

15. PARNASSIA Linnaeus, Sp. Pl. 1: 273. 1753.

梅花草属 mei hua cao shu

Gu Cuizhi (谷粹芝 Ku Tsue-chih); Ulla-Maj Hultgård

Herbs perennial, glabrous. Rhizome sympodial, robust. Stems (scapes) 1 to several, 1- or 2- or several leaved, rarely leafless. Basal leaves 2 or several, forming a rosette; stipules membranous; petiole usually long; leaf blade entire. Cauline leaves 1 to several or absent, often sessile and semiamplexicaul. Flower solitary, terminal; hypanthium free or fused with ovary proximally. Sepals 5, usually imbricate. Petals 5, imbricate, white or yellowish, rarely greenish, margin fimbriate, erose, or entire. Stamens 5, inserted opposite sepals, a few species with anther connective projected into a lanceolate appendage; staminodes 5, inserted opposite petals, terete and entire or flat and divided into lobes or filiform rays, apically somewhat glandular or with a distinct, globose gland. Pistil 1; ovary superior or semi-inferior, 1-loculed; placentation parietal; ovules numerous. Fruit a capsule, superior or semi-inferior, sometimes longitudinally angled, loculicidally dehiscent on abaxial suture into 3 or 4 valves. Seeds numerous, brown, obovoid or oblong, very small, 1–2 mm; testa thin, membranous, reticulate, smooth; endosperm thin or absent. About 70 species: temperate regions of the N hemisphere, mainly in S and SE Asia; 63 species (49 endemic) in China.

Key 1

- 1a. Staminodes 3–5- or 7–23-branched, branches with globose glands at apex.
 - 2a. Staminodes 7–23-branched 63. *P. palustris*
 - 2b. Staminodes 3- or 5-branched.
 - 3a. Staminodes 3-branched; cauline leaves 2 or more.
 - 4a. Leaf blade broadly oblanceolate to narrowly ovate; petals rhomboid, margin subentire or undulate 53. *P. rhombipetala*
 - 4b. Leaf blade reniform; petals not rhomboid, margin fimbriate proximally or throughout.
 - 5a. Petal margin fimbriate proximally; cauline leaves 3–6 54. *P. amoena*
 - 5b. Petal margin fimbriate throughout; cauline leaves 2–8.
 - 6a. Petals oblanceolate or oblong, marginal fimbriae turgid at apex, becoming clavate; cauline leaves usually 2–5 55. *P. noemiae*
 - 6b. Petals ovate or triangular-ovate, marginal fimbriae not turgid at apex; cauline leaves usually more than 3 56. *P. foliosa*
 - 3b. Staminodes (3–)5(or 7)–branched; cauline leaf 1.
 - 7a. Petal margin fimbriate throughout; staminodes divided for 1/3–1/2 their length.
 - 8a. Leaf blade ovate-cordate, thick textured, base cordate 61. *P. perciliata*
 - 8b. Leaf blade ovate or reniform, thin textured, base often truncate or subcordate 62. *P. davidii*
 - 7b. Petal margin slightly undulate, or fimbriate proximally and undulate or entire distally; staminodes divided for up to 1/2 their length or more.
 - 9a. Petal margin slightly undulate; basal leaf blade ovate to oblong-ovate 57. *P. guilinensis*
 - 9b. Petal margin fimbriate proximally, undulate or entire distally; basal leaf blade ovate-cordate to broadly orbicular.
 - 10a. Basal leaf blade broadly orbicular, obviously wider than long 60. *P. longshengensis*
 - 10b. Basal leaf blade ovate-cordate, about as long as wide.
 - 11a. Staminodes divided nearly to base 58. *P. gansuensis*
 - 11b. Staminodes divided for ca. 1/2 their length 59. *P. simaoensis*
- 1b. Staminodes terete and divided at apex or not, or flat and 5–7-dentate or 2- or 3- or 5-lobed at apex, apex usually eglandular.
 - 12a. Staminodes terete, apex divided or not.
 - 13a. Staminodes terete, apex 2-lobed and ± 2-labiate.
 - 14a. Basal leaf blade 6–15 mm, broadly obovate, broadly ovate, or broadly rhomboid-ovate; staminodes 2-lobed, posterior lobes 2- or 3-lobed 11. *P. faberi*
 - 14b. Basal leaf blade 2–3 mm, rhomboid, ovate-rhomboid, or suborbicular; staminodes 2-lobed, posterior lobes 2–5-lobed 12. *P. labiata*
 - 13b. Staminodes terete, apex entire, rounded or discoid.
 - 15a. Basal leaves numerous, forming a rosette.
 - 16a. Petals broadly elliptic; staminodes knoblike at apex; sepals oblong; cauline leaf borne near middle of stem 9. *P. petitmenginii*

- 16b. Petals narrowly obovate-spatulate; staminodes sublingulate at apex; sepals lanceolate; cauline leaf borne near apex of stem 10. *P. esquirolii*
- 15b. Basal leaves few, 3–5(–8), not forming a rosette.
- 17a. Basal leaf blade reniform or deeply cordate, rarely cordate at base; petals green.
- 18a. Plants 15–30 cm tall; petals lanceolate to oblong-lanceolate, 14.5–22.5 × 4.5–5.5 mm; leaf blade 2–6 × 5–9.5 cm 1. *P. longipetala*
- 18b. Plants 5–11 cm tall; petals broadly obovate, 4–8 × 3–6 mm; leaf blade 0.8–2.5 × 1.3–3 cm 2. *P. tenella*
- 17b. Basal leaf blade ovate-cordate, ovate-reniform, or ovate-triangular, cordate or attenuate at base; petals white or green.
- 19a. Petals green or yellow-green.
- 20a. Petals yellow-green; cauline leaf cordate-reniform; basal leaf blade ovate-reniform 5. *P. longipetaloides*
- 20b. Petals green; cauline leaf oblong or ovate-lanceolate; basal leaf blade ovate-cordate or ovate-reniform.
- 21a. Petals densely purple-brown punctate; staminodes rounded at apex; basal leaf blade ± ovate-cordate 3. *P. angustipetala*
- 21b. Petals not punctate; staminodes truncate or emarginate at apex; basal leaf blade mostly ovate-reniform 4. *P. yulongshanensis*
- 19b. Petals white or yellowish.
- 22a. Petals minutely purple-brown punctate, often emarginate at apex; staminodes often indistinctly 3-crenate at apex or entire 6. *P. yunnanensis*
- 22b. Petals not punctate, acute or rounded at apex; staminodes rounded at apex.
- 23a. Staminodes broad and flat; basal leaf blade ovate-cordate, base cordate; cauline leaf borne near apex of stem, much smaller than basal leaves; petals yellowish 7. *P. yanyuanensis*
- 23b. Staminodes thin and long; basal leaf blade ovate-triangular, base attenuate; cauline leaf borne near base of stem, slightly smaller than or subequaling basal leaves; petals white 8. *P. humilis*
- 12b. Staminodes flat, apex 5–7-dentate or (2 or)3(or 5)-lobed, usually eglandular.
- 24a. Staminodes 5–7-dentate at apex.
- 25a. Petals broadly spatulate or obovate, margin erose or subentire, base with a claw ca. 1 mm wide; leaf blade cuneate or subcordate at base 13. *P. degeensis*
- 25b. Petals triangular-ovate, margin long fimbriate proximally, base with a long claw; leaf blade deeply cordate at base 14. *P. farreri*
- 24b. Staminodes (2 or)3(–5)-lobed at apex.
- 26a. Staminodes 2- or 5-lobed at apex.
- 27a. Staminodes 2-lobed at apex, lobes subequal; cauline leaves 2 46. *P. bifolia*
- 27b. Staminodes 5-lobed at apex, lobes equal or unequal; cauline leaf 1.
- 28a. Petal margin sparsely and shortly fimbriate throughout; stem not more than 10 cm 52. *P. omeiensis*
- 28b. Petal margin long fimbriate proximally; stem more than 10 cm.
- 29a. Staminodes 5-lobed or 5-parted at apex, lobes unequal.
- 30a. Petals yellow-white; leaf blade reniform 50. *P. yiliangensis*
- 30b. Petals white; leaf blade ovate-cordate 51. *P. chengkouensis*
- 29b. Staminodes 5-lobed to middle, lobes subequal.
- 31a. Basal leaf blade oblong-cordate or broadly cordate 49. *P. monochoriifolia*
- 31b. Basal leaf blade broadly cordate, broadly orbicular, or suborbicular.
- 32a. Basal leaf blade broadly orbicular, rarely suborbicular, usually wider than long, rarely as wide as long; cauline leaf broadly ovate or reniform 48. *P. dilatata*
- 32b. Basal leaf blade reniform, broadly cordate, or broadly ovate, about as wide as or wider than long; cauline leaf similar in shape to basal ones 47. *P. wightiana*
- 26b. Staminodes 3(–5)-lobed at apex, lobes usually eglandular, rarely inconspicuously glandular at apex.

- 33a. Connective of anther apically projected into a lanceolate appendage.
- 34a. Basal leaf blade ovate-cordate or ovate; staminodes 3-lobed for 1/4–1/3 their length, central lobe narrower than lateral ones; styles usually short, not exerted beyond staminodes, occasionally longer 43. *P. brevistyla*
- 34b. Basal leaf blade reniform or suborbicular; staminodes 3-lobed or -parted, lobes subequal; styles usually long, exerted beyond staminodes, rarely shorter.
- 35a. Staminodes 3-lobed to middle or almost so; basal leaf blade reniform or suborbicular 44. *P. delavayi*
- 35b. Staminodes 3-parted beyond middle; basal leaf blade reniform 45. *P. leptophylla*
- 33b. Connective of anther not apically projected.
- 36a. Cauline leaves absent.
- 37a. Staminodes lobed for ca. 1/3 their length, lobes narrow; petals yellow, apex emarginate or 2-lobulate; leaf with 3 parallel veins 15. *P. lutea*
- 37b. Staminodes lobed for ca. 1/5 their length, lobes short and broad, central one longer than lateral ones; petals white, apex rounded-obtuse; leaf usually with 5 parallel veins 16. *P. scaposa*
- 36b. Cauline leaves 1 or 2.
- 38a. Cauline leaves 2 42. *P. lijiangensis*
- 38b. Cauline leaf 1.
- 39a. Staminodes 3-lobed at apex, lobes unequal.
- 40a. Central lobe of staminode much shorter than lateral ones; petals greenish, narrowly oblong, margin sparsely and shortly fimbriate; cauline leaf borne distally on stem 39. *P. cooperi*
- 40b. Central lobe of staminode longer than lateral ones; petals white, obovate, rarely subspatulate, margin entire; cauline leaf borne near base of stem 40. *P. laxmannii*
- 39b. Staminodes 3(–5)-lobed at apex, lobes equal or subequal.
- 41a. Petal margin long fimbriate proximally.
- 42a. Basal leaf blade obovate or oblong-obovate 41. *P. obovata*
- 42b. Basal leaf blade reniform, orbicular, broadly ovate-orbicular, ovate-cordate, or occasionally other shapes.
- 43a. Basal leaf blade ovate-cordate, 2–4.5 × 1.8–3.5 cm, thick textured, subleathery 19. *P. crassifolia*
- 43b. Basal leaf blade reniform, orbicular, or broadly ovate-orbicular, rarely ovate-cordate.
- 44a. Basal leaf blade orbicular or broadly ovate-orbicular, base cordate with a deep sinus, apex obtuse and apiculate; cauline leaf much smaller than basal ones; petals oblanceolate, with 2 green, oblong glands near base, apex acute 17. *P. yui*
- 44b. Basal leaf blade reniform, rarely ovate-cordate, apex rounded, rarely subobtusate or emarginate; cauline leaf about as large as basal ones; petals obovate, eglandular, apex emarginate 18. *P. chinensis*
- 41b. Petal margin entire or shortly fimbriate and erose proximally.
- 45a. Petal margin shortly fimbriate proximally.
- 46a. Sepals and petals purple-brown punctate; petals 5–6 × 3–4 mm; basal leaf blade 9–10 × 8–9 mm 21. *P. venusta*
- 46b. Sepals and petals not punctate; petals 7.8–9.5 × 5.2–6.1 mm; basal leaf blade 1–1.5 cm × 9–14 mm 20. *P. epunctulata*
- 45b. Petal margin erose or entire.
- 47a. Ovary superior.
- 48a. Basal leaf blade oblong or elliptic, truncate or cuneate at base.
- 49a. Basal leaf blade oblong, 8–9 × 4–5 mm; petals spatulate 23. *P. filchneri*
- 49b. Basal leaf blade elliptic, 1.8–6 × 1–2.5 cm; petals suborbicular or elliptic 24. *P. xinganensis*
- 48b. Basal leaf blade ovate-reniform, -cordate, -oblong, or broadly ovate, cordate at base.
- 50a. Petals green, lanceolate, margin minutely and densely purple punctate, densely erose, apex acuminate 25. *P. lanceolata*
- 50b. Petals white, obovate, margin sparsely erose or entire, apex rounded or cleft.
- 51a. Basal leaf blade ovate-reniform; plants not more than 4 cm tall 26. *P. kangdingensis*
- 51b. Basal leaf blade ovate-cordate, ovate-oblong, or broadly ovate; plants usually more than 4 cm tall.
- 52a. Petals usually cleft or emarginate at apex; staminodes 3-lobed for ca. 1/3 or occasionally ca. 1/2 their length 27. *P. mysorensis*

- 52b. Petals rounded at apex; staminodes shallowly 3-lobed for ca. 1/6 their length.
53a. Plants 16–27 cm tall; basal leaf blade ovate-oblong or broadly ovate, deeply cordate at base, 2–9-veined; staminodes 3(–6)-lobed, lobes truncate at apex, central one narrower than lateral ones 28. *P. submysorensis*
53b. Plants 7–10 cm tall; basal leaf blade ovate, densely brown punctate, with 5–7 arcuate veins; staminodes 3-lobed, lobes rounded at apex 29. *P. cacuminum*
- 47b. Ovary semi-inferior.
54a. Basal leaf blade ovate-cordate to reniform, base usually cordate.
55a. Stem usually more than 28 cm; basal leaf blade ovate-cordate, 3–4.1 cm, deeply cordate at base 30. *P. cordata*
55b. Stem usually 2–8 cm, occasionally to 20 cm; basal leaf blade not more than 2 cm.
56a. Petals pale yellow-green 22. *P. qinghaiensis*
56b. Petals white.
57a. Basal leaf blade reniform, rarely ovate-cordate; cauline leaf borne near middle of stem; staminode lobes lanceolate 31. *P. pusilla*
57b. Basal leaf blade ovate-cordate; cauline leaf borne near base of stem; staminode lobes oblong.
58a. Petals broadly obovate, purple punctate; stem less than 6 cm; basal leaf petiole ca. 1 cm, leaf blade usually cordate at base 35. *P. subscaposa*
58b. Petals obovate, not or indistinctly punctate; stem 8–20 cm; basal leaf petiole (1.5–)3–6 cm, leaf blade usually truncate at base 36. *P. deqenensis*
- 54b. Basal leaf blade oblong, base not cordate.
59a. Stem relatively low; basal leaves small.
60a. Petals white; basal leaf petiole 8–15(–40) mm, leaf blade usually cuneate at base 37. *P. trinervis*
60b. Petals green; basal leaf petiole (1–)15–25 mm, leaf blade usually subcordate at base 38. *P. viridiflora*
59b. Stem relatively tall; basal leaves large.
61a. Staminodes 3-parted for ca. 2/3 their length, lobes parallel, to 3.2 mm . 32. *P. oreophila*
61b. Staminodes 3-lobed for 1/5–1/4 their length.
62a. Staminodes broad, lobes linear, ca. 1 mm; petals yellow 33. *P. tibetana*
62b. Staminodes narrow, lobes lanceolate or ovate-lanceolate, ca. 1.5 mm; petals white 34. *P. nubicola*

Key 2

- 1a. Cauline leaves absent.
2a. Petals yellow, emarginate or 2-lobulate at apex; leaf blade with 3–5 parallel veins; staminodes 3-lobed for ca. 1/3 their length, lobes equal, narrow 15. *P. lutea*
2b. Petals white, rounded-obtuse at apex; leaf blade usually with 5 parallel veins; staminodes 3-lobed for ca. 1/5 their length, central lobe longer than lateral ones 16. *P. scaposa*
- 1b. Cauline leaves 1–3 or more.
3a. Cauline leaves 2 or 3 or more.
4a. Cauline leaves 2; staminodes 2- or 3-lobed and eglandular at apex.
5a. Staminodes 2-lobed at apex; stem 10–50 cm 46. *P. bifolia*
5b. Staminodes 3-lobed at apex; stem 4–6 cm 42. *P. lijiangensis*
4b. Cauline leaves 3 or more; staminodes branched, branches with globose glands at apex.
6a. Petals rhomboid, margin subentire or undulate 53. *P. rhombipetala*
6b. Petals not rhomboid, margin fimbriate proximally or throughout.
7a. Petal margin fimbriate proximally 54. *P. amoena*
7b. Petal margin fimbriate throughout.
8a. Petals oblanceolate or oblong, marginal fimbriae turgid at apex; staminode branches not parallel; cauline leaves usually 2–5 55. *P. noemiae*
8b. Petals ovate or triangular-ovate, marginal fimbriae not turgid at apex; staminode branches parallel; cauline leaves usually more than 3 56. *P. foliosa*

3b. Cauline leaf 1.

9a. Basal leaves 10 or more, cespitose.

10a. Stamines entire and rounded at apex.

