

3. TROLLIUS Linnaeus, Sp. Pl. 1: 556. 1753.

金莲花属 jin lian hua shu

Li Liangqian (李良千); Michio Tamura

Herbs perennial, glabrous, with fibrous roots. Leaves all basal, or basal and cauline, simple, palmately parted or sect. Flower solitary, terminal or few in a cyme. Sepals 5 to many, usually yellow, rarely purplish, obovate, petaloid, usually caducous, rarely persistent. Petals 5 to many, linear, shortly clawed and with nectary pit above base. Stamens numerous; anthers ellipsoid or oblong, filaments narrowly linear. Follicles 5 to many, with branching transverse veins and a persistent style. Seeds subglobose, smooth.

About 30 species: temperate to cold regions of the N hemisphere; 16 species (eight endemic) in China.

- 1a. Sepals lilac-blue or pale blue, or white with blue veins, persistent 16. *T. lilacinus*
- 1b. Sepals yellow, usually caducous, or rarely white inside and purplish outside, persistent.
 - 2a. Leaves palmately parted.
 - 3a. Leaves all basal, or 1–3 inserted near base of stem.
 - 4a. Leaf blade 3-parted, lobes indistinct, margin with teeth ovate or broadly ovate 4. *T. pumilus*
 - 4b. Leaf blade deeply 3-sect nearly to base, segments lobed, margin with teeth triangular or narrowly triangular 5. *T. farreri*
 - 3b. Leaves both basal and cauline, cauline leaves 2–4, inserted at middle or above on stem.
 - 5a. Sepals 8–13 3. *T. dschungaricus*
 - 5b. Sepals 5.
 - 6a. Sepals ± green when dried; petals broadly spatulate at apex; persistent style erect 1. *T. yunnanensis*
 - 6b. Sepals not green when dried; petals narrowed at apex; persistent style turning outside 2. *T. buddae*
 - 2b. Leaves palmately sect.
 - 7a. Petals longer than stamens, caducous.
 - 8a. Petals shorter than sepals.
 - 9a. Petals narrowly linear, 1–1.5(–1.8) mm wide, slightly spatulate 12. *T. ledebourii*
 - 9b. Petals spatulate-linear, broadened from base, broadest above middle, 2–3.5 mm wide 13. *T. asiaticus*
 - 8b. Petals equaling or longer than sepals.
 - 10a. Sepals (6–)10–15(–19); petals subequaling sepals; persistent style ca. 1 mm 14. *T. chinensis*
 - 10b. Sepals 5–7; petals usually longer than sepals; persistent style 3.5–4 mm 15. *T. macropetalus*
 - 7b. Petals shorter than or subequaling stamens, usually persistent.
 - 11a. Petals longer than filaments, subequaling stamens; flower solitary and terminal, or 2 or 3 flowers in a cyme.
 - 12a. Sepals 5–7; styles purplish 10. *T. japonicus*
 - 12b. Sepals 15–18; styles dark purple or black 11. *T. altaicus*
 - 11b. Petals equaling filaments; flower solitary, terminal.
 - 13a. Sepals ca. 6 mm, persistent 6. *T. micranthus*
 - 13b. Sepals 10–20 mm, caducous or persistent.
 - 14a. Segments of leaves not separate; sepals ± green when dried 7. *T. ranunculoides*
 - 14b. Segments of leaves separate; sepals not green when dried.
 - 15a. Basal leaves 4–6.5 cm wide; sepals not purplish outside, caducous 9. *T. taihasenzanensis*
 - 15b. Basal leaves 1–2.6(–4.5) cm wide; sepals purplish outside, usually persistent.
 - 16a. Central segment 3-lobed to ± middle; carpels 6–9(–25) 5. *T. farreri*
 - 16b. Central segment 3-parted nearly to base; carpels 4–6 8. *T. vaginatus*

1. Trollius yunnanensis (Franchet) Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 368. 1922.

云南金莲花 yun nan jin lian hua

Stems more than 20 cm tall, to 80 cm at fruiting, simple or branched above middle. Basal leaves 2 or 3; petiole 7–20 cm, base narrowly sheathed; leaf blade dark green when dried, pentagonal, 2.6–5.5 × 4.8–11 cm, base deeply cordate, 3-parted; central lobe rhombic-ovate or rhombic, 3-fid, incised-lobulate or dentate at margin; lateral lobes obliquely flabellate, unequally 2-fid.

