

25. Tribe GALEGEAE

山羊豆族 shan yang dou zu

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Dietrich Podlech, Stanley L. Welsh, Hiroyoshi Ohashi, Kai Larsen, Anthony R. Brach

Herbs or shrubs, with simple or T-shaped hairs; glands or glandular punctae sometimes present. Leaves epulvinate or pulvinus reduced, imparipinnate or paripinnate, with many opposite to irregularly arranged or rarely conjugate leaflets, rarely 1–3-foliolate; stipules free or adnate to petiole, estipellate. Flowers in axillary racemes, spikes, or rarely solitary. Calyx campanulate to tubular; standard clawed or narrowed to base; wings auriculate; keel blunt to apiculate. Stamens diadelphous, rarely monadelphous; anthers usually uniform, but slightly dimorphic and with confluent thecae in *Glycyrrhiza*. Ovary few to many ovuled (sometimes 1-seeded); style slender, bearded or not, with a terminal or lateral stigma. Legumes compressed, angled or inflated, sometimes with sutured margins intruded or longitudinally septate, occasionally torulose, dehiscent or indehiscent. Seeds oblong-reniform, estrophiolate.

About 24 genera and 2900–3200 species: principally in Asia, Europe, and North America, but extending thinly in mountainous and/or drier places to S Africa, Australia, and temperate South America; 11 genera and 586 species (324 endemic, two introduced) in China.

Galega officinalis Linnaeus (Sp. Pl. 2: 714. 1753), probably native to SW Asia (Caucasus), is cultivated in China.

- 1a. Style bearded, sometimes just a tuft of hairs below stigma on one side; wings and keel never interlocking (subtribe Coluteinae).
 - 2a. Leaves reduced to scales; flowers solitary; legumes compressed 145. *Eremosparton*
 - 2b. Leaves imparipinnate, 7–25-foliolate; flowers in racemes; legumes inflated.
 - 3a. Flowers yellow; standard with 2 callosities above claw; shrubs 143. *Colutea*
 - 3b. Flowers red to violet, rarely yellow; standard without callosities above claw; shrubs or herbs.
 - 4a. Plants with medifixed hairs; legumes inflated subglobose 144. *Sphaerophysa*
 - 4b. Plants with basifixed hairs; legumes narrowly ellipsoid to ovoid 138. *Phyllobium*
- 1b. Style glabrous, but stigma sometimes penicillate (sometimes inner side of style upper part hairy in *Astragalus*); wings and keel mostly interlocking with bosses on keel and matching sockets on wings (indistinct only in *Gueldenstaedtia* and *Tibetia*).
 - 5a. Anther thecae confluent toward apex; leaves pulvinate, spirally arranged; some hairs glandular-peltate or -capitate (subtribe Glycyrrhizinae) 148. *Glycyrrhiza*
 - 5b. Anther thecae separate; leaf pulvinus reduced or absent; plants without peltate glandular hairs.
 - 6a. Legume nerves oblique, closely parallel, raised at maturity, confluent toward placental margin; vexillary filament connate with others; keel petals not auriculate; leaflet nerves extending to margin (subtribe Galeginae) *Galega* (see note above)
 - 6b. Legume nerves transverse, confluent over middle part of valves, fine or inconspicuous; vexillary filament generally free; keel petals generally auriculate; leaflet nerves usually looped within margin or inconspicuous (subtribe Astragalinae).
 - 7a. Calyx base usually oblique, upper side ± slightly gibbous; wings pinnately nerved; legume valves generally twisting on dehiscent.
 - 8a. Stem obvious; stipules membranous, separated from petiole; calyx campanulate 142. *Chesniella*
 - 8b. Stem abbreviated, plants appearing acaulescent; stipules herbaceous, adnate to petiole; calyx tubular 141. *Chesneya*
 - 7b. Calyx base symmetric or suboblique; wings usually palmately nerved; legume valves not twisting.
 - 9a. Keel petals half as long as wings; style shorter than or as long as ovary.
 - 10a. Style incurved; upper 2 calyx lobes free; seeds scrobiculate; stipules free and adnate to base of petiole 146. *Gueldenstaedtia*
 - 10b. Style curved in right angle; upper 2 calyx lobes connate; seeds smooth, marbled-spotted; stipules connate below apex and opposite to leaves 147. *Tibetia*
 - 9b. Keel petals subequal to or slightly shorter than wings; style longer than ovary.
 - 11a. Keel petals obtuse; legume 1-locular or with a septum intruding from abaxial suture; leaflets ± symmetric 139. *Astragalus*
 - 11b. Keel petals apiculate; legume 1-locular or with a septum intruding from adaxial suture; leaflets basally ± oblique or, if narrow, falcately incurved 140. *Oxytropis*

138. PHYLLOLOBIUM Fischer in Sprengel, Novi Provent. 33. 1818.

膨果豆属 peng guo dou shu

Xu Langran (徐朗然 Xu Lang-rang), Zhang Mingli (张明理); Dietrich Podlech

Perennial herbs with mostly well-developed stems, with basifixed hairs. Stipules free from petiole and from each other, very

rarely shortly connate behind stem. Racemes several, with a distinct peduncle; bracts persistent. Bracteoles present or more rarely absent. Calyx campanulate. Standard wide, mostly suborbicular to transversely elliptic, with a very short claw, emarginate at apex; keel and wing petals not interlocking due to absence of bosses on keel and matching sockets on wings. Style with a brush of straight, rigid, short hairs just below glabrous stigma. Legumes 1-locular or incompletely to completely 2-locular.

Twenty-two species: mostly in China, a small number in the Himalayas and one in Tajikistan; 21 species (17 endemic) in China.

- 1a. Plants with slender stems up to 90 cm, at least in lower 1/2 with long, horizontally spreading lateral branches; hairs slender, 0.1–0.4 mm 8. *P. eutrichus*
- 1b. Stems mostly shorter, without horizontally spreading lateral branches, if sometimes as long as above, then with other kinds of hair.
- 2a. Plants in all parts covered with bladderlike, scalelike hairs up to 0.1 mm 4. *P. chinense*
- 2b. Plants at least at calyx with slender, longer, not bladderlike hairs.
- 3a. Petals yellow, rarely with violet-tipped keel.
- 4a. Plants 30–75 cm tall; calyx 7–12 mm, teeth 4–9 mm; keel as long as wings 5. *P. dolichochaete*
- 4b. Plants 10–50 cm tall; calyx up to 10 mm, teeth up to 6 mm; keel longer than wings.
- 5a. Leaflets in 7–13 pairs, 5–16 × 1–4 mm, distinctly more than 2 × as long as wide; peduncles 3–11 cm 9. *P. flavovirens*
- 5b. Leaflets in 4–10 pairs, 5–10 × 2.5–5 mm, ca. 2 × as long as wide; peduncles 1.5–4 cm 2. *P. camptodontum*
- 3b. Petals blue or violet, rarely yellow at base only.
- 6a. Plants at least in part with spreading hairs.
- 7a. Calyx 8–10 mm, white hairy, teeth 4.5–6 mm; standard 15–19 mm; legumes with a stipe ca. 5 mm, 25–30 mm, 2-locular 21. *P. turgidocarpum*
- 7b. Calyx shorter, white and black hairy, teeth mostly shorter; standard 7–13 mm; legumes with a stipe up to 3 mm or sessile, up to 20 mm, 1-locular.
- 8a. Leaflets 8–20 mm; bracts 8–10 mm; calyx 7–8 mm, with teeth 4–5 mm 12. *P. lineariauriferum*
- 8b. Leaflets distinctly smaller; bracts at most up to 4 mm; calyx up to 6 mm with shorter teeth.
- 9a. Stipules 2.5–4.5 mm; leaflets 3–15 mm; bracts 1.5–4 mm; bracteoles 0.5–2 mm; calyx teeth 1.5–4 mm; legumes 5–6.5 mm high and wide 20. *P. tribulifolium*
- 9b. Stipules up to 2.5 mm; leaflets 2–6 mm; bracts up to 2 mm; bracteoles mostly absent, if present, then ca. 0.3 mm (in *P. milingense*); calyx teeth up to 2.5 mm; legumes either much higher than wide or much wider than high.
- 10a. Stems with appressed hairs; leaflets loosely to rather densely hairy adaxially; bracts 1.5–2 mm; legumes 15–20 mm, 8–12 mm high, strongly compressed laterally, without beak 10. *P. heydei*
- 10b. Stems with partly spreading hairs; leaflets glabrous to subglabrous adaxially; bracts 0.6–1 mm; legumes 10–15 mm, 2.5–3 mm high and 5–7 mm wide, with a short beak 13. *P. milingense*
- 6b. Plants with appressed to ascending hairs only.
- 11a. Leaflets on both surfaces loosely to densely hairy.
- 12a. Stipules 2–3 mm; bracts 4–6 mm, with spreading hairs; calyx 7–8 mm, covered with spreading white and dark brown hairs 3. *P. chapmanianum*
- 12b. Stipules 4–7 mm; bracts 6–10 mm, with appressed to ascending hairs; calyx 9–10 mm, covered with appressed to ascending white and shorter black hairs 11. *P. lasaense*
- 11b. Leaflets adaxially glabrous or rarely sparsely hairy.
- 13a. Standard up to 10 mm; bracts up to 2 mm; bracteoles absent.
- 14a. Plants up to 50 cm tall; calyx 7–8 mm; legumes 25–30 mm 17. *P. siccanum*
- 14b. Plants up to 30 cm tall; calyx up to 5.5 mm; legumes up to 13 mm.
- 15a. Stem and peduncles loosely to rather densely hairy; leaflets narrowly elliptic, 3–11 × 1–2 mm, acute; keel as long as wings 15. *P. prodigosum*
- 15b. Stem and peduncles glabrous to sparsely hairy; leaflets elliptic, 4–9 × 1.5–4 mm, obtuse; keel distinctly longer than wings 16. *P. sanbilingense*
- 13b. Standard at least 12 mm; bracts mostly distinctly longer.
- 16a. Stem, rachises, and peduncles glabrous or sparsely hairy; leaflets 10–30 × 3.5–10 mm 14. *P. pastorium*
- 16b. Stem, rachises, and peduncles loosely to rather densely hairy, sometimes only sparsely hairy; leaflets up to 12 mm.
- 17a. Stem, rachises, and peduncles covered with hairs up to 0.15 mm and also with much shorter, minute, nearly globose hairs; calyx teeth 2.5–3 mm; legumes very shortly acuminate 7. *P. enneaphyllum*
- 17b. Stems without minute subglobose hairs; at least longer calyx teeth 3.5–6 mm; legumes with a beak 2–4 mm.
- 18a. Stipules 1–3 mm, lower ones completely embracing stem but free from each other; keel shorter than wings 6. *P. donianum*

- 18b. Stipules 3–5 mm, lower ones not or up to 1/2 embracing stem; keel longer than wings.
 19a. Plants 20–40(–60) cm tall; racemes 2–7(–9)-flowered; petals violet or in lower part yellow 1. *P. balfourianum*
 19b. Plants 10–25 cm tall; stipules not embracing stem, never reflexed; racemes 1–5-flowered; petals purple or purple-red and standard in middle with a white, purple-striate spot.
 20a. Leaflets narrowly obovate, 2–3 mm wide; bracteoles 2–3(–4) mm; standard purple-red, ca. 16 mm, limb ca. 14 mm wide, transversely elliptic, in middle with a white, purple-striate spot 19. *P. tingriense*
 20b. Leaflets widely obovate, 3.3–6 mm wide; bracteoles absent or up to 1 mm; standard purple, ca. 12 mm, limb ca. 8 mm wide, suborbicular 18. *P. sichuanense*

1. *Phyllobium balfourianum* (N. D. Simpson) M. L. Zhang & Podlech, Feddes Repert. 117: 44. 2006.

长小苞膨果豆 chang xiao bao peng guo dou

Astragalus balfourianus N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 123. 1913; *A. minutebracteolatus* N. D. Simpson; *A. prattii* N. D. Simpson; *A. prattii* var. *multiflorus* K. T. Fu; *A. prattii* var. *pastorioides* K. T. Fu; *A. schneideri* Ulbrich.

Plants 20–40(–60) cm tall, with appressed hairs 0.1–0.4 mm. Stems several, (6–)20–55 cm, mostly glabrous at base, in lower part loosely and in upper part more densely white and black hairy. Leaves 2–6 cm; stipules 3–5 mm, sparsely to loosely hairy; petiole short, 0.1–1 cm, like rachis sparsely to rather densely hairy; leaflets in lower leaves mostly in 3–5 pairs, in upper leaves mostly in 5–10 pairs, 5–12(–16) × (2–)3–6 mm, abaxially subglabrous or loosely to rather densely white hairy, adaxially glabrous to very rarely sparsely appressed hairy. Racemes short, nearly capitate-umbellate, with 2–7(–9) flowers; peduncle 1–6.5 cm, loosely to rather densely predominantly black hairy; bracts 3–7 mm, sparsely hairy. Bracteoles 1–7 mm. Calyx 6–10 mm, covered loosely to rather densely with appressed, predominantly blackish hairs up to 0.3 mm; teeth 3.5–6 mm. Petals violet to purplish; standard 12.5–17.5 × 9–14 mm; wings 11–16 mm; keel 12.5–16 mm. Legumes with a stipe 2–3.5 mm, 16–18 mm, 6–7 mm high and wide, with a beak 2–4 mm, 1-locular, loosely covered with mostly dark brown appressed hairs 0.05–0.15 mm.

- 2600–4000 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

2. *Phyllobium camptodontum* (Franchet) M. L. Zhang & Podlech, Feddes Repert. 117: 46. 2006.

弯齿膨果豆 wan chi peng guo dou

Astragalus camptodontus Franchet, Pl. Delavay. 160. 1889; *A. camptodontoides* N. D. Simpson; *A. camptodontus* var. *lichiangensis* (N. D. Simpson) K. T. Fu; *A. lichiangensis* N. D. Simpson; *A. rockii* C. Marquand & Airy Shaw.

Plants 25–50 cm tall, with exception of leaflets and calyx covered with subappressed, bladderlike, minute, predominantly black hairs 0.05–0.2 mm. Stems slender, mostly glabrous at base, in middle part loosely and in upper part more densely hairy. Leaves 2–4.5 cm; stipules 2–5 mm, often reflexed, hairy mostly only at margins; petiole 0.3–0.5 cm, like rachis loosely to rather densely predominantly white hairy; leaflets in 4–10 pairs, 5–10 × 2.5–5 mm, abaxially loosely to rather densely

covered with appressed white hairs 0.2–0.35 mm, adaxially glabrous. Racemes short, with 1–6 flowers; peduncle 1.5–4 cm, loosely hairy; bracts 1.5–5 mm, white ciliate. Bracteoles 1–4 mm. Calyx 6–8 mm, covered loosely to rather densely with appressed, mostly dark brown, slender hairs 0.1–0.2 mm; teeth 2.5–5.5 mm. Petals yellow with violet-tipped keel or violet-purple; standard 13–17 × 9–13 mm; wings 11–13 mm; keel 13–14.5 mm. Legumes with a stipe 2.5–3 mm, (13–)17–21 mm, 3.5–6 mm high and wide, with a beak 2–3 mm, 1-locular, glabrous.

- 2500–3800 m. Sichuan, Xizang, Yunnan.

3. *Phyllobium chapmanianum* (Weninger) M. L. Zhang & Podlech, Feddes Repert. 117: 47. 2006.

蔓生膨果豆 man sheng peng guo dou

Astragalus chapmanianus Weninger, Mitt. Bot. Staats-samml. München 30: 108. 1992.

Plant hairs appressed to nearly spreading, white, in inflorescence predominantly dark brown. Stems 6.5–11 cm, slender, in lower parts glabrescent, in upper part rather densely white and dark brown hairy. Leaves 1–2.2 cm, sessile; stipules 2–3 mm, hairy; rachis hairy; leaflets in (2–)4–7 pairs, 4–6 × 2–3.5 mm, abaxially densely and adaxially loosely to densely covered with ± appressed hairs. Racemes 1–3-flowered; peduncle 0.8–1.5 cm, rather densely covered with ± appressed white and dark brownish hairs; bracts 4–6 mm, spreading hairy. Bracteoles 4–5 mm. Calyx 7–8 mm, rather densely covered with spreading, white and dark brown hairs; teeth ca. 4 mm. Petals violet; standard transversely elliptic, ca. 10 × 8.5 mm; wings 9.5–10 mm; keel ca. 9 mm. Ovary with a stipe ca. 0.5 mm, densely black brown and white hairy. Legumes unknown.

- 3500–4500 m. Xizang.

4. *Phyllobium chinense* Fischer in Sprengel, Novi Provent. 33. 1818.

背扁膨果豆 bei bian peng guo dou

Astragalus complanatus Bunge; *A. pratensis* Ulbrich.

Plants 30–90(–100) cm tall, covered with ± appressed, very short, scalelike, bladderlike hairs up to 0.1 mm. Stems in lower part glabrous, in upper part loosely to rather densely hairy. Leaves 4–11 cm; stipules 1–3 mm, obliquely inserted at stem and sometimes slightly clasping stem, sparsely to loosely hairy; petiole very short, rachis sparsely to loosely white hairy; leaflets in 4–10 pairs, 5–18 × 2.5–11 mm, abaxially sparsely to

loosely hairy, adaxially glabrous. Racemes 4–9 cm, remotely 2–7-flowered; peduncle 4–9 cm, sparsely to loosely white hairy; bracts 1–2.5 mm, white and black hairy. Bracteoles 0.5–1 mm. Calyx 4–7 mm, loosely to densely white or black hairy; teeth 2–3.5 mm. Petals yellow to reddish; standard orbicular or transversely elliptic, 9–11 × 8–10.5 mm; wings 8–11 mm; keel 9–10 mm. Legumes with a stipe 1–1.5 mm, 30–44 mm, 4–8 mm high, with a straight beak 3–4 mm, 1-locular, loosely to rather densely covered with appressed white or black hairs.

• 1000–1700 m. Gansu, Hebei, Henan, Jiangsu, Jilin, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

5. *Phyllobium dolichochoete* (Diels) M. L. Zhang & Podlech, Feddes Repert. 117: 48. 2006.

芒齿膨果豆 mang chi peng guo dou

Astragalus dolichochoete Diels, Notes Roy. Bot. Gard. Edinburgh 5: 245. 1912; *A. albidoflavus* K. T. Fu.

Plants 30–75 cm tall, covered with appressed to ascending hairs 0.3–0.5 mm. Stems 10–25 mm in diam., sparsely to loosely covered in lower part with white hairs, in upper part with increasingly blackish brown hairs, and in inflorescence region only with black hairs. Leaves 3.5–11.5 cm; stipules 4–6 mm, glabrous or sparsely to loosely hairy, at margins more densely hairy; petiole very short, like rachis sparsely to loosely hairy; leaflets in (4 or) 5–12 pairs, 4–21.5 × 1.5–6 mm, abaxially sparsely to loosely hairy, adaxially glabrous. Racemes 1–2 cm, densely, later somewhat more loosely, 3–11-flowered; peduncle 4–15 cm, often curved, mostly with brownish black hairs, bracts 4–8 mm, nearly glabrous to loosely or at margins more densely black hairy. Bracteoles 0.5–4 mm. Calyx 7–12 mm, sparsely to loosely or densely mostly appressed black hairy; teeth 4–9 mm, often ± strongly curved. Petals greenish yellow to sulfur-yellow; standard 14–17 × 12–15 mm; wings 12–15 mm; keel 12–15 mm. Legumes with a stipe 2–3 mm, 16–22 mm, 3.5–4.5 mm high, with a beak 2–3 mm, 1-locular, glabrous or sparsely to loosely covered with white to blackish brown hairs.

• 2700–4300 m. Sichuan, Xizang, Yunnan.

6. *Phyllobium donianum* (Candolle) M. L. Zhang & Podlech, Feddes Repert. 117: 49. 2006.

亚东膨果豆 ya dong peng guo dou

Astragalus donianus Candolle, Prodr. 2: 283. 1825; *A. monanthus* K. T. Fu; *A. prattii* N. D. Simpson var. *uniflorus* E. Peter; *A. pycnorhizus* Wallich ex Benth; *A. yatungensis* C. C. Ni & P. C. Li.

Plants creeping to prostrate. Stems 15–44 cm, in basal part glabrous to sparsely and in upper part loosely or more rarely rather densely covered with appressed white or white and black hairs 0.1–0.2 mm. Leaves 1.5–5 cm; stipules 1–3 mm, free or in front of petiole shortly connate, lower and middle ones 1/2 to completely embracing stem but not connate, at margins and often also elsewhere loosely hairy; petiole short, rachis loosely hairy like stem; leaflets in 4–8 pairs, 2–7(–9) × 1.5–4 mm, emarginate, abaxially at first rather densely appressed hairy, becoming loosely hairy with age, hairs ca. 0.3 mm, adaxially gla-

brous. Racemes short, 1–3(–5)-flowered; peduncle 1.5–6 cm, loosely white and black hairy; bracts 1–4 mm, sparsely hairy. Bracteoles 1–3 mm. Calyx 5.5–7.5 mm, loosely to rather densely covered with ± ascending white and black hairs 0.2–0.5 mm; teeth 2–4.5 mm. Petals blue-violet to purple or dark red; standard orbicular to transversely elliptic, 13–17 × 11–13.5(–15) mm; wings 12–16 mm; keel 12–15(–16) mm. Legumes with a stipe 2–3 mm, 15–30 mm, (5–)6–8(–9.5) mm high, with a beak 2–3 mm, 1-locular, at first densely, later loosely, shortly, white and blackish or only blackish hairy.

Xizang, Yunnan [Bhutan, India, Nepal].

7. *Phyllobium enneaphyllum* (P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 51. 2006.

九叶膨果豆 jiu ye peng guo dou

Astragalus enneaphyllum P. C. Li, Acta Bot. Yunnan. 11: 289. 1989.

Plants subappressed white hairy or in inflorescence also with a few black hairs. Stems prostrate, 40–60 cm, sparsely to loosely covered with hairs up to 0.15 mm and also with much shorter, minute, nearly globose hairs. Leaves 2–4.5 cm; stipules 1.5–3 mm, subglabrous; petiole short, rachis hairy like stem; leaflets in 3 or 4 pairs, 6–11 × 3–5.5 mm, abaxially loosely covered with hairs 0.3–0.5 mm, adaxially glabrous. Racemes loosely 2–4-flowered; peduncle 2.5–3.5 cm, hairy like stem; bracts 2–3 mm, white hairy. Bracteoles not always present, 1–2 mm. Calyx 6.5–7 mm, loosely covered with appressed white hairs up to 0.5 mm and with fewer and shorter black hairs; teeth 2.5–3 mm. Petals pale blue; standard widely obovate to suborbicular, ca. 12 × 7.5–8 mm; wings ca. 11 mm; keel ca. 12 mm. Legumes with a stipe ca. 3 mm, 25–28 mm, 2.5–3 mm high and 7–8 mm wide, very shortly acuminate, 1-locular, sparsely to loosely covered with subappressed white hairs 0.1–0.25 mm.

• Yunnan.

8. *Phyllobium eutrichus* (Handel-Mazzetti) M. L. Zhang & Podlech, Feddes Repert. 117: 51. 2006.

真毛膨果豆 zhen mao peng guo dou

Astragalus complanatus Bunge var. *eutrichus* Handel-Mazzetti, Symb. Sin. 7: 553. 1933; *A. complanatus* subsp. *eutrichus* (Handel-Mazzetti) Weninger.

Plants 30–90(–100) cm tall, covered with always thin, slender hairs 0.1–0.4 mm. Stems at least in lower 1/2 with ± horizontally spreading, long lateral branches, glabrous in lower part, in upper part and lateral branches loosely appressed white hairy, in upper part with some black hairs mixed in. Leaves 2–9 cm, subsessile; stipules 2–5 mm, sparsely hairy or subglabrous; rachis loosely appressed white hairy; leaflets in 5–8 pairs, 4–8 × 2–5 mm, abaxially loosely hairy, adaxially toward margins sparsely hairy or subglabrous, apex emarginate. Racemes 2–5 cm, remotely 2–7-flowered; peduncle 2.5–6 cm, sparsely white and black hairy; bracts 1.5–2.5 mm, white and black hairy. Bracteoles sometimes present, ca. 1 mm. Calyx 5–6 mm, sparsely to very sparsely white and black hairy; teeth 2–2.5 mm. Petal color unknown; standard widely elliptic to orbicular,

12–13 × ca. 7.5 mm; wings ca. 9 mm; keel 11–12 mm. Legumes (unripe) with a stipe ca. 3 mm, narrowly ellipsoid, narrowed at both ends, straight, with a beak ca. 2 mm, when young densely covered with appressed white hairs 0.2–0.3 mm.

- 2400–3000 m. Yunnan.

9. *Phyllobium flavovirens* (K. T. Fu) M. L. Zhang & Podlech, Feddes Repert. 117: 52. 2006.

黄绿膨果豆 huang lü peng guo dou

Astragalus flavovirens K. T. Fu, Bull. Bot. Res., Harbin 2(1): 122. 1982; *A. angustifoliolatus* K. T. Fu.

Plants loosely caespitose, in vegetative parts covered with appressed white hairs 0.1–0.3 mm, in inflorescence mostly with dark brownish to blackish hairs. Stems 10–40(–60) cm, prostrate to ascending or erect, in lower part only with bractlike stipules without developed leaves, loosely hairy. Leaves 2–11 cm, nearly sessile; stipules 4–8 mm, loosely hairy or sparsely ciliate; rachis loosely hairy; leaflets in 7–13 pairs, 5–16 × 1–4(–7) mm, abaxially sparsely to loosely hairy, adaxially glabrous, mostly somewhat cucullate at apex, with a cusp up to 0.5 mm. Racemes short, densely 3–9-flowered; peduncle 3–11 cm, blackish brown hairy; bracts 5–6 mm, with blackish brown hairs. Bracteoles 1.5–4 mm. Calyx 7–9 mm, loosely covered with appressed black hairs 0.05–0.1 mm; teeth unequal, 2 upper 2–4 mm, 3 lower 4–6 mm. Petals yellowish, sometimes with purple tip; standard suborbicular, ca. 15 × 11 mm; wings ca. 12 mm; keel ca. 13 mm. Ovary with a stipe ca. 3 mm, linear, glabrous to white hairy. Legumes unknown.

- 2500–3000 m. Yunnan.

10. *Phyllobium heydei* (Baker) M. L. Zhang & Podlech, Feddes Repert. 117: 53. 2006.

毛柱膨果豆 mao zhu peng guo dou

Astragalus heydei Baker in J. D. Hooker, Fl. Brit. India 2: 118. 1876; *A. hendersonii* Baker; *A. heydei* var. *hendersonii* (Baker) H. Ohba, S. Akiyama & S. K. Wu.

Plants up to 12 cm tall, densely hairy. Stems in leafy part ca. 1 cm, sparsely to loosely covered with subappressed, flexuous, tangled, white hairs 0.1–0.2 mm. Leaves 1–2.5 cm; stipules 1–2.5 mm, shortly connate behind stem and mostly also in front of petiole, sparsely to loosely white hairy; petiole 0.2–0.6 cm, like rachis loosely to rather densely covered with subappressed to spreading, white hairs 0.2–0.4 mm; leaflets in 3–7 pairs, 2–5(–7) × 1–4 mm, both surfaces densely to rather densely covered with subappressed to ascending, partly flexuous, tangled, white hairs 0.5–0.7 mm. Racemes (1 or) 2–5-flowered; peduncle 1–4.5 cm, often curved, loosely hairy like stem in upper part; bracts 1.5–2 mm, hairy. Calyx 3–6 mm, densely to rather densely covered with ascending to spreading, flexuous, white hairs 0.5–0.7 mm, with very short, appressed, black hairs mixed in; teeth 1.5–2(–3) mm. Petals pink to pale violet; standard orbicular to transversely elliptic, 9–12 × 9–13 mm; wings 9–11 mm; keel 8–10 mm. Legumes subsessile, 15–20 mm, 8–12 mm high, compressed laterally, 1-locular, rather densely, later loosely, covered with short, appressed to ascending, white or black and white hairs.

3900–5800 m. Qinghai, Sichuan, Xinjiang, Xizang [India, Nepal].

11. *Phyllobium lasaense* (C. C. Ni & P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 54. 2006.

拉萨膨果豆 la sa peng guo dou

Astragalus lasaensis C. C. Ni & P. C. Li, Acta Phytotax. Sin. 17(2): 107. 1979.

Plants densely covered with appressed or nearly ascending hairs (0.3–)0.5–1 mm. Stems creeping, prostrate to ascending or erect, 15–30 cm, loosely to densely covered with subappressed, tangled, white and brownish black, partly very short hairs. Leaves 2.5–4 cm, nearly sessile; stipules 4–7 mm, densely white hairy; rachis densely hairy; leaflets in 4–9 pairs, 3–10 × 1.5–4 mm, abaxially densely and adaxially loosely silvery hairy. Racemes short, 2–7-flowered; peduncle 1.5–3 cm, rather densely white and black hairy; bracts 6–10 mm, white or white and black hairy. Bracteoles 4–5 mm. Calyx 9–10 mm, densely covered with tangled, subappressed to ascending, white hairs and with mostly distinctly shorter black hairs; teeth 4–5 mm. Petals purple to violet; standard orbicular to transversely elliptic, 10–12 × 8–11 mm; wings 10–11 mm; keel 8–10 mm. Legumes shortly stipitate, 6–10 mm, 3–4 mm high and wide, with a short beak, nearly fully 2-locular, loosely covered with appressed white and also some black hairs 0.1–0.2 mm.

- 4100–4700 m. Xizang.

12. *Phyllobium lineariauriferum* (P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 55. 2006 [*“lineariaurifer”*].

线耳膨果豆 xian er peng guo dou

Astragalus lineariaurifer P. C. Li, Acta Bot. Yunnan. 11: 292. 1989.

Plants 20–30 cm tall, with subappressed to spreading hairs 0.3–1 mm. Stems erect, often curved, loosely to rather densely covered with ascending to ± spreading mostly white hairs. Leaves 3–5 cm, subsessile; stipules 4–7 mm, loosely white hairy, at base also black hairy; rachis loosely covered with subappressed to spreading white and scattered black hairs; leaflets in 5 or 6 pairs, 8–20 × 2–5 mm, both surfaces loosely to rather densely subappressed hairy. Racemes loosely 4–6-flowered; peduncle 4–5 cm, loosely covered with ± spreading, mostly black hairs; bracts 8–10 mm, black hairy. Bracteoles ca. 2 mm. Calyx 7–8 mm, loosely to rather densely covered with ascending to ± spreading white and black hairs; teeth 4–5 mm. Petals ?bluish; standard widely ovate to suborbicular, 12–13 × 10–11 mm; wings 10.5–11 mm; keel 12–13 mm. Legumes (immature) with a stipe ca. 3 mm, narrowly ellipsoid, ca. 10 mm, 1-locular, densely covered with subappressed to ascending white hairs.

- Sichuan.

13. *Phyllobium milingense* (C. C. Ni & P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 56. 2006.

米林膨果豆 mi lin peng guo dou

Astragalus milingensis C. C. Ni & P. C. Li, Acta Phytotax. Sin. 17(2): 107. 1979; *A. milingensis* var. *heydeiodes* K. T. Fu.

Plants covered with mostly white hairs. Stems prostrate,

5–30 cm, often zigzaglike bent, in basal parts glabrous or sparsely hairy, in upper parts loosely to rather densely covered with appressed to spreading white or partly black and white hairs 0.2–0.3(–0.4) mm. Leaves 1–2.5 cm; stipules 1.5–2 mm, sparsely hairy; petiole 0.3–0.5 cm, like rachis loosely to rather densely hairy, hairs subappressed to spreading, white, sometimes also some black; leaflets in 3–6 pairs, 2–4 × 1–2 mm, abaxially densely to rather densely covered with ± appressed, short, white hairs, more rarely also with black hairs, adaxially glabrous or sometimes with a few appressed hairs toward base and margins. Racemes loosely 1–4-flowered; peduncle 1–2 cm, rather densely covered with mostly appressed, short, white hairs; bracts 0.6–1 mm, mostly white hairy. Bracteoles mostly absent, if present, less than 0.3 mm. Calyx 3–5 mm, rather densely covered with subappressed to ascending or even spreading, short, white hairs, sometimes also with black hairs; teeth 1.5–2.5 mm. Petals pink or purple to violet; standard orbicular, 7–10 × 6–8.5 mm; wings 7–8 mm; keel 7–8 mm. Legumes with a stipe ca. 1 mm, 10–15 mm, 2.5–3 mm high and 5–7 mm wide, with a short beak and often persistent style, 1-locular, rather densely covered with ascending white hairs 0.2–0.3 mm.

- 3000–4300 m. Gansu, Sichuan, Xizang.

14. *Phyllobium pastorium* (H. T. Tsai & T. T. Yu) M. L. Zhang & Podlech, Feddes Repert. 117: 57. 2006.

牧场膨果豆 mu chang peng guo dou

Astragalus pastorius H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 264. 1940; *A. pastorius* var. *linearibracteatus* K. T. Fu; *A. tencingensis* K. T. Fu.

Plants 25–40 cm tall, with appressed hairs 0.1–0.5 mm. Stems prostrate to ascending or erect, glabrous or sparsely to loosely or especially in upper part to rather densely covered with subappressed to ascending white and black hairs. Leaves 6–10 cm; stipules 4–7 × 3–5 mm, glabrous or with a few black hairs at margins; petiole 1–2 cm, glabrous or very sparsely furnished with short black hairs; leaflets in 2–5 pairs, 10–30 × 3.5–10 mm, abaxially sparsely to loosely covered with appressed white or black and white hairs 0.3–0.4 mm, adaxially glabrous or sparsely hairy. Racemes rather densely 4–8-flowered; peduncle (3–)4.5–10 cm, glabrous or sparsely to rather densely black hairy; bracts 4–6 mm, black hairy. Bracteoles 1–2 mm. Calyx 5–7(–10) mm, densely to rather densely covered with appressed black hairs 0.1–0.3 mm; teeth 2–3(–5) mm. Petals blue; standard suborbicular, 12–13 × 9–10 mm; wings ca. 11 mm; keel ca. 11 mm. Legumes with a stipe ca. 4 mm, 15–25 mm, ca. 5 mm high and wide, with a straight beak 1–3 mm, 2-locular, sparsely to loosely furnished with appressed black hairs 0.05–0.15 mm.

- 3000–4000 m. Sichuan, Xizang, Yunnan.

15. *Phyllobium prodigiosum* (K. T. Fu) M. L. Zhang & Podlech, Feddes Repert. 117: 58. 2006.

奇异膨果豆 qi yi peng guo dou

Astragalus prodigiosus K. T. Fu, Bull. Bot. Res., Harbin 2(1): 121. 1982; *A. milingensis* C. C. Ni & P. C. Li var. *pauci-*

jugus (K. T. Fu) K. T. Fu; *A. milingensis* var. *prodigiosus* (K. T. Fu) K. T. Fu; *A. prodigiosus* var. *paucijugus* K. T. Fu.

Plants 5–10 cm tall, covered with appressed to subappressed, short, white hairs. Stems several, prostrate to ascending or erect, 2–10 cm, loosely to densely covered with hairs 0.05–0.2 mm. Leaves 2–3.5 cm, subsessile; stipules 1.5–3 mm, sparsely hairy; rachis hairy like stem; leaflets in 3–9 pairs, 3–11 × 1–2 mm, abaxially loosely covered with appressed hairs 0.3–0.5 mm, adaxially glabrous or with a few hairs only, especially toward margins. Racemes 1–1.5 cm, 3–5-flowered; peduncle 1–3 cm, rather densely hairy like stem; bracts ca. 1 mm, hairy. Calyx 4–5.5 mm, loosely covered with appressed white hairs 0.2–0.4 mm; teeth 2–2.5 mm. Petals violet; standard transversely ovate, 8–10 × 9–12 mm; wings 7–9 mm; keel 7–9 mm. Legumes shortly stipitate, ca. 12 mm, ca. 3 mm high and ca. 5 mm wide, with a slender, slightly curved beak ca. 4 mm, 1-locular, loosely covered with appressed white hairs 0.2–0.3 mm.

- 3300–3800 m. Sichuan, Xizang.

16. *Phyllobium sanbilingense* (H. T. Tsai & T. T. Yu) M. L. Zhang & Podlech, Feddes Repert. 117: 58. 2006.

乡城膨果豆 xiang cheng peng guo dou

Astragalus sanbilingensis H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 265. 1940.

Plants ca. 30 cm tall, with only white, appressed, flattened hairs 0.02–0.3 mm. Stems glabrous to sparsely hairy. Leaves 2–3.5 cm, subsessile or petiole 0.4–0.6 cm, like rachis loosely hairy; stipules 2–2.5 mm, sparsely hairy at margins; leaflets in 7–9 pairs, 4–9 × 1.5–4 mm, abaxially loosely hairy, adaxially glabrous. Racemes loosely 2–5-flowered; peduncle 2–4 cm, sparsely hairy to glabrous; bracts ca. 2 mm, sparsely hairy. Calyx ca. 5 mm, loosely covered with appressed hairs 0.3–0.5 mm; teeth 2–2.5 mm. Petals purplish; standard orbicular, ca. 9 × 7–8 mm; wings ca. 7 mm; keel 8–8.5 mm. Legumes subsessile, 8–13 mm, ca. 2 mm high and ca. 4 mm wide, with a straight beak ca. 2 mm, 1-locular, loosely covered with short, appressed, white hairs.

- Sichuan, Yunnan.

17. *Phyllobium siccaneum* (P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 59. 2006.

耐旱膨果豆 nai han peng guo dou

Astragalus siccaneus P. C. Li, Acta Bot. Yunnan. 11: 291. 1989.