11a. Petals broadly elliptic; sepals oblong; cauline leaf borne near middle of stem 9. *P. petitmenginii*

11b. Petals broadly oblanceolate; sepals lanceolate; cauline leaf borne near apex of stem 10. *P. esquirolii*

10b. Stamines 2-lobed and 2-labiate at apex.

12a. Basal leaf blade broadly obovate, broadly ovate, or broadly rhomboid-ovate, 6–15 mm 11. *P. faberi*

12b. Basal leaf blade rhomboid, ovate-rhomboid, or suborbicular, 2–3 mm 12. *P. labiata*

9b. Basal leaves usually 3–5(–12), not cespitose.

13a. Anther connective apically projected into a lanceolate appendage.

14a. Basal leaf blade ovate-cordate or ovate; stamines 3-lobed for 1/4–1/3 their length, central lobe narrow, lateral ones wider; style short, not exerted beyond stamines, occasionally longer 43. *P. brevistyla*

14b. Basal leaf blade reniform or suborbicular; stamines 3-lobed for 1/2 their length or slightly more; style usually longer, exerted beyond stamines, rarely shorter.

15a. Stamines divided for 2/5–1/2 their length; basal leaf blade reniform or suborbicular . 44. *P. delavayi*

15b. Stamines divided for ca. 2/3 their length; basal leaf blade reniform 45. *P. leptophylla*

13b. Anther connective not apically projected.

16a. Basal leaf blade elliptic, obovate, or broadly orbicular.

17a. Basal leaf blade elliptic or ovate.

18a. Basal leaf blade elliptic, rarely obovate-elliptic; stamines 3-cleft at apex 24. *P. xinganensis*

18b. Basal leaf blade ovate or oblong-ovate; stamines 5-branched, branches globose glandular at apex 57. *P. guilinensis*

17b. Basal leaf blade obovate or broadly orbicular.

19a. Basal leaf blade densely purple-brown punctate, broadly orbicular, apex emarginate 60. *P. longshengensis*

19b. Basal leaf blade not punctate, obovate, oblong-obovate, broadly orbicular, or suborbicular.

20a. Basal leaf blade obovate or oblong-obovate, 2–4 × 1.5–2.6 cm; stamines 3- or 4(or 5)-lobed for ca. 1/3 their length 41. *P. obovata*

20b. Basal leaf blade broadly orbicular or suborbicular, 1.2–2 × 1.4–2.5 cm; stamines (3 or)4- or 5-lobed for 1/3–1/2 their length 48. *P. dilatata*

16b. Basal leaf blade reniform, ovate-reniform, or ovate-cordate.

21a. Stamines terete, entire, apex rounded or discoid.

22a. Basal leaf blade reniform, base deeply cordate; petals green.

23a. Stem 15–30 cm; petals lanceolate or oblong-lanceolate, 10–20 × ca. 5 mm; basal leaf blade 3–6 × 5–9.5 cm 1. *P. longipetala*

23b. Stem 5–11 cm; petals flabellate, 4–8 × 3–6 mm; basal leaf blade 5–25 × 13–30 mm 2. *P. tenella*

22b. Basal leaf blade ovate-cordate, base cordate; petals white or green.

24a. Petals green or yellow-green.

25a. Petals yellow-green; cauline leaf ovate-reniform; basal leaf blade ovate-reniform; stamines indistinctly 3–6-dentate at apex 5. *P. longipetaloides*

25b. Petals green; cauline leaf oblong or ovate-lanceolate; basal leaf blade ovate-cordate or ovate-reniform.

26a. Petals densely purple-brown punctate; stamines rounded at apex; basal leaf blade usually ovate-cordate 3. *P. angustipetala*

26b. Petals not punctate; stamines truncate or emarginate at apex; basal leaf blade usually ovate-reniform 4. *P. yulongshanensis*

24b. Petals white or yellowish.

27a. Petals distinctly purple-brown punctate, obovate-oblong, often emarginate at apex; stamines

often indistinctly 3-crenate at apex, or entire 6. *P. yunnanensis*

27b. Petals indistinctly purple punctate, oblong or narrowly oblanceolate, acute or rounded at apex; stamines rounded at apex.

28a. Basal leaf blade ovate-cordate, base cordate; cauline leaf borne near apex of stem, much

smaller than basal leaves; petals yellowish 7. *P. yanyuanensis*

- 28b. Basal leaf blade ovate-triangular, base not cordate; cauline leaf borne near base of stem,
about as large as basal leaves; petals white 8. *P. humilis*
- 21b. Staminoles branched, or flat with apex dentate or lobed.
- 29a. Staminoles branched.
- 30a. Staminoles 7–23-branched 63. *P. palustris*
- 30b. Staminoles (3 or 5)(or 7)–branched.
- 31a. Petal margin fimbriate proximally, entire or undulate distally.
- 32a. Staminoles divided almost to base 58. *P. gansuensis*
- 32b. Staminoles divided for ca. 1/2 their length 59. *P. simaoensis*
- 31b. Petal margin fimbriate throughout; staminoles divided for 1/3–1/2 their length.
- 33a. Basal leaf blade ovate-cordate, thick textured, base cordate 61. *P. perciliata*
- 33b. Basal leaf blade reniform, thin textured, base subcordate or truncate 62. *P. davidii*
- 29b. Staminoles flat, apex dentate or lobed.
- 34a. Staminoles (3–)5–7-dentate at apex.
- 35a. Cauline leaf borne near base of stem 22. *P. qinghaiensis*
- 35b. Cauline leaf borne near middle of stem or distally.
- 36a. Petals broadly spatulate or obovate, base broadly and shortly clawed (claw ca. 1 mm),
margin erose or subentire; basal leaf blade cuneate or subcordate at base 13. *P. degeensis*
- 36b. Petals triangular-ovate, base long clawed (claw 2–2.5 mm), margin long fimbriate
proximally; basal leaf blade deeply cordate at base 14. *P. farreri*
- 34b. Staminoles 3- or 5-lobed at apex.
- 37a. Staminoles 5-lobed at apex.
- 38a. Petal margin sparsely and shortly fimbriate throughout; stem less than 10 cm . 52. *P. omeiensis*
- 38b. Petal margin long fimbriate proximally; stem more than 10 cm.
- 39a. Staminoles lobes subequal.
- 40a. Basal leaf blade broadly cordate, about as long as wide, 2.5–4.5(–5) × 3.8–5.5 cm;
petals shortly clawed 47. *P. wightiana*
- 40b. Basal leaf blade oblong-cordate, nearly 2 × as long as wide, to 7 cm; petals long
clawed 49. *P. monochoriifolia*
- 39b. Staminoles lobes unequal.
- 41a. Central 3 staminoles lobes ca. 3 × as long as lateral ones; petals yellow-white;
basal
leaf blade reniform 50. *P. yiliangensis*
- 41b. Staminoles lobes subequal, central 3 parted, lateral ones very shallowly lobed;
petals
white; basal leaf blade ovate-cordate 51. *P. chengkouensis*
- 37b. Staminoles 3-lobed at apex.
- 42a. Staminoles lobes unequal.
- 43a. Central staminoles lobe much shorter than lateral ones; petals greenish, narrowly
oblong,
margin sparsely and shortly fimbriate; cauline leaf borne distally on stem 39. *P. cooperi*
- 43b. Central staminoles lobe ca. 0.6 mm longer than lateral ones; petals white, obovate,
rarely subspatulate, margin entire; cauline leaf borne near base of stem 40. *P. laxmannii*
- 42b. Staminoles lobes subequal.
- 44a. Petal margin long fimbriate proximally.
- 45a. Basal leaf blade ovate-cordate, larger, thick textured 19. *P. crassifolia*
- 45b. Basal leaf blade reniform, orbicular, or broadly ovate-orbicular, occasionally
ovate-
cordate, thin textured.
- 46a. Petals oblanceolate, with 2 green, oblong glands near base, apex acute; basal leaf
blade
1.2–2.4 × 1.2–2.4 cm, much larger than cauline leaf 17. *P. yui*
- 46b. Petals broadly obovate, eglandular, apex emarginate; basal leaf blade 6–11 ×
7.5–14 mm, subequaling cauline leaf 18. *P. chinensis*
- 44b. Petal margin shortly fimbriate or erose proximally, or entire.
- 47a. Petal margin shortly fimbriate proximally.
- 48a. Sepals and petals purple-brown punctate; petals 5–6 × 3–4 mm; basal leaf blade
9–10 × 8–9 mm 21. *P. venusta*

- 48b. Sepals and petals not punctate; petals 7.8–9.5 × 5.2–6.1 mm; basal leaf blade 1–1.5 cm × 9–14 mm 20. *P. epunctulata*
- 47b. Petal margin erose or entire.
- 49a. Ovary superior.
- 50a. Basal leaf blade broadly elliptic, attenuate into petiole at base; petals yellow, spatulate or spatulate-oblongate 23. *P. filchneri*
- 50b. Basal leaf blade ovate-reniform or ovate-cordate, cordate at base; petals white or green, obovate or lanceolate.
- 51a. Petals green, minutely purple punctate, lanceolate, margin densely erose, apex acuminate 25. *P. lanceolata*
- 51b. Petals white, obovate, margin sparsely erose or entire, apex rounded or 2-lobed.
- 52a. Basal leaf blade ovate-reniform; stem to 4 cm 26. *P. kangdingensis*
- 52b. Basal leaf blade ovate-cordate; stem usually more than 4 cm.
- 53a. Petals 2-lobed or emarginate at apex; staminodes 3-lobed for ca. 1/3 their length 27. *P. mysorensis*
- 53b. Petals rounded at apex; staminodes shallowly 3(–6)-lobed for ca. 1/6 their length.
- 54a. Stem 7–10 cm; basal leaf blade densely brown punctate, ovate, with 5–7 arcuate veins, base cordate; staminode lobes rounded at apex, subequal 29. *P. cacuminum*
- 54b. Stem 16–27 cm; basal leaf blade not distinctly punctate, ovate-oblong, 7–9-veined, base deeply cordate; staminode lobes truncate at apex, central one narrower than lateral ones 28. *P. submysorensis*
- 49b. Ovary semi-inferior.
- 55a. Basal leaf blade ovate-cordate or reniform.
- 56a. Basal leaf blade ovate-cordate or reniform, longer than wide base cordate 31. *P. pusilla*
- 56b. Basal leaf blade ovate-cordate, about as long as wide, base deeply cordate.
- 57a. Stem 8–13 cm; basal leaf blade 5–15 × 7–15 mm, cordate or subcordate at base 27. *P. mysorensis*
- 57b. Stem 23–32 cm; basal leaf blade 3–4.1 × 3–4.1 cm, deeply cordate at base 30. *P. cordata*
- 55b. Basal leaf blade ovate-oblong.
- 58a. Stem (13–)17–40 cm; basal leaf blade ovate-oblong or ovate-triangular, truncate, subcordate, or sometimes decurrent at base.
- 59a. Staminode lamina 3-parted for (1/2–)2/3 its length 32. *P. oreophila*
- 59b. Staminode lamina 3-lobed for 1/5–1/4(–1/2) its length.
- 60a. Staminodes ca. 3.2 mm, lobes shortly linear; petals yellow 33. *P. tibetana*
- 60b. Staminodes 4–5 mm, lobes lanceolate or ovate-lanceolate; petals white 34. *P. nubicola*
- 58b. Stem 6–21 cm; basal leaf blade ovate-cordate, not truncate at base.
- 61a. Petals obovate or broadly so.
- 62a. Petals purple punctate, broadly obovate; stem less than 6 cm; basal leaf petiole ca. 1 cm, leaf blade usually cordate at base 35. *P. subscaposa*
- 62b. Petals not or indistinctly punctate, obovate; stem 8–21 cm, rarely shorter; basal leaf petiole (1.5–)3.5–6 cm, leaf blade usually truncate at base 36. *P. degenensis*
- 61b. Petals lanceolate or oblong-lanceolate.
- 63a. Petals white; basal leaf petiole 8–15 mm, occasionally to 4 cm 37. *P. trinervis*
- 63b. Petals green; basal leaf petiole (1–)5–25 mm 38. *P. viridiflora*

1. *Parnassia longipetala* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 182. 1924.
 长瓣梅花草 chang ban mei hua cao
 Stems 1 or 2, 12–30 cm, often with 1 leaf near middle.
 Basal leaves usually 1, rarely 2; petiole 4–11 cm; leaf blade abaxially greenish, adaxially deep green, reniform, 3–6 × 5–9.5 cm, inconspicuously arcuate veined abaxially, base deeply cordate, apex rounded. Cauline leaf sessile, reniform, 0.8–2 × 1.5–3.5 cm, base

sometimes with a few rusty brown, hairlike appendages. Flower 2.5–3.2 cm in diam.; hypanthium turbinate. Sepals semiorbicular or ovate, 4–6 × 2–4 mm, margin serrulate, apex obtuse. Petals green, lanceolate or narrowly oblong-lanceolate, (1–)1.5–2.5 cm × 4–5.5 mm, base cuneate into a claw 2–2.5 mm, margin densely serrulate or shortly fimbriate, apex acute. Anthers oblong, ca. 1.2 mm; filaments 5–6 mm; staminodes dark purple, terete, discoid, 3.5–4 mm, shorter

than stamens, stalk ca. 2×1 mm, apex of lamina rounded, entire, occasionally indistinctly dentate. Ovary superior, depressed globose, with 3 or 4 slightly thickened angles; style ca. 1.5 mm; stigma 3-lobed, lobes spreading, obovate. Capsule depressed globose. Seeds brown, glossy, oblong. Fl. Jul, fr. Aug.

• *Tsuga* forests, forest margins, *Rhododendron* scrub, alpine meadows; 2400–3900 m. SE Xizang, NW Yunnan.

1a. Petals 1.5–2.5 cm \times 4–5.5 mm; stem 15–30 cm; basal leaf blade 3–6 \times 5–9.5 cm 1a. var. *longipetala*

1b. Petals to 1 cm; stem ca. 12 cm; basal leaf blade relatively small 1b. var. *brevipetala*

1a. *Parnassia longipetala* var. *longipetala*

长瓣梅花草(原变种) chang ban mei hua cao (yuan bian zhong)

Stem 15–30 cm. Basal leaf blade 3–6 \times 5–9.5 cm.

Petals 1.5–2.5 cm \times 4–5.5 mm.

• *Tsuga* forests, forest margins, alpine meadows; 2400–3900 m. SE Xizang, NW Yunnan.

1b. *Parnassia longipetala* var. *brevipetala* Z. P. Jien ex T. C. Ku, Bull. Bot. Res., Harbin 7(1): 23. 1987.

短瓣梅花草 duan ban mei hua cao

Stem ca. 12 cm. Basal leaf blade relatively small. Petals to 1 cm.

• *Rhododendron* scrub; 3500–3600 m. NW Yunnan (Dêqên Xian).

2. *Parnassia tenella* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 2: 80. 1858.

青铜钱 qing tong qian

Stems 1 or 2, slender, (3.5–)5–11 cm, with 1 leaf near middle or distally. Basal leaves 1 or 2; stipules brown fimbriate at margin; petiole 2–8 cm; leaf blade abaxially greenish and purple punctate, adaxially deep green, reniform, 0.8–2.5 \times 1.3–3 cm, conspicuously arcuate veined, base deeply cordate, apex rounded, often emarginate, minutely apiculate. Cauline leaf sessile, similar to basal ones but smaller, 2–4 \times 3–5 mm, base often with several caducous, rusty brown, hairlike appendages. Flower 0.5–1.5 cm in diam.; hypanthium turbinate. Sepals semiorbicular, ovate, or triangular-ovate, 3–5 \times 1–2 mm, margin erose, apex rounded. Petals green, sparsely purple punctate, broadly obovate, 4–8 \times 3–6 mm, parallel 7–9-veined, base cuneate into a short claw, margin densely erose or denticulate, apex rounded. Anthers oblong, 0.5–1 mm; filaments 4–6 mm; staminodes terete, discoid, ca. 1/2 as long as stamens, stalk longer than lamina, apex of lamina entire, occasionally minutely crenate. Ovary superior, purple punctate, globose; style ca. 1 mm; stigma 3-lobed. Capsule broadly obcordate, 3-angled, 3-valved. Seeds brown, glossy, oblong. Fl. Aug, fr. Sep.

Mixed forests, forest margins; 2800–3400 m. W Sichuan, Xizang (Linzhi), NW Yunnan [Nepal, Sikkim].

3. *Parnassia angustipetala* T. C. Ku, Bull. Bot. Res., Harbin 7(1): 23. 1987.

窄瓣梅花草 zhai ban mei hua cao

Stem 1, 2.5–4 cm, with 1 leaf usually distally or near apex. Basal leaves 6–9, forming a rosette; stipules

brown fimbriate at margin; petiole to 1 cm; leaf blade abaxially greenish, adaxially deep green, usually ovate-cordate, 5–7 \times ca. 4 mm, inconspicuously 3-veined abaxially at base, base cordate, sometimes subtruncate, apex rounded. Cauline leaf sessile, semiamplexicaul, similar to basal ones but much smaller, base sometimes with a few rusty brown appendages. Flower 6–8 mm in diam.; hypanthium shortly campanulate. Sepals inconspicuously purple punctate, oblong or ovate-lanceolate, 3–4 \times ca. 1.5 mm, margin entire, apex obtuse. Petals green, densely purple-brown punctate, spatulate or ovate-oblongate, 5–7 \times ca. 1.5 mm, base abruptly contracted into a claw ca. 1.5 mm, margin entire, indistinctly erose, or undulate, apex obtuse or acute. Anthers ellipsoid, ca. 0.5 mm; filaments 3–4 mm; staminodes terete, discoid, ca. 1.5 mm, shorter than stamens, stalk ca. 0.5 \times 0.8 mm, lamina dark purple, ca. 1 \times 1.5 mm, apex rounded, entire. Ovary superior, ovoid; style ca. 1–1.5 mm; stigma 3-lobed, lobes reflexed, obovate. Capsule ovoid. Seeds brown, glossy. Fl. Jul.

