

13. RHEUM Linnaeus, Sp. Pl. 1: 371. 1753.

大黄属 da huang shu

Bao Bojian (包伯坚); Alisa E. Grabovskaya-Borodina

Herbs perennial. Roots long, stout. Stem erect, hollow, sulcate, glabrous or strigose. Leaves basal and cauline, simple, sinuate-dentate or palmate, the basal ones sparse, dense, or in a rosette, larger than the alternate cauline leaves, the latter sometimes lacking; ocrea usually large, membranous, margin entire. Inflorescence simple or branched, usually paniculate, or spikelike or spherical. Pedicel articulate. Flowers bisexual or polygamo-monoecious. Perianth persistent, tepals 6. Stamens usually 9 (6+3), rarely 7 or 8. Styles 3, short, horizontal; stigmas inflated, recurved. Achenes trigonous, winged.

About 60 species: temperate and subtropical Asia; 38 species (19 endemic) in China.

- 1a. Panicle usually similar to spike or capitulum; stem absent or solitary, stout, with dense leaves and large bracts, nodes inconspicuous.
 - 2a. Stem stout, simple, with leaves and large bracts; panicle not similar to spike or capitulum; stamens longer than perianth.
 - 3a. Plant 1–2 m tall; stem leaves ovate to orbicular; fruit broadly ovoid 37. *R. nobile*
 - 3b. Plant short, 0.4–0.8 m tall; stem leaves ovate to narrowly ovate; fruit rhomboid-ellipsoid 38. *R. alexandrae*
 - 2b. Stem absent; panicle, similar to spike or capitulum; stamens subequal to perianth.
 - 4a. Plant very short, less than 10 cm; panicle similar to capitulum; fruit broadly ovoid, slightly constricted at both sides 36. *R. globulosum*
 - 4b. Plant short, 10–30 cm; panicle similar to spike; fruit ellipsoid or ovoid.
 - 5a. Panicle deliquescently branched (with side branches).
 - 6a. Leaves ovate or nearly rhomboid, glabrous, rarely hairy abaxially; panicles 2–4-branched; tepals broadly ovate, ca. 1.5 × 1.3 mm 33. *R. przewalskyi*
 - 6b. Leaves ovate, long hairy abaxially; panicles straight, 1–3-branched from lower part; tepals narrowly elliptic, 2–2.5 × 0.8–1.2 mm 34. *R. rhizostachyum*
 - 5b. Panicle not deliquescently branched (without side branches).
 - 7a. Leaves rhombic, abaxially hairy; perianth purple-red 32. *R. rhomboideum*
 - 7b. Leaves ovate or triangular-ovate, abaxially glabrous or hairy; perianth green or yellow-white.
 - 8a. Leaves broadly ovate or ovate-elliptic, both surfaces hairy, apex obtuse; fruit ellipsoid; perianth green 30. *R. spiciforme*
 - 8b. Leaves ovate or triangular-ovate, glabrous or hairy abaxially, apex obtuse to acute; fruit ovoid or broadly ovoid; perianth yellow-white.
 - 9a. Leaves ovate, glabrous; panicle 2–4(or 5)-branched from base; fruit ovoid, 7–8 × 5–6 mm, wings 1–1.5 mm wide 31. *R. moorcroftianum*
 - 9b. Leaves triangular-ovate, pubescent abaxially; panicle much branched from base; fruit broadly ovoid, 7.5–8.5 × 7–8 mm, wings ca. 2.5 mm wide 35. *R. reticulatum*
 - 1b. Panicle terminal, without leaves or with bracts, not spicate or headlike; nodes usually inflated, stem rarely absent.
 - 10a. Stem without leaves; leaves leathery or nearly so.
 - 11a. Leaves papery, orbicular to cordate-orbicular; inflorescence 3-branched; joint of pedicel at upper part 29. *R. tataricum*
 - 11b. Leaves leathery or nearly so, elliptic or ovate to orbicular; inflorescence 1(or 2)-branched; joint of pedicel beneath middle.
 - 12a. Stem absent; inflorescence usually 2-branched.
 - 13a. Leaves papery, longer than wide, ovate to narrowly ovate, palmate-pinnately veined; inflorescences caespitose from base 26. *R. uninerve*
 - 13b. Leaves leathery, ca. as long as wide, reniform-orbicular to orbicular, conspicuously palmately veined; inflorescence solitary from base.
 - 14a. Leaves reniform-orbicular to orbicular, 6–14 × 8–16 cm; fruit shorter than wide, reniform-orbicular, 10–12 × 12–14 mm 27. *R. nanum*
 - 14b. Leaves cordate to cordate-orbicular, 12–20 × 13–21 cm; fruit ca. as long as wide, ovoid, 8–10 mm 28. *R. tibeticum*
 - 12b. Stem with conspicuous nodes; inflorescence 1(or 2)-branched.
 - 15a. Plant tall, 20(–30)–70 cm; leaves (5)–8–20 cm, abaxially glabrous or hairy.
 - 16a. Leaves narrowly ovate to broadly lanceolate, glabrous, ca. 2 × as long as wide; fruit ovoid-ellipsoid 21. *R. sublancoletum*

- 16b. Leaves ovate or triangular ovate, abaxially hairy or glabrous, slightly longer than wide; fruit ellipsoid or orbicular.
 - 17a. Plant high, 50–70 cm; leaves glabrous; fruit elliptic, narrow 20. *R. racemiferum*
 - 17b. Plant short, 20–35 cm; leaves hairy abaxially; fruit orbicular, broad 22. *R. inopinatum*
- 15b. Plant shorter, 10–30 cm; leaves 2–10 cm, abaxially at least hairy.
 - 18a. Leaves 6–10 × 4–7 cm, triangular-cordate or triangular ovate, apex acuminate; inflorescence broad 25. *R. subacaule*
 - 18b. Leaves 2–6 × 1–5 cm, elliptic, ovate-elliptic, or oblong-elliptic, apex obtuse; inflorescence narrow.
 - 19a. Fruit triangular to triangular-ovoid, 5–6 mm; basal leaves ovate-elliptic, 1.5–5 × 1–3 cm 23. *R. pumilum*
 - 19b. Fruit cordate-orbicular, 8–9 mm in diam.; basal leaves oblong-elliptic or ovate-elliptic, 3–6 × 2.5–5 cm 24. *R. delavayi*
- 10b. Stem leafy; leaf blade not leathery or papery.
 - 20a. Plant 0.4–0.8 m tall, stem leaves 1 or 2(or 3), cordate, reniform-cordate, or triangular-cordate, margin entire; inflorescence a lax panicle, 1- or 2-branched.
 - 21a. Plant 50–80 cm tall; leaves 13–28 × 12–25 cm; inflorescence usually 2-branched.
 - 22a. Stem and petioles purple-red or green, without spots; leaves cordate to broadly cordate, longer than wide; inflorescence branched from middle 16. *R. acuminatum*
 - 22b. Stem and petioles green, with dense purple spots; leaves reniform or broadly cordate, ca. as long as wide or shorter; inflorescence branched from upper part 17. *R. maculatum*
 - 21b. Plant 30–55 cm tall; leaves less than 10 cm; inflorescence 1- or 2-branched.
 - 23a. Flower large, pedicel 4–7 mm, shortly hairy; tepals 3–4 mm; leaves reniform-cordate or broadly cordate; fruit more than 10 mm 18. *R. yunnanense*
 - 23b. Flower small, pedicel 2–3 mm, glabrous; tepals ca. 1.5 mm; leaves ovate-cordate or triangular-cordate; fruit 7–8 mm 19. *R. kialense*
 - 20b. Plant 0.5–2 m tall; stem leaves many, triangular-ovate; inflorescence large, more than 2-branched.
 - 24a. Leaves lobed, parted to lacinate.
 - 25a. Leaves lobed, lobed part triangular.
 - 26a. Lobed parts of blade broadly triangular; flowers large, perianth white; fruiting branches divaricate 12. *R. officinale*
 - 26b. Lobed parts of blade narrowly triangular; flowers small, perianth purple-red; fruiting branches connivent 13. *R. palmatum*
 - 25b. Leaves parted, lobed part narrow, triangular-lanceolate, or linear.
 - 27a. Lobed parts of blade narrowly lanceolate; perianth usually purple-red, tepals entire at margin 14. *R. tanguticum*
 - 27b. Lobed parts of blade linear; perianth white, tepals slightly sinuate at margin 15. *R. laciniatum*
 - 24b. Leaves entire, with crispate or sinuate margin.
 - 28a. Leaves with sinuate margin.
 - 29a. Fruit 9–12 × 7–11 mm, wings broad, 4–5 mm 5. *R. wittrockii*
 - 29b. Fruit less than 1 cm, with narrow or broad wings.
 - 30a. Leaves with 5–7 basal veins; leaf blade narrowly triangular to broadly ovate, not cordate.
 - 31a. Perianth white-green or yellow-white; rachis of panicle papilliferous 1. *R. rhabarbarum*
 - 31b. Perianth purple-red; rachis of panicle densely pubescent 2. *R. australe*
 - 30b. Leaves with 5 basal veins; leaf blade cordate or broadly ovate.
 - 32a. Leaf blade reniform-cordate or cordate, usually shorter than wide; perianth yellow-white 3. *R. webbianum*
 - 32b. Leaf blade ovate-cordate or broadly ovate, usually longer than wide; perianth green 4. *R. hotaoense*
 - 28b. Leaf margin sinuate or slightly so.
 - 33a. Fruit 5.5–8 × 4.5–7 mm.
 - 34a. Leaves ovate-cordate, apex not acuminate, margin sinuate; tepals yellow-white 6. *R. altaicum*
 - 34b. Leaves cordate-obovate to broadly ovate, apex acuminate, margin nearly entire; tepals purple at margin 11. *R. glabricaule*
 - 33b. Fruit 9–12 × 7–11 mm.