Plants 18–50 cm tall, with only white, short, ± appressed hairs up to 0.3 mm. Stem erect, sparsely to loosely covered with hairs 0.05–0.2 mm. Leaves 3–5 cm, subsessile; stipules 2–4 mm; rachis sparsely hairy; leaflets in 3–5 pairs, 4–7 × 2–4 mm, abaxially loosely hairy, adaxially glabrous. Racemes loosely 2- or 3-flowered; peduncle 3–9 cm, glabrous or sparsely hairy like stem; bracts 1.5–2 mm, sparsely hairy. Calyx 7–8 mm, loosely hairy; teeth 2–2.5 mm. Petals pink or purplish; standard transversely elliptic, ca. 10 × 10 mm; wings ca. 9 mm; keel ca. 8 mm. Legumes with a stipe ca. 3 mm, 25–30 mm, 4–5 mm high, with a beak 4–5 mm, 1-locular, loosely white hairy when young, soon glabrescent.

• Sichuan.

18. *Phyllobium sichuanense* Podlech, Feddes Repert. 120: 56. 2009.

四川膨果豆 si chuan peng guo dou

Plants ca. 15 cm tall. Stems 6–12 cm, branched at base, sparsely to loosely covered with appressed white and black hairs 0.2–0.3 mm. Leaves ca. 3 cm, subsessile; stipules 3–4 mm, free, subglabrous, sparsely ciliate; leaflets in 5–7 pairs, widely obovate, 5–9 × 3.3–6 mm, abaxially loosely covered with appressed hairs 0.4–0.5 mm, adaxially glabrous. Racemes short, 4- or 5-flowered; peduncle 2–3 cm, predominantly black hairy; bracts 3–4 mm, narrowly triangular, black hairy. Bracteoles absent or up to 1 mm. Calyx 7–8 mm, rather densely covered with subappressed black hairs 0.1–0.3 mm, with some white hairs mixed in; teeth ca. 4 mm. Petals purple; standard ca. 12 mm, limb ca. 8 mm wide, suborbicular; wings ca. 10 mm, limbs narrowly oblong, ca. 6 × 1.5 mm; keel ca. 12 mm. Legumes (unripe), with a stipe 2–3 mm, at least 10 mm, densely covered with appressed white and black hairs.

• Sichuan (Dêgê).

19. *Phyllobium tingriense* (C. C. Ni & P. C. Li) M. L. Zhang & Podlech, Feddes Repert. 117: 59. 2006.

定日膨果豆 ding ri peng guo dou

Astragalus tingriensis C. C. Ni & P. C. Li, Acta Phytotax. Sin. 18: 367. 1980.

Plants 10–25 cm tall. Stems prostrate to ascending, sparsely to loosely covered in basal parts with appressed to ascending, tangled, white hairs 0.2–0.5 mm, in upper part with much shorter black hairs. Leaves 2–4.5 cm, subsessile; stipules 3–4.5 mm, sparsely white hairy; rachis sparsely to loosely covered with subappressed to spreading white and black hairs 0.1–0.3 mm; leaflets in (3–)5–8 pairs, 4–8 × 2–3 mm, abaxially and at margins rather densely covered with subappressed, ± rigid, white hairs 0.2–0.3 mm, adaxially glabrous. Racemes 1–4-flowered; peduncle 2–9 cm, sparsely to loosely and below raceme often densely hairy like stem in upper part; bracts 3–5 mm, white or black hairy. Bracteoles 2–3(–4) mm, hairy. Calyx 5–6 mm, densely covered with subappressed to ascending white hairs 0.5–0.8 mm and with black hairs 0.1–0.3 mm; teeth 2–3 mm. Petals purple-red, standard in middle with a white, purplish-striate spot; standard 15–16 × 11–12 mm, limb wider than long, with a claw ca. 4 mm; wings ca. 13 mm; keel 14–15 mm. Legumes (unripe) with a stipe ca. 5 mm, at least 10 mm, ca. 3 mm high, compressed laterally, with a beak 2–2.5 mm; valves densely covered with appressed white hairs 0.1–0.2 mm.

Xizang [Nepal].

20. *Phyllobium tribulifolium* (Bentham ex Bunge) M. L. Zhang & Podlech, Feddes Repert. 117: 60. 2006.

蒺藜叶膨果豆 ji li ye peng guo dou

Astragalus tribulifolius Bentham ex Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 4. 1868; *A. chingianus* P. C. Li (1989), not E. Peter (1937); *A. tanguticus* Batalin; *A. tanguticus* f. *albiflorus* (K. T. Fu) K. T. Fu; *A. tanguticus* var. *albiflorus* K. T. Fu; *A. tribulifolius* var. *pauciflorus* C. Marquand & Airy Shaw.

Plants covered with white hairs, in inflorescence with mostly blackish hairs. Stems 6–20 cm, prostrate to ascending or erect, loosely, in upper part rather densely covered with spreading or sometimes partly appressed white or white and brownish hairs 0.2–0.3 mm. Leaves 1–5 cm, subsessile; stipules (1.5–)2.5–4.5(–5.5) mm, lower ones triangular, often semiamplexicaul, upper ones narrowly triangular, all sparsely to loosely hairy; rachis loosely to rather densely hairy; leaflets in (3 or)4–9(or 10) pairs, 3–15 × 2–5 mm, abaxially to densely and adaxially sparsely to loosely covered with subappressed to ascending hairs up to 0.5 mm, or adaxially glabrous. Racemes short, (1 or)2–10-flowered; peduncle 1–6 cm, rather densely hairy; bracts 1.5–4(–5) mm, hairy. Bracteoles 0.5–2 mm or sometimes absent. Calyx (3–)4–6(–7) mm, loosely to rather densely hairy; teeth (1–)1.5–4 mm. Petals violet, purple, or pinkish; standard orbicular to transversely elliptic, 8–12 × 8–12 mm; wings 7–9 mm; keel 7.5–11 mm. Legumes with a stipe 2–2.5 mm, 9–17 mm, 5–6.5 mm high and wide, with a beak 1–2 mm, 1-locular, loosely to rather densely covered with short, spreading or appressed, white, or white and blackish or only blackish hairs.

Dry open scrub-covered and rocky slopes; 2700–5500 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [India, Nepal, Pakistan].

21. *Phyllobium turgidocarpum* (K. T. Fu) M. L. Zhang & Podlech, Feddes Repert. 117: 62. 2006.

膨果豆 peng guo dou

Astragalus turgidocarpus K. T. Fu, Bull. Bot. Res., Harbin 2(1): 127. 1982.

Plants up to 30 cm tall, covered with only white hairs 0.02–0.3 mm. Stems 15–40 cm, diffusely prostrate to ascending, in basal part glabrous, in upper part sparsely to loosely spreading hairy. Leaves 3–5.5 cm; stipules 3–4 mm, ciliate; petiole 0.3–1 cm, with rachis hairy like stem; leaflets in 5–7 pairs, 5–9 × 2.5–5 mm, abaxially loosely covered with tangled subappressed hairs, adaxially glabrous. Racemes 2–4-flowered; peduncle 3–7 cm, hairy like stem; bracts ca. 4 mm, ciliate. Bracteoles 0.3–1 mm. Calyx 8–10 mm, sparsely to loosely hairy; teeth 4.5–6 mm. Petals purple; standard suborbicular, 15–19 × 10–13 mm; wings ca. 12 mm; keel 14–15 mm. Legumes with a stipe ca. 5 mm, 25–30 mm, ca. 5 mm high and wide, with a slender beak, 2-locular, loosely hairy.

• 900–2100 m. Gansu, Sichuan.

139. ASTRAGALUS Linnaeus, Sp. Pl. 2: 755. 1753.

黄耆属 huang qi shu

Xu Langran (徐朗然 Xu Lang-rang); Dietrich Podlech

Annual or perennial herbs, subshrubs, or shrubs, often sometimes spiny, glabrous or hairy; hairs basifixed or symmetrically or

asymmetrically bifurcate, white or black, at margins of stipules and bracts often with minute sessile glands. Leaves paripinnate or imparipinnate or leaflets rarely verticillate; stipules green or membranous, adnate to petiole or free, often vaginate-connate behind stem. Racemes axillary, sessile or pedunculate, loosely or densely few to many flowered. Flowers subsessile or with a distinct pedicel; bracteoles sometimes present. Calyx campanulate to tubular, with 5 equal or unequal teeth mostly hairy on inner side, sometimes inflated in fruit. Petals glabrous or more rarely hairy; standard mostly emarginate at apex, more rarely rounded, mostly with a \pm distinct claw; wings auriculate at limb base. Stamens diadelphous, rarely monadelphous, with uniform anthers. Ovary sessile or stipitate; style below or at capitate stigma rarely hairy or penicillate. Legumes very variable, mostly keeled ventrally and grooved dorsally, 1-locular, incompletely or completely 2-locular; walls membranous, leathery or rarely hard and legumes then nutlike. Seeds rectangular-reniform, estrophiolate.

About 3,000 species: ca. 2,500 species in the Old World, represented in nearly all parts of the N Hemisphere, ca. 500 species in the New World; 401 species (221 endemic) in 59 sections (two endemic) in China.

Several species and varieties of the genus described from China, the types of which are housed in several small herbaria, have not been seen by us. The taxonomic value of these taxa is therefore uncertain. They are treated here according to the original diagnosis only.

The measurements of legumes do not include the stipe and beak.

1a. Annual herbs.

- 2a. Legumes narrowly linear, curved, terete, 1-locular, slightly constricted between seeds; stipules minute, free; racemes sessile to subsessile, few flowered 5. *A. sect. Ophiocarpus* (p. 335)
- 2b. Legumes never linear and curved, never constricted; other characters different.
- 3a. Calyx teeth very unequal in length; keel always longer than wings.
- 4a. Petals whitish or yellowish; legumes falcate to screwlike twisted 3. *A. sect. Cycloglottis* (p. 334)
- 4b. Petals violet; legumes curved 4. *A. sect. Heterodontus* (p. 335)
- 3b. Calyx teeth \pm equal in length; keel shorter than wings.
- 5a. Standard in middle distinctly transversely dilated; legumes with a hooked or bent beak, with an indumentum of short appressed and longer spreading hairs 1. *A. sect. Ankylotus* (p. 333)
- 5b. Standard never dilated in middle; other characters different.
- 6a. Standard without distinct claw; legumes with sharp edges or wings on sides 6. *A. sect. Oxyglottis* (p. 336)
- 6b. Standard with a distinct claw; legumes without sharp edges or wings.
- 7a. Racemes elongated 2. *A. sect. Haematodes* (p. 334)
- 7b. Racemes densely capitate 7. *A. sect. Onycholobium* (p. 336)

1b. Perennial herbs or shrublets.

- 8a. Plants with medifixed or asymmetrically bifurcate hairs.
- 9a. Strongly branched, subspherical spiny shrublets 55. *A. sect. Bulimoides* (p. 443)
- 9b. Plants never spiny.
- 10a. All stipules or rarely only those of lower leaves distinctly vaginate-connate behind stem.
- 11a. Plants acaulescent or nearly so.
- 12a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated; legumes included in persistent calyx 59. *A. sect. Laguropsis* (p. 448)
- 12b. Calyx tubular up to fruiting time, ruptured by legume.
- 13a. Legumes bladderlike inflated, membranous 48. *A. sect. Cystium* (p. 428)
- 13b. Legumes not bladderlike inflated, leathery 45. *A. sect. Helmia* (p. 421)
- 11b. Plants with a well-developed stem.
- 14a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated; legumes included in persistent calyx.
- 15a. Plants shrubby to subshrubby 57. *A. sect. Cysticalyx* (p. 444)
- 15b. Plants herbaceous 58. *A. sect. Hypsophili* (p. 447)
- 14b. Calyx tubular up to fruiting time, ruptured by legume.
- 16a. Flowers in loose, rather elongated racemes.
- 17a. Petals yellowish green 36. *A. sect. Uliginosi* (p. 405)
- 17b. Petals lilac or violet.
- 18a. Calyx mostly long tubular; legumes linear 40. *A. sect. Ornithopodium* (p. 409)
- 18b. Calyx campanulate or shortly campanulate-tubular; legumes ovoid to oblong.
- 19a. Shrubby or subshrubby psammophytes; leaflets in 1–3 pairs or solitary; legumes up to 8 mm, with \pm long spreading hairs, if legumes longer and appressed hairy, then leaflets in only 1 pair or solitary 54. *A. sect. Ammodendron* (p. 442)
- 19b. Plants herbaceous; leaflets usually in at least 5 pairs, if in only 3 pairs, then legumes 11–16 mm and covered with appressed hairs 38. *A. sect. Craccina* (p. 407)
- 16b. Flowers in capitate or subumbelliform racemes, rarely elongated.

- 20a. Dwarf pulvinate plants with short, prostrate stems; flowers 1 or 2 in leaf axils, subsessile; stipules completely connate into a tubular sheath surrounding stem and base of petiole 43. *A. sect. Ammodytes* (p. 419)
- 20b. Plants with erect stems.
- 21a. Calyx tubular, at least 9–10 mm, slightly inflated after anthesis 46. *A. sect. Ammotrophus* (p. 425)
- 21b. Calyx campanulate, 5–8 mm, never inflated.
- 22a. Bracteoles present 37. *A. sect. Brachycephali* (p. 406)
- 22b. Bracteoles absent 39. *A. sect. Onobrychides* (p. 409)
- 10b. All stipules free from each other.
- 23a. Plants always with a well-developed stem (sometimes some stems of a plant short).
- 24a. All petals appressed hairy 50. *A. sect. Tanythrix* (p. 429)
- 24b. All petals glabrous.
- 25a. Legumes bladderlike inflated, valves membranous 47. *A. sect. Leucophysa* (p. 426)
- 25b. Legumes not bladderlike inflated, valves leathery.
- 26a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated 56. *A. sect. Chaetodon* (p. 443)
- 26b. Calyx tubular, unchanged until fruiting time, ruptured by peduncle.
- 27a. Ovary and legumes covered with appressed to subappressed hairs, rarely also with some ascending hairs 41. *A. sect. Xiphidium* (p. 413)
- 27b. Ovary and legumes villous with ascending to spreading hairs.
- 28a. Racemes sessile 50. *A. sect. Tanythrix* (p. 429)
- 28b. Peduncles slightly shorter to longer than leaves.
- 29a. Legumes shortly acuminate or with a beak up to 2 mm 44. *A. sect. Erioceras* (p. 419)
- 29b. Legumes with a beak ca. 10 mm 53. *A. sect. Cytisodes* (p. 441)
- 23b. Plants acaulescent or nearly so, rarely with a short stem.
- 30a. Calyx soon after beginning of anthesis enlarging and becoming bladderlike inflated; legumes included in persistent calyx.
- 31a. Leaves with ascending to spreading hairs 56. *A. sect. Chaetodon* (p. 443)
- 31b. Leaves with appressed hairs 59. *A. sect. Laguropsis* (p. 448)
- 30b. Calyx tubular, unchanged until fruiting time, ruptured by legume.
- 32a. Raceme ovoid to cylindric, with a long peduncle.
- 33a. Leaflets linear to very narrowly elliptic, to 3(–4) mm wide; peduncle 5–14 cm 42. *A. sect. Corethrurum* (p. 417)
- 33b. Leaflets elliptic, 4–15 mm wide; peduncle up to 30 cm 52. *A. sect. Podochreati* (p. 440)
- 32b. Raceme loosely subumbelliform or flowers subradical.
- 34a. Legumes bladderlike inflated 49. *A. sect. Paracystium* (p. 428)
- 34b. Legumes not bladderlike inflated.
- 35a. Legumes with a prominent, rigid, long beak 5–8 mm 53. *A. sect. Cytisodes* (p. 441)
- 35b. Legumes shortly acuminate or with a very short beak.
- 36a. Racemes with peduncle 3–8 cm; legumes linear, 3–4 cm 44. *A. sect. Erioceras (A. yangchangii)*; p. 419)
- 36b. Racemes sessile or more rarely with a peduncle up to 2 cm; legumes shorter 51. *A. sect. Trachycercis* (p. 429)
- 8b. Hairs of plants simple, basifixed, or plants completely glabrous.
- 37a. Plants spiny, shrubby, mostly cushionlike; leaves paripinnate 34. *A. sect. Aegacantha* (p. 404)
- 37b. Plants herbaceous or subshrubby; leaves imparipinnate, rarely becoming spiny with age.
- 38a. Style with a distinctly hairy stigma.
- 39a. Bracteoles absent; stipules often vaginate-connate, at least lower ones 12. *A. sect. Skythropos* (p. 353)
- 39b. Bracteoles always present, at least at beginning of anthesis; stipules always free from each other.
- 40a. Bracts caducous and mostly missing at fruiting time; plants often tall with thick stems; legumes inflated 10. *A. sect. Coluteocarpus* (p. 347)
- 40b. Bracts persistent, always present at fruiting time; plants often smaller with slender stems; legumes distinctly to strongly compressed laterally 9. *A. sect. Pseudosesbanella* (p. 346)
- 38b. Style glabrous at and below stigma, rarely below stigma with a row of short hairlets, very rarely stigma very minutely hairy.
- 41a. Standard hairy.
- 42a. Inflorescence cylindric, 7–9 cm, densely many flowered 30. *A. sect. Alopecias* (p. 396)
- 42b. Inflorescence not as above, mostly loosely few flowered.
- 43a. Leaflets adaxially with long, flexuous, cottonlike hairs 33. *A. sect. Erionotus* (p. 403)
- 43b. Leaflets adaxially glabrous or appressed hairy 31. *A. sect. Myobroma* (p. 397)
- 41b. All petals glabrous.

- 44a. Leaflets verticillate in several mostly remote whorls 32. *A. sect. Gontscharoviella* (p. 402)
- 44b. Leaflets all opposite or subopposite.
- 45a. Upper edge of keel limbs for whole length or in upper part furnished with minute teeth 31b. *A. "Purpurascens group"* (p. 401)
- 45b. Margins of keel limbs entire, never furnished with minute teeth.
- 46a. Calyx at anthesis tubular to slightly ventricose, soon bladderlike inflated and distinctly netlike nerved; legumes stalked, included in calyx 35. *A. sect. Eremophysa* (p. 405)
- 46b. Calyx never inflated after anthesis, ruptured by ripe legume.
- 47a. Inflorescences large, subsessile to shortly pedunculate, ovoid to cylindrical, densely many flowered 30. *A. sect. Alopecias* (p. 396)
- 47b. Inflorescence not as above.
- 48a. Hairs mostly with a very short, subacute, basal appendix and therefore extremely asymmetrically bifurcate; leaflets $2-4 \times 2-3$ mm, both surfaces rather densely spotted with minute blackish dots 27. *A. sect. Irinaea* (p. 391)
- 48b. Hairs basifixed; leaflets without blackish dots.
- 49a. Plants acaulescent or subacaulescent; stems, if present, at most up to 4 cm.
- 50a. Stipules embracing stem but not connate behind it, high connate around petiole; legumes 25–50 mm, strongly compressed laterally, glabrous 15. *A. sect. Hookeriani* (p. 356)
- 50b. Stipules and legumes not as above.
- 51a. Petals pale yellowish; stipules 1–2 mm 23. *A. sect. Poliothrix (A. yangii)*, p. 381
- 51b. Petals purple to violet, yellow, or white; stipules distinctly longer.
- 52a. Stipules vaginate-connate behind stem or before petiole; petals purple to violet; ovary and legumes sessile or subsessile.
- 53a. Stipules free from petiole; racemes 1- or 2-flowered 17. *A. sect. Komaroviella (A. damxungensis)*, p. 357
- 53b. Stipules adnate to petiole; racemes with more flowers.
- 54a. Plants at most up to 10 cm tall; calyx 3–6 mm 26. *A. sect. Pseudotapinodes* (p. 390)
- 54b. Plants more than 10 cm tall; calyx 7–9 mm 12. *A. sect. Skythropos* (p. 353)
- 52b. Stipules never vaginate-connate; petals yellow or white, or if violet then ovary and legumes long stipitate.
- 55a. Ovary and legumes with a stipe at least 4 mm.
- 56a. Stipules distinctly adnate to petiole 31a. *A. "Caprini group"* (p. 397)
- 56b. Stipules free from petiole 12. *A. sect. Skythropos* (p. 353)
- 55b. Ovary and legumes sessile or subsessile.
- 57a. Plants with spreading hairs; petals white 14. *A. sect. Lithophili* (p. 355)
- 57b. Plants with appressed hairs; petals bright yellow 28. *A. sect. Lotidium* (p. 392)
- 49b. Plants distinctly caulescent.
- 58a. Stems stout, 3–10 mm or more in diam., \pm erect; plants mostly tall with long erect stems.
- 59a. Stipules vaginate-connate behind stem.
- 60a. Standard 34–39 mm; legumes \pm globose, 15–22 mm in diam., with very thick walls and a narrow, hollow, very densely long hairy 29. *A. sect. Lithoon* (p. 395)
- 60b. Standard up to 17 mm; legumes not as above 11. *A. sect. Chlorostachys* (p. 347)
- 59b. Stipules free from each other.
- 61a. Keel distinctly longer than wings; legumes nut-shaped, 9–14 mm, glabrous 13. *A. sect. Nuculiella* (p. 355)
- 61b. Keel shorter or at most as long as wings; legumes not nut-shaped.
- 62a. Racemes subsessile or with a short peduncle; plants densely spreading hairy all over 14. *A. sect. Lithophili* (p. 355)
- 62b. Racemes with a distinct, long peduncle; plants in most parts appressed hairy or subglabrous.
- 63a. Plants completely glabrous; stipules distinctly longitudinally nerved; ovary and legumes subsessile 31. *A. sect. Myobroma (A. luculentus)*, p. 397
- 63b. Plants in most parts appressed hairy or subglabrous; stipules not distinctly nerved; legumes mostly with a distinct to long stipe; bracteoles sometimes present.
- 64a. Legumes 1-locular; bracts persistent 8. *A. sect. Cenantrum* (p. 338)
- 64b. Legumes incompletely to completely 2-locular; bracts persistent or soon falling 11. *A. sect. Chlorostachys* (p. 347)
- 58b. Stems \pm slender, at most up to 3 mm in diam., often prostrate to ascending.

- 65a. Leaves 6–10 cm, at end of vegetation period elongating up to 25 cm; petiole 1–3 cm, later up to 6 cm, like rachis slender, later thickened and hardened, persistent, glabrous or very sparsely subappressed hairy; leaflets in 13–15 pairs, often caducous 16. *A. sect. Pelta* (p. 357)
- 65b. Leaves with other characters.
- 66a. Stipules free from each other and mostly free from petiole.
- 67a. Plants with long, prostrate to erect or creeping stems; racemes subumbellate, few flowered; legumes linear, erect 28. *A. sect. Lotidium* (p. 392)
- 67b. Plants with ascending to erect stems; racemes not subumbellate; legumes of other form.
- 68a. Wing limbs with linear-acute auricle 2–4.5 mm, sometimes as long as claw.
- 69a. Plants up to 60 cm tall; stipules mostly 3–5 mm; inflorescences several on 1 stem; standard ovate or obovate, abruptly contracted at base into very short claw; legumes 8–12 mm 24. *A. sect. Chrysopteri* (p. 389)
- 69b. Plants 8–18 cm tall; stipules 6–15 mm; inflorescence solitary on 1 stem; standard widely obovate to nearly orbicular, gradually narrowed at base; legumes 15–28 mm 25. *A. sect. Ebracteolati* (p. 389)
- 68b. Auricles of wing limbs mostly shorter, never linear and acute.
- 70a. Leaves with a distinct petiole 2–4.5 cm 12. *A. sect. Skythropos* (p. 353)
- 70b. Leaves sessile, with a petiole up to 1(–2) cm.
- 71a. Plants mostly tall, conspicuously leafy; ovary and legumes with a distinct, slender stipe, often distinctly longer than 10 mm.
- 72a. Legumes 1-locular; bracts persistent; bracteoles absent 8. *A. sect. Cenantrum* (p. 338)
- 72b. Legumes 2-locular or incompletely so; bracts persistent or soon falling; bracteoles present or absent 11. *A. sect. Chlorostachys* (p. 347)
- 71b. Plants often low, not conspicuously leafy; ovary and legumes sessile or very shortly stipitate.
- 73a. Racemes long, remotely many flowered; legumes globose to subglobose 20. *A. sect. Melilotopsis* (p. 370)
- 73b. Racemes at anthesis short, dense, sometimes elongated in fruit; legumes globose to narrowly ovoid.
- 74a. Legumes globose to widely ovoid, at most up to 2 × as long as wide, often cross-wrinkled 21. *A. sect. Brachycarpus* (p. 373)
- 74b. Legumes ovoid to narrowly ovoid, at least 2 × as long as wide but mostly longer, very rarely cross-wrinkled 19. *A. sect. Oroboidei* (p. 365)
- 66b. Stipules all or at least of lower leaves distinctly vaginate-connate behind stem.
- 75a. Keel longer than (rarely as long as) wings, limbs always large, wider than those of wings 17. *A. sect. Komaroviella* (p. 357)
- 75b. Keel distinctly shorter than wings, rarely to as long as wings, with narrower limbs.
- 76a. Wing limbs distinctly emarginate to deeply bilobed.
- 77a. Ovary and legumes with a long, slender stipe 22. *A. sect. Hemiphragmium* (p. 380)
- 77b. Ovary and legumes sessile or subsessile.
- 78a. Legumes globose to widely ovoid, at most up to 2 × as long as wide, often cross-wrinkled, hairy 21. *A. sect. Brachycarpus* (p. 373)
- 78b. Legumes ovoid to narrowly ovoid, at least 2 × as long as wide but mostly longer, never distinctly cross-wrinkled, glabrous or rarely very sparsely hairy 19. *A. sect. Oroboidei* (p. 365)
- 76b. Wing limbs rounded at apex to rarely slightly emarginate.
- 79a. Inflorescence subumbellate, few flowered or a loose raceme; legumes linear, erect 28. *A. sect. Lotidium* (p. 392)
- 79b. Inflorescence at anthesis a dense, many-flowered raceme, often elongating in fruit; legumes of other form.
- 80a. Standard at least 14 mm, at base with a sometimes short, but mostly distinct, cuneate claw.
- 81a. Stems, stipules, and rachis with ± spreading hairs; ovary with a stipe 3.5–5 mm 12. *A. sect. Skythropos* (p. 353)
- 81b. Stems, stipules, and rachis with appressed to slightly ascending hairs; ovary and legumes sessile or subsessile 18. *A. sect. Glycyrrhizi* (p. 363)

- 80b. Standard 6–10 mm, rarely up to 12 mm, mostly without distinct claw.
- 82a. Inflorescence ovoid to shortly cylindrical; legumes narrowly ellipsoid to narrowly oblong, distinctly curved to sometimes semicircular curved, sessile to stipitate, 1-locular or rarely very incompletely 2-locular 23. *A. sect. Poliothrix* (p. 381)
- 82b. Inflorescence capitate to shortly ovoid; legumes globose to ovoid, sessile, 1-locular or 2-locular.
- 83a. Legumes globose to widely ovoid, at most up to 2 × as long as wide, often cross-wrinkled 21. *A. sect. Brachycarpus* (p. 373)
- 83b. Legumes ovoid to narrowly so, at least 2 × as long as wide, mostly longer, never distinctly cross-wrinkled 19. *A. sect. Oroboidei* (p. 365)

1. *Astragalus* sect. *Ankylotus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 15. 1868.

钩荚组 gou jia zu

Plants annual, with basifixed hairs. Stipules whitish membranous, shortly adnate to petiole, free from each other. Racemes mostly with a distinct peduncle, loose to rather dense. Calyx tubular. Petals unequal in length; standard in middle strongly transverse-elliptically dilated, at base with a distinct claw, toward apex abruptly tongue-like narrowed; limbs of wings incised at tip. Legumes sessile, curved, with a bent to hooked beak, obtusely keeled ventrally, deeply grooved dorsally, at least in middle part completely 2-locular; valves with a double indumentum consisting of short appressed and long spreading hairs.

Four species: Afghanistan, China, N India, Pakistan, Russia; C and SW Asia; three species in China.

- 1a. Stems densely obliquely spreading villous; racemes sessile or with a peduncle up to 3 cm; legumes with longer hairs up to 2 mm 3. *A. stalinskyi*
- 1b. Stems with appressed or more rarely ascending hairs; racemes with a peduncle 0.5–12 cm; legumes with longer hairs up to 1 mm.
- 2a. Stipules 1.5–2 mm; calyx 4–5 mm; legumes 7–15(–20) mm, with a bent beak 2. *A. gracilipes*
- 2b. Stipules 3–5 mm; calyx 5–8 mm; legumes 20–40 mm, with a hooked beak 1. *A. commixtus*

1. *Astragalus commixtus* Bunge, *Arbeiten Naturf. Vereins Riga* 1: 246. 1847.

混合黄耆 hun he huang qi

Stems 0.5–10 cm, with appressed hairs up to 1 mm. Leaves 3–7 cm; stipules 3–5 mm, white and black ciliate; petiole 1–2.5 cm, with rachis loosely to rather densely appressed to spreading hairy; leaflets in 5–7 pairs, narrowly elliptic, 3–14 × 0.5–4 mm, loosely hairy, apex rounded to slightly retuse. Racemes 1–5-flowered; peduncle 1–12 cm, appressed hairy; bracts whitish membranous, 1–2 mm, ciliate. Calyx tubular, 5–8 mm, with subappressed to ascending white hairs, toward teeth with black hairs; teeth subulate, 2–3.5 mm. Petals violet or whitish; standard 9–10 mm, limb in middle strongly dilated, 3.5–4 mm wide; wings 7–8 mm; keel 6–6.5 mm. Legumes sessile, linear, distinctly to semicircular curved, (1–)2–4 cm, 2.5–3 mm high and ca. 3 mm wide, with a hooked beak; valves thin, pale brownish, rather densely covered with appressed hairs 0.05–0.3 mm and sparsely to loosely with ascending to spreading hairs 0.4–1 mm.

Steppes, semideserts, saline soils. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Caucasus, Iran)].

2. *Astragalus gracilipes* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 15. 1868.

细柄黄耆 xi bing huang qi

Astragalus ninae Gontscharow (1947), not Pavlov (1934); *A. schuriae* Pavlov.

Stems 0.5–6(–12) cm, with appressed to ascending hairs 0.2–1.2 mm. Leaves (1.5–)3–8 cm; stipules 1.5–2 mm, ciliate; petiole (0.5–)1–3.5 cm, with rachis hairy like stem; leaflets in 4 or 5 pairs, narrowly elliptic, 3–8 × 1–4 mm, abaxially densely covered with subappressed to ascending hairs, adaxially sparsely to loosely covered, apex rounded to retuse. Racemes loosely to rather densely 1–3(or 4)-flowered; peduncle 0.5–6 cm, hairy like stem; bracts whitish membranous, triangular, 0.6–1.2 mm, ciliate. Calyx 4–5 mm, loosely to rather densely covered with appressed to ascending white hairs, toward teeth also with black hairs; teeth subulate, 1–2 mm. Petals violet or whitish; standard 7–9 mm, limb in middle strongly dilated, 3–4 mm wide; wings 6–7.5 mm; keel 5–7 mm. Legumes linear, erect, slightly curved, 0.7–1.5(–2) cm, 2.4–4 mm high and 2.5–3 mm wide, with a short, bent, straight beak; valves thin, straw-colored, rather densely covered with ascending hairs 0.1–0.3 mm and loosely with hairs 0.5–0.8(–1.2) mm and often inserted in small tubercles.

Subalpine and alpine steppes; 2900–4500 m. Xizang [Afghanistan, India, Pakistan, Tajikistan].

3. *Astragalus stalinskyi* Širjaev, *Repert. Spec. Nov. Regni Veg.* 53: 75. 1944.

矮型黄耆 ai xing huang qi

Astragalus brachymorphus Nikiforova; *A. commixtus* Bunge var. *abbreviatus* Popov.

Stems 0.5–3 cm, densely villous with ascending to spreading hairs 0.4–1 mm. Leaves 4–10 cm; stipules 4–7 mm, ciliate; petiole 1–5 cm, with rachis loosely hairy; leaflets in 4–7

pairs, narrowly elliptic, 3.5–18 × 1–4 mm, abaxially loosely to rather densely covered with ascending hairs, adaxially sparsely to loosely covered, apex narrowly rounded to emarginate. Racemes densely 1–3(–5)-flowered; peduncle nearly absent or up to 3(–4) cm, hairy like stem; bracts whitish membranous, 1–2 mm, ciliate. Calyx tubular, 5–7 mm, rather densely covered with ascending white hairs, toward teeth also with black hairs; teeth subulate, 2–3.5 mm. Petals whitish or at least standard often violet; standard 8–10 mm, limb in middle transverse-

elliptically dilated, 4–5 mm wide; wings 6.5–8 mm; keel 6–7 mm. Legumes linear, slightly curved, 1–2.5 cm, ca. 3 mm high and 3.5–4.5 mm wide, with hooked beak, incompletely 2-locular; valves subleathery, straw-colored, densely covered with appressed to ascending hairs 0.1–0.3 mm and loosely with nearly spreading hairs 1–2 mm.

Steppes, semideserts; 1000–2400 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; SW Asia (Iran)].

2. *Astragalus* sect. *Haematodes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 15. 1868.

廉莢組 lian jia zu

Plants annual, with basifixed hairs. Stipules shortly adnate to petiole. Inflorescence a loose raceme. Calyx campanulate or shortly tubular. Petals unequal; limbs of wings rounded to emarginate at apex. Stigma glabrous or hairy. Legumes sessile, mostly linear and curved, keeled ventrally, deeply grooved dorsally, incompletely to completely 2-locular; valves with a simple or double indumentum, in latter case longer hairs often inserted in small tubercles.

Eleven species: Afghanistan, NW China, Pakistan, Russia; N Africa, C and SW Asia, S Europe; two species in China.

1a. Leaflets in 4–6 pairs, linear to very narrowly elliptic, 8–10 × as long as wide, glabrous adaxially; legumes

3–5 cm 5. *A. campylorhynchus*

1b. Leaflets in 1–3 pairs, ovate to obovate, ca. 2 × as long as wide, hairy adaxially; legumes 1–3 cm 4. *A. arpilobus*

4. *Astragalus arpilobus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 336. 1842.

廉莢黃耆 lian jia huang qi

Astragalus gyzensis Delile var. *arpilobus* (Karelin & Kirilov) Boissier.

Plants with white hairs 0.2–1 mm. Stems 1–30 cm, loosely to rather densely spreading hairy. Leaves 1.5–10 cm; stipules whitish to greenish, 1–3.5 mm, hairy; petiole 1–3.5 cm, with rachis hairy like stem; leaflets in 1–3(–5) pairs, ovate to obovate, 4–20 × 2–10 mm, abaxially densely covered with ascending hairs, adaxially loosely covered with appressed hairs, apex rounded, truncate, or retuse. Racemes loosely 2–7-flowered; peduncle 0.3–3.5 cm, hairy like stem; bracts 1–1.5 mm, hairy. Calyx shortly tubular, 3–4(–6) mm, rather densely appressed hairy; teeth 1–1.5 mm. Petals whitish pink or more rarely violet; standard 6–8(–10) mm, limb elliptic, 2–5 mm wide, cuneately narrowed at base, apex emarginate; wings 5–7 mm; keel 5–6 mm. Legumes linear, distinctly and to semi-circular curved, 1–3 cm, 2.5–3.5 mm high and wide, with a curved, short beak, nearly completely 2-locular; valves thin, straw-colored to pale brownish, loosely to rather densely covered with appressed hairs 0.2–0.3 mm and with ascending hairs 0.7–1.2 mm, often inserted in small tubercles.

Sandy soil, semideserts, pebbles, gypsum. Xinjiang [Afghanistan, Kazakhstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

Astragalus arpilobus subsp. *arpilobus* is the only subspecies found in China.

5. *Astragalus campylorhynchus* Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 23. 1835.

弯喙黄耆 wan hui huang qi

Plants with hairs 0.3–0.5 mm. Stems 7–30 cm, lower part covered with nearly spreading hairs, upper part with ± appressed hairs. Leaves 3–10 cm; stipules whitish membranous, 3–6 mm, ciliate; petiole 0.5–2.5 cm, like rachis with appressed or more rarely ascending hairs; leaflets in 3–6 pairs, remote, glaucous, linear, 5–25 × 0.5–2.5 mm, abaxially sparsely appressed hairy, adaxially glabrous, apex bilobed. Racemes remotely 1–4-flowered; peduncle 1.5–7 cm, hairy like stem; bracts 1–3 mm. Calyx campanulate, 3–5 mm, loosely covered with appressed white and black hairs; teeth 0.8–2 mm. Petals pale violet; standard narrowly rhombic, 6.5–9 × 3–3.5 mm, apex emarginate to nearly bilobed; wings 6–7.5 mm; keel 5–6 mm. Legumes linear, straight or slightly curved, 3–5(–6) cm, 2.5–4 mm high and wide, with a short uncinat beak, incompletely to nearly completely 2-locular; valves thin but tough, glabrous or loosely covered with appressed white hairs 0.1–0.3 mm.

Steppes, cultivated lands; below 2700 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Caucasus)].

3. *Astragalus* sect. *Cycloglottis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 3. 1868.

环莢組 huan jia zu

Plants annual, with basifixed hairs. Stipules shortly adnate to petiole. Raceme densely capitate, borne on a short peduncle. Calyx campanulate, with distinctly unequal teeth, 3 lower teeth ca. twice as long as 2 upper teeth. Keel longer than wings. Legumes sessile, linear, falcate to spirally twisted, 2-locular.

One species: scattered and rare from S Europe to W China.

6. *Astragalus contortuplicatus* Linnaeus, Sp. Pl. 2: 758. 1753.

环荚黄耆 huan jia huang qi

Plant hairs thin, often bent, white, in inflorescence also black, 1–2 mm. Stems mostly several, prostrate to ascending, 2–50 cm, spreading hairy. Leaves 5–15 cm; stipules greenish, 5–10 mm, hairy; petiole 1–2 cm, with rachis slender, often flexuous, hairy like stem; leaflets in 6–11 pairs, elliptic to obovate, 4–15 × 2–8 mm, adaxially sparsely to loosely and abaxially to densely covered with appressed to spreading hairs, apex deeply incised. Racemes 5–15(–20)-flowered; peduncle 1–4 cm, hairy like stem; bracts green, linear-acute, 2–3 mm, hairy. Flowers subsessile. Calyx 5–6.5 mm, shortly campanulate, densely

covered with white or white and black hairs; teeth very unequal, 3 lower ones filiform, 3–5 mm, 2 upper ones only 2–2.5 mm. Petals whitish or yellowish; standard elliptic, 5–7.5 × 2.5–3.5 mm, apex deeply incised; wings 4–5.5 mm; keel 5–6.5 mm. Legumes linear, strongly falcate to screwlike twisted and often forming a complete circle of less than 1 cm in diam., 1–2 cm, 3–3.5 mm high and 2.5–3 mm wide, with a minute beak, completely 2-locular; valves thinly membranous, nearly blackish brown when ripe, rugulose to pitted or warty, loosely to rather densely covered with spreading hairs.