• Forest margins, alpine meadows; ca. 2900 m. SW Sichuan (Muli Zang Zu Zizhixian).

In habit, this species resembles the two varieties of *Parnassia yunnanensis*. However, *P. yunnanensis* differs in having white, obovate petals; var. *longistipitata* differs in having longer-stalked staminodes; and var. *yunnanensis* differs in having apically inconspicuously 3-dentate staminodes.

4. *Parnassia yulongshanensis* T. C. Ku, Bull. Bot. Res., Harbin 7(1): 25. 1987.

玉龙山梅花草 yu long shan mei hua cao

Stem usually 1, 1.5–2 cm, with 1 leaf near apex. Basal leaves 2–5; petiole ca. 1 cm; leaf blade abaxially greenish, adaxially deep green, ovate-reniform, rarely ovate-cordate, 4–5 \times 4–6 mm, inconspicuously 5-veined abaxially, base cordate, apex rounded or obtuse. Cauline leaf sessile, semiamplexicaul, ovate-lanceolate, ca. 4 \times 1.5–2 mm, often with 2 or 3 rusty brown appendages at base. Flower 8–9 mm in diam.; hypanthium shortly campanulate. Sepals oblong, rarely ovate, ca. 2.5 \times 1.8 mm, base often with rusty brown appendages, margin entire, apex rounded or obtuse. Petals green, oblong, ca. 3 \times 1.5 mm, 3-veined, base attenuate into a broad claw ca. 0.5 mm, margin erose proximally, apex rounded. Anthers oblong, ca. 0.8 mm; filaments 0.5–2.8 mm; staminodes dark purple, terete, discoid, ca. 1.5 mm, shorter than stamens, stalk ca. 0.8 \times 0.7 mm, lamina ca. 0.6 \times 0.9 mm, apex truncate or emarginate, often 1- or 2-dentate centrally. Ovary superior, ovoid. Capsule unknown. Fl. Jul.

• Alpine meadows; 4100–5300 m. NW Yunnan (Lijiang Naxi Zu Zizhixian).

5. *Parnassia longipetaloides* J. T. Pan, Acta Phytotax. Sin. 23: 222. 1985.

似长瓣梅花草 shi chang ban mei hua cao

Stems 1 or 2, 2.7–4 cm, usually with 1 leaf distally. Basal leaves 5 or 6; petiole 0.9–2.2 cm; leaf blade abaxially greenish, adaxially deep green, ovate-

reniform, 4.5–6.5 × 4.1–7 mm, 3-veined abaxially, base cordate, apex obtuse. Cauline leaf sessile, amplexicaul, cordate-reniform, 4–6 × 4–5 mm, base sometimes with a few rusty brown appendages. Flower 3.5–5.5 mm in diam.; hypanthium campanulate. Sepals erect at anthesis, ovate-elliptic, 2.5–3 × 1.9–2 mm, 3-veined, base with several rusty brown appendages, margin entire, apex obtuse. Petals yellow-green or brown-green, oblong or lanceolate, 3.2–4.1 × 1.5–2 mm, base abruptly contracted into a claw ca. 1 mm, sometimes with several rusty brown, hairlike appendages, margin indistinctly erose proximally, apex acute. Anthers ellipsoid, ca. 0.8 mm; filaments ca. 3 mm; staminodes terete, ca. 1.5 mm, stalk ca. 0.5 × 0.6 mm, lamina apically discoid, disc 0.8 mm in diam., rim indistinctly 4–6-dentate. Ovary mostly superior; style ca. 0.5 mm; stigma 3-lobed. Capsule unknown. Fl. Jul.

• Alpine meadows; 3600–4200 m. NW Yunnan (Eryuan Xian, Lijiang Naxi Zu Zizhixian).

6. *Parnassia yunnanensis* Franchet, J. Bot. (Morot) 10: 266. 1896.

云南梅花草 *yun nan mei hua cao*

Plants caespitose. Stems 1–3, 4–8 cm, with 1 leaf distally or near apex. Basal leaves 3–5, forming a rosette; petiole 0.5–2 cm; leaf blade abaxially greenish, glaucous, and densely purple-brown punctate, adaxially deep green, broadly ovate, 6–11 × 6–11 cm, base deeply cordate, apex obtuse. Cauline leaf sessile, semiamplexicaul, ovate or semiorbicular, 2–3 mm, base sometimes with a few rusty brown appendages. Flower 0.7–1.4 cm in diam.; hypanthium hemispheric. Sepals ovate-oblong or semiorbicular, ca. 4 × 2 mm, margin sometimes shallowly erose, apex rounded. Petals white or whitish green, densely purple-brown punctate or not, obovate-oblong, ca. 7 mm, margin densely erose or shortly fimbriate, apex emarginate. Anthers oblong, 0.5–1 mm; filaments 3–4 mm; staminodes terete, 1–1.5 mm, stalk 0.7–1 mm, lamina apically discoid, disc ca. 1.2 mm in diam., rim undulate. Ovary superior, globose; stigma 3-lobed. Capsule depressed globose. Fl. Jul–Aug, fr. Sep.

• Forests, marshy meadows, grassy slopes, streamsides; 3300–4300 m. W Sichuan, NW Yunnan.

- 1a. Staminodes ca. 1 mm, stalk ca. 0.7 mm; petals whitish green, densely purple-brown punctate 6a. var. *yunnanensis*
- 1b. Staminodes ca. 1.5 mm, stalk ca. 1 mm; petals white, not punctate 6b. var. *longistipitata*

6a. *Parnassia yunnanensis* var. *yunnanensis*

云南梅花草(原变种) *yun nan mei hua cao* (*yun bian zhong*)

Petals whitish green, densely purple-brown punctate. Staminodes ca. 1 mm, stalk ca. 0.7 mm.

• Forests, grassy slopes, streamsides; 3500–4000 m. NW Yunnan.

6b. *Parnassia yunnanensis* var. *longistipitata* Z. P. Jien, Acta Phytotax. Sin. 8: 255. 1963.

长柄云南梅花草 *chang bing yun nan mei hua cao*
Petals white, not punctate. Staminodes ca. 1.5 mm, stalk ca. 1 mm.

• Marshy meadows, grassy places; 3300–4300 m. W Sichuan (Kangding Xian, Qianning).

7. *Parnassia yanyuanensis* T. C. Ku, Bull. Bot. Res., Harbin 7(1): 26. 1987.

盐源梅花草 *yan yuan mei hua cao*

Stems 1(or 2), 3–4 cm, with 1 leaf distally or near apex. Basal leaves 4–7; petiole 1.5–2.8 cm; leaf blade abaxially greenish, adaxially deep green, ovate-cordate, 6–11 × 6–9 mm, inconspicuously 3-veined abaxially at base, base cordate, apex obtuse. Cauline leaf very shortly petiolate; leaf blade ovate-lanceolate, ca. 7 × 4 mm, base truncate or subcordate, often with several rusty brown appendages. Flower ca. 1 cm in diam.; hypanthium shortly campanulate. Sepals long elliptic, 2.5–2.8 × ca. 2 mm, base often with 2 or 3 rusty brown appendages, margin entire, apex obtuse. Petals yellowish, inconspicuously purple punctate, obovate-oblong, 4–4.8 × ca. 2 mm, base attenuate into a claw ca. 1 × 0.8 mm, margin entire or indistinctly erose, apex rounded. Anthers oblong, ca. 0.8 mm; filaments 3–4 mm; staminodes terete, discoid, ca. 1.1 × 0.2 mm, shorter than stamens, stalk ca. 0.2 × 0.8 mm, lamina ca. 0.7 × 0.2 mm, apex rounded. Ovary superior, ovoid; stigma 3-lobed. Capsule unknown. Fl. Jul.

• Rock fissures on mountain slopes; ca. 4000 m. SW Sichuan (Yanyuan Xian).

In habit, this species resembles both *Parnassia angustipetala* and *P. yulongshanensis*. However, the former species differs in having sepals oblong or ovate-lanceolate, and petals green, densely purple-brown punctate, spatulate or ovate-lanceolate. The latter species differs in having green petals and apically truncate or emarginate staminodes.

8. *Parnassia humilis* T. C. Ku, Bull. Bot. Res., Harbin 7(1): 27. 1987.

矮小梅花草 *ai xiao mei hua cao*

Stems 1–3, 3–5 cm, with 1 leaf near base. Basal leaves 7–9, forming a rosette; petiole ca. 0.5 × 1 cm; leaf blade abaxially greenish, adaxially deep green, ovate-triangular, 0.8–1.4 cm × 6–9 mm, conspicuously brown 3–5-veined abaxially, base attenuate, apex acuminate. Cauline leaf similar to basal ones but often smaller, base sometimes with a few caducous, rusty brown appendages. Flower ca. 1 cm in diam.; hypanthium inconspicuous. Sepals ovate-lanceolate, 3.5–4 × ca. 1.8 mm, conspicuously 3-veined, margin entire, apex obtuse. Petals white, indistinctly punctate, elliptic or oblong, 6–7 × ca. 2 mm, 3-veined, base with a short claw ca. 1 × 0.8 mm, margin sparsely fimbriate proximally, erose or subentire distally, apex acute. Anthers subglobose, 0.5–1 mm; filaments ca. 2.5 mm; staminodes terete, discoid, ca. 2 mm, shorter than stamens, stalk ca. 1.2 × 0.5 mm, lamina ca. 0.8 × 1.2 mm. Ovary superior. Capsule unknown. Fl. Jul.

- Riverside meadows; ca. 5000 m. EC Xizang (Amdo Xian).

In habit, this species resembles both *Parnassia angustipetala* and *P. yunnanensis*. However, the former species differs in having basal leaf blades usually ovate-cordate, with a cordate, sometimes subtruncate base, and petals green, densely purple-brown punctate, spatulate or ovate-oblongate. The latter species differs in having basal leaf blades broadly ovate, with a deeply cordate base, and petals white or whitish green, often densely purple-brown punctate, obovate-oblong.

9. *Parnassia petitmenginii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 285. 1910.

贵阳梅花草 *gui yang mei hua cao*

Stems 1–3, slender, 4–7 cm. Basal leaves numerous; petiole long, broadly winged along both sides; leaf blade abaxially dark green, adaxially deep green, spatulate, 5–10 mm, base cuneate, attenuate, apex rounded. Cauline leaf sessile, amplexicaul, small. Flower small, 5–8 mm in diam. Sepals oblong, ca. 1/2 as long as petals, apex obtuse. Petals white, broadly elliptic, veined, margin entire. Anthers white, subglobose; staminodes brown, ca. 1/2 as long as stamens, margin entire. Ovary conical.

- C Guizhou (Guiyang Shi).

The present authors have seen no specimens of this species; the above description is based on the protologue.

10. *Parnassia esquirolii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 258. 1914.

龙场梅花草 *long chang mei hua cao*

Stems 3–12, slender, to 6 cm, with 1 leaf near apex. Basal leaves 12–25, forming a rosette; petiole 1–2 cm; leaf blade orbicular- or obovate-spatulate or spatulate, 0.7–1.5 cm × 5–9 mm, base attenuate, apex obtuse or subacute, apiculate. Cauline leaf subsessile, broadly obovate, ca. 3 mm wide, 3-veined, apex obtuse. Flower 6–8 mm in diam. Sepals linear-lanceolate, ca. 4 × 1 mm, 1-veined, apex obtuse. Petals white, narrowly obovate-spatulate, ca. 5 × 2 mm, base attenuate into a claw ca. 1 mm, margin entire, apex acute. Anthers broadly ellipsoid, ca. 0.5 mm; staminodes flat, distally sublingulate, ca. 1/2 as long as stamens, ca. 1.25 × 0.3 mm, margin entire, apex obtuse. Ovary superior, conical, ca. 3 × 1.5 mm; stigma 3-lobed. Capsule trigonous-globose, ca. 3 mm in diam., apex acutely trigonous. Seeds ovoid-ellipsoid, ca. 0.4 mm, smooth.

- Guizhou (Longchang).

The present authors have seen no specimens of this species; the above description is based on Evans (Notes Roy. Bot. Gard. Edinburgh 13: 173. 1921).

11. *Parnassia faberi* Oliver, Hooker's Icon. Pl. 18: t. 1778. 1888.

峨眉梅花草 *e mei mei hua cao*

Parnassia faberi f. *abbreviata* Engler; *P. faberi* f. *ramosa* Engler.

Stems 2 or 3, short or occasionally branched and elongate, 5–8 cm, with 1 leaf near middle. Basal leaves numerous; petiole 5–8 mm; leaf blade abaxially

greenish, adaxially purple-green, broadly ovate, broadly rhomboid-ovate, or broadly obovate, 0.6–1.5 cm × 5–14 mm, base cuneate, apex rounded or obtuse, sometimes apiculate. Cauline leaf sessile, semiamplexicaul, oblong or obovate, sometimes rhomboid, 2–3 mm, base often with a few rusty brown appendages. Flower ca. 1 cm in diam.; hypanthium inconspicuous. Sepals purple punctate, ovate-lanceolate, oblong, or elliptic, 4–5 × 2–3 mm, margin entire, apex obtuse. Petals white, indistinctly punctate, obovate-oblong, 3–5 × ca. 3 mm, 3-veined, base abruptly contracted into a stalk ca. 0.5 mm, margin entire, apex acuminate. Anthers ellipsoid, ca. 0.5 mm; filaments ca. 0.5 mm; staminodes with stalk ca. 2 mm, lamina turgid distally, 2-lobed and 2-labiate, abaxial lobe entire, adaxial lobe 2- or 3-lobed. Ovary superior, ovoid or ellipsoid; stigma 3-lobed, lobes ovate. Capsule subglobose. Seeds brown, glossy, oblong. Fl. Jul–Sep, fr. Sep.

- Moist shaded forest understories, moist rocky places, roadsides; 1100–1900 m. C Sichuan (Emei Shan, Mabian Xian), NE Yunnan (Yiliang Xian).

12. *Parnassia labiata* Z. P. Jien, Acta Phytotax. Sin. 8: 253. 1963.

宝兴梅花草 *bao xing mei hua cao*

Stem 1 or 2 (or 3), occasionally branched, elongate, 5–12 cm, with 1 leaf near middle. Basal leaves forming a rosette; petiole 1.5–3 × as long as leaf blade; leaf blade abaxially greenish, inconspicuously brown punctate, adaxially deep green, rhomboid, ovate- or obovate-rhomboid, or suborbicular, 2–3 mm, arcuate 5-veined abaxially, base cuneate, apex subobtuse, often minutely apiculate. Cauline leaf sessile, amplexicaul, rhomboid-elliptic, ca. 2 mm, base with several brown, membranous appendages. Flower 5–10 mm in diam.; hypanthium inconspicuous. Sepals spreading, oblong-lanceolate or triangular-lanceolate, ca. 3 × 1 mm, midvein conspicuous, margin entire, apex rounded. Petals white, brown punctate, broadly elliptic or ovate-elliptic, ca. 5 × 3 mm, 3-veined, base rounded, abruptly contracted into a claw ca. 1 mm, margin entire, apex obtuse or apiculate. Anthers ellipsoid, ca. 0.8 mm; filaments unequal; staminodes minutely red punctate, stalk slender, lamina 2-lobed, 2-labiate, abaxial lobe entire and ligulate, adaxial lobe flat, digitately 2–5-fid. Ovary superior, ovoid or oblong; style usually conspicuous; stigma 3- or 4-lobed. Capsule ovoid, ca. 3 mm. Seeds brown, glossy. Fl. Aug–Sep, fr. Sep.

- Grassy slopes; ca. 1000 m. W Sichuan (Baoping Xian).

13. *Parnassia degeensis* T. C. Ku, Bull. Bot. Res., Harbin 7(1): 30. 1987.

德格梅花草 *de ge mei hua cao*

Stems 1 or 2, ca. 6 cm, with 1 leaf distally. Basal leaves 3 or 4; petiole 1–2 cm, flat; leaf blade abaxially greenish, adaxially deep green, broadly ovate, 5–7 × 6–

7 mm, 5(–7)-veined abaxially, base cuneate or subcordate, apex rounded. Cauline leaf sessile, semiamplexicaul, ovate, ca. 2 mm, base sometimes with a few rusty brown appendages. Flower 6–8 mm in diam.; hypanthium shortly turbinate. Sepals oblong, ca. 4 × 2.5 mm, margin entire, apex rounded. Petals green, densely purple-brown punctate, broadly spatulate or obovate, 7–8 × 3.5–4 mm, brownish 5–7-veined with veins confluent apically, base attenuate into a claw ca. 1 mm, margin erose or subentire, apex rounded. Anthers oblong, ca. 0.8 mm; filaments ca. 8 mm; staminodes flat, ca. 2.8 mm, stalk ca. 1.2 mm, lamina undulate or 5–7-dentate at apex. Ovary ovoid; style 0.8–1 mm; stigma 3-lobed, lobes spreading, semiorbicular. Capsule unknown. Fl. Aug.

• Rock fissures. NW Sichuan (Dêgê Xian).

14. *Parnassia farreri* W. E. Evans, Notes Roy. Bot. Gard. Edinburgh 13: 174. 1921.

