

- 17a. Stems basally woody; leaf margin irregularly serrate, pandurately lobed below middle; stems and leaves abaxially green 12. *M. celsioides*
- 17b. Stems herbaceous; leaf margin irregularly sinuate-toothed; stems and leaves abaxially purple 13. *M. solanifolius*
- 16b. Calyx lobes ca. 1/2 of calyx length.
- 18a. Perennials, white villous.
- 19a. Stem leaves crowded; corolla purple-red, lower middle lobe longer than other lobes 14. *M. kweichowensis*
- 19b. Stem leaves 2–4 pairs; corolla blue-purple, lower middle lobe shorter than other lobes 18. *M. saltuarius*
- 18b. Annuals, glabrous or sparsely pubescent.
- 20a. Pedicel 0.3–1.2 cm; corolla lower lip lobes obovate; upper lobes ovate-triangular 17. *M. pumilus*
- 20b. Pedicel ca. 1.5 cm; corolla lower lip lobes broadly ovate; upper lobes oblong-ovate 19. *M. fukienensis*
- 15b. Stem leaves absent or 1 or 2.
- 21a. Corolla 2–3 cm, lobes usually erose or fimbriate apically; leaves usually to 20 cm.
- 22a. Plants glabrous or sparsely villous; leaves thick papery to subleathery; pedicel 1–15 cm 5. *M. omeiensis*
- 22b. Plants densely white or rusty pubescent; leaves papery; pedicel to 4 cm ... 6. *M. pulchellus*
- 21b. Corolla less than 2 cm, lobes not fimbriate; leaves less than 12 cm.
- 23a. Plants mostly over 10 cm; flowers usually over 10.
- 24a. Pedicel ca. 5 cm; leaves oblanceolate, margin sharply toothed; flowering stems erect 10. *M. lecomtei*
- 24b. Pedicel 1–3 cm; leaves obovate-spatulate, margin obtusely toothed or pinnately lobed; flowering stems not erect 11. *M. fauriei*
- 23b. Plants less than 10 cm; flowers less than 10.
- 25a. Leaf margin entire; flowers 1–3; pedicel to 3 cm 9. *M. oliganthus*
- 25b. Leaf margin dentate or shallowly lobed; flowers 4–10; pedicel less than 2 cm.
- 26a. Plants glabrous or subglabrous; calyx lobes subulate-triangular; corolla yellow or dark purple 7. *M. rockii*
- 26b. Plants sparsely white villous; calyx lobes oblong-lanceolate; corolla white or white with purple spots 8. *M. humilis*

1. *Mazus stachydifolius* (Turczaninow) Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 20: 438. 1875.
弹刀子菜 dan dao zi cai

Tittmannia stachydifolia Turczaninow, Bull. Soc. Imp. Naturalistes Moscow 7: 156. 1837; *Mazus simadus* Masamune; *M. villosus* Hemsley; *Vandellia stachydifolia* Walpers.

Perennials, 10–50 cm tall, white villous. Rhizomes short. Stems erect, rarely ascending, terete, basally woody with age. Basal leaves short petiolate; leaf blade spatulate. Stem leaves opposite or upper ones alternate, sessile, elliptic to obovate-lanceolate, 2–7 cm, papery, margin irregularly serrate. Racemes terminal, lax, 2–20 cm; bracts triangular-ovate, ca. 1 mm. Pedicel shorter

than or ± as long as calyx. Calyx funnelform, 5–10 mm, to 1.6 cm in fruit, over 1 cm in diam.; lobes slightly longer than tube, lanceolate-triangular, apex narrowly acute, conspicuously 10-veined. Corolla blue-purple, 1.5–2 cm; tube almost as long as lips; lower lip yellow-punctate, large, spreading flat, papillate glandular hairy, middle lobe smaller than other lobes and suborbicular; upper lip short, lobes narrowly triangular, apex acute. Ovary apically long hirsute. Capsule ovoid, 2–3.5 mm, flattened. Fl. Apr–Jun, fr. Jul–Sep.

Trailsides, grassland, wet places at edge of forests; below 1500 m. Anhui, Guangdong, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [Korea, Mongolia, Russia].

2. *Mazus caducifer* Hance, J. Bot. 20: 292. 1882.

早落通泉草 *zao luo tong quan cao*

Perennials, 20–50 cm tall, stout, white villous. Roots fibrous, to 20 cm, primary root considerably shorter. Stems erect or ascending, terete, woody near base, sometimes branched. Basal leaves mostly in a rosette, often deciduous; leaf blade obovate-spatulate. Stem leaves opposite, petiolate; leaf blade ovate-spatulate, 3.5–10 cm, papery, base tapering, margin coarsely irregularly serrate, sometimes shallowly lobed. Racemes terminal, lax, to 35 cm; bracts ovate-triangular, apex acute. Pedicel 0.8–1.5 cm. Calyx funnelform, ca. 1.3 cm in fruit, over 1 cm in diam.; lobes almost as long as tube, ovate-lanceolate, apex acute, veins 10. Corolla light blue-purple, ca. 2 × as long as calyx; lower lip middle lobe exerted and smaller than lateral lobes; upper lip lobes apically acute. Ovary hairy. Capsule globose. Seeds brown. Fl. Apr–May, fr. Jun–Aug.