Proximal cauline leaves similar to basal ones, distal cauline leaves sessile, smaller. Flower solitary,

terminal, or 2 or 3 flowers in a cyme, (3.2–)4–5.5 cm in diam. Pedicel ca. 4 cm, to 9.5 cm at fruiting. Sepals 5(–7), yellow, ± green when dried, broadly obovate or obovate, rarely broadly elliptic, 1.7–2.5(–3) × 1.2–2.5(–2.8) cm, apex rounded or truncate. Petals linear, shorter than stamens, 7–7.5(–17) × ca. 1 mm, slightly widened at apex, subspatulate. Stamens ca. 1 cm. Follicles 7–25, 0.9–1.1 cm × ca. 3 mm; persistent style erect, ca. 1 mm. Seeds narrowly ovoid, ca. 1.5 mm, smooth. Fl. Jun–Sep, fr. Sep–Oct.

• Grassy slopes, mountain slopes, wet places; 1900–3900 m. S Gansu, Sichuan, W Yunnan.

- 1a. Petals longer than stamens, 12–17 mm 1b. var. *eupetalus*
- 1b. Petals shorter than or subequaling stamens, less than 8 mm.
 - 2a. Leaves distinctly peltate at base 1d. var. *peltatus*
 - 2b. Leaves not peltate at base.
 - 3a. Leaf lobes ± separate from each other, central lobe 3-fid to or beyond middle 1a. var. *yunnanensis*
 - 3b. Leaf lobes overlapping, central lobe 3-lobed, not divided below middle 1c. var. *anemonifolius*

1a. *Trollius yunnanensis* var. *yunnanensis*

云南金莲花(原变种) yun nan jin lian hua (yuan bian zhong)

Trollius pumilus D. Don var. *yunnanensis* Franchet, Bull. Soc. Bot. France 33: 375. 1886; ?*T. papavereus* Schipczinsky; *T. pumilus* subsp. *normalis* Brühl var. *yunnanensis* (Franchet) Brühl; *T. yunnanensis* f. *ubera* Stapf.

Leaves not peltate at base; leaf lobes ± separate from each other, central lobe 3-fid to or beyond middle. Sepals less than 2.8 cm wide. Petals shorter than or subequaling stamens, less than 8 mm. $2n = 16^*$.

• Grassy slopes, wet grassy places; 2700–3600 m. W Sichuan, W Yunnan.

1b. *Trollius yunnanensis* var. *eupetalus* (Stapf) W. T. Wang in W. T. Wang & P. K. Hsiao, Acta Phytotax. Sin., Addit. 1: 50. 1965.

长瓣云南金莲花 chang ban yun nan jin lian hua

Trollius yunnanensis f. *eupetala* Stapf, Bot. Mag. 152: t. 9134. 1928.

Sepals 1.7–3 cm wide. Petals longer than stamens, 1.2–1.7 cm.

• Grassy slopes; 3300–3900 m. NW Yunnan.

1c. *Trollius yunnanensis* var. *anemonifolius* (Brühl) W. T. Wang in W. T. Wang & P. K. Hsiao, Acta Phytotax. Sin., Addit. 1: 51. 1965.

复裂云南金莲花 fu lie yun nan jin lian hua

Trollius pumilus D. Don subsp. *anemonifolius* Brühl, Ann. Roy. Bot. Gard. (Calcutta) 5: 87. 1896; *T. anemonifolius* (Brühl) Stapf; *T. yunnanensis* subsp. *anemonifolius* (Brühl) Doroszewska.

Leaves not peltate at base; lobes overlapping, central lobe 3-lobed, not divided below middle. Sepals less than 2.8 cm wide. Petals shorter than or subequaling stamens, less than 8 mm.

• Grassy slopes; 3000–3800 m. S Gansu, W Sichuan.

1d. *Trollius yunnanensis* var. *peltatus* W. T. Wang in W. T. Wang & P. K. Hsiao, Acta Phytotax. Sin., Addit. 1: 51. 1965.

盾叶云南金莲花 dun ye yun nan jin lian hua

Leaves distinctly peltate at base. Sepals less than 2.8 cm wide. Petals shorter than or subequaling stamens, less than 8 mm.