长爪梅花草 chang zhao mei hua cao

Stems 1 or 2, slender, 4–10 cm, with 1 leaf near middle or distally. Basal leaves 2 or 3(–5); petiole slender, 1–3 cm; leaf blade abaxially greenish, densely brown punctate, adaxially deep green, orbicular, rarely reniform, 2–9(–14) × 2–9(–14) mm, base deeply cordate, apex rounded, rarely obtuse. Cauline leaf sessile or subsessile, purple-brown punctate, ovate-triangular or ovate, ca. 4 × 3.5 mm, base not cordate, often with a few rusty brown appendages, apex acute. Flower 8–11 mm in diam.; hypanthium turbinate. Sepals purple-brown punctate, ovate or oblong, ca. 2.5 × 1.8 mm, margin entire, apex obtuse or acute. Petals white, densely purple-brown punctate, triangular-ovate, 4.5–6 × ca. 2 mm, base abruptly contracted into a claw 2–2.5 × ca. 0.5 mm, margin long fimbriate proximally, entire or undulate distally, apex rounded-obtuse. Anthers ellipsoid, 0.5–1 mm; filaments 2–2.5 mm; staminodes broadly spatulate, flat, ca. 0.8 × 1.2 mm, stalk ca. 0.5 × 1.2 mm, margin dentate or undulate distally, apex rounded. Ovary superior, broadly ovoid; style ca. 0.8 mm; stigma 3-lobed, lobes long ovate. Capsule depressed ovoid. Seeds brown, glossy, oblong. Fl. Aug–Sep, fr. Oct.

Forests, valleys, rock fissures; 3000–3400 m. NW Yunnan (Gongshan Drung-Nu Zu Zizhixian) [Myanmar].

15. *Parnassia lutea* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 320. 1895.

黄花梅花草 huang hua mei hua cao

Stems 1–3(–7), 13–20 cm, leafless. Basal leaves 2–4; petiole 1.2–2.5(–4) cm, with 3 brownish striations; leaf blade ovate or oblong-ovate, 0.8–1.3(–2.5) cm × 5–9(–15) mm, 3(–5)-veined with veins prominent abaxially and impressed adaxially, base attenuate or subcordate, apex rounded. Flower 1.8–2.3 cm in diam.; hypanthium shortly turbinate. Sepals lanceolate, ca. 7 × 2–5 mm, 3(or 5)-veined, margin entire, apex obtuse or subacute.

Petals deep yellow, obovate, 1.2–1.4 cm × 5–8 mm, base contracted into a claw ca. 4 × 1.5 mm, curved 5-veined with veins branched, margin entire, apex rounded and cleft. Anthers oblong, ca. 1.5 mm; filaments ca. 4 mm; staminodes flat, ca. 3.5 mm, 3-lobed at apex, lobes linear, ca. 1.2 mm, rounded and slightly thickened at apex. Ovary semi-inferior, long ovoid; style very short; stigma 3-lobed, lobes spreading, oblong, nearly equaling style. Capsule ovoid, 3-valved. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Aug.

• Scrub, alpine meadows, under rocks; 3500–4100 m. NE Qinghai.

16. *Parnassia scaposa* Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 306. 1931.

白花梅花草 bai hua mei hua cao

Parnassia aphylla T. C. Ku.

Stem usually 1, 10–20 cm, leafless. Basal leaves 4 or 5; petiole 5–14(–23) cm; leaf blade elliptic or obovate, 1.2–2.5 × 0.8–1.3 cm, 3- or 5-veined with veins prominent abaxially and impressed adaxially, base attenuate, apex rounded. Flower 1.8–2.5 cm in diam.; hypanthium shortly turbinate. Sepals ovate-lanceolate, ca. 8 × 2.5 mm, distinctly 3-veined, margin entire, apex obtuse. Petals white or white-yellow, obovate, ca. 1.4 cm × 7–8 mm, base cuneate into a claw ca. 2.5 × 2 mm, apex rounded or emarginate. Anthers ellipsoid, ca. 1.5 mm; filaments ca. 4 mm; staminodes flat, ca. 3.5 mm, stalk ca. 2.8 × 1 mm, lamina divided for 1/5–1/3 its length into 3 lobes, central lobe linear, ca. 0.6 mm, longer than lateral ones, apex truncate, slightly thickened. Ovary semi-inferior, ovoid; style short; stigma 3-lobed. Capsule unknown. Fl. Aug.

• Scrub, alpine meadows; 3700–4500 m. S Qinghai, W Sichuan, S Xizang (Gongbo'gyamda Xian).

17. *Parnassia yui* Z. P. Jien, Acta Phytotax. Sin. 8: 256. 1963.

俞氏梅花草 yu shi mei hua cao

Stems 1 or 2(–4), 6–14 cm, usually with 1 leaf near middle. Basal leaves usually 2; petiole slender, 1.5–3 cm; leaf blade abaxially greenish, adaxially deep green, orbicular or broadly ovate-orbicular, 1.2–2.4 × 1.2–2.4 cm, arcuate 7-veined, base deeply cordate, apex rounded-obtuse, distinctly apiculate. Cauline leaf sessile or subsessile, ovate or triangular, very small, 1–4 mm, base truncate or broadly cuneate, often with several rusty brown appendages ca. 1 mm. Flower 0.8–1.3 cm in diam.; hypanthium shortly turbinate. Sepals brown punctate on both surfaces, oblong-lanceolate, ca. 3 × 1.2 mm, 3-veined, margin entire, apex subobtuse, acute, acuminate. Petals white, purple-brown punctate on both surfaces, oblanceolate, 4.5–6 × 1.8–2.5 mm, 1- or 3-veined, base attenuate into a claw 1–1.5 mm, with 2 green, oblong glands, margin fimbriate proximally, apex acute to acuminate. Anthers oblong, 0.5–1 mm; filaments ca. 3 mm; staminodes flat, ca. 2 × 2.4 mm, 3-lobed, central lobe narrower than lateral ones. Ovary ovoid, proximally sunken into hypanthium for ca. 1/4 its length; style 1–1.2 mm; stigma 3-lobed, lobes

oblong. Capsule ovoid. Seeds brown, glossy, oblong. Fl. Aug.

• Beneath bamboos; ca. 3000 m. NW Yunnan (Gongshan Drung-Nu Zu Zizhixian).

18. *Parnassia chinensis* Franchet, Bull. Soc. Bot. France 44: 252. 1897.

中国梅花草 zhong guo mei hua cao

Stems 1–4, 8–16 cm, with 1 leaf near middle. Basal leaves usually 3–8; petiole 1.5–3.5(–5) cm; leaf blade abaxially gray-green, purple punctate, adaxially brown-green, usually reniform or ovate-reniform, occasionally ovate-cordate, 0.6–1.1 × 0.75–1.4 cm, distinctly 3–5-veined abaxially, base deeply cordate, apex rounded, sometimes obtuse or emarginate. Cauline leaf sessile, semiamplexicaul, abaxially densely purple-brown punctate, ovate-cordate, 4–9 × 4–8 mm, base often with several rusty brown appendages. Flower 1–1.4 cm in diam.; hypanthium turbinate. Sepals densely purple punctate, ovate or oblong, 3–5 × 2.5–3.5 mm, margin subentire, apex acute. Petals white, brown punctate, broadly obovate, 1–1.15 cm × ca. 6 mm, base attenuate into a claw 1.2–2 mm, margin densely long fimbriate or lacerate-fimbriate proximally, entire, undulate, or irregularly crenate distally, apex emarginate. Anthers oblong, ca. 0.8 mm; filaments 4–6 mm; staminodes broadly spatulate, flat, ca. 2.5 mm, stalk ca. 1.5 × 1.2 mm, lamina ca. 1 × 1.8 mm, 3-lobed at apex. Ovary depressed globose, apex abruptly contracted into style; style ca. 1.2 mm; stigma 3-lobed. Capsule unknown. Fl. Jul–Aug.

Scrub, alpine meadows, slopes; 3600–4200 m. C Sichuan, SE Xizang, NW Yunnan [Bhutan, N Myanmar, Nepal, Sikkim].

- 1a. Basal leaf blade reniform, occasionally ovate-cordate; petal margin long fimbriate proximally, basal claw 1.5–2 mm 18a. var. *chinensis*
1b. Basal leaf blade ovate-reniform; petal margin lacerate-fimbriate proximally, basal claw ca. 1.2 mm 18b. var. *sechuanensis*

18a. *Parnassia chinensis* var. *chinensis*

中国梅花草(原变种) zhong guo mei hua cao (yuan bian zhong)

Basal leaf blade reniform, occasionally ovate-cordate. Petal margin long fimbriate proximally, basal claw 1.5–2 mm.

Scrub, alpine meadows, slopes; 3600–4200 m. SE Xizang, NW Yunnan [Bhutan, N Myanmar, Nepal, Sikkim].

18b. *Parnassia chinensis* var. *sechuanensis* Z. P. Jien, Acta Phytotax. Sin. 8: 255. 1963.

四川梅花草 si chuan mei hua cao

Basal leaf blade ovate-reniform. Petal margin lacerate-fimbriate proximally, basal claw ca. 1.2 mm.

• C Sichuan (Baoping Xian, Emei Shan).

19. *Parnassia crassifolia* Franchet, Bull. Soc. Bot. France 44: 253. 1897.

鸡心梅花草 ji xin mei hua cao

Stem 1(or 2), 17–55 cm, with 1 leaf near middle. Basal leaves 2–4(or 5); petiole (4–)7–12 cm; leaf blade

abaxially greenish, densely brown punctate, adaxially deep greenish, ovate-cordate, 2–4.5 × ca. 3.5 cm, leathery, midvein conspicuous, base cordate or subcordate, apex acute or acuminate. Cauline leaf sessile, semiamplexicaul, densely purple-brown punctate, ovate-cordate, 1.3–2.1 cm, base cordate, often with several rusty brown appendages. Flower 1.5–2.5 cm in diam.; hypanthium turbinate. Sepals densely purple-brown punctate, broadly ovate, 5–6 × 2–4 mm, margin entire or erose proximally, apex obtuse or acute. Petals white, densely purple-brown punctate, broadly spatulate, 1–2 cm × 6–8 mm, 3-veined, base with a claw 3–3.5 mm, margin entire or long fimbriate proximally, erose distally, apex rounded. Anthers ellipsoid, ca. 1.8 mm; filaments ca. 8 mm; staminodes flat, ca. 5 mm, 3-lobed to middle, lobes linear, ca. 3 mm, apex rounded. Ovary densely purple-brown punctate, ovoid; style short; stigma 3-lobed. Capsule ovoid, with 3 thickened, longitudinal angles. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep.

• Streamsides, moist places in valleys; 2500–3300 m. W Sichuan, N Yunnan.

In habit, this species resembles *Parnassia wightiana*, which differs in having thinner, subtriangular-ovate, ovate-cordate, broadly cordate, or reniform basal leaf blades and 5-lobed staminodes.

20. *Parnassia epunctulata* J. T. Pan, Acta Phytotax. Sin. 23: 220. 1985.

无斑梅花草 wu ban mei hua cao

Stems 1–3(–5), 9–13 cm, with 1 leaf proximally. Basal leaves 3–5(–8); petiole 1.5–3.2 cm; leaf blade abaxially greenish, adaxially deep green, cordate, rarely ovate-cordate, 1–1.5 × 0.9–1.4 cm, midvein conspicuous, base deeply cordate, apex rounded or subobtusate. Cauline leaf sessile, semiamplexicaul, ovate-cordate, 6–11 × 6–7 mm, base with a few rusty brown appendages. Flower 1.5–1.9 cm in diam.; hypanthium shallow. Sepals erect at anthesis, oblong, 3–4 × 1.5–2 mm, 3-veined with veins confluent apically, base with a few rusty brown appendages, margin entire, apex subobtusate. Petals white, spatulate-ovate, 7.8–9.5 × 5.2–5.4 mm, base attenuate into a claw ca. 1.7 mm, margin shortly fimbriate proximally, undulate or dentate distally, apex rounded or emarginate. Anthers oblong, 0.8–1.2 mm; filaments ca. 3 mm; staminodes spatulate, flat, 3-lobed to middle, lobes sometimes unequal, stalk ca. 1.5 × 1 mm. Ovary ovoid; style ca. 0.8 mm; stigma 3-lobed. Capsule unknown. Fl. Jul.

• Alpine meadows; 3400–3800 m. NW Yunnan.

In habit, this species resembles *Parnassia mysorensis*, which differs in having petals with margin entire, erose, or serrate proximally and apex emarginate or 2-cleft, and staminodes with subequal lobes.

21. *Parnassia venusta* Z. P. Jien, Acta Phytotax. Sin. 8: 257. 1963.

娇媚梅花草 jiao mei mei hua cao

Stem usually 1, 3–8 cm, with 1 leaf near middle or distally. Basal leaves 3–5(–8); petiole slender, 1.5–3.5

cm; leaf blade abaxially greenish, adaxially deep green, reniform, 9–10 × 8–9 mm, arcuate 3–5 veined, base deeply cordate, apex rounded-obtuse, apiculate. Cauline leaf sessile, semiamplexicaul, ovate-cordate or ovate-triangular, ca. 3 mm, base often with a few caducous, rusty brown appendages. Flower 6–10 mm in diam.; hypanthium shortly turbinate. Sepals spreading, brown punctate, ovate-oblong or oblong, 3–4 × 1.5–2 mm, 1-veined, base attenuate, apex obtuse. Petals white, brown punctate, obovate-lanceolate, 5–6 × 3–4 mm, base contracted into a claw 1–1.2 mm, margin shortly fimbriate proximally, entire or erose distally, apex rounded-obtuse, sometimes emarginate or indistinctly crenate. Anthers ellipsoid, ca. 0.8 mm; filaments ca. 2 mm; staminodes broadly spatulate, flat, ca. 2.5 mm, lamina ca. 1.2 mm, slightly shorter than stalk, 3-lobed, central lobe narrower than lateral ones. Ovary ovoid, proximally sunken into hypanthium for ca. 1/3 its length; style short; stigma 3-lobed. Capsule unknown. Fl. Aug–Sep.

• Grassy slopes; 3600–4000 m. NW Yunnan (Dèqên Xian, Gongshan Drung-Nu Zu Zizhixian).

22. *Parnassia qinghaiensis* J. T. Pan in T. N. Ho et al., *Novon* 6: 188. 1996.

青海梅花草 qing hai mei hua cao

Stems several, ca. 2 cm, glabrous, with 1 leaf near base. Basal leaves 8 or 9; petiole 8–10 mm, base broadened into a membranous sheath, margin brown ciliate; leaf blade brown punctate, cordate-reniform, 4–6 × 5–8 mm, leathery, glabrous, base cordate, apex obtuse. Cauline leaf petiolate; petiole to 1 mm, margin brown ciliate; leaf blade subcordate, 3.3–3.5 mm, glabrous. Hypanthium ca. 2 mm. Sepals brown punctate, subovate, 3–3.3 × 2–2.5 mm, 5- or 6-veined with veins apically confluent, glabrous on both surfaces, apex obtuse. Petals pale yellow-green, obovate, 4.3–5 × 3–3.5 mm, base truncate to auriculate, with a claw adnate to hypanthium and staminodes, margin erose, apex retuse. Stamens to 4.3 mm; filaments subulate, base adnate to hypanthium; staminodes subspatulate, 2–2.2 × 0.8–1 mm, apex 3–5-dentate. Ovary semi-inferior, ovoid, ca. 2.5 mm; style to 1.5 mm; stigma 3-lobed. Capsule opening when ripe to expose seeds in an apparent splash cup.

• Dense turf in alpine meadows; ca. 4200 m. S Qinghai (Darlag Xian, Yushu Xian).

The present authors have seen no specimens of this species; the above description is based on the protologue, in which it was said to be allied to *Parnassia venusta*. *Parnassia qinghaiensis* differs from that species in having the cauline leaf borne near the stem base, sepal veins apically confluent, petal and filament bases adnate to the hypanthium, staminodes 3–5-dentate at the apex, and the ovary semi-inferior.

23. *Parnassia filchneri* Ulbrich, *Repert. Spec. Nov. Regni Veg.* 2: 65. 1906.

藏北梅花草 zang bei mei hua cao

Stems ca. 4 cm, with 1 leaf near base. Basal leaves long petiolate; petiole ca. 1 cm; leaf blade oblong, 8–9 × 4–5 mm, 3-veined, base attenuate. Cauline leaf sessile,

amplexicaul, ca. 1 cm. Flower ca. 7 mm in diam.; hypanthium turbinate, ca. 3 mm. Sepals ca. 3.5 mm, narrowly ovate, apex obtuse. Petals yellow, spatulate or spatulate-lanceolate, 5–6 × 2.5 mm, apex obtuse. Anthers ellipsoid, ca. 0.5 mm; filaments filiform; staminodes broadly spatulate, ca. 2.5 mm, 3-lobed at apex, lobes short, truncate at apex.

• SC Qinghai (Madoi Xian).

The present authors have seen no specimens of this species; the above description is based on the protologue.

24. *Parnassia xinganensis* C. Z. Gao & G. Z. Li, *Guihaia* 3: 19. 1983.

兴安梅花草 xing an mei hua cao

Stems 2–8, 6–15 cm, with 1 leaf proximally or near middle. Basal leaves 4 or 5(–11); petiole 1.5–8.5 cm; leaf blade abaxially greenish, brown punctate, adaxially deep green, elliptic, rarely obovate-elliptic, 1.8–7 × 1–2.5 cm, 5-veined basally, midvein prominent, base rounded or cuneate, apex acute, obtusely apiculate. Cauline leaf ovate or ovate-triangular, 1–1.8 × 0.5–1.1 cm, base rounded or cuneate, with several rusty brown appendages. Flower 1.5–2 cm in diam.; hypanthium shortly turbinate. Sepals elliptic or ovate, rarely obovate, 4–5 × 2.5–3.5 mm, 5-veined, margin entire, apex rounded. Petals spreading, white, elliptic, 9–10 × 7–8 mm, 5-veined basally, base attenuate into a claw ca. 2 mm, margin entire, apex rounded. Anthers ellipsoid, ca. 1 mm; filaments ca. 5 mm; staminodes flat, 3–3.5 mm, stalk ca. 1.8 × 0.5 mm, lamina ca. 1.5 mm wide, 3-lobed, lobes lanceolate. Ovary superior, ovoid; style ca. 1.5 mm; stigma 3-lobed, lobes oblong. Capsule unknown. Fl. Jul–Aug.

