon menglianensis H. W. Li, Acta Bot. Yunnan. 13: 268. 1991.

勐连沿阶草 meng lian yan jie cao

Stem ± prostrate, elongate, subterete, 5–7 mm thick, covered with sheaths and with a few roots. Leaves in distant tufts 4–5 cm apart, 7–9 per tuft, sessile, adaxially green, abaxially glaucescent, long linear, 28–40 × (0.7–)1–1.6 cm, base somewhat distichous equitant, margin membranous at base, apex acuminate. Scape arising from an apical leaf axil, ca. 6 cm, slightly compressed, wingless. Inflorescence a reduced panicle, ca. 6 cm; bracts ovate to ovate-lanceolate, 5–7 mm, base ca. 5 mm wide, apex acuminate to long acuminate. Flowers often in clusters of 3 or 4; pedicel less than 8 mm, articulate proximally. Tepals white, subovate, ca. 7 × 3 mm.

• Forests; ca. 1000 m. SW Yunnan (Menglian Dai-Lahu-Va Zu Zizhixian).

12. Ophiopogon jiangchengensis Y. Y. Qian, Acta Bot. Austro Sin. 7: 14. 1991.

江城沿阶草 jiang cheng yan jie cao

Stem erect, rarely prostrate, elongate, 2.5–4 mm thick, covered with sheaths and with a few woody, striate, densely

pubescent roots 3–4 mm thick. Leaves in distant tufts 5–7 cm apart, 4–14 per tuft, indistinctly petiolate (petiole 1–10 cm), adaxially deep green, abaxially gray-green or whitish streaked, long linear, 5–35 cm × 4–8(–11) mm, papery, base attenuate, sheathing, margin membranous at base, apex acuminate. Scape arising from an apical leaf axil, deep violet, 8–20 cm, slightly compressed, furrowed. Inflorescence a reduced panicle, 4–12 cm, 20–60-flowered; bracts ovate-lanceolate, basal one 1–2 cm. Flowers in clusters of 2–5, campanulate, 8–11 mm in diam.; pedicel 6–8 mm, articulate near middle. Tepals pale violet, ovate, 4.8–5 × 3–3.2 mm, apex slightly revolute. Filaments 0.2–0.3 mm; anthers narrowly ovate-deltoid, 3.5–4 × ca. 1.5 mm, free. Style 4–4.5 mm. Seeds pale violet at maturity, ellipsoid, 7–10 × 5–7 mm. Fl. Aug–Sep, fr. Oct–Feb.

• Forests; 300–1300 m. S Yunnan (Jiangcheng Hani-Yi Zu Zizhixian).

This species is similar to *Ophiopogon siamensis* M. N. Tamura (Acta Phytotax. Geobot. 49: 27. 1998), from N Thailand, but differs in having longer bracts and shorter filaments and style. *Ophiopogon siamensis* has bracts less than 1 cm, filaments 0.7–1.1 mm, and style 5–5.4 mm. Further studies are needed to ascertain whether or not these two species are really distinct.

13. Ophiopogon albimarginatus D. Fang, J. Trop. Subtrop. Bot. 6: 97. 1998.

白边沿阶草 bai bian yan jie cao

Stem prostrate proximally and erect distally, or wholly decumbent, elongate, terete, 13–22 cm × 2–5 mm, covered with sheaths and with a few roots (1–)2–3 mm thick. Leaves in distant tufts, indistinctly petiolate, long linear to narrowly elliptic-linear, 14–30 cm × 6–11 mm, 5–9-veined, base slightly attenuate, apex acuminate. Scape arising from an apical leaf axil, slightly compressed, narrowly 2-winged. Inflorescence a reduced panicle, 4.5–6.5 cm, 14–18-flowered; bracts linear-lanceolate to narrowly ovate, basal one ca. 2 cm, base 3–5 mm wide, membranous. Flowers in clusters of 2 or 3; pedicel 6–9 mm, shorter than bracts, articulate proximally or near middle. Tepals reflexed distally, purple with white margin, narrowly ovate to lanceolate, ca. 7 × 2.3 mm, apex obtuse. Seeds broadly ellipsoid, 8–11 × 5–8 mm.

• Valley forests; ca. 300 m. E Guangxi (He Xian).

The present authors have not seen flowers of this species. Judging from the characteristics of the vegetative organs, it is similar to *Ophiopogon jiangchengensis*. Detailed observation of the flowers is necessary in order to ascertain whether or not the two species are really distinct.

14. Ophiopogon chingii F. T. Wang & Tang, Bull. Fan Mem. Inst. Biol. 7: 282. 1937.

长茎沿阶草 chang jing yan jie cao

Ophiopogon chingii var. *glaucifolius* F. T. Wang & L. K. Dai.

Stem prostrate, distally ± ascending, sometimes branched, elongate, 2–5 mm thick, proximally with stiff, somewhat woody roots. Leaves scattered, subsessile, abaxially glaucous, sword-shaped, 7–20 cm × 3–8(–20) mm, 5–9-veined, base clasping, margin membranous at base. Scape arising from a distal leaf axil, 8–15 cm. Inflorescence a reduced panicle, 5–10-flowered; bracts white, ovate to lanceolate, scarious, basal one ca. 6 mm. Flowers solitary or in clusters of 2–4; pedicel 6–12 mm, articulate proximally. Tepals white or purplish, oblong to ovate-oblong, ca. 5 × 2 mm. Filaments ca. 1 mm; anthers ca. 2 mm. Style 3–4 mm. Fl. May–Jul. 2*n* = 36*.

• Dense evergreen broad-leaved forests, bamboo forests, thickets, rocky and moist places; 700–2100 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan.

15. Ophiopogon filipes D. Fang, J. Trop. Subtrop. Bot. 6: 98. 1998.

丝梗沿阶草 si geng yan jie cao

Stem decumbent, elongate, terete, more than 19 cm × 3–5 mm, proximally with dense, residual sheaths. Leaves scattered distally on stem, sessile, long linear, 16–24 cm × 2.5–5 mm, 5- or 6-veined, base not attenuate, apex acuminate. Scape arising from an apical leaf axil, ca. 5 cm. Inflorescence a reduced panicle, ca. 12 cm, ca. 60-flowered; bracts pale green, linear-lanceolate to narrowly deltoid, basal one ca. 6 cm, base ca. 2 mm wide. Flowers in clusters of 2–4; pedicel filiform, 13–15 mm, articulate distally. Tepals salmon pink, ovate to narrowly so, ca. 3.5 × 2–2.5 mm, apex obtuse. Filaments very short; anthers narrowly ovate, ca. 2.5 mm, free. Style ca. 4 mm. Fl. Oct.

• Limestone hills. SW Guangxi (Daxin Xian).