- 35a. Tepals lanceolate; basal veins 5–9 7. *R. forrestii*
- 35b. Tepals broad, ovate or elliptic, not lanceolate; basal veins 5–7.
 - 36a. Stem, inflorescence, and branches densely white hispid; leaves broadly ovate or ovate 8. *R. likiangense*
 - 36b. Stem, inflorescence, and branches glabrous or short hairy at nodes; leaves triangular-ovate or ovate-cordate.
 - 37a. Plant high 30–70 cm; leaves triangular to triangular-ovate; margin of tepals and anthers purple; fruit orbicular 9. *R. lhasaense*
 - 37b. Plant ca. 1 m high; leaves ovate-cordate; perianth yellow-white; fruit ellipsoid to oblong-ellipsoid 10. *R. compactum*

1. *Rheum rhabarbarum* Linnaeus, Sp. Pl. 1: 372. 1753.

波叶大黄 bo ye da huang

Rheum franzenbachii Münter; *R. franzenbachii* var. *mongolium* Münter; *R. undulatum* Linnaeus; *R. undulatum* var. *longifolium* C. Y. Cheng & T. C. Kao.

Herbs large, 50–150 cm tall. Stem stout, hollow, glabrous, or pilose at nodes. Petiole of basal leaf stout, usually shorter than blade, pubescent; leaf blade light green or dark purple-red abaxially, dark green adaxially, triangular-ovate, subovate, broadly cordate, or narrowly triangular, large, 12–40(–57) × 10–30(–61) cm, abaxially pubescent, adaxially glabrous or sparsely pubescent near veins, basal veins 5–7, base cordate, margin crispate or sinuate, apex obtuse or acute. Stem leaves smaller, triangular or ovate-triangular. Panicle large, jointed at lower part. Flowers 3–8-fascicled, 2.5–4 mm. Tepals 6, not spreading, white-green or yellow-white, outer 3 smaller, inner 3 very broad to orbicular, ca. 2 mm. Ovary broadly ellipsoid to oblong-ellipsoid; style short; stigma inflated. Fruit triangular-ovoid to oblong-ellipsoid; wings narrow, 1.5–2 mm. Seeds brown, ovoid or ovoid-ellipsoid, ca. 3 mm. Fl. Jun, fr. after Jul. $2n = 44$.

Slopes; 1000–1600 m. Hebei, Heilongjiang, Hubei, Jilin, Nei Mongol, Shanxi [Mongolia, Russia (E Siberia); cultivated in Europe].

2. *Rheum australe* D. Don, Prodr. Fl. Nepal. 75. 1825.

藏边大黄 zang bian da huang

Rheum emodi Wallich ex Meisner.

Herbs large, 0.7–2 m tall. Rhizomes and roots stout. Stem sulcate, glabrous, pubescent only at nodes. Petiole of basal leaf equal to blade or slightly longer, pubescent; leaf blade ovate-elliptic or broadly ovate, large, 20–50 × 18–40 cm, abaxially pilose, basal veins 5–7, base cordate, margin entire, sinuate, apex obtuse. Stem leaves ovate, narrow; ocrea large, pubescent, clasping. Panicle large, 2- or 3-branched, densely papilliferous. Pedicel muricate, jointed below middle. Perianth spreading, purple-red, 3–3.5 mm; outer 3 smaller, oblong-elliptic, ca. 1.5 × 1 mm; inner 3 very broadly elliptic or rarely orbicular, ca. 2.5 × 2 mm. Filaments subulate. Ovary rhomboid-obovoid; stigma oblate, muricate. Fruit ovoid-ellipsoid or broadly ellipsoid, 9–10 × 7–8.5 cm, base subcordate, apex retuse or not; wings purple-red, ca. 2.5 mm wide; longitudinal veins near margin. Seeds ovoid. Fl. Jun–Jul, fr. Aug or later.

Grassy slopes; 3400–4300 m. Xizang [India, Myanmar, Nepal, Pakistan, Sikkim].

3. *Rheum webbianum* Royle, Ill. Bot. Himal. Mts. 1: 318. 1839.

须弥大黄 xu mi da huang

Herbs large, 0.5–1.5 m tall. Stem stout, hollow, finely sulcate, glabrous or papilliferous on upper part. Petiole of basal leaf shorter than blade, stout, papilliferous; leaf blade green adaxially, reniform-cordate to cordate, 20–25 × 25–30 cm, shorter than wide, nearly leathery, adaxially muricate, basal veins 5, base broadly cordate, margin slightly sinuate, apex obtuse. Stem leaves ovate, smaller. Panicle large, 1- or 2-branched. Flowers small. Tepals yellow-white, elliptic, jointed below middle of pedicel. Fruit broadly ellipsoid or orbicular, 1–1.2 cm, ca. as long as wide, both ends slightly retuse; wings ca. 3.5 mm, broad, longitudinal veins near margin. Seeds narrowly ovoid-ellipsoid, ca. 4 mm wide. Fr. Aug–Sep. $2n = 44$.

Slopes; 3500–3600 m. SW Xizang [NW India, Kashmir, Nepal, Pakistan].

4. *Rheum hotaoense* C. Y. Cheng & T. C. Kao, Acta Phytotax. Sin. 13(3): 79. 1975.

河套大黄 he tao da huang

Herbs large, 0.8–1.5 m tall. Rhizomes and roots brown-yellow, stout. Stem straight, glabrous, muricate near nodes. Petiole of basal leaf 17–25 cm, glabrous or muricate; leaf blade dark green or blue-green, ovate-cordate or broadly ovate, large, 25–40 × 23–28 cm, glabrous, basal veins 5, base cordate, margin sinuate, apex obtuse or acute. Stem leaves shorter petiolate, ovate or ovate-triangular, smaller; ocrea 5–8 cm, clasping. Panicle large, more than 2-branched; rachis and branches glabrous, papilliferous only near nodes. Pedicel 4–5 mm, slender; jointed below middle. Flowers large. Tepals 6, outer 3 subequal to inner 3, elliptic, 2–2.5 mm, sparsely reticulate-veined, abaxially light green with white margin. Stamens equal to perianth. Ovary broadly ellipsoid; styles 3, short; stigmas inflated. Fruit ± orbicular, 7.5–8.5 mm, base circular or slightly cordate, apex retuse; wings 2–2.5 mm wide, with longitudinal veins at middle. Seeds broadly ovoid. Fl. May–Jul, fr. Jul–Sep.

• Slopes, gullies; 1000–1800 m. Gansu, Shaanxi, Shanxi.

5. *Rheum wittrockii* C. E. Lundström, Acta Horti Berg. 5(3): 23. 1914.