• Streamsides in valleys; ca. 1200 m. NE Guangxi (Xing'an Xian).

25. *Parnassia lanceolata* T. C. Ku, *Bull. Bot. Res.*, Harbin 7 (1): 34. 1987.

披针瓣梅花草 pi zhen bai mei hua cao

Stem 1, 3–7 cm, with 1 leaf near middle. Basal leaves 3–5; petiole 1.5–3.5 cm; leaf blade abaxially greenish, purple punctate, adaxially deep green, ovate-reniform or ovate-cordate, 4–14 × 5–12 mm, base cordate, apex acuminate. Cauline leaf sessile, semiamplexicaul, similar to basal leaves but smaller, base often with a few rusty brown appendages. Flower 5–6 mm in diam.; hypanthium shortly turbinate. Sepals purple punctate on both surfaces, lanceolate, 2–2.5 × 0.8–1 mm, margin entire, apex obtuse. Petals green, densely purple-brown punctate on both surfaces, lanceolate or oblong, ca. 4 × 1.2 mm, base truncate, abruptly contracted into a claw ca. 1.2 mm, margin densely and acutely serrulate, apex acuminate or obtuse. Anthers oblong, 0.5–1 mm; filaments ca. 5 mm; staminodes flat, ca. 0.9 mm, stalk ca. 0.3 mm, lamina 3-lobed at apex. Ovary superior, ovoid; style ca. 0.8 mm; stigma 3-lobed. Capsule unknown. Fl. Jul.

• *Picea* forests, grassy slopes near forests, alpine scrub and meadows; 3600–3900 m. W Sichuan, NW Yunnan.

In habit, this species resembles *Parnassia angustipetala*, which differs in having terete, discoid staminodes rounded and entire at the apex.

- 1a. Petals lanceolate, apex acuminate 25a. var. *lanceolata*
1b. Petals oblong, apex obtuse 25b. var. *oblongipetala*

25a. *Parnassia lanceolata* var. *lanceolata*

披针瓣梅花草(原变种) pi zhen bai mei hua cao (yuan bian zhong)

Petals lanceolate, apex acuminate.

- *Picea* forests, grassy slopes near forests; 3600–3900 m. W Sichuan.

25b. *Parnassia lanceolata* var. *oblongipetala* T. C. Ku, Acta Phytotax. Sin. 29: 82. 1991.

长圆瓣梅花草 chang yuan ban mei hua cao

Petals oblong, apex obtuse.

- Alpine scrub and meadows; ca. 3600 m. NW Yunnan (Eryuan Xian).

26. *Parnassia kangdingensis* T. C. Ku, Bull. Bot. Res., Harbin 7(1): 35. 1987.

康定梅花草 kang ding mei hua cao

Stem usually 1, 1.5–3.5 cm, with 1 leaf near apex.

Basal leaves 3 or 4 (or 5); petiole 1–1.2 cm; leaf blade abaxially greenish, adaxially brown-green, ovate-reniform, ca. 4–6 mm, nearly as long as wide, base cordate, apex rounded. Cauline leaf sessile, semiamplexicaul, abaxially purple-brown punctate, similar to basal leaves, often with a few rusty brown appendages at base. Flower 6–7 mm in diam.; hypanthium inconspicuous. Sepals purple-brown punctate near margin, ovate-oblong, ca. 2.2 × 1.8 mm, margin entire, apex rounded. Petals white, purple-brown punctate, obovate, ca. 4 × 1.8 mm including claw, base attenuate into a claw ca. 0.8 mm, margin densely serrulate, apex rounded. Anthers oblong, 0.5–1 mm; filaments ca. 1.8 mm; staminodes flat, ca. 1.2 mm, stalk ca. 0.6 mm, lamina nearly equaling stalk, 3-lobed to middle, lobes lanceolate, margin entire, apex truncate. Ovary superior, ovoid; style very short; stigma 3-lobed. Capsule unknown. Fl. Jul.

- W Sichuan (Kangding Xian).

27. *Parnassia mysorensis* F. Heyne ex Wight & Arnott, Prodr. Fl. Ind. Orient. 35. 1834.

凹瓣梅花草 ao ban mei hua cao

Stems 1 or 2, 8–13 cm, with 1 leaf near base or in proximal 1/3. Basal leaves 2–4 (or 5); petiole to 2 cm; leaf blade abaxially greenish, adaxially deep green or brown-green, ovate-cordate, broadly ovate, or ovate-oblong, 0.5–1.5 × 0.7–1.5 cm, base cordate, subcordate, or truncate, apex rounded-obtuse. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, base often with several rusty brown appendages. Flower 1.8–2 cm in diam.; hypanthium campanulate. Sepals oblong or semiorbicular, 4–5 × ca. 3.5 mm, margin entire, apex obtuse. Petals white, broadly spatulate, ca. 8 × 5 mm, base attenuate into a claw ca. 1.5 mm, margin entire, erose, or serrate proximally and entire distally, apex emarginate or 2-cleft. Anthers ellipsoid,

0.8–1 mm; filaments ca. 5 mm; staminodes broadly spatulate, flat, 3–3.5 × ca. 1.5 mm, stalk ca. 1 mm, lamina ca. 2 mm, 3-lobed for ca. 1/3 its length, lobes subequal. Ovary superior, ovoid; stigma 3-lobed. Capsule ovoid, 3-valved. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep.

Mixed forests, scrub, meadows, grassy places, grassy or open slopes; 2500–3600 m. Guizhou, Sichuan, Xizang, Yunnan [N India, Sikkim].

- 1a. Basal leaf blade ovate-cordate or broadly ovate, base cordate or subcordate 27a. var. *mysorensis*
1b. Basal leaf blade ovate-oblong, base subcordate or truncate 27b. var. *aucta*

27a. *Parnassia mysorensis* var. *mysorensis*

凹瓣梅花草(原变种) ao ban mei hua cao (yuan bian zhong)

Parnassia affinis J. D. Hooker & Thomson, p.p.

Basal leaf blade ovate-cordate or broadly ovate, base cordate or subcordate.

Mixed forests, scrub, meadows, grassy places, open slopes; 2500–3600 m. Guizhou, Sichuan, Xizang, Yunnan [N India, Sikkim].

The original material of *Parnassia affinis* is heterogeneous, also including plants identifiable as *P. pusilla*.

27b. *Parnassia mysorensis* var. *aucta* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 281. 1912.

锐尖凹瓣梅花草 rui jian ao ban mei hua cao

Parnassia affinis J. D. Hooker & Thomson var. *aucta* (Diels) Nekrassova.

Basal leaf blade ovate-oblong, base subcordate or truncate.

- Scrub, grassy slopes; 3200–3300 m. NW Yunnan.

28. *Parnassia submysorensis* J. T. Pan, Acta Phytotax. Sin. 23: 221. 1985.

近凹瓣梅花草 jin ao ban mei hua cao

Stems 2 or 3, 16–27 cm, with 1 leaf near middle or distally. Basal leaves 2 or 3; petiole 4–7 cm; leaf blade abaxially greenish, adaxially deep green, ovate-oblong or broadly ovate, 2–3 × 2–3 cm, arcuate 7–9-veined, base cordate or deeply so, apex acuminate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, often with rusty brown appendages at base. Flower 2.3–2.8 cm in diam.; hypanthium turbinate. Sepals densely punctate, oblong, 8–10 × 4–5 mm, parallel veined with veins confluent apically, margin entire, apex rounded. Petals white, sparsely purple-brown punctate, obovate, ca. 1.4 cm × 8 mm, 3–5-veined, base attenuate into a claw ca. 2 mm, margin erose-dentate, apex rounded. Anthers oblong, ca. 1.5 mm; filaments ca. 5 mm; staminodes flat, ca. 3 mm, stalk ca. 1 × 0.8 mm, lamina ca. 2 × 2.5 mm, 3(–6)-lobed. Ovary superior, depressed globose; style ca. 1.5

mm; stigma 3-lobed, lobes ovate, ca. 1 mm. Capsule unknown. Fl. Jul.

- Among shrubs in forests, shaded slopes; 3400–3600 m. NW Yunnan (Zhongdian Xian).

29. *Parnassia cacuminum* Handel-Mazzetti, Symb. Sin. 7: 433. 1931.

高山梅花草 gao shan mei hua cao

Parnassia cacuminum f. *yushuensis* T. C. Ku.

Stem 1, (4–)7–10 cm, with 1 leaf near apex. Basal leaves numerous, usually 5–7; petiole 1.5–3 cm; leaf blade abaxially greenish, densely brown punctate, adaxially deep green or brown-green, ovate or ovate-cordate, 1–1.5 cm × 8–11 mm, arcuate 5(–7)-veined, base cordate, apex rounded. Cauline leaf sessile, semiamplexicaul, ovate, 5–8 mm, often with several rusty brown appendages at base. Flower 1.1–1.5 cm in diam.; hypanthium shallowly campanulate. Sepals densely purple-brown punctate or indistinctly punctate on both surfaces, broadly oblong or ovate, 5–6 × ca. 3.5 mm, margin entire, apex rounded. Petals white, yellow-green, or whitish green, densely purple-brown punctate or indistinctly punctate on both surfaces, spatulate, 8–9 × 3–4 mm, base cuneate into a short claw ca. 1 mm, margin erose, apex rounded. Anthers oblong, 0.5–1 mm; filaments ca. 4.5 mm; staminodes green, flat, 3-lobed, central lobe slightly longer than lateral ones, lateral lobes truncate at apex. Ovary superior, long ovoid, apex abruptly contracted into a short style; stigma 3-lobed. Capsule unknown. Fl. Jun–Jul.

- Moist grassy places in or at margins of scrub, shaded moist places near streams; 3400–4300 m. S Qinghai (Yushu Xian), W Sichuan.

30. *Parnassia cordata* (Drude) Z. P. Jien ex T. C. Ku, Bull. Bot. Res., Harbin 7(1): 37. 1987.

心叶梅花草 xin ye mei hua cao

Parnassia nubicola Wallich ex Royle var. *cordata* Drude, Linnaea 39: 316. 1875.

Stems 1–3, 28–32 cm, often with 1 leaf near middle. Basal leaves (2 or)3–7; petiole brown striate, slender, 4–16 cm; leaf blade ovate-cordate, 3–4.1 × 3–4.1 cm, arcuate 7-veined with veins prominent abaxially, base deeply cordate, apex rounded, apiculate. Cauline leaf sessile, semiamplexicaul, cordate, 2–3 cm, base with several rusty brown appendages. Flower 2–2.5 cm in diam.; hypanthium campanulate. Sepals oblong, ca. 6 × 4 mm, conspicuously arcuate 7-veined, margin entire, apex obtuse. Petals white, purple-veined, densely punctate, obovate-oblong, 1.3–1.5 cm × 8–10 mm, base cuneate, margin shortly fimbriate or erose in proximal 1/3, entire in distal 2/3, apex rounded. Anthers oblong, 0.8–1.4 mm; filaments ca. 7 mm; staminodes flat, ca. 3 mm, stalk ca. 1.5 × 1.3 mm, lamina 3-lobed to middle, lobes lanceolate. Ovary semi-inferior, ovoid; styles ca. 2 mm; stigma 3-lobed, lobes oblong. Capsule depressed globose, ca. 1 cm in diam. Seeds brown, glossy. Fl. Jul–Aug, fr. Sep.

Alpine meadows; 3200–4100 m. NW Yunnan (Bijiang Xian) [India]. *Parnassia cordata* was originally described by Drude (loc. cit.) as a variety of *P. nubicola*. However, the present authors treat *P. cordata* as a distinct species because it strongly differs from *P. nubicola* in having slender stems and ovate-cordate basal leaf blades with a deeply cordate base.

31. *Parnassia pusilla* Wallich ex Arnott, Companion Bot. Mag. 2: 315. 1837.

类三脉梅花草 lei san mai mei hua cao

Parnassia affinis J. D. Hooker & Thomson, p.p.

Stem usually 1, 4–10 cm, with 1 leaf near middle or distally. Basal leaves 2–4; petiole 7–9 cm; leaf blade abaxially purple-brown punctate, reniform or ovate-cordate, 4–7 × 3–5 mm, (3–)5-veined abaxially, base cordate, margin entire, apex rounded-obtuse. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, base sometimes with a few rusty brown appendages. Flower 6–8 mm in diam.; hypanthium turbinate. Sepals oblong, ca. 1.5 × 1.2 mm, midvein conspicuous, base often with 1 or 2 rusty brown appendages, apex rounded. Petals white, brownish punctate on both surfaces, obovate, 5–6(–8) × ca. 3.5 mm, midvein conspicuous, base cuneate into a claw ca. 0.1 mm, margin sparsely and shortly fimbriate proximally, erose or undulate distally, apex rounded. Anthers subglobose, ca. 0.3 mm; filaments ca. 1.7 mm; staminodes flat, ca. 1.5 mm, shortly stalked, 3-lobed at apex, lobes lanceolate, 0.3–0.4 mm, central one somewhat narrower than lateral ones. Ovary semi-inferior, ovoid; style short; stigma 3-lobed. Capsule unknown. Fl. Jul–Aug.

S Xizang [Bhutan, N India, Nepal, Sikkim].

The original material of *Parnassia affinis* is heterogeneous, also including plants identifiable as *P. mysorensis* var. *mysorensis*.

32. *Parnassia oreophila* Hance, J. Bot. 16: 106. 1878.

细叉梅花草 xi cha mei hua cao

Parnassia setchuenensis Franchet.

Stems (1 or)2–9 or more, 17–30 cm, with 1 leaf proximally or near middle. Basal leaves 2–8; petiole 2–5(–10) cm; leaf blade ovate-oblong or triangular-ovate, 2–3.5 × 1–1.8 cm, conspicuously 3–5-veined with veins prominent abaxially, base often truncate or subcordate, sometimes attenuate, apex rounded, sometimes apiculate. Cauline leaf sessile, semiamplexicaul, ovate-oblong, 2.5–4.5 × 1–2.5 cm, often with several rusty brown appendages at base. Flower 2–3 cm in diam.; hypanthium campanulate. Sepals lanceolate, 6–7 × ca. 2 mm, 3-veined, margin entire, apex obtuse. Petals white, purple-brown veined, broadly spatulate or obovate-oblong, 1–1.5 × 0.6–0.8 cm; 5-veined, base attenuate into a claw ca. 2 mm, margin entire, apex rounded. Anthers oblong, ca. 1.5 mm; filaments ca. 4.5 mm; staminodes flat, 4.5–5 mm, stalk ca. 1.5 mm, lamina ca. 4 × 1.8 mm, 3-parted for (1/2–)2/3 its length, lobes linear, ca. 2 mm, apex somewhat glandular, but without a distinct, globose gland. Ovary semi-inferior, long

ovoid; style ca. 1 mm; stigma 3-lobed. Capsule long ovoid, 5–7 mm in diam. Seeds brown, glossy. Fl. Jul–Aug, fr. Sep.

• Alpine meadows at forest margins, moist slopes, roadsides; 1600–3000 m. Gansu, Hebei, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

33. *Parnassia tibetana* Z. P. Jien ex T. C. Ku, Bull. Bot. Res., Harbin 7(1): 38. 1987.

西藏梅花草 xi zang mei hua cao

Stems 1 or 2, ca. 12 cm, with 1 leaf proximally. Basal leaves usually 2 or 3 (or 4); petiole ca. 1.5 cm; leaf blade abaxially greenish, adaxially brown-green, ovate-oblong, 1.5–2.3 × 1–1.4 cm, base truncate or broadly cuneate, apex acute. Cauline leaf sessile, semiamplexicaul, similar to basal ones, often with several rusty brown appendages at base. Flower ca. 1 cm in diam.; hypanthium campanulate. Sepals ovate, ca. 6 × 3 mm, 5-veined, margin entire, apex rounded. Petals yellow, obovate or oblong, 8–10 × 5–6 mm, 5–7-veined, margin entire, apex rounded. Anthers oblong, 0.5–1 mm; filaments flat; staminodes flat, ca. 3.2 mm, stalk ca. 1.2 mm, lamina ca. 2 × 2.8 mm, 3-lobed for 1/5–1/4(–1/2) its length, lobes shortly linear, apex truncate or rounded. Ovary ovoid; styles ca. 1 mm, 3-lobed at apex. Capsule unknown. Fl. Aug.

• *Tsuga* forests; ca. 3700 m. S Xizang.

34. *Parnassia nubicola* Wallich ex Royle, Ill. Bot. Himal. Mts. 1: 227. 1835.

云梅花草 yun mei hua cao

Stems 3 or 4 (or 5), (5–)13–40 cm, with 1 leaf near base or in proximal 1/4. Basal leaves 3–8; petiole 3–7(–13) cm; leaf blade abaxially greenish, adaxially deep green or brown-green, elliptic or ovate-oblong, rarely oblong, (2–)2.5–7.5 × (1.5–)2–3.8 cm, thick textured or thin and papery, base subcuneate, sometimes truncate, apex acute or shortly acuminate. Cauline leaf similar to basal ones but smaller, often with a few rusty brown appendages at base. Flower 2.8–3.4 cm in diam.; hypanthium campanulate. Sepals densely brown punctate, ovate-oblong or ovate-lanceolate, ca. 8 × 3 mm, margin entire, apex obtuse. Petals white, purple-brown punctate, broadly ovate, 1.2–1.6 cm × 8–10 mm, base contracted into a claw 2–3 mm, margin entire or erose proximally, apex rounded. Anthers ellipsoid, 0.8–1.1 mm; filaments ca. 4.5 mm; staminodes flat, 4–5 mm, stalk ca. 2 × 1 mm, lamina 3-lobed for 1/5–1/4(–1/2) its length, lobes lanceolate or ovate-lanceolate. Ovary semi-inferior, ovoid; style ca. 2 mm; stigma 3-lobed. Capsule ovoid, 3- or 4-lobed. Seeds brown, glossy, oblong. Fl. Aug–Sep, fr. Sep. $2n = 18$.