16. Ophiopogon amblyphyllus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 251. 1978.

钝叶沿阶草 dun ye yan jie cao

Stem rhizomelike, terete, elongate, stout, with dense nodes and several creeping stolons. Leaves nearly crowded and subterminal; petiole 3–6 cm; leaf blade abaxially glaucous, oblanceolate-oblong to suboblanceolate, 6–8 × 0.8–2.4 cm, apex subrounded or obtuse. Scape 9–15 cm. Inflorescence a raceme or a reduced panicle, 5–8 cm, several to 15-flowered; bracts lanceolate, basal one 5–8 mm. Flowers solitary or rarely paired; pedicel 3–4 mm, articulate near middle. Tepals purple, ovate, ca. 4 × 2 mm. Filaments short, less than 1 mm; anthers ca. 1.5 mm. Style ca. 3 mm. Seeds ellipsoid, ca. 9 mm. Fl. Jul, fr. Aug–Sep. 2*n* = 108*.

• Forests, shady and humid places, hillsides; 1600–2200 m. S Sichuan, NW Yunnan.

17. Ophiopogon angustifoliatus (F. T. Wang & Tang) S. C. Chen, Acta Phytotax. Sin. 26: 141. 1988.

短药沿阶草 duan yao yan jie cao

Ophiopogon bockianus Diels var. *angustifoliatus* F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 252. 1978.

Stem rhizomelike, elongate, subterete, 4–6 mm thick, stout, with dense nodes, stoloniferous. Leaves nearly crowded and subterminal, long linear, 15–25 cm × 3–7 mm. Scape 5–15 cm. Inflorescence a raceme, usually 3–6-flowered; bracts lanceolate, 6–9 mm. Flowers solitary; pedicel 8–10 mm, articulate near middle. Tepals subovate, 7–8 × 3–3.5 mm. Filaments very short; anthers 3.5–4 mm, connate to form a cone. Style 6–7.5 mm, slender. Seeds globose, 5–7 mm. Fl. Jul–Aug, fr. Sep–Oct.

$2n = 36^*, 72^*$.

• Dense forests, mossy forests, hillsides, valleys, stream banks, moist and shady places; 800–3200 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, NW Yunnan (Weixi Xian).

18. Ophiopogon fooningensis F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 252. 1978.

富宁沿阶草 fu ning yan jie cao

Stem rhizomelike, elongate, stout, with dense nodes, usually with somewhat woody, white-hairy roots. Leaves somewhat crowded and subterminal, abaxially slightly glaucous, grasslike, 30–50 cm × 4–6 mm, 7–9-veined, margin serrulate, white membranous at base. Scape arising from an apical leaf axil, much shorter than leaves. Inflorescence a reduced panicle, 10–22-flowered; bracts ovate-lanceolate to lanceolate, basal one ca. 6 mm. Flowers solitary or paired; pedicel ca. 4 mm, articulate distally. Tepals purplish, oblong to ovate-lanceolate, ca. 6 × 2 mm. Filaments distinct, ca. 1 mm; anthers ca. 4 mm. Style ca. 4.5 mm, slender. Fl. May. $2n = 36^*$.

• Evergreen broad-leaved forests; 1000–1600 m. SE Yunnan.

One of us (Tamura) has never seen specimens of this species and, therefore, does not know the exact characteristics of the stem. If the stem is not rhizomelike and the leaves are not only tufted subterminally but also at distant nodes along the stem, then *Ophiopogon fooningensis* is similar to *O. siamensis* M. N. Tamura (Acta Phytotax. Geobot. 49: 27. 1998), from N Thailand. However, *O. fooningensis* flowers in May, whereas *O. siamensis* flowers in September and October.

19. Ophiopogon platyphyllus Merrill & Chun, Sunyatsenia 2: 211. 1935.

宽叶沿阶草 kuan ye yan jie cao

Ophiopogon hainanensis Masamune.

Stem rhizomelike, elongate, stout, with dense nodes and somewhat woody roots. Leaves somewhat crowded and subterminal, subsessile, abaxially glaucous, linear-lanceolate, (24–)40–55 × 1.8–2.2 cm, leathery, margin membranous at base. Scape 12–16 cm. Inflorescence a reduced panicle, ca. 6 cm, 20–26-flowered; bracts ovate, basal one ca. 7 mm. Flowers usually in clusters of 2–4; pedicel 7–9 mm, articulate proximally. Tepals white, lanceolate to narrowly so, ca. 7 × 1.5–2 mm. Filaments very short; anthers ca. 6 mm. Style ca. 6 mm. Seeds oblong, ca. 11 × 5 mm. Fl. May–Jun, fr. Jul–Aug.

• Forest, hillsidess, stream banks; 600–1800 m. Guangdong, Guangxi, Hainan.

20. Ophiopogon latifolius L. Rodriguez, Bull. Soc. Bot. France 75: 998. 1928.

大叶沿阶草 da ye yan jie cao

Stem rhizomelike, elongate, stout, with dense nodes and somewhat woody roots. Leaves somewhat crowded and subterminal, sessile, grasslike, 55–100 × 1–2.7 cm, leathery. Scape 40–45 cm. Inflorescence a reduced panicle, 10–20(–25) cm, many flowered; bracts lanceolate to subulate, basal one 1–1.5 cm. Flowers in clusters of 3 or 4; pedicel ca. 1 cm, articulate distally. Tepals bluish, 5–6 mm, outer ones lanceolate, inner ones ovate. Filaments very short; anthers ca. 3 mm. Style longer than anthers, apically curved. Seeds subglobose. Fl. Aug. $2n = 36^*$.

Forests, moist places along valleys; 100–1200 m. Guangxi, SE Yunnan [Vietnam].

21. Ophiopogon grandis W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 171. 1921.

大沿阶草 da yan jie cao

Stem rhizomelike, elongate, 4–10 mm thick, stout, with dense nodes and relatively slender, hairy roots. Leaves somewhat crowded and subterminal, grasslike, 25–55 cm × (4–)7–11 mm, 5–9-veined, margin distinctly denticulate, white membranous at base. Scape 15–20 cm. Inflorescence a reduced panicle, 7–8 mm, many flowered; bracts lanceolate to subulate, broadly membranous at margin, basal one 2–4 cm. Flowers usually paired; pedicel 3–5 mm, articulate near middle. Tepals white, ovate to ovate-lanceolate, 8–9 × 2–2.5 mm, inner ones slightly narrower than outer. Filaments distinct, ca. 1 mm; anthers 4–6 mm. Style ca. 7 mm. Seeds ellipsoid, ca. 9 mm in diam. Fl. Jun–Jul, fr. Aug–Sep.

• Forests; 1800–2800 m. Guizhou, Yunnan.

22. Ophiopogon mairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 9: 78. 1910.

西南沿阶草 xi nan yan jie cao

Anemarrhena mairei (H. Léveillé) H. Léveillé.