• Trailsides, wet places in forests, grassland; ca. 1300 m. Anhui, Jiangxi, Zhejiang.

3. *Mazus spicatus* Vaniot, Bull. Acad. Int. Géogr. Bot. 15: 85. 1905.

毛果通泉草 *mao guo tong quan cao*

Mazus angusticalyx P. C. Tsoong; *M. bodinieri* Bonati. Perennials, 10–30 cm tall, white to pale rusty villous. Primary root 2–4 cm. Stems terete, slender, rigid, usually woody and much branched at base, erect or procumbent and ascending, rooting from nodes. Basal leaves few, caudate. Stem leaves opposite or upper ones alternate; petiole to 1 cm on lower leaves, decreasing in length to lacking upward; leaf blade obovate to obovate-spatulate, 1–4 cm, base tapering, margin incised-serrate. Racemes terminal, lax, to 20 cm; bracts subulate. Pedicel slender, almost as long as calyx. Calyx campanulate, 5–8 mm in fruit, less than 1 cm in diam., veins 10; lobes triangular-lanceolate, as long as tube, margin and veins ciliate, apex acute. Corolla white or light purple, 0.8–1.2 cm; lateral lobes of lower lip rounded and entire, middle lobe narrower and longer and with an emarginate apex; upper lip lobes narrowly acute. Ovary long hirsute. Capsule light yellow, ovoid, small, long hirsute. Fl. May–Jun, fr. Jul–Aug.

• Mountain slopes, trailsides, grassland; 700–2300 m. Guangxi, Guizhou, Hubei, Hunan, S Shaanxi, Sichuan.

4. *Mazus xiuningensis* X. H. Guo & X. L. Liu, Act. Phytotax. Sin. 28: 163. 1990.

休宁通泉草 *xiu ning tong quan cao*

Perennials. Primary root slender and long. Stems diffuse, pubescent, rooting from nodes. Petiole 1.5–6.5 cm, densely pubescent. Basal leaves rosulate, rotund, ovate-orbicular, or elliptic, 1–6 × 0.8–4 cm, pubescent, base abruptly cuneate and decurrent, margin repand and crenate. Stem leaves opposite or alternate, similar to basal leaves. Peduncle slender, densely pubescent. Calyx broadly campanulate, 3–5 mm, deeply 5-lobed, outside densely villous; lobes ovate, 2–2.5 mm, veins conspicuous. Corolla white or light red; tube 6–8 mm;

lower lip middle lobe 7–9 mm, lateral lobes 5.5–7.5 mm; upper lip erect, 4–6 mm, lobes apically subtruncate and with few irregular small teeth. Ovary rotund, with dense clavate glandular hairs. Stigma unequally 2-lobed. Capsule ovoid. Fl. Jun–Jul, fr. Aug–Sep.

• About 400 m. SE Anhui.

5. *Mazus omeiensis* H. L. Li, Taiwania 1: 161. 1950.

岩白菜 *yan bai cai*

Mazus crassifolius P. C. Tsoong; *M. neriifolius* H. L. Li. Perennials, 10–30 cm tall, stout, glabrous or sparsely villous. Rhizomes short or to 15 cm. Leaves all basal, rosulate; leaf blade obovate-spatulate to spatulate, 3–20 cm, thick papery to subleathery, abaxially glaucous, adaxially green and bright, base tapering, margin sparsely and coarsely toothed, apex rounded to obtuse. Scapes 1(–4), herbaceous, erect or ascending, striate. Racemes lax flowered; bracts narrowly lanceolate, to 6 mm. Pedicel 1–1.5 cm, glandular hairy. Calyx campanulate, ca. 7 mm; lobes ca. 1/2 as long as tube, ovate-triangular, veins inconspicuous. Corolla light blue-purple, 2–3 cm; tube enlarged near throat; lower lip margin erose-toothed, apex truncate and emarginate; upper lip erect, shorter than lower lip, lobes ca. 4 mm wide, apex rounded. Ovary glabrous. Capsule ovoid, ca. 5 mm. Fl. Apr–Jul, fr. Jul–Sep.

• Moist crevices; 500–2000 m. NW Guizhou, SW Sichuan.

The whole plant is used medicinally.

6. *Mazus pulchellus* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 182. 1890.

美丽通泉草 *mei li tong quan cao*

Mazus pulchellus var. *primuliformis* Bonati.