Abies or *Betula* forests, streamsides near forests, moist places in scrub, meadows in glacial valleys; 2700–3900 m. SE Xizang, NW Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan].

1a. Stems 13–40 cm; basal leaf blade 2.5–7.5

× 2–3.8 cm, thick textured 34a. var. *nubicola*

1b. Stems 5–8(–13) cm; basal leaf blade ca.

2 × 1.5 cm, thin textured, papery 34b. var. *nana*

34a. *Parnassia nubicola* var. *nubicola*

云梅花草(原变种) yun mei hua cao (yuan bian zhong)

Stems 13–40 cm. Basal leaf blade 2.5–7.5 × 2–3.8 cm, thick textured.

Abies or *Betula* forests, streamsides near forests; 2700–3900 m. SE Xizang, NW Yunnan (Dêqên Xian) [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan].

34b. *Parnassia nubicola* var. *nana* T. C. Ku, Acta Phytotax. Sin. 29: 82. 1991.

矮云梅花草 ai yun mei hua cao

Stems 5–8(–13) cm. Basal leaf blade ca. 2 × 1.5 cm, thin textured, papery.

• Moist places in scrub, meadows in glacial valleys; 3000–3900 m. SE Xizang (Zayü Xian), NW Yunnan (Dêqên Xian).

35. *Parnassia subscaposa* C. Y. Wu ex T. C. Ku, Bull. Bot. Res., Harbin 7(1): 40. 1987.

倒卵瓣梅花草 dao nuan bai mei hua cao

Stem 1, ca. 6 cm, with 1 leaf near base. Basal leaves 2–4; petiole 5–11 mm; leaf blade densely purple-brown punctate, ovate-cordate, ca. 1 cm × 3–8 mm, arcuate 5-veined, base cordate, apex rounded-obtuse. Cauline leaf shortly petiolate or semiamplexicaul, similar to basal ones but much smaller, base often with several rusty brown appendages. Flower ca. 1.6 cm in diam.; hypanthium turbinate. Sepals oblong or ovate-oblong, ca. 3.1 × 1.5 mm, base often with several rusty brown appendages, margin entire, apex rounded. Petals white, densely purple punctate, broadly obovate, ca. 8 × 5 mm, 5-veined, base cuneate, occasionally sparsely and shortly fimbriate, margin sparsely erose, apex truncate, emarginate, or indistinctly cleft. Anthers ellipsoid, ca. 1 mm; filaments unequal; staminodes flat, ca. 1.6 mm, stalk ca. 0.5 mm, lamina ca. 1.1 mm, 3-lobed to middle, lobes oblong. Ovary semi-inferior, ovoid; style ca. 0.5 mm; stigma 3-lobed, lobes obovate, becoming reflexed. Capsule unknown. Fl. Aug.

• Grassy slopes; ca. 4200 m. NW Yunnan (Dêqên Xian).

In habit, this species most closely resembles *Parnassia trinervis*, which differs in having taller stems, 7–20(–30) cm, a sessile cauline leaf, and oblanceolate petals, rounded and entire at the apex.

36. *Parnassia deqenensis* T. C. Ku, Bull. Bot. Res., Harbin 7(1): 41. 1987.

德钦梅花草 de qin mei hua cao

Stem usually 1 (or 2), 8–20 cm, with 1 leaf near base. Basal leaves 2–4(–6); petiole slender, (1.5–)3.5–6 cm; leaf blade abaxially greenish, adaxially deep green, ovate-cordate, 0.6–1.9 × 0.8–1.3 cm, base cordate or subtruncate, apex obtuse. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, often with a few rusty brown, hairlike appendages at base. Flower ca. 1.2 cm in diam.; hypanthium shortly turbinate. Sepals sparsely purple-brown punctate, oblong-lanceolate, ca. 4 × 1.8 mm, 3-veined, margin entire, apex rounded. Petals white, purple-brown veined,

densely purple-brown punctate, obovate, ca. 8×4 mm, 3-veined, base attenuate, margin sparsely erose. Anthers ellipsoid, ca. 0.8 mm; filaments (0.6–)4 mm; staminodes flat, ca. 2 mm, stalk ca. 1×0.5 mm, lamina ca. 1 mm wide, 3-lobed to middle, lobes oblong. Ovary ovoid; style ca. 1.5 mm; stigma ca. 3-lobed, lobes capitate. Capsule unknown. Fl. Jul–Aug.

• Alpine meadows, grassy slopes; 2900–4200 m. SE Xizang, NW Yunnan.

37. *Parnassia trinervis* Drude, *Linnaea* 39: 322. 1875.

三脉梅花草 san mai mei hua cao

Stems (1 or)2–4(–8), 7–20(–30) cm, with 1 leaf near base. Basal leaves 7–9; petiole brown-striate, 0.8–1.5(–4) cm; leaf blade oblong, oblong-lanceolate, or ovate-oblong, $0.8–1.5$ cm \times 5–12 mm, arcuate 3–5-veined with veins prominent abaxially, base subcordate, truncate, or attenuate, apex acute. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, sometimes with a few rusty brown, hairlike appendages at base. Flower ca. 1 cm in diam.; hypanthium turbinate. Sepals lanceolate or oblong-lanceolate, ca. 4×1.5 mm, 3-veined abaxially, margin entire, apex obtuse. Petals white, oblanceolate, ca. 7.8×2 mm, 3-veined, base cuneate into a claw ca. 1.5 mm, margin entire, apex rounded, entire. Anthers ellipsoid; filaments 1.5–2 mm; staminodes flat, ca. 2.5 mm, stalk ca. 1×0.7 mm, lamina ca. 1.3 mm wide, 3-lobed, lobes shortly clavate. Ovary semi-inferior, oblong; style ca. 0.5 mm; stigma 3-lobed. Capsule 3-valved. Seeds brown, glossy, oblong. Fl. Jul–Aug., fr. Sep.

• Moist places in valleys, marshy meadows, river beaches; 3100–4500 m. Gansu, Qinghai, Sichuan, Xizang.

38. *Parnassia viridiflora* Batalin, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 12: 168. 1892.

绿花梅花草 lu hua mei hua cao

Parnassia laxmannii Pallas var. *viridiflora* (Batalin) Diels; *P. rumicifolia* Brieger ex Limpricht; *P. trinervis* Drude var. *viridiflora* (Batalin) Handel-Mazzetti. Stems 1–5, 9.5–20.5 cm, with 1 leaf near base. Basal leaves (1 or)2–4(or 5); petiole (1–)1.5–2.5 cm; leaf blade purple punctate or not, ovate-elliptic or triangular-ovate, rarely ovate-cordate, $1–2.5 \times 0.6–1.5$ cm, arcuate 5–7-veined with veins prominent abaxially, base broadly cuneate, subtruncate, or attenuate, apex obtuse or subacute. Cauline leaf sessile, semiamplexicaul, similar to basal ones but much smaller, sometimes with a few rusty brown appendages at base. Flower 1.3–1.8 cm in diam.; hypanthium turbinate. Sepals inconspicuously minutely brown punctate abaxially, ovate-lanceolate or oblong-lanceolate, $3.5–5 \times 1.5–1.8$ mm, 3-veined abaxially, margin entire, apex obtuse. Petals green, purplish veined, occasionally purple punctate, oblong-lanceolate or narrowly oblong, $7–8 \times 2–2.5$ mm, 5-veined, base attenuate into a claw

1.5–2 mm, margin entire, apex rounded. Anthers ellipsoid, ca. 1 mm; filaments ca. 3.5 mm; staminodes flat, ca. 2.5 mm, stalk ca. 1×0.8 mm, lamina ca. 1.5×1.5 mm, 3-lobed, lobes truncate at apex. Ovary semi-inferior, ellipsoid; style ca. 0.5 mm; stigma 3-lobed, lobes obovate. Capsule ellipsoid. Seeds brown, glossy, oblong. Fl. Aug. and fr. Sep.

• Scrub, alpine meadows; 3600–4100 m. Qinghai, Shaanxi, Sichuan, Yunnan.

One of the present authors (Hultgård) believes that this species would be better treated as a variety of *Parnassia laxmannii*, on account of the green petals being practically the only distinguishing character.

39. *Parnassia cooperi* W. E. Evans, *Notes Roy. Bot. Gard. Edinburgh* 13: 172. 1921.

指裂梅花草 zhi lie mei hua cao

Stems 1–4, 14–19 cm, with 1 leaf distally. Basal leaves 2 or 3; petiole 5–9 cm; leaf blade abaxially greenish, adaxially brown-green, reniform or ovate-cordate, $1.6–3.5 \times 2.5–4$ cm, arcuate 7–9-veined, base deeply cordate, apex rounded, obtusely apiculate. Cauline leaf sessile, semiamplexicaul, ovate-cordate, $1.2–2.9 \times 1–2.5$ cm, base deeply cordate, sometimes with a few rusty brown appendages. Flower 2.5–5 cm in diam.; hypanthium shallowly campanulate. Sepals adaxially purple punctate, ovate-lanceolate or lanceolate, $6–7 \times 2.5$ mm, midvein distinct abaxially, margin entire, apex rounded. Petals white or yellowish green, narrowly lanceolate, $1.2–1.5$ cm \times (2–)3–3.8 mm, 3-veined, base with a distinct claw 2.5–4 mm, margin sparsely long fimbriate, apex acuminate. Anthers oblong, ca. 1.2 mm; filaments 6–7 mm; staminodes flat, stalk ca. 1.8×1.1 mm, lamina 3-lobed, lateral lobes lanceolate, to 1.5 mm, 2–3 \times as long as central lobe. Ovary superior; style ca. 1.8 mm; stigma 3-lobed. Capsule obconical-ovoid, trigonous, 3-valved. Seeds black-brown, glossy, oblong. Fl. Jul–Aug, fr. Sep.

Tsuga forests on slopes, sandy banks; 2400–2800 m. SE Xizang (Mêdog Xian) [Bhutan, Sikkim].

40. *Parnassia laxmannii* Pallas ex Schultes in Roemer & Schultes, *Syst. Veg.* 4: 696. 1820.

新疆梅花草 xin jiang mei hua cao

Parnassia subacaulis Karelin & Kirilov.

Stems 2 or 3(–5), 7.5–25 cm, with 1 leaf near base. Basal leaves (2–)4; petiole 0.5–1.8 cm; leaf blade abaxially greenish, adaxially deep green, ovate or long ovate, $1–2.5 \times 0.6–1.5$ cm, conspicuously 3–5-veined abaxially, base truncate, subcordate, or attenuate, apex obtuse. Cauline leaf sessile, semiamplexicaul, similar to basal ones but slightly smaller, occasionally with a few caducous, rusty brown, hairlike appendages at base. Flower ca. 2 cm in diam.; hypanthium campanulate. Sepals lanceolate, ca. 3.5×1.5 mm, 3-veined, margin entire, apex obtuse. Petals white, brown veined, obovate, rarely spatulate, $0.6–1.3$ cm \times 5–6 mm, 5-veined, base attenuate into a claw ca. 1.5 mm. Anthers oblong, ca. 1.2 mm; filaments ca. 3 mm; staminodes

flat, 2–2.7 mm, stalk 0.7–0.8 mm, lamina ca. 1.9×1 mm, 3-lobed, lobes parallel, clavate, central one ca. 0.6 mm, longer than lateral ones, truncate or rounded at apex. Ovary semi-inferior, ovoid or ovoid-pyriform; style very short; stigma 3-lobed, lobes oblong. Capsule brown punctate. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep. $2n = 18, 36$.

Picea forest margins, shaded places, meadows by streams in valleys; 2500–2600 m. C Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)]. In habit, this species resembles *Parnassia nubicola* and *P. trinervis*. However, *P. laxmannii* differs in having the central staminode lobe ca. 0.6 mm, longer than the lateral ones, with the apex truncate or rounded.

41. *Parnassia obovata* Handel-Mazzetti, *Sinensia* 2: 134. 1932.

倒卵叶梅花草 *dao nuan ye mai hua cao*

Stems (2 or)3(or 4), 19–22 cm, with 1 leaf near middle or distally. Basal leaves 4–6(–12), forming a rosette; petiole 5–11 cm; leaf blade abaxially greenish, adaxially deep green, obovate or oblong-obovate, 2–4 \times 1.5–2.6 cm, 5–7-veined with veins parallel in proximal 2/3, prominent abaxially, and impressed adaxially, base cuneate, apex rounded, often obtusely apiculate. Cauline leaf sessile, semiamplexicaul, ovate or broadly so, 1.2–2 \times 1.5–2.4 cm, base subcordate, often with several rusty brown appendages. Flower ca. 2.4 cm in diam.; hypanthium turbinate. Sepals adaxially densely purple-brown punctate, ovate or oblong, ca. 6 \times 3–4 mm, margin sparsely denticulate, apex acute. Petals white, densely purple-brown punctate on both surfaces, oblong or obovate, ca. 1.2 cm \times 4–5 mm, 5-veined basally, base cuneate, margin long fimbriate proximally, entire or undulate distally. Anthers ellipsoid, ca. 3.5 mm; filaments ca. 6 mm; staminodes flat, ca. 5 mm, 3–5-lobed, with inconspicuous glands at apex. Ovary superior, obovoid-trigonal, depressed at apex; style ca. 1.5 mm; stigma 3-lobed. Capsule obconical, with 3 or 4 slightly thickened angles. Seeds brown, glossy, oblong. Fl. Oct.

• Streamsides, moist places. Guizhou (Changling, Langdai).

In floral structure, this species is close to *Parnassia dilatata* and *P. wightiana*. However, *P. obovata* is easily distinguished by its peculiar, obovate or oblong-obovate basal leaf blade, with cuneate base and rounded, often obtusely apiculate apex.

42. *Parnassia lijiangensis* T. C. Ku, *Bull. Bot. Res.*, Harbin 7(1): 43. 1987.

丽江梅花草 *li jiang mei hua cao*

Stems usually 1 or 2, slender, 4–6 cm, with 2 leaves near middle. Basal leaves 3–5; petiole 4–10 mm; leaf blade abaxially greenish, adaxially deep green, ovate-cordate or broadly ovate, 5–8 \times 4–9 mm, base subcordate, apex rounded or obtuse. Cauline leaves sessile, semiamplexicaul, similar to basal ones but smaller, often with several caducous, rusty brown appendages at base. Flower 1–1.3 cm in diam.; hypanthium turbinate. Sepals abaxially densely brown punctate, oblong, ca. 3 \times 1.3 mm, inconspicuously 3-

veined, margin entire, apex rounded-obtuse. Petals white, densely brown punctate on both surfaces, oblong-obovate, ca. 5 \times 3 mm, 3–5-veined, base attenuate, margin entire, apex 2-lobulate or emarginate. Anthers oblong; filaments ca. 2.5 mm; staminodes flat, ca. 2.7 mm, stalk ca. 1 mm, lamina 3-lobed to middle, rarely irregularly 4- or 5-lobed, lobes linear. Ovary superior, obovoid, depressed at apex; style ca. 8 mm; stigma 3-lobed, lobes oblong. Capsule unknown. Fl. Aug.

• NW Yunnan (Lijiang Naxi Zu Zizhixian).

43. *Parnassia brevistyla* (Brieger) Handel-Mazzetti, *Symb. Sin.* 7: 434. 1931.

短柱梅花草 *duan zhu mei hua cao*

Parnassia delavayi Franchet var. *brevistyla* Brieger ex Limpricht, *Repert. Spec. Nov. Regni Veg. Beih.* 12: 400. 1922; *P. appendiculata* A. Batalin; *P. souliei* Franchet ex Nekrassova.

Stems 1–5, 11–23 cm, with 1 leaf near middle or distally. Basal leaves 2–6; petiole 3–14 cm; leaf blade abaxially greenish, adaxially deep green, ovate-cordate or ovate, 1.8–2.5 \times 1.5–3.5 cm, 5–7(–9)-veined abaxially, base deeply cordate, apex acute. Cauline leaf sessile, semiamplexicaul, similar to basal ones but usually smaller, base often with several rusty brown appendages sometimes connate into small lamellae. Flower 1.8–3(–5) cm in diam.; hypanthium shallow. Sepals adaxially often purple-brown punctate, oblong, ovate, or obovate, 4–11 \times 3–8 mm, midvein conspicuous, margin entire, apex rounded. Petals white, purple veined, densely purple punctate, broadly obovate or oblong-obovate, 1–1.5(–2.5) \times 0.5–1 cm, 5–7-veined, base attenuate into a claw 1.8–4 mm, margin shortly fimbriate in proximal 1/3, irregularly erose in distal 2/3, apex rounded. Anthers ellipsoid, ca. 2 mm, connective projected at apex into a lanceolate appendage ca. 5 mm; filaments ca. 5 mm; staminodes flat, 2.5–4 mm, stalk 2.5–4 mm, lamina ca. 4.5 mm wide, 3-lobed, lobes lanceolate or oblong, lateral one often 2-lobulate. Ovary superior, ovoid; style short; stigma 3-lobed, lobes short. Capsule obovoid-globose. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep.