Roots numerous, long, soft, usually with fusiform, tuberous part near tip. Stem rhizomelike, elongate, stout, with dense nodes. Leaves somewhat crowded and subterminal, sessile, abaxially glaucous, grasslike or sword-shaped, 20–40 × 0.7–1.4 cm, ca. 9-veined, margin serrulate, membranous at base. Scape 10–15 cm. Inflorescence a reduced panicle, 5–7 cm, densely many flowered; bracts subulate, basal one 5–7 mm. Flowers solitary or paired; pedicel 3–5 mm, articulate near middle. Tepals white to blue, ovate, 4–5 × 1.5–2 mm. Filaments ca. 0.5 mm; anthers ca. 2 mm. Style ca. 2.5 mm. Seeds bluish gray at maturity, ellipsoid to ovoid-globose, ca. 8 mm in diam. Fl. May–Jul, fr. Jul–Aug. $2n = 36^*$.

• Forests, ravines, moist and shady places; 800–2100 m. Guizhou, Hubei, Sichuan, Yunnan.

23. Ophiopogon hongjiangensis Y. Y. Qian, Acta Bot. Austro Sin. 9: 54. 1994.

红疆沿阶草 hong jiang yan jie cao

Roots numerous, ± long and thick. Stem not rhizomelike, short, with a few roots. Leaves in a single, subterminal tuft, grasslike; petiole 3–16 cm, winged; leaf blade adaxially deep green, abaxially glaucous, 15–60 cm × 7–13 mm, 11–15-veined, base attenuate, apex acute or obtuse. Scape 14–22 cm. Inflorescence a reduced panicle, 3–9 cm, 10–20-flowered; bracts ovate-lanceolate, basal one 0.8–1.4 cm. Flowers in clusters of 2–4, rarely solitary; pedicel 4–6 mm, articulate at middle or ± distally. Tepals white or pale purple, long ovate, 5–6 × 2–3 mm. Filaments ca. 0.5 mm; anthers pale green, lanceolate, 3–4 mm. Style 4–5 mm. Fl. Jul–Aug.

• Forests; ca. 1100 m. S Yunnan (Jiangcheng Hani-Yi Zu Zizhixian).

24. Ophiopogon stenophyllus (Merrill) L. Rodriguez, Bull. Mus. Hist. Nat. (Paris), sér. 2, 6: 95. 1934.

狭叶沿阶草 xia ye yan jie cao

Peliosanthes stenophylla Merrill, Philipp. J. Sci. 13: 134. 1918.

Stem rhizomelike, stout, with dense nodes and somewhat woody, densely hairy roots. Leaves somewhat crowded and subterminal, subsessile, grasslike, 25–60 × (0.4–)0.7–1.3 cm, ca. 9-veined, margin serrulate, membranous at base. Scape 10–30 cm. Inflorescence a reduced panicle, 4–14 cm, usually ca. 100-flowered; bracts lanceolate, basal one 0.8–1.5 cm. Flowers solitary or paired; pedicel 1–1.4 cm, articulate proximally or at middle. Tepals white or purplish, ovate to lanceolate, ca. 6 × 2.5–3 mm. Filaments ca. 1 mm; anthers ca. 3 mm, sometimes ± connate. Style ca. 5 mm. Seeds ellipsoid, ca. 1 cm in diam. Fl. Jul–Sep, fr. Oct–Nov. 2*n* = 36*.

• Dense forests; 900–2300 m. Guangdong, Guangxi, Hainan, S Jiangxi, SE Yunnan.

25. Ophiopogon bockianus Diels, Bot. Jahrb. Syst. 29: 254. 1900.

连药沿阶草 lian yao yan jie cao

Mondo bockianum (Diels) Farwell.

Roots 1–3 mm thick, white hairy, sometimes with tuberous part near tip. Stem rhizomelike, relatively short, more than 1 cm thick, with dense nodes. Leaves somewhat crowded and subterminal, subsessile, abaxially glaucous, suboblong, 20–30 (–80) × (0.7–)1.4–2.2 cm, margin serrulate, membranous at base. Scape 18–28 cm. Inflorescence a reduced panicle, 5–14 cm, more than 10-flowered; bracts lanceolate, basal one 1.2–1.5 cm. Flowers paired; pedicel 6–9 mm, articulate proximally. Tepals purplish, ovate, 6–7 × 2–3 mm, apex usually recurved or re-volute. Filaments very short; anthers 2.5–3 mm, connate. Style ca. 5 mm. Seeds ca. 10 × 8 mm. Fl. Jun–Jul, fr. Aug. 2*n* = 36*.

• Forests, bamboo forests, hillsides along ravines, shady and humid places; 900–2100 m. Guangxi, NE Guizhou (Fanjing Shan), Hubei, Hunan, Sichuan, Yunnan.

26. Ophiopogon sinensis Y. Wan & C. C. Huang in Y. Wan, Acta Phytotax. Sin. 25: 398. 1987.

中华沿阶草 zhong hua yan jie cao

Stem rhizomelike, relatively short, ca. 1 cm thick. Leaves nearly crowded and subterminal, indistinctly petiolate, oblanceolate-oblong to suboblong, 23–35 × 3.2–4 cm, apex obtuse. Scape ca. 14 cm. Inflorescence a reduced panicle, ca. 5 cm, several flowered; bracts ovate, basal one 5–7 mm. Flowers solitary or paired; pedicel 1.2–1.5 cm, articulate proximally. Tepals white, tinged purplish at base, oblong, ca. 7 × 2.5 mm. Filaments very short; anthers ca. 4.5 mm, initially connate, later free. Style ca. 6 mm. Fl. Jul.

• Forests on limestone slopes; 1300–1400 m. Guangxi, SE Yunnan.

27. Ophiopogon lushuiensis S. C. Chen, Acta Phytotax. Sin. 26: 141. 1988.

泸水沿阶草 lu shui yan jie cao

Stem rhizomelike, 7–9 cm × ca. 5 mm, with dense nodes and slender roots. Leaves somewhat crowded and subterminal, sessile, long linear, 20–35 cm × 2–3 mm, margin membranous at base. Scape 10–15 cm. Inflorescence a raceme, 4–7 cm, 7–12-flowered; bracts lanceolate, basal one 1–1.5 cm. Flowers solitary; pedicel 3–4 mm, articulate at middle. Tepals oblong to ovate, 5–8 × 3–5 mm, inner ones slightly wider than outer. Filaments ca. 0.8 mm; anthers 3–4 mm. Style ca. 4 mm. Fl. May.

• Evergreen broad-leaved forests, moist and shady places; 1900–3000 m. W Yunnan (Lushui Xian).

28. Ophiopogon szechuanensis F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 252. 1978.

四川沿阶草 si chuan yan jie cao

Roots relatively slender, sometimes with fusiform, tuberous part near tip. Stem rhizomelike, stout, with dense nodes. Leaves somewhat crowded and subterminal, sessile, abaxially glaucous, grasslike, 25–60 cm × 5–11 mm, 5–9-veined, margin serrulate, membranous at base. Scape 13–26 cm. Inflorescence a raceme, 4–11 cm, several to many flowered; bracts lanceolate, basal one 0.8–1.6 cm. Flowers solitary; pedicel 7–9 mm, articulate proximally. Tepals purple or purplish red, ovate-lanceolate, 8–9 × 2–2.5 mm. Filaments very short; anthers 6.5–7 mm, connate to form a cone. Style ca. 7 mm, slender. Fl. Jun–Jul. 2*n* = 36*.