Riversides, saline meadows. Xinjiang [Kazakhstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Azerbaijan), Europe].

4. *Astragalus* sect. *Heterodontus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 5. 1868.

异齿组 yi chi zu

Plants annual or biannual, with basifixed or subbasifixed hairs. Stipules shortly adnate to petiole, otherwise free. Racemes with a distinct peduncle, at anthesis densely flowered, later loosely flowered and strongly elongating. Calyx campanulate; teeth distinctly unequal, 3 lower teeth often more than twice as long as 2 upper teeth. Standard widely emarginate at apex; keel as long as or mostly distinctly longer than wings. Legumes stipitate, linear, curved, 2-locular.

One species: China, Korea, Mongolia, Russia.

7. *Astragalus dahuricus* (Pallas) Candolle, Prodr. 2: 285. 1825.

达乌里黄耆 da wu li huang qi

Galega dahurica Pallas, Reise Russ. Reich. 3: 742. 1776.

Plants 15–65 cm tall; hairs thin, white, in inflorescence also black. Stems simple or branched, erect, with ± appressed hairs 0.3–1 mm. Leaves 3–8 cm; stipules greenish, 4–8 mm; petiole 0.3–1.5 cm, ± appressed hairy; leaflets in 4–9 pairs, narrowly elliptic, 7–20 × 2–6 mm, abaxially sparsely to loosely covered and adaxially glabrous or sparsely covered with ± appressed hairs up to 2 mm. Racemes rather densely up to 25-flowered, elongating in fruit to 15 cm; peduncle 1–3.5 cm, hairy like stem; bracts whitish, linear, 3–4 mm, ciliate. Calyx cam-

panulate, 5–7 mm, loosely covered with appressed to spreading long hairs; teeth subulate, unequal, lower 3 teeth 3.5–5 mm, upper 2 teeth only 1.5–2 mm. Petals violet; standard elliptic, 10–15 × 6.5–9 mm, abruptly contracted into short claw, apex deeply V-like incised; wings 8–9 mm; keel 10–13 mm. Legumes with a stipe 1.5–2 mm, linear, distinctly to nearly semi-circular curved, 1.5–2.5 cm, 2–2.5 mm high and wide, keeled ventrally, deeply V-like grooved dorsally, with a beak 1.5–2 mm, completely 2-locular; valves gray-brown, loosely covered with nearly spreading hairs 0.3–1 mm.

Riversides, damp meadows, fields. Gansu, Hebei, Heilongjiang, Hunan, Jilin, Nei Mongol, Shandong, Shanxi, Sichuan [Korea, Mongolia, Russia (Far East, Siberia)].

5. *Astragalus* sect. *Ophiocarpus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 9. 1868.

蛇荚组 she jia zu

Ophiocarpus (Bunge) Ikonnikov.

Plants annual, branched at base, glabrous or with basifixed hairs. Stipules minute, free. Inflorescence sessile or very shortly pedunculate, a loose 1–5-flowered raceme. Flowers pendulous. Calyx campanulate. Petals glabrous, deciduous; standard slightly longer than wings and keel, without distinct claw. Legumes sessile, very narrowly linear, terete, curved or flexuous, somewhat constricted between seeds, 1-locular.

One species: Afghanistan, China, India, Pakistan, Tajikistan, Turkmenistan, and SW Asia (Iran, Iraq).

8. *Astragalus ophiocarpus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 10. 1868.

蛇荚黄耆 she jia huang qi

Astragalus aitchisonii Baker; *A. paulsenii* Freyn; *Ophiocarpus aitchisonii* (Baker) Podlech.

Plants branched at base, with white hairs 0.2–0.5 mm, in inflorescence also with black hairs, rarely glabrous. Stems 3–25 cm, prostrate to ascending, rather densely appressed to

spreading hairy. Leaves 1.5–4.5 cm; stipules 0.75–2 mm, ciliate; petiole 0.4–1.5 cm, like rachis hairy; leaflets in 4–8 pairs, narrowly obovate to obovate, 3–7 × 1.5–3 mm, sometimes folded, both surfaces rather densely covered with subappressed hairs, apex rounded to retuse. Racemes sessile or with a peduncle up to 0.5 cm, loosely 1–5-flowered; bracts membranous, ca. 0.5 mm. Pedicels absent or up to 0.3 mm. Calyx 2.5–3.5 mm, rather densely subappressed white hairy, more rarely also black hairy; teeth 1–1.5 mm. Petals creamy or pink to bluish suffused,

keel with violet tip; standard ovate to rhombic-ovate, 6–7 × 2.5–3 mm, apex incised; wings ca. 5 mm; keel ca. 5 mm. Legumes sessile, narrowly linear, flexuous or strongly to circular curved, terete, 3–5 cm, 1.5–2 mm thick, slightly constricted between seeds, with a hooked beak up to 3 mm, 1-locular; valves

densely covered with very short appressed hairs or rarely glabrous. Seeds oblong.

On dry sandy to loamy soil; below 100–3600 m. Xizang [Afghanistan, India, Pakistan, Tajikistan, Turkmenistan; SW Asia (Iran, Iraq)].

6. *Astragalus* sect. *Oxyglottis* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7*, 11(16): 10. 1868.

尖舌组 jian she zu

Plants annual, with basifixed hairs. Stipules shortly adnate to petiole. Inflorescences capitate, sometimes with additional whorls, or loose racemes. Flowers subsessile. Calyx shortly tubular to campanulate. Standard without distinct claw; wing limbs slightly emarginate at tip. Legumes sessile, often distinctly wider than high, keeled ventrally, widely flattened to deeply V-like grooved dorsally, with sharp edges or wings on back of valves, completely 2-locular.

Six species: Afghanistan, NW China, Pakistan, Russia; N Africa, C and SW Asia, Europe; two species in China.

- 1a. Inflorescences capitate, sometimes with additional, remote whorls; standard 5–6 mm; legumes as wide as high, with crenulate lateral edges 9. *A. oxyglottis*
 1b. Inflorescence loosely racemose; standard 6–10 mm; legumes dorsiventrally flattened, ca. 2 × wider than high, with shortly dentate lateral wings 10. *A. vicarius*

9. *Astragalus oxyglottis* Steven ex M. Bieberstein, *Fl. Taur.-Caucas. 2*: 192. 1808.

尖舌黄耆 jian she huang qi

Astragalus oxyglottis var. *psiloglottis* (Candolle) Bunge; *A. psiloglottis* Candolle.

Plants with appressed hairs 0.1–0.3 mm. Stems 2–25 cm, often glabrescent with age. Leaves 2–9 cm; stipules greenish membranous, 2–4 mm, hairy; petiole 1–2.5 cm, like rachis loosely hairy; leaflets in 4–8 pairs, cuneate-oblong to elliptic, 3–10 × 1.5–5 mm, abaxially loosely to rather densely hairy, adaxially glabrous or sparsely to loosely hairy, apex distinctly and mostly widely emarginate. Racemes sessile or with a peduncle up to 4 cm, headlike, densely 4–8-flowered, in well-developed plants often with 1 or 2 additional remote whorls of 2–4 flowers; bracts membranous, less than 0.5 mm. Calyx campanulate, 2–2.5 mm, white and black hairy; teeth 0.4–0.5 mm. Petals whitish or bluish to violet; standard elliptic, 5–6 × 2.5–3 mm, apex incised; wings 4–5 mm; keel 3–4 mm. Legumes star-like spreading or ascending, narrowly ovoid, 7–15 mm, 2.5–3.5 mm high and wide, sharply keeled ventrally and on sides of valves, grooved beside keels of valves, slightly vaulted, and with 2 shallow grooves dorsally, in cross section quadrangular, shortly acuminate; valves thin, blackish brown when ripe, at keels of valves distinctly transversely rugulose, glabrous or hairy.

Sandy, stony, and saline soils, gypsum, steppes, semideserts, fields; below 100–2600 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe (Spain, Ukraine)].

10. *Astragalus vicarius* Lipsky, *Trudy Imp. S.-Peterburgsk. Bot. Sada 18*: 25. 1900.

替代黄耆 ti dai huang qi

Plant hairs white, at nodes and in inflorescence also black, 0.1–0.3 mm. Stems 2–40 cm, simple or branched at base, rather densely appressed to partly spreading hairy, often glabrescent with age. Leaves 3–10 cm; stipules greenish membranous, 3–6 mm; petiole 0.5–1.5 cm, like rachis with appressed to ascending hairs; leaflets in 6–9 pairs, narrowly elliptic to narrowly oblong, 4–18 × 1–5 mm, abaxially mostly loosely subappressed hairy, adaxially glabrous, apex mostly distinctly and widely emarginate. Racemes at anthesis rather densely 3–9-flowered, later strongly elongating and up to 7 cm; peduncle 3–9 cm, hairy like stem; bracts whitish membranous, 1–2 mm, hairy. Calyx campanulate, 3–4 mm, black or black and white hairy; teeth subulate, 1–1.5 mm. Petals bluish to pale violet; standard narrowly oblong to narrowly elliptic, 6–10 × 2.5–3 mm, apex distinctly incised; wings 5–7 mm; keel 4.5–6 mm. Legumes seen from adaxial side narrowly acuminate ovate, 1.5–2 cm, 3–3.5 mm high and 6–7 mm wide, keeled ventrally, widely flattened to slightly vaulted dorsally, in middle of valves (= margins of fruit) with a winglike densely and shortly dentate crest 1–2 mm wide, fruit in cross section widely triangular, 2-locular; valves thin, glabrous.

Stony and loessic soil, ephemeral steppes. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

7. *Astragalus* sect. *Onycholobium* Pomel, *Bull. Soc. Sci. Phys. Algérie 11*: 189. 1874.

胡麻组 hu ma zu

Plants annual, mostly branched at base, with basifixed hairs. Stipules shortly adnate to petiole. Racemes sessile or pedunculate, ± densely capitate. Petals of unequal length. Legumes sessile, at base mostly distinctly widened to bigibbous, keeled ventrally, deeply grooved dorsally, groove often widened toward base, mostly fully 2-locular.

Twenty-four species: N Africa, SW Asia to Pakistan and China, S Europe; four species in China.

- 1a. Stems, petiole, and rachis closely appressed hairy.
 2a. Calyx 3–4 mm; bracts 1–1.5 mm; legumes 6–10 mm, with wrinkled walls, covered with short subappressed hairs and spreading hairs up to 1.5 mm 11. *A. filicaulis*
 2b. Calyx 5.5–7 mm; bracts 2–3 mm; legumes 12–15 mm, covered with subappressed to ascending hairs up to 1.3 mm 13. *A. sesamoides*
 1b. Stems, petiole, and rachis at least in part with ascending to spreading hairs.
 3a. Calyx 2.5–3 mm; leaflets adaxially glabrous; legumes widest at base but not bigibbous 12. *A. persepolitianus*
 3b. Calyx 3–5 mm; leaflets on both surfaces densely appressed hairy; legumes at base distinctly bigibbous 14. *A. tribuloides*

11. *Astragalus filicaulis* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 336. 1842.

丝茎黄耆 si jing huang qi

Astragalus filicaulis subsp. *rytilobus* (Bunge) Popov; *A. leptodermus* Bunge; *A. rytilobus* Bunge.

Plant hairs white, at stipules and in inflorescence also black, 0.3–1.6 mm. Stems 8–27 cm, prostrate to erect, sparsely appressed hairy. Leaves 5–8 cm; stipules greenish, 2.5–4 mm, ciliate; petiole 0.5–1.2 cm, like rachis sparsely subappressed hairy; leaflets in 5–7 pairs, narrowly elliptic to narrowly oblong, 2–13 × 1–2.8 mm, subappressed hairy, apex obtuse to slightly retuse. Racemes 3–9-flowered; peduncle 1.5–6 cm, appressed hairy; bracts hyaline, 1–1.5 mm, ciliate. Calyx campanulate, 3–4 mm, covered at base mainly with appressed white hairs, toward teeth with more spreading and more black hairs; teeth subulate, 1.8–2 mm. Petals violet; standard narrowly elliptic, 6–8 × 2–2.5 mm, apex widely retuse; wings 4.5–5 mm; keel 3.5–4 mm. Legumes stellately arranged or more deflexed, oblong to narrowly ovoid, 6–10 mm, 3–4 mm high and wide, somewhat widened near base, with a short beak, incompletely 2-locular; valves thin, wrinkled, loosely covered with 2 kinds of hairs: short subappressed hairs 0.1–0.3 mm and long spreading hairs up to 1.5 mm.

Steppes, semideserts, in all kinds of soils; below 3200 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

12. *Astragalus persepolitianus* Boissier, Diagn. Pl. Orient., ser. 1, 9: 60. 1849.

沙生黄耆 sha sheng huang qi

Astragalus ammophilus Karelin & Kirilov.

Plants with mostly white hairs 0.05–0.6 mm. Stems 4–27 cm, prostrate to ascending, appressed to spreading hairy. Leaves 2–7 cm; stipules whitish or greenish, 1–2.5 mm, appressed hairy or ciliate; petiole 1–2.3 cm, sparsely spreading hairy; leaflets in 3–7 pairs, narrowly obovate to obovate, 2–8.5 × 0.8–4.5 mm, abaxially appressed hairy, adaxially glabrous, apex retuse. Racemes 3–10-flowered, sometimes with 2 superposed and remote whorls of flowers; peduncle 0.5–7 cm or sometimes absent, appressed or rarely spreading hairy; bracts hyaline, 0.8–1.2 mm, ciliate. Calyx campanulate, 2.5–3 mm, loosely to densely spreading hairy; teeth subulate, 0.8–1 mm. Petals whitish to pale violet; standard narrowly elliptic, 4.5–6 × ca. 2 mm, rounded at apex; wings 4–4.5 mm; keel 3–3.8 mm. Legumes ovoid-triangular, 6–9 mm, ca. 3 mm high and wide, widest at base, straight or slightly curved at ventral side, strongly curved at dorsal side, with a beak 0.7–1 mm; valves thin, glabrous or subappressed hairy.

From the plains up to 3000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Caucasus, Iran)].

13. *Astragalus sesamoides* Boissier, Diagn. Pl. Orient., ser. 1, 9: 59. 1849.

胡麻黄耆 hu ma huang qi

Plants with white hairs, near stipules and in inflorescence also black hairy. Stems 7–35 cm, ascending, sparsely covered with appressed hairs 0.3–1 mm. Leaves 2.5–5.5 cm; stipules whitish to greenish, 3–4 mm, ciliate or sparsely hairy; petiole 0.3–1 cm, like rachis slender, subappressed hairy; leaflets in 4–6 pairs, narrowly oblong to narrowly elliptic, 4–15 × 2–5.5 mm, abaxially somewhat densely appressed hairy, adaxially glabrous or sparsely appressed hairy, apex obtuse. Racemes 2–9-flowered; peduncle 2–6 cm, with subappressed to ascending hairs; bracts membranous, 2–3 mm, ciliate. Calyx campanulate, 5.5–7 mm, covered at base with white and black hairs up to 1 mm, toward teeth with more black and somewhat longer and more spreading hairs; teeth subulate, 3–4 mm. Petals violet; standard 5.5–7 × 2–2.5 mm, apex slightly retuse; wings 4.5–5.5 mm; keel 4–4.5 mm. Legumes erect, straight, narrowly oblong with rounded base, 1.2–1.5 cm, 3–4 mm high and wide, with a reflexed beak 1–1.5 mm; valves covered with subappressed to ascending white hairs up to 1.3 mm.

Loessic and sandy soil, in steppes and semideserts, fields. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

14. *Astragalus tribuloides* Delile, Descr. Egypte, Hist. Nat. 70. 1813.

蒺藜黄耆 ji li huang qi

Astragalus kirghisicus Stscheglejew.

Plants with appressed to ascending white hairs 0.2–1.5 mm. Stems from nearly absent to 40 cm, prostrate to ascending, hairy. Leaves 1.5–7 cm; stipules membranous, 2–3 mm, hairy; petiole 0.5–2 cm, like rachis hairy; leaflets in 4–10 pairs, narrowly elliptic, 2.5–15 × 0.8–4 mm, both surfaces sericeous with appressed hairs, apex acute. Racemes sessile, rarely with a peduncle up to 2.5 cm, (1 or) 2–8-flowered; bracts membranous, 1–3 mm. Calyx tubular, 3–5 mm, densely hairy; teeth 1–2 mm. Petals whitish or white suffused with mauve or pink; standard narrowly oblong, 4–10 × 1.2–2.5 mm, apex retuse; wings 4–6 mm; keel 3–5 mm. Legumes mostly starlike spreading, straight or slightly curved, oblong-triangular, 4–12 mm, 2.5–4 mm high and wide, distinctly bigibbous at base, acute at apex, with a deep dorsal groove widened at base; valves with short

appressed hairs 0.05–0.15 mm and with much longer appressed to subappressed hairs up to 1.5 mm.

?Xizang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia (Caucasus)].

Steppes, semideserts, from the plains up to 3000 m. Xinjiang,

The Chinese record of *Astragalus cruciatus* Link (FRPS 42(1): 242. 1993) is referable to *A. tribuloides*.

8. *Astragalus* sect. *Cenantrum* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 23. 1868.

膜荚组 mo jia zu

Astragalus sect. *Albiflori* Y. C. Ho; *A.* sect. *Cenantroides* N. D. Simpson; *A.* sect. *Monadelphica* K. T. Fu; *A.* sect. *Polyphylli* N. D. Simpson; *Neodielsia* Harms.

Plants caulescent, erect; hairs basifixed, white or black. Leaves mostly nearly sessile or with a short petiole; stipules green or greenish, rarely membranous, free from petiole and from each other, rarely lower ones connate behind stem. Racemes with a long peduncle, many flowered; bracts persistent. Bracteoles mostly absent. Flowers with a distinct pedicel. Calyx campanulate to shortly tubular, mostly laterally gibbous at base, obliquely cut at mouth. Petals mostly yellow or pale greenish yellow, often drying purple, rarely purplish from beginning; standard slightly to distinctly emarginate, rarely rounded. Stamens diadelphous or more rarely monadelphous. Style and stigma glabrous. Legumes ± long stipitate, 1-locular; valves papery, glabrous or hairy.

Forty-two species: China, Japan, Mongolia, Russia; C to S Asia, Europe; 27 species (19 endemic) in China.

- 1a. Inner side of calyx tube hairy in upper 1/2.
- 2a. Petals yellow; leaflets in 3–7 pairs, narrowly to widely elliptic; keel as long as standard 40. *A. tongolensis*
- 2b. Petals purplish; leaflets in 2–4 pairs, narrowly elliptic; keel distinctly shorter than standard, (12–)15–16 mm 30. *A. moellendorffii*
- 1b. Inner side of calyx tube glabrous.
- 3a. Ovary and legumes glabrous.
- 4a. Leaflets in (1 or) 2 pairs; calyx 4–5 mm, teeth indistinct or up to 0.3 mm; standard 8–10 mm; keel longer than wings 24. *A. henryi*
- 4b. Leaflets in at least 3 pairs but mostly more; calyx at least 5 mm but mostly distinctly longer; standard at least 13 mm but mostly longer; keel shorter than or as long as wings.
- 5a. Leaf rachis sparsely to loosely covered with appressed to spreading hairs; leaflets in 8–12 pairs 32. *A. mongholicus*
- 5b. Leaf rachis glabrous; leaflets in 3–5 pairs.
- 6a. Calyx 11–12 mm, sparsely to loosely covered with ± spreading brown or blackish hairs; bracts sparsely to loosely white and black hairy; standard limb widely ovate to orbicular, 13–16 mm wide; legumes 30–40(–50) mm, inflated ellipsoid 17. *A. bahrakianus*
- 6b. Calyx at most up to 11 mm but mostly shorter, glabrous or appressed white hairy; bracts glabrous or only white hairy; standard limb rhombic to elliptic, up to 12 mm wide; legumes 20–30 mm, strongly compressed laterally (unknown in *A. sichuanensis*).
- 7a. Racemes 6–16 cm, many flowered; bracts glabrous or sparsely ciliate; calyx 6–8 mm, often glabrous; ovary with a stipe 6–8 mm 15. *A. aksuensis*
- 7b. Racemes short, 5–10-flowered; bracts densely appressed hairy; calyx 9–11 mm, teeth very short to mostly inconspicuous; ovary with a stipe 12–14 mm 38. *A. sichuanensis*
- 3b. Ovary and legumes hairy.
- 8a. Stems in lower 1/3–1/2 without developed leaves 36. *A. przewalskii*
- 8b. Stems leafy throughout.
- 9a. Leaflets in 8–15 pairs.
- 10a. Leaflets very narrowly elliptic to narrowly elliptic, 10–17(–20) × 2–6 mm; calyx when young with long white or black hairs, therefore racemes sericeous, with age loosely to rather densely and mostly black hairy; standard 12–13 × 4–4.5 mm, narrowly oblong-elliptic, deeply incised 22. *A. floridulus*
- 10b. Leaflets relatively wider; calyx without long white or black hairs and not sericeous when young; standard elliptic to obovate, if narrowly oblong-elliptic, then rounded (in *A. degensis*).
- 11a. Leaflets adaxially sparsely and abaxially loosely hairy; petals dark purple to blackish violet; stem up to 7 mm thick 35. *A. petrovii*
- 11b. Leaflets adaxially glabrous, abaxially sparsely hairy; petals yellow or rarely pale lilac or purple; stem up to 3 mm thick.
- 12a. Calyx ca. 5 mm, white hairy; standard ca. 8 mm; legumes shortly stipitate, densely white hairy 18. *A. changduensis*
- 12b. Calyx mostly distinctly longer; standard distinctly longer, at least 11 mm; legumes with a stipe at least 4 mm but mostly longer, ± black hairy.

- 13a. Plants in vegetative parts furnished with appressed to spreading hairs 1–1.5(–2) mm; leaflets rounded to emarginate; calyx teeth 0.5–1.5 mm; standard 13–20 × 7–9 mm, widely elliptic, emarginate, at base with a long claw; legumes obliquely ellipsoid, 2–3 cm 32. *A. mongholicus*
- 13b. Plants in vegetative parts furnished with appressed hairs 0.3–0.6 mm; leaflets acute to emarginate but with a distinct cusp ca. 0.5 mm; calyx teeth ca. 3 mm; standard 11–13 × ca. 5 mm, narrowly oblong-elliptic, rounded at apex, abruptly contracted into a very short claw; legumes ellipsoid, 1.3–1.7 cm 20. *A. degensis*
- 9b. Leaflets in up to 9 pairs but often in fewer.
- 14a. Plants totally glabrous with exception of inner side of calyx teeth; rachis at insertion of leaflets often with simple or divided emergences and or with stalked glands; stamen tube monadelphous 41. *A. xitaibaicus*
- 14b. Plants at least in some parts hairy; rachis at insertion without emergences and glands; stamen tube diadelphous or monadelphous.
- 15a. Lower stipules distinctly vaginate-connate; calyx 1–1.4 cm, teeth 4–7(–8) mm; petals yellow, sometimes violet suffused when dry 27. *A. longilobus*
- 15b. All stipules free; calyx and calyx teeth distinctly shorter.
- 16a. Standard 10–12 mm.
- 17a. Leaflets glabrous or ciliate; calyx glabrous; petals yellow 19. *A. chilienshanensis*
- 17b. Leaflets and calyx hairy; petals at least partly purple or bluish.
- 18a. Stem ca. 2 mm thick; leaflets adaxially glabrous; bracts sparsely black hairy; calyx 4.5–5 mm; petals blue to blue-violet with yellowish base 33. *A. muliensis*
- 18b. Stem ca. 6 mm thick; leaflets adaxially sparsely hairy; bracts glabrous or sparsely white ciliate; calyx ca. 6 mm; petals yellow with purple-tipped standard or keel or all purplish 29. *A. minhensis*
- 16b. Standard distinctly longer, if only 10–12 mm, then stamens monadelphous.
- 19a. Leaflets 10–17 × 3–7 mm; bracteoles 0.5–1 mm, at pedicel; calyx 4(–5) mm; petals lilac to dark purple 37. *A. purpurinus*
- 19b. Leaflets at least in part distinctly longer; bracteoles absent (only in *A. arnoldianus* sometimes present); calyx at least 5 mm but mostly distinctly longer; petals yellow when alive, sometimes purple when dry.
- 20a. Bracts 3–5 mm; stems glabrous or with appressed hairs.
- 21a. Calyx hairy only at upper margins and teeth, teeth 2–3 mm; stipules 1–1.6 cm, auricle-like dilated at base; leaflets in 6–9 pairs, abaxially sparsely hairy at midrib or glabrous; peduncle glabrous 21. *A. ernestii*
- 21b. Calyx hairy also at tube, teeth only up to 1.5 mm; stipules up to 1 cm, not dilated at base, lower ones often connate around petiole up to top; leaflets in 4–6 pairs, abaxially loosely hairy; peduncle loosely hairy.
- 22a. Plants in vegetative parts with mainly black hairs; lower stipules often connate around petiole up to top; calyx ca. 9 mm; standard 16–19 mm 16. *A. arnoldianus*
- 22b. Plants in vegetative parts with mainly white hairs; all stipules free from each other; calyx 6–7 mm; standard 12–14 mm 28. *A. luteolus*
- 20b. Bracts at least 5 mm but partly distinctly longer, if sometimes only ca. 4 mm (in *A. lessertioides*), then stems with ascending to spreading hairs.
- 23a. Stamen tube closed, monadelphous.
- 24a. Leaflets glabrous or ciliate when young; racemes with flowers all around, rachis densely black hairy; calyx teeth unequal, upper ones triangular, 1–1.5 mm, lower ones narrowly triangular 1.5–3 mm; standard 16–17 × 8–11 mm, with short claw 34. *A. neomonodelphus*
- 24b. Leaflets sparsely hairy abaxially; racemes 1-sided, rachis sparsely white or black hairy; calyx teeth all subulate, 3–4 mm; standard 12–13 × 5–6 mm, with long claw 31. *A. monadelphus*
- 23b. Stamen tube diadelphous, with 1 free stamen.
- 25a. Calyx 4.5–7 mm with glabrous tube, teeth narrowly triangular-acuminate, 1.5–3 mm; petals yellow drying to brown-violet; standard 11–12 mm 26. *A. lessertioides*
- 25b. Calyx longer with tube hairy at least in upper part, teeth triangular, up to 1.5 mm; petals remaining yellow; standard distinctly longer.
- 26a. Stems and leaf rachis sparsely to loosely covered with subappressed to ascending hairs; legumes with white and black hairs 25. *A. lepsensis*
- 26b. Stems and leaf rachis glabrous or more rarely very sparsely appressed hairy; legumes with black hairs only.
- 27a. Peduncle sparsely, toward raceme more densely, black hairy, rarely subglabrous; standard 14–17 mm; legumes 1–2.5 cm, flattened dorsally and ventrally 23. *A. frigidus*

- 27b. Peduncle glabrous; standard 15–25 mm; legumes 2.5–4.5 cm, slightly keeled ventrally, slightly grooved dorsally 39. *A. tecti-mundi*

15. *Astragalus aksuensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 25. 1868.

阿克苏黄耆 a ke su huang qi

Phaca bracteosa Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 323. 1842, not *Astragalus bracteosus* Boissier & Noë (1856).

Plants 50–100 cm tall, with basifixed hairs. Stems at base 3–5(–7) mm thick, glabrous or sometimes in lower part with very short white spreading hairs. Leaves 8–12 cm, with glabrous rachis; stipules green, 10–18 mm, glabrous or ciliate; leaflets in 3 or 4(or 5) pairs, narrowly elliptic to narrowly ovate, 2–6 × 0.5–1.8 cm, glabrous on both surfaces, apex acute to obtuse. Racemes loosely many flowered, 6–16 cm; peduncle 6–20 cm, glabrous; bracts green, 8–12 mm, glabrous or very sparsely ciliate. Calyx shortly tubular, 6–8 mm, glabrous or sparsely appressed hairy; teeth unequal, 2 adaxial distant, triangular acuminate, 0.5–1(–1.5) mm, 3 abaxial close together, narrowly triangular, 1–2(–3) mm. Petals yellow; standard widely rhombic, 17–21 × 11–12 mm, ± rounded at apex; wings 16–18 mm; keel 14–16 mm. Legumes with a slender stipe 6–8 mm, narrowly ellipsoid, 2–3 cm, 7–10 mm high and 3–4 mm wide, acuminate at both ends; valves yellowish, glabrous.

Xerophytic scrub, forests, rock debris, pebbles, middle mountain zone. Sichuan, Xinjiang [Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

16. *Astragalus arnoldianus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 239. 1915.

灌县黄耆 guan xian huang qi

Astragalus simpsonii E. Peter.

Plants 30–40 cm tall, with predominantly black hairs 0.2–0.7 mm. Stems 2–3 mm thick, sparsely appressed hairy. Leaves 6–10 cm; stipules 5–8 mm, lowest high connate around suppressed petiole into a single limb, upper ones narrowly triangular, free, black and white ciliate; petiole 1.5–2.7 cm, like rachis appressed hairy; leaflets in 4–6 pairs, ovate, 8–22 × 3–12 mm, abaxially pale green and loosely appressed white hairy, adaxially dark green and glabrous, apex rounded to slightly emarginate. Racemes 2–6 cm, 8–18-flowered; peduncle 5–8.5 cm, striate-sulcate, loosely appressed black hairy; bracts whitish, 3–5 mm, black hairy. Bracteoles sometimes present, minute, whitish, up to 1 mm. Calyx tubular-campanulate, ca. 9 mm, loosely appressed hairy; teeth nearly equal, triangular, 0.5–1 mm. Petals yellow; standard obovate, 16–19 × 7–8 mm; wings 15–18 mm; keel 14–15 mm. Ovary shortly stipitate, densely black hairy. Legumes unknown.

- About 3000 m. NC Sichuan (Guanxian).

17. *Astragalus bahrakianus* Grey-Wilson, Kew Bull. 29: 45. 1974.

巴拉克黄耆 ba la ke huang qi

Plants 30–60 cm tall, subglabrous or with curly, ±

spreading hairs ca. 1 mm. Stems several, at base up to 8 mm thick, glabrous. Leaves 12–17 cm; stipules 2–4 cm, auricle-like dilated at base, glabrous; petiole ca. 2 cm, glabrous; leaflets in 3 or 4 pairs, narrowly ovate, 3.5–7 × 1.2–3 cm, abaxially or only at margin sparsely hairy, apex acute. Racemes loosely 7–10-flowered; peduncle erect, 9–20 cm, glabrous; bracts green, 1–2 cm, at margins and apex sparsely or all over loosely white and black hairy. Bracteoles sometimes present, 1–4 mm. Calyx 1.1–1.2 cm, sparsely to loosely covered with pale brown to black hairs; teeth triangular, 2–2.5 mm. Petals yellow; standard widely ovate to nearly orbicular, 20–23 × 13–16 mm, slightly emarginate; wings 18–19 mm; keel 16–18 mm. Legumes with a stipe 6–9 mm, inflated ellipsoid, 3–4(–5) cm, 1.5–2.2(–3) cm high and 1.2–1.4(–1.6) cm wide, rounded ventrally and dorsally; valves glabrous.

Wet places in *Picea* forests, alpine slopes near water; 2800–4000 m. Xinjiang (W Kunlun Shan) [NE Afghanistan].

18. *Astragalus changduensis* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 106. 1981.

昌都黄耆 chang du huang qi

Plants 70–90 cm tall. Stems erect, with ± appressed, tangled, white hairs 0.3–0.7 mm. Leaves 5–10 cm, subsessile; stipules triangular-ovate, 6–10 × 5–6 mm, sparsely white hairy; leaflets in 11–13 pairs, narrowly ovate to elliptic, 7–20 × 3–8 mm, abaxially sparsely covered with appressed to ascending short white hairs, adaxially glabrous, apex obtuse to emarginate. Racemes 4–5 cm, rather densely many flowered; peduncle 6–8 cm; bracts narrowly triangular, 5–8 mm, sparsely white or black hairy. Calyx 5–6 mm, predominantly white hairy; teeth ca. 3 mm. Petals yellowish to white; standard widely ovate to nearly orbicular, 7–9 × 5–6 mm, apex emarginate; wings ca. 7 mm; keel ca. 6 mm. Ovary with a stipe up to 4 mm, densely white hairy, without septum.

- Xizang.

19. *Astragalus chilienshanensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 51. 1980.

祁连山黄耆 qi lian shan huang qi

Plant 20–30 cm tall. Stem 4–6 cm. Leaves 4–8 cm; stipules elliptic, 5–15 × 3–7 mm, white ciliate; petiole 2–4 cm; leaflets in 4–6 pairs, ovate to elliptic, 1–2 × 0.4–1 cm, glabrous or ciliate, apex rounded or slightly emarginate. Racemes 1–2 cm, ca. 10-flowered, elongating in fruit; peduncle 15–20 cm; bracts linear-acute to narrowly ovate, 4–6 mm, sparsely white hairy. Pedicels ca. 2 mm, densely black hairy. Calyx campanulate, ca. 5 mm, glabrous; teeth narrowly triangular, ca. 2 mm, black hairy on inner side. Petals yellow, all of nearly same length; standard widely obovate, 10–12 × ca. 9 mm. Legumes with a stipe ca. 3 mm, pendulous, narrowly ellipsoid, ca. 2 cm, attenuate at both ends; valves sparsely black hairy.

- About 3500 m. Qinghai, Xizang.

20. *Astragalus degensis* Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 418. 1922.

窄翼黄耆 zhai yi huang qi

Astragalus degensis var. *rockianus* E. Peter; *A. grubovii* S. H. Cheng ex P. C. Li (1989), not Sanchir (1974); *A. guan-shuanus* P. C. Li; *A. voburus* Y. H. Xu & Q. R. Liu.

Plants 40–50(–100) cm tall, with appressed hairs 0.3–0.6(–1) mm. Stem sparsely to loosely covered with white and black or predominantly black hairs, glabrescent with age. Leaves 6–12 cm; stipules linear-subulate, 6–10 mm, spreading to reflexed, black ciliate; rachis sparsely to loosely covered with mostly black hairs; leaflets in 7–15 pairs, narrowly elliptic, 8–20(–30) × 3–8(–12) mm, abaxially ± light green and loosely appressed white hairy, adaxially dark green and glabrous, apex acute to slightly retuse with a distinct cusp ca. 0.5 mm. Racemes ca. 3 cm, densely many flowered, at fruiting time elongated and up to 6(–12) cm; rachis loosely to densely black hairy; peduncle 5–20 cm, loosely to rather densely black hairy, glabrescent with age; bracts whitish, linear-subulate, 5–7 mm, black ciliate. Calyx shortly tubular, 6–9 mm, loosely covered with white and black or only black hairs; teeth subulate, 3–5 mm. Petals yellow to greenish yellow or purplish, yellow when dry; standard oblong to elliptic, 11–13(–15) × 4–7 mm, rounded at apex; wings 10–11(–13) mm; keel 11–12(–14) mm. Legumes with a stipe 4–7 mm, erect or spreading, ellipsoid, compressed laterally, 1.3–1.7 cm, 6–8 mm high and 2.5–3 mm wide, sharply keeled ventrally, keeled to narrowly rounded dorsally, shortly acuminate at both ends; valves dirty brownish, sparsely to rather densely covered with subappressed black and white or only black hairs.

• Alpine zone; 2700–3800 m. Sichuan, Xizang, Yunnan.

21. *Astragalus ernstii* Comber, Notes Roy. Bot. Gard. Edinburgh 18: 230. 1934.

梭果黄耆 suo guo huang qi

Astragalus josephii E. Peter; *A. wilsonii* N. D. Simpson; *A. xiaojinensis* Y. C. Ho.

Plants 25–60 cm tall, with hairs up to 0.3 mm. Stems up to 7 mm thick, glabrous. Leaves 4–10 cm; stipules 1–1.6 cm, lower ones laterally widened into a wide auricle, spreading to deflexed, at base with minute glands; leaflets in 6–9 pairs, narrowly elliptic, 6–24(–40) × 2.5–10 mm, glabrous on both surfaces or loosely to sparsely covered with appressed white hairs abaxially. Racemes densely many flowered, later elongated and up to 8 cm; peduncle 5–10 cm, glabrous; bracts green, elliptic to somewhat spatulate, 3–4 mm, black or white ciliate. Calyx greenish, campanulate-tubular, 6–8 mm, deeply split on adaxial surface, tube glabrous; teeth 2–3 mm, both sides or only inner side and margins between teeth densely shortly black hairy. Petals pale yellow or purplish blue, blackish purple when dry; standard rectangular-oblong to obovate, 13–15 × 5–8 mm; wings 11–13 mm; keel 10–13 mm. Legumes with a stipe 4–11 mm, pendulous, narrowly ovoid, 1.5–2.5 cm, 4–6 mm high, sharply keeled ventrally, narrowly rounded dorsally, apex long acuminate; valves light brownish, densely covered with very short black nearly spreading hairs, loosely hairy or glabrescent

with age.

• *Abies* forests, subalpine and alpine meadows; 3500–4300 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

22. *Astragalus floridulus* Podlech, Sendtnera 1: 270. 1993.

多花黄耆 duo hua huang qi

Astragalus floridus Benthham ex Bunge (1869), not Scopoli (1787).