• Mountain slopes, wet places; ca. 1900 m. Sichuan (Emei Shan).

2. *Trollius buddae* Schipczinsky, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 4: 10. 1923.

川陕金莲花 chuan shan jin lian hua

Trollius stenopetalus Stapf.

Stems 60–70 cm tall, usually branched at middle or above. Basal leaves 1–3; petiole 11–30 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 5.9–9 × 9.5–18 cm, base deeply cordate, 3-parted; central lobe rhombic or broadly rhombic, 3-lobed, with several lobules and dentate margin; lateral lobes obliquely flabellate, unequally 2-fid. Cauline leaves 3 or 4, proximal ones similar to basal leaves, distal ones diminishing. Inflorescence cymose, 2- or 3-flowered. Sepals 5, yellow, not green when dried, obovate or broadly obovate, rarely elliptic, 1.2–1.6 × 0.9–1.6 cm, caducous. Petals nearly as long as stamens, ca. 8 mm, apex not or slightly widened. Stamens 8–10 mm. Follicles 20–30, 1–1.4 cm × ca. 3 mm; persistent style turning outside, ca. 1 mm. Fl. Jul, fr. Aug.

• Grassy slopes; 1800–2400 m. S Gansu, S Shaanxi, N Sichuan.

3. *Trollius dschungaricus* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 383. 1880.

准噶尔金莲花 zhun ga er jin lian hua

Trollius europaeus Linnaeus var. *songoricus* Regel.

Stems ca. 10 cm tall, to 50 cm at fruiting, simple. Basal leaves 3–7; petiole 6–28 cm, base narrowly sheathed; leaf blade green when dried, 1.5–4.5 × 2–7.5 cm, base cordate, 3-parted; central lobe broadly elliptic or elliptic-obovate, 3-lobed, with lobules and irregularly denticulate margin; lateral lobes obliquely flabellate, unequally 2-fid. Cauline leaves 2 or 3, similar to basal ones. Flower solitary, terminal, sometimes 2 or 3 flowers in a cyme, 3–5.4 cm in diam. Pedicel ca. 5 cm, to 15 cm at fruiting. Sepals 8–13, yellow or orange-yellow, not green when dried, obovate or broadly obovate, sometimes narrowly obovate, 1.5–2.6 × 0.8–1.6 cm, margin several toothed or subentire at apex, apex rounded. Petals linear, orbicular, or spatulate, shorter than stamens or subequal to filaments, 7–8 × ca. 1 mm. Stamens 0.9–1.4 cm. Follicles 12–18, 1–1.2 cm × ca. 2 mm; persistent style ca. 1.2 mm. Seeds ca. 1.5 mm, ellipsoid-globose, smooth. Fl. Jul–Aug, fr. Sep. $2n = 16$.

Grassy slopes, *Picea* forests; 1800–3100 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

4. *Trollius pumilus* D. Don, Prodr. Fl. Nepal. 195. 1825.

小金莲花 xiao jin lian hua

Stems more than 3.5 cm tall, to 25 cm at fruiting, simple. Basal leaves 1–3; petiole 1.5–5 cm, base

sheathed; leaf blade green or not when dried, pentagonal or pentagonal-ovate, 0.8–1.5 × 1.2–2.5 cm, base deeply cordate, 3-parted; central lobe obovate or flabellate-obovate, apex rounded, 3-lobed, with 2 or 3 lobules or dentate margin; lateral lobes obliquely flabellate, unequally 2-fid. Cauline leaves 2 or 3, similar to basal ones. Flower solitary, terminal, 1.5–2 cm in diam. Sepals 5, yellow and caducous, or white inside, purplish outside and persistent, green or not when dried, obovate or ovate, 6–10(–17) × 3.5–9 (–15) mm, apex rounded, usually caducous. Petals spatulate-linear, shorter than stamens, 2–3 × ca. 0.5 mm, apex rounded. Stamens 3.5–5 mm. Follicles 6–16, ca. 1 cm; persistent style ca. 1 mm. Seeds ca. 1 mm, ellipsoid-globose, smooth. Fl. Jul, fr. Aug.

Marshes, alpine grasslands; 2300–4800 m. S and SW Gansu, E and S Qinghai, Sichuan, Xizang [Bhutan, N Myanmar, Nepal, Sikkim].