• Moist places in sparse forests, hillsides along streams; 1000–2000 m. Sichuan, Yunnan.

29. Ophiopogon peliosanthoides F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 252. 1978.

长药沿阶草 chang yao yan jie cao

Rhizome 1–2 cm. Roots slender, stiff, usually with fusiform or oblong, tuberous part near tip. Leaves basal or nearly so, tufted; petiole 10–35 cm; leaf blade abaxially glaucous, oblong, 10–15 × 3.2–3.8 cm, pinnate-parallel veined, with 4(–6) lateral veins running from midvein, margin ± wrinkled. Scape ca. 30 cm. Inflorescence a reduced panicle, ca. 13 cm, 20–25-flowered; bracts ovate, ca. 1 cm, margin membranous. Flowers solitary or in clusters of 2 or 3; pedicel 5–11 mm, articulate near middle. Tepals purple or white, lanceolate to narrowly so, 1–1.2 cm × 1.5–2.5 mm. Filaments very short; anthers ca. 8 mm. Style ca. 9 mm. Fl. May. 2*n* = 36*.

• Evergreen broad-leaved forests, bamboo forests, scrub forests, moist places in thickets; 1000–2100 m. Guangxi, SW Guizhou, SE Yunnan.

30. Ophiopogon clavatus C. H. Wright ex Oliver, Hooker's Icon. Pl. 24: t. 2582. 1895.

棒叶沿阶草 bang ye yan jie cao

Mondo clavatum (C. H. Wright ex Oliver) Farwell.

Plants stoloniferous; stolons with spaced nodes. Leaves basal, tufted; petiole 2.5–10 cm; leaf blade abaxially glaucous, narrowly oblong to suboblanceolate, 5–12 × 0.5–1.3 cm, 5–7-veined, base attenuate, apex subrounded or obtuse. Scape 7–11 cm. Inflorescence a raceme, 1–3(or 4)-flowered; bracts ovate, ca. 7 mm, margin membranous. Flowers solitary; pedicel 5–8 mm, articulate near apex. Tepals scarcely spreading, white, tinged purplish, suboblong, ca. 1.2 cm × 3–4.5 mm. Filaments ca. 2 mm; anthers ca. 7 mm. Style ca. 1 cm, slender. Seeds deep blue at maturity, ellipsoid, ca. 8 mm in diam. Fl. May–Jun, fr. Jul–Aug. 2*n* = 36*.

• Forests, sparse forests, hillsides along streams; 1000–1600 m. Guangdong, Guangxi, NE Guizhou (Fanjing Shan), Hubei, Hunan, Sichuan.

31. Ophiopogon pingbienensis F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 251. 1978.

屏边沿阶草 ping bian yan jie cao

Stem very short, indistinct. Leaves basal, tufted; petiole 4–14 cm; leaf blade abaxially slightly glaucous, narrowly elliptic-oblong, 5.5–9 × 1.5–2 cm, base attenuate, apex acute. Scape 6–10 cm. Inflorescence a raceme, several flowered; bracts ovate to ovate-lanceolate, 6–8 mm. Flowers solitary; pedicel 4–6 mm, articulate at middle. Tepals oblong-lanceolate to narrowly oblong, 8–11 × 2.5–3.5 mm. Filaments ca. 1 mm; anthers ca. 6 mm. Style ca. 7 mm, slender. Fl. May. 2*n* = 36*.

• Dense forests; 1800–2000 m. SE Yunnan (Pingbian Miao Zu Zizhixian).

32. Ophiopogon tonkinensis L. Rodriguez, Bull. Soc. Bot. France 75: 998. 1928.

多花沿阶草 duo hua yan jie cao

Rhizome short, with densely white-hairy roots. Leaves basal, tufted; petiole (6–)10–20(–28) cm; leaf blade oblanceolate-oblong, 15–25 × 2.5–3.5(–4.2) cm, thickly leathery, apex acute or mucronate. Scape 15–24 cm. Inflorescence a reduced panicle, 9–12 cm, 15–35-flowered; bracts ovate to lanceolate, basal one 6–9 mm. Flowers usually in clusters of 2–4; pedicel 3–5 mm, articulate at middle. Tepals purplish, ovate to oblong, ca. 4 × 2 mm. Filaments ca. 1 mm; anthers ca. 3 mm. Style 3–4 mm, slender. Seeds ellipsoid to globose, ca. 9 mm in diam. Fl. Sep, fr. Oct–Nov. 2*n* = 36*.

Dense forests, scrub forests, thickets, open grassy slopes; 1000–1600 m. W Guangxi, SE Yunnan [Vietnam].

33. Ophiopogon pseudotonkinensis D. Fang, J. Trop. Subtrop. Bot. 6: 100. 1998.

拟多花沿阶草 ni duo hua yan jie cao

Rhizome ca. 2.5 × 1 cm, robust. Roots ca. 1.5 mm thick. Leaves basal, tufted; petiole 4–8 cm; leaf blade usually narrowly elliptic-oblong, rarely linear, asymmetric, 13.5–27 × 1–2.2 cm, papery, 9–16-veined, base attenuate, apex ± obtuse. Scape ca. 5.5 cm, compressed. Inflorescence a reduced panicle, ca. 7 cm, ca. 30-flowered; bracts narrowly ovate, membranous, basal one ca. 7 mm, base ca. 3 mm wide. Flowers in clusters of 2 or 3; pedicel ca. 1 cm, articulate at middle. Tepals reflexed distally, white, ovate, ca. 5 × 3.5–4 mm, apex obtuse. Filaments very short; anthers ovate-oblong, ca. 3 mm, connate, apex subtruncate. Style ca. 5 mm. Fl. Sep.

• Limestone hillsides. NW Guangxi (Nandan Xian).

34. Ophiopogon marmoratus Pierre ex L. Rodriguez, Bull. Soc. Bot. France 75: 997. 1928.

丽叶沿阶草 li ye yan jie cao

Roots slender, soft. Leaves basal, tufted; petiole 8–12 cm; leaf blade narrowly oblong, 13–18 × 1.8–2.5 cm, distinctly ca. 7-veined, base attenuate, apex acute to shortly acuminate. Scape 15–30 cm. Inflorescence a reduced panicle, 10–13 cm, laxly 15–20-flowered; bracts ovate to broadly so, membranous, basal one ca. 1 cm. Flowers solitary or in clusters of 2 or 3; pedicel ca. 8 mm, articulate proximally. Tepals white, oblong-lanceolate, ca. 8 × 1.5–2.5 mm. Filaments very short; anthers ca. 4 mm. Style ca. 8 mm. Fl. Aug. 2*n* = 36*.