Perennials, ca. 20 cm tall, densely white or rusty pubescent, glabrescent. Roots fibrous, tufted. Rhizomes short. Leaves all basal, rosulate; leaf blade obovate-spatulate to oblong-spatulate, to 20 cm, papery, base tapering, margin incised-serrate, double serrate, or irregularly pinnately parted, apex rounded. Scapes 1–5, herbaceous, erect or ascending, simple or sparsely branched. Racemes lax, numerous flowered; bracts narrowly lanceolate, 2–5 mm. Pedicel slender, to 4 cm. Calyx campanulate, 5–7 mm; lobes much shorter than tube, narrowly ovate, apex acute, veins inconspicuous. Corolla red, purple, or dark violet, 2–2.5 cm; lower lip lobes sparsely fimbriate-toothed, middle lobe narrower and longer than lateral lobes; upper lip erect, short, lobes subrounded, margin fimbriate-toothed, apex truncate. Ovary glabrous. Capsule ovoid. Fl. and fr. Mar–Jun.

• Moist places in rocky crevices, forests; ca. 1600 m. W Hubei, SE Sichuan, SE Yunnan.

7. *Mazus rockii* H. L. Li, Brittonia 8: 35. 1954.

丽江通泉草 *li jiang tong quan cao*

Perennials, 4–8 cm tall, glabrous or subglabrous. Roots fibrous, numerous, tufted. Rhizomes short. Stolons short, with many minute leaves. Leaves mostly basal,

rosulate, sessile, obovate-lanceolate to spatulate, 0.8–2 cm, thin papery, base tapering, margin basally subentire and apically sparsely sharp serrate, apex acute to obtuse. Flowering shoots 3–5, ascending, few branched, leafless or with few small leaves. Racemes terminal, less than 10-flowered; bracts ca. 1 mm, caudate. Pedicel less than 2 cm. Calyx funnelform ca. 5 mm, slightly enlarged in fruit; lobes subulate-triangular, as long as tube, apex narrowly acute, veins inconspicuous. Corolla yellow to dark purple, 8–11 mm; lower lip ca. 2 × as long as upper lip, middle lobe slightly longer, nearly 1/2 as wide as lateral lobes; upper lip small, lobes narrowly triangular-ovate. Ovary ovoid, glabrous. Fl. May–Oct.

• Mountain slopes; 2500–3400 m. NW Yunnan.

8. *Mazus humilis* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 11. 1926.

低矮通泉草 di ai tong quan cao

Perennials, less than 10 cm tall, white villous. Roots fibrous, numerous, tufted. Rhizomes short. Basal leaves numerous, rosulate; petiole inconspicuous to almost as long as leaf blade; leaf blade obovate-spatulate to oblong-obovate, 1–3.5 cm, papery, base tapering, margin irregularly and coarsely toothed or lobed, apex obtuse. Scapes 1–8, erect, 2–6 cm. Flowers solitary or in racemes to 7-flowered. Pedicel at lower part of scape 1–2 cm in fruit, glandular hairy. Calyx funnelform, 5–7 mm, glandular hairy; lobes oblong-lanceolate, as long as tube, apex obtuse, veins inconspicuous. Corolla white or white with purple spots, ca. 1 cm; tube almost as long as lips; lower lip lobes subrounded, middle lobe slightly longer and narrower than lateral lobes; upper lip erect, lobes subovate. Ovary glabrous. Capsule globose. Fl. and fr. Jun.

• Wet grassland; 2500–3500 m. Guangxi, SW Sichuan, NW Yunnan.

9. *Mazus oliganthus* H. L. Li, Brittonia 8: 34. 1954.

稀花通泉草 xi hua tong quan cao

Perennials, 3–5 cm tall, glabrous or sparsely pubescent, without stolons. Rhizomes thick. Roots fibrous, 0.5–1 mm thick. Leaves basal; petiole 1–1.3 cm, glabrous or ciliate; leaf blade oblong to oblong-ovate, 1–1.2 cm × 5–7 mm or longer, base attenuate, margin entire, apex rounded. Racemes terminal, 1–3-flowered; bracts oblong, ca. 5 mm; peduncle absent or to 5 mm. Pedicel slender, to 3 cm. Calyx ca. 5 mm, glabrous or sparsely pubescent, parted to middle; lobes triangular-ovate, apex acute, veins inconspicuous. Corolla pink, 1–2 cm, outside glabrous, inside hairy at throat; lower lip ca. 6 × 6 mm; upper lip 2–3 mm. Style included. Ovary glabrous. Fl. Mar–May.

• Moist places; 2500–3000 m. NE Yunnan (Tongchuan Xian).

10. *Mazus lecomtei* Bonati, Bull. Herb. Boissier 2: 538. 1908.

莲座通泉草 lian zuo tong quan cao

Mazus lecomtei var. *ramosus* Bonati.