Plants 50–90 cm tall, with hairs 0.2–0.8(–1) mm. Stems at base up to 6 mm thick, with slender, non-flowering lateral branches out of most of leaf axils, loosely covered with ascending, mostly black hairs. Leaves on main stem 5–9 cm; stipules on main stem linear-acute, 1–1.4 cm, white ciliate, those on lateral branches 4–5 mm; rachis slender, with ascending white hairs; leaflets in 10–15 pairs, very narrowly elliptic to narrowly elliptic, 10–17(–20) × 2–6 mm, abaxially rather densely appressed white hairy, adaxially glabrous, apex acute; leaves and leaflets on lateral branches mostly distinctly smaller. Racemes densely many flowered, ovoid to capitate, later strongly elongated and in fruit up to more than 15 cm; peduncle 2–7 cm, loosely covered with ascending to spreading white and predominantly black hairs; bracts whitish membranous, linear-acute, 3.5–6 mm, black ciliate. Calyx shortly tubular, 5–6 mm, strongly obliquely cut at mouth, in lower part loosely, toward teeth rather densely, covered with longer appressed black or white hairs, young inflorescences therefore white or sometimes black sericeous; teeth slightly unequal, 2 adaxial 1–2 mm, 3 abaxial 1.5–3 mm, sometimes all teeth nearly equal, subulate, 3–4 mm. Petals pale yellow or whitish, often purplish suffused; standard 12–13 × 4–5.5 mm, narrowly oblong-elliptic; wings 11–12 mm; keel 11–12 mm. Legumes with a stipe 4–5 mm, ellipsoid, 1–1.5 cm, 4–5 mm high and 2–3 mm wide, keeled ventrally and dorsally; valves covered with subappressed to ascending black and white hairs up to 1 mm.

Subalpine to alpine zones; 2700–5200 m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, India (Sikkim)].

23. *Astragalus frigidus* (Linnaeus) A. Gray, Proc. Amer. Acad. Arts 6: 219. 1864.

广布黄耆 guang bu huang qi

Phaca frigida Linnaeus, Syst. Nat., ed. 10, 2: 1173. 1759; *A. secundus* Candolle.

Plants 8–35 cm tall, mostly nearly glabrous; hairs 0.3–0.5 mm. Stems at base 2–5 mm thick. Leaves 5–15 cm; stipules 1–2 cm; petiole 1–3 cm, like rachis glabrous or sparsely appressed white hairy; leaflets in (3 or)4–6(–8) pairs, narrowly ovate to narrowly elliptic, 15–35(–45) × 7–19 mm, abaxially light gray-green with a distinct darker net of nerves, mostly sparsely appressed hairy, adaxially dark green, mostly glabrous, apex rounded to subacute. Racemes rather densely 5–20-flowered; peduncle 5–10 cm, appressed black hairy or nearly glabrous; bracts greenish, narrowly ovate, 5–10 mm, at margins with predominantly black hairs. Calyx shortly tubular, 6–9 mm, in basal part subglabrous, toward teeth more densely hairy, sometimes only at teeth black hairy; teeth equal, triangular, 0.3–1 mm. Petals pale yellow; standard obovate to nearly orbicular, 14–17

× ca. 8 mm; wings 13–16 mm; keel 13–15 mm. Legumes with a stipe up to 8 mm, pendulous, inflated, narrowly ellipsoid, 1–2.5 cm, 3–4 mm high and 5–7 mm wide, flat ventrally and dorsally, acuminate at both ends; valves loosely or rather densely covered with very short appressed black hairs.

Forests, damp meadows, riversides; 200–3100 m. Sichuan, Xinjiang, Yunnan [Japan, Kazakhstan, Mongolia, Russia (Far East, Siberia); Europe].

24. *Astragalus henryi* Oliver, Hooker's Icon. Pl. 20: t. 1959. 1891.

秦岭黄耆 qin ling huang qi

Neodielsia polyantha Harms.

Plants 40–45 cm tall, with white hairs 0.1–0.3 mm, only at leaves 0.5–0.7 mm. Stems several, zigzaglike bent at nodes at least in upper part, slender, mostly glabrous. Leaves 6–12 cm; stipules membranous, yellowish, soon withering, narrowly oblong to narrowly triangular, 5–8(–12) mm, glabrous or sparsely ciliate; petiole 2–4 cm, like rachis sparsely appressed hairy, at insertion of leaflets mostly with a small tuft of short hairs; leaflets in (1 or) 2 pairs, with short, often undulate-winged petioles, narrowly elliptic, 1.5–4.5(–6) × 0.7–2(–2.5) cm, abaxially pale green, reticulately nerved, and loosely covered with partly spreading hairs, adaxially dark green and glabrous, apex obtuse to acute. Racemes many flowered, in fruit elongated and up to 11 cm; peduncle often branched and inflorescence therefore nearly paniculate, 1–4 cm, slender, glabrous; bracts greenish, linear, 2–4 mm, deflexed, soon falling. Calyx widely campanulate-tubular, 4–5 mm, subglabrous to loosely appressed hairy; teeth inconspicuous, less than 0.3 mm. Petals yellow; standard elliptic-oblong, 8–10 × ca. 4 mm, very slightly emarginate; wings 6–8 mm; keel 8–10 mm. Legumes with a stipe 6–8 mm, obliquely ovoid, 1–1.5 cm, 5–7 mm high, compressed laterally, apex long acuminate; valves yellowish, thinly membranous, glabrous. Seeds mostly 1.

• Hebei, Shaanxi, Shanxi, Sichuan.

25. *Astragalus lepsensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 25. 1868.

天山黄耆 tian shan huang qi

Plants 25–45 cm tall. Stems ca. 3 mm thick at base, sparsely to loosely covered with ascending to spreading white hairs 0.3–1 mm. Leaves 7–14 cm; stipules 10–20 mm, ciliate; petiole short, rachis hairy like stem; leaflets in 5–8 pairs, narrowly ovate, 15–40 × 8–17 mm, abaxially gray-green with whitish midvein, subappressed hairy, adaxially dark green and glabrous. Racemes rather densely to loosely 10–20-flowered, 1-sided, 3–7 cm; peduncle 5–9 cm, appressed hairy; bracts green, narrowly elliptic, 7–11 mm, ciliate, apex acute. Bracteoles sometimes present, linear, 1–2 mm. Calyx shortly tubular, 8–9 mm, subglabrous or in upper part with short spreading black hairs; teeth nearly equal, narrowly triangular, 0.8–1 mm. Petals yellow; standard ovate to obovate, 20–21 × ca. 8 mm; wings 19–20 mm; keel 19–20 mm. Legumes with a stipe 6–7 mm, pendulous, narrowly ellipsoid, 1.5–2.4 cm, 6–7 mm wide and 4–5 mm high, with a beak ca. 2 mm; valves membranous, rather

densely covered with very short white and black nearly appressed hairs.

Xerophytic scrub, coniferous forests, meadows, middle mountain and subalpine zones. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia].

The value of *Astragalus lepsensis* var. *leduensis* Y. H. Wu (Acta Bot. Yunnan. 20: 37. 1998) is uncertain because we have not seen any material. According to the description, it differs by its stipules 4–8 mm, leaflets sparsely hairy on both surfaces, bracts 4–7 mm, calyx 6–8 mm, and standard 15–17 mm.

26. *Astragalus lessertioides* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 24. 1868.

喜马拉雅黄耆 xi ma la ya huang qi

Astragalus levitubus H. T. Tsai & T. T. Yu.

Plants 10–30 cm tall, with soft hairs 0.5–1 mm. Stems several, slender, up to 2 mm thick, sparsely covered with ascending white hairs. Leaves 2–7 cm; stipules 6–15 mm, ciliate; petiole short, like rachis slender, glabrous or sparsely hairy; leaflets in 3–6(–8) pairs, elliptic, 4–11 × 2–6 mm, abaxially sparsely appressed white hairy at margin and especially at midvein, adaxially glabrous. Racemes densely 6–12-flowered; rachis densely black hairy; peduncle 1.5–16 cm, sparsely white hairy, toward top increasingly spreading black hairy; bracts whitish to greenish, linear-acute, 3–6 mm, black ciliate. Calyx campanulate, 4.5–7 mm, not gibbous at base, with truncate mouth, tube glabrous; teeth 1.5–3 mm, black hairy. Petals yellow or purple, often dark purplish brown when dry, all of same length; standard widely obtriangular to widely obovate, 11–12 × 6–8 mm. Legumes stipitate, narrowly ellipsoid, ca. 1.5 cm, very densely covered with appressed black hairs, acuminate at both ends.

Alpine meadows; 3500–4900 m. Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Nepal].

27. *Astragalus longilobus* E. Peter, Acta Horti Gothob. 12: 47. 1938.

长萼裂黄耆 chang e lie huang qi

Plants 30–60 cm tall, with hairs 0.5–1 mm. Stems several, 3–6 mm thick, sparsely to loosely covered with ± appressed white or sometimes also black hairs. Leaves 7–10 cm; stipules greenish, 8–20 mm, lowest ± high vaginate-connate behind stem, upper ones mostly narrowly triangular, long acuminate, free, ciliate; petiole short, like rachis sparsely to loosely covered with ± appressed white and black hairs; leaflets in 3–5 pairs, with a short petiolule often furnished with minute globose glands, narrowly ovate to narrowly elliptic, (18–)25–40(–55) × 7–15 mm, abaxially loosely to densely appressed white hairy, adaxially glabrous, apex acute and often minutely mucronulate. Racemes densely many flowered; peduncle 5–7 cm, loosely predominantly black hairy; bracts whitish, linear-acuminate, 8–10 mm, black hairy. Calyx campanulate, 10–14 mm, sparsely to loosely covered with ± appressed white and toward teeth increasingly black hairs; teeth subulate, (3–)4–7(–8) mm. Petals yellow; standard widely elliptic to widely obovate, 14–15 × 8–9 mm; wings 13–14 mm; keel 11–13 mm. Legumes with a stipe 5–6 mm, narrowly ellipsoid, 18–22 × 7–8 mm, inflated, acuminate at both ends; valves papery, densely covered with short appressed black hairs.

• Subalpine to alpine meadows, grassy slopes, riversides; 3300–4300 m. Gansu, Qinghai, Sichuan.

28. *Astragalus luteolus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 23. 1936.

淡黄花黄耆 dan huang hua huang qi

Plants 30–100 cm tall, with hairs 0.3–0.8 mm. Stem up to 5 mm thick, subglabrous at base, in upper part loosely appressed white hairy. Leaves (4–)7–10 cm; stipules narrowly triangular, (3–)6–10 mm, white or black ciliate; petiole 0.4–1.2 cm, like rachis sparsely to rather loosely covered with appressed to subappressed mostly white hairs; leaflets in (2–)4–7 pairs, narrowly ovate, 15–40 × 6–14 mm, abaxially gray-green and loosely hairy, adaxially dark green and glabrous to sparsely hairy, apex rounded to slightly emarginate. Racemes at anthesis densely 7- to many flowered, at fruiting time elongated up to 10 cm; peduncle 4–13 cm, loosely appressed, mostly white hairy; bracts whitish, linear-acute, 2–5 mm, white and blackish hairy. Calyx shortly tubular, 6–7 mm, ± densely appressed white and black hairy; teeth subulate, unequal, 1–1.5 mm. Petals yellow; standard elliptic to ovate, 12–14 × ca. 5 mm; wings 11–11.5 mm; keel 10–11 mm. Ovary with a stipe ca. 2 mm, white hairy; style with short spreading hairs just below stigma on abaxial surface. Legumes with a stipe 4–5 mm, narrowly ellipsoid, 1.8–2.5 cm × 5–7 mm, inflated, apex long acuminate; valves papery, densely covered with short, ascending black and white or only black hairs.

• Qinghai, Sichuan.

29. *Astragalus minhensis* X. Y. Zhu & C. J. Chen, Guihaia 15: 112. 1995.

民和黄耆 min he huang qi

Astragalus penduliflorus Lamarck var. *minhensis* (X. Y. Zhu & C. J. Chen) X. Y. Zhu.

Plants 60–70 cm tall. Stem in upper part white and black hairy. Leaves 5–9 cm, subsessile; stipules 4–10 mm, narrowly triangular, white ciliate; rachis white hairy; leaflets in 5–9 pairs, narrowly ovate to narrowly elliptic, 11–23 × 3–8 mm, both surfaces appressed white hairy. Racemes loosely 9–19-flowered; peduncle 6–10 cm; bracts linear-acute, 2–5 mm, glabrous or white ciliate. Calyx campanulate, ca. 6 mm, white and black hairy; teeth narrowly triangular, ca. 1 mm. Petals yellow with purple-tipped standard or keel or all purplish; standard obovate ca. 12 × 5 mm; wings ca. 11 mm; keel ca. 11 mm. Ovary with a stipe ca. 1.5 mm, loosely black and white hairy; style with shortly hairy stigma. Legumes with a stipe 2.5–3 mm, narrowly obliquely ellipsoid, 3–3.8 cm, 8–9 mm high, inflated; valves membranous, loosely white and black hairy.

• Qinghai.

30. *Astragalus moellendorffii* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 472. 1880.

边向花黄耆 bian xiang hua huang qi

Astragalus moellendorffii var. *kansuensis* E. Peter.

Plants 35–45 cm tall, vegetative parts with hairs 0.5–

0.8(–1 mm). Stems glabrous or hairy in nodal region, up to 3 mm thick. Leaves 6–10 cm; stipules 10–23 mm, ciliate; petiole 1.5–3 cm, like rachis glabrous or sparsely hairy especially at insertion of leaflets; leaflets in 2–4 pairs, narrowly elliptic to narrowly ovate, 1.5–4(–6) × 0.5–2 cm, abaxially sparsely to loosely appressed hairy, adaxially glabrous, apex rounded to subacute. Racemes densely 10- to many flowered, elongating with age; peduncle 6–22 cm, glabrous; bracts greenish, narrowly elliptic, 5–8 mm, white or black ciliate, apex acute. Calyx 6–8 mm, outside very sparsely or toward apex loosely white and more densely black hairy or nearly glabrous, inner side of tube at least in upper 1/2 densely covered with appressed black or more rarely white hairs; teeth unequal, 0.2–1.5 mm. Petals yellow or purplish; standard ovate to elliptic, 18–19 × 7–10 mm; wings 17–18 mm; keel 15–16 mm. Legumes with a black hairy stipe 6–10 mm, narrowly ellipsoid, 2–2.5 cm, ca. 4 mm high and ca. 5 mm wide, slightly keeled ventrally, widely flattened dorsally, apex long acuminate into a short hooked beak; valves papery, rather densely covered with nearly spreading, predominantly black hairs 0.1–0.2 mm.

• 1800–2600 m. Gansu, Hebei, Ningxia, Shanxi.

31. *Astragalus monadelphus* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 32. 1877.

单蕊黄耆 dan rui huang qi

Astragalus luteus Ulbrich.

Plants 20–60 cm tall, with mostly white hairs 0.4–1 mm. Stems at base 1.5–3 mm thick, glabrous or nearly so. Leaves 7–12 cm, nearly sessile; stipules 8–16 mm, often reflexed, sparsely ciliate; rachis glabrous or nearly so; leaflets in (4–)6–8 pairs, narrowly elliptic to narrowly ovate, 1.2–3.5 × 0.5–1.3 cm, abaxially gray-green and sparsely hairy, adaxially dull green and glabrous, apex rounded or shortly acuminate and minutely mucronulate. Racemes 1-sided, loosely many flowered; peduncle 6–12(–15) cm, erect, glabrous; bracts greenish, narrowly elliptic, 6–10 mm, white and black ciliate, apex acute. Calyx greenish to reddish, campanulate-tubular, 8–10 mm, tube glabrous or sometimes sparsely black hairy; teeth subulate, (2–)3–4 mm. Petals yellow; standard widely elliptic to widely obovate or nearly orbicular, (10–)12–13 × 5–6 mm; wings (10–)11–12 mm; keel 10–11 mm. Stamen tube closed, monadelphous. Legumes with a white hairy stipe 5–6 mm, inflated ellipsoid, ca. 15 mm, ca. 6 mm high and wide, keeled ventrally, flattened dorsally; valves thinly membranous, loosely covered with ascending short white and black hairs.

• Gansu, Qinghai, Shaanxi, Sichuan, Yunnan.

32. *Astragalus mongholicus* Bunge, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 7, 11(16): 25. 1868.

蒙古黄耆 meng gu huang qi

Astragalus borealimongolicus Y. Z. Zhao; *A. membranaceus* Bunge (1868), not Moench (1794); *A. membranaceus* var. *mongholicus* (Bunge) P. K. Hsiao; *A. mongholicus* var. *dahuricus* (Candolle) Podlech; *A. penduliflorus* Lamarck var. *membranaceus* Glehn; *A. propinquus* Schischkin; *A. purdomii* N. D. Simpson; *Phaca abbreviata* Ledebour; *P. alpina* Linnaeus var. *dahurica* Candolle; *P. macrostachys* Turczaninow.

Plants 25–60 cm tall, covered with hairs 1–1.5(–2) mm. Stems at base 2.5–3 mm thick, glabrous or sparsely to rarely loosely covered with \pm spreading white hairs up to 2 mm and with mostly shorter more appressed hairs. Leaves 6–15 cm, nearly sessile; stipules narrowly to very narrowly triangular, lower ones 8–10 mm, upper ones 4–5 mm, glabrous or ciliate; rachis sparsely to loosely appressed to spreading hairy; leaflets in 8–12 pairs, narrowly ovate to narrowly elliptic, 5–22 \times 3–11 mm, glabrous or on midvein abaxially and margins with nearly spreading hairs, apex widely rounded to shallowly emarginate. Racemes loosely many flowered, 4–5 cm, at fruiting time strongly elongated to 9–14 cm; peduncle 7–13 cm, sparsely white hairy; bracts greenish to whitish, narrowly triangular to linear, 3–6 mm, white and black hairy. Bracteoles sometimes present, whitish, linear, ca. 0.5 mm. Calyx campanulate-tubular, 5–9 mm, glabrous or sparsely covered with short ascending black hairs; teeth sometimes also with longer white hairs 0.5–1.5 mm. Petals yellow, rarely lilac; standard widely elliptic, 13–20 \times 7–9 mm; wings 12–17 mm; keel 11–16 mm. Legumes with a slender stipe 6–9(–15) mm, obliquely ellipsoid to nearly semicircular as seen from side, with strongly curved dorsal side and slightly curved to nearly straight ventral side, 2–3 cm, 8–12 mm high and 3–4 mm wide, sharply keeled ventrally, narrowly rounded dorsally, apex shortly acuminate; valves membranous, glabrous or loosely covered with very short appressed black or more rarely white hairs.

Steppes, meadows, xerophytic shrubs, coniferous forests, montane zone; 800–2000 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia (Far East, Siberia)].

33. *Astragalus muliensis* Handel-Mazzetti, Symb. Sin. 7: 554. 1933.

木里黄耆 mu li huang qi

Plants up to 60 cm tall, with appressed to subappressed hairs 0.2–0.3 mm. Stems several, at base ca. 2 mm thick, subglabrous or sparsely covered with mainly black hairs. Leaves 6–10 cm, upper ones nearly sessile, lower ones with petiole up to 2 cm; stipules very narrowly triangular, 5–6 mm, glabrous or ciliate; rachis sparsely subappressed hairy; leaflets in 5–8 pairs, narrowly ovate to narrowly elliptic, 10–22 \times 4–8 mm, abaxially covered sparsely to loosely with appressed hairs 0.3–0.8 mm, adaxially glabrous, apex widely rounded to shallowly notched. Racemes loosely 12–15-flowered, 3–4 cm, at fruiting time elongated; peduncle 8–15 cm, sparsely to loosely covered with appressed to ascending short black hairs; bracts whitish membranous, filiform to linear-acute, 3–4 mm, sparsely black hairy. Calyx campanulate, 4.5–5 mm, rather densely covered with subappressed black and sometimes a few white hairs; teeth slightly unequal, 1–2 mm. Petals blue or bluish violet with yellowish base; standard obovate, 10–11 \times 5–6 mm; wings 9–10 mm; keel ca. 8 mm. Legumes (unripe) with a long slender stipe, acute at both ends; valves densely brownish hairy.

• Sichuan, Xizang, Yunnan.

34. *Astragalus neomonodelphus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 263. 1940.

新单蕊黄耆 xin dan rui huang qi

Plants 25–50 cm tall, vegetative parts glabrous. Stems solitary to mostly several, ca. 3 mm thick. Leaves 5–10 cm, nearly sessile; stipules ovate, 11–15 mm; leaflets in 4–7 pairs, narrowly elliptic or rarely elliptic, (7–)10–30 \times (3–)4–10 mm, apex obtuse. Racemes densely 5–16-flowered; rachis black hairy; peduncle 4.5–12 cm, glabrous; bracts greenish, 5–9 mm, white and black ciliate. Calyx greenish, shortly tubular, 8–9 mm, glabrous; teeth unequal, 2 adaxial triangular, 1–1.5 mm, 3 abaxial narrowly triangular, 1.5–3 mm. Petals yellow, often blackish when dry; standard obovate to widely rhombic-obovate to sometimes wider than long, 16–17 \times 8–11 mm; wings 15–16 mm; keel 15–16 mm. Stamen tube closed, monadelphous. Legumes with a stipe 7–8 mm, pendulous, ellipsoid, 1.8–2.5 cm, 6–8 mm high and ca. 4 mm wide, keeled ventrally and dorsally; valves papery, rather densely covered with appressed to subappressed black hairs 0.1–0.3 mm.

• Alpine zone; 3400–4700 m. Yunnan.

35. *Astragalus petrovii* N. Ulziykhtag, Novosti Sist. Vyssh. Rast. 30: 109. 1996.

肃南黄耆 su nan huang qi

Plants 60–90 cm tall. Stems up to 7 mm thick, glabrous or with some subappressed to spreading hairs 0.8–1.5 mm. Leaves 6–8 cm, subsessile; stipules 4–11 mm, often reflexed, ciliate; rachis sparsely hairy like stem; leaflets in 8–11 pairs, narrowly ovate to narrowly elliptic, 10–15 \times 4–6 mm, abaxially loosely and adaxially sparsely covered with appressed to subappressed hairs 0.3–1 mm, apex rounded to obtuse. Racemes 3–6 cm, rather densely (10–)15–25-flowered; peduncle 6–15 cm; bracts greenish, narrowly triangular, 3–5 mm, white ciliate. Calyx campanulate, 4–6 mm, loosely, in upper margins and teeth densely, covered with appressed to subappressed predominantly black hairs 0.2–0.3 mm; teeth unequal, triangular, 0.3–1 mm. Petals dark purplish to blackish violet; standard obovate, ca. 13 \times 7 mm; wings ca. 12 mm; keel 11–11.5 mm. Legumes with a stipe 3–5.5 mm, \pm spreading, obliquely ellipsoid, 3–3.5 cm, ca. 10 mm high and ca. 4 mm wide, obtusely keeled ventrally, narrowly rounded dorsally, with a beak 1–1.5 mm; valves membranous, with very short, appressed, black or white hairs 0.05–0.08 mm.

• 2600–3100 m. Gansu.

36. *Astragalus przewalskii* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 32. 1877.

黑紫花黄耆 hei zi hua huang qi

Plants 30–80 cm tall, with subappressed hairs 0.2–0.6 mm. Stems solitary or several, 1–3 mm thick, in lower 1/2 or 2/3 leafless, loosely hairy. Leaves 5–12 cm; stipules membranous, 4–8 mm, with \pm spreading black and white hairs; petiole short, like rachis subappressed white and black hairy; leaflets in 4–8 pairs, narrowly ovate to narrowly elliptic, 8–35 \times 1–5(–8) mm, abaxially subappressed white hairy, adaxially glabrous, apex obtuse to subacute. Racemes 3–7 cm, rather densely 4–20-flowered; peduncle 4–11 cm, subappressed white and black hairy; bracts membranous, narrowly elliptic, 5–7 mm, white hairy. Calyx campanulate, 5–6 mm, densely covered with subappressed,

predominantly brownish to blackish hairs; teeth nearly equal, 1–2 mm. Petals blackish purple; standard widely rhombic-elliptic, ca. 11 × 7 mm; wings ca. 10 mm; keel ca. 9 mm. Ovary with a style shortly hairy below stigma. Legumes with a stipe 4–5 mm, ovoid to ellipsoid, 15–30 mm, 5–6 mm high and wide; valves thinly membranous, loosely covered with ascending to spreading black hairs 0.1–0.3 mm.

- Subalpine to alpine zones. Gansu, Qinghai, Sichuan, Xinjiang.

37. *Astragalus purpurinus* (Y. C. Ho) Podlech & L. R. Xu, *Novon* 14: 221. 2004.

淡紫花黄耆 dan zi hua huang qi

Astragalus membranaceus Bunge var. *purpurinus* Y. C. Ho, *Bull. Bot. Lab. N. E. Forest. Inst., Harbin* 1980(8): 54. 1980; *A. membranaceus* f. *pallidipurpureus* Y. C. Ho; *A. membranaceus* subsp. *pallidipurpureus* (Y. C. Ho) X. Y. Zhu & C. J. Chen; *A. membranaceus* f. *purpurinus* (Y. C. Ho) K. T. Fu; *A. penduliflorus* Lamarck var. *pallidipurpureus* (Y. C. Ho) X. Y. Zhu.

Plants at least 60–70 cm tall, with hairs 0.3–0.5(–1.5) mm. Stem at base up to 8 mm thick, glabrous or with scattered spreading hairs up to 1.5 mm. Leaves 5–9 cm, nearly sessile; stipules 4–10 mm, glabrous or ciliate; rachis sparsely covered with spreading hairs up to 1 mm; leaflets in 3–9 pairs, narrowly ovate to narrowly elliptic, 10–17 × 3–7 mm, both surfaces loosely covered with appressed to subappressed hairs 0.3–1 mm, apex rounded to minutely acuminate. Racemes 4–5 cm, loosely many flowered, soon elongating up to 10 cm; peduncle 5–13 cm, sparsely to loosely covered with appressed to ± spreading white hairs; bracts green, linear-subulate, 5–8 mm, mainly white ciliate. Bracteoles whitish, linear, 0.5–1 mm. Calyx campanulate, 4(–5) mm, tube loosely covered with subappressed black hairs up to 0.3 mm and with a few long white hairs; teeth 0.3–1 mm. Petals lilac or dark purplish; standard obovate, ca. 13 × 7 mm; wings ca. 13 mm; keel ca. 12 mm. Legumes (immature) with a stipe 5–6 mm, narrowly ellipsoid; valves very densely covered with subappressed white and black hairs.

- Gansu.

38. *Astragalus sichuanensis* L. Meng, X. Y. Zhu & P. K. Hsiao, *Nordic J. Bot.* 24: 419. 2007.

蜀黄耆 shu huang qi

Plants ca. 60 cm tall. Stems erect, green-blue, sometimes dark reddish, glabrous. Leaves 10–13 cm; stipules narrowly ovate, 20–26 × 5–8 mm, usually with conspicuous veins, free, glabrous; petiole 1–4 cm; leaflets in 3–5 pairs, narrowly ovate, 26–42 × 10–17 mm, sparsely appressed hairy abaxially, glabrous adaxially. Racemes 5–10-flowered; peduncle 5–7 cm; bracts 11–14 × 2.5–4 mm, densely appressed white hairy. Calyx 9–11 mm, sparsely appressed white hairy, at teeth sometimes with a few black hairs mixed in; teeth triangular, very short and nearly inconspicuous. Petals yellow; standard elliptic, 20–22 × ca. 7 mm, gradually narrowed at base, apex emarginate; wings 20–21 mm; keel 18.5–20 mm. Ovary with a slender stipe 12–14 mm, glabrous. Legumes unknown.

- Meadows along riversides and shady hillsides or wet areas near wells. Sichuan.

39. *Astragalus tecti-mundi* Freyn, *Bull. Herb. Boissier, sér. 2, 4*: 456. 1904.

屋脊黄耆 wu ji huang qi

Plants 30–90 cm tall. Stems at base 3–7 mm thick, glabrous or more rarely sparsely to very sparsely appressed hairy. Leaves 7–15 cm, nearly sessile; stipules 1.2–2 cm, glabrous or ciliate; leaflets in 4–7 pairs, narrowly ovate to ovate, 2–6 × 0.8–3.5 cm, glabrous or sparsely hairy abaxially. Racemes 6–9 cm, loosely to rather densely many flowered; peduncle 5–14 cm; bracts greenish, 6–9 mm, glabrous or sparsely ciliate, soon falling. Calyx shortly tubular, 8–11 mm, sparsely covered with very short appressed black hairs or nearly glabrous; teeth widely triangular, 0.5–1.5 mm, mostly black hairy. Petals yellow; standard obovate to widely obovate, 15–25 × 7–10 mm; wings 14–22 mm; keel 14–20 mm. Legumes with a stipe 8–10 mm, narrowly ellipsoid, 2.5–4.5 cm, 4–6 mm high and 5–8 mm wide, slightly keeled ventrally, slightly widely grooved dorsally, acuminate at both ends; valves papery, loosely covered with short appressed black hairs, rarely glabrous when fully ripe.

Wet meadows, riversides, among shrubs in the subalpine and alpine zones; 2500–4200 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Pakistan, Tajikistan].

- 1a. Leaflets larger, 4 or 5 pairs, glabrous 39a. subsp. *tecti-mundi*
- 1b. Leaflets smaller, 5–7 pairs, sparsely to loosely appressed hairy abaxially 39b. subsp. *orientalis*

39a. *Astragalus tecti-mundi* subsp. *tecti-mundi*

屋脊黄耆(原亚种) wu ji huang qi (yuan ya zhong)

Leaflets larger, 4 or 5 pairs, glabrous.

Xinjiang [Afghanistan, India, Pakistan, Tajikistan].

39b. *Astragalus tecti-mundi* subsp. *orientalis* Podlech, *Sendtnera* 7: 178. 2001.

东方屋脊黄耆 dong fang wu ji huang qi

Leaflets smaller, 5–7 pairs, sparsely to loosely appressed hairy abaxially.

Xinjiang, Xizang [India, Kashmir, Pakistan].

40. *Astragalus tongolensis* Ulbrich, *Bot. Jahrb. Syst.* 50(Beibl. 110): 12. 1913.

东俄洛黄耆 dong e luo huang qi

Astragalus potaninii Komarov; *A. tongolensis* var. *breviflorus* H. T. Tsai & T. T. Yu; *A. tongolensis* var. *glaber* E. Peter; *A. tongolensis* var. *lanceolatodentatus* E. Peter; *A. veitchianus* N. D. Simpson.

Plants 30–70(–120) cm tall, sparsely hairy. Stems several, up to 7 mm thick, glabrous. Leaves 6–15 cm; stipules 15–30 mm, sparsely ciliate; petiole 1–5 cm, like rachis glabrous or very sparsely hairy; leaflets in 3–7 pairs, narrowly elliptic to

obovate, 1–6 × 0.4–2.5 cm, glabrous on both surfaces or sometimes abaxially loosely covered with nearly spreading white hairs 0.5–1 mm, apex obtuse. Racemes rather densely 8- to many flowered, later strongly elongating; peduncle 6–25 cm, glabrous or sparsely white hairy, toward raceme also black hairy; bracts whitish or greenish, linear, 5–10 mm, black ciliate, soon falling. Calyx turbinate-tubular, 6–9 mm, glabrous or sparsely hairy outside, on inner side in upper 1/2 of tube densely appressed black hairy, rarely also in upper 1/2 of outer side rather densely black hairy; teeth triangular, 1.5–2(–3) mm. Petals yellow, all of equal length; standard oblong to slightly obovate, 18–24 × 6–8 mm, somewhat constricted in middle. Legumes with a stipe 8–10 mm, narrowly ovoid, 2–2.5 cm × 5–6 mm, keeled ventrally, flattened dorsally, apex long acuminate; valves papery, very densely black hairy.

• *Picea* forests, among shrubs, meadows; 3400–4800 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

41. *Astragalus xitaibaicus* (K. T. Fu) Podlech & L. R. Xu, *Novon* 14: 222. 2004.

9. *Astragalus* sect. *Pseudosesbanella* Podlech, Feddes Repert. 117: 230. 2006.

扁莢組 *bian jia zu*

Plants with well-developed, prostrate to erect stems, subglabrous or with basifixed hairs. Stipules free. Bracts persistent. Bracteoles present, minute. Calyx campanulate. Stigma hairy. Legumes stipitate, distinctly to strongly compressed laterally, 1-locular or incompletely to completely 2-locular.

Three species: NE Afghanistan, W China, NW India, Kashmir, N Pakistan, Tajikistan; two species in China.

1a. Plants subglabrous; leaflets in 15–20 pairs; calyx and legumes glabrous 43. *A. hoffmeisteri*
1b. Plants covered with spreading hairs; leaflets in 6–11 pairs; calyx and legumes hairy 42. *A. falconeri*

42. *Astragalus falconeri* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 4. 1868.

侧扁黄耆 *ce bian huang qi*

Astragalus badachschanicus Borissova; *A. falconeri* var. *paucistrigosus* K. T. Fu; *A. hoffmeisteri* (Klotzsch) Ali var. *pilosulus* Ali.

Plants ± densely covered with mostly spreading white hairs. Stems several to many, 15–40 cm, prostrate to ascending or erect, 1–3.5 mm thick, hairy. Leaves 1.5–5 cm, subsessile; stipules 1.5–8 mm, semicordate or orbicular, hairy on both surfaces, apex ± long acuminate; rachis hairy; leaflets in 6–11 pairs, obovate, 3–11 × 1.5–6 mm, both surfaces rather densely covered with spreading white hairs, apex retuse to emarginate. Racemes at anthesis 2–3 cm, loosely 3–14-flowered, at fruiting time up to 5 cm; peduncle 2.5–6 cm, loosely to densely hairy; bracts linear, 1–2 mm, ciliate. Bracteoles 0.25–0.5 mm, often indistinct. Calyx 4.5–6 mm, sparsely to loosely covered with ± spreading, white or mixed white and dark violet hairs; teeth unequal, 1–3 mm. Petals pale yellow, at apex often pale to dark violet, all of nearly same length; standard widely elliptic to sub-orbicular, 9.5–13 × 6.5–9 mm, apex retuse to emarginate. Style below and at stigma densely hairy. Legumes with a stipe 4–7 mm, narrowly ellipsoid, 12–18 mm, 4–7 mm high, compressed laterally, keeled ventrally, deeply grooved dorsally, incom-

西太白黄耆 *xi tai bai huang qi*

Astragalus monadelphus Bunge subsp. *xitaibaicus* K. T. Fu, *Acta Bot. Boreal.-Occid. Sin.* 1(2): 17. 1981.

Plants 12–22 cm tall, totally glabrous with exception of inner side of calyx teeth and legumes. Stems several, up to 4 mm thick. Leaves 4–8 cm; stipules greenish membranous with narrowly hyaline margins, ovate, 12–15 mm; petiole 0.7–2 cm, rachis at base of leaflets mostly with stipel-like entire or fringed linear to narrowly triangular emergences 0.5–2.5 mm and/or with distinctly stalked minute glands; leaflets in 5–7 pairs, ovate to elliptic, 10–18 × 5–9 mm, apex rounded. Racemes 8–11-flowered; peduncle 4–7.5 cm; bracts narrowly ovate, ca. 10 mm. Calyx campanulate, 7.5–9 mm; teeth subulate, 2.5–3 mm, hairy on inner side. Petals yellow; standard obovate, ca. 11 × 5–6 mm; wings ca. 11 mm; keel ca. 10 mm. Stamen tube closed, monadelphous. Legumes with a stipe 5–6 mm, narrowly ellipsoid, ca. 1.5 cm, shortly attenuate at both ends; valves hairy.

• Alpine grasslands; 2800–3300 m. Shaanxi.

pletely to nearly completely 2-locular; valves thin, densely covered with spreading white hairs, glabrescent with age.

2400–3800 m. Xizang [NE Afghanistan, Kashmir, Pakistan, Tajikistan].

43. *Astragalus hoffmeisteri* (Klotzsch) Ali, *Kew Bull.* 13: 304. 1958.

疏花黄耆 *shu hua huang qi*

Phaca hoffmeisteri Klotzsch, *Bot. Ergebn. Reise Walde-mar*, 159. 1862; *Astragalus tsataensis* C. C. Ni & P. C. Li.

Plants 30–70 cm tall, subglabrous, with few, appressed, mostly white hairs. Stems up to 5 mm thick, branched, glabrous or at base loosely hairy. Leaves 4–13 cm; stipules 3–15 mm, semicordate or obliquely ovate, glabrous or sparsely ciliate; petiole short, like rachis glabrous or sparsely hairy; leaflets in 15–20 pairs, widely obovate to obcordate, 1.5–7.5(–13) × 1–8(–12) mm, glabrous or abaxially and margins sparsely hairy, apex retuse to emarginate. Racemes at anthesis 4–10(–14) cm, very loosely 5–20-flowered, at fruiting time elongating to 14–22 cm; peduncle at anthesis (4–)6–12 cm, later strongly elongating, glabrous or sparsely hairy; bracts 1–2.5 mm, ciliate. Bracteoles 0.25–1 mm. Calyx 3.5–5 mm, glabrous; teeth unequal, 1–2 mm, sparsely white hairy. Petals pale yellow, often with violet tip when dry, nearly all of same length; standard widely obovate, 8–11 × 5.5–7 mm, apex retuse to slightly

emarginate. Stigma densely hairy. Legumes with a stipe 5–8 mm, narrowly ellipsoid, 15–22 mm, 4–5.5 mm high, strongly compressed laterally, keeled ventrally, deeply grooved dorsally,

nearly 1-locular, with a narrow septum; valves thin, glabrous.

Dry stony slopes; 2400–4600 m. Xizang [NE Afghanistan, Kashmir].

10. Astragalus sect. Coluteocarpus Boissier, Fl. Orient. 2: 11. 1872.

泡果组 pao guo zu

Astragalus sect. *Robusti* E. Peter.

Plants with a well-developed, stout stem. Stipules free from petiole and from each other but often distinctly widened at base and to nearly fully amplexicaul. Racemes with a distinct peduncle, densely many flowered; bracts soon falling. Bracteoles present. Stigma hairy, sometimes only minutely. Legumes with a long stipe, glabrous, inflated, incompletely to completely 2-locular.

Six species: Afghanistan, China, Kazakhstan, Mongolia, Pakistan, Tajikistan; two species (one endemic) in China.

- 1a. Plants glabrous or only with a few scattered hairs; petals yellowish white; legumes 2.5–4 cm, with short beak, strongly compressed laterally 44. *A. dschimensis*
 1b. Plants in most parts at least sparsely hairy; petals violet; legumes 4–6.4 cm, with a beak 3–5 mm, inflated 45. *A. hoantchy*

44. Astragalus dschimensis Gontscharov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 30. 1947.

乌拉特黄耆 wu la te huang qi

Astragalus hedinii Ulbrich.