Dense forests along valleys. SW Guangxi, SE Yunnan [Cambodia, Laos, Thailand, Vietnam].

35. Ophiopogon xylorrhizus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 252. 1978.

木根沿阶草 mu gen yan jie cao

Roots somewhat stiltlike, straight, 3–5 mm thick, stiff, ± woody, not hairy. Leaves basal, tufted; petiole 7–9 cm; leaf blade suboblong, 11–16 × 3.2–4.2 cm, base attenuate, apex shortly acuminate. Scape ca. 10 cm. Inflorescence a reduced panicle, ca. 6 cm, more than 20-flowered; bracts ovate, 4–5 mm. Flowers solitary or in clusters of 2 or 3; pedicel ca. 3 mm, articulate at middle. Tepals bluish, ovate-lanceolate to lanceolate, ca. 5 × 2 mm. Filaments ca. 1 mm; anthers 2–2.5 mm. Style ca. 4 mm. Fl. Jun. 2*n* = 36*.

• Dense forests, rainforests, thickets, moist and shady places; 600–1200 m. S Yunnan.

36. Ophiopogon zingiberaceus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 252. 1978.

姜状沿阶草 jiang zhuang yan jie cao

Rhizome gingerlike, ca. 3 cm thick, fleshy. Leaves basal, tufted, sessile, grasslike, 15–30 cm × 4–6 mm, 5–9-veined. Scape ca. 18 cm. Inflorescence a raceme, ca. 3 cm, more than 10-flowered; bracts linear, basal one ca. 7 mm. Flowers solitary; pedicel ca. 2.5 mm, articulate near middle. Tepals deltoid-ovate, ca. 4 mm (in slightly immature flowers). Filaments very short; anthers ca. 3 mm. Style ca. 3 mm. Fl. May–Jun. 2*n* = 36*.

• Mixed forests, bamboo forests, moist and shady places; 1400–3000 m. S Sichuan, N and SE Yunnan.

37. Ophiopogon megalanthus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 253. 1978.

大花沿阶草 da hua yan jie cao

Plants basally ± purple-brown. Rhizome tuberous, thick. Roots densely yellow-brown tomentose when young. Leaves basal, tufted, sessile, grasslike, 25–60 × 0.8–1.5 cm, margin membranous at base, serrulate distally; leaf tufts surrounded by

many linear-lanceolate sheaths. Scape 30–35 cm. Inflorescence a reduced panicle, 7–10 cm, 10–25-flowered; bracts lanceolate, slightly falcate, broadly membranous at margin, basal one 1.5–4 cm. Flowers in clusters of 2–4; pedicel 1–1.5 cm, articulate proximally. Tepals purplish red, 9–10 mm, outer ones ovate, inner ones lanceolate. Filaments very short; anthers ca. 5 mm. Style ca. 8 mm. Fl. Jul. $2n = 36$*.

• Dense forests, scrub forests, thickets along streams; 1100–2800 m. S Yunnan.

38. Ophiopogon revolutus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 253. 1978.

卷瓣沿阶草 juan ban yan jie cao

Roots slender, white hairy, sometimes with small, tuberous part near tip. Leaves basal, tufted, indistinctly petiolate, abaxially glaucous, grasslike, 25–50 × 0.8–1.2 cm, base attenuate, margin serrulate; leaf tufts surrounded by broadly lanceolate sheaths. Scape 20–40 cm. Inflorescence a raceme or a reduced panicle, 8–23 cm, 10–24-flowered; bracts subulate, basal one 16–28 mm. Flowers solitary or sometimes paired; pedicel 7–9 mm, articulate near base. Tepals revolute, white or purplish, linear, ca. 9 × 1.5 mm. Filaments very short; anthers ca. 7 mm, slightly connate or free. Style ca. 8 mm, slender. Seeds ellipsoid, ca. 9 × 5 mm. Fl. and fr. Sep–Oct. $2n = 36$*.

Rainforests, evergreen broad-leaved forests, dense or sparse forests; 500–1900 m. S Yunnan [Thailand].

Tanaka (in J. Jap. Bot. 74: 321–328. 1999) reduced *Ophiopogon revolutus* to the synonymy of *O. griffithii*. However, one of us (Tamura) prefers to maintain the former species and regard the latter as a synonym of the very variable *O. intermedius*.

39. Ophiopogon corifolius F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 353. 1978.

厚叶沿阶草 hou ye yan jie cao

Roots slender, soft, white hairy. Leaves basal, tufted, indistinctly petiolate, abaxially glaucous and white streaked, grasslike, 38–60 × 1–1.5 cm, leathery, rigid, base attenuate, margin slightly recurved; leaf tufts ± surrounded by membranous sheaths. Scape ca. 22 cm. Inflorescence a reduced panicle, ca. 12 cm, many flowered; bracts purple-brown, subovate, basal one ca. 6 mm. Flowers usually in clusters of 2–4; pedicel 1–1.2 cm, articulate distally. Tepals purple, ca. 9 mm, outer ones linear, inner ones lanceolate. Filaments ca. 1 mm; anthers ca. 8 mm. Style ca. 9 mm, slender. Seeds ellipsoid, ca. 10 × 8 mm. Fl. Apr–May, fr. Jul–Aug.

• Dense forests; 1200–1400 m. Guangxi, SW Guizhou.

40. Ophiopogon sparsiflorus F. T. Wang & L. K. Dai in F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 253. 1978.

疏花沿阶草 shu hua yan jie cao

Roots slender, soft, densely white hairy. Leaves basal, tufted, indistinctly petiolate, abaxially glaucous, grasslike, 15–40 cm × 4–7(–9) mm, 5–9-veined, base attenuate; leaf tufts surrounded by membranous sheaths. Scape 13–28 cm. Inflorescence a raceme, 6–8 cm, several to 15-flowered; bracts lanceolate, basal one 7–8 mm. Flowers solitary; pedicel ca. 1 cm, articulate near middle. Tepals purplish, narrowly lanceolate, ca. 10 × 2.5–3 mm. Filaments ca. 2 mm; anthers ca. 7 mm, initially connate, later free. Style ca. 8 mm, slender. Fl. May.

• Forests, moist and shady places along streams; 800–1400 m. SW Guangdong, Guangxi.