Perennials, to 15 cm tall, white villous. Primary root turbinate, often fleshy and inflated, to 6 cm; lateral roots few. Leaves mostly basal, numerous, rosulate; petiole broadly winged; leaf blade oblanceolate, to 4 cm or longer, base tapering, margin irregularly incised toothed, apex obtuse. Flowering shoots erect, rarely ascending, unbranched or basally branched, leafless or with 1 or 2 small opposite or alternate leaves. Racemes 10–20-flowered, lax; bracts needlelike, short. Lower pedicel longer than calyx, ca. 5 cm. Calyx campanulate, ca. 5 mm; lobes lanceolate, as long as tube, apex acute, veins inconspicuous. Corolla purplish violet, ca. 1 cm; lower lip middle lobe longer than lateral lobes, all lobes entire; upper lip short, triangular. Ovary glabrous. Capsule globose. Seeds brown-yellow. Fl. and fr. Mar–May.

• Wet grassland, trailsides, beside water; 1000–2600 m. SW Sichuan, NW Yunnan.

11. *Mazus fauriei* Bonati, Bull. Herb. Boissier 2: 537. 1908.

台湾通泉草 tai wan tong quan cao

Mazus japonicus (Thunberg) Kuntze var. *tenuiracemus* Hayata ex Makino & Nemoto; *M. taihokuensis* Masamune.

Perennials, to 8–20 cm tall, white villous. Primary root short, fibrous roots numerous, tufted. Flowering stems not erect. Leaves all basal, rosulate; petiole broadly winged; leaf blade obovate-spatulate, 2–6 cm, papery, base tapering, margin coarsely serrate to double serrate or basally pinnately parted, apex obtuse. Flowering stems often branched, terete to somewhat ribbed, slender, ascending, leafless or with 1 or 2 small leaves. Racemes 3–15-flowered, lax; bracts ovate-triangular, 1.5–3 mm. Pedicel slender 1–2 cm. Calyx campanulate, 5–7 mm, enlarged to 1 cm in fruit; lobes as long as tube, lanceolate-triangular, apex acute, veins inconspicuous. Corolla light purple, 1.2–2 cm; lower lip ovate, middle lobe narrower and longer than lateral lobes; upper lip erect, lobes narrowly triangular. Ovary glabrous. Capsule globose, slightly longer than calyx tube. Seeds brown-yellow; seed coat finely reticulate. Fl. and fr. Apr–May.

Coastal cliffs; near sea level. N Taiwan [Japan].

12. *Mazus celsioides* Handel-Mazzetti, Symb. Sin. 7: 833. 1936.

琴叶通泉草 qin ye tong quan cao

Annuals, to 40 cm tall, stout, without stolons, white villous. Primary root short, fibrous roots numerous. Stems 1–3-branched, erect, rigid, basally woody, usually branched from base; branches long and further branched. Leaves decreasing in size upward. Basal leaves numerous, rosulate, to 10 cm, early deciduous. Stem leaves numerous; petiole broadly winged; leaf blade oblong-obovate, to 8 cm below, base tapering, margin irregularly serrate and below middle pandurate lobed, apex rounded. Racemes terminal, rigid, elongated to 20 cm, many flowered, often lax in fruit;

bracts narrowly lanceolate. Pedicel erect, upper ones shorter than calyx. Calyx funnellform, to 6 mm, enlarged in fruit; lobes to 2 mm, broadly ovate-triangular, apex acute, veins inconspicuous. Corolla pink to violet, ca. $2 \times$ as long as calyx; lower lip lobes rounded, middle one narrow and small; upper lip short, apex subobtusate. Ovary glabrous. Capsule ovoid. Seeds yellow-green, slightly channeled. Fl. and fr. Jun–Jul.

• Mixed forests, mountain slopes, along streams; ca. 2000 m. SE Xizang, NW Yunnan.

13. *Mazus solanifolius* P. C. Tsoong & H. P. Yang. Fl. Reipubl. Popularis Sin. 67(2): 399. 1979.

茄叶通泉草 *qie ye tong quan cao*

Perennials, 10–15 cm tall, sparsely rusty-red villous with long multicellular hairs. Roots many, fibrous. Rhizomes slender, to 9 cm. Stems 1–2, erect, herbaceous, purple, longitudinally striate. Basal leaves caudate. Stem leaves 4–6, mostly crowded apically on stem, lower stems leafless or with 1 or 2 smaller leaves; petiole 1.5–4 cm, stout; leaf blade elliptic-ovate to oblong-ovate, 4–8 cm, papery, abaxially purple, base broadly cuneate, margin irregularly sinuate-toothed, apex acute. Racemes terminal, ascending, to 8–11 cm, slender, 1–5-flowered; bracts linear-lanceolate, apex acute. Pedicel shorter than calyx. Calyx campanulate, 5–8 mm; lobes ca. $1/3$ as long as calyx, veins inconspicuous. Corolla purple ca. 2 cm; lower lip lobes subequal, apex obtuse and praemorse; upper lip lobes triangular. Ovary glabrous. Capsule ovoid. Fl. and fr. May–Jun.