1a. Leaves both basal and cauline 4c. var. *foliosus*
1b. Leaves all basal or subbasal.

- 2a. Leaf blade and sepals green when dried; sepals to 17 × 15 mm 4b. var. *tanguticus*
- 2b. Leaf blade and sepals not green when dried; sepals to 6–10 × 3.5–9 mm.
- 3a. Stems 3.5–9 cm tall; sepals yellow, 6–10 × 3.5–7 mm, caducous 4a. var. *pumilus*
- 3b. Stems 20–25 cm tall; sepals white inside, dark purple outside, ca. 10 × 8–9 mm, persistent 4d. var. *tehkehensis*

4a. *Trollius pumilus* var. *pumilus*

小金莲花(原变种) xiao jin lian hua (yuan bian zhong)

Trollius pumilus subsp. *normalis* Brühl var. *sikkimensis* Brühl.

Stems 3.5–9 cm tall at anthesis. Leaves all basal or subbasal; leaf blade not green when dried. Sepals yellow, 6–10 × 3.5–7 mm, caducous. 2n = 16.

Grassy marshes, grasslands; 4100–4800 m. S Xizang [Bhutan, N Myanmar, Nepal, Sikkim].

4b. *Trollius pumilus* var. *tanguticus* Brühl, Ann. Roy. Bot. Gard. (Calcutta) 5: 88. 1896.

青藏金莲花 qing zang jin lian hua

Trollius pumilus var. *alpinus* Ulbrich; *T. tanguticus* (Brühl) W. T. Wang.

Leaves all basal or subbasal, green when dried. Sepals green when dried, to 1.7 × 1.5 cm.

• Mountainous grasslands, marshes; 2300–3700 m. SW Gansu, E and S Qinghai, NW Sichuan, NE Xizang.

4c. *Trollius pumilus* var. *foliosus* (W. T. Wang) W. T. Wang, Fl. Reipubl. Popularis Sin. 27: 78. 1979.

显叶金莲花 xian ye jin lian hua

Trollius tanguticus (Brühl) W. T. Wang var. *foliosus* W. T. Wang in W. T. Wang & P. K. Hsiao, Acta Phytotax. Sin., Addit. 1: 52. 1965.

Leaves both basal and cauline.

• Alpine grasslands; 3000–3400 m. S Gansu.

4d. *Trollius pumilus* var. *tehkehensis* (W. T. Wang) W. T. Wang, Fl. Reipubl. Popularis Sin. 27: 78. 1979.

德格金莲花 de ge jin lian hua

Trollius tehkehensis W. T. Wang in W. T. Wang & P. K. Hsiao, Acta Phytotax. Sin., Addit. 1: 52. 1965.

Stems 20–25 cm tall. Leaves all basal or subbasal, not green when dried. Sepals dark purple outside, white inside, ca. 1 cm × 8–9 mm, persistent.

• Alpine grasslands. Sichuan (Dêgê Xian).

Rudolf V. Kamelin (pers. comm.) believes that this taxon deserves recognition at the rank of species.

5. *Trollius farreri* Stapf, Bot. Mag. 152: t. 9143. 1928.

矮金莲花 ai jin lian hua

Stems more than 5 cm tall, to 19 cm at fruiting, simple.

Leaves 3 or 4, all basal or subbasal, or with 1 or 2 leaves near middle of stem; petiole 1–4 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 0.8–2.1 × 1.4–4.5 cm, base cordate, 3-sect nearly to base; central segment rhombic-obovate or cuneate, 3-lobed, with 2 or 3 irregular triangular teeth; lateral segments unequally 2-fid. Flower solitary, terminal, 1.8–3.4 cm in diam. Sepals 5(or 6), yellow, abaxially usually dark purple, not green when dried, broadly ovate, 1–1.5 × 0.9–1.5 cm, apex rounded or subtruncate, persistent, rarely caducous. Petals spatulate-linear, shorter than stamens, ca. 5 × 0.5–0.8 mm. Stamens ca. 7 mm. Follicles 6–9(–25), 0.9–1.2 cm; persistent style erect, ca. 2 mm. Seeds ellipsoid-globose, ca. 1 mm. Fl. Jun–Jul, fr. Aug.