41. Ophiopogon intermedius D. Don, Prodr. Fl. Nepal. 48. 1825.

间型沿阶草 jian xing yan jie cao

Flueggea dubia Kunth; *F. griffithii* Baker; *F. jacquemontiana* Kunth; *F. japonica* (Linnaeus f.) Richard var. *intermedia* (D. Don) Schultes; *F. wallichiana* Kunth; *Mondo intermedium* (D. Don) L. H. Bailey; *M. japonicum* (Linnaeus f.) Farwell var. *griffithii* (Baker) Farwell; *M. japonicum* var. *intermedium* (D. Don) Farwell; *M. japonicum* var. *wallichianum* (Kunth) Farwell; *M. scabrum* Ohwi; *M. wallichianum* (Kunth) L. H. Bailey; *Ophiopogon aciformis* F. T. Wang & Tang ex H. Li & Y. P. Yang; *O. compressus* Y. Wan & C. C. Huang; *O. griffithii* (Baker) J. D. Hooker; *O. japonicus* (Linnaeus f.) Ker Gawler var. *intermedius* (D. Don) Maximowicz; *O. longibracteatus* H. Li & Y. P. Yang; *O. longipedicellatus* Y. Wan & C. C. Huang; *O. wallichianus* (Kunth) J. D. Hooker; *O. xiaokuai* Z. Y. Zhu.

Roots sometimes with fleshy, tuberous part near tip. Rhizome short, thick. Leaves basal, tufted, sessile, grasslike, 15–55(–70) cm × 3–15 mm, 5–9-veined, base attenuate, margin usually serrulate; leaf tufts usually surrounded by brownish, membranous sheaths. Scape (15–)20–50 cm, sometimes slightly flattened and narrowly 2-winged. Inflorescence a reduced panicle, (2.5–)5–16 cm, many flowered; bracts subulate, linear, or lanceolate, basal one 1.5–4 cm. Flowers in clusters of 2 or 3 or sometimes solitary; pedicel 4–7 mm, articulate proximally or at middle. Tepals white or purplish, oblong, ovate, or ovate-lanceolate, 4–7 × 2–2.5 mm. Filaments very short; anthers 2–4 mm. Style 3–4 mm. Seeds ellipsoid. Fl. May–Aug, fr. Aug–Oct. $2n = 36$*, 54, 68, 72*, 108*, 112.

Evergreen broad-leaved forests, mixed forests, bamboo forests, scrub, moist and shady places along streams, grassy slopes; 700–3000 m. Anhui, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Sikkim, Sri Lanka, Thailand, Vietnam].

Ophiopogon intermedius is a very variable species. *Ophiopogon griffithii,* reported by Yang and Li (Acta Bot. Yunnan., Suppl. 3: 82–83. 1990) from S Yunnan, seems to be conspecific with *O. intermedius*.

42. Ophiopogon reversus C. C. Huang, Fl. Hainan. 4: 534. 1977.

高节沿阶草 gao jie yan jie cao

Rhizome short. Leaves basal, tufted, sessile, long linear, 30–50 cm × 3–8 mm, (5–)7–9-veined, base attenuate, margin serrulate distally. Scape 18–25 cm, slightly flattened and minutely winged. Inflorescence a reduced panicle, 5–7 cm, many flowered; bracts deltoid to ovate, basal one to 2 cm. Flowers in clusters of 2 or 3 or solitary; pedicel curved, 5–10 mm, artic-

ulate distally. Tepals purple, or white tinged with purple, oblong-ovate, ca. 5 × 2 mm, 1-veined. Filaments short; anthers oblong. Style 5–6 mm, slender. Seeds purple-blue at maturity, ellipsoid or globose. Fl. and fr. Aug–Oct.

• Forests, hillsides along streams, moist places. Guangxi, Hainan.

43. Ophiopogon umbraticola Hance, J. Bot. 6: 115. 1868.

阴生沿阶草 yin sheng yan jie cao

Flueggea japonica (Linnaeus f.) Richard var. *umbraticola* (Hance) Baker; *Mondo umbraticola* (Hance) Ohwi; *M. japonicum* (Linnaeus f.) Farwell var. *umbraticola* (Hance) Farwell; *Ophiopogon japonicus* (Linnaeus f.) Ker Gawler var. *umbraticola* (Hance) C. H. Wright.

Rhizome short. Leaves basal, tufted, sessile, grasslike, 15–35(–50) cm × 1–2 mm, ca. 3-veined, margin serrulate. Scape ca. 30 cm. Inflorescence a reduced panicle, 8–16 cm, many flowered; bracts nearly subulate, basal one 6–8 mm. Flowers in clusters of 2 or 3 or solitary; pedicel ca. 1 cm, slender, articulate near middle. Tepals bluish, lanceolate to oblong, ca. 4 × 1.5–2 mm. Filaments ca. 0.8 mm; anthers ca. 2 mm. Style ca. 1.2 mm in diam., longer than anthers, basally widened. Fl. Aug. 2*n* = 68*, 72*.

• Forests, scrub, cliffs, streamsides, moist and shady places along valleys; 700–1000 m. N Guangdong, NE Guizhou (Fanjing Shan), Jiangxi, SE Sichuan (Jinfo Shan).

44. Ophiopogon bodinieri H. Léveillé, Mem. Pontif. Accad. Romana Nuovi Lincei 23: 343. 1905.

沿阶草 yan jie cao

Mondo bodinieri (H. Léveillé) Farwell; *M. formosanum* Ohwi; *Ophiopogon bodinieri* var. *pygmaeus* F. T. Wang & L. K. Dai; *O. filiformis* H. Léveillé; ?*O. lofouensis* H. Léveillé.

Plants stoloniferous. Roots slender, usually with tuberous part near tip. Leaves basal, tufted, sessile, grasslike, (5–)20–40 × 1–4(–7) mm, margin serrulate. Scape (5–)15–35 cm. Inflorescence a reduced panicle, 1–7 cm, several to many flowered; bracts yellowish, linear, basal one ca. 7 mm. Flowers solitary or paired; pedicel 5–8 mm, articulate at middle. Tepals white, purplish, or yellowish, tinged reddish, ovate-lanceolate to subobblong, 4–6 × 1.5–3 mm. Filaments 0.5–0.8 mm; anthers ca. 2.5 mm. Style 4–5 mm, slender. Seeds subglobose or ellipsoid, 5–6 mm in diam. Fl. Jun–Aug, fr. Aug–Oct. 2*n* = 36*, 108*.

• Forests, scrub forests, thickets, hillsides along ravines, moist places on grassy slopes; 500–3600 m. Gansu, Guizhou, Henan, Hubei, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [?Bhutan].

The tuberous roots are used medicinally.

45. Ophiopogon japonicus (Linnaeus f.) Ker Gawler, Bot. Mag. 27: t. 1063. 1807.

麦冬 mai dong

Convallaria japonica Linnaeus f., Suppl. Pl. 204. 1782; *Anemarrhena cavaleriei* H. Léveillé, nom. illeg. (included *Ophiopogon stolonifer*); *C. japonica* var. *minor* Thunberg; *Flueggea japonica* (Linnaeus f.) Richard; *Mondo japonicum* (Linnaeus f.) Farwell; *M. stolonifer* (H. Léveillé & Vaniot) Farwell; *O. argyi* H. Léveillé; *O. chekiangensis* Koiti Kimura & Migo; *O. stolonifer* H. Léveillé & Vaniot; *Slateria japonica* (Linnaeus f.) Desvaux.