• Moist sparse forests, montane forests. SW Sichuan (Leibo Xian).

14. *Mazus kweichowensis* P. C. Tsoong & H. P. Yang. Fl. Reipubl. Popularis Sin. 67(2): 399. 1979.

贵州通泉草 *gui zhou tong quan cao*

Perennials, 15–30 cm tall, white villous and glandular hairy. Primary root short, fibrous roots numerous, tufted. Stems mostly 2–4-branched from base, erect, herbaceous, longitudinally striate. Basal leaves rosulate, often deciduous. Stem leaves opposite, crowded; leaf blade obovate-spatulate, larger and to 7 cm at middle of stem, papery, base tapering, margin of leaves above middle of stem irregularly serrate or sinuate-toothed, lower leaves pinnatisect, apex rounded; pinnae 2–4 pairs, ovate to oblong, margin sparsely toothed. Racemes terminal; bracts lanceolate. Pedicel shorter than calyx. Calyx campanulate, 6–7 mm, enlarged in fruit; lobes as long as tube, ovate-triangular, apex acute, veins inconspicuous. Corolla purple-red, ca. 1 cm; lateral lobes of lower lip subrounded, middle lobe broadly ovate, narrower, and longer than other lobes; upper lip ovate-triangular. Ovary glabrous. Capsule ovoid. Fl. and fr. May–Jun.

• Beside water; ca. 900 m. SE Guizhou.

15. *Mazus longipes* Bonati, Bull. Herb. Boissier 2: 532. 1908.

长蔓通泉草 *chang wan tong quan cao*

Perennials, less than 10 cm tall, glabrous. Primary root short; fibrous roots numerous, tufted. Stolons internodes to 5 cm. Basal leaves rosulate; petiole 1–4 cm, narrowly winged; leaf blade obovate, 1–4 cm, \pm fleshy, base obtuse and tapering, margin entire or sinuate-toothed. Leaves on stolons opposite; petiole as long as or longer than leaf blade; leaf blade suborbicular, slightly smaller than basal leaves. Flowering stems short, erect. Racemes 3–6-flowered; bracts lanceolate, 5–12 mm. Pedicel 1–4 cm. Calyx campanulate, 4–10 mm; lobes ovate-lanceolate, ca. $2/5$ of calyx length, apex acute. Corolla white or light purple, 1.2–1.8 cm; lower lip lobes suborbicular, middle lobe slightly longer and narrower than lateral lobes; upper lip lobes linear-triangular or semi-orbicular, and apex obtuse. Ovary glabrous. Capsule ovoid. Fl. Mar–May.

• Dry fields, trailsides, grassland; ca. 2100 m. Guizhou, Yunnan.

16. *Mazus surculosus* D. Don, Prodr. Fl. Nepal. 87. 1825.

西藏通泉草 *xi zang tong quan cao*

Perennials, to 8 cm tall, sparsely white villous. Stems short; stolons slender, internodes more than 4 cm. Basal leaves rosulate; leaf blade obovate to spatulate, 2–7 cm including petiole, papery, base often pinnately pandurate parted, margin irregularly crenate, apex rounded. Leaves on stolons opposite, short petiolate; leaf blade rotund to obovate, much smaller than basal leaves. Scape longer than leaves, erect; racemes with flowers almost from base, lax. Basal pedicels to 2 cm. Calyx tube campanulate, 4–8 mm; lobes ca. $1/3$ as long as calyx, broadly ovate, apex obtuse to subacute. Corolla pink to light purple, ca. $2 \times$ as long as calyx; lower lip middle lobe ovate and longer than lateral lobes; upper lip erect, short, lobes suborbicular. Capsule ovoid, ca. 4 mm. Seeds surface smooth. Fl. and fr. Jun–Jul.

Grassland at forest edges; 2000–3300 m. Xizang, Yunnan [Bhutan, India, Kashmir, Nepal, Sikkim].

17. *Mazus pumilus* (N. L. Burman) Steenis, Nova Guinea n.s. 9(1): 31. 1958.

通泉草 *tong quan cao*

Annuals, 3–30 cm tall, glabrous or sparsely pubescent. Primary root perpendicular, elongated or shortened; fibrous roots numerous, scattered or tufted. Stems 1 or more, erect, ascending, or procumbent-ascending, rooting from prostrate nodes. Basal leaves early deciduous or few to numerous and sometimes rosulate; leaf blade obovate-spatulate to ovate-oblong, 2–6 cm, membranous to papery, base cuneate and decurrent, margin coarsely and irregularly toothed or pinnately parted with 1 or 2 lobules, rarely subentire, apex entire or obscurely and sparsely toothed. Stem leaves opposite or few alternate. Racemes terminal, elongated to apically fascicled, usually 3–20-flowered, lax. Pedicel 3–12 mm. Calyx campanulate, 3–8 mm, enlarged in fruit or not; lobes ovate, almost as long as tube, apex

acute. Corolla white, purple, or blue, ca. 1 cm; lower lip middle lobe smaller than lateral lobes, slightly exerted, obovate; upper lip lobes ovate-triangular. Ovary glabrous. Capsule globose. Fl. and fr. Apr–Oct.