• Grassy slopes, alpine meadows; 3500–4700 m. S Gansu, E and S Qinghai, S Shaanxi, W Sichuan, NE and SE Xizang, NW Yunnan.

1a. Leaf blade 1.4–2.6 cm wide, leaves basal or subbasal; central segment rhombic-obovate or cuneate, with 2 or 3 irregular triangular teeth 5a. var. *farreri*

1b. Leaf blade 2–4.5 cm wide, leaves all basal or with 1 or 2 cauline leaves near middle of stem; central segment broadly rhombic, densely lobulate 5b. var. *major*

5a. *Trollius farreri* var. *farreri*

矮金莲花(原变种) ai jin lian hua (yuan bian zhong)

Trollius kansuensis (Brühl) Mukerjee; *T. pumilus* D. Don subsp. *normalis* Brühl var. *kansuensis* Brühl.

Leaves basal or subbasal; leaf blade 1.4–2.6 cm wide; central segment rhombic-obovate or cuneate, with 2 or 3 irregular triangular teeth.

• Grassy slopes; 3500–4700 m. S Gansu, E and S Qinghai, S Shaanxi, W Sichuan, NE Xizang, NW Yunnan.

5b. *Trollius farreri* var. *major* W. T. Wang in W. T. Wang & P. K. Hsiao, Acta Phytotax. Sin., Addit. 1: 52. 1965.

大叶矮金莲花 da ye ai jin lian hua

Leaves all basal or with 1 or 2 cauline leaves near middle of stem; leaf blade 2–4.5 cm wide; central segment broadly rhombic, densely lobulate.

• Alpine meadows; 3500–4200 m. SE Xizang (Zayü Xian), NW Yunnan (Dêqên Xian).

6. *Trollius micranthus* Handel-Mazzetti, Symb. Sin. 7: 268. 1931.

小花金莲花 xiao hua jin lian hua

Stems more than 5 cm tall, to 24 cm at fruiting, simple or 1-branched at base. Basal leaves 4 or 5; petiole 1.2–3.5 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 0.8–1.5 × 1.3–3.5 cm, base cordate, 3-sect; central segment broadly rhombic or cuneate, 3-lobed, margin with several teeth or entire; lateral segments obliquely flabellate, 2-fid. Subbasal cauline leaves similar to basal ones. Flower solitary, 1.2–1.5 cm in diam. Sepals 5, yellow, tinged with purple when dried, 5–8 mm, narrowly obovate or oblong, apex obtuse, persistent. Petals shorter than stamens, 2–3 mm. Stamens 3.5–5 mm. Follicles ca. 7, subequaling sepals, 5–8 × ca. 2 mm; persistent style erect, ca. 0.7 mm. Seeds ellipsoid-globose, ca. 1 mm, smooth. Fl. Jun, fr. Aug.

• Grassy slopes; 3900–4200 m. E Xizang (Médog Xian), NW Yunnan (Dêqên Xian).

7. *Trollius ranunculoides* Hemsley, J. Linn. Soc., Bot. 29: 301. 1892.

毛茛状金莲花 mao gen zhuang jin lian hua

Trollius pumilus D. Don subsp. *normalis* Brühl var. *ranunculoides* Brühl.

Stems more than 6 cm tall, to 30 cm at fruiting, simple. Basal leaves with petiole 3–13 cm, base sheathed; leaf blade not green when dried, orbicular-pentagonal or pentagonal, 1–1.5 (–2.5) × 1.4–2.4 (–4.2) cm, base cordate, 3-sect; central segment broadly rhombic or rhombic-obovate, 3-fid, lobules 1- or 2-triangular or ovate-triangular dentate; lateral segments obliquely flabellate, unequally 2-fid nearly to base. Cauline leaves 1–3, smaller than basal leaves. Flower solitary, 2.2–3.2 (–4) cm in diam. Sepals 5(–8), yellow, ± green when dried, obovate, 1–1.5 × 1–1.8 cm, apex rounded or subtruncate, caducous. Petals spatulate-linear, shorter than stamens, 4.5–6 × ca. 1 mm. Stamens 5–7 mm. Follicles 7–9, ca. 1 cm; persistent style erect, ca. 1 mm. Seeds ellipsoid-globose, ca. 1 mm. Fl. May–Jun, fr. Aug.