天山大黄 tian shan da huang

Herbs large, 50–100 cm tall. Rhizomes dark brown, slender. Stem hollow, finely sulcate, glabrous or papilliferous near nodes. Basal leaves 2–4; petiole ca. as long as blade, slender, sparsely papilliferous or glabrous; leaf blades ovate to triangular-ovate, 15–26 × 10–20 cm, abaxially pubescent near veins, adaxially glabrous, basal veins 5–7, base cordate, margin sinuate, apex obtuse or acute. Stem leaves 2–4, shortly petiolate, smaller than basal ones, longer than wide; ocrea 4–8 cm, abaxially pubescent, clasping. Panicle large, sparsely branched. Pedicel ca. 3 mm, jointed below middle. Flowers small, ca. 2 mm. Tepals white-green, outer 3 smaller and narrower; inner 3 slightly larger, obovate or broadly elliptic, ca. 1.5 mm. Stamens equal to perianth. Styles 3; stigmas large, muricate. Fruit orbicular or oblong, broader than long, ca. 1.2 × 1.5 cm, both ends cordate; wings broad, 4–5 mm, with longitudinal veins at middle. Seeds ovoid, ca. 6 mm wide. Fl. Jun–Jul, fr. Aug–Sep.

Grassy slopes, forests, gullies; 1200–2600 m. Xinjiang [Kazakhstan, Kyrgyzstan].

6. *Rheum altaicum* Losinskaja, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 3: 87. 1937.

阿尔泰大黄 a er tai da huang

Rheum rhaponticum Herder.

Herbs large, 50–100 cm tall. Stem erect, hollow, finely sulcate, glabrous. Petiole of basal leaf ca. as long as blade, slender, glabrous; leaf blade ovate-cordate or triangular-ovate, 15–30 × 13–22 cm, abaxially papilliferous or pubescent, adaxially glabrous, base cordate, margin slightly sinuate, apex obtuse. Stem leaves 1–3, shortly or very shortly petiolate, smaller, sometimes ca. as long as wide; ocrea brown, 3–6 cm, abaxially with very short hairs, clasping. Panicle narrowly ovate, large. Pedicel slender, jointed below middle. Flowers small, 4–7-fascicled. Tepals yellow-white, oblong or narrowly elliptic, inner 3 larger, ca. 1.5 × 1 mm. Stamens equal to perianth. Fruit oblong-ellipsoid, small, 5.5–7.5 × 4.5–6 mm, rarely retuse at both ends; wings narrow, 1–1.5 mm wide, with longitudinal veins at middle. Seeds black-brown, broadly ovoid. Fl. Jun–Jul, fr. Jul–Aug.

Forests, valleys; 1900–2400 m. N Xinjiang [Kazakhstan, Mongolia, Russia (Altai)].

7. *Rheum forrestii* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 262. 1912.

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Herbs 60–80 cm tall. Roots stout, 3–4 cm in diam. Stem erect, hollow, 0.8–1.4 cm in diam. at base, glabrous at lower part, yellow-white pubescent at upper part, especially at nodes. Basal leaves 3–5; petiole light green, subterete, ca. 1/2 as long as to subequal leaf blade, shortly hispid; leaf blade broadly ovate or ovate, 12–20 × 10–18 cm, abaxially densely hispid, adaxially pubescent, or to glabrous, basal veins 5–9, conspicuously raised abaxially, base cordate, margin entire, apex obtuse. Stem leaves 1 or 2, shortly petiolate, ovate or narrowly ovate, small; ocrea short, membranous when dry. Panicle branched from middle. Pedicel 2–3 mm, slender, jointed below middle. Flowers densely fascicled. Tepals yellow-green, broadly lanceolate, outer 3 smaller, ca. 1.8 × 1 mm, inner 3 larger, with a dark green longitudinal vein at middle. Stamens 8 or 9, shorter than perianth; filaments ca. 1 mm; anthers light purple-red, elliptic, ca. 1 mm. Ovary obovoid; stigma slightly inflated. Fruit very broadly ellipsoid or orbicular, 9–10 × 8–9.5 mm, base cordate, apex rounded; wings brown, narrow, ca. 1.5 mm wide, with longitudinal veins at middle. Seeds yellow-brown, ovoid-ellipsoid, 6–7 mm wide. Fl. Jun–Jul, fr. Aug–Sep.

• Slopes; ca. 3000 m. ?Sichuan, Xizang, Yunnan.

8. *Rheum likiangense* Samuelsson, Svensk Bot. Tidskr. 30: 720. 1936.

丽江大黄 li jiang da huang

Rheum ovatum C. Y. Cheng & T. C. Kao.

Herbs 40–70(–90) cm tall. Stem 7–12 mm in diam. at base, densely white hispid, especially at nodes, sparsely hispid or glabrous at fruiting. Basal leaves 2–4; petiole subterete, shorter than perianth, 2.5–8 cm, stout, pubescent; leaf blade dark purple abaxially, broadly ovate to orbicular, rarely ovate, 8–16 × 8–14 cm, nearly leathery, abaxially with dense white hairs, adaxially glabrous or shortly hispid only near veins, basal veins 5–7, stout, conspicuously raised, base cordate, margin entire, apex obtuse or acute. Stem leaves 1–3, ovate, small. Panicle 1- or 2-branched, with white hairs. Pedicel 2.5–3 mm, slender, jointed below middle. Flowers fascicled; bracts linear, 3–5 mm, membranous when dry. Tepals white-green, outer 3 slightly smaller, broadly elliptic, inner 3 orbicular or very broadly elliptic, 2–2.2 mm. Stamens equal to perianth. Ovary rhomboid-circular; style slender. Fruit ovoid, 8.5–9 × 7–7.5 mm; wings ca. 2 mm wide, with longitudinal veins at middle. Seeds ovoid, ca. 3 mm wide. Fl. Jul, fr. Aug–Sep.

• Forests, shrubby meadows; 2500–4000 m. SW Sichuan, E Xizang, NW Yunnan.

9. *Rheum lhasaense* A. J. Li & P. K. Hsiao in C. Y. Wu, Fl. Xizang. 1: 598. 1983.

拉萨大黄 la sa da huang

Herbs 30–70 cm tall. Stems glabrous, or pubescent on nodes, 7–10 mm in diam. near base. Petiole of basal leaf subterete, 3–7 cm, papilliferous; leaf blade narrowly triangular or triangular-ovate, rarely narrowly ovate, 8–20 × 6–13 cm, abaxially shortly hispid, adaxially glabrous, basal veins 5, base cordate, margin slightly sinuate, apex obtuse or acute. Stem leaves 1 or 2, very shortly petiolate, small; ocrea short, membranous. Panicles narrow, 2-branched only from lower part; bracts very small. Pedicel 2.5–3 mm, jointed below middle. Tepals light green with purple margin, broadly ovate. Fruit spherical, 8–9 mm in diam.; wings narrow, 1.5–2 mm wide, with longitudinal veins near middle. Seeds orbicular or ovoid, large, ca. 5 mm in diam. Fl. Jul–Aug, fr. Sep–Oct.

- Grassy slopes; 4200–4600 m. Xizang (Lhasa).

10. *Rheum compactum* Linnaeus, Sp. Pl., ed. 2, 1: 531. 1762.

密序大黄 mi xu da huang

Rheum nutans Pallas.

Herbs large, ca. 1 m tall. Rhizomes and roots dark brown, stout. Stem erect, hollow, glabrous. Petiole of basal leaf subterete, shorter than or ca. as long as blade, muricate beneath; leaf blade ovate-cordate, rarely ovate, large, 20–30 cm in diam., sometimes slightly longer than wide, abaxially pubescent, adaxially glabrous, basal veins 5–7, base cordate, margin entire, apex obtuse. Stem leaves shorter petiolate, small; ocrea short, glabrous or slightly muricate. Panicle large, densely branched. Pedicel slender, jointed below middle. Flowers fascicled. Tepals yellow, elliptic, subequal, ca. 2 mm. Fruit broadly ellipsoid to oblong-ellipsoid, ca. 1.2 × 1.1 cm, both ends cordate; wings narrower than seeds, ca. 3 mm wide, with longitudinal veins at middle. Seeds dark brown, ovoid to broadly ovoid. Fl. Jun–Jul, fr. Aug. $2n = 22, 44$.

- Slopes; ca. 2000 m. N Xinjiang [Kazakhstan, Mongolia, Russia (Far East, Siberia)].