• Moist forests, canopy openings in *Picea* forests, forest margins, grassy slopes, riverside meadows; 2800–4400 m. Gansu, S Shaanxi, N and W Sichuan, NE Xizang, NW Yunnan.

44. *Parnassia delavayi* Franchet, *J. Bot.* (Morot) 10: 267. 1896.

突隔梅花草 *tu ge mei hua cao*

Parnassia mairei H. Léveillé; *P. nana* W. Griffith; *P. schmidtii* Zenker; *P. wightiana* Wallich ex Wight & Arnott var. *brachyloba* Franchet; *P. wightiana* var. *flavida* Franchet; *P. wightiana* var. *microblephara* Franchet.

Stem 1, 12–40 cm, with 1 leaf proximally or near middle. Basal leaves 3 or 4(–7); petiole (3–)5–16 cm; leaf blade abaxially greenish, adaxially deep green or brown-green, reniform or suborbicular, 2–4 \times 2.5–4.5 cm, 5–7(–9)-veined with veins prominent abaxially,

base deeply cordate, apex rounded, apiculate, or obtusely apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, rarely larger, often with 2 or 3 caducous, rusty brown appendages at base. Flower 3–3.5 cm in diam.; hypanthium obconical. Sepals densely brown punctate, oblong, ovate, or obovate, 6–8 × 4–6 mm, 3–5(–7)-veined, margin entire, apex rounded-obtuse. Petals white, purple veined, densely purple-brown punctate, oblong- or spatulate-obovate, (1–)1.2–2.5 × 0.6–0.9 cm, 5-veined, base attenuate, margin sparsely and shortly fimbriate in proximal 1/3, apex rounded or acute. Anthers ellipsoid, connective projected at apex into a lanceolate appendage, to 5 mm; filaments 1–5.5 mm; staminodes flat, 3.5–4 mm, 3-lobed, lobes 1.5–1.8 mm. Ovary superior, depressed globose; style ca. 1.8 mm; stigma 3-lobed, lobes obovate. Capsule obovoid. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep.

Abies forests, mixed forests, open woods, moist grassy beaches, gravelly slopes; 1800–3800 m. Gansu, Hubei, Shaanxi, Sichuan, Yunnan [Bhutan].

45. *Parnassia leptophylla* Handel-Mazzetti, Oesterr. Bot. Z. 90: 120. 1941.

细裂梅花草 xi lie mei hua cao

Stems 1–3, 11–28 cm, with 1 leaf distally. Basal leaves 2–4; petiole 4–14 cm; leaf blade purple-brown punctate, reniform, 2–5.5 × 2.5–7 cm, 7–9-veined with veins prominent abaxially, base deeply cordate, apex rounded, apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, sometimes with 2 or 3 caducous, rusty brown appendages at base. Flower 2.5–3.5 cm in diam.; hypanthium shallow. Sepals adaxially brownish punctate, oblong or obovate-oblong, 6–12 × 4–8 mm, 3–5-veined, margin entire, apex rounded. Petals white, brownish veined, purple punctate, oblong-obovate, 1.5–2 cm × 7–9 mm, 5-veined, base cuneate, margin shortly fimbriate in proximal 1/3, irregularly erose distally, apex acuminate. Anthers ellipsoid, ca. 1.5 mm, connective projected at apex into a lanceolate appendage to 5 mm; filaments 1.5–6.5 mm; staminodes flat, ca. 5 × 3.5 mm, 3-lobed for ca. 2/3 their length, central lobe lanceolate, lateral ones falcate, narrower than central one. Ovary superior, globose; style ca. 1 mm; stigma 3-lobed, lobes short. Capsule unknown. Fl. Jul–Aug.

• Alpine meadows; 2200–3600 m. S and W Sichuan.

46. *Parnassia bifolia* Nekrassova in B. Fedtschenko, Fl. Asiat. Ross. 11: 39. 1917.

双叶梅花草 shuang ye mei hua cao

Stem 1 (or 2), 10–50 cm, with 2 leaves proximally or near middle. Basal leaves 2–7, sometimes forming a rosette; petiole 3–7 cm; leaf blade abaxially greenish, densely purple-brown punctate, adaxially deep green, oblong-ovate, 1.5–3.5 × 1–2.1 cm, 5(–7)-veined with veins prominent abaxially and impressed adaxially, base subcordate or subtruncate, apex rounded-obtuse, sometimes apiculate. Cauline leaves alternate, sessile or

mostly shortly petiolate, inconspicuously brown punctate, similar to basal ones but (0.6–)1–2.9 × (0.5–)1.5 cm, 3–5-veined, with 2 or 3 caducous, rusty brown appendages at base. Flower 2–2.9 cm in diam.; hypanthium turbinate. Sepals purple-brown punctate, lanceolate, 7–9 × 2–2.5 mm, 5(–7)-veined, margin entire, apex acuminate. Petals erect, white, spatulate, 1.4–1.7 cm × 6–8 mm, base cuneate into a claw ca. 2 mm, margin entire, apex rounded. Anthers ellipsoid, ca. 1.5 mm; filaments 5–6 mm; staminodes deep brown, flat, ca. 5 mm, stalk ca. 1.5 × 1 mm, lamina 3–3.5 × ca. 2 mm, 2-lobed, lobes lanceolate or oblong, 1.5–2 mm. Ovary ovoid-globose; style short; stigma 3-lobed, lobes short. Capsule unknown. Fl. Jul–Aug, fr. Aug.

Forests, shaded slopes, streamsides; 2200–2800 m. Xinjiang [Russia].

47. *Parnassia wightiana* Wallich ex Wight & Arnott, Prodr. Fl. Ind. Orient. 35. 1834.

鸡肫草 ji zhun cao

Parnassia ornata Wallich ex Arnott; *P. wightiana* var. *ornata* (Wallich ex Arnott) Drude.

Stems 2–4(–7), 18–24(–30) cm or less, with 1 leaf near middle or distally. Basal leaves 2–5; petiole 3–10(–13) cm; leaf blade abaxially greenish, adaxially green, subtriangular-ovate, ovate-cordate, broadly cordate, or reniform, 2.5–4(–5) × 3.8–6.3 cm, 7–9 veined, base deeply cordate to subcordate, truncate, or occasionally subtruncate, apex rounded, obtuse, or apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but sometimes smaller, often with several rusty brown appendages at base. Flower 1.5–4 cm in diam.; hypanthium shortly turbinate. Sepals densely purple-brown punctate on both surfaces, ovate-lanceolate, 5–9 × 3–3.5 mm, base often with several rusty brown appendages, margin entire, apex rounded-obtuse. Petals white, oblong, obovate, or subpandurate, 8–11 × 4–9 mm, base cuneate into a claw 1.5–2.5 mm, margin long fimbriate proximally, erose-dentate or rarely erose distally. Anthers oblong, ca. 1.5 mm; filaments 5–7 mm; staminodes flat, 3–5 mm, 5-lobed for up to 1/2 their length, lobes narrowly linear, occasionally with inconspicuous glands at apex. Ovary superior, densely small brown punctate, obovoid; style ca. 1.5 mm; stigma 3-lobed. Capsule obovoid. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep. *2n* = 36.

Open valley forests, valleys, grassy areas, roadsides; 600–2000 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal, Sikkim, N Thailand].

Parnassia wightiana is a very variable species. Populations in E Sichuan have basal leaf blades usually reniform, wider than long, with base cordate, deeply cordate, or occasionally subtruncate, apex apiculate, flower (2–)4 cm in diam., and staminodes usually divided to the middle, rarely shallowly lobed. Populations in NE Yunnan have stems low, basal leaf blades mostly ovate-cordate, nearly as long as (rarely longer than) wide, smaller, with base cordate, flower 1.5–2.5 cm in diam., and staminodes divided to the middle. Other populations in C and NE Yunnan have basal leaf blades mostly reniform, with base often cordate and apex apiculate. Populations in Guangdong have stems of moderate height, basal leaf blades subtriangular-ovate,

larger, with base usually truncate or occasionally subcordate, apex obtuse, and flower larger. Because intermediate forms occur in various regions, and the characters all show \pm continuous variation, the varieties and forms described by some authors are difficult to distinguish. Therefore none is recognized in the present account.

This species is used medicinally.

48. *Parnassia dilatata* Handel-Mazzetti, *Sinensia* 2: 135. 1932.

宽叶梅花草 kuan ye mei hua cao

Stems 2–4, 8–10 cm, with 1 leaf proximally. Basal leaves several; petiole slender, 2–4 cm; leaf blade abaxially greenish, densely brown punctate, adaxially deep green, broadly orbicular, rarely suborbicular, 1.2–2 \times 1.4–2.5 cm, conspicuously 5–7-veined on both surfaces, base truncate, apex truncate, apiculate. Cauline leaf sessile, semiamplexicaul, broadly ovate or reniform, ca. 1 \times 1.5 cm, base truncate or subcordate, often with several rusty brown appendages. Flower ca. 1.5 cm in diam.; hypanthium turbinate. Sepals densely purple-brown punctate on both surfaces, oblong or ovate, ca. 4.5 \times 3 mm, margin entire, apex obtuse. Petals white, densely purple-brown punctate, spatulate, ca. 8 \times 4 mm, base cuneate, margin long fimbriate in proximal 2/3, apex rounded or obtuse. Anthers subglobose, ca. 2 mm; filaments ca. 5.5 mm; staminodes flat, ca. 4.5 mm, (3 or) 4- or 5-lobed, lobes often with inconspicuous, globose glands at apex. Ovary ovoid; style ca. 2 mm; stigma 3-lobed, lobes short. Capsule unknown. Fl. Sep–Oct.

• Riversides. SW Guizhou (Anlong Xian).

49. *Parnassia monochoriifolia* Franchet, *Bull. Soc. Bot. France* 44: 260. 1897.

大叶梅花草 da ye mei hua cao

Stems 2–4, ca. 24 cm, with 1 leaf near middle. Basal leaves petiolate; leaf blade abaxially greenish, adaxially deep green, oblong-ovate, to 7 cm, 7-veined abaxially, base cordate, apex acute. Cauline leaf sessile, semiamplexicaul, similar to basal ones but much smaller. Flower ca. 3 cm in diam.; hypanthium inconspicuous. Sepals unequal, larger ones to 1.2 cm. Petals white, spatulate, base attenuate into a long claw, margin fimbriate with fimbriae capitate at apex, apex rounded. Staminodes 5-lobed, lobes narrowly oblong. Style inconspicuous; stigma spreading.

• NE Yunnan (Yanjin Xian).

The present authors have seen no specimens of this species; the above description is based on the protologue and a photograph of the type specimen.

50. *Parnassia yiliangensis* T. C. Ku, *Bull. Bot. Res.*, Harbin 7(1): 48. 1987.

彝良梅花草 yi liang mei hua cao

Stems ca. 3, ca. 10 cm, with 1 leaf proximally. Basal leaves ca. 6; petiole 2.5–3.5 cm; leaf blade abaxially

greenish, densely purple punctate, adaxially deep green, reniform, 1.5–2.5 \times 1.8–3 cm, conspicuously arcuate 7–9-veined abaxially, base deeply cordate, apex rounded, apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, base sometimes with a few caducous, rusty brown appendages. Flower ca. 1.8 cm in diam.; hypanthium inconspicuous. Sepals oblong, ca. 5 \times 2.5 mm, conspicuously parallel veined adaxially, margin entire, apex rounded. Petals white, spatulate, ca. 1.1 cm \times 5 mm, base cuneate into a claw ca. 1.2 mm, margin long fimbriate in proximal 2/3, entire or repand in distal 1/3, apex rounded. Anthers oblong, ca. 2 mm; filaments 1.6–5.5 mm; staminodes flat, ca. 4 mm, 5-parted, 3 central lobes ca. 2.5 mm, 2 lateral ones ca. 0.8 mm. Ovary superior, densely purple punctate, obovoid; style ca. 1.8 mm; stigma 3-lobed, lobes short. Capsule unknown. Fl. Aug–Sep.

• Moist streambanks on slopes; 1800–1900 m. NE Yunnan (Yiliang Xian).

51. *Parnassia chengkouensis* T. C. Ku, *Bull. Bot. Res.*, Harbin 7(1): 49. 1987.

城口梅花草 cheng kou mei hua cao

Stems 3 or 4, 14–20 cm, with 1 leaf proximally or near middle. Basal leaves 3 or 4; petiole 5–10 cm; leaf blade abaxially pale green, inconspicuously brown punctate, adaxially brown-green, ovate-cordate, 2.5–4.4 \times 2.5–4.2 cm, 7–9-veined, base deeply cordate, apex acute. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, base cordate, sometimes with a few rusty brown appendages. Flower ca. 1.5 cm in diam.; hypanthium shortly turbinate. Sepals densely brown punctate, oblong-lanceolate, ca. 5 \times 3 mm midvein conspicuous, margin entire, apex acuminate. Petals white, obovate-oblong, ca. 9 \times 3.5 mm, base attenuate into a claw ca. 1 mm, margin long fimbriate in proximal 2/3, entire in distal 1/3. Anthers oblong, 0.5–1 mm; filaments ca. 5 mm; staminodes flat, ca. 3 mm, (3–)5-lobed, lobes unequal, with inconspicuous glands at apex. Ovary ovoid; style ca. 1.8 mm; stigma 3-lobed, lobes ovate. Capsule ovoid. Seeds brown, glossy, oblong. Fl. Aug–Sep, fr. Sep.

• Grasslands. NE Sichuan (Chengkou Xian).

In habit, this species resembles *Parnassia crassifolia*, which differs in having a larger flower, 1.5–2.5 cm in diam., and staminodes 3-lobed to the middle. In leaf shape, *P. chengkouensis* is similar to *P. perciliata*, which differs in having a larger flower, 1.5–3 cm in diam., and petal margins long fimbriate throughout.

52. *Parnassia omeiensis* T. C. Ku, *Bull. Bot. Res.*, Harbin 7(1): 47. 1987.

金顶梅花草 jin diang mei hua cao

Stems 1 or 2, ca. 10 cm, with 1 leaf proximally. Basal leaves 6 or 7; petiole 2.5–3.5 cm; leaf blade abaxially greenish, purple-brown punctate, adaxially brown-green, cordate, rarely ovate-cordate, 6–7 \times 6–7 mm, base deeply cordate, apex acuminate. Cauline leaf similar to

basal ones but smaller, abaxially densely brown punctate, base often with several rusty brown appendages sometimes connate into small lamellae. Flower ca. 1.3 cm in diam.; hypanthium inconspicuous. Sepals oblong, 3.5–4 × 1.8–2 mm, 5-veined abaxially, margin entire, apex rounded-obtuse. Petals white, densely purple-brown punctate on both surfaces, broadly obovate, ca. 6 × 4 mm, 5-veined on both surfaces, base cuneate, margin sparsely and shortly fimbriate, apex rounded. Anthers oblong, ca. 1.8 mm; filaments ca. 4 mm; staminodes deep purple, flat, ca. 1.8 mm, 5-lobed, lobes unequal. Ovary superior, ovoid; style short; stigma 3-lobed, lobes ovate. Capsule unknown. Fl. Aug.

• Shaded and moist places on grassy slopes; ca. 3100 m. C Sichuan (Emei Shan).

In habit, this species most closely resembles *Parnassia chinensis* var. *sechuanensis*, which is easily distinguished by its apically 3-lobed staminodes.

53. *Parnassia rhombipetala* B. L. Chai, J. Sichuan Univ., Nat. Sci. Ed. 28(3): 375. 1991.

叙永梅花草 *xu yong mei hua cao*

Stems 2–5, 8–12 cm, with 3 or 4 leaves. Basal leaves 2 or 3; petiole 2.5–9 cm; leaf blade abaxially greenish, adaxially brown-green, broadly oblanceolate or narrowly ovate, 1.5–5.5 × 1.2–3 cm, 7-veined abaxially, base narrowed or subtruncate, apex acute. Cauline leaves sessile, not amplexicaul, lanceolate, ca. 1/2 as long as basal leaves, base with sparse, rusty brown appendages. Flower 1–1.5 cm in diam.; hypanthium inconspicuous. Sepals brown punctate, oblong or narrowly ovate, 6–7 × ca. 4 mm, 3-veined, margin entire, apex obtuse. Petals white, brown punctate, rhomboid, 1–1.2 × ca. 1 cm, many veined, base cuneate into a claw ca. 1 mm, margin subentire or undulate. Anthers oblong, ca. 1 mm; filaments 4–5 mm; staminodes 3–4 mm, divided into 3 filiform rays with globose glands at apex. Ovary superior; style short; stigma 4-lobed. Capsule unknown. Fl. Jul–Aug.

• Forests by streams; ca. 1000 m. S Sichuan (Xuyong Xian).

The present authors have not seen the type specimen of *Parnassia rhombipetala*, and the above description is translated from the protologue. It is noteworthy that this species has some peculiar morphological characters, e.g., oblanceolate or narrowly ovate basal leaf blades and rhomboid petals subentire or undulate at the margin.

54. *Parnassia amoena* Diels, Bot. Jahrb. Syst. 29: 370. 1900.