• Grassy slopes; 2900–4100 m. S Gansu, E and S Qinghai, W Sichuan, E Xizang, NW Yunnan.

8. *Trollius vaginatus* Handel-Mazzetti, Symb. Sin. 7: 267. 1931.

鞘柄金莲花 qiao bing jin lian hua

Stems more than 4 cm tall, to 11 cm at fruiting, simple. Basal leaves 1 or 2(or 3); petiole 3–4 cm, base sheathed; leaf blade not green when dried, pentagonal-reniform, 1–1.5 × 1.6–2.8 cm, base deeply cordate, 3-sect; central segment broadly rhombic, 3-fid, lobules with 1 or 2 triangular teeth; lateral segments obliquely rhombic, unequally 2-fid nearly to base. Cauline leaves similar to basal ones, long petiolate. Flower solitary, 2.5–3.2 (–3.7) cm in diam. Sepals 5, yellow, abaxially usually purple-brown, not green when dried, obovate or broadly obovate, 1.1–2 cm, apex rounded, persistent. Petals ca. 12, spatulate-linear, subequaling filaments or slightly

shorter, 4–5 × 1–1.2 mm. Stamens 5–7 mm. Follicles 4–6, ca. 9 mm; persistent style ca. 1 mm. Fl. Jun, fr. Jun.

• Grassy slopes; 3000–4200 m. SW Sichuan (Muli Zang Zu Zhi-xian), NW Yunnan (Zhongdian Xian).

9. *Trollius taihasenzanensis* Masamune, J. Soc. Trop. Agr. 6: 570. 1934.

台湾金莲花 tai wan jin lian hua

Stems 20–35 cm tall, simple or 1-branched. Basal leaves ca. 5; petiole 8–13 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 2.3–3 × 4–6.5 cm, base cordate, 3-sect; central segment broadly rhombic, 3-fid, with narrowly triangular teeth; lateral segments obliquely flabellate, unequally 2-fid nearly to base. Cauline leaves similar to basal ones. Flowers 1–5, in terminal branches, 2.5–4 cm in diam. Sepals 5–8, yellow, not green when dried, not purplish outside, broadly obovate to narrowly obovate, or broadly elliptic, 1.2–1.9 × 0.7–1.4 cm, caducous. Petals ca. 12, linear-elliptic, 3–4 × 0.5–1 mm. Stamens 5–7.5 mm. Follicles 4–15, ca. 1 cm × 3 mm; persistent style 2.5–3 mm. Seeds ellipsoid-globose, 1.2–1.5 mm, smooth.

• Scrub forests in valleys, grassy streambanks, open areas in *Abies* forests; 3200–3900 m. Taiwan.

10. *Trollius japonicus* Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 6. 1876.

长白金莲花 chang bai jin lian hua

Stems 20–60 cm tall, simple. Basal leaves 3–5; petiole 5.5–20 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 2.7–10 × 4–10 cm, base cordate, 3-sect; central segment rhombic, 3-fid, with several lobules and small teeth; lateral segments obliquely flabellate, 2-parted nearly to base. Cauline leaves 3, similar to basal ones. Pedicel 2–6 cm. Flower solitary, or 2 or 3 flowers in a terminal cyme, 2.7–4 cm in diam. Sepals 5–7, yellow, green when dried, obovate or orbicular-obovate, 1.4–1.6 × 1–1.4 cm, several denticulate, apex rounded. Petals 9, linear, subequaling stamens, 6–7 × ca. 1 mm. Stamens 5–7.5 mm. Follicles 7–15, to 1.1 cm × ca. 3 mm; persistent style 1.5–4 mm. Seeds ellipsoid-globose, ca. 1.5 mm. Fl. Jul–Aug, fr. Sep. $2n = 16$.

Grassy slopes; 1200–2300 m. E Jilin (Changbai Shan) [Japan].

11. *Trollius altaicus* C. A. Meyer, Verz. Pflanz. Caucas. 200. 1831.

阿尔泰金莲花 a er tai jin lian hua

Stems 26–70 cm tall, simple. Basal leaves 2–5; petiole 7–36 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 3.5–6 × 6.5–11 cm, base cordate, 3-sect; central segment rhombic, 3-lobed, ultimate lobules dentate; lateral segments obliquely flabellate, 2-fid nearly to base. Cauline leaves similar to basal ones. Flower solitary, 3–5 cm in diam. Sepals (10–)15–18, orange, not green when dried, obovate or broadly obovate, 1.6–2.5 × 0.9–2 cm, apex rounded.