边陲黄耆 bian chui huang qi

Astragalus hoantchy Franchet subsp. *dschimensis* (Gontscharov) K. T. Fu.

Plants up to 100 cm tall or more; hairs short and a few long, appressed to spreading, white, in inflorescence also dark brown. Stem 4–8 mm thick, erect, loosely to rather densely covered with ± spreading rigid hairs 0.8–2(–2.5) mm. Leaves 10–24 cm, subsessile; stipules 6–11 mm, often spreading or reflexed, with long, spreading, white or white and blackish hairs; rachis sparsely to loosely white hairy; leaflets in 7–11 pairs, widely elliptic, 7–26 × 4–20 mm, glabrous or abaxially sparsely to loosely white hairy, apex truncate to retuse, with a minute but distinct cusp. Racemes 1.5–6 cm, rather densely 10–17-flowered, elongating in fruit to 8–10 cm; peduncle at anthesis 8–12 cm, elongating up to 20 cm with age, glabrous or with hairs 1–3 mm; bracts soon falling, 4–10 mm, ciliate. Bracteoles 0.5–6 mm. Calyx 11–13 mm, at base with dark brownish hairs, in upper part nearly glabrous; teeth unequal, 2–3.5 mm. Petals purplish, pink, or violet; standard ovate or elliptic, 19–26 × 11–14 mm, apex emarginate; wings 19–26 mm; keel 17–23 mm. Stigma covered with white hairs up to 1 mm. Legumes with a stipe 10–14 mm, narrowly ellipsoid, 4.5–6.4 cm, 0.8–1.4 cm high and wide, keeled ventrally, grooved dorsally, with a beak 3–5 mm, incompletely to completely 2-locular; valves thin, glabrous.

Plants 30–65 cm tall, glabrous or with a few scattered white or black spreading hairs 1–2 mm. Stem up to 6 mm thick. Leaves 12–27 cm; stipules 6–10(–15) mm, widely triangular-ovate, at base unilaterally auriculate; petiole 0.6–3 cm; leaflets in 7–10(–14) pairs, widely elliptic to widely obovate, (5–)10–17 × (4–)8–15 mm, apex rounded to emarginate. Racemes 7–15 cm, at fruiting time up to 25 cm, loosely 6–15-flowered; peduncle 12–17 cm; bracts soon falling, whitish membranous, 5–7 mm. Bracteoles linear, 1–2 mm. Calyx 10–13 mm; teeth unequal, 3–5 mm. Petals pale yellowish white, nearly of equal length; standard widely ovate, 20–25 × 11–13 mm, apex emarginate. Style below stigma with very short white hairlets. Legumes with a stipe 10–15 mm, obliquely narrowly ellipsoid, (2.5–)3.5–4 cm, 8–10 mm high, compressed laterally, keeled ventrally, narrowly rounded dorsally, with a short beak, incompletely to nearly completely 2-locular; valves thin, glabrous.

900–2500 m. Xinjiang [Kazakhstan, Mongolia].

● 1400–2400 m. Gansu, Nei Mongol, Ningxia, Qinghai.

45. Astragalus hoantchy Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 5: 238; Pl. David. 1: 86. 1883.

11. Astragalus sect. Chlorostachys Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 27. 1868.

绿穗组 lü sui zu

Astragalus sect. *Diplothea* Bunge; *A. sect. Nigricantes* N. D. Simpson.

Plants perennial, caulescent, with ± long stems; hairs basifixed, white or dark brown to blackish brown. Leaves nearly sessile or with a short petiole; stipules free from petiole, mostly green or greenish, vaginate-connate behind stem or free from each other. Racemes mostly several in 1 stem, with a long peduncle, densely (1–)4- to many flowered; bracts persistent or early falling. Flowers pedicellate. Bracteoles often present. Calyx campanulate to shortly tubular, slightly obliquely gibbous at base, obliquely cut at mouth. Petals yellow or violet; standard rounded to emarginate; keel often longer than wings. Ovary stipitate; style and stigma glabrous. Legumes subsessile to distinctly stipitate, mostly ± keeled ventrally, rounded, obtusely keeled or grooved dorsally, 1-locular or incompletely to completely 2-locular.

Thirty-five species: Afghanistan, Bhutan, China, India, Japan, Kashmir, Myanmar, Nepal, Pakistan; 20 species (14 endemic) in China.

- 1a. Stipules 30–70 mm, behind stem connate up to top 63. *A. stipulatus*
- 1b. Stipules shorter, not connate up to top, if shortly connate, then considerably shorter.
- 2a. Stipules 10–45 mm, 2 of 1 leaf often strongly unequal 53. *A. graveolens*
- 2b. Stipules at most up to 20(–25) mm but mostly distinctly shorter, equal.
- 3a. Stipules of main stem high connate behind stem.
- 4a. Bracts 2–3 mm; calyx 8–10 mm, glabrous 61. *A. moupinensis*
- 4b. Bracts 5–6 mm; calyx 6–7 mm, loosely to densely white and black hairy 54. *A. hancockii*
- 3b. Stipules of main stem free from each other, sometimes shortly connate in leaves of lateral branches or in front of petiole.
- 5a. Leaflets hairy adaxially, sometimes in some leaves glabrous.
- 6a. Leaflets 8–10 × 4–5 mm; rachis and peduncle covered with ± spreading hairs 59. *A. matiensis*
- 6b. Leaflets distinctly larger, at least 10 mm and up to 35(–40) mm; rachis and peduncle covered with appressed to slightly ascending hairs.
- 7a. Stem 1–3 mm in diam.; calyx 4–6.5 mm, teeth 0.5–1.5 mm or sometimes indistinct 49. *A. chlorostachys*
- 7b. Stem (2–)4–6(–8) mm in diam., often hollow; calyx 6–9 mm, at least longer teeth 1.5–3 mm.
- 8a. Plants in vegetative parts with white hairs only 55. *A. khasianus*
- 8b. Plants in vegetative parts with white and black or predominantly blackish brown hairs.
- 9a. Stem unbranched; stipules all free; bracts persistent; stigma glabrous 48. *A. chengkangensis*
- 9b. Stems strongly branched; stipules in non-flowering lateral branches often connate behind stem or in front of petiole; bracts soon falling; stigma shortly papillose 50. *A. concretus*
- 5b. Leaflets of all leaves glabrous adaxially.
- 10a. Plants completely glabrous, only leaflet just after development abaxially sparsely hairy but soon also glabrous 46. *A. basiflorus*
- 10b. Plants hairy at least in parts when fully developed.
- 11a. Calyx glabrous or only between and at teeth sparsely and shortly ciliate.
- 12a. Leaflets in 5–7 pairs; peduncles 14–18 cm; calyx purple red; petals reddish brown; ovary densely black hairy 57. *A. lamalaensis*
- 12b. Leaflets in (6–)8–18 pairs; peduncles up to 4.5 cm; calyx not purple red; petals yellow to greenish yellow; legumes glabrous.
- 13a. Stipules in main stem ca. 5 mm, in lateral branches 2–3 mm; leaflets 4–7 mm, truncate to retuse; bracts 1–3 mm; calyx ca. 4 mm; standard ca. 9 × 5 mm 47. *A. brachytrichus*
- 13b. Stipules 6–16 mm; leaflets 8–15 mm, rounded; bracts 4–5 or 6–12 mm; calyx at least 4 mm but mostly longer; standard 11–13 × ca. 7 mm.
- 14a. Bracts 4–5 mm; calyx 4–6 mm, glabrous, teeth ca. 1.5 mm; legumes with a stipe ca. 4 mm, ca. 12 mm, ca. 5 mm high 58. *A. lucidus*
- 14b. Bracts 6–12 mm; calyx 6–10 mm, teeth 2–4 mm, between and at teeth shortly black ciliate; legumes with a stipe 5–11 mm, 10–20 mm, 6–12 mm high 60. *A. minshanensis*
- 11b. Calyx hairy.
- 15a. Calyx 9–11 mm, with teeth 4–5 mm; standard ca. 18 mm 65. *A. zadaensis*
- 15b. Calyx at most 9 mm but mostly distinctly shorter, teeth up to 3 mm; standard shorter, up to 15 mm.
- 16a. Bracts 1.5–3 mm; calyx 3–5 mm; bracteoles absent.
- 17a. Stems in lower parts rather densely covered with spreading white hairs 0.5–1 mm and with a few appressed black hairs 0.3–0.4 mm, partly glabrescent and in older parts to completely glabrous, in upper parts sparsely to loosely covered with short appressed black hairs 0.3–0.5 mm; petals cream, sometimes flushed with violet; standard ca. 13 × 5 mm, with slightly distinct short tongue-like tip, below middle slightly constricted 62. *A. rhododendrophilus*
- 17b. Stems glabrous at base, in upper parts rather densely covered with curly subappressed hairs 0.1–0.25 mm; petals yellow; standard 9–11 × 5.5–7.5 mm, rhombic-ovate 56. *A. kialensis*
- 16b. Bracts at least 4 mm and up to 10(–17) mm; calyx longer; bracteoles often present.
- 18a. Stems strongly branched; stipules in non-flowering lateral branches often connate behind stem or in front of petiole; bracts soon falling; stigma shortly papillose 50. *A. concretus*
- 18b. Stems not strongly branched; stipules all free from each other; stigma glabrous.
- 19a. Leaflets in 7–9 pairs; petals cream, sometimes flushed with red; stipules 5–7 mm 64. *A. tumbatsicus*
- 19b. Leaflets in at least 10 but mostly in distinctly more pairs; petals yellow; stipules 8–16 mm.
- 20a. Stems 1.5–2 mm thick; bracts glabrous; bracteoles, if present, 0.4–1 mm; stipules glabrous or very sparsely ciliate 51. *A. dumetorum*

- 20b. Stems 2–6 mm thick; bracts black hairy or white ciliate; bracteoles mostly present, 1.5–3 mm; stipules sparsely to loosely hairy or long ciliate.
- 21a. Stipules sparsely to loosely white and black hairy; leaflets in 15–19 pairs; bracts predominantly black hairy, persistent; calyx 5–6 mm; standard 10–12 mm; legumes with a short stipe 52. *A. forrestii*
- 21b. Stipules long spreading ciliate; leaflets in 10–13 pairs; bracts white ciliate, soon falling; calyx 6–8 mm; standard 13–15 mm; legumes with a stipe 5–7 mm 55. *A. khasianus*

46. *Astragalus basiflorus* E. Peter, Acta Horti Gothob. 12: 65. 1938.

地花黄耆 di hua huang qi

Plants ca. 30 cm tall, glabrous with exception of leaflets and inner side of calyx teeth. Stems ascending to procumbent, 1–1.2 mm thick. Leaves 6–11 cm; stipules 6–10 mm, free; petiole 1.5–2.5 cm; leaflets in 7–11 pairs, ± elliptic, 6–13 × 2–7 mm, when young covered abaxially with ± spreading asymmetrically bifurcate to basifixed white hairs 0.7–1.5 mm, very soon glabrescent and later completely glabrous, apex rounded to subacute, mostly with a minute cusp. Racemes densely 5–8-flowered; peduncle in axil of lower leaves only, 2.5–6 cm; bracts 6–10 mm. Bracteoles 1–2 mm, soon falling. Calyx 8–9 mm; teeth unequal, 2.5–3 mm, glabrous outside, with black basifixed hairs on inner side. Petals ?purplish; standard narrowly obovate, 13–14 × ca. 4 mm; wings 12–13 mm; keel 12–13 mm. Legumes (unripe) with a stipe ca. 10 mm, ellipsoid-curved, ca. 20 mm, ca. 6 mm high, laterally compressed, acutely keeled ventrally, deeply grooved dorsally.

- About 2300 m. Gansu, Qinghai.

This is a little known species and is provisionally assigned to this section.

47. *Astragalus brachytrichus* Podlech & L. R. Xu, Novon 17: 232. 2007.

短毛黄耆 duan mao huang qi

Plants at least 35 cm tall (basal parts missing). Stem branched, ca. 1.5 mm thick, glabrous, those of lateral branches sparsely covered with subappressed white hairs 0.15–0.3 mm. Leaves 3–7 cm; stipules ca. 5 mm, in lateral branches 2–3 mm, free, at margins and apex sparsely white and black hairy; petiole 0.5–1.5 cm, like rachis sparsely to loosely hairy; leaflets in 8–15 pairs, elliptic, 4–7 × 2–3.5 mm, abaxially sparsely appressed hairy at margins and midvein, adaxially glabrous, apex truncate to retuse. Racemes 2–3 cm, rather densely 12–15-flowered; peduncle 3–4.5 cm, sparsely hairy; bracts 1–3 mm, sparsely hairy. Calyx ca. 4 mm, glabrous or with scattered black hairs only; teeth unequal, abaxial ca. 2 mm, adaxial ca. 1 mm. Petals greenish yellow; standard obovate, ca. 9 × 5 mm, apex emarginate; wings and keel ca. 8 mm. Legumes (unripe) with a stipe 3–4 mm, obliquely ellipsoid, 10–12 mm, incompletely 2-locular; valves membranous, glabrous.

- Xizang.

48. *Astragalus chengkangensis* Podlech & L. R. Xu, Novon 17: 232. 2007.

镇康黄耆 zhen kang huang qi

Plants ca. 110 cm tall. Stem ca. 4 mm in diam., hollow,

glabrous. Leaves 10–17 cm; stipules 1–1.5 cm, free, white hairy at margins and apex; petiole 2–2.5 cm, like rachis sparsely to rather loosely covered with subappressed to ascending, white and black hairs up to 1 mm; leaflets in 8–11 pairs, narrowly elliptic, 15–30 × 5–13 mm, abaxially loosely, at margins more densely, covered with white hairs 0.2–0.5 mm, adaxially mostly sparsely appressed hairy, apex rounded, minutely mucronulate. Racemes rather densely 12–22-flowered, elongating after anthesis; peduncle 8–12 cm, hairy like rachis; bracts 7–11 mm, loosely white and black hairy, ± persistent. Bracteoles 2–3 mm. Calyx ca. 8 mm, rather densely covered with subappressed to ascending, predominantly black hairs 0.2–0.8 mm; teeth ca. 2 mm. Petals yellow; standard obovate, 16–17 × ca. 7 mm, slightly constricted below middle, claw ca. 5 mm, apex emarginate; wings and keel ca. 15 mm. Ovary with a stipe ca. 5 mm, linear, glabrous. Legumes unknown.

- About 2900 m. Yunnan (Zhenkang).

This species is in *Astragalus* sect. *Chlorostachys* provisionally because it is not clear if the fruit is 1- or 2-locular. In habit and in most characters, it resembles *A. dumetorum* in *A.* sect. *Chlorostachys*. It does not resemble any species with a glabrous ovary in *A.* sect. *Cenantrum*.

49. *Astragalus chlorostachys* Lindley, Trans. Hort. Soc. London 7: 249. 1830.

绿穗黄耆 lü sui huang qi

Astragalus bakeristrobiliferus H. Ohashi; *A. microdontus* Baker; *Hedysarum strobiliferum* Baker (1876), not Linnaeus (1753).

Plants 40–100 cm tall, with appressed to spreading, white to dark brown hairs. Stems 1–1.5 mm thick, erect, hairy, often glabrescent with age. Leaves 6–17 cm; stipules 3–13(–16) mm, narrowly triangular to ovate, mostly spreading, free or in lateral branches sometimes shortly vaginate-connate behind stem, hairy; petiole (0.4–)1.6–2.5 cm, like rachis glabrous or hairy; leaflets in 6–11(–13) pairs, elliptic, 9–40 × 4–20 mm, both surfaces loosely to rather densely covered with appressed to subappressed white or yellowish hairs, adaxially sometimes glabrescent, apex obtuse to slightly retuse. Racemes densely many flowered, later elongating to 4–11(–14) cm; peduncle 4–8 cm, elongating up to 13 cm with age, with short hairs; bracts soon falling, 3–8 mm, hairy. Bracteoles 0.25–1.5 mm, sometimes absent. Calyx 4–6.5 mm, densely covered with appressed to ascending, dark brown and white hairs; teeth mostly unequal, triangular, 0.5–1.5 mm, sometimes indistinct. Petals pale yellow, all nearly of same length; standard elliptic to rhombic-elliptic or obovate, 10–13 × 4–6(–7) mm, apex retuse to emarginate. Style with glabrous or very shortly hairy stigma. Legumes with a stipe 6–9 mm, narrowly ellipsoid to oblong, 15–31 mm, 3.5–5.5 mm high and wide, keeled ventrally and dorsally, with a beak

2–4 mm, incompletely to completely 2-locular; valves thin, glabrous.

1800–4400 m. Xizang [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan].

50. *Astragalus concretus* Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

合生黄耆 he sheng huang qi

Astragalus vicioides Baker (1876), not Ledebour (1831); *A. xiphocarpus* Bunge.

Plants 50–100 cm tall, hairy. Stems 3–8 mm thick, mostly strongly branched, covered rather densely with predominantly dark brownish hairs. Leaves 8–20 cm; stipules membranous, soon falling, 7–25 mm, in lateral branches often vaginate-connate behind stem or connate before petiole up to 10 mm, sparsely to loosely hairy or glabrous; petiole short, like rachis, with white and dark brown hairs; leaflets in 10–14 pairs, oblong to narrowly elliptic, 12–30(–40) × 4–10(–12) mm, abaxially loosely hairy, adaxially glabrous or sparsely to loosely appressed hairy, apex obtuse to slightly retuse. Racemes 2–5 cm, densely 8–32-flowered; peduncle 4–10 cm, predominantly dark brown hairy to nearly glabrous; bracts soon falling, 4–10(–17) mm, white and dark hairy. Bracteoles 1–4 mm. Calyx 6–9 mm, rather densely covered with appressed to ascending predominantly dark brown hairs; teeth mostly unequal, 1–3 mm. Petals yellow; standard obovate, 11–15 × 5–7 mm, apex indistinctly emarginate; wings 12–15 mm; keel 11–13 mm. Stigma with very short hairs. Legumes with a stipe 6–9 mm, narrowly ellipsoid, straight or distinctly curved, 25–44 mm, 3.5–6 mm high and 3–4.5 mm wide, keeled ventrally, slightly grooved dorsally, with a conspicuous beak 6–11 mm, 2-locular; valves thin, yellowish to blackish brown, glabrous.

2500–4000 m. Xizang [Bhutan, India, Nepal].

51. *Astragalus dumetorum* Handel-Mazzetti, Symb. Sin. 7: 555. 1933.

灌丛黄耆 guan cong huang qi

Plants 30–90 cm tall, very sparsely to sometimes loosely covered with subappressed hairs 0.3–0.5 mm. Stems several, 1.5–2 mm thick, ascending, simple or with short non-flowering lateral branches, glabrous or to loosely hairy. Leaves 7–17 cm; stipules 8–15 mm, glabrous or ciliate; petiole short, like rachis very sparsely white and black hairy; leaflets in 12–16 pairs, narrowly elliptic, 5–18 × 3–8 mm, abaxially hairy at margins and at midvein or all over, adaxially glabrous, apex rounded to truncate. Racemes shortly cylindric, 3–6 cm, densely many flowered, in fruit elongated up to 15 cm; peduncle 6–11 cm, sparsely white and black hairy or subglabrous; bracts 5–8 mm, glabrous. Bracteoles sometimes present, 0.4–1 mm, like bracts soon falling. Calyx ca. 6 mm, at base densely, otherwise sparsely, or all over rather densely, white or black hairy; teeth mostly unequal, 1.5–3 mm. Petals yellow; standard widely obovate, 10–11 × ca. 7 mm, emarginate; wings and keel 9–10 mm. Stigma glabrous. Legumes with a stipe 6–7 mm, obliquely ellipsoid, 11–17 mm, 7–8 mm high and 3–4 mm wide, keeled

ventrally, slightly grooved dorsally, with a curved beak 2–4 mm, 2-locular; valves thin, brown to blackish, glabrous.

• 3900–4400 m. Sichuan, Xizang, Yunnan.

52. *Astragalus forrestii* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 7: 124. 1913.

中甸黄耆 zhong dian huang qi

Plants 45–70 cm tall, with mostly ± curly hairs 0.2–0.5(–0.8) mm. Stems several, branched, to 6 mm thick, loosely to densely covered with very short black and somewhat longer white hairs. Leaves 8–15 cm, subsessile; stipules 8–12 mm, sparsely to loosely white and black hairy; rachis loosely to rather densely mostly black hairy; leaflets in 15–19 pairs, narrowly elliptic, 8–23 × 3–8 mm, abaxially loosely appressed mostly white hairy, adaxially glabrous. Racemes 4–7 cm, very densely many flowered, later elongating up to 10 cm; peduncle 3–8 cm, ± densely black hairy; bracts linear-acute, 7–10 mm, predominantly black hairy. Bracteoles sometimes present, linear, 2–3 mm. Calyx 5–6 mm, mostly glabrous at base, toward teeth with a few black hairs or all over ± loosely predominantly black hairy; teeth unequal, 1–2.5 mm. Petals green-yellow; standard rhombic-obovate, 10–12 × 6–7 mm, apex emarginate; wings and keel 9–10 mm. Legumes with a stipe up to 2 mm, 10–12 mm, inflated, 2-locular, glabrous.

• 2700–3300 m. Sichuan, W Yunnan.

53. *Astragalus graveolens* Buchanan-Hamilton ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

烈香黄耆 lie xiang huang qi

Astragalus bodinieri H. Léveillé; *A. rotundifolius* Royle ex Benth (1835), not Willdenow (1802).

Plants 60–90(–120) cm tall, very sparsely hairy. Stem 4–6.5 mm thick, erect, hollow, mostly branched, glabrous. Leaves 10–25 cm; stipules 1–4.5 cm, glabrous, 2 stipules of 1 leaf often distinctly different in form and length; petiole short, like rachis glabrous; leaflets in 4–8 pairs, ovate to obovate, 10–30 × 9–16 mm, glabrous or abaxially with a few appressed white hairs, apex obtuse to slightly retuse. Racemes at anthesis 5–10 cm, rather densely 20–50-flowered, later elongating to 15–30 cm; peduncle 5–8 cm, elongating up to 16 cm with age, glabrous; bracts narrowly triangular, soon falling, 2.5–7 mm, glabrous or ciliate. Bracteoles mostly absent, if present minute, ca. 0.5 mm. Calyx 8–10.5 mm, glabrous; teeth mostly unequal, 1–5 mm. Petals pale yellow; standard oblong or obovate, 15–19 × 5.5–8 mm, apex retuse to emarginate; wings 15–18 mm; keel 14–15.5 mm. Stigma glabrous or with a few short hairs. Legumes with a stipe 6–10 mm, narrowly ellipsoid, 2–5 cm, 4–8 mm high, compressed laterally, keeled ventrally, grooved dorsally, with a short beak, 2-locular; valves thin, glabrous.

Stony slopes, light coniferous forests; 500–2700 m. Yunnan [E Afghanistan, India, Nepal, Pakistan].

54. *Astragalus hancockii* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 471. 1880.

短花梗黄耆 duan hua geng huang qi

Astragalus saxicola Ulbrich.

Plants 20–35 cm tall, vegetative parts subglabrous, with hairs 0.3–0.5 mm. Stems at base up to 3 mm thick. Leaves 4–9 cm; lowest stipules acuminate ovate, ca. 6 mm, upper ones narrowly triangular, 8–12 mm, all or only lower ones high vaginate-connate behind stem; rachis subglabrous, only at insertion of leaflets mostly with a small tuft of short white or rarely blackish hairs; leaflets in 3–7 pairs, elliptic, 10–22 × 3–10 mm, abaxially grayish green with darker venation, adaxially dull green, apex rounded to emarginate. Racemes densely many flowered, strongly elongated, up to 12 cm in fruit; peduncle 8–14 cm, glabrous; bracts whitish, linear-acuminate, 5–6 mm, sparsely black hairy. Bracteoles sometimes present, minute. Calyx campanulate-tubular, 6–7 mm, loosely to densely covered with short blackish and whitish hairs; teeth 3–3.5 mm. Petals pale yellow to whitish or purplish; standard oblong to elliptic, 14–17 × 5–6 mm; wings 11–13 mm; keel 8–10 mm. Legumes with a stipe 5–6 mm, obliquely elliptic to nearly narrowly semicircular as seen from side, with strongly curved ventral edge and nearly straight dorsal edge, strongly compressed laterally, 10–15 mm, 5–6 mm high, sharply keeled ventrally, 1-locular; valves glabrous, brownish.

• Hebei.

55. *Astragalus khasianus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 27. 1868.

长果颈黄耆 chang guo jing huang qi

Astragalus duclouxii N. D. Simpson; *A. englerianus* Ulbrich; *A. englerianus* var. *gingdongensis* Z. G. Qian; *A. englerianus* var. *longiflorus* C. Chen & Z. G. Qian.

Plants 30–100 cm tall; hairs appressed to partly spreading, white, in inflorescence also dark brown. Stem 2–5 mm thick, branched, erect, hollow, glabrous or loosely hairy. Leaves 8–11.5 cm; stipules 8–16 mm, often nearly amplexicaul, at margins with long spreading hairs; petiole 1.4–2.6 cm, like rachis glabrous or sparsely hairy; leaflets in 10–13 pairs, narrowly elliptic, 12–28(–35) × 4–9(–12) mm, abaxially somewhat densely hairy, adaxially glabrous or sparsely to loosely hairy, apex obtuse. Racemes 4–8 cm, rather loosely 15–30-flowered; peduncle 6–18 cm, sparsely to loosely hairy; bracts soon falling, whitish membranous, 4–8 mm, white ciliate. Bracteoles subulate, 1.5–2.5 mm, soon falling. Calyx 6–8 mm, loosely to rather densely hairy; teeth unequal, 1–3 mm. Petals yellow or yellowish brown; standard oblong or elliptic, 13–15 × 6.5–7.5 mm, apex emarginate; wings 13–15 mm; keel 13–15 mm. Legumes with a stipe 5–7 mm, obliquely narrowly ellipsoid, 18–25 mm, 5–7.5 mm high, obtusely keeled ventrally, grooved dorsally, with a beak 2–4 mm, 2-locular; valves thin, glabrous.

1600–3500 m. Sichuan, Xizang, Yunnan [Bhutan, NE India, Myanmar].

56. *Astragalus kialensis* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 242. 1915.

苦黄耆 ku huang qi

Astragalus forrestii N. D. Simpson var. *minor* H. T. Tsai & T. T. Yu.

Plants 40–50 cm tall, appressed to subappressed, white

and dark brown hairy. Stem up to 2 mm thick, branched, erect, hollow, glabrous at base, upper parts rather densely covered with curly hairs 0.1–0.25 mm. Leaves 3.5–5.5 cm; stipules 3–5 mm, white and black ciliate; petiole short, rachis hairy like stem; leaflets in 10–18 pairs, narrowly elliptic, 3–8 × 1.5–3.5 mm, abaxially sparsely to loosely hairy, adaxially glabrous, apex obtuse. Racemes 2–3 cm, densely 10–15-flowered; peduncle 2–5 cm, hairy; bracts 1.5–2.5 mm, blackish brown hairy, persistent. Bracteoles subulate, 1–2 mm. Calyx 4–5 mm, with appressed blackish brown hairs; teeth unequal, 0.5–2 mm. Petals yellow; standard widely obovate, 9–11 × 5.5–7.5 mm, apex emarginate; wings 8–9 mm; keel 7.5–9 mm. Stigma glabrous. Legumes with a stipe 3–4 mm, obliquely narrowly ellipsoid, 6–13 mm, 3.5–4.5 mm high and wide, keeled ventrally, shallowly grooved dorsally, with a beak ca. 1 mm, 2-locular; valves glabrous.

• 3000–3900 m. Sichuan, Xizang, Yunnan.

57. *Astragalus lamalaensis* C. C. Ni, Acta Phytotax. Sin. 25: 232. 1987.

拉马拉黄耆 la ma la huang qi

Plants 30–40 cm tall. Stems 25–30 cm, nearly glabrous. Leaves 5–12 cm; stipules green, ovate, 8–18 × 3–7 mm, glabrous; petiole ca. 2 cm, like rachis glabrous to subglabrous; leaflets in 5–7 pairs, ovate to elliptic, 5–20 × 4–10 mm, hairy only on midvein abaxially. Racemes 5–8-flowered; peduncle 14–18 cm, glabrous; bracts narrowly triangular, black hairy. Calyx ca. 6 mm, campanulate, purple-red, nearly glabrous; teeth narrowly triangular, 2–3 mm. Petals reddish brown; standard obovate, 8–10 × ca. 6 mm, apex emarginate; wings nearly as long as standard; keel 7–9 mm. Ovary densely black hairy. Legumes unknown.

• About 4200 m. Xizang.

58. *Astragalus lucidus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 262. 1940.

光亮黄耆 guang liang huang qi

Plants 40–60 cm tall. Stem erect, up to 4 mm in diam., sparsely covered with white hairs ca. 0.3 mm or subglabrous. Leaves 6–12 cm; stipules 7–16 mm, free, glabrous; petiole 1–1.5 cm; leaflets in 9–16 pairs, narrowly elliptic to elliptic, 6–20 × 2.5–7 mm, abaxially at margin and at midvein sparsely hairy, adaxially glabrous, apex rounded. Racemes ca. 2.5 cm, 10–25-flowered; peduncle 3–4 cm; bracts membranous, narrowly elliptic, 4–5 × ca. 2 mm, sparsely hairy. Calyx 4–6 mm, glabrous or between and at teeth shortly black ciliate; teeth unequal, 1.5–3 mm. Petals greenish yellow; standard widely rhombic-obovate, ca. 11 × 7 mm, deeply incised; wings ca. 9 mm; keel ca. 8.5 mm. Legumes with a stipe 3–4 mm, obliquely ellipsoid, somewhat curved, ca. 12 mm, ca. 5 mm high and ca. 4 mm wide, incompletely 2-locular; valves thin, glabrous.

• 2700–3900 m. Sichuan, Xizang, Yunnan.

59. *Astragalus matiensis* P. C. Li, Acta Bot. Yunnan. 11: 294. 1989.

马蹄黄耆 ma ti huang qi

Plants 35–45 cm tall; hairs somewhat rigid, white, in inflorescence also black, 0.5–1 mm. Stem erect, ca. 2 mm thick, sparsely to rather densely covered with spreading hairs. Leaves 10–13 cm, subsessile; stipules 6–7 mm, free, sparsely to loosely hairy on both surfaces; rachis slender, loosely spreading hairy; leaflets in 10–12 pairs, narrowly elliptic to elliptic, 8–10 × 4–5 mm, abaxially loosely and adaxially sparsely covered with subappressed to ascending hairs, apex retuse. Racemes ca. 5 cm, rather loosely up to 20-flowered; peduncle ca. 10 cm, with spreading, white hairs; bracts green, acuminate ovate, 2–4 mm, mostly white hairy. Calyx 4–5 mm, loosely to rather densely covered with subappressed to ascending white and somewhat shorter black hairs; teeth unequal, 1.5–2.5 mm. Petals yellow or bluish purple, drying to yellowish; standard ovate, 12–14 × ca. 7 mm, apex deeply emarginate; wings 9–12 mm; keel 11–13 mm. Ovary with a stipe ca. 3 mm, densely white hairy; style and stigma glabrous. Legumes unknown.

- About 2800 m. Sichuan.

60. *Astragalus minshanensis* K. T. Fu, Acta Bot. Boreal.-Occid. Sin. 11: 341. 1991.

岷山黄耆 min shan huang qi

Astragalus xiqingshanicus Y. H. Wu.

Plants 15–20 cm tall, loosely caespitose, subglabrous, partly with scattered very short hairs. Stems several, ascending or erect, slender. Leaves 8–10 cm; stipules 8–12 mm; petiole 1.5–2.5 cm; leaflets in 13–18 pairs, narrowly elliptic to elliptic, 8–12 × 3–6 mm, abaxially sometimes at main nerves appressed hairy, ciliate, apex subobtusely. Racemes (1–)5–12-flowered; peduncle (1–)4–4.5 cm, sparsely appressed white hairy or subglabrous; bracts persistent, membranous, narrowly ovate, 6–12 mm, sparsely black ciliate. Calyx 6–10 mm, between and at teeth shortly black ciliate; teeth 2–4 mm. Flowers unknown. Legumes with a stipe 5–11 mm, obliquely inflated ellipsoid, 10–20 mm, 6–12 mm high and 5–7 mm wide, subobtusely ventrally, narrowly grooved dorsally, with a slender beak 1.5–2 mm, 2-locular; valves thinly leathery, glabrous or nearly so.

- About 4000 m. Gansu, Qinghai.

61. *Astragalus moupinensis* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 213; Pl. David. 2: 31. 1885.

天全黄耆 tian quan huang qi

Plants up to 100 cm tall, glabrous. Stem erect. Leaves 7–10 cm; stipules 10–15 mm, mostly high connate behind stem; petiole 1–2 cm; leaflets in 5–8 pairs, remote, elliptic to obovate, 7–15 × 4–7 mm, apex widely rounded. Racemes at anthesis to 5 cm, loosely 10- to many flowered, later strongly elongated; peduncle (3–)5–7 cm; bracts whitish membranous, linear-acute, 2–3 mm. Calyx 8–10 mm; teeth 2–3.5 mm. Petals pale yellowish to yellow; standard rhombic-elliptic, ca. 14 × 5 mm, apex obtuse; wings ca. 13 mm; keel ca. 11 mm. Legumes (immature) stipitate, attenuate at both ends, at least 20 mm.

- Sichuan, Yunnan.

62. *Astragalus rhododendrophilus* Podlech & L. R. Xu, Sendtnera 7: 170. 2001.

杜鹃黄耆 du juan huang qi

Plants 50–60 cm tall. Stem 1–3 mm in diam., hollow, sparsely to rather densely covered with ± spreading white hairs 0.5–1 mm and with appressed black hairs 0.3–0.4 mm, glabrescent with age. Leaves 5–8 cm, subsessile; stipules 5–9 mm, free, sparsely hairy; rachis slender, loosely covered with subappressed to ascending, predominantly black hairs 0.1–0.3 mm; leaflets in 10–14 pairs, narrowly elliptic, 5–13 × 1–3.5 mm, abaxially loosely appressed hairy, adaxially glabrous, apex rounded. Racemes 4–6 cm, loosely many flowered; peduncle 6–8 cm, predominantly black hairy; bracts whitish, ca. 3 mm, black hairy. Calyx 4–5 mm, loosely to rather densely covered with subappressed black hairs 0.3–0.6 mm and sometimes also with a few white hairs; teeth slightly unequal, 1–1.5 mm. Petals cream, sometimes flushed with violet, all of nearly same length; standard elliptic, ca. 13 × 5 mm, with a slightly to distinctly tongue-like emarginate tip. Legumes (immature) with a slender stipe ca. 5 mm, densely covered with ascending white and predominantly black hairs.

- About 4100 m. Xizang.

63. *Astragalus stipulatus* D. Don, Bot. Mag. 50: t. 2380. 1823.

大托叶黄耆 da tuo ye huang qi

Plants 60–180 cm tall, very scarcely hairy. Stem 3–8(–10) mm in diam., erect, hollow, glabrous. Leaves 20–35 cm; stipules leaflike, widely ovate, (20–)30–70 mm, behind stem connate up to top, free from petiole, glabrous or ciliate; petiole 3–5.5 cm, like rachis glabrous or sparsely white hairy; leaflets in (8–)11–20 pairs, narrowly ovate to narrowly oblong, (15–)20–55 × (4–)7–18 mm, abaxially loosely to rather densely covered with appressed to ascending white hairs, later glabrescent, adaxially glabrous, margins distinctly ciliate, apex obtuse to widely retuse. Racemes 6–25 cm, rather densely many flowered (up to more than 100); peduncle 4–10 cm, glabrous; bracts caducous, whitish membranous, 4–14 mm, hairy. Calyx 8–13 mm, glabrous or loosely to rather densely hairy; teeth unequal, 3–8 mm. Petals whitish yellow to yellow, sometimes fading violet; standard widely oblong to obovate, 12–15 × 6–8 mm, apex emarginate; wings 12.5–15 mm; keel 12–14 mm. Stigma glabrous or sparsely hairy. Legumes with a stipe 1–2 mm, narrowly ellipsoid to narrowly oblong, 18–32 mm, 4–6 mm high and wide, long acuminate, 2-locular; valves thin, yellowish to pale brown, glabrous.

- 1500–3700 m. Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

64. *Astragalus tumbatsicus* C. Marquand & Airy Shaw, J. Linn. Soc., Bot. 48: 171. 1929 [*tumbatsica*].

东坝子黄耆 dong ba zi huang qi

Plants 60–90 cm tall. Stem branched, ca. 3 mm in diam., hollow, glabrous in basal parts, otherwise sparsely covered with short appressed black hairs. Leaves on main stem 8–10 cm; stipules 5–7 mm, free, sparsely black ciliate; petiole 1–1.5 cm, like rachis sparsely to loosely appressed to spreading black hairy; leaflets in 7–9 pairs, elliptic, 10–24 × 4–9 mm, abaxially loosely and when young densely covered with short appressed white hairs, adaxially glabrous, apex rounded or slightly emar-

ginate. Racemes loosely many flowered; peduncle 6–10 cm, sparsely black hairy; bracts greenish, ovate to widely ovate, 4–7 mm, black and white hairy, very soon falling. Calyx 6–7 mm, loosely covered with short appressed to ascending black and white hairs; teeth unequal, 1–2.5 mm. Petals cream, sometimes flushed with red, all of same length; standard rectangular-oblong, 12–13 × 5–6 mm, apex incised. Ovary with a stipe 3–4 mm, spindle-like, glabrous, obviously with a narrow septum. Legumes with a slender stipe 2–5 mm, 10–12 mm, ca. 4 mm high and ca. 3 mm wide, keeled ventrally, widely and deeply grooved dorsally, with a beak 2–4 mm, nearly completely 2-locular; valves rather thin, glabrous.

3300–4100 m. Xizang, Yunnan [Bhutan, Nepal].

65. *Astragalus zadaensis* Podlech & L. R. Xu, Novon 17: 233. 2007.