Wet grassland, along streams, trailsides, waste fields, wet places and edge of forests, grassland on mountain slopes; 1200–3800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, NW India, Indonesia, Japan (Ryukyu Islands), Kashmir, Korea, Nepal, New Guinea, Philippines, Russia, Sikkim, Thailand, Vietnam].

1a. Calyx enlarged in fruit to 2 cm in diam.; petiole of basal leaves often equal to or longer than blade

..... 17d. var. *macrocalyx*

1b. Calyx not conspicuously enlarged in fruit; petiole of basal leaves shorter than blade.

2a. Plants to 10 cm; leaf margin subentire

..... 17b. var. *wangii*

2b. Plants more than 10 cm; leaf margin dentate or lobed.

3a. Stems numerous, much branched; pedicel less than 5(–7) mm 17c. var. *delavayi*

3b. Stems few, few branched; pedicel 5–12 mm 17a. var. *pumilus*

17a. *Mazus pumilus* var. *pumilus*

通泉草(原变种) tong quan cao (yuan bian zhong)

Lobelia pumila N. L. Burman, Fl. Indica 186. 1768; *Hornemannia bicolor* Willdenow; *Lindernia japonica* Thunberg; *Mazus japonicus* (Thunberg) Kuntze; *M. rugosus* Loureiro; *M. vandellioides* Hance ex Hemsley; *Tittmannia obovata* Bunge; *Vandellia obovata* Walpers. Plants more than 10 cm. Stems few, few branched. Petiole of basal leaves shorter than blade; leaf margin dentate or lobed. Racemes 5–20-flowered. Pedicel 5–12 mm. Calyx not enlarged in fruit. Fl. and fr. Apr–Oct.

Wet grassland, along streams, trailsides, waste fields, edge of forests; below 2500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Indonesia, Japan (Ryukyu Islands), Kashmir, Korea, New Guinea, Philippines, Russia, Sikkim, Thailand, Vietnam].

17b. *Mazus pumilus* var. *wangii* (H. L. Li) T. L. Chin ex D. Y. Hong, Novon 6: 374. 1996.

通泉草匍茎变种 tong quan cao pu jing bian zhong

Mazus wangii H. L. Li, Brittonia 8: 37. 1954; *Mazus japonicus* (Thunberg) Kuntze var. *wangii* (H. L. Li) P. C. Tsoong.

Plants less than 10 cm. Stems with creeping ascending branches. Petiole of basal leaves shorter than blade; leaf margin subentire. Racemes 3–7-flowered. Calyx not enlarged in fruit.

• Moist places in forest; 1500–2500 m. S Yunnan.

17c. *Mazus pumilus* var. *delavayi* (Bonati) T. L. Chin ex D. Y. Hong, Novon 6: 374. 1996.

通泉草多枝变种 tong quan cao duo zhi bian zhong

Mazus delavayi Bonati, Bull. Herb. Boissier 2: 530. 1908; *Mazus japonicus* (Thunberg) Kuntze var. *delavayi* (Bonati) P. C. Tsoong.

Plants more than 10 cm. Stems numerous, much branched. Petiole of basal leaves shorter than blade. Racemes elongated, 10–20-flowered. Pedicel short, less than 5(–7) mm. Calyx not enlarged in fruit.

Trailsides, wet grassland; 1200–3800 m. Guangxi, W Sichuan, Yunnan [Bhutan, NW India, Kashmir, Nepal, Sikkim].

17d. *Mazus pumilus* var. *macrocalyx* (Bonati) T. Yamazaki, J. Jap. Bot. 55: 11. 1980.

通泉草大萼变种 tong quan cao da e bian zhong

Mazus macrocalyx Bonati, Bull. Herb. Boissier 2: 529. 1908; *M. japonicus* (Thunberg) Kuntze var. *macrocalyx* (Bonati) P. C. Tsoong.

Stems unbranched. Petiole of basal leaf often as long as leaf blade or longer. Calyx ca. 2 × enlarged in fruit, to 2 cm in diam.

Along streams, trailsides, grassland on mountain slopes; 1200–2800 m. Guangdong, Guangxi, Sichuan, Taiwan, Yunnan [Thailand].

18. *Mazus saltuarius* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 10. 1926.