Petals linear, shorter than or subequalling stamens, 6–13 × ca. 1 mm, narrowed at apex. Stamens 0.7–1.3 cm. Styles dark purple or black. Follicles ca. 16, ca. 1 cm × 3.5 mm; persistent style ca. 1 mm. Seeds ellipsoid-globose, ca. 1.2 mm. Fl. May–Jul, fr. Aug. $2n = 16$.

Grassy slopes, wet places in valleys; 1200–2700 m. W Nei Mongol, N Xinjiang [E Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Uzbekistan].

12. *Trollius ledebourii* Reichenbach, *Icon. Pl. Crit.* 3: 63. 1825.

短瓣金莲花 duan ban jin lian hua

Stems 40–100 cm tall. Basal leaves 2 or 3; petiole 9–29 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 4.5–6.5 × 8.5–12.5 cm, base cordate, 3-sect; central segment rhombic, 3-fid, ultimate lobules triangular-denticulate; lateral segments obliquely flabellate, unequally 2-fid nearly to base. Cauline leaves 3 or 4, similar to basal ones. Pedicel 5.5–15 cm. Flower solitary, or 2 or 3 flowers in a terminal cyme, 3.2–4.8 cm in diam. Sepals 5–8, yellow, not green when dried, elliptic to narrowly elliptic, 1.3–2.8 × 1–1.5 cm, apex rounded. Petals 10–22, linear, longer than stamens but shorter than sepals, 1.3–1.6 cm × ca. 1 mm, narrowed at apex. Stamens to 9 mm. Follicles 20–28, ca. 7 mm; persistent style ca. 1 mm. Fl. Jun–Jul, fr. Jun. $2n = 16$.

Wet grasslands, by streams; 100–900 m. Heilongjiang, Liaoning, NE Nei Mongol [Mongolia, Russia (Far East, Siberia)].

13. *Trollius asiaticus* Linnaeus, *Sp. Pl.* 1: 557. 1753.

宽瓣金莲花 kuan ban jin lian hua

Stems more than 20 cm tall, to 80 cm at fruiting, simple or branched above middle. Basal leaves ca. 3; petiole 7–31 cm; leaf blade not green when dried, pentagonal, to 4.5 × 8.5 cm, base cordate, 3-sect; central segment rhombic, 3-fid, margin incised-dentate; lateral segments obliquely flabellate, unequally 2-fid nearly to base. Cauline leaves similar to basal ones, shortly petiolate or sessile. Flower solitary, terminal, (2–)3.4–4.5 cm in diam. Sepals 10–15(–20), orange-red or orange, rarely dark yellow, broadly elliptic or obovate, (0.7–)1.5–2.3 × (0.5–)1.2–1.7 cm, margin entire or irregularly dentate at apex. Petals spatulate-linear, longer than stamens but shorter than sepals, (4–)16 × 2–3.5 mm. Stamens ca. 1 cm. Follicles ca. 30; persistent style 0.5–1(–1.5) mm. Fl. Jul. $2n = 16$.

Wet places in grasslands, forests. Heilongjiang (Shangzhi Xian), Xinjiang (Altay Xian, Hami Shi) [E Kazakhstan, Mongolia, Russia (Siberia)].

14. *Trollius chinensis* Bunge, *Mém. Acad. Imp. Sci. St.-Pétersbourg*, Ser. 6, *Sci. Math.* 2: 77. 1835.

金莲花 jin lian hua

Trollius asiaticus Linnaeus var. *chinensis* (Bunge)

Maximowicz.