Plants stoloniferous. Roots moderately thick, usually with tuberous part near middle or tip. Leaves basal, tufted, sessile, grasslike, generally 10–50 cm × 2–4 mm, 3–7-veined, margin serrulate. Scape 6–15(–27) cm, much shorter than leaves. Inflorescence a reduced panicle, 2–5 cm, several to more than 10-flowered; bracts lanceolate, basal one 7–8 mm. Flowers solitary or paired, usually nodding; pedicel 3–4 mm, articulate near middle. Tepals white or purplish, lanceolate, ca. 5 × 2 mm. Filaments very short; anthers 2.5–3 mm. Style somewhat narrowly conical, ca. 4 mm, moderately thick, basally widened. Seeds globose, 7–8 mm in diam. Fl. May–Aug, fr. Aug–Sep. 2*n* = 34*, 36*, 67, 68*, 72*, 108*.

Forests, dense scrub in ravines, moist and shady places on slopes and along streams, cliffs; 200–2800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

Widely cultivated in China for its tuberous roots, which are used medicinally.

46. Ophiopogon clarkei J. D. Hooker, Fl. Brit. India 6: 268. 1892.

长丝沿阶草 chang si yan jie cao

Mondo dracaenoides (Baker) Farwell var. *clarkei* (J. D. Hooker) Farwell.

Plants stoloniferous. Roots slender, usually with fusiform, tuberous part near middle or tip. Leaves basal, tufted, sessile, grasslike, 7–30 cm × 2–3 mm, 5–7-veined, margin slightly serrulate. Scape 10–20 cm. Inflorescence a reduced panicle, 2–3 cm, 2–5-flowered; bracts lanceolate to narrowly ovate, basal one 6–7 mm. Flowers solitary or paired; pedicel 4–5 mm, articulate at or below middle. Tepals white, ovate to ovate-lanceolate, 7–8 × 2.5–3.5 mm. Filaments ca. 1.5 mm; anthers ca. 4.5 mm. Style basally slightly widened. Fl. Jun–Jul. 2*n* = 36*, ?38.

Forests, scrub forests, cliffs, streamsides; 2000–3500 m. E Xizang, NW Yunnan [Bhutan, NE India, Nepal, Sikkim].

47. Ophiopogon paniculatus Z. Y. Zhu, Guihaia 14: 206. 1994.

锥序沿阶草 zhui xu yan jie cao

Plants stoloniferous. Rhizome stout. Roots slender. Leaves basal, tufted, subsessile or indistinctly petiolate, grasslike, 12–33 × 0.2–0.7 cm, 5–7-veined, base attenuate. Scape 15–20 cm. Inflorescence a panicle, 3–5 cm, many flowered; branches 5–7 mm, 2–4-flowered; bracts and bracteoles lanceolate to ovate-lanceolate, 5–7 mm. Pedicel 4–7 mm, articulate near apex. Tepals white, oblong to oblong-lanceolate, 5–6 × 1.5–2 mm. Filaments indistinct; anthers lanceolate, 3.8–4.5 mm. Style 4–5 mm, slender. Fl. Jun–Jul.

• Slopes; ca. 1000 m. Sichuan.

57. PELIOSANTHES Andrews, Bot. Repos. 10: t. 605. 1810.

球子草属 qiu zi cao shu

Chen Xinqi (陈心启 Chen Sing-chi); Minoru N. Tamura

Bulbospermum Blume; *Lourya* Baillon; *Neolourya* L. Rodriguez; *Teta* Roxburgh.

Herbs perennial, rhizomatous, with thick roots. Stem usually short, rarely elongate and procumbent. Leaves usually basal, rarely cauline, petiolate; leaf blade linear to elliptic-ovate, subplicate veined, with conspicuous, transverse veins between main, longitudinal veins, glabrous. Scape terminating in a raceme or reduced panicle. Flowers solitary or in clusters of 2–5, subtended by a bract; pedicel articulate near apex; bracteole absent or 1. Perianth segments 6, united into a tube. Stamens 6; filaments dilated, connate in a fleshy ring (corona), rarely free; corona flat or elevated; anthers subsessile. Ovary inferior to semi-inferior, 3-loculed; ovules 2–4(or 5) per locule. Style shortly conical to columnar; stigma capitate to 3-lobed, small. Fruit bursting at an early stage and exposing young seeds. Seeds blue at maturity, berrylike, ellipsoid to globose.

About 16 species: Bangladesh, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sikkim, Thailand, Vietnam; six species (five endemic) in China.

Jessop (Blumea 23: 141–159. 1976) united all the previously recognized species of *Peliosanthes* into a single species, *P. teta* Andrews, comprising two subspecies, subsp. *teta* and subsp. *humilis* (Andrews) Jessop ex Gandhi, because he could not find satisfactory correlations between the variations of gross morphological characters. However, according to a molecular taxonomic study by Yamashita, Vogel, and Tamura (unpublished), individuals of some species of *Peliosanthes* based on the earlier, narrower species concept clearly form clades. Therefore, in this treatment, we use the narrower species concept instead of that of Jessop. *Peliosanthes kaoi*, *P. macrostegia*, and *P. yunnanensis* are distinguishable from one another primarily by size, and *P. ophiopogonoides* is distinguished from these three species primarily by leaf venation (the diagnostic value of which in *Peliosanthes* is not well known). Further studies are needed to ascertain whether or not these four species are really distinct from one another and also from the Himalayan species *P. macrophylla* Wallich ex Baker. *Peliosanthes stenophylla* Merrill, described from Guangdong, has been transferred to *Ophiopogon*, as *O. stenophyllus* (Merrill) L. Rodriguez. The holotype specimen of *P. mairei* H. Léveillé, described from Yunnan, can be identified as *Maianthemum atropurpureum* (Franchet) LaFrankie.

1a. Flowers in clusters of 2–5; ovary inferior ..... 1. *P. teta*
1b. Flowers solitary; ovary semi-inferior.
2a. Stem procumbent, 5.5–18.5 cm ..... 2. *P. sinica*
2b. Stem erect, less than 3 cm.
3a. Leaves with oblique transverse veins ..... 3. *P. ophiopogonoides*
3b. Leaves with horizontal transverse veins.
4a. Perianth 12–16 mm in diam.; anthers ca. 2 mm ..... 4. *P. yunnanensis*
4b. Perianth 5.5–12 mm in diam.; anthers 0.5–1 mm.
5a. Leaf blade 15–25 × 5–6 cm; petiole 20–30 cm; raceme 9–25 cm; scape 6–10 cm; pedicels 5–6 mm ..... 5. *P. macrostegia*
5b. Leaf blade 6–8 × 1.5–2 cm; petiole 3–5 cm; raceme 3–5 cm; scape 4–5 cm; pedicels 1.5–2 mm ..... 6. *P. kaoi*

1. Peliosanthes teta Andrews, Bot. Repos. 10: t. 605. 1810.

簇花球子草 cu hua qiu zi cao

Peliosanthes minor Yamamoto; *P. tonkinensis* F. T. Wang & Tang; *P. torulosa* Y. Wan.