11. *Rheum glabricaule* Samuelsson, Svensk Bot. Tidskr. 30: 714. 1936.

光茎大黄 guang jing da huang

Herbs large, ca. 1 m tall. Stem glabrous. Petiole of basal leaf longer than blade, glabrous; leaf blade cordate-ovate, large, 11–25 × 10–17 cm, abaxially pubescent especially along veins, adaxially glabrous, margin entire, apex acuminate. Stem leaves (absent or 1 or) 2, shortly petiolate, small. Panicle narrow, sparsely branched, glabrous. Tepals subequal, ovate, 1.5–2 mm, abaxially green with purple margin. Anthers purple, globose-ovate, 0.7–1 mm. Fruit purple, oblong-ovoid, 5–8 mm; wings 2.5–3.5 mm, with longitudinal veins near middle. Seeds ovoid. Fl. Jun–Jul, fr. Aug–Sep.

- Among rocks; 3000–3500 m. Gansu.

12. *Rheum officinale* Baillon, Adansonia 10: 246. 1871.

药用大黄 yao yong da huang

Herbs large, 1.5–2 m tall. Rhizomes and roots stout. Stem stout, hollow, finely sulcate, with white hairs, especially above and at nodes. Petiole of basal leaf terete, ca. as long as blade or slightly shorter, pubescent; leaf blade orbicular, rarely broadly ovate, large, 30–50 cm in diam., or longer than wide, abaxially pubescent, adaxially glabrous, rarely pubescent along veins, basal veins 5–7, base subcordate; palmatilobate, apex subacute. Stem leaves smaller upward; ocrea large, to 15 cm, broad, outside with dense hairs. Panicles large; branches spreading. Pedicel 3–3.5 mm, slender, jointed below middle. Flowers 4- or 5-fascicled. Tepals 6, green to yellow-white, elliptic or narrowly elliptic, 2–2.5 × 1.2–1.5 mm. Stamens shorter than perianth. Style deflexed; stigma inflated. Fruit oblong-ellipsoid, 8–10 × 7–9 mm; wings ca. 3 mm wide, with longitudinal veins near margin. Seeds broadly ovoid. Fl. May–Jun, fr. Aug–Sep.

- Hills, forests; 1200–4000 m. ?Fujian, Guizhou, SW Henan, W Hubei, Shaanxi, Sichuan, Yunnan.

The roots and rhizomes used medicinally.

13. *Rheum palmatum* Linnaeus, Syst. Nat., ed. 10, 2: 1010. 1759.

掌叶大黄 zhang ye da huang

Rheum potaninii Losinskaja; *R. qinlingense* Y. K. Yang et al.

Herbs large, 1.5–2 m tall, stout. Rhizomes and roots stout. Stem hollow, sulcate, subglabrous or muricate on nodes. Petiole of basal leaf terete, ca. as long as blade, densely papilliferous; leaf blade large, ca. as long as wide, 40–60 cm, abaxially densely pubescent, adaxially sulcate to papilliferous, basal veins 5, base cordate, palmately divided into pinnatisect lobes, apex acuminate or narrowly acute. Stem leaves smaller above; ocrea large, to 15 cm, outside muricate. Panicle large; branches connivent, densely pubescent. Pedicel 2–2.5 mm, jointed below middle. Flowers small. Tepals 6,

purple-red, rarely yellow-white, outer 3 elliptic to orbicular, smaller, 1–1.5 mm. Stamens not exceeding perianth. Ovary rhomboid-ovoid; style slightly deflexed; stigma inflated. Fruit oblong-ellipsoid to oblong, 8–9 × 7–7.5 mm, both ends retuse; wings ca. 2.5 mm wide, with longitudinal veins near margin. Seeds brown-black, broadly ovoid. Fl. Jun, fr. Aug.

- Slopes, valleys; 1500–4400 m. Gansu, Hubei, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [cultivated in Russia].

The roots and rhizomes are used medicinally.

14. *Rheum tanguticum* (Maximowicz ex Regel) Maximowicz ex Balfour, Trans. Bot. Soc. Edinburgh 13(App.): cxlvi. 1879.

鸡爪大黄 *ji zhua da huang*

Herbs large or short, (0.6–)1.5–2 m tall. Rhizomes and roots yellow, stout. Stem stout, hollow, finely sulcate, glabrous or pubescent. Basal leaves orbicular or broadly ovate, large, 30–60 cm, abaxially pubescent, adaxially papilliferous or muricate, basal veins 5, base subcordate, palmately 5-lobed, middle 3 lobes pinnatisect, apex narrowly acute. Stem leaves few, much parted; ocrea large, abaxially pubescent, clasping. Panicle large; branches connivent. Pedicel 2–3 mm, slender, jointed below middle. Flowers small. Tepals purple-red, rarely light red, orbicular, inner 3 larger, ca. 1.5 mm. Ovary broadly ovoid; style short; stigma inflated. Fruit oblong-ovoid to oblong, 8–9.5 × 7–7.5 mm; wings 2–2.5 mm wide, with longitudinal veins near margin. Seeds black, ovoid. Fl. Jun, fr. Jul–Aug.

- Valleys; 1600–3000 m. Gansu, Qinghai, Shaanxi, Xizang.

One of us (Grabovskaya-Borodina) indicates that this is a synonym of *Rheum palmatum*.

- 1a. Plant tall, 1.5–2 m high; stem glabrous or strigose at nodes of upper part; inflorescence much branched 14a. var. *tanguticum*
- 1b. Plant short, 0.6–1 m high; stem densely pubescent; inflorescence less branched 14b. var. *liupanshanense*

14a. *Rheum tanguticum* var. *tanguticum*

鸡爪大黄(原变种) *ji zhua da huang* (yuan bian zhong)

Rheum palmatum Linnaeus var. *tanguticum* Maximowicz ex Regel, Gartenflora 23: 305. 1874; *R. palmatum* subsp. *dissectum* Stapf; *R. tanguticum* var. *viridiflorum* Y. K. Yang & D. K. Zhang.

Plants 1.5–2 m tall. Stem glabrous or strigose at nodes of upper part. Basal leaves orbicular or broadly ovate, large, 30–60 cm. Panicle much branched; branches connivent.

- Valleys; 1600–3000 m. Gansu, Qinghai, Shaanxi, Xizang.

14b. *Rheum tanguticum* var. *liupanshanense* C. Y. Cheng & T. C. Kao, Acta Phytotax. Sin. 13(3): 81. 1975.

六盘山鸡爪大黄 *liu pan shan ji zhua da huang*

Herbs 0.5–1 m tall. Stem slender, 6–8 mm in diam., smooth, pubescent. Leaves small. Panicle usually branched only once, or only lower part with branchlets.

- Gansu.

One of us (Grabovskaya) suggests that further studies should compare this with *Rheum palmatum*.

15. *Rheum laciniatum* Prain, Bull. Misc. Inform. Kew 1908: 182. 1908.

条裂大黄 *tiao lie da huang*

Herbs large, ca. 1 m tall. Petiole of basal leaf subterete, shorter than to about as long as blade, shortly strigose; leaf blade large, subovate, 25–36 × 20–24 cm, palmately divided into pinnatisect lobes, all lobes lanceolate or nearly linear, apex acute; ocrea ca. 7 cm, abaxially muricate. Stem leaves smaller. Panicle triangular, large. Pedicel 1.5–2 mm, jointed at base. Tepals yellow-white or green-white, obovate-elliptic or broadly elliptic; inner 3 larger, ca. 2.5 mm, margin irregular. Flower disk irregularly circular, fleshy. Ovary subovoid; stigma irregularly inflated. Fruit unknown.

- Hills; ca. 3000 m. N Sichuan.

One of us (Grabovskaya-Borodina) believes that this is a synonym of *Rheum palmatum*.

16. *Rheum acuminatum* J. D. Hooker & Thomson, Bot. Mag. 81: t. 4877. 1855.

心叶大黄 *xin ye da huang*

Rheum orientalexizangense Y. K. Yang, J. K. Wu & Gasang.