林地通泉草 lin di tong quan cao

Perennials, 6–20 cm tall, white villous. Primary root short; fibrous roots numerous, slender. Stems 1–5, unbranched, creeping for a short distance then ascending. Basal leaves numerous, rosulate; leaf blade obovate-spatulate, 1.5–9 cm including petiole, base tapering, margin undulate and toothed, or irregularly crenate. Stem leaves opposite, 2–4 pairs, rarely alternate, 1/3–1/2 as large as basal leaves; petiole short; leaf blade obovate to suborbicular, margin coarsely serrate. Racemes terminal, 3–12-flowered; bracts ovate-lanceolate, membranous, ca. 2 mm. Pedicel less than 1 cm. Calyx funnelform, 6–7 mm; lobes ovate-oblong, as long as tube, apex obtuse or apiculate. Corolla blue-purple, 1–1.6 cm; lower lip rounded, slightly exerted, middle lobe shorter than lateral lobes; upper lip lobes ovate to oblong. Ovary glabrous. Fl. Mar–Apr.

• Moist sparse forests, hilly areas, grassland along trails; 100–800 m. Hunan, Jiangxi.

19. *Mazus fukienensis* P. C. Tsoong, Kew Bull. 1954: 445. 1954.

福建通泉草 fu jian tong quan cao

Annuals, 15–30 cm tall, glabrous or sparsely pilose. Primary root short; fibrous roots clustered. Stems 1 to numerous, ascending, not creeping. Basal leaves rosulate; petiole as long as leaf blade, broadly winged;

leaf blade oblong-spatulate, 2.5–4.5 cm including petiole, papery, base tapering, margin crenate and sometimes entire near base or 1–3-toothed on each side. Stem leaves opposite, 2–4 pairs; petiole short; leaf blade similar to basal leaves, ca. 1/2 as long. Racemes to 20 cm, 6–20-flowered; bracts ovate-lanceolate, 2.5–3.5 mm. Pedicel to 1.5 cm. Calyx broadly campanulate, less than 3.5 mm, to 7 mm in fruit; lobes broadly ovate, equalling tube in length, apex acute. Corolla blue-purple, ca. 1 cm; lower lip lobes broadly ovate, exserted; upper lip lobes oblong-ovate. Ovary glabrous. Capsule globose. Fl. and fr. Apr–May.

- Along rivers. Fujian.

20. Mazus henryi P. C. Tsoong, Kew Bull. 1954: 444. 1954.

长柄通泉草 chang bing tong quan cao

Mazus henryi var. *elatior* P. C. Tsoong.

Perennials, densely lanose when young, glabrescent. Primary root short; fibrous roots ca. 7 cm, clustered. Stems to 25 cm, erect or ascending; stolons elongated, internodes 6–10 cm. Petiole 2.5–7 cm. Basal leaves 5–12, clustered, nearly rosulate; leaf blade suborbicular to broadly ovate, 2.5–5 cm, to 3 cm wide, margin crenate, teeth apices callous, sometimes with 1 or 2 pairs of lobes near base. Leaves on stolons opposite; petiole to 3 cm; blade smaller and more rounded than basal leaves, to 3 cm wide, margin often unlobed. Racemes terminal, shortened or elongated to 15 cm, lax, 2–13-flowered. Pedicel 1.5–2.5 cm. Calyx campanulate, 5–10 mm; lobes ovate-triangular, less than 1/3 of calyx length. Corolla light purple 1.2–1.6 cm; lower lip lobes subrounded, middle lobe smaller than lateral lobes and exserted; upper lip lobes lanceolate. Ovary glabrous. Capsule subglobose, ca. 4 mm. Fl. Jan–Apr, fr. Apr–May.

Edge of forests, mixed forests, wet and dense forests; 800–2200 m. C to S Yunnan [Laos].

21. Mazus miquelii Makino, Bot. Mag. (Tokyo) 16: 162. 1902.

匍茎通泉草 pu jing tong quan cao

Mazus fargesii Bonati, *M. japonicus* Bonati (1908), not Kuntze (1891); *M. miquelii* Makino var. *stolonifer* (Maximowicz) Nakai; *M. rugosus* Loureiro var. *stolonifer* Maximowicz; *M. stolonifer* (Maximowicz) Makino; *M. wilsonii* Bonati; *Vandellia japonica* Miquel. Perennials, glabrous or sparsely villous. Primary root short; fibrous roots numerous, clustered. Stems erect to obliquely ascending, 10–15 cm; stolons to 15–20 cm, rooting from nodes or not. Basal leaves numerous, rosulate, petiolate; leaf blade obovate-spatulate, 3–7 cm including petiole, margin coarsely serrate, sometimes pinnatisect. Stem leaves on erect stems alternate, on stolons mostly opposite; petiole short; leaf blade ovate to subrounded, 1.5–4 cm including petiole, less than 2 cm wide, margin sparsely serrate. Racemes terminal,

elongated, lax. Pedicel gradually shorter toward inflorescence apex, lower ones to 2 cm. Calyx campanulate-funnelform, 7–10 mm; lobes lanceolate-triangular, as long as tube. Corolla purple or white with purplish spots, 1.5–2 cm; lower lip middle lobe obovate, shorter than lateral lobes and slightly exserted; upper lip erect, short. Capsule globose, slightly exserted. Fl. and fr. Feb–Aug.