札达黄耆 zha da huang qi

Plants more than 55 cm tall, vegetative parts covered with

appressed white hairs 0.2–0.5 mm. Stem erect, at base ca. 4 mm in diam., finely angular-sulcate, glabrous. Leaves 6–15 cm, nearly sessile; stipules of lower leaves unknown, of upper leaves ca. 5 mm, glabrous or very sparsely white and black hairy, soon falling; rachis glabrous or with scattered hairs only; leaflets in 6–8 pairs, elliptic, 10–20 × 5–12 mm, both surfaces glabrous or with scattered hairs only, apex acuminate-mucronulate. Racemes 5–7 cm, loosely 10–12-flowered; peduncle 7–10 cm, with scattered white and black hairs; bracts narrowly triangular to linear, ca. 2 mm, white and black hairy. Bracteoles 1–2 mm. Calyx 9–11 mm, sparsely covered with ascending to spreading black hairs 0.3–0.5 mm; teeth 4–5 mm. Petals pale lilac; standard ca. 18 × 8 mm; wings and keel ca. 17 mm. Legumes with a slender stipe 8–10 mm, narrowly ellipsoid, 20–25 mm, ca. 6 mm high, keeled ventrally, narrowly rounded dorsally, shortly acuminate, 2-locular; valves membranous, glabrous.

• About 3500 m. W Xizang (Zanda).

12. *Astragalus* sect. *Skythropos* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 255. 1915.

肾形子组 shen xing zi zu

Plants perennial, with basifixed white or dark brown to black hairs. Stems 2–10(–20) cm, rarely plants acaulescent. Leaves imparipinnate, with a distinct petiole; stipules free from petiole, lower ones sometimes shortly vaginate-connate behind stem, often scalelike and without leaves in basal parts of stems; leaflets in 4–17 pairs. Racemes with a rather long peduncle, 1–25-flowered. Bracteoles mostly absent. Petals yellow or violet. Stigma glabrous or hairy. Legumes stipitate, 1-locular.

Seven species: Bhutan, China, India, Nepal; six species (four endemic) in China.

1a. Petals yellow.

2a. Leaflets in 4–6 pairs 69. *A. nanfengensis*

2b. Leaflets in (5–)8–15 pairs.

3a. Plants mostly acaulescent, stems if present up to 1 cm; leaflets on both surfaces loosely to rather densely covered with subappressed white hairs up to 0.7 mm; bracts 3–4 mm; calyx 8–9 mm, with teeth 3–4 mm 66. *A. datunensis*

3b. Plants with stems 1–10 cm; leaflets adaxially sparsely to loosely hairy or glabrous, rarely densely hairy on both surfaces; bracts 4–10 mm; calyx 8–14.5 mm, with teeth 4–7.5 mm 71. *A. yunnanensis*

1b. Petals violet.

4a. Leaflets adaxially glabrous, abaxially sparsely hairy only at midvein and margins; calyx not violet suffused or red-brown 70. *A. skythropos*

4b. Leaflets adaxially hairy, if sometimes glabrous, then loosely to rather densely hairy abaxially; calyx violet suffused to red-brown.

5a. Stipules sparsely to loosely hairy, connate behind stem and sometimes before petiole, rarely free from each other; calyx 9–12.5 mm, strongly violet suffused to red-brown, teeth 4–7 mm; standard 16–26 mm; stigma glabrous 67. *A. kongrensis*

5b. Stipules only ciliate, all free from each other; calyx 7–9 mm, slightly violet suffused, teeth 2.5–4 mm; standard 13–16.5 mm; stigma hairy 68. *A. licentianus*

66. *Astragalus datunensis* Y. C. Ho, Bull. Bot. Lab. N. E. For-est. Inst., Harbin 1980(8): 57. 1980.

大通黄耆 da tong huang qi

Plants ca. 8 cm tall, nearly acaulescent. Stem ca. 1 cm, covered with subappressed white hairs up to 1 mm, partly glabrescent. Leaves 4–6 cm; stipules 5–8 mm, free; petiole 1–2 cm, rachis hairy like stem; leaflets in 10–13 pairs, elliptic, 4–6 × 2–4 mm, both surfaces rather densely covered with subappressed white hairs up to 0.7 mm, apex rounded to slightly

emarginate. Racemes loosely 4–6-flowered; peduncle 3–5 cm, hairy like stem; bracts narrowly elliptic, 3–4 mm, substipitate, white and black hairy. Calyx 8–9 mm, rather densely covered with white hairs up to 1.5 mm and with appressed, distinctly shorter black hairs; teeth 3–4 mm. Petals yellow; standard elliptic, ca. 15 × 7 mm, apex widely emarginate; wings ca. 14 mm; keel ca. 16 mm. Ovary with a glabrous stipe 3–4 mm, densely white and black hairy; style glabrous. Legumes (unripe) with a stipe ca. 4 mm, narrowly ellipsoid, with white hairs up to 2 mm.

• Qinghai.

67. *Astragalus kongrensis* Baker in J. D. Hooker, Fl. Brit. India 2: 120. 1876.

深紫萼黄耆 shen zi e huang qi

Plants 6–14 cm tall; hairs appressed to ± spreading, long, white, in inflorescence white and black or black. Stems often several, ascending to erect, 3–8 cm, at base 1.5–2 mm thick, branched, often zigzaglike bent, at base glabrous, in upper part loosely to rather densely hairy. Leaves 7–22 cm; stipules 4–15 mm, lower ones amplexicaul, free or behind stem and before petiole connate, upper ones narrowly triangular, sparsely to loosely spreading hairy; petiole 1.5–5 cm, like rachis, loosely to rather densely white hairy; leaflets in 7–15 pairs, elliptic to widely elliptic, 4–15 × 3–10 mm, abaxially loosely to rather densely hairy, at midvein often densely sericeous, adaxially glabrous or sparsely to loosely hairy, apex rounded to retuse. Racemes 1.5–3 cm, densely 6–16-flowered; peduncle 4–12.5 cm, appressed to ± spreading hairy; bracts narrowly triangular, 3–5 mm, loosely hairy. Calyx green, strongly violet suffused or red-brown, 9–12.5 mm, rather densely covered with long, appressed, mostly black hairs; teeth 4–7 mm. Petals (in dry state) violet to blue-violet; standard elliptic, 16–26 × 7–10 mm, apex emarginate; wings 16–20 mm; keel 16.5–19 mm. Ovary stipitate, densely white or white and black hairy; style and stigma glabrous. Legumes unknown.

Sichuan, Xizang, Yunnan [India (Sikkim)].

68. *Astragalus licentianus* Handel-Mazzetti, Oesterr. Bot. Z. 82: 247. 1933.

甘肃黄耆 gan su huang qi

Plants 10–20 cm tall; hairs appressed to ± spreading, thin, long, white, in inflorescence white and black or black. Stems mostly several, 2–5 cm, at base glabrous, in upper part covered with mostly spreading hairs. Leaves 3.5–11 cm; stipules 6–11 mm, long ciliate, basal ones vaginate-connate, leafless; petiole 1.5–3 cm, like rachis spreading hairy; leaflets in 10–16 pairs, ovate to elliptic, 5–10 × 3–6 mm, obtuse, both surfaces appressed gray sericeous. Racemes 1.5–3 cm, densely 8–18-flowered, at fruiting time elongated up to 11 cm; peduncle 4.5–10.5 cm, with white and black hairs; bracts narrowly triangular, 5–8 mm, hairy, often reflexed. Calyx 7–9 mm, rather densely covered with long, appressed to ascending, mostly black hairs; teeth 2.5–4 mm. Petals (in dry state) violet to blue-violet; standard widely elliptic, 13–16.5 × 6–8.5 mm, apex emarginate; wings 15–17 mm; keel 14–16 mm. Ovary with a stipe 3.5–4 mm, densely white or white and blackish hairy; style glabrous; stigma shortly hairy. Legumes (unripe) with a stipe 5–7 mm, more than 10 mm, densely covered with ascending black hairs ca. 0.5 mm.

• Gansu, Qinghai, Xizang.

69. *Astragalus nanfengensis* C. C. Ni, Acta Phytotax. Sin. 25: 233. 1987.

南峰黄耆 nan feng huang qi

Astragalus ludlowii Wenninger.

Plants 15–25 cm tall, with hairs 0.3–0.8(–1) mm. Stems

solitary or several, 4–20 cm, ascending to erect, loosely to rather densely covered with subappressed white hairs. Leaves 5–13 cm; stipules 10–20 × 3–8 mm, free, loosely white hairy; petiole 1.5–4 cm, like rachis loosely covered with subappressed to nearly spreading white and fewer black hairs; leaflets in 4–6 pairs, ovate to elliptic, 8–25 × 6–16 mm, abaxially pale gray-green and loosely subappressed hairy, adaxially dull green and glabrous or very sparsely hairy toward margins, apex obtuse to acute. Racemes short, 5–10-flowered, after anthesis somewhat elongating and up to 7 cm; peduncle 5–7 cm, loosely white or white and black hairy; bracts narrowly ovate, 8–15 mm, white and black hairy, apex acute. Calyx 12–16 mm, loosely covered with black hairs; teeth 3.5–6 mm. Petals yellow; standard elliptic, 20–25 × 9–10 mm, apex deeply emarginate; wings 18–22 mm; keel 17.5–20 mm. Stigma glabrous. Legumes (very young) long stipitate, ellipsoid, long acuminate at apex; valves densely covered with ascending black hairs.

• Xizang.

70. *Astragalus skythropos* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 31. 1877.

肾形子黄耆 shen xing zi huang qi

Astragalus skythropos var. *acaulis* Danguy; *A. weigoldianus* Handel-Mazzetti.

Plants 10–20 cm tall, subcaulescent; hairs white, in inflorescence also blackish brown. Stem 2–5 cm, 2–2.5 mm thick, glabrous or in upper part loosely spreading hairy. Leaves 5–16 cm; stipules 8–13 mm, lower ones vaginate-connate behind stem, without leaf, bractlike, upper ones narrowly triangular to oblong-elliptic, free, ciliate; petiole 2–4.5 cm, like rachis spreading hairy; leaflets in 7–13 pairs, ovate to elliptic, 4–12 × 3.5–9 mm, abaxially hairy only at midvein and margins, adaxially glabrous, apex acute. Racemes short, rather densely 8–13-flowered; peduncle 5–17 cm, appressed to spreading hairy; bracts 4–10 × 1–2 mm, white and black hairy. Calyx 8.5–9.5 mm, loosely covered with long, ascending, black hairs; teeth 3–5 mm, with white and black hairs. Petals bluish violet or violet; standard elliptic to ovate, 15.5–17.5 × 5.5–8 mm, slightly to deeply emarginate; wings 15.5–17.5 mm; keel 15–18 mm. Ovary with a stipe 3–5 mm, densely white or blackish brown hairy. Legumes (unripe) with a stipe 5–7 mm, more than 10 mm, densely covered with ascending black hairs ca. 0.5 mm.

• Gansu, Qinghai, Sichuan, Xinjiang, Yunnan.

71. *Astragalus yunnanensis* Franchet, Pl. Delavay. 162. 1890.

云南黄耆 yun nan huang qi

Plants 15–25 cm tall, subcaulescent to shortly caulescent; hairs spreading, white, in inflorescence also blackish brown. Stems several, 1–10 cm, 1–3 mm thick, ascending to erect, glabrous or in upper part sparsely to loosely hairy, in basal parts furnished with vaginate-connate whitish bracts. Leaves 5–16 cm; stipules 4–14 mm, lower ones widely ovate to elliptic, upper ones narrowly triangular, free, sparsely to loosely hairy; petiole 2–4.5 cm, like rachis glabrous or sparsely to loosely hairy; leaflets in 5–15 pairs, ovate to elliptic, 3–15 × 2.5–10 mm, abaxially loosely to densely villous, sometimes only at midvein and

margins, adaxially glabrous or sparsely to loosely, more rarely densely, villous, apex obtuse to acute, often with a distinct cusp 1–2 mm. Racemes 1–2.5 cm, rather densely 2–13-flowered, at fruiting time somewhat elongated up to 5 cm; peduncle 4–11 cm, mostly rather densely hairy; bracts 4–10 × 1–3 mm, mostly white hairy. Bracteoles sometimes present. Calyx 8–14.5 mm, densely hairy; teeth 4–7.5 mm. Petals pale yellow, sometimes slightly fading violet; standard widely elliptic to widely ovate, 14–21 × 7–13.5 mm, apex emarginate; wings 13–21 mm; keel 15–21 mm. Legumes with a stipe 3.5–8 mm, narrowly or widely ellipsoid, 12–23 mm, 6–8 mm high, keeled ventrally and dorsally, with a beak 2–3 mm; valves densely to rather densely covered with spreading white and black hairs.

Gansu, Henan, Qinghai, Shandong, Sichuan, Xizang, Yunnan [India, Nepal].

- 1a. Legumes narrowly ellipsoid,
15–23 mm 71a. subsp. *yunnanensis*
1b. Legumes widely ellipsoid,
12–15 mm 71b. subsp. *incanus*

71a. *Astragalus yunnanensis* subsp. *yunnanensis*

云南黄耆(原亚种) *yun nan huang qi* (*yuan ya zhong*)

Astragalus fenzelianus E. Peter; *A. tatsienensis* Bureau & Franchet; *A. tatsienensis* var. *kangrenbuchiensis* (C. C. Ni & P. C. Li) Y. C. Ho; *A. yunnanensis* f. *elongatus* N. D. Simpson; *A.*

yunnanensis var. *kangrenbuchiensis* C. C. Ni & P. C. Li; *A. yunnanensis* var. *tatsienensis* (Bureau & Franchet) P. C. Li & C. C. Li.

Leaflets abaxially loosely to densely villous, sometimes only at midvein and margins, adaxially glabrous or sparsely to loosely, more rarely densely, villous. Calyx densely hairy. Legumes with a stipe 4–8 mm, narrowly ellipsoid, 15–23 mm, 6–8 mm high.

Gansu, Henan, Qinghai, Shandong, Sichuan, Xizang, Yunnan [India, Nepal].

71b. *Astragalus yunnanensis* subsp. *incanus* (E. Peter) Podlech & L. R. Xu, *Novon* 17: 242. 2007.

灰毛云南黄耆 *hui mao yun nan huang qi*

Astragalus tatsienensis f. *incanus* E. Peter, *Acta Horti Gothob.* 12: 54. 1938; *A. tatsienensis* var. *incanus* (E. Peter) Y. C. Ho.

Leaflets villous, densely to very densely covered on both surfaces with ascending to spreading, flexuous, tangled, white hairs 0.5–1 mm. Calyx covered with ± spreading, straight, white hairs 1–2 mm and with slightly shorter black hairs. Legumes with a stipe 3.5–5 mm, widely ellipsoid, 12–15 × ca. 8 mm.

• Sichuan, Yunnan.

13. *Astragalus* sect. *Nuculiella* Gontscharov in Komarov, *Fl. URSS* 12: 876. 1946.

坚果组 *jian guo zu*

Plants perennial, with long stem, covered with basifixed white hairs. Leaves imparipinnate; stipules free, green. Bracteoles present. Calyx campanulate, glabrous. Petals soon caducous; keel longer than wings. Legumes long stipitate, inflated, 2-locular, rigidly cartilaginous-leathery, nut-shaped.

One species: China, Mongolia, Russia (Far East).

72. *Astragalus chinensis* Linnaeus f., *Dec. Pl. Horti Upsal.* 1: 5. 1762.

中国黄耆 *zhong guo huang qi*

Glycyrrhiza costulata Handel-Mazzetti.

Plants 35–55 cm tall, with hairs 0.04–0.4 mm. Stem solitary, erect, up to 5 mm thick, glabrous, branched with slender, mostly non-flowering lateral branches. Leaves 7–15 cm; stipules linear-acuminate, 6–10 mm, glabrous, with a curved short auricle at base; petiole 1–3 cm, like rachis glabrous or with a few appressed hairs; leaflets in 10–15 pairs, narrowly elliptic, 16–25 × 2–10 mm, abaxially sparsely appressed white hairy, adaxially glabrous, apex rounded and shortly mucronulate. Ra-

cemes 3.5–5 cm, loosely many flowered; peduncles numerous in upper part of stem, 3–6 cm, glabrous; bracts 3–4 mm, sparsely ciliate. Bracteoles 1–2 mm. Calyx 4–5 mm, glabrous; teeth 1–2 mm. Petals yellow or whitish yellow; standard ovate to widely ovate, 12–15 × 7–9 mm, apex emarginate; wings 9–11.5 mm; keel 13–14 mm. Legumes with a slender stipe 6–8 mm, nodding, nut-shaped, globose to obovoid, 9–14 mm, 5–6 mm high and 7–9 mm wide, with a very short slender beak, widely and deeply grooved ventrally, rounded dorsally; valves rigidly cartilaginous-leathery, transversely wrinkled-nerved, glabrous.

Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shanxi [Mongolia, Russia (Far East)].

14. *Astragalus* sect. *Lithophili* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 29. 1868 [*“Lithophilus”*].

岩生组 *yan sheng zu*

Plants perennial, acaulescent or with a well-developed stem, herbaceous, covered with long, basifixed, mostly spreading hairs. Leaves imparipinnate with marcescent rachis; stipules free or more rarely shortly adnate to petiole. Racemes subsessile or with a short peduncle, few flowered. Calyx campanulate to tubular. Legumes subsessile to stipitate, 2-locular, with thin, membranous walls.

Four species: NW and W China, N India, Kazakhstan, Kyrgyzstan, Tajikistan; three species (one endemic) in China.

- 1a. Plants acaulescent; calyx ca. 10 mm; petals white; standard ca. 12 mm; legumes sessile, ca. 10 mm 73. *A. dalaiensis*
 1b. Plants with a well-developed stem; calyx at least 20 mm; petals yellow; legumes with a stipe 4–5 mm, 15–30 mm.
 2a. Stems, rachises, and peduncles glabrous or sparsely hairy; leaflets in 12–15 pairs, ovate to elliptic, 8–15 × 4–9 mm 74. *A. lithophilus*
 2b. Stems, rachises, and peduncles densely villous; leaflets in 9–11 pairs, narrowly elliptic, 10–25 × 2–5 mm 75. *A. munroi*

73. *Astragalus dalaiensis* Kitagawa, J. Jap. Bot. 22: 172. 1948.

草原黄耆 cao yuan huang qi

Plants 10–15 cm tall, acaulescent, caespitose. Leaves 10–20 cm; stipules membranous, ovate, ca. 10 mm, shortly adnate to petiole, villous, apex long cuspidate-acuminate; petiole and rachis covered with white spreading hairs; leaflets in 6–13 pairs, elliptic, 5–15 × 3–9 mm, both surfaces subappressed hairy, apex mostly obtuse. Racemes subsessile, crowded at base of petioles. Calyx tubular, ca. 10 mm, long white hairy; teeth subulate, 2.5–3 mm. Petals white; standard ovate, ca. 12 mm, rounded at apex; wings longer than standard, ca. 16 mm; keel slightly longer than wings, ca. 17 mm. Legumes erect, ovoid-ellipsoid, ca. 10 mm, compressed laterally; valves densely white hairy.

- Nei Mongol.

74. *Astragalus lithophilus* Karelina & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 344. 1842.

岩生黄耆 yan sheng huang qi

Astragalus dicystis Bunge.

Plants 15–45 cm tall; hairs very fine, spreading, white, in inflorescence also black, 1–3(–4) mm. Stem simple or branched at base, up to 7 mm thick, often in lower part leafless and with scalelike stipules, glabrous or sparsely hairy. Leaves 9–20 cm; stipules membranous, 7–20 mm, glabrous or sparsely hairy; petiole 3–5 cm, at base up to 3 mm thick, like rachis glabrous or sparsely hairy; leaflets in 12–15 pairs, ovate to elliptic, 8–15 × 4–9 mm, glabrous on both surfaces or abaxially sparsely to loosely hairy, apex rounded to truncate. Racemes loosely 3–6-flowered; peduncle 0.5–4.5 cm, glabrous or sparsely white hairy, toward raceme increasingly black hairy; bracts whitish membranous, linear-acute, 7–13 mm, white and black hairy. Calyx 13–17 mm, loosely covered with spreading white and black

hairs 1–2 mm; teeth 7–10 mm. Petals yellow; standard obovate, 19–29 × ca. 9 mm, apex emarginate; wings 18–22 mm; keel 17–21 mm. Legumes with a curved stipe 4–5 mm, inflated ellipsoid, 20–30 mm, ca. 15 mm high and wide, grooved ventrally and dorsally, with a straight beak 2–3 mm, 2-locular; valves thin, glabrous or with scattered spreading hairs.

Steppic slopes in high mountains; 2400–3500 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

75. *Astragalus munroi* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 30. 1868.

细梗黄耆 xi geng huang qi

Astragalus longicalyx C. C. Ni & P. C. Li.

Plants 30–70 cm tall; hairs thin, mostly spreading, in vegetative parts only white, 1–4 mm. Stems in lower part often leafless, densely villous. Leaves 4–10 cm; stipules whitish membranous, linear-acute, 10–15 mm, free, hairy; petiole 1–2.5 cm, like rachis densely covered with spreading hairs 1–2 mm and with somewhat fewer hairs up to 4 mm; leaflets in 9–11 pairs, narrowly oblong to narrowly elliptic, 10–25 × 2–5 mm, abaxially loosely to rather densely covered with spreading hairs up to 4 mm, adaxially glabrous, apex rounded to subobtusely, minutely acuminate-mucronulate. Racemes loosely 3–6-flowered; peduncle 0.5–1 cm, with spreading white hairs; bracts whitish membranous, linear-acute, 10–18 mm, hairy. Calyx ca. 20 mm, covered with long, spreading, white hairs; teeth linear to subulate, 10–12 mm. Petals yellow; standard elliptic, 20–22 × 7–9 mm, apex emarginate; wings ca. 18 mm; keel ca. 19 mm. Legumes with a curved stipe 4–5 mm, inflated ellipsoid, 20–30 mm, 12–14 mm high and wide, widely grooved ventrally and dorsally, with a slightly curved beak ca. 5 mm, 2-locular; valves thin, rather densely villous, hairs very fine, tangled, ± spreading, 2–3 mm.

3000–5200 m. Xinjiang, Xizang [NW India].

15. *Astragalus* sect. *Hookeriani* Podlech, Mitt. Bot. Staatssamml. München 12: 343. 1976 [*“Hookeriana”*].

虎克组 hu ke zu

Plants perennial, acaulescent to nearly so, with basifixed white hairs. Stipules membranous, free from petiole, nearly completely embracing stem but not connate behind it, high connate around petiole. Calyx tubular, gibbous at base. Petals pale sulfur-yellow, glabrous. Legumes strongly compressed from sides, valves thin but tough, with slender, vertical nerves, nearly completely 2-locular.

One species: Bhutan, China, India (Sikkim).

76. *Astragalus acaulis* Baker in J. D. Hooker, Fl. Brit. India 2: 132. 1876.

无茎黄耆 wu jing huang qi

Astragalus litangensis Bureau & Franchet; *A. pseudoxytropis* Ulbrich.

Plants up to 15 cm tall, sparsely white hairy or sometimes

glabrous or subglabrous. Stems, if present, very short, rarely up to 3 cm, glabrous. Leaves 8–15 cm; stipules whitish membranous, free from petiole, at base nearly completely embracing stem but not connate behind it, high connate behind abaxial side of petiole, upper ones 10–12(–15) mm, connate for 1/3–2/3 of their length, lower ones mostly shorter and connate often nearly up to top, all ciliate, rarely sparsely hairy on outer side; petiole

2–6 cm, like rachis glabrous or very sparsely hairy; leaflets in 7–12 pairs, narrowly ovate, 6–8 × 2–3 mm, abaxially glabrous or sparsely hairy at margins and midvein, rarely more densely hairy, adaxially glabrous, apex acute. Racemes subsessile, 2- or 3-flowered; bracts membranous, linear, acute, 10–15 mm, glabrous or ciliate. Calyx tubular, 11–15 mm, tube glabrous or rarely sparsely hairy; teeth 3–4 mm, sometimes ciliate at margin and apex. Petals pale sulfur-yellow; standard widely obovate,

20–25 × 11–13(–16) mm, apex rounded to slightly emarginate; wings 19–24 mm; keel 19–22 mm. Legumes subsessile, erect, slightly obliquely oblong, 25–50 mm, 10–15 mm high and 3–4 mm wide, narrowly rounded ventrally and dorsally, without beak, nearly completely 2-locular; valves thin but tough, with numerous vertical fine nerves, glabrous.

High alpine regions; 3300–5400 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim)].

16. Astragalus sect. Pelta Podlech & I. Deml, Mitt. Bot. Staatssamml. München 6: 543. 1967.

盾叶组 *dun ye zu*

Plants shrubby or subshrubby, spiny or not, with basifixed white or partly black hairs. Leaves imparipinnate; stipules membranous, shortly adnate to petiole, otherwise free from each other or connate before abaxial side of petiole; petiole and rachis hardening with age and sometimes spiny, partly persistent, terminal leaflet then soon falling. Leaflets sometimes subpeltate or peltate. Petals glabrous, yellow. Legumes obtusely keeled ventrally, grooved dorsally, incompletely to completely 2-locular; valves thinly or rigidly membranous.

Six species: mainly in Afghanistan, one species in NE Iran, one species in C Asia including NW China.

77. Astragalus olgae Bunge, Izv. Imp. Obsc. Ljubit. Estestv. Moskovsk. Univ. 26(2): 223. 1880.

奥尔格黄耆 *ao er ge huang qi*

Astragalus chionanthus Popov.

Plants subshrubby, acaulescent or shortly caulescent, 12–30 cm tall; hairs sparse, white, in inflorescence also black. Stem 1–10 cm, glabrous or very sparsely covered with appressed to spreading hairs 0.5–1 mm, at base very densely covered with remnants of old leaves and rigid but not spiny rachises. Leaves 6–10 cm, at end of vegetation period elongating up to 25 cm; stipules whitish hyaline, lower ones 5–6 mm, upper ones up to 15 mm, shortly ciliate or rarely glabrous; petiole 1–3 cm, later up to 6 cm, like rachis slender, later thickened and hardening,

persistent, glabrous or very sparsely subappressed hairy; leaflets in 13–15 pairs, easily falling, narrowly oblong, 3–18 × 1–3 mm, glabrous or abaxially very sparsely hairy, apex rounded to incised. Racemes loosely 2–4-flowered; peduncle 1–3.5 cm, glabrous; bracts whitish membranous, linear, acute, 6–10 mm, mostly glabrous. Calyx 13–15 mm, at base nearly glabrous, upper part sparsely to very loosely black hairy; teeth 3–5.5 mm. Petals whitish or yellow; standard obovate-oblong, 25–28 × 8–13 mm, lower part slightly constricted, scarcely to distinctly emarginate; wings 23–26 mm; keel 20–22 mm. Legumes with a stipe 2–4 mm, globose to inflated ellipsoid, 10–25 mm, 10–12 mm high and 10–18 mm wide, slightly grooved ventrally and dorsally, with a beak 2–4 mm, 2-locular; valves thin, glabrous.

Stony slopes of high mountains; 3100–3900 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

17. Astragalus sect. Komaroviella Gontscharow in Komarov, Fl. URSS 12: 876. 1946.

短翼组 *duan yi zu*

Plants perennial, with developed stems, rarely subacaulescent, with basifixed hairs. Stipules free from petiole or nearly so, all or only lower ones connate behind stem, rarely all free from each other. Racemes borne on long peduncle, shortly ovoid to subumbellate, loose or nearly so. Bracteoles mostly absent. Flowers with a short pedicel. Calyx campanulate. Petals lilac or violet; wings shorter than keel, limbs rounded at apex; keel with large limbs, 2–3 × as long as claw. Legumes pendulous, with a stipe equaling or slightly exceeding calyx, incompletely to completely 2-locular or 1-locular; valves thin, membranous, hairy, rarely glabrous.

Twenty-four species: NE Afghanistan, China, India, Kashmir, Mongolia, Nepal, Pakistan, Russia; C and SW Asia, Europe, North America; 20 species (16 endemic) in China.

1a. Plants subglabrous; ovary and legumes glabrous.

2a. Plants 3–4 cm tall; peduncle 0.4–1 cm; bracteoles present; standard 12–13 × ca. 10 mm, limb widely

obovate to orbicular 86. *A. damxungensis*

2b. Plants 5–20 cm tall; peduncle 1.5–6 cm; bracteoles absent; standard ca. 11 × 5 mm, limb obovate 88. *A. habamontis*

1b. Plants distinctly hairy, at least in part; bracteoles rarely present; ovary and legumes hairy.

3a. Stem, rachis, and peduncle with double indumentum of very short appressed hairs ca. 0.1 mm and

fewer spreading hairs 1–1.5 mm; legumes 12–14 mm, strongly curved 96. *A. semicircularis*

3b. Stem, rachis, and peduncle with a simple indumentum; legumes mostly shorter, not strongly curved.

4a. Leaf rachis with at least partly spreading hairs.

5a. Plants up to 100 cm tall; stipules free from each other; rachis with hairs spreading, white, at

base also black, 0.2–0.3 mm; bracts 2–3 mm; limb of standard elliptic without distinct claw 84. *A. chiukiangensis*

- 5b. Plants 17–25 cm tall; at least lower stipules vaginate-connate; rachis with hairs appressed to partly spreading, white, 0.4–0.6 mm; bracts ca. 1 mm; limb of standard orbicular, at base abruptly contracted into short claw 95. *A. saxorum*
- 4b. Leaf rachis with appressed to subappressed hairs.
- 6a. Stipules 2–3 mm, glabrous or subglabrous; plants 40–60 cm tall; petals purple.
- 7a. Rachis with very short, subglobose hairs; bracteoles absent; calyx 3–3.5 mm; standard 9–10 mm, wings ca. 7 mm and keel ca. 10 mm; legumes 8–10 mm, nearly fully 2-locular 87. *A. dulungkiangensis*
- 7b. Rachis without subglobose hairs; bracteoles present, 0.5–1 mm; calyx 4–5.5 mm; standard 12–13 mm, wings 10–11 mm and keel 12–14 mm; legumes 15–18 mm, 1-locular 83. *A. changmuicus*
- 6b. Stipules mostly longer, hairy at least at margins; plants distinctly smaller, if up to 65 cm tall (in *A. leptocladus* and *A. weixinensis*), then petals yellowish to white or white with violet tip.
- 8a. Plants up to 65 cm tall; petals yellowish to white or white with violet tip.
- 9a. Leaflets in 6–9 pairs, elliptic, 5–14 × 2.5–7 mm; petals yellowish to white, standard 8–9 mm, wings ca. 7 mm, keel ca. 8 mm 97. *A. weixinensis*
- 9b. Leaflets in 10–12 pairs, narrowly elliptic, 9–20 × 2–6 mm; petals white with violet tip, standard ca. 12 mm, wings ca. 10 mm, keel ca. 11 mm 91. *A. leptocladus*
- 8b. Plants up to 25 cm tall (in *A. chagyabensis* up to 30 cm); petals purple, blue, or violet.
- 10a. Standard up to 8.5 mm; leaflets in 5–9 pairs.
- 11a. Leaflets adaxially sparsely hairy to subglabrous; calyx 4–5 mm, covered with white hairs; legumes deeply grooved dorsally, 2-locular 79. *A. aridovallicola*
- 11b. Leaflets on both surfaces loosely to rather densely hairy; calyx 2.5–3 mm, covered with black hairs 0.2–0.3 mm and sometimes with longer white hairs; legumes keeled ventrally and dorsally, 1-locular 90. *A. kuschakewiczii*
- 10b. Standard at least 9 mm but in most flowers longer, if sometimes only ca. 8 mm (*A. bouffordii*), then leaflets in 11–15 pairs.
- 12a. Bracts 3–6 mm; calyx 6–7 mm, teeth 3–4 mm.
- 13a. Stipules ciliate, otherwise glabrous; leaflets in 4–6 pairs, mostly whitish margined; limb of standard ± orbicular, ca. 9 mm wide, at base abruptly contracted into claw 92. *A. mattam*
- 13b. Stipules loosely to rather densely white hairy, glabrescent with age; leaflets in 6–9 pairs, not whitish margined; limb of standard elliptic, 5–8 mm wide, at base gradually narrowed 93. *A. oxyodon*
- 12b. Bracts distinctly shorter; calyx distinctly shorter, up to 5 mm (only in *A. alpinus* sometimes up to 6 mm), teeth mostly distinctly shorter.
- 14a. Stipules shortly vaginate-connate, upper ones free; leaflets in 4–7 pairs; calyx covered with white hairs 80. *A. batangensis*
- 14b. Stipules all distinctly to high vaginate-connate (in *A. bouffordii* upper ones sometimes free); leaflets in 5–12 pairs; calyx with black or white and black hairs.
- 15a. Plants 2–10 cm tall; leaflets 1.2–3 × 0.5–1.2 mm, on both surfaces loosely to rather densely hairy; stipules in front of petiole distinctly connate; racemes 1–7-flowered 85. *A. confertus*
- 15b. Plants mostly distinctly taller; leaflets distinctly larger, if only 3–5 mm (*A. haiyuanensis*), then adaxially glabrous or sometimes sparsely hairy; stipules in front of petiole not connate; racemes mostly with distinctly more flowers.
- 16a. Stipules ciliate or rarely very sparsely hairy (in *A. retusifolius*); rachis sparsely to loosely hairy; calyx black hairy; legumes black or more rarely white and black hairy.
- 17a. Leaflets in 6–9 pairs, 4–8 × 2–5 mm; bracts 2–3 mm; legumes narrowly oblong, slightly curved, 12–18 mm, incompletely 2-locular 94. *A. retusifolius*
- 17b. Leaflets in 7–12 pairs, 5–15(–20) × 2–5(–7) mm; bracts 0.5–2 mm; legumes narrowly ellipsoid, straight, 7–13 mm, 1-locular or nearly so 78. *A. alpinus*
- 16b. Stipules densely hairy; rachis loosely to densely hairy; calyx white and black or black hairy; ovary white hairy (legumes unknown in *A. chagyabensis*).

- 18a. Plants 20–30 cm tall; leaves 8–10 cm; leaflets 9–13 × 5–7 mm; peduncles 8–10 cm; calyx white and black hairy 82. *A. chagyabensis*
- 18b. Plants 10–20 cm tall; leaves 1–6 cm; leaflets 3–8 mm; calyx with other kind of hairs.
- 19a. Stems, rachises, and peduncles white and black hairy; leaflets in 7–10 pairs; calyx loosely black hairy; standard 9–10 mm, wings ca. 8 mm, keel 9–11 mm 89. *A. haiyuanensis*
- 19b. Stems, rachises, and peduncles only with white hairs; leaflets in 11–15 pairs; calyx densely covered with white hairs, often with some black hairs mixed in; standard 8–9 mm, wings ca. 6 mm, keel 7–7.5 mm 81. *A. bouffordii*

78. *Astragalus alpinus* Linnaeus, Sp. Pl. 2: 760. 1753.

高山黄耆 gao shan huang qi

Astragalus salicetorum Komarov.

Plants caespitose, mostly low, with ± appressed white and black hairs. Stems several to many, slender, prostrate to ascending, 1–15(–20) cm, sparsely hairy. Leaves 2–8 cm; stipules 1.5–6 mm, lower high connate behind stem, upper shortly connate or free, all ciliate; petiole 0.5–4 cm, like rachis slender, sparsely to loosely hairy; leaflets in 7–12 pairs, narrowly elliptic, 5–15(–20) × 2–5(–7) mm, abaxially somewhat densely hairy, adaxially glabrous or sparsely hairy, more rarely rather densely hairy on both surfaces, apex rounded to slightly retuse. Racemes short, densely 5–15-flowered; peduncle 3–8(–15) cm, erect, sparsely to loosely white hairy, toward raceme increasingly black hairy; bracts triangular, 0.5–2 mm, black ciliate. Calyx 4–6 mm, appressed black hairy; teeth 1–3 mm. Petals violet with whitish base, wings often whitish, often yellowish when dry but mostly with violet-tipped keel; standard rhombic-elliptic to widely elliptic, 9–13 × 6–7.5 mm, apex emarginate; wings 7–12 mm; keel 9–12 mm, limbs triangular, 6–8 × 3–3.5 mm. Legumes nodding, with a stipe 2–5 mm, ellipsoid, 7–13 mm, 3–3.5 mm high and wide, attenuate at both ends, keeled ventrally, deeply grooved dorsally, with a short beak, 1-locular or nearly so; valves thin, loosely to rather densely covered with appressed to semispreading black hairs. Seeds 2.5–3 × 2–2.5 mm, smooth.

Subarctic zone, subalpine to alpine meadows, in subarctic tundra. Xinjiang [Russia; C Asia, SW Asia (Caucasus), Europe, North America].

79. *Astragalus aridovallicola* P. C. Li, Acta Bot. Yunnan. 11: 299. 1989.

旱谷黄耆 han gu huang qi

Plants with appressed white hairs. Stems several, branched near base, slender, prostrate, up to 15 cm, sparsely covered with hairs 0.1–0.2 mm. Leaves 2.5–5 cm; stipules greenish, 2–3 mm, lower ones shortly connate behind stem, upper free, all sparsely hairy; petiole 0.5–1.5 cm, with rachis loosely to rather densely hairy like stem; leaflets in 5–7 pairs, widely obovate to suborbicular, 3–6 × 2–4 mm, abaxially loosely covered with appressed hairs 0.1–0.3 mm, adaxially sparsely hairy or with scattered hairs only, apex emarginate. Racemes loosely 3- or 4-

flowered; peduncle 1.5–4.5 cm, erect, hairy like stem; bracts whitish membranous, 0.5–0.8 mm, white hairy. Calyx 4–5 mm, sparsely to loosely hairy; teeth unequal, 1–3 mm. Petals pale purple; standard widely ovate, ca. 8 × 5 mm, apex emarginate; wings ca. 6.5 mm; keel 7–7.5 mm, limbs ca. 5.5 × 3 mm. Legumes (immature) with a stipe ca. 2 mm, obliquely narrowly ellipsoid, ca. 10 mm, 1.5–2 mm high and wide, keeled ventrally, deeply grooved dorsally, with a very short beak, 2-locular; valves thin, loosely to rather densely covered with appressed white hairs.

• Sichuan.