Herbs 50–80 cm tall. Roots slender. Stem erect, purple-red, 7–10 mm in diam. at base, hollow, glabrous; nodes inflated. Basal leaves 1–3; petiole purple-red, ca. as long as blade, subterete, glabrous or pilose near blade; leaf blade purple-red abaxially, dark green adaxially, broadly cordate or cordate, 13–20 × 12–19 cm, abaxially pubescent, adaxially glabrous, basal veins usually 5, base cordate, margin entire, apex acuminate or long acuminate, rarely obtuse. Stem leaves 1–3, smaller upward, broadly ovate to ovate-cordate; ocrea ca. 2 cm, glabrous or muciculate, scarious when dry, clasping. Panicle usually 2-branched at middle, sparsely arranged, glabrous. Pedicel ca. 3 mm, slender, jointed below middle. Flowers nearly 10-fascicled. Tepals 6, purple-red, outer 3 smaller, broadly elliptic, ca. 1.8 × 1.3 mm; inner 3 orbicular or broadly ovate, 2–2.5 mm. Stamens shorter than perianth; filaments purple-red, ca. 2 mm; anthers black-purple. Ovary rhomboid-ellipsoid; style short; stigma large. Fruit oblong-ovoid or broadly ovoid, 7–8 × 6.5–7 mm; wings purple-red when fresh, narrow, with longitudinal veins near middle. Seeds brown, ovoid or narrowly ovoid. Fl. Jun–Jul, fr. Aug–Sep.

Slopes, forests; 2800–4000 m. S Gansu, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Sikkim].

17. *Rheum maculatum* C. Y. Cheng & T. C. Kao, *Acta Phytotax. Sin.* 13(3): 81. 1975.

斑茎大黄 ban jing da huang

Herbs 50–80 cm tall. Stem erect, green, with dense purple-red spots, hollow, slender, 5–6 mm in diam. at base. Petiole of basal leaf slender, 14–18 cm, with purple-red spots; leaf blade reniform-cordate or broadly cordate, large, 18–28 cm, scarious when dry, abaxially with white hairs, adaxially glabrous, basal veins 5, base cordate, margin entire, apex acuminate. Stem leaf 1, at upper part; petiole 2.5–4 cm, nearly reniform, 4–9 × 4.5–11.5 cm, apex acuminate; ocrea ca. 1.5–2.5 cm, nearly glabrous, clasping. Panicle terminal, small, 7–8 cm, broad, few branched, with yellow hairs on peduncle. Pedicel linear, ca. 2 mm, jointed at base. Flowers small. Tepals 6, light red, orbicular, subequal, 1–1.5 mm. Stamens slightly longer than perianth; anthers purple, subglobose. Ovary broadly ellipsoid; style short; stigma inflated. Fl. Jun.

• Sichuan.

18. *Rheum yunnanense* Samuelsson, *Svensk Bot. Tidskr.* 30: 713. 1936.

云南大黄 yun nan da huang

Herbs short, 30–60 cm tall. Stem 3–6 mm in diam. at base, pubescent or papilliferous. Basal leaves 1–3; petiole 5–8 cm, slender, pubescent; leaf blades reniform-cordate or broadly cordate, 5–7 × 6–8.5 cm, abaxially pubescent mainly near veins and margin, adaxially glabrous, basal veins 5, base cordate, margin entire, apex acuminate or long acuminate. Stem leaves 2 or 3, shortly petiolate, subcordate, small; ocrea 1.5–2.5 cm, membranous when dry. Panicle 1- or 2-branched, slightly spreading, pubescent. Pedicel 4–7 mm, jointed below middle, hispidulous above. Flowers large, 1–3 (or 4)-fascicled. Tepals 6, spreading, purple, ovate or broadly elliptic, 5–7 mm in diam.; outer 3 smaller, 3–3.5 mm, abaxially hispidulous or long papilliferous. Stamens shorter than perianth; filaments 1.5–2 mm; anthers purple-red, subglobose. Ovary narrowly ellipsoid. Fruit purple-red, ellipsoid or ovoid-ellipsoid, ca. 1.3 × 1 cm; wings slightly broad, with longitudinal veins near margin. Fl. Jul–Aug, fr. Sep–Oct.

Slopes; ca. 4000 m. NW Yunnan [Myanmar].

19. *Rheum kialense* Franchet, *Bull. Mus. Hist. Nat. (Paris)* 1: 212. 1895.

疏枝大黄 shu zhi da huang

Rheum micranthum Samuelsson; *Rumex cacaliifolius* H. Léveillé.

Herbs short, 25–55 cm tall. Roots black-brown, slender, ca. 1 cm in diam., few branched. Stem slender, hollow, 3.5–5 mm in diam., internode very long, not branched, slightly muciculate, sparsely hispidulous. Basal leaves 1–3; petiole ca. as long as to 2 × as long as blade, slender, yellow hispidulous; leaf blade light green abaxially, green adaxially, ovate-cordate, triangular-ovate, or triangular-cordate, 6–11 × 4–8.5 cm, papery, abaxially sparsely hispidulous, with densely yellow hairs especially near margin, basal veins 5, middle one stout, base cordate, margin entire, apex slightly acuminate. Stem leaves 1 or 2, shortly petiolate, small; ocrea subovate, 1.5–2 cm, abaxially with white hairs, membranous when dry, not clasping. Panicle few branched, pubescent. Pedicel 2–3 mm, jointed at or below middle. Flowers small, 2–5-fascicled. Tepals 6, not spreading, white-green, rarely light purple, small, outer 3 smaller, nearly elliptic, inner 3 broadly elliptic, ca. 1.5 mm. Stamens 9 or fewer, slightly longer than perianth; anthers purple-red. Ovary rhomboid-ellipsoid or obovoid-ellipsoid; stigma inflated. Fruit broadly ovoid or subovoid, 6.5–8 mm, base cordate, apex retuse; wings red, narrow, ca. 1.5 mm wide, with longitudinal veins at middle. Seeds yellow-brown, with lanceolate black stripes at middle, narrowly ovoid, ca. 3 mm wide at base. Fl. Jun–Jul, fr. Jul–Aug.

• Slopes, forests; 2800–3900 m. Gansu, Sichuan, Yunnan.

20. *Rheum racemiferum* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 26: 503. 1880.

总序大黄 zong xu da huang

Herbs 50–70 cm tall. Roots black-brown, straight. Stem erect, brown-red, hollow, ca. 1 cm in diam., glabrous. Basal leaves 2–5; petiole usually purple-red, short, 4–9 cm, stout, compressed or compressed-terete, glabrous; leaf blade cordate or broadly ovate, 10–20 cm wide, leathery or nearly so, glabrous, palmate veins 3–5(–7), middle one very stout, base subcordate, margin very sinuate, apex obtuse. Stem leaves 1 or 2(or 3); ocrea dark brown, short, to 1.5 cm, glabrous. Panicle usually once branched, rarely branched again at basal branches. Pedicel longer than flowers, jointed below middle. Flowers fascicled. Tepals 6, inner 3 larger, elliptic to narrowly elliptic, 1.5–2 mm. Stamens equal to perianth; anthers oblong. Style very short; stigma muricate. Fruit ellipsoid to oblong-ellipsoid, rarely ovoid-ellipsoid, ca. 1.2 cm × 8.5–9.5 mm; wings light brown, with longitudinal veins near margin. Seeds dark brown, ovoid-ellipsoid. Fl. Jun–Jul, fr. Jul–Aug.

- Slopes, grasslands; 1300–2000 m. Gansu, Nei Mongol, Ningxia [?Mongolia].

21. *Rheum sublanceolatum* C. Y. Cheng & T. C. Kao, Acta Phytotax. Sin. 13(3): 82. 1975.

窄叶大黄 zhai ye da huang

Herbs 30–55 cm tall. Stem erect, hollow, 5–8 mm in diam. at base, glabrous. Basal leaves 3–5; petioles short, 3–6 cm, glabrous; leaf blade purple-red abaxially, narrowly ovate or broadly lanceolate, 5–15 × 3–5.5 cm, leathery, glabrous, basal veins 3–5, palmate, middle one stout, base rounded, margin entire or rarely sinuate, apex acute. Stem leaves 1 or 2 or absent, very shortly petiolate, nearly lanceolate or ovate-triangular, small; ocrea ca. 1 cm, membranous when dry, glabrous, clasping. Panicle narrow, 18–25 cm, only once branched, sparse, glabrous or sparsely papilliferous. Pedicel 2.5–3 mm, jointed below middle. Flowers 4- or 5-fascicled. Tepals 6, narrowly elliptic, outer 3 smaller, ca. 1.5 mm. Filaments subequal to perianth, slightly compressed. Ovary ellipsoid or obovoid; stigma inflated. Fruit ovoid-ellipsoid, 7.5–8.5 × 6–6.5 mm, base subcordate, apex round; wings red, narrow, ca. 1.5 mm wide, slightly membranous, with longitudinal veins at middle. Seeds brown, ovoid. Fl. Jun, fr. Aug.