Stems more than 20 cm tall, to 80 cm at fruiting, simple. Basal leaves 1–4; petiole 12–30 cm, base narrowly

sheathed; leaf blade not green when dried, pentagonal, 3.8–6.8 × 6.8–12.5 cm, base cordate, 3-sect; central segment rhombic, 3-fid to or beyond middle, margin densely unequally dentate; lateral segments obliquely flabellate, 2-fid nearly to base. Cauline leaves similar to basal ones, shortly petiolate or sessile. Pedicel 5–9 cm. Flower solitary, or 2 or 3 flowers in a terminal cyme, 3.8–5.5 cm in diam. Sepals (6–)10–15(–19), golden yellow, not green when dried, elliptic-obovate or obovate, 1.5–2.8 × 0.7–1.6 cm, apex rounded. Petals 18–21, narrowly linear, subequalling or longer than sepals, rarely shorter than sepals, 1.8–2.2 cm × 1.2–1.5 mm. Stamens 0.5–1.1 cm. Follicles 20–30, 1–1.2 cm × ca. 3 mm; persistent style ca. 1 mm. Seeds subovoid, ca. 1.5 mm, smooth. Fl. Jun–Jul, fr. Aug–Sep. $2n = 16^*$.

• Grassy slopes; 1000–2200 m. Hebei, N Henan, W Jilin, W Liaoning, E Nei Mongol, Shanxi.

15. *Trollius macropetalus* (Regel) F. Schmidt, *Mém. Acad. Imp. Sci. St.-Pétersbourg*, Ser. 7, 12(2): 88. 1868.

长瓣金莲花 chang ban jin lian hua

Trollius ledebourii Reichenbach var. *macropetalus* Regel, *Mém. Acad. Imp. Sci. St.-Pétersbourg*, Ser. 7, 4: 4. 1861; *T. chinensis* Bunge subsp. *macropetalus* (Regel) Luferov.

Stems more than 40 cm tall, to 100 cm at fruiting, simple. Basal leaves 2–4; petiole 10–28 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 5.5–9.2 × 11–16 cm, 3-sect; central segment rhombic, 3-fid, ultimate lobules unequally dentate; lateral segments obliquely flabellate, unequally 2-fid. Cauline leaves 3 or 4, similar to basal ones. Flower solitary, 3.5–4.5 cm in diam. Sepals 5–7, golden yellow, orange-yellow when dried, broadly ovate or obovate, 1.5–2(–2.5) × 1.2–1.5 cm, apex rounded. Petals 14–22, narrowly linear, longer than sepals, sometimes subequalling sepals, 1.8–2.6 cm × ca. 1 mm. Stamens 1–2 cm. Follicles 20–40, ca. 1.3 cm × 4 mm; persistent style 3.5–4 mm. Seeds black, narrowly obovoid-globose, ca. 1.5 mm. Fl. Jul–Sep, fr. Jul.

Wet grasslands; 400–600 m. Heilongjiang, Jilin, Liaoning [N Korea, Russia (Far East)].

16. *Trollius lilacinus* Bunge, *Mém. Acad. Imp. Sci. St.-Pétersbourg*, Ser. 6, *Sci. Math.* 2: 33. 1835.

淡紫金莲花 dan zi jin lian hua

Hegemone lilacina (Bunge) Bunge ex Ledebour.

Stems more than 5, to 28 cm tall at fruiting, simple. Basal leaves 3–6; petiole 4–7 cm, base narrowly sheathed; leaf blade not green when dried, pentagonal, 1.8–2.5 × 2.8–4 cm, base cordate, 3-sect; central segment rhombic, 3-fid to middle or subpinnatifid with several lobules and triangular or broadly lanceolate teeth; lateral segments obliquely flabellate, unequally 2-fid to base. Cauline leaves with sheathlike short petioles or subsessile, smaller than basal ones. Flower solitary, 2.5–3.5 cm in diam. Sepals 15–18, lilac-blue or pale blue, rarely white with blue veins, obovate, broadly elliptic, elliptic, or rarely ovate, 1.2–

Flora of China 6: 137–142. 2001.

1.6 cm × 5.5–14 mm, apex rounded, sometimes acute. Petals ca. 8, broadly linear, shorter than stamens, 5–6 × 1.2–1.5 mm. Stamens 5–7 mm. Follicles 6–11, ca. 1.2 cm × 2 mm; persistent style 2–2.5 mm. Seeds ca. 1 mm, ellipsoid-globose, smooth. Fl. Jul–Aug, fr. Aug–Sep. $2n = 32$.

Grassy slopes, at forest margins; 2600–3500 m. Xinjiang (Altay Xian, Tian Shan) [Kazakhstan, Kyrgyzstan, Mongolia, Russia (W Siberia and C Asia), Uzbekistan].

Flora of China 6: 137–142. 2001.