80. *Astragalus batangensis* E. Peter, Acta Horti Gothob. 12: 35. 1938.

巴唐黄耆 ba tang huang qi

Astragalus cinerascens H. T. Tsai & T. T. Yu (1940), not Candolle ex Steudel (1840), nor (Rydberg) Tidestrom (1937).

Plant hairs appressed to subappressed, white, in inflorescence also black, 0.3–1 mm. Stems solitary or several, branched, slender, prostrate to ascending, up to 15 cm, loosely to rather densely white hairy. Leaves 3–7 cm; stipules greenish, 3–4 mm, all shortly connate behind stem or upper free, all rather densely hairy; petiole 1–1.5 cm, like rachis loosely to rather densely hairy; leaflets in 5–7 pairs, elliptic to obovate, 4–13 × 2–8 mm, abaxially somewhat densely and adaxially sparsely to rather loosely covered with subappressed hairs up to 1 mm, apex subacute to rounded or slightly retuse. Racemes short, rather loosely 8–10-flowered; peduncle 3–8 cm, rather densely white hairy; bracts whitish membranous, 1–1.5 mm, white hairy. Calyx 3–4 mm, rather densely appressed white hairy; teeth 1–2 mm. Petals blue to violet; standard widely ovate, 8–11 × 5–8 mm, apex emarginate; wings 6–7 mm; keel 8–10 mm, limbs 6–7 × ca. 2.5 mm. Legumes with a stipe 2–5 mm, nodding, ellipsoid, 7–13 mm, 3–3.5 mm high and wide, keeled ventrally, deeply grooved dorsally, with a short beak, 1-locular or nearly so; valves thin, loosely to rather densely covered with appressed to ascending white or black hairs.

• Sichuan, Xizang, Yunnan.

81. *Astragalus bouffordii* Podlech, Feddes Repert. 120: 53. 2009.

鲍氏黄耆 bao shi huang qi

Plants 10–20 cm tall. Stems many, branched from base, loosely covered with appressed white hairs. Leaves 5–6 cm; stipules 2.5–3 mm, at least lower ones shortly vaginate-connate behind stem; petiole 1–2 cm, hairy like stem; leaflets in 11–15 pairs, elliptic, 3–8 × 1.5–3 mm, abaxially loosely appressed hairy, adaxially glabrous. Racemes rather densely 7–12-flowered; peduncle 4–7 cm, white hairy like stem; bracts 0.5–1 mm, predominantly white hairy. Calyx ca. 4 mm, densely covered with appressed white hairs 0.3–0.5 mm and often with black hairs mixed in; teeth subulate, ca. 2 mm. Petals purple, keel with darker tip; standard 8–9 × ca. 6 mm, widely elliptic, emarginate; wings ca. 6 mm; keel 7–7.5 mm. Legumes (unripe) with a stipe ca. 2 mm, ca. 6 mm, 2–2.5 mm high and wide.

- About 3400 m. E Xizang.

82. *Astragalus chagyabensis* P. C. Li & C. C. Ni, Acta Phytotax. Sin. 18: 368. 1980.

察雅黄耆 cha ya huang qi

Plants 20–30 cm tall, caespitose. Stems several, branched at base, sparsely white and black hairy. Leaves 8–10 cm; stipules narrowly triangular, ca. 5 mm, free from petiole, high connate behind stem, densely white hairy; petiole like rachis densely appressed white hairy; leaflets in 9–11 pairs, elliptic, 9–13 × 5–7 mm, abaxially densely and adaxially sparsely appressed white hairy, apex rounded. Racemes many flowered; peduncle 8–10 cm, sparsely white hairy. Calyx ca. 5 mm, loosely white and black hairy; teeth subulate, ca. 2.5 mm. Petals pale purplish; standard widely elliptic, ca. 10 mm; wings ca. 8 mm; keel ca. 10 mm. Ovary stipitate, sparsely white hairy. Legumes unknown.

- Xizang.

83. *Astragalus changmuicus* C. C. Ni & P. C. Li, Acta Phytotax. Sin. 17(2): 105. 1979.

樟木黄耆 zhang mu huang qi

Plants white hairy. Stems slender, 40–50 cm, prostrate to ascending, 1–1.5 mm thick, glabrescent in lower part, sparsely hairy in upper part. Leaves 2–4 cm, subsessile; stipules 2–3 mm, lower ones shortly connate behind stem, upper ones free, narrowly triangular, glabrescent; rachis sparsely to loosely hairy; leaflets in 8–10 pairs, narrowly elliptic, 5–9 × 3–4 mm, abaxially sparsely appressed hairy, adaxially glabrous, apex acute or shortly mucronulate. Racemes 3–5 cm, (1–)4–9-flowered; peduncle 2–4 cm, hairy; bracts ca. 2 mm, subulate, hairy. Bracteoles present, 0.5–1 mm. Calyx 4–4.5 mm, appressed black hairy; teeth ca. 2 mm. Petals purple; standard elliptic, 12–13 × 5.5–6.5 mm, apex emarginate; wings 10–11 mm; keel 12–14 mm. Legumes with a stipe 4–5 mm, narrowly ellipsoid, 15–18 mm, 1-locular; valves appressed white hairy.

- Xizang.

84. *Astragalus chiukiangensis* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 260. 1940.

侏江黄耆 qiu jiang huang qi

Plants up to 100 cm tall, furnished with white and black hairs up to 0.5 mm. Stem erect, branched, sparsely covered with

appressed to ascending white and some black hairs, those of lateral branches often with rather dense and to spreading white hairs. Leaves 8–12 cm, subsessile; stipules greenish, 3–5 mm, free, reflexed, white ciliate; rachis sparsely to loosely covered with spreading white or at base predominantly black hairs 0.2–0.3 mm; leaflets in 8–11 pairs, in lateral branches in fewer pairs, narrowly elliptic to elliptic, 10–16 × 3.5–7 mm, abaxially loosely, in young leaves also rather densely, covered with appressed to ascending white hairs 0.5–0.8 mm, adaxially glabrous or sparsely white hairy, apex subacute to obtuse. Racemes shortly cylindrical, rather densely many flowered; peduncle 3–7 cm, loosely covered with nearly spreading white hairs; bracts membranous, linear, 2–3 mm, white hairy. Calyx ca. 5 mm, sparsely to loosely subappressed white hairy; teeth 2–2.5 mm. Petals white greenish or white; standard obovate, 9–11 × ca. 5 mm, apex obtuse; wings 7–8 mm; keel 8–10 mm, limbs 5–5.5 × 2.2–2.5 mm. Legumes (unripe) nodding, with a stipe ca. 3 mm, white hairy.

- Yunnan.

85. *Astragalus confertus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 23. 1868.

丛生黄耆 cong sheng huang qi

Plants 2–10 cm tall, acaulescent to shortly caulescent, densely caespitose; hairs appressed to subappressed, in vegetative parts mostly white, 0.2–0.4 mm, sometimes mixed with black hairs. Stems mostly numerous, very short or to up to 5 cm, sparsely to loosely hairy. Leaves 1–2.5 cm; stipules 3–4 mm, free from petiole or shortly adnate, but distinctly connate before petiole, high connate behind stem, sparsely to rather densely hairy; petiole 0.5–0.8 cm, like rachis slender, loosely to rather densely covered with subappressed to ascending hairs; leaflets in 5–9 pairs, narrowly elliptic to elliptic, 1.2–3 × 0.5–1.2 mm, both surfaces loosely to rather densely covered with appressed to slightly ascending hairs 0.5–0.7 mm, apex subacute to obtuse. Racemes 1–7-flowered; peduncle 0.5–4 cm, loosely covered with appressed white hairs 0.2–0.3 mm, toward raceme increasingly black hairy; bracts ca. 2 mm. Calyx 4.5–5 mm, densely to rather densely covered with appressed, predominantly black hairs 0.1–0.3 mm; teeth 1.5–2 mm. Petals violet; standard widely elliptic to suborbicular, 10–12 × 6.5–8 mm, apex emarginate; wings 8–10 mm; keel 9–11 mm. Legumes (unripe) pendulous, with a stipe ca. 3 mm, white hairy.

- Qinghai, Xizang [India, Kashmir, Nepal].

86. *Astragalus damxungensis* Podlech & L. R. Xu, Sendtnera 7: 193. 2001.

当雄黄耆 dang xiong huang qi

Plants 3–4 cm tall, nearly acaulescent, subglabrous; hairs subappressed, black, 0.2–0.3 mm. Leaves 1.5–2.5 cm; stipules greenish to membranous, 3–4 mm, distinctly to high connate behind stem, glabrous; petiole 0.4–1 cm, like rachis glabrous or with scattered hairs; leaflets in 4–6 pairs, elliptic, 3–5 × 1–2.8 mm, glabrous or more rarely with scattered hairs abaxially, conspicuously and densely wrinkled when dry abaxially, apex obtuse to subacute. Racemes 1- or 2-flowered; peduncle 0.5–1 cm, glabrous or below raceme with scattered black hairs; bracts

whitish membranous, ca. 3 mm, glabrous. Bracteoles present, linear-subulate, 1–2 mm. Calyx ca. 6 mm, rather densely hairy; teeth 2.5–3 mm. Petals purple violet; standard widely obovate to orbicular, 12–13 × ca. 10 mm, apex emarginate; wings ca. 10 mm; keel ca. 11 mm, limbs ca. 8 × 4 mm. Ovary with a stipe ca. 1.5 mm, glabrous. Legumes unknown.

• Xizang.

87. *Astragalus dulungkiangensis* P. C. Li, Acta Bot. Yunnan. 11: 298. 1989.

独龙江黄耆 du long jiang huang qi

Plant hairs appressed to subappressed, white, in inflorescence also black, 0.1–0.3 mm or even shorter and inflated subglobose. Stem prostrate, branched, slender, 40–60 cm, loosely hairy, soon glabrescent. Leaves 3–6 cm, subsessile; stipules greenish, 2–2.5 mm, glabrous, lower ones shortly connate behind stem; rachis slender, sparsely covered with very short inflated subglobose hairs; leaflets in 7–10 pairs, elliptic, 4–9 × 2–4 mm, abaxially sparsely to loosely covered with appressed hairs, adaxially subglabrous, apex retuse to emarginate. Racemes short, rather loosely 4- or 5-flowered; peduncle 1.5–3.5 cm, loosely to densely hairy; bracts greenish membranous, ca. 1.5 mm, subglabrous. Calyx 3–3.5 mm, loosely covered with white hairs and at teeth also with black hairs; teeth 1.5–2 mm. Petals pale purplish; standard widely ovate to suborbicular, 9–10 × ca. 6 mm, apex emarginate; wings ca. 7 mm; keel ca. 10 mm, limbs ca. 5.5 × 3 mm. Legumes nodding, with a stipe ca. 3 mm, oblong, slightly curved, 8–10 mm, ca. 2 mm high and wide, keeled ventrally, deeply grooved dorsally, with a short beak, nearly fully 2-locular; valves thin, loosely to rather densely covered with very short white hairs.

• Yunnan.

88. *Astragalus habamontis* K. T. Fu, Bull. Bot. Res., Harbin 2(4): 68. 1982.

哈巴山黄耆 ha ba shan huang qi

Plants 5–20 cm tall, with appressed hairs 0.1–0.3 mm. Stems prostrate to ascending. Leaves 3–6 cm; stipules 3–4 mm, ovate, connate behind stem to middle; leaflets in 5–8 pairs, obovate, 4–7 × 1.5–4 mm, abaxially sparsely covered with appressed white hairs, adaxially glabrous. Racemes 3–5-flowered; peduncle 1.5–6 cm, sparsely black hairy; bracts narrowly triangular-subulate, 1.5–3 mm. Calyx 4–5 mm, black hairy; teeth 1.5–2 mm. Petals red or blue; standard obovate, 10–12 mm; wings slightly shorter than standard; keel slightly longer than wings. Ovary stipitate, glabrous. Legumes shortly stipitate, narrowly ovate to narrowly elliptic, ca. 10 mm, 1-locular; valves glabrous.

• Qinghai, Yunnan.

89. *Astragalus haiyuanensis* Podlech, Feddes Repert. 120: 53. 2009.

海原黄耆 hai yuan huang qi

Plants 15–20 cm tall. Stems of current year 11–13 cm, sparsely to loosely appressed white and black hairy. Leaves 2–3 cm; stipules 2.5–4 mm, high connate behind stem, lower one

white hairy, upper ones predominantly black hairy; petiole ca. 0.5 cm, with rachis hairy like stem; leaflets in 7–10 pairs, elliptic, 3–5 × 1.5–3 mm, abaxially loosely to rather densely appressed hairy, adaxially glabrous or sparsely hairy. Racemes 10–12-flowered; peduncle 3–5 cm, white and black hairy, toward raceme hairs predominantly black; bracts ca. 1.5 mm, predominantly black hairy. Calyx 4–5 mm, loosely appressed black hairy; teeth 1–2 mm. Petals violet; standard ovate, 9–10 × ca. 6 mm, apex widely emarginate; wings ca. 8 mm; keel 9–11 mm. Legumes (unripe) with a stipe ca. 4 mm, appressed white hairy.

• Ningxia.

90. *Astragalus kuschakewiczii* B. Fedtschenko ex O. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 311. 1903 [*“kuschakewiczii”*].

库萨克黄耆 ku sa ke huang qi

Astragalus eugeniae B. Fedtschenko; ?*A. hegingensis* Y. X. Liou; *A. mongutensis* Lipsky; *A. pulvinalis* P. C. Li & C. C. Ni.

Plants 7–15(–20) cm tall, densely caespitose, densely gray hairy with subappressed to ascending hairs 0.2–0.3 mm. Stems many, ascending to erect, branched from base. Leaves 1–3 cm; stipules 1.5–2.5 mm, behind stem shortly connate; petiole 0.3–0.8 cm, like rachis slender, densely to rather densely hairy; leaflets in 6–9 pairs, oblong to elliptic, 1–5 × 0.5–3 mm, both surfaces loosely to rather densely hairy, apex rounded to retuse. Racemes 1–1.5 cm, rather loosely 4–10-flowered; peduncle 1.5–4 cm, white hairy, below raceme increasingly black hairy; bracts whitish membranous, 0.5–1 mm, black and white hairy. Calyx 2.5–3 mm, loosely to rather densely covered with appressed black hairs 0.2–0.3 mm and sometimes also with somewhat longer white hairs; teeth 1–1.5 mm. Petals light blue, keel with darker tip; standard orbicular, 8–8.5 × 6–7 mm, apex retuse to emarginate; wings 6–7 mm; keel 8–8.5 mm, limbs 4.5–6 × 1.5–3 mm. Legumes spreading to pendulous, with a stipe 1–1.5 mm, obliquely ellipsoid, 5–7 mm, keeled ventrally and dorsally, minutely beaked, 1-locular; valves thin, with appressed white or white and black hairs.

Stony soil, riverbanks, ascending to 3900–4300 m. Gansu, Qinghai, Xinjiang, Xizang [Afghanistan, Kazakhstan, Tajikistan].

91. *Astragalus leptocladus* Podlech & L. R. Xu, Novon 17: 237. 2007.

细枝黄耆 xi zhi huang qi

Plants up to 65 cm tall. Stems up to 55 cm, very sparsely covered with ± appressed black hairs 0.2–0.4 mm. Leaves 8–12 cm; stipules 3–5 mm, lower ones vaginate-connate behind stem to middle, upper ones free, all sparsely covered with white and black hairs up to 1 mm; petiole 1–2 cm, rachis sparsely hairy like stem; leaflets in 10–12 pairs, narrowly elliptic, 9–20 × 2–6 mm, abaxially loosely and adaxially sparsely covered with subappressed white hairs ca. 1 mm, apex rounded to subacute, mostly very minutely mucronulate. Racemes at anthesis capitate, densely 12–15-flowered; peduncle 10–12 cm, sparsely to rather loosely only black hairy; bracts ca. 2 mm, black hairy.

Calyx ca. 5 mm, loosely to rather densely covered with subappressed black hairs 0.1–0.4 mm; teeth 2–3 mm. Petals whitish with violet tip; standard ovate, ca. 12 × 6 mm, deeply emarginate; wings ca. 10 mm; keel ca. 11 mm. Legumes spreading to nodding, with a stipe ca. 3 mm, oblong, distinctly curved, ca. 12 mm, ca. 3 mm high and ca. 2 mm wide, keeled ventrally, grooved dorsally, with a slender beak ca. 2 mm, 2-locular; valves loosely to rather densely covered with appressed to ascending or partly spreading black hairs 0.3–0.5 mm.

• Xinjiang.

92. *Astragalus mattam* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 24. 1936.

茵垫黄耆 yin dian huang qi

Plants 4–15 cm tall, densely caespitose, rather densely hairy; hairs subappressed to ascending, white, in inflorescence also black, 0.3–1 mm. Stems numerous, branched, ascending to erect, up to 5 cm, densely covered in lower parts with remnants of old leaves, hairy. Leaves 2–4 cm; stipules membranous, 5–7 mm, high connate behind stem, sometimes nearly to top, white ciliate; petiole 0.5–1.5 cm, like rachis loosely to more rarely rather densely white hairy; leaflets in 4–6 pairs, elliptic, 2–5 × 1–2.5 mm, abaxially rather densely and adaxially sparsely to loosely covered with subappressed white hairs up to 1 mm, margin mostly whitish, apex rounded or slightly retuse. Racemes short, 3–5-flowered; peduncle 1–3 cm, rather densely white hairy, toward racemes also increasingly black hairy; bracts whitish membranous, 3–9 mm, white hairy. Calyx 6–9 mm, rather densely covered with appressed white and black hairs; teeth 3–6 mm. Petals purple to blue, wings and center of standard white; standard nearly orbicular, 13–16 × 9–11 mm, apex emarginate; wings 11–13 mm; keel 13–15.5 mm, limbs ca. 9 × 4 mm. Ovary with a stipe ca. 2 mm, white hairy. Legumes unknown.

• Qinghai.

- 1a. Standard ca. 13 × 9 mm, wings ca. 11 mm, keel ca. 13 mm; calyx 6–7 mm, teeth 3–4 mm; bracts 3–6 mm 92a. var. *mattam*
 1b. Standard ca. 16 × 11 mm, wings ca. 13 mm, keel ca. 15.5 mm; calyx ca. 9 mm, teeth 5–6 mm; bracts 6–9 mm 92b. var. *macroflorus*

92a. *Astragalus mattam* var. *mattam*

茵垫黄耆(原变种) yin dian huang qi (yuan bian zhong)

Flowers smaller. Bracts 3–6 mm. Calyx 6–7 mm; teeth 3–4 mm. Standard nearly orbicular, ca. 13 × 9 mm; wings ca. 11 mm; keel ca. 13 mm.

• Qinghai.

92b. *Astragalus mattam* var. *macroflorus* Y. H. Wu, Acta Bot. Yunnan. 20: 39. 1998.

大花茵垫黄耆 da hua yin dian huang qi

Flowers larger. Bracts 6–9 mm. Calyx ca. 9 mm; teeth 5–6

mm. Standard ca. 16 × 11 mm; wings ca. 13 mm; keel ca. 15.5 mm.

• Qinghai.

We have seen no material of this taxon. It is perhaps a separate species.

93. *Astragalus oxyodon* Baker in J. D. Hooker, Fl. Brit. India 2: 125. 1876.

尖齿黄耆 jian chi huang qi

Plants 10–18 cm tall; hairs wide, often somewhat flattened, appressed to subappressed. Stems several, 4–12 cm, loosely to sometimes partly rather densely covered with appressed white hairs 0.3–0.5 mm, sometimes with some black hairs mixed in. Leaves 4–7 cm; stipules 2–7 mm, ± distinctly and sometimes high connate behind stem, loosely to rather densely white hairy, glabrescent to glabrous with age; petiole 0.3–1 cm, with rachis hairy like stem; leaflets in 6–9 pairs, elliptic, 4–8 × 2–4 mm, abaxially somewhat densely and adaxially sparsely to loosely covered with subappressed white hairs 0.5–1 mm, apex rounded to subacute. Racemes short, loosely 4–7-flowered; peduncle 2.5–8 cm, loosely covered with white and black subappressed hairs 0.2–1 mm; bracts whitish membranous, 3–4 mm, sparsely white and black hairy. Calyx 6–7 mm, loosely to rather densely covered with appressed black hairs 0.1–0.5 mm and sparsely with subappressed white hairs up to 1 mm; teeth 3–4 mm. Petals pale pinkish to deep blue; standard elliptic to widely elliptic, 10–13 × 5–8 mm, apex emarginate; wings 7–10 mm; keel 10–13 mm, limbs 7–8 × 2.5–3.8 mm. Legumes with a stipe ca. 3 mm, ellipsoid, 6–7 mm, 2–3 mm high and 3–5 mm wide, flattened or obtusely keeled ventrally, flattened to shallowly grooved dorsally, with a very short, bent beak, 1-locular; valves rather densely covered with subappressed white or white and predominantly black hairs 0.1–0.3 mm.

3500–4600 m. Xinjiang [India, Nepal, Pakistan].

94. *Astragalus retusifolius* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 114. 1981 [*“retusifolius”*].

凹叶黄耆 ao ye huang qi

Plants 10–30 cm tall, sparsely hairy. Stems several, 5–25 cm, slender, with short lateral branches, sparsely to loosely covered with partly subbasifixed, appressed, mostly white hairs 0.05–0.3 mm. Leaves 3–6 cm; stipules 2–4 mm, behind stem distinctly connate, very sparsely hairy and ciliate; petiole 0.5–1.5 cm, with rachis hairy like stem; leaflets in 6–9 pairs, elliptic, 4–8 × 2–5 mm, abaxially loosely covered with appressed white hairs 0.3–0.5 mm, adaxially glabrous or sparsely hairy, apex rounded to emarginate. Racemes rather densely 4–12-flowered; peduncle 2.5–4 cm, hairy; bracts whitish membranous, 2–3 mm, black hairy. Calyx 4–4.5 mm, loosely covered with appressed black hairs 0.2–0.3 mm and white hairs 0.4–0.6 mm; teeth 2–3 mm. Petals bluish violet but yellowish with violet-tipped keel when dry; standard widely elliptic to ovate, 10–11 × 6–7 mm, apex deeply incised; wings 8–9 mm; keel 9–11 mm, limbs 6.5–7 × 3–3.8 mm. Legumes with a stipe 3–5 mm, narrowly oblong, slightly curved, 12–18 mm, ca. 3 mm high and wide, keeled

ventrally, deeply grooved dorsally, shortly acuminate, incompletely 2-locular; valves loosely to rather densely covered with very short, appressed to ascending, black and white or only black hairs.

- Xizang, Yunnan.

95. *Astragalus saxorum* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 245. 1915.

石生黄耆 shi sheng huang qi

Plants 17–25 cm tall, with appressed to ascending or sometimes also ± spreading and with exception of legumes only white hairs 0.4–0.6 mm. Stems few to several, 15–20 cm, rather densely hairy, partly glabrescent. Leaves 2.5–6 cm; stipules whitish membranous, 2–3 mm, at least lower ones behind stem connate to middle, hairy; petiole 0.5–1.5 cm, like rachis loosely to rather densely hairy; leaflets in 7–10 pairs, obovate, 4–7 × 1.5–3 mm, both surfaces loosely to rather densely covered with ascending hairs, apex mostly retuse. Racemes subumbellate, up to 15-flowered; peduncle 2–3.5 cm, rather densely hairy; bracts ca. 1 mm, hairy. Calyx 3–4 mm, rather densely appressed hairy; teeth ca. 2 mm. Petals pale purplish; standard nearly orbicular, 6–8 × 5–6 mm, apex emarginate; wings 5–7 mm; keel 7–9 mm, limbs 4–5.5 × 2.5–3 mm. Legumes with a stipe ca. 2 mm, 8–10 mm, ca. 3 mm high and wide, nearly 1-locular; valves covered with subappressed white or white and black hairs 0.3–0.5 mm.

- Qinghai, Sichuan, Xinjiang, Yunnan.

96. *Astragalus semicircularis* P. C. Li, Acta Bot. Yunnan. 11: 297. 1989.

半圆黄耆 ban yuan huang qi

Plants ca. 15 cm tall, with appressed and spreading white hairs. Stems several, sparsely covered with white hairs ca. 0.1 mm or even shorter and subglobose and with some scattered, very fine, spreading hairs 1–1.5 mm, soon glabrescent. Leaves 2.5–5 cm; stipules green, 3–3.5 mm, behind stem connate to middle or higher up, sparsely hairy; petiole 0.5–1.5 cm, like

rachis sparsely covered with very short appressed hairs up to 1.5 mm and with fewer scattered spreading hairs; leaflets in 6–8 pairs, elliptic, 4–7 × 2–4 mm, abaxially sparsely to loosely covered with appressed hairs 0.3–0.5 mm, adaxially subglabrous, more rarely with some long ± spreading hairs especially adaxially, apex obtuse to sometimes emarginate. Racemes short, rather loosely 7–13-flowered; peduncle 2.5–5.5 cm, hairy like stem; bracts membranous, ca. 1 mm, subglabrous. Calyx 3–3.5 mm, loosely appressed white hairy; teeth ca. 1.5 mm. Petals with dark purplish hue; standard ovate, 7–7.5 × ca. 4 mm, apex emarginate; wings ca. 6 mm; keel ca. 7.5 mm, limbs ca. 5 × 2 mm. Legumes nodding, with a stipe ca. 2 mm, oblong, strongly curved, 12–14 mm, 2–3 mm high and 1.5–2 mm wide, keeled ventrally, deeply grooved dorsally, shortly acuminate, 1-locular; valves loosely covered with appressed white hairs 0.2–0.3 mm.

- Xizang.

97. *Astragalus weixinensis* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 112. 1981.

维西黄耆 wei xi huang qi

Plants up to 60 cm tall. Stem mostly several, up to 50 cm, sometimes branched, sparsely covered with appressed to subappressed or ascending mostly black hairs 0.1–0.3 mm. Leaves 4–10 cm; stipules greenish, 3–5 mm, free, white and black hairy; petiole 0.5–1.5 cm, with rachis hairy like stem; leaflets in 6–9 pairs, elliptic, 5–14 × 2.5–7 mm, abaxially loosely and adaxially sparsely covered with appressed to slightly ascending white hairs 0.8–1 mm, apex obtuse to emarginate. Racemes rather densely ca. 10-flowered; peduncle 2–6 cm, hairy like stem; bracts greenish, 1–2 mm, black hairy. Calyx ca. 5 mm, loosely covered with subappressed short black and longer white hairs; teeth 2.5–3 mm. Petals yellowish to white; standard ovate to elliptic, 8–9 × ca. 5 mm, apex emarginate; wings ca. 7 mm; keel ca. 8 mm, limbs 4.5–5 × 1.8–2.2 mm. Legumes (unripe) with a stipe 3–4 mm, narrowly ellipsoid (ca. 5 mm), densely black and white hairy.

- Yunnan.

18. *Astragalus* sect. *Glycyrrhizi* W. D. J. Koch, Syn. Fl. Germ. Helv. 182. 1836.

密花组 mi hua zu

Astragalus sect. *Hypoglottis* Bunge.

Plants perennial, with short to long stems, furnished with basifixed hairs. Stipules not or shortly adnate to petiole, ± vaginate-connate around stem. Inflorescences with a well-developed peduncle, capitate to shortly cylindrical, mostly densely many flowered, more rarely only few flowered. Flowers with a short pedicel. Bracteoles absent. Calyx campanulate-tubular or tubular. Corolla purple or violet (in Chinese species) but sometimes yellowish when dry, marcescent, not persistent in fruit. Legumes sessile to subsessile, ± erect, oblong to ovoid, 2-locular or nearly so; valves firm or membranous.

Forty-four species: Afghanistan, China, India, Mongolia, Pakistan, Russia (Siberia); N Africa, C and SW Asia, Europe, North America; four species (one endemic) in China.

1a. Calyx teeth nearly as long as tube; legumes densely covered with spreading white hairs.

2a. Bracts 3–7 mm, white and black hairy; calyx covered with appressed to nearly spreading white and black hairs up to 0.9 mm; standard ovate to rhombic-ovate, at base gradually narrowed; legumes

7–10 mm 98. *A. agrestis*

2b. Bracts ca. 3 mm, only ciliate; calyx covered with short appressed black hairs; standard ± oblong,

at base somewhat abruptly contracted into a very short, indistinct claw; legumes 14–16 mm 101. *A. wulumuquianus*

- 1b. Calyx teeth distinctly shorter than tube; legumes covered with predominantly black hairs or hairs sitting on small tubercles.
- 3a. Stipules 4–10 mm; peduncle with black hairs all over; standard 16–22 mm, wing limbs distinctly obliquely emarginate; legumes with a stipe 2–4 mm, narrowly ellipsoid, 10–15 mm, ca. 3 mm high and wide, covered with predominantly black hairs 100. *A. tibetanus*
- 3b. Lower stipules ca. 2 mm, upper ones up to 5 mm; peduncle white hairy, toward raceme also black hairy; standard 14–15 mm, wing limbs rounded at apex; legumes sessile, widely ovoid, 5–7 mm, ca. 3 mm high and 4–4.5 mm wide, covered with white hairs up to 1.5 mm, sitting on small tubercles 99. *A. danicus*

98. *Astragalus agrestis* G. Don, Gen. Hist. 2: 258. 1832.

毛喉黄耆 mao hou huang qi

Astragalus dasyglottis Candolle; *A. hypoglottis* Linnaeus var. *dasyglottis* (Candolle) Ledebour.

Plants 10–30 cm tall, with ± appressed hairs 0.3–0.5 mm and up to 0.9 mm in leaflets and calyx. Stems few, 4–25 cm, glabrous or sparsely to loosely hairy. Leaves 2–10 cm; lower stipules 2–4 mm, whitish hyaline, high connate behind stem, glabrous, upper ones 4–6(–10) mm, shortly connate or free from each other, hairy; petiole short, like rachis hairy or subglabrous; leaflets in 6–10 pairs, narrowly elliptic, 4–18 × 1–4.5 mm, abaxially loosely hairy, adaxially glabrous or sparsely hairy, apex rounded to retuse or subacute. Racemes rather densely 5–15-flowered; peduncle 1.5–11 cm, hairy like stem; bracts membranous to partly greenish, 3–7 mm, white and black hairy. Calyx tubular, 7–11 mm, loosely to densely covered with subappressed to nearly spreading straight or curly white and black hairs; teeth 3–5 mm. Petals purplish to bluish lilac; standard ovate to rhombic-ovate, 15–22 × 5.5–8.5 mm, apex emarginate; wings 15–18.5 mm; keel 11.5–14 mm. Legumes subsessile, erect, ovoid to narrowly ellipsoid, 7–10 mm, 2.8–4.5 mm high and wide, keeled ventrally, widely and deeply grooved dorsally, acuminate, 2-locular; valves densely silky villous with straight to curly white hairs up to 1–2 mm.

Meadows, steppes, often in saline or sandy soils, from the plains up to 3200 m. NW Xinjiang [Kazakhstan, Russia (Siberia); North America].

99. *Astragalus danicus* Retzius, Observ. Bot. 3: 41. 1783.

丹麦黄耆 dan mai huang qi

Plants up to 30 cm tall, with ± appressed to more rarely ascending hairs 0.3–0.5 mm. Stems mostly several, slender, 4–30 cm, glabrous in lower part, toward top increasingly white hairy, below stipules mostly with spreading black hairs. Leaves 2.5–6 cm; stipules whitish membranous, high vaginate-connate behind stem, lower ones ca. 2 mm, glabrous, upper ones up to 5 mm, ciliate and sparsely hairy; petiole 0.5–1.5 cm, like rachis loosely white and black hairy; leaflets in 6–12 pairs, narrowly elliptic, 2–12 × 0.5–4 mm, both surfaces sparsely to loosely hairy or adaxially nearly glabrous, apex rounded. Racemes short, densely 3–15(–20)-flowered; peduncle 1–10(–15) cm, in lower parts sparsely white hairy, toward raceme increasingly black hairy; bracts whitish membranous, 2–3 mm, black ciliate. Calyx 7–8 mm, densely and predominantly black hairy, more rarely predominantly white hairy; teeth 1.5–3 mm. Petals violet; standard rhombic-elliptic, 14–15 × 7–8 mm, apex deeply incised to bilobed; wings 12–13 mm; keel 10.5–11 mm. Legumes

ellipsoid, slightly compressed dorsiventrally, 5–7 mm, ca. 3 mm high and 4–4.5 mm wide, ventrally and dorsally shallowly grooved, nearly completely 2-locular; valves blackish brown when ripe, densely covered with white hairs up to 1.5 mm, inserted on small tubercles.

Meadows, steppes, open forests, subarctic tundra, from plains to the mountain zone. Heilongjiang, Jilin, Nei Mongol [Kazakhstan, Russia; Europe].

100. *Astragalus tibetanus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 52. 1868.

藏新黄耆 zang xin huang qi

Astragalus chadjanensis Franchet; *A. narynensis* Freyn; *A. olufsenii* Freyn; *A. talievii* Širjaev; *A. tibetanus* var. *patentipilus* K. T. Fu.

Plants 4–35 cm tall, covered with hairs 0.2–0.5 mm. Stems 2–20 cm, loosely covered with appressed to ascending or even spreading white and partly also black hairs. Leaves 3–11 cm; stipules 4–10 mm, high vaginate-connate, very sparsely white and black hairy and ciliate; petiole 0.5–2 cm, like rachis loosely covered with appressed to ascending hairs; leaflets in 7–14 pairs, ± narrowly elliptic, 5–12 × 2–5 mm, abaxially loosely covered with appressed to ascending white hairs, adaxially glabrous or sparsely hairy, apex rounded to slightly retuse. Racemes rather densely 4–15-flowered; peduncle 1–10 cm, loosely to densely predominantly black hairy; bracts whitish, 2–3 mm, black hairy. Calyx 7–10 mm, loosely to rather densely appressed black hairy; teeth unequal, 0.5–3 mm. Petals blue-violet or pale lilac but often yellowish when dry; standard elliptic, 16–22 × 6–9 mm, apex incised; wings 15–20 mm; keel 12–15 mm. Legumes with a stipe 2–4 mm, narrowly ellipsoid, 10–15 mm, ca. 3 mm high and wide, obtusely keeled ventrally, widely and deeply grooved dorsally, with a beak 1–2 mm, 2-locular; valves rather densely covered with appressed to spreading mostly predominantly black hairs.

Steppes and open scrub, from the mountain zone to 3900 m. Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia)].

101. *Astragalus wulumuquianus* K. T. Fu, Bull. Bot. Res., Harbin 2(4): 71. 1982.

乌鲁木齐黄耆 wu lu mu qi huang qi

Plants 30–60 cm tall. Stems covered with short appressed hairs. Leaves 6–12 cm; stipules 6–7 mm, vaginate-connate in lower 1/2, ciliate; petiole short; leaflets in ca. 10 pairs, narrowly ovate, 5–19 × 2.5–6 mm, abaxially sparsely covered with short hairs, adaxially glabrous, apex rounded to slightly emarginate. Racemes ca. 3 cm, dense; peduncle 2.5–6 cm, shortly appressed

hairy; bracts membranous, linear-acute, ca. 3 mm, ciliate. Calyx campanulate, ca. 9 mm, covered with short appressed black hairs; teeth subulate, ca. 4 mm, more densely black hairy. Petals purple; standard narrowly oblong, ca. 18 × 6 mm, apex emarginate; wings ca. 15 mm; keel ca. 12.5 mm. Legumes shortly

stipitate, narrowly oblong, 14–16 mm, keeled ventrally, subtriangular in cross section; valves transversely reticulate, densely covered with spreading white hairs.

- About 900 m. Xinjiang.

19. *Astragalus* sect. *Oroboidei* A. Gray, Proc. Amer. Acad. Arts 6: 203. 1864.

裂翼组 lie yi zu

Astragalus sect. *Hemiphaca* Bunge; *A.* sect. *Orobella* Gontscharow.

Plants perennial, with well-developed stems, with basifixed hairs. Leaves imparipinnate with marcescent petiole; stipules free from petiole, partly connate behind stem or upper or all free from each other; leaflets adaxially glabrous or with scattered hairs toward margins only. Racemes loose or ± dense, borne on rather long axillary peduncles. Bracteoles absent. Calyx campanulate. Petals violet or blue, more rarely yellow, sometimes only when dry; wings exceeding keel, limbs bifid, emarginate or obtuse; keel shorter than wings. Legumes sessile or subsessile, rarely with a stipe up to 2 mm, small, ovoid to narrowly ovoid, at least 2 × as long as wide but mostly longer, keeled ventrally, ± grooved dorsally, completely to incompletely 2-locular or 1-locular; valves membranous, mostly smooth, glabrous or hairy.

Forty-five species: Afghanistan, China, NW India, Kashmir, Mongolia, Nepal, Pakistan, Russia; C and SW Asia, Europe; 20 species (14 endemic) in China.