- Slopes; 2400–3000 m. Gansu, Qinghai, Xinjiang.

22. *Rheum inopinatum* Prain, Bot. Mag. 134: t. 8190. 1908.

红脉大黄 hong mai da huang

Herbs short, 20–35 cm tall. Roots stout, 2–3 cm in diam. Stem finely striped, 3–5 mm in diam., muricate, with white hairs. Basal leaves 3–5 in a rosette; petiole red, short, 2–4 cm, densely white hispidulous; leaf blade green adaxially, triangular-ovate or ovate, 7–13.5 × 5–9.5 cm, leathery, glabrous, rarely hispidulous along veins, usually with 5 palmate, light red veins, base cordate or truncate, margin sinuate, apex obtuse. Stem leaves 1(or 2) or absent. Panicle terminal, branched only once, pubescent. Pedicel 2.5–3.5 mm, jointed below middle. Flowers large. Tepals 6, yellow-white; outer 3 smaller, narrowly elliptic, ca. 2 mm; inner 3 elliptic to broadly elliptic. Stamens equal to perianth. Ovary ovoid. Fruit orbicular, 9–10 × 8–9.5 mm; wings purple-red, with longitudinal vein at middle, persistent inner perianth enlarged, ca. 5 × 4 mm. Seeds ovoid. Fl. Jul, fr. Aug–Sep.

- Slopes; 4000–4200 m. C and S Xizang.

23. *Rheum pumilum* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 503. 1880.

小大黄 xiao da huang

Herbs short, 10–25 cm tall. Stem erect, finely striped, slender, pilose. Basal leaves 2 or 3; petiole subterete, ca. as long as blade or slightly longer, hairy; leaf blades ovate-elliptic, 1.5–5 × 1–3 cm, subleathery, abaxially pilose, adaxially glabrous, rarely pilose at base of midvein, basal veins 3–5, middle one stout, base cordate, margin entire, apex obtuse. Stem leaves 1 or 2, nearly lanceolate, small; ocrea short, ca. 5 mm, membranous when dry, glabrous, not clasping. Panicle narrow, sparsely branched, pilose. Pedicel 2–3 mm, slender, jointed at base. Flowers 2- or 3-fascicled. Tepals not spreading, with purple-red margin, elliptic or broadly elliptic, 1.5–2 mm. Stamens 9 or fewer, shorter than perianth. Ovary broadly ellipsoid; stigma nearly inflated. Fruit triangular or triangular-ovoid, 5–6 mm; wings narrow, 1–1.5 mm wide, with longitudinal vein at middle. Seeds ovoid, 2–2.5 mm wide. Fl. Jun–Jul, fr. Aug–Sep.

- Slopes; 2800–4500 m. Gansu, Qinghai, Sichuan, Xizang.

24. *Rheum delavayi* Franchet, Bull. Mus. Hist. Nat. (Paris) 1: 212. 1895.

滇边大黄 dian bian da huang

Rheum strictum Franchet.

Herbs short, 15–28 cm tall. Stem erect, dark purple, usually not hollow, 3–5 mm in diam. at base, pilose. Basal leaves 2–4; petiole purple, subterete, ca. as long as blade or slightly longer, slender, pubescent; leaf blade light green abaxially, dark green adaxially, oblong-elliptic or ovate-elliptic, rarely orbicular, 3–6 × 2.5–5 cm, nearly leathery, abaxially

hispidulous especially along veins or margin, adaxially glabrous or hispidulous along main vein, basal veins 3–5, middle one stout, base subcordate, margin entire to slightly sinuate, apex obtuse. Stem leaves 1 or 2, linear above, small; ocrea short, membranous when dry, glabrous, not clasping. Panicle narrow, branched once, usually purple hispidulous. Pedicel 3–4.5 mm, slender, jointed below middle. Flowers large, ca. 5 mm, 3- or 4-fascicled. Tepals narrowly elliptic, outer 3 smaller, 1.5–2 × ca. 1 mm, inner 3 ca. 2.5 × 1.5 mm, with dark purple-red margin. Filaments purple, short, 1–1.5 mm; anthers purple, broadly elliptic to subglobose. Style reflexed; stigma purple, compressed. Fruit cordate-orbicular, 8–9 mm in diam.; wings ca. 2.5 mm wide, with longitudinal vein at middle. Seeds ovoid. Fl. Jun–Jul, fr. Aug–Sep.

Slopes; 3000–4800 m. W Sichuan, N Yunnan [Bhutan, Nepal].

25. *Rheum subacaule* Samuelsson, *Svensk Bot. Tidskr.* 30: 712. 1936.

垂枝大黄 *chui zhi da huang*

Herbs short, 15–20 cm tall. Roots slender, ca. 1 cm in diam. Stem very short, densely pubescent. Basal leaves 3 or 4; petiole green-purple, subterete, ca. as long as to 1.5 × as long as blade, pilose; leaf blade purple abaxially, dark green adaxially, triangular-cordate or triangular-ovate, 6–10(–12) × 4–7 cm, abaxially yellow hispidulous, adaxially glabrous, basal veins 3–5, middle one stout, base cordate, margin entire, apex acuminate. Stem leaves 1 or 2, small, 3–4 cm; ocrea spreading, 3–4 cm, membranous, glabrous, not clasping. Panicles 2–4 from base, sparsely branched from base, densely hispidulous. Pedicel short, ca. 2 mm, jointed below middle. Flowers 3–5-fascicled. Tepals 6, purple-red, ovate or elliptic, outer 3 smaller, ca. 1.5 mm. Stamens ca. as long as perianth or slightly longer; anthers ellipsoidal. Ovary ellipsoid; stigma inflated. Fruit broadly cordate or cordate, 7.5–8.5 × 8.5–9.5 mm, base retuse; wings purple-red, ca. 2.5–3 mm, broad, with longitudinal vein at middle. Seeds red-brown with a lanceolate black-brown stripe, triangular-ovoid. Fl. Jul, fr. Aug–Sep.

• Hilltops, slopes; 3500–4300 m. W Sichuan.

26. *Rheum uninerve* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 26: 503. 1880.

单脉大黄 *dan mai da huang*

Herbs short, 15–30 cm tall. Roots slender. Stem absent. Basal leaves 2–4; petiole short, 3–5 cm, glabrous or rarely papilliferous; leaf blade ovate or narrowly ovate, 8–12 × 4–7.5 cm, papery, glabrous, main vein 1, lateral veins 8–10, base rounded or very broadly cuneate, margin sinuate, apex obtuse or obtuse-acute. Panicle narrow, from apex of rhizome, 2–5 mm in diam., 1- or 2-branched, glabrous. Pedicel ca. 3 mm, slender, jointed at base. Flowers 2–4-fascicled; bracteole lanceolate, 1–2 mm. Tepals purple-red, elliptic, outer 3 smaller, 1–1.5 mm; disk circular, fleshy. Stamens 8 or 9, shorter than perianth; filaments very short, less than 1 cm. Ovary nearly rhomboid-ovoid; style long, reflexed; stigma inflated. Fruit broadly oblong-ellipsoid, 1.4–1.6 × 1.3–1.5 cm, base cordate, apex obtuse or retuse; wings purple-red, ca. 5 mm wide, membranous, with longitudinal veins near margin. Seeds dark brown, narrowly ovoid, ca. 3 mm wide. Fl. May–Jul, fr. Aug–Sep.

Slopes, roadsides; 1100–2300 m. Gansu, Nei Mongol, E Qinghai [Mongolia].

27. *Rheum nanum* Sievers ex Pallas, *Neueste Nord. Beytr. Phys. Geogr. Erd.-Völkerbeschreib.* 7: 264. 1796.

矮大黄 *ai da huang*

Rheum cruentum Sievers ex Pallas; *R. leucorrhizum* Pallas.