Trailsides in wet places, sparse forests; below 300 m. Anhui, Fujian, Guangxi, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [Japan].

22. Mazus alpinus Masamune, J. Soc. Trop. Agric. 2: 153. 1930.

高山通泉草 gao shan tong quan cao

Perennials. Stems erect or ascending, scapose; stolons to 30 cm, hirsute, sometimes very sparsely so. Basal leaves rosulate; leaf blade spatulate, 1.5–5 × 0.8–1.5 cm, base attenuate, margin coarsely crenate, dentate, or pinnately lobed. Stolon leaves opposite, sessile or petiolate; leaf blade obovate to subrounded, much smaller than basal leaves. Flowering stems scapose, to 15 cm, hirsute. Racemes borne on main stems and on stolons, 3–13-flowered; bracts subulate. Pedicel 5–6 mm. Calyx campanulate, 3–8 mm, parted to middle; lobes subulate-lanceolate, as long as tube, apex acute. Corolla pale purple, 1–2.2 cm. Fl. and fr. Mar–Sep.

- Grassland on rocky slopes; 1700–3400 m. Taiwan.

23. Mazus gracilis Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 181. 1890.

纤细通泉草 xian xi tong quan cao

Perennials, glabrous or soon glabrescent. Stems creeping, to 30 cm, slender, conspicuously stoloniferous. Basal leaves petiolate; leaf blade spatulate to ovate, 2–5 cm including petiole, thin, margin sparsely serrate. Stem leaves opposite, petiolate; leaf blade obovate-spatulate to subrounded, 1–2.5 cm including petiole, margin crenate to subentire. Racemes usually axillary, rarely terminal, ascending, to 15 cm, lax. Pedicel slender, 1–1.5 cm in fruit. Calyx campanulate, 4–7 mm, slightly enlarged in fruit; lobes ovate-lanceolate, as long as tube, apex acute to obtuse. Corolla yellow with purple patches, white, blue-purple, or pale violet, 1.2–1.5 cm; lower lip middle lobe narrowly ovate, narrower, longer than lateral lobes; plaits with sparse glandular hairs; upper lip erect. Ovary glabrous. Capsule globose. Seeds brown-yellow; seed coat smooth. Fl. and fr. Apr–Jul.

- Moist hilly areas, trailsides, beside water; below 800 m. Henan, Hubei, Jiangsu, Jiangxi, Zhejiang.

We have not seen any specimens of *Mazus cavaleriei* Bonati (Bull. Herb. Boissier. 2: 534. 1908). According to the original description and the photo of the type specimen (*Cavalerie* 2324 from Pinbei, Guizhou) it is similar to *M. gracilis* but differs by the deeply incised serrate leaves and the calyx lobes being longer than the tube.

24. Mazus procumbens Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 182. 1890.

长匍通泉草 chang pu tong quan cao

Perennials, white villous. Stems numerous, slender, hard, procumbent, 30–45 cm, simple or branched, internodes often shorter than leaves, conspicuously stoloniferous. Basal leaves several to numerous, often deciduous. Stem leaves often alternate, long petiolate; leaf blade orbicular-spatulate to subrounded, 1.5–6 cm including petiole, larger at middle of stem, base truncate to subrounded and tapering. Racemes terminal, to 13 cm or more, lax. Pedicel slender, 1–2 × as long as flower. Calyx campanulate, ca. 5 mm, white villous; lobes ovate-lanceolate, as long as or slightly longer than tube, apex acute. Corolla purple, less than 1 cm. Capsule globose, small. Fl. and fr. May.

- W Hubei.

25. *Mazus lanceifolius* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 181. 1890.

狭叶通泉草 xia ye tong quan cao

Perennials, 20–30 cm tall, black when dry, glabrous or soon glabrescent. Stems numerous, erect, quadrangular, slender. Leaves opposite, subsessile; lower leaves scalelike and small, obovate-oblong, apex obtuse; middle and upper leaves with leaf blade lanceolate to narrowly so, 6–9 cm, submembranous, abaxially glaucous and light green, base cuneate, margin sparsely to obscurely serrate, apex acute to narrowly acuminate, lateral veins several. Racemes terminal, scorpioid, ca. 6-flowered; bracts narrowly lanceolate. Flowers small. Pedicel shorter than flower, slender. Calyx funnelform, 6–9 mm, 5-lobed; lobes lanceolate, as long as tube in length, apex acute, midrib conspicuous, lateral veins inconspicuous. Corolla hardly exerted from calyx. Capsule ovoid, apex acuminate. Fl. and fr. Mar.

- W Hubei, E Sichuan.