南川梅花草 *nan chuan mei hua cao*

Stems 1–5, 10–20 cm, with 3–6 leaves. Basal leaves 3–5, forming a rosette; petiole slender, 2.5–4.5 cm; leaf blade abaxially greenish, adaxially deep green, reniform, 1.1–2.3 × 1.2–2.6 cm, 5–7-veined with veins prominent abaxially, base deeply cordate, apex rounded, apiculate. Cauline leaves subreniform or suborbicular, subequal, ca. 5 × 8–10 mm, smaller than basal ones, base deeply cordate, sometimes with a few rusty brown appendages. Flower 1–1.6 cm in diam.; hypanthium inconspicuous. Sepals purple punctate, oblong or long elliptic, 3.5–5 ×

2–2.2 mm, 3-veined, margin entire, apex rounded-obtuse. Petals snow white, purple punctate, oblong-lanceolate or ovate-oblanceolate, ca. 7.5 × 2.5 mm, 3-veined, base cuneate, margin long fimbriate in proximal 2/3, apex rounded, sometimes sparsely erose. Anthers ellipsoid, ca. 1 mm; filaments ca. 4.5 mm; staminodes ca. 9 mm, divided for 2/5 their length into 3 filiform rays with globose glands at apex. Ovary superior, subglobose; style ca. 0.4 mm; stigma 3- or 4-lobed. Capsule depressed globose. Seeds brown, glossy, oblong. Fl. Aug–Sep, fr. Sep.

• Moist rocks in forests; 1500–1800 m. SE Sichuan (Nanchuan Xian).
55. *Parnassia noemiae* Franchet, J. Bot. (Morot) 10: 281. 1896.

棒状梅花草 *bang zhuang mei hua cao*

Stems 1–3, 15–20 cm, with 2–5 leaves. Basal leaves 2–4; petiole slender, 3–5.5 cm; leaf blade abaxially greenish, adaxially deep green, reniform, 1.2–2.2 × 1.8–3 cm, 7-veined abaxially, base deeply cordate, apex rounded, apiculate. Cauline leaves reniform or suborbicular, 0.4–1.8 × 0.6–1.8 cm, base deeply cordate, sometimes with a few caducous, rusty brown appendages. Flower ca. 1.5 cm in diam.; hypanthium inconspicuous. Sepals lanceolate or ovate-lanceolate, ca. 3.5 × 1.5 mm, 3-veined, margin entire, apex acuminate. Petals white, oblanceolate or oblong, ca. 5.5 × 1.2 mm, base attenuate, margin fimbriate throughout with fimbriae turgid at apex and becoming clavate, apex rounded. Anthers ellipsoid, ca. 1.2 mm; filaments ca. 5 mm; staminodes 3–4 mm, divided into 3 rays or narrowly linear lobes 1.2–1.5 mm with globose glands at apex. Ovary superior, ovoid; style very short; stigma 3- or 4-lobed. Capsule densely purple punctate, depressed globose. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep.

• Shaded moist grassy slopes, roadsides; 2000–2500 m. C and NE Sichuan (Baoping Xian, Chengkou Xian, Wenchuan Xian).

56. *Parnassia foliosa* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 2: 79. 1858.

白耳菜 *bai er cai*

Parnassia nummularia Maximowicz ex Drude.

Stems 1–4, 15–40 cm, usually with 4–8 leaves. Basal leaves 3–6, forming a rosette; petiole 5–8 cm; leaf blade abaxially greenish, adaxially deep green, reniform, 1.5–4(–5) × 2.4–6(–7) cm, arcuate 7–9-veined with veins prominent abaxially and impressed adaxially, base cordate, apex rounded, often obtusely apiculate. Cauline leaves reniform, rarely ovate-cordate, smaller than basal leaves, equal or distal ones smaller, base cordate. Flower 2–3 cm in diam.; hypanthium conspicuous. Sepals brown punctate, ovate or oblong, ca. 7 × 5 mm; parallel veined, margin entire, apex rounded-obtuse. Petals white, purple veined, purple punctate, ovate or triangular-ovate, ca. 8 mm, base attenuate, margin long fimbriate throughout with fimbriae not turgid at apex. Anthers ellipsoid, ca. 2.5 mm; filaments

ca. 6.5 mm; staminodes 4–5 mm, divided proximally into 3 filiform rays with globose glands at apex. Ovary superior, depressed ovoid or ovoid-globose; style ca. 2 mm; stigma 3-lobed. Capsule depressed globose, 3- or 4-valved. Seeds brown, glossy, oblong. Fl. Aug–Sep, fr. Sep.

Slopes, streamsides, moist roadsides; 1100–2000 m. S Anhui (Huang Shan), W Fujian (Jianning Xian), N and W Jiangxi (Lu Shan, Wugong Shan), NW Zhejiang (Tianmu Shan) [N India, Japan].

This species is used medicinally.

57. *Parnassia guilinensis* G. Z. Li & S. C. Tang, *Guihaia* 19: 341. 1999.

桂林梅花草 *gui lin mei hua cao*

Stems 1 or 2, 10–20 cm, usually with 1 leaf near middle. Basal leaves (7 or)8(–13); petiole 1–9 cm; leaf blade abaxially gray-white, adaxially green, ovate to oblong-ovate, (1–)2.5–4.5(–5.5) × (0.8–)1.5–2.5(–3) cm, inconspicuously 5–7-veined on both surfaces, base rounded or subtruncate, apex obtuse or acute. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller. Flower ca. 2 cm in diam.; hypanthium inconspicuous. Sepals green, ovate, ca. 5 × 4 mm. Petals white, broadly obovate, ca. 1.2 cm × 8 mm, base with a claw ca. 3 mm, margin slightly undulate, apex emarginate. Anthers ellipsoid; filaments 2–7 mm; staminodes ca. 3 mm, 5-branched to middle, branches globose glandular at apex. Ovary superior, yellowish, ovoid, ca. 1.5 cm; styles ca. 1 mm; stigma slightly cleft. Fl. Aug.

• Streamsides; ca. 600 m. NE Guangxi (Xing'an Xian).

The present authors have seen no specimens of this species; the above description is based on the protologue.

58. *Parnassia gansuensis* T. C. Ku, *Bull. Bot. Res., Harbin* 7(1): 52. 1987.

甘肃梅花草 *gan su mei hua cao*

Stems 1–8, 12–30 cm, usually with 1 leaf near middle. Basal leaves 2 to several; petiole slender, 2–9 cm; leaf blade abaxially greenish, occasionally purple punctate, adaxially deep green, ovate-cordate, 1–2.2 × 1.3–2 cm, arcuate 5–7-veined abaxially, base deeply cordate, apex acute. Cauline leaf sessile, amplexicaul, similar to basal ones but smaller, base with rusty brown, filiform appendages sometimes adnate to blade. Flower 1.5–2.1 cm in diam.; hypanthium shortly turbinate. Sepals reflexed and persistent after anthesis, densely purple punctate, obovate or oblong, 3–6 × 3–4 mm, 1–3-veined, margin entire, apex rounded. Petals white, obovate-lanceolate or oblong-lanceolate, ca. 1 cm × 5 mm, base attenuate, margin fimbriate proximally, entire or undulate distally, apex rounded. Anthers ellipsoid, ca. 2 mm; filaments ca. 8 mm; staminodes 4–9 mm, divided almost to base into 5 filiform rays with globose glands at apex. Ovary slightly sunken into hypanthium,

ovoid, ca. 5 mm; style 1.5–2 mm; stigma 3-lobed, lobes ovate. Capsule unknown. Fl. Jul–Aug.

• Streamsides, shaded and moist places; 1300–3500 m. S Gansu.

59. *Parnassia simaoensis* Y. Y. Qian, *Bull. Bot. Res., Harbin* 17: 305. 1997.

思茅梅花草 *si mao mei hua cao*

Stem 1, 8–22 cm, with 1 leaf proximally. Basal leaves 5–12; petiole 1–3 cm; leaf blade abaxially green, adaxially gray-green, conspicuously punctate on both surfaces, ovate-cordate, 0.7–2 × 0.6–1.9 cm, (5–)7-veined basally, base deeply cordate, apex acute. Cauline leaf sessile, amplexicaul, similar to basal ones but smaller, base often with several rusty brown appendages. Flower 1.8–2.2 cm in diam.; hypanthium shortly turbinate. Sepals reflexed and persistent after anthesis, pale green, brown punctate, ovate, 3–5 × 2–3 cm, 1–3-veined, margin fimbriate proximally, apex rounded. Petals white, brownish punctate, obovate or narrowly so, 6–12 × 3–6 mm, base attenuate into a claw ca. 1 mm, margin long fimbriate proximally, sparsely fimbriate to undulate distally, apex rounded. Anthers ellipsoid; 2–2.5 mm; staminodes 3.5–4 mm, divided for ca. 1/2 their length into 5 filiform rays, apex with globose glands. Ovary slightly sunken into hypanthium, ovoid, 3–4 mm; style 2–2.5 mm; stigma 3-lobed, lobes oblong. Capsule depressed trigonous when young. Fl. Sep–Nov, fr. Oct–Nov.

• Bogs; ca. 1400 m. S Yunnan (Simao Xian).

The present authors have seen no specimens of *Parnassia simaoensis*; the above description is based on the protologue, in which it was compared with *P. gansuensis*, which differs in having staminodes divided almost to the base.

60. *Parnassia longshengensis* T. C. Ku, *Bull. Bot. Res., Harbin* 7(1): 54. 1987.

龙胜梅花草 *long sheng mei hua cao*

Stems 5 or 6, 15–28 cm, with 1 leaf near middle or distally. Basal leaves often 6–8, forming a rosette; petiole slender, 9.5–13 cm; leaf blade abaxially greenish, adaxially deep green, broadly orbicular, 2–3 × 2.7–4.5 cm, arcuate 7–9-veined with veins prominent abaxially and inconspicuous adaxially, base subcordate, apex concave and apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, base often with several rusty brown appendages sometimes connate into small lamellae. Flower 2–2.3 cm in diam.; hypanthium very short. Sepals reflexed and persistent after anthesis, densely purple punctate, oblong, 6–7 × 3–5 mm, midvein conspicuous, margin entire, apex obtuse, sometimes apiculate. Petals white, densely purple punctate, obovate-lanceolate, 1–1.2 cm × 4–5 mm, 3–5-veined, base attenuate, margin long fimbriate in proximal 2/3, undulate in distal 1/3. Anthers ellipsoid, ca. 2 mm; filaments ca. 7.5 mm; staminodes 4–5 mm, divided for up to 1/2 their length into 5 branches with globose glands at apex. Ovary slightly sunken into hypanthium, trigonous; style ca. 1.8 mm; stigma 3-

lobed, lobes ovate. Capsule trigonous. Seeds brown, glossy, oblong. Fl. Jul–Aug, fr. Sep–Nov.

• Woods, moist places, rocks by streams. NE Guangxi (Longsheng Ge Zu Zizhixian, Xiang Xian).

In habit, this species somewhat resembles *Parnassia dilatata*, which differs in having smaller basal leaf blades, 1.2–2 × 1.4–2.5 cm, with shorter petioles, 2–4 cm, and flat, (3 or)4- or 5-lobed staminodes, with inconspicuous, globose glands at the apex.

61. *Parnassia perciliata* Diels, Bot. Jahrb. Syst. 29: 369. 1900.

厚叶梅花草 *hou ye mei hua cao*

Stems 3–5, robust, slightly curved, 18–30 cm, with 1 leaf distally. Basal leaves 3–5, forming a rosette; petiole robust, 8–19 cm; leaf blade sparsely purple punctate, densely so along veins, ovate-cordate, 3.5–6.5 × 2.5–5.5 cm, 7-veined adaxially with midvein prominent abaxially, base deeply cordate, apex acuminate, often apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but 2.2–4 × 2–3 cm, base often with rusty brown appendages sometimes connate into small lamellae. Flower 1.5–3 cm in diam.; hypanthium very short. Sepals reflexed and persistent after anthesis, brown punctate on both surfaces, oblong or oblong-lanceolate, ca. 1 cm × 5 mm, 1-veined, margin with sparse, rusty brown appendages proximally, entire distally, apex obtuse. Petals white, purple veined, sparsely purple punctate, obovate-oblong or oblong, 0.8–1.3 cm × 5–8 mm, 3-veined, base abruptly contracted into a claw, margin long fimbriate throughout, apex rounded or acute. Anthers ellipsoid, ca. 3 mm; filaments 6–8 mm; staminodes ca. 4 mm, branches 5(–7), with globose glands at apex. Ovary superior, ovoid; style ca. 1.8 mm; stigma 3-lobed, lobes short. Capsule unknown. Fl. Jul–Aug.

• Rocky places; ca. 1100 m. SE Sichuan (Nanchuan Xian).

62. *Parnassia davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 237. 1885.

大卫梅花草 *da wei mei hua cao*

Stems 2 or 3, ca. 23 cm, with 1 leaf near middle or distally. Basal leaves 4 or 5; petiole 4–6 cm; leaf blade abaxially greenish, adaxially deep green, densely purple-brown punctate, reniform, ovate, or suborbicular, 1.8–2 × 2.2–2.5 cm, base subcordate, subtruncate, truncate, or rarely subcuneate, apex rounded, often apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal ones but smaller, base often with several rusty brown appendages sometimes connate into small lamellae. Flower ca. 2.5 cm in diam.; hypanthium inconspicuous. Sepals adaxially densely purple-brown punctate, oblong, ca. 5 × 3 mm, margin entire, apex rounded. Petals white, densely purple-brown punctate, oblong, ca. 1.4 cm × 6.5 mm, conspicuously 3-veined, base cuneate, margin fimbriate, apex rounded. Anthers oblong, ca. 2.2 mm; filaments ca. 8 mm; staminodes ca. 4.5 mm, 3–7-branched to middle. Ovary superior, depressed globose; style ca. 1.2 mm; stigma 3-lobed, lobes reflexed and persistent after anthesis. Capsule unknown. Fl. Jul–Aug.

• About 1200 m. Sichuan.

- 1a. Basal leaf blade reniform, base subcordate or subtruncate; staminodes 3–7-branched 62a. var. *davidii*
- 1b. Basal leaf blade ovate or suborbicular, base truncate or subcuneate; staminodes (4 or)5-branched 62b. var. *arenicola*

62a. *Parnassia davidii* var. *davidii*

大卫梅花草(原变种) *da wei mei hua cao* (*yuan bian zhong*)

Basal leaf blade reniform, base subcordate or subtruncate. Staminodes 3–7-branched.

• S and W Sichuan

62b. *Parnassia davidii* var. *arenicola* Z. P. Jien, Acta Phytotax. Sin. 8: 255. 1963.

喜砂梅花草 *xi sha mei hua cao*

Basal leaf blade ovate or suborbicular, base truncate or subcuneate. Staminodes (4 or)5-branched.

• About 1200 m. E Sichuan (Wan Xian).

63. *Parnassia palustris* Linnaeus, Sp. Pl. 1: 273. 1753.

梅花草 *mei hua cao*

Stems 2–4(–7), 12–20(–30) cm, usually with 1 leaf near middle. Basal leaves 3 to numerous; petiole 3–6(–8) cm; leaf blade abaxially greenish, often purple punctate, adaxially deep green, ovate or long ovate, occasionally triangular-ovate, 1.5–3 × 1–2.5 cm, base subcordate, apex rounded-obtuse or acuminate, often apiculate. Cauline leaf sessile, semiamplexicaul, similar to basal leaves, base often with several rusty brown appendages. Flower 2.2–3(–3.5) cm in diam.; hypanthium inconspicuous. Sepals densely purple-brown punctate, elliptic or oblong, 5–8 × 3–5 mm, margin entire, apex obtuse. Petals white, often purple punctate, broadly ovate or obovate, 1–1.5 (–1.8) × 0.7–1(–1.3) cm, base with a short claw, margin entire or occasionally inconspicuously erose, apex rounded-obtuse or shortly acuminate. Anthers ellipsoid, ca. 3 mm; filaments 2.2–7 mm; staminodes to 1 cm, divided into (7–)9–21 filiform rays with globose glands at apex. Ovary superior, ovoid; style very short; stigma 4-lobed. Capsule ovoid. Seeds brown, glossy, oblong. Fl. Jul–Sep, fr. Oct. $2n = 18$, (27), 36.

Moist grassy slopes, streamsides, shaded moist places in valleys, grassy fields; 1200–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shanxi, N Xinjiang [Japan, Kazakstan, Korea, Mongolia, Russia; Europe, North America].

- 1a. Staminodes (7–)9–11(–13)-branched 63a. var. *palustris*
- 1b. Staminodes 13–21-branched 63b. var. *multiseta*

63a. *Parnassia palustris* var. *palustris*

梅花草(原变种) *mei hua cao* (*yuan bian zhong*)

Parnassia mucronata Siebold & Zuccarini; *P. palustris* f. *nana* T. C. Ku.

Staminodes (7–)9–11(–13)-branched.

Moist grassy slopes, streamsides, shaded moist places in valleys; 1600–2000 m. N Xinjiang [Kazakstan, Russia; Europe, North America].

63b. *Parnassia palustris* var. *multisetata* Ledebour, Fl. Ross. 1: 263. 1842.

多枝梅花草 *duo zhi mei hua cao*

Parnassia multisetata (Ledebour) Fernald.

Staminodes 13–21-branched.

Shaded places in valleys, streamsides, grassy fields; 1200–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shanxi [Japan, Korea, Russia].

Losina-Losinskaja (in Komarov, Fl. URSS 9: 217. 1939) divided *Parnassia palustris* into four forms. However, after examining a large number of Chinese specimens of this species, the present authors have found that *P. palustris* is highly variable in many morphological characters, e.g., height of stem, number, shape, and size of basal leaves, position, shape, and size of cauline leaf, punctate marking, shape, and venation of sepals and petals, and number and length of staminode branches. It is not possible to classify Losina-Losinskaja's forms according to these characters. On the other hand, the present authors accept the two varieties of *P. palustris* described by Ledebour (Fl. Ross. 1: 262. 1842) based on the number of staminode branches. In the present account, according to Ledebour's delimitation, the population in Xinjiang is identified as var. *palustris* and the populations in N and NE China as var. *multisetata*.