Herbs short, 20–35 cm tall, stout. Roots straight or bent, 2–4 cm in diam. Stem absent. Basal leaves 2–4; petiole short, 2–4.5 cm, 7–9 mm in diam., glabrous; leaf blade light green abaxially, yellow-green adaxially, reniform or orbicular, 6–14 × 8–16 cm, rarely larger, leathery, abaxially glabrous, adaxially tuberculate, basal veins 3–5, base rounded or subcordate, margin nearly entire, apex rounded. Panicle broad, from tip of rhizome, branched at middle, glabrous. Pedicel 1.5–3 mm, stout, not jointed. Flowers densely fascicled; bracteole scale-like. Tepals yellow-white, nearly fleshy, outer 3 smaller, lanceolate, 2–2.5 × ca. 1 mm; inner 3 larger, broadly elliptic to broadly ovate, ca. 3.5 × 2.5–3 mm. Stamens short. Ovary rhomboid-ellipsoid; stigma inflated. Fruit red, reniform, 1–1.2 × 1.2–1.4 cm, with longitudinal veins near margin. Seeds ovoid, ca. 5 mm wide. Fl. May–Jun, fr. Jul–Sep.

Slopes, valleys; 700–2000 m. Gansu, C and W Nei Mongol, NE Xinjiang [Kazakhstan, Mongolia, Russia (W Siberia)].

28. *Rheum tibeticum* Maximowicz ex J. D. Hooker, *Fl. Brit. India* 5: 56. 1886.

西藏大黄 *xi zang da huang*

Herbs short, 15–25 cm tall. Rhizome stout. Petiole of basal leaf short, 3–5(–10.5) cm, muricate, pubescent, or glabrous; leaf blade subcordate or cordate, 12–20(–28) × 13–21(–27) cm, leathery, abaxially pubescent near veins, adaxially glabrous, basal veins 5, base cordate or rounded, margin entire, apex obtuse. Panicle from tip of rhizome, branches spreading, pubescent or nearly glabrous; bracts very small. Pedicel short, 2–3.5 mm. Tepals light purple-red to

yellowish green, elliptic, ca. 2.5 mm. Anthers yellow or dark brown. Fruit ovoid, ca. 10 × 8–9 mm, both ends retuse; wings red-brown to light brown, broader than achene, with longitudinal veins near margin. Seeds black-brown, narrowly ovoid. Fl. Jul, fr. Aug. $2n = 22$.

Slopes; 4000–4600 m. Xizang [Afghanistan, Kashmir, Pakistan].

29. *Rheum tataricum* Linnaeus f., Suppl. Pl. 229. 1782.

圆叶大黄 *yuan ye da huang*

Rheum caspicum Pallas; *R. songaricum* Schrenk.

Herbs 35–50 cm tall. Roots stout. Stem erect, short, hollow, glabrous. Basal leaves procumbent, large; petiole short, subterete, glabrous; leaf blade cordate-orbicular or orbicular, usually slightly wider than long, 20–35 × 27–50 cm, papery, abaxially glabrous or papilliferous, base cordate, margin serrulate, apex obtuse. Stem leaves orbicular, small, 5–6 cm in diam. Panicle 3-branched at middle, glabrous or papilliferous above. Pedicel 2.5–5 mm, slender, jointed above middle. Flowers 1- or 2-fascicled; bracteole scale-like. Tepals yellow-white, broadly elliptic, ca. 2 × 1.5 mm, outer 3 smaller. Stamens slightly shorter than perianth. Anthers oblong; filaments inflated forward to base, ca. 1 mm; disk adnate to base of perianth. Ovary triangular-ovoid; style slender, reflexed; stigma discoid. Fruit purple-red, ovoid, sometimes triangular-ovoid or ovoid-ellipsoid, 1–1.2 cm × 6–9 mm, base cordate, apex retuse; wings narrow, ca. 1.5 mm wide, with longitudinal vein near margin. Seeds dark brown, ovoid, ca. 5 mm wide. Fl. May, fr. Jun–Jul.

Grasslands, deserts, plains; 500–1000 m. W Xinjiang [Afghanistan, Kazakhstan, Russia (European part)].

30. *Rheum spiciforme* Royle, Ill. Bot. Himal. Mts. 1: 318. 1839.

穗序大黄 *sui xu da huang*

Rheum scaberrimum Lingelsheim ex Limpricht.

Herbs short, stout. Stem absent. Petiole of basal leaf purplish red, subterete, 3–10 cm, stout, glabrous or papilliferous; leaf blade purple-red abaxially, dark green or yellow-green adaxially, ovate or broadly ovate-elliptic, 10–20 × 8–15 cm, nearly leathery, both surfaces papilliferous or abaxially glabrous, basal veins 5, base rounded or subcordate, margin entire and slightly sinuate, apex obtuse. Panicle spiciform; rachis 2–4-branched from tip of rhizome, 10–30 cm, papilliferous. Pedicel ca. 3 mm, slender, jointed at base. Tepals light green, elliptic or oblong-elliptic, outer 3 smaller, 1.8–2 × ca. 1 mm. Stamens subequal to perianth; anthers yellow. Ovary nearly obovoid; stigma large, raised on surface. Fruit oblong-ellipsoid, 8–10 × 7–9 mm, apex rounded or retuse; wings 2.5–3.5 mm wide, with longitudinal vein at middle. Fl. Jun, fr. Aug.

Slopes; 4000–5000 m. W Xizang [Afghanistan, Bhutan, Kashmir, Pakistan, Sikkim].

31. *Rheum moorcroftianum* Royle, Ill. Bot. Himal. Mts. 1: 315, 318. 1839.

卵果大黄 *luan guo da huang*

Herbs dwarf, procumbent. Stem absent. Basal leaves 3–6, forming a rosette; petiole finely striped, short, 3–6 cm, glabrous; leaf blade dark purple abaxially, green adaxially, ovate or triangular ovate, 6–12 × 4–8.5 cm, abaxially glabrous, rarely papilliferous along veins, adaxially glabrous, basal veins 5, leathery, base rounded or slightly cordate, margin entire, palmately divided to pinnate, apex obtusely acute. Panicle spiciform; rachis 2–5, nearly equal to leaf. Pedicel ca. 2 mm, slender. Tepals yellow-white or with some red, narrowly oblong or oblong-elliptic, inner 3 larger, ca. 2 mm. Anthers purple-red. Fruit ovoid or broadly ovoid, 7–8 × 5–6 mm; wings narrow, 1–1.5 mm, with longitudinal veins at middle. Seeds ovoid, ca. 3 mm wide. Fl. Jul, fr. Aug–Sep.

Slopes, river banks; 4500–5300 m. C and W Xizang [Afghanistan, India, Nepal, Pakistan, E Tajikistan].

32. *Rheum rhomboideum* Losinskaja, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 3: 116. 1937.

菱叶大黄 *ling ye da huang*

Herbs dwarf, procumbent. Roots ca. 5 cm in diam. Stem absent. Petiole of basal leaf shorter than blade, subterete, 2–7 cm, papilliferous or glabrous; leaf blade rhombic or rhombic-elliptic, 10–16 × 8.4–14 cm, nearly leathery, abaxially densely papilliferous, adaxially glabrous, basal veins 5, base cuneate or broadly cuneate, margin entire, apex obtuse or obtusely acute. Panicle spiciform; rachis mostly from apex of rhizome, shorter than leaf, 10–15 cm. Tepals purple-red, narrowly oblong-elliptic, 1.5–2 mm. Stamens subequal to perianth. Fruit broadly cuneate, 5.5–12.5 × 5.5–15 mm, base slightly cordate, apex retuse; wings 3–5 mm wide, with longitudinal veins at middle. Seeds ovoid, 3–5 mm wide. Fl. Jun–Jul, fr. Aug–Sep.

- Slopes, grasslands; 4700–5400 m. C and E Xizang.

33. *Rheum przewalskyi* Losinskaja, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 3: 115. 1937.