Stem short. Leaves 4–8; petiole (5–)20–30 cm, slightly compressed; leaf blade lanceolate to elliptic, (12–)16–23 × 2–4 cm, with 5 main veins, apex acute to acuminate. Scape 3–20 cm. Inflorescence a reduced panicle, (5–)10–15 cm; bracts lanceolate, 3–7 mm, membranous. Flowers in clusters of 2–5; pedicel (3–)5–8 mm; bracteole 1, ca. 2 mm. Perianth purple, 6–8 mm in diam.; tube 2–3 mm, mostly adnate to ovary; lobes oblong to ovate, 2.5–4 × 1.5–2 mm. Corona purple, ca. 0.5 mm wide; anthers ca. 0.5 mm. Style short; stigma capitate. Seeds subglobose, 5–7 mm. Fl. Jan. $2n = 36$*.

Forests; ca. 600 m. S Guangxi, Hainan, S Yunnan [Bangladesh, NE and SE India, Laos, Malaysia, Myanmar, Sikkim, Thailand, Vietnam].

2. Peliosanthes sinica F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 253. 1978.

匍匐球子草 pu fu qiu zi cao

Stem procumbent, 5.5–18.5 cm. Leaves 3 or 4; petiole (2–)7–20 cm; leaf blade oblong to elliptic, 11–17 × 3–6 cm, with 7 main veins. Scape ca. 3.5 cm. Inflorescence a raceme, 1.5–5 cm; bracts lanceolate, 5–10 mm, papery, apex caudate. Flowers solitary; pedicel ca. 3 mm; bracteole absent. Perianth purple, 6–7 mm in diam.; tube ca. 1 mm, proximally adnate to ovary; lobes ovate, 3–4 mm. Corona ca. 1 mm wide; anthers ca. 0.5 mm. Style short; stigma shortly 3-lobed. Seeds ellipsoid, 0.7–1.5 cm. Fr. Oct. $2n = 36$*.

- Evergreen broad-leaved forests, rainforests, bamboo forests; 400–2100 m. S Guangxi, S Yunnan.

3. Peliosanthes ophiopogonoides F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 253. 1978.

长苞球子草 chang bao qiu zi cao

Stem 2–3 cm. Leaves 2 or 3; petiole 15–30 cm; leaf blade linear-lanceolate, 17–30 × 2–3 cm, with 5 main veins, apex caudate. Scape 7–15 cm. Inflorescence a raceme, 8–15 cm; bracts lanceolate, 7–15 mm, herbaceous. Flowers solitary; pedicel 2–3 mm; bracteole 1, 2–3 mm. Perianth 6–8 mm in diam.; tube 3–4 mm, basally adnate to ovary; lobes deltoid-ovate, ca. 3 × 2.5 mm. Corona ca. 1 mm wide; anthers ca. 1 mm. Style ca. 1 mm; stigma capitate. Seeds narrowly ellipsoid, ca. 1.2 cm. Fl. Oct, fr. Jun. 2*n* = 36*.

• Dense forests, evergreen broad-leaved forests; 1300–1800 m. SE Yunnan (Pingbian Miao Zu Zizhixian).

4. Peliosanthes yunnanensis F. T. Wang & Tang, Fl. Reipubl. Popularis Sin. 15: 254. 1978.

云南球子草 yun nan qiu zi cao

Stem short. Leaves 2–5; petiole 15–25 cm; leaf blade linear-oblong, 25–35 × ca. 3 cm, with 8–10 main veins, apex caudate. Scape 10–13 cm. Inflorescence a raceme, 5–7 cm; bracts lanceolate-oblong, 5–10 mm. Flowers solitary; pedicel 1–3 mm; bracteole 1, 3–4 mm. Perianth purplish green, 1.2–1.6 cm in diam.; tube ca. 1.5 × 5–6 mm, proximally adnate to ovary; lobes ovate, 4–6 × ca. 4 mm. Corona ca. 2 mm wide; anthers ca. 2 mm. Style short; stigma capitate. Fl. Nov. 2*n* = 36*.

• Forests; 200–1800 m. SE Yunnan (Hekou Yao Zu Zizhixian, Malipo Xian).

5. Peliosanthes macrostegia Hance, J. Bot. 23: 328. 1885.

大盖球子草 da gai qiu zi cao

Peliosanthes arisanensis Hayata; *P. delavayi* Franchet; *P. tashiroi* Hayata.

Stem ca. 1 cm. Leaves 2–5; petiole 20–30 cm; leaf blade lanceolate-oblong, 15–25 × 5–6 cm, with 5–9 main veins. Scape 6–10 cm. Inflorescence a raceme, 9–25 cm; bracts lanceolate to lanceolate-oblong, 6–15 mm, membranous. Flowers solitary; pedicel 5–6 mm; bracteole 1, 3–5 mm. Perianth purple, 5.5–12 mm in diam.; tube ca. 2 mm, proximally adnate to ovary; lobes deltoid-ovate, ca. 4 mm. Corona undulate apically; anthers 0.5–1 mm. Style short; stigma 3-lobed. Seeds subglobose, ca. 1 cm. Fl. Apr–Jun, fr. Jul–Sep. 2*n* = 36*.

• Dense tropical forests, evergreen broad-leaved forests, bamboo forests and thickets, scrub, shady and humid cliffs; 400–1800 m. Guangdong, Guangxi, Guizhou, Hunan, NE Sichuan, Taiwan, SE Yunnan [?Vietnam].

This species probably also occurs in Vietnam: one locality is on the border between Yunnan and Vietnam. The plants here identified as *Peliosanthes macrostegia* were treated by Handel-Mazzetti (Symb. Sin. 7: 1219. 1936) as *P. macrophylla* Wallich ex Baker.

6. Peliosanthes kaoi Ohwi, J. Jap. Bot. 42: 317. 1967.

台东球子草 tai dong qiu zi cao

Stem short. Petiole 3–5 cm, slightly compressed; leaf blade not shining, oblong to ovate-oblong, 6–8 × 1.5–2 cm, thickly papery, with 5 main veins, apex abruptly acuminate. Scape 4–5 cm. Inflorescence a raceme, 3–5 cm; bracts lanceolate, 3–10 mm. Flowers solitary; pedicel 1.5–2 mm; bracteole 1. Perianth purple, ca. 3 mm; tube turbinate, proximally adnate to ovary; lobes deltoid-ovate, slightly shorter than tube, apex obtuse. Corona narrow. Style short. Seeds ovoid. Fl. Jul. 2*n* = 34*, 36*.

• Forests; 1400–1600 m. SE Taiwan (Taidong Xian).