歧穗大黄 qi sui da huang

Herbs short, stout. Stem absent. Ocreae usually at tip of rhizome, brown, membranous or papery, glabrous. Basal leaves 2–4; petiole purple-red, subterete, 4–10 cm, stout, glabrous or muricate; leaf blade purple-red abaxially, yellow-green adaxially, broadly ovate or rhombic-ovate, 10–20 × 9–17 cm, leathery, abaxially glabrous or papilliferous, adaxially glabrous, basal veins 5–7, base subcordate, margin entire, rarely slightly sinuate, apex obtuse. Panicles 2 or 3, spiciform; rachis from tip of rhizome, subequal to leaves, 2–4-branched, 5–7 mm in diam. at base, glabrous or sparsely papilliferous. Pedicel ca. 2 mm, jointed below middle. Tepals not spreading, yellow-white, broadly ovate or ovate, outer 3 smaller, ca. 1.2 mm. Stamens subequal to perianth, slightly longer than perianth; filaments connected to disk. Ovary broadly ellipsoid; style reflexed, long; stigma inflated to disk. Fruit broadly ovoid or ovoid, 8.5–10 × 7–8.5 mm, base subcordate, apex obtuse, rarely retuse or slightly raised; wings ca. 3 mm wide, with longitudinal veins near middle. Seeds dark brown, ovoid, ca. 3 mm wide. Fl. Jul, fr. Aug.

- Slopes, forests; 1500–5000 m. Gansu, Qinghai, NW Sichuan.

34. *Rheum rhizostachyum* Schrenk, Bull. Acad. Imp. Sci. Saint-Petersbourg 10: 254. 1842.

直穗大黄 zhi sui da huang

Rheum aplostachyum Karelin & Kirilov.

Herbs ca. 30 cm tall, stout. Rhizome with large ocrea; roots stout. Petiole of basal leaf nearly subterete, short, 3–6 cm, 5–9 mm in diam., papilliferous; leaf blade broadly ovate or ovate, 12–25 × 10–22 cm, leathery, abaxially densely papilliferous, basal veins 5–7, purple-red, stout, base narrowly cordate or rounded, margin entire, slightly sinuate, apex obtuse. Panicles 2–5, spiciform; rachis from apex of rhizome, 12–28 cm, 4–8 mm in diam., hollow, 1–3-branched from lower part or not, papilliferous. Pedicel ca. 3 mm, jointed below middle. Tepals yellow-white, narrowly elliptic, outer 3 smaller, 1.8–2 × 0.8–1 mm. Filaments ca. 1.5 mm; anthers broadly elliptic. Fruit ovoid or ellipsoid-ovoid, 1–1.1 cm × 7–8 mm, base subcordate, apex obtuse; wings ca. 2 mm wide, with longitudinal veins at middle. Seeds ovoid. Fl. Jun, fr. Aug–Sep.

- Slopes; 2600–4200 m. Xinjiang [Kazakhstan].

35. *Rheum reticulatum* Losinskaja, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 3: 112. 1937.

网脉大黄 wang mai da huang

Herbs short. Roots stout, ca. 3.5 cm in diam.; rhizome with remaining ocrea at apex. Petiole of basal leaf usually purple-red, short, 2–5 cm, compressed, glabrous or muricate; leaf blade purple-red abaxially, ovate to triangular-ovate, 5–18 × 5–9 cm, leathery, abaxially papilliferous, adaxially glabrous, basal veins 5, raised abaxially, base rounded or subcordate, margin slightly sinuate, apex acute. Panicle spiciform; rachis to 10 cm from apex of rhizome, shorter than leaves. Pedicel short, 1.5–2 mm, jointed below middle. Flowers dense. Tepals yellow-white, elliptic, outer 3 smaller, ca. 1 mm. Stamens 7–9, subequal to perianth. Ovary obovoid-ellipsoid; style short; stigma inflated. Fruit broadly ovoid, 7.5–8.5 × 7–8 mm, base subcordate, apex obtuse or retuse, wings ca. 2.5 mm wide, with longitudinal veins near middle. Seeds ovoid. Fl. Jun, fr. Jul–Aug.

- Slopes; 2900–4200 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

36. *Rheum globulosum* Gage, Bull. Misc. Inform. Kew 1908: 181. 1908.

头序大黄 tou xu da huang

Herbs short, 2–8 cm tall. Roots stout, 1–3 cm in diam. Stem absent. Basal leaves 1, rarely 2; leaf blade purple-red abaxially, dark green adaxially, reniform-orbicular, 2–3 × 3–4 cm, leathery, abaxially glabrous or muricate, basal veins 5–7, stout, conspicuously raised abaxially, base cordate, margin entire, apex obtuse, rarely retuse. Panicle headlike, 1–2 cm in diam.; rachis solitary, ca. 5 cm, 1.5–2.5 mm in diam., glabrous or muricate. Pedicel short. Flowers dense. Tepals 6, not spreading, light green with white margin, obovate or oblong, subequal, 3–3.5 × ca. 2 mm, fleshy. Stamens 8 or 9, subequal to

perianth; filaments adnate to disk; anthers oblong-elliptic, ca. 1 mm. Ovary nearly rhomboid; style lateral spreading, not reflexed; stigma inflated. Fruit broadly ovoid, with marks on both sides at upper part; wings narrow. Fl. Jun–Jul, fr. Aug–later.

Slopes; 4500–5000 m. C and S Xizang [Sikkim].

37. *Rheum nobile* J. D. Hooker & Thomson, Ill. Himal. Pl. t. 19. 1855.

塔黄 ta huang

Herbs large, 1–2 m tall. Roots and rhizomes stout, ca. 8 cm in diam. Stem erect, finely striped, stout, 2–3 cm in diam., glabrous, simple. Basal leaves in a rosette. Stem leaves dense; petiole stout, shorter than blade, 5–15 cm, glabrous; leaf blade large, orbicular, ovate, or cordate-ovate, 20–30 cm, nearly lea-thery, abaxially glabrous or pilose, adaxially glabrous, basal veins 5–7, conspicuously raised abaxially, base rounded or subcordate, margin entire, apex obtuse; distal leaves smaller upward, orbicular, 5–13 cm; ocrea red, broadly lanceolate, large, 10–15 cm, both surfaces glabrous. Panicle 5–8-branched, 5–9 cm, rarely with branchlets, glabrous; bracts light yellow, membranous when dry. Pedicel 2–3 mm, slender, jointed at middle or slightly below. Flowers 5–9-fascicled. Tepals 6 or fewer, connected at base, not spreading, elliptic, inner 3 larger, yellow-green, ca. 2 × 1 mm. Stamens (8 or)9; anthers compressed, oblong-elliptic; filaments compressed, base inflated, 3–3.5 mm. Ovary ovoid; style short; stigma inflated. Fruit broadly ovoid or ovoid, 6–7 × 5–6 mm, base rounded to slightly truncate, apex obtuse; wings dark brown, less than 1 mm, narrow, with longitudinal veins near margin. Seeds black-brown, cordate-ovoid. Fl. Jun–Jul, fr. Sep.

Slopes; 4000–4800 m. S Xizang [Afghanistan, Bhutan, India, Myanmar, Nepal, Pakistan, Sikkim].

38. *Rheum alexandrae* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 384. 1894.

水黄 shui huang

Herbs 40–80 cm tall. Rhizomes and roots straight, stout. Stem straight, usually yellow-green, finely striped, stout, hollow, glabrous, simple. Basal leaves 4–6. Petiole of basal leaf ca. as long as blade or longer, subterete, glabrous; leaf blade ovate to ovate-elliptic, 9–14 × 6.5–9 cm, both surfaces glabrous, rarely papilliferous along main vein and margin, basal veins 5–7, middle 3 stout; ocrea brown, large, ca. 7 cm, membranous when dry, clasping; leaves usually light green adaxially, narrowly ovate, membranous when dry, shortly petiolate or sessile. Panicle 2- or 3-branched, erect, 3–6 cm, glabrous. Pedicel 2.5–4 mm, slender, jointed near base, glabrous. Flowers fascicled, small. Tepals (4 or 5 or)6, green, connected at base to cup, ca. 1.5 mm. Stamens 7–9; filaments 2.5–3 mm, from perianth; anthers oblong-elliptic. Ovary rhomboid-obovoid; styles 3 or 2, short, reflexed; stigma inflated. Fruit rhomboid-ellipsoid, 7–8 × 5–6 mm, base cuneate or broadly cuneate, apex retuse; wings dark brown, ca. 0.5 mm, very narrow, smooth. Fl. Jun–Jul, fr. Sep.

• Slopes; 3000–4600 m. W Sichuan, E Xizang, NW Yunnan.