- 1a. Calyx ca. 5 mm or longer.
- 2a. Leaflets touching, thickish, suborbicular to wider than long, 3–7 × 3–7 mm 104. *A. crassifolius*
- 2b. Leaflets not touching, narrowly elliptic to narrowly obovate.
- 3a. Calyx 8–9 mm; standard and wing limbs deeply cleft to 1/3 of their length 109. *A. laceratus*
- 3b. Calyx up to 7(–7.5) mm; standard emarginate, wing limbs rounded to emarginate.
- 4a. Plants 8–10 cm tall, vegetative parts covered with flattened acuminate hairs; peduncle 1.5–3.5 cm; wing limbs obtriangular, widest at deeply emarginate tip 114. *A. nigrodentatus*
- 4b. Plants distinctly taller, covered with terete hairs; peduncle at least 4 cm but mostly distinctly longer; wing limbs narrowly oblong to narrowly elliptic, rounded or slightly emarginate.
- 5a. Leaflets in 9–11 pairs, 5–10 mm; bracts ca. 2 mm, like calyx partly covered with reddish brown hairs; ovary hairy 119. *A. sedaensis*
- 5b. Leaflets in 5–9 pairs, often longer; bracts mostly longer, like calyx covered with white or black hairs; ovary and legumes glabrous or hairy.
- 6a. Calyx at least partly covered with spreading, flexuous, tangled hairs.
- 7a. Stem, rachis, and peduncle covered at least partly with spreading black hairs up to 0.7 mm, with some white hairs mixed in; calyx teeth 0.3–1 mm; ovary with a stipe ca. 1.5 mm, glabrous 108. *A. gongshanensis*
- 7b. Stem glabrous, rachis and peduncle only with appressed to slightly ascending white and black hairs up to 0.2 mm; calyx teeth 2–3 mm; ovary sessile, white hairy 115. *A. ohbanus*
- 6b. Calyx covered only with appressed to subappressed hairs.
- 8a. Petals yellowish green with violet keel; standard 10–11 mm, without distinct claw; ovary white hairy 110. *A. latiunguiculatus*
- 8b. Petals intensively blue to violet; standard 12–14 mm, with a short but distinct claw; ovary and legumes glabrous or black hairy.
- 9a. Plants covered with hairs 0.3–0.8(–1) mm; pedicels 2–5 mm; calyx teeth 0.5–2 mm, all crowded at dorsal side; legumes 10–12 mm, 5–6 mm high and wide, 2-locular, glabrous 120. *A. taipashanensis*
- 9b. Plants covered with hairs 0.2–0.3 mm; pedicels ca. 1 mm; calyx teeth 1–3 mm, not crowded at dorsal side; legumes 4–10 mm, 3.5–4 mm high, compressed laterally, black hairy 117. *A. peterae*
- 1b. Calyx up to 4 mm.
- 10a. Stipules high connate behind stem.
- 11a. Leaflets narrowly elliptic, 1.5–3.5 × 0.8–1.5 mm, adaxially hairy toward margins; standard ca. 9 mm; wing limbs obtuse; plants densely caespitose with very short non-flowering stems 107. *A. dutreuilii*
- 11b. Leaflets linear, 5–12 × 0.5–1.5 mm, glabrous adaxially; standard 7–7.5 mm; wing limbs emarginate to deeply incised; plants without short non-flowering stems 106. *A. daqingshanicus*
- 10b. Stipules free from each other or rarely very shortly connate.
- 12a. Plants covered with distinctly flattened, often curved, tangled, only white hairs 0.1–0.3 mm; leaflets in (2 or)3(or 4) pairs 116. *A. pavlovii*

- 12b. Plants with terete hairs; leaflets in more pairs.
- 13a. Petals white with bluish tips or yellow, rarely with purple keel (see also alternative when dry).
- 14a. Leaflets in 8–11 pairs; petals whitish yellow; standard ca. 7×6 mm, limb orbicular, abruptly contracted into very short claw 121. *A. tsangpoensis*
- 14b. Leaflets in fewer pairs; petals of other color; standard limb elliptic to obovate.
- 15a. Leaflets linear, $5-6 \times$ as long as wide, $8-15(-25) \times 1-3$ mm; petals white with bluish tips; legumes with a stipe ca. 2 mm 111. *A. lhorongensis*
- 15b. Leaflets elliptic to obovate, $2 \times$ as long as wide or slightly longer; petals of other color; legumes sessile.
- 16a. Petals purple or yellow with purple keel; standard 9–11 mm, rounded or retuse; legumes 7–9 mm, incompletely to completely 2-locular, glabrous 112. *A. macropterus*
- 16b. Petals greenish yellow also when dry; standard 7–8 mm, deeply incised; legumes ca. 4 mm, 1-locular, on ventral side appressed white hairy 102. *A. alaschanus*
- 13b. Petals lilac, blue, or violet (in *A. caeruleopetalinus* and *A. puberulus* sometimes drying to yellow).
- 17a. Leaflets in 13 or 14 pairs, ca. $5 \times$ as long as wide, $13-15 \times 2-3$ mm; legumes sparsely white hairy 113. *A. nangxianensis*
- 17b. Leaflets in up to 9 pairs, relatively wider; legumes (and ovary) glabrous or densely black hairy.
- 18a. Bracts 2–3 mm, subglabrous; calyx 3–4 mm; legumes with a stipe ca. 2 mm, 1-locular, densely appressed black hairy 103. *A. caeruleopetalinus*
- 18b. Bracts up to 1.5 mm, hairy; calyx at most up to 3 mm; legumes sessile or subsessile, incompletely to completely 2-locular (unknown in *A. dabanshanicus*), glabrous (including ovary).
- 19a. Leaflets in up to 6 pairs; racemes short, dense; bracts and calyx black hairy 105. *A. dabanshanicus*
- 19b. Leaflets in up to 9 pairs; racemes up to 12–15 cm, loosely many flowered; bracts and calyx white and black hairy.
- 20a. Leaflets slightly more than $2 \times$ as long as wide; petals purple or yellowish with purple keel; standard 9–11 mm 112. *A. macropterus*
- 20b. Leaflets $4-10 \times$ as long as wide; petals pale lilac, sometimes pale yellow when dry; standard 5–7 mm 118. *A. puberulus*

102. *Astragalus alaschanus* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 31. 1877.

阿拉善黄耆 *la shan huang qi*

Astragalus chingianus E. Peter.

Plants 8–20 cm tall, caespitose, covered with appressed to subappressed hairs 0.1–0.3 mm. Stems 5–10 cm, loosely to rather densely white hairy. Leaves 2–6 cm, subsessile; stipules greenish, 2–3 mm, lower ones shortly connate behind stem, upper ones mostly free, sparsely to loosely hairy or only ciliate; rachis sparsely to rather densely hairy; leaflets in (3–)5–8 pairs, elliptic to obovate, $3-7 \times 2-5$ mm, abaxially sparsely to loosely hairy, adaxially glabrous or with scattered hairs, apex rounded to retuse or slightly emarginate. Racemes up to 2 cm, rather densely up to 20-flowered; peduncle 3–4 cm, white hairy like rachis; bracts whitish membranous, 0.8–1(–2) mm, black hairy or white ciliate. Calyx 2.5–3 mm, loosely white and/or black hairy; teeth unequal, 0.3–1 mm. Petals greenish yellow (according to collector), yellowish when dry; standard obovate to widely ovate, $7-8 \times$ ca. 4 mm, apex deeply incised; wings 6–7 mm, limbs slightly emarginate; keel 4.5–5 mm. Legumes sessile, obliquely ellipsoid, ca. 4 mm, ca. 1.5 mm high and ca. 1 mm wide, keeled ventrally, rounded dorsally, with a short curved beak, 1-locular; valves covered on ventral side loosely with short appressed white hairs. Seed 1.

About 2000 m. Gansu, Nei Mongol, Ningxia, Xinjiang [Mongolia].

103. *Astragalus caeruleopetalinus* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 60. 1980.

蓝花黄耆 *lan hua huang qi*

Astragalus caeruleus H. T. Tsai & T. T. Yu (1940), not Pallas (1776).

Plants 20–25 cm tall. Stems several, up to 20 cm, ascending, sparsely to loosely covered with appressed to ascending white and blackish hairs 0.1–0.3 mm, partly subglabrous. Leaves 3–6 cm; stipules ca. 3 mm; petiole 0.5–2 cm, with rachis hairy like stem; leaflets in 4–7 pairs, ovate to elliptic, $5-10 \times 2.5-5$ mm, abaxially loosely covered with appressed hairs 0.3–0.5 mm, adaxially glabrous, apex obtuse. Racemes short, rather loosely 4–9-flowered; peduncle 4–9 cm, very sparsely to loosely white and toward raceme increasingly black hairy; bracts narrowly triangular, 2–3 mm, subglabrous. Calyx 3–4 mm, densely covered with appressed black hairs; teeth 1–1.5 mm. Petals blue, but yellowish with violet-tipped keel when dry; standard widely obovate, $8-13 \times$ ca. 5 mm, without distinct claw; wings 7–12 mm; keel 5.5–9 mm. Legumes (unripe) with a stipe ca. 2 mm, ellipsoid, 5–6 mm, ca. 4 mm high, 1-locular; valves densely covered with short subappressed black hairs.

- Alpine meadows. Sichuan, Xizang, Yunnan.

Astragalus caeruleopetalimus var. *glabricarpus* Y. C. Ho (loc. cit.) differs mainly by its glabrous legumes.

104. *Astragalus crassifolius* Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 421. 1922.

厚叶黄耆 hou ye huang qi

Plants caespitose, up to 13 cm tall, very sparsely covered with subappressed hairs 0.1–0.3 mm. Stems several, up to 6 cm, glabrous. Leaves 3–5 cm; stipules ovate to suborbicular, 3–7 mm, glabrous; petiole 1.5–2.5 cm, like rachis somewhat flattened, glabrous; leaflets thickish, in 5–9 pairs, mostly touching, suborbicular or widely cordate, 3–7 × 3–7 mm, sometimes also reniform and wider than long, glabrous on both surfaces or sparsely white hairy abaxially, base widely rounded to retuse or slightly cordate, apex widely obtuse to slightly acute. Racemes rather densely 7–12-flowered; peduncle 3–8 cm, very sparsely to loosely covered with white and toward raceme black hairs; bracts elliptic, 5–7 mm, black hairy. Calyx 6–7 mm, rather densely black hairy; teeth 3–3.5 mm. Standard suborbicular, 9–10.5 × 7–7.5 mm, apex incised; wings 9–10 mm; keel ca. 7 mm. Legumes sessile, obliquely ovoid, 10–13 mm, 6–7 mm high and 4–6 mm wide, keeled ventrally, narrowly grooved dorsally, very shortly acuminate, nearly fully 2-locular; valves thin, membranous, sparsely covered with ascending white hairs up to 1.5 mm and very short black hairs.

- Alpine meadows; 3000–4900 m. Sichuan, Xizang, Yunnan.

105. *Astragalus dabanshanicus* Y. H. Wu, Acta Bot. Yunnan. 20: 35. 1998.

大板山黄耆 da ban shan huang qi

Plants 40–50 cm tall. Stems erect, 40–50 cm, sparsely white and black hairy or subglabrous. Leaves 5–8 cm; stipules 2–3 mm, glabrous; petiole 1–2 cm, like rachis sparsely white and black hairy; leaflets in 4–6 pairs, narrowly elliptic, 5–18 × 3–6 mm, abaxially sparsely covered with appressed short white hairs, adaxially glabrous, apex obtuse. Racemes short, densely many flowered; peduncle 6–8 cm, shortly black hairy; bracts whitish membranous, subulate, ca. 1.5 mm, black hairy. Calyx ca. 2.5 mm, sparsely shortly black hairy; teeth ca. 1 mm. Petals purple; standard elliptic, 6.5–7 × ca. 4 mm, without distinct claw; wings ca. 5 mm; keel ca. 4 mm. Ovary shortly stipitate, glabrous. Legumes unknown.

- Qinghai.

106. *Astragalus daqingshanicus* Z. G. Jiang & Z. T. Yin, Acta Phytotax. Sin. 29: 272. 1991.

大青山黄耆 da qing shan huang qi

Plants 10–20 cm tall. Stems several, sparsely white hairy. Leaves 2–5.5 cm, subsessile; stipules membranous, ca. 4 mm, connate behind stem, ciliate; leaflets in 6 or 7 pairs, narrowly oblong to very narrowly elliptic, 5–12 × 0.5–1.5 mm, abaxially hairy, adaxially glabrous, apex acuminate. Racemes 1–2.5 cm, 2–10-flowered; peduncle 6–7 cm; bracts membranous, subulate, 3–4 mm, glabrous or sparsely white hairy. Calyx 3.5–4.5 mm, white and black hairy; teeth ca. 1 mm. Petals lilac, keel purple;

standard widely elliptic, 7–7.5 × 5–5.5 mm, rounded at apex; wings ca. 7 mm, limbs deeply incised; keel ca. 5.5 mm. Legumes sessile, ovoid, ca. 11 mm, ca. 4 mm high, obtusely keeled ventrally, grooved dorsally, 2-locular; valves subleathery, glabrous. Seeds 5 or 6.

- Nei Mongol.

107. *Astragalus dutreuilii* (Franchet) Grubov & N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 27: 93. 1990.

中昆仑黄耆 zhong kun lun huang qi

Oxytropis dutreuilii Franchet, Bull. Mus. Hist. Nat. (Paris) 3: 322. 1897.

Plants 6–12 cm tall, densely caespitose, covered with appressed to subappressed hairs, with very short non-flowering stems. Flowering stems erect, 5–10 cm, slender, loosely covered with white hairs 0.3–0.4 mm, with some black hairs mixed in. Leaves 0.8–2 cm, subsessile; stipules 3–4 mm, adnate to petiole for 0.5–1 mm, high vaginate-connate behind stem, sparsely white hairy; rachis loosely appressed hairy; leaflets in 3–6 pairs, elliptic, 1.5–3.5 × 0.8–1.5 mm, abaxially all over and adaxially toward margins loosely hairy, apex obtuse to slightly retuse. Racemes short, densely 6–8-flowered; peduncle 1–4 cm, loosely white hairy, toward raceme increasingly blackish hairy; bracts membranous, 1–1.5 mm, sparsely black hairy. Calyx ca. 4 mm, loosely covered with grayish black or black hairs 0.05–0.2 mm; teeth unequal, 1–2 mm. Standard obovate to widely ovate, ca. 9 × 5 mm, deeply incised; wings ca. 8 mm, limbs obtuse at apex; keel ca. 7 mm. Ovary with a stipe ca. 1 mm, glabrous. Legumes unknown.

- Xinjiang (C Kunlun Shan).

108. *Astragalus gongshanensis* Podlech & L. R. Xu, Novon 17: 241. 2007.

贡山黄耆 gong shan huang qi

Plants ca. 30 cm tall. Stems ascending to erect, branched with short non-flowering lateral branches, sparsely to loosely covered with appressed to spreading black hairs 0.3–0.7 mm, with some white hairs mixed in. Leaves 5–8 cm; stipules greenish, 2–4 mm, linear-acute, free, sparsely hairy to subglabrous, ciliate; petiole 1–2 cm, with rachis hairy like stem; leaflets in 5–8 pairs, narrowly elliptic, 8–20 × 3–8 mm, abaxially loosely covered with subappressed white hairs 0.4–0.8 mm, adaxially glabrous, apex obtuse to retuse. Racemes loosely 12–20-flowered; peduncle 7–9 cm, loosely hairy like stem; bracts membranous, very narrowly triangular, 2–3 mm, white and black hairy. Calyx 5–6 mm, loosely, toward teeth more densely, covered with subappressed to spreading, tangled, flexuous, black and white hairs 0.1–0.5 mm; teeth unequal, upper ca. 1 mm, lower ones 0.3–0.5 mm. Petals probably yellow; standard oblong, ca. 10 × 4 mm; wings ca. 9 mm; keel ca. 8.5 mm. Ovary with a stipe ca. 1.5 mm, glabrous. Legumes unknown.

- Yunnan (Gongshan).

109. *Astragalus laceratus* Lipsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 26: 144. 1907.

裂翼黄耆 lie yi huang qi

Plants 10–40 cm tall, with subappressed hairs 0.2–0.3 mm. Stems sterile or flowering, ascending to erect, 5–30 cm, sparsely to loosely white hairy. Leaves 3–10 cm; stipules 7–12 mm, often amplexicaul but free from each other, sparsely white ciliate; petiole 0.5–1 cm, rachis sparsely to loosely hairy like stem; leaflets in 5 or 6 pairs, narrowly elliptic, 6–17(–25) × 2.5–4(–6) mm, abaxially sparsely hairy, adaxially glabrous, apex acute to subobtusate. Racemes 10–18-flowered; peduncle 5–16 cm, sparsely white hairy in lower part, densely black hairy in upper part; bracts whitish green membranous, 5–10(–14) mm, sparsely black hairy. Calyx 8–9 mm, loosely black hairy; teeth 2–3.5 mm. Petals violet; standard ovate, 13–16 × 6.5–7 mm, deeply cleft up to 1/4; wings 10–13 mm, limbs deeply bifurcate (up to 1/3 of length); keel 7–9 mm. Legumes sessile, widely inflated ovoid, 6–11 mm, slightly keeled ventrally, rounded dorsally, 1-locular; valves glabrous.

Xinjiang [Kyrgyzstan].

110. *Astragalus latiunguiculatus* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 60. 1980.

宽爪黄耆 kuan zhua huang qi

Plants 8–25 cm tall, caespitose. Stems several to many, in lower parts sparsely and in upper part to densely covered with appressed to subappressed black hairs 0.1–0.3 mm. Leaves 3–7 cm; stipules 3–5 mm, sparsely predominantly white hairy and ciliate to subglabrous; petiole 1–2 cm, with rachis sparsely to loosely hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, 5–12 × 2–4.5 mm, abaxially loosely covered with short white hairs, adaxially glabrous, apex subacute to rounded. Racemes 1.5–2.5 cm, 6–10-flowered; peduncle 5–9 cm, densely hairy like stem; bracts whitish membranous, linear, 3–4 mm, white and blackish hairy. Calyx 5–6 mm, rather densely covered with appressed blackish hairs 0.05–0.2 mm; teeth 1.5–2 mm. Petals yellowish green, keel violet; standard obovate, 10–11 × ca. 7 mm, without distinct claw; wings 9–10 mm; keel 7–8 mm. Ovary subsessile, shortly white hairy. Legumes unknown.

• Alpine slopes; 3600–4400 m. Sichuan.

111. *Astragalus lhorongensis* P. C. Li & C. C. Ni, Acta Phytotax. Sin. 18: 368. 1980.

洛隆黄耆 luo long huang qi

Plants 30–40 cm tall, covered with appressed to subappressed hairs 0.2–0.3 mm. Stems erect, branched, at base sparsely, otherwise loosely to rather densely white and black hairy. Leaves 4–10 cm; stipules 2–5 mm, free, sparsely white and black hairy; petiole 0.5–2 cm, with rachis sparsely to loosely hairy like stem; leaflets in 5–7 pairs, linear, 8–15(–25) × 1–3 mm, abaxially loosely appressed white hairy, adaxially glabrous, apex subacute. Racemes 4–6 cm, loosely many flowered, at fruiting time elongated up to 10 cm or more; peduncle 9–12 cm, sparsely to loosely hairy like stem; bracts whitish membranous, 1.5–2 mm, black hairy. Calyx 3–3.5 mm, rather densely covered with predominantly black hairs; teeth 0.5–1 mm. Petals whitish with bluish-tipped keel; standard widely rhombic-elliptic, ca. 7 × 5 mm, without distinct claw, rounded at apex; wings ca. 7 mm, limbs rounded at apex; keel ca. 5 mm. Legumes spreading to pendulous, with a stipe ca. 2 mm, oblong, 6–10

mm, ca. 3 mm high and ca. 2 mm wide, keeled ventrally, narrowly grooved dorsally, very shortly acuminate, 1-locular; valves glabrous. Seeds 2.

• 3300–3600 m. Xizang.

112. *Astragalus macropterus* Candolle, Prodr. 2: 283. 1825.

大翼黄耆 da yi huang qi

Astragalus karaculensis Ovczinnikov & Rassulova; *A. longipes* Karelin & Kirilov (1841), not Steudel (1840); *A. multicaulis* Ledebour; *A. pseudomacropterus* Karmysheva; *A. vicioides* Ledebour; *A. vicioides* var. *longipes* Trautvetter.

Plants 20–90 cm tall, covered with appressed to subappressed hairs 0.1–0.35 mm. Stems several, simple or branched, sparsely to loosely covered with white hairs, toward nodes or elsewhere with scattered black hairs, sometimes glabrescent. Leaves 4–7 cm, subsessile; stipules 3–5 mm, free, soon falling; rachis sparsely to loosely hairy; leaflets in 4–9 pairs, narrowly oblong to oblong, 3–15(–20) × 1–7 mm, abaxially sparsely to loosely hairy, adaxially glabrous, apex acute to obtuse. Racemes 3–12 cm, loosely many flowered; peduncle 5–15 cm, glabrous or sparsely to loosely hairy; bracts whitish, 1–1.5 mm, hairy, soon falling. Calyx 2.5–3 mm, loosely covered with white and predominantly black hairs; teeth 0.5–1 mm. Petals purple or yellowish with purple keel; standard elliptic, 9–11 × 4–5.5 mm, mostly without distinct claw, apex rounded to retuse or more rarely emarginate; wings nearly as long as standard, limbs obtuse to more rarely slightly incised; keel 5–6 mm. Legumes sessile, obliquely ovoid, 7–9 mm, ca. 3 mm high, keeled ventrally, widely flattened to slightly impressed dorsally, incompletely 2-locular to nearly 2-locular; valves brown, glabrous.

Steppes, stony slopes, in scrub formations; 1600–3800 m. Gansu, Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia), Tajikistan].

113. *Astragalus nangxianensis* P. C. Li & C. C. Ni, Acta Phytotax. Sin. 18: 368. 1980.

朗县黄耆 lang xian huang qi

Plants ca. 30 cm tall. Stems branched in upper part, striate, sparsely hairy, glabrescent with age. Leaves 5–7 cm; stipules ca. 4 mm, narrowly triangular, free from petiole, ciliate; petiole and rachis sparsely hairy; leaflets in 13 or 14 pairs, narrowly ovate, 13–15 × 2–3 mm, abaxially sparsely appressed hairy to subglabrous, adaxially glabrous, apex obtuse. Racemes many flowered; peduncle longer than leaves, sparsely hairy. Calyx campanulate, ca. 4 mm, covered with white and black hairs; teeth ca. 1 mm. Petals lilac; standard ca. 8 mm, limb orbicular; wings ca. 7 mm; keel ca. 6 mm. Ovary stipitate, sparsely hairy. Legumes ovoid, ca. 5 mm, ca. 2 mm high, sparsely hairy, incompletely 2-locular.

• Xizang (Nangxian).

114. *Astragalus nigrodentatus* N. Ulziykhutag ex Podlech & L. R. Xu, Novon 14: 223. 2004.

黑齿黄耆 hei chi huang qi

Plants 8–10 cm tall; hairs in vegetative parts flattened,

long acuminate, white, widest near base, elsewhere slender and black. Stems ascending, at base stolonlike, glabrous, with few, remote leafless stipules, in upper part loosely to rather densely covered with stiff, ascending to spreading, white hairs 0.6–0.8 mm, toward nodes mostly black hairy. Leaves 3–5 cm; stipules 6–7 mm, those without developed leaves connate to middle, other ones free from each other, lower ones glabrous, upper ones loosely white and black hairy; petiole 0.8–1.5 cm, with rachis loosely white hairy like stem; leaflets in 6–8 pairs, narrowly elliptic, 5–14 × 2.5–5 mm, abaxially loosely covered with appressed hairs 0.2–0.5 mm, adaxially glabrous but with densely white hairy margins, apex obtuse. Racemes short, densely many flowered; peduncle 1.5–3.5 cm, loosely to densely covered with subappressed black hairs 0.3–1 mm; bracts 4–6 mm, predominantly black hairy. Calyx ca. 5 mm, densely covered with ascending to partly nearly spreading black hairs; teeth ca. 2 mm. Petals probably violet in life, pale yellowish brown when dry; standard oblong, ca. 9 × 4 mm, without distinct claw, apex widely and deeply incised; wings ca. 7.5 mm, limbs obtriangular, widest at widely and deeply incised tip; keel ca. 6.5 mm. Ovary subsessile, ellipsoid, glabrous. Legumes unknown.

- E Xizang.

115. *Astragalus ohbanus* Podlech, Feddes Repert. 116: 56. 2005 [*“ohbaensis”*].

奥巴黄耆 ao ba huang qi

Plants 20–25 cm tall, caespitose. Stems several, below middle only with few leaves, glabrous. Leaves 3–4 cm, subsessile; stipules greenish membranous, 6–9 mm, adnate to petiole for 1–2 mm, otherwise free, glabrous; rachis glabrous or very sparsely covered with white and black ± appressed hairs 0.1–0.2 mm; leaflets in 5–7 pairs, narrowly elliptic to elliptic, 5–12 × 2–4 mm, abaxially sparsely covered with appressed white hairs up to 0.3 mm, sometimes only at margins and midvein, adaxially glabrous, apex obtuse to subacute. Racemes 1.5–2 cm, rather densely 6–10-flowered; peduncle 4.5–8 cm, sparsely covered with appressed to slightly ascending white and black hairs up to 0.3 mm; bracts whitish membranous, linear, ca. 5 mm, sparsely white and black hairy, apex acute. Calyx 6–7.5 mm, loosely to rather densely covered with subappressed to partly spreading, flexuous, tangled, predominantly black hairs 0.2–0.3 mm; teeth unequal, 2–3 mm. Petals pale blue, drying pale yellow; standard widely ovate, ca. 12 × 7 mm, deeply bilobed; wings ca. 11 mm, limbs narrowly obovate, shortly but distinctly incised; keel ca. 8 mm. Ovary subsessile, narrowly ellipsoid, very sparsely white hairy. Legumes unknown.

- Xinjiang (Kunlun Shan).

116. *Astragalus pavlovii* B. Fedtschenko & Basilevskaja, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 38: 90. 1929.

了墩黄耆 liao dun huang qi

Astragalus lioui H. T. Tsai & T. T. Yu.

Plants 10–20 cm tall; hairs appressed to subappressed, distinctly flattened, often curved, white, 0.1–0.3 mm. Stems several, 6–18 cm, rather densely hairy. Leaves 2–4 cm; stipules ca.

2 mm, free or more rarely very shortly connate behind stem, loosely to rather densely hairy; petiole 1–1.5 cm, like rachis loosely to mostly densely hairy; leaflets in (2 or)3(or 4) pairs, elliptic to obovate, 7–13 × 3–8 mm, abaxially loosely to densely hairy, adaxially glabrous or sparsely hairy, apex rounded to widely retuse or emarginate. Racemes loosely to rather densely 10–20-flowered; peduncle 1.5–4 cm, rather densely hairy; bracts 0.5–1 mm, loosely hairy. Calyx 2.5–3 mm, loosely to rather densely hairy; teeth 0.3–0.8 mm. Petals pale purplish (when dry); standard elliptic, ca. 8 × 3.5 mm, without distinct claw, apex emarginate; wings ca. 7 mm, limbs incised; keel ca. 5.5 mm. Legumes sessile, obliquely erect, narrowly oblong, 8–10 mm, ca. 3 mm high and 2–2.5 mm wide, keeled ventrally, widely grooved dorsally, very shortly acuminate, 2-locular; valves very finely reticulate veined, glabrous. Seeds mostly 2 in each locule.

Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia].

117. *Astragalus peterae* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 27. 1936.

川青黄耆 chuan qing huang qi

Astragalus abramovii Gontscharov; *A. brachytrypis* (Candolle) C. A. Meyer f. *giganteus* Lipsky; *A. pseudobrachytrypis* Gontscharov.

Plants 25–35 cm tall. Stems several, up to 30 cm, glabrous or very sparsely furnished with subappressed predominantly black hairs 0.2–0.3 mm. Leaves 5–9 cm; stipules 4–9 mm, glabrous or with few hairs; petiole 0.3–1 cm, like rachis sparsely to loosely covered with subappressed to ascending short black and white hairs; leaflets in 7–9 pairs, elliptic, 5–10 × 2.5–5 mm, apex obtuse to retuse, blades of upper leaves mostly narrower, up to 15 × 3.5 mm, apex acute or minutely mucronulate, all abaxially loosely covered with appressed white hairs, adaxially glabrous. Racemes 3–4.5 cm, rather densely many flowered; peduncle 6–11 cm, loosely or below raceme rather densely covered with subappressed black hairs; bracts whitish membranous, linear-acute, 5–10 mm, black hairy. Calyx 6–7 mm, densely subappressed black hairy; teeth 1–3 mm. Petals blue or purple; standard widely elliptic, 12–14 × 7–8 mm, apex deeply incised; wings 9–10 mm; keel 7–8 mm. Legumes subsessile, pendulous, narrowly oblong, 4–10 mm, 3.5–4 mm high and ca. 3.5 mm wide, with a beak 1–1.5 mm, incompletely 2-locular to nearly fully 2-locular; valves densely covered with ascending to spreading black hairs 0.3–0.5 mm, with scattered white hairs mixed in.

2800–3800 m. Gansu, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang [Kyrgyzstan, Mongolia, Tajikistan].

118. *Astragalus puberulus* Ledebour, Fl. Altaic. 3: 299. 1831.

茸毛黄耆 rong mao huang qi

Plants 20–45 cm tall, with appressed to subappressed hairs 0.1–0.3 mm. Stems several, erect, 15–40 cm, angular, loosely to rather densely white hairy, sometimes glabrescent with age. Leaves 2–6 cm, subsessile; stipules 1.5–3 mm, narrowly triangular, free, sparsely appressed white hairy; rachis hairy like stem; leaflets in 6–9 pairs, linear to narrowly oblong, 3–15 ×

0.5–3 mm, abaxially loosely to densely white hairy, adaxially glabrous or with scattered hairs only, apex obtuse to retuse. Racemes 3–15 cm, loosely 15–30-flowered; peduncle 3–10 cm, loosely to densely hairy like stem; bracts ca. 1 mm, white and black hairy. Calyx 2–3 mm, rather densely covered with appressed white and black hairs; teeth 0.3–0.5 mm. Petals pale lilac, sometimes pale yellow when dry; standard widely obovate, 5–7 mm, with short claw, apex retuse; wings 4–6 mm; keel 3.5–5 mm. Legumes sessile, erect, obliquely ovate as seen from side, with straight ventral side, 6–7 mm, 2.5–4 mm high, keeled ventrally, grooved dorsally, subobtusate at apex, 2-locular; valves finely cross-nerved, glabrous.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

119. *Astragalus sedaensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 64. 1980.

色达黄耆 se da huang qi

Plants 10–15 cm tall. Stems several, with short white and black hairs. Leaves 5–7 cm; stipules 2–3 mm, hairy; petiole ca. 1 cm; leaflets in 9–11 pairs, narrowly elliptic to elliptic, 5–10 × 2–4 mm, obtuse to slightly retuse, abaxially white hairy, adaxially glabrous. Racemes 2–3 cm, dense; peduncle 4–6 cm; bracts membranous, narrowly triangular, ca. 2 mm, covered with white or reddish brown hairs. Calyx ca. 5 mm, with short, ascending, reddish brown hairs; teeth ca. 1.5 mm. Petals yellow; standard obovate, ca. 12 × 6 mm; wings 9–10 mm; keel ca. 7 mm. Ovary subsessile, ovoid, hairy. Legumes unknown.

• About 4300 m. Sichuan.

120. *Astragalus taipaihanensis* Y. C. Ho & S. B. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 63. 1980.

太白山黄耆 tai bai shan huang qi

Plants 20–40 cm tall, loosely hairy. Stems ascending to erect, with appressed to subappressed white hairs 0.3–0.8(–1) mm. Leaves 3–9 cm; stipules 5–10 mm, sparsely hairy to subglabrous, ciliate; petiole 0.5–1.5 cm, with rachis hairy like stem;

leaflets in 5–9 pairs, oblong to narrowly ovate, 5–20 × 2–8 mm, abaxially especially at midrib loosely covered with subappressed white hairs 0.2–0.5 mm, adaxially glabrous or more rarely with scattered hairs only, apex obtuse to retuse. Racemes loosely 7–12-flowered; peduncle 5–7 cm, hairy like stem; bracts membranous, narrowly triangular, 2–5 mm, white and black hairy. Calyx 5–6 mm, loosely, toward teeth more densely, covered with subappressed, predominantly black hairs 0.5–0.8 mm; teeth narrowly triangular, all close together at dorsal side, 0.5–2 mm. Petals violet; standard obovate, 12–14 × ca. 6 mm; wings 10–13 mm; keel 9–11 mm. Legumes subsessile, ovoid to ellipsoid, 10–12 mm, 5–6 mm high and wide, keeled ventrally, grooved dorsally, acuminate, 2-locular; valves glabrous.

• 2400–2900 m. Gansu, Shaanxi.

121. *Astragalus tsangpoensis* Podlech & L. R. Xu, Sendtnera 7: 191. 2001.

藏布黄耆 zang bu huang qi

Plants at least 30 cm tall (basal parts missing), covered with subappressed to ascending hairs 0.3–0.7 mm. Stem branched, glabrous in basal parts, otherwise sparsely to loosely white and black hairy. Leaves 3–7 cm; stipules 3–5 mm, free, sparsely white and black hairy; petiole 0.5–1.5 cm, like rachis loosely to rather densely mostly white hairy; leaflets in 8–11 pairs, elliptic, 4–9 × 1–2.5 mm, abaxially loosely to rather densely subappressed white hairy, adaxially glabrous, apex acute. Racemes 1.5–2.5 cm, loosely 6–10-flowered; peduncle 5–6 cm, hairy like stem; bracts 1.5–2 mm, sparsely white and black hairy. Bracteoles rarely present. Calyx ca. 3 mm, loosely to rather densely covered with white or white and black hairs; teeth ca. 1 mm. Petals (in dry state) whitish yellow or very slightly pale bluish suffused; standard orbicular, ca. 7 × 6 mm, apex widely emarginate; wings ca. 6.5 mm, limbs rounded at apex; keel ca. 5 mm. Ovary sessile, ellipsoid, white hairy. Legumes unknown.

• About 3600 m. Xizang (Lhasa region).

20. *Astragalus* sect. *Melilotopsis* Gontscharow in Komarov, Fl. URSS 12: 878. 1946.

假草木樨组 jia cao mu xi zu

Plants perennial, with long, commonly branched stems. Leaves imparipinnate; stipules free. Racemes borne on long slender peduncles, from beginning of anthesis loosely many flowered. Flowers small. Calyx campanulate. Wing limbs slightly to distinctly bilobed. Legumes subsessile, small, globose to subglobose, 2-locular; valves smooth or rarely cross-wrinkled.

Eight species: China, Japan, Mongolia, Russia (Siberia); eight species (six endemic) in China.

- 1a. Racemes 28–32 cm, loosely 25–50-flowered; bracts 3–4 mm; calyx 4–5 mm; standard ca. 10 mm 125. *A. guinanicus*
 1b. Racemes mostly much shorter, sometimes up to 15 cm; bracts, calyx, and standard distinctly shorter.
 2a. Stems ± densely covered with appressed to spreading hairs; wing limbs deeply bilobed.
 3a. Rachis appressed hairy; leaflets ca. 4 × as long as wide, 5–12 × 1.5–3 mm; petals orange; legumes glabrous 124. *A. dependens*
 3b. Rachis partly with spreading hairs; leaflets ca. 2 × as long as wide, 2–4 × 1–2 mm; petals yellow; legumes very shortly white hairy 126. *A. huiningensis*
 2b. Stems glabrous or with scattered hairs only; wing limbs slightly emarginate to bilobed; legumes always glabrous.
 4a. Leaflets in 1(or 2) pairs, sometimes only terminal leaflet present, more than 10 × as long as wide 129. *A. tenuis*
 4b. Leaflets in at least 2 pairs, at most 5 × as long as wide.
 5a. Rachis sparsely to loosely covered with appressed to partly spreading hairs up to 0.5 mm; leaflets up to 10 mm; bracts 2–3 mm; calyx teeth equally distributed 122. *A. aurantiacus*

- 5b. Rachis glabrous or sparsely covered with appressed hairs up to 0.2 mm; most leaflets longer, up to 20 mm; bracts 0.5–2 mm; calyx teeth all crowded at lower side.
- 6a. Stipules 1–1.5 mm, narrowly triangular, white hairy; calyx 1.5–2 mm, loosely hairy; leaflets in 2 or 3 pairs, sublabellately crowded, narrowly obovate, 5–20(–30) × 1–4(–6) mm 127. *A. melilotoides*
- 6b. Stipules 2–3 mm, from widely triangular base somewhat abruptly subulate-acuminate, glabrous; calyx 2.5–3 mm, tube subglabrous or sparsely hairy; leaflets equally distributed.
- 7a. Leaflets in 3–7 pairs, narrowly elliptic, 7–15 × 1.5–2.5 mm; calyx teeth 0.5–1 mm, white hairy on outer and inner sides; standard ca. 5 mm, wings ca. 4.5 mm; legumes 3–3.5 mm 128. *A. satoi*
- 7b. Leaflets in (1 or)2 or 3 pairs, elliptic, 5–20 × 2.5–8 mm; calyx teeth 0.1–0.5 mm, black hairy on outer and inner sides; standard and wings ca. 6 mm; legumes 5–6 mm 123. *A. capillipes*

122. *Astragalus aurantiacus* Handel-Mazzetti, Symb. Sin. 7: 557. 1933.

橙黄花黄耆 cheng huang hua huang qi

Astragalus dependens Bunge var. *aurantiacus* (Handel-Mazzetti) Y. C. Ho; *A. dependens* var. *flavescens* Y. C. Ho; *A. dependens* var. *sericeus* K. T. Fu.

Plants up to 65 cm tall, with subappressed to nearly spreading hairs 0.1–0.5 mm. Stems erect, glabrous or with scattered hairs. Leaves 1.5–4 cm, subsessile; stipules whitish membranous, 3–4 mm, subglabrous, free from each other; rachis slender, sparsely to loosely covered with subappressed to spreading white and a few black hairs; leaflets in 3–7 pairs, narrowly elliptic, 5–10 × 1.5–3 mm, abaxially rather densely and adaxially sparsely hairy, apex rounded to retuse or slightly emarginate. Racemes at anthesis densely many flowered, later strongly elongated up to 15 cm; peduncle 6–26 cm, sparsely to loosely covered with ascending white or black hairs; bracts 2–3 mm, long subulate-acuminate, mostly black hairy. Calyx 2–2.5 mm, loosely covered with appressed black and a few white hairs 0.1–0.15 mm; teeth 0.3–0.5 mm. Petals orange; standard obovate, 5–6 × 3–4 mm, apex widely emarginate; wings 5–5.5 mm, limbs slightly obliquely incised; keel 4.5–5 mm. Legumes sessile, widely ellipsoid, ca. 4 mm, ca. 3 mm high and ca. 2 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, with a persistent style ca. 2 mm, 2-locular, glabrous. Seed 1 in each locule.

- Gansu, Nei Mongol, Qinghai, Sichuan, Xinjiang.

123. *Astragalus capillipes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 20. 1868.

草珠黄耆 cao zhu huang qi

Plants 40–50 cm tall, sparsely furnished with appressed white and black hairs 0.1–0.2 mm. Stems erect, 35–40 cm, strongly branched, glabrous. Leaves 2–5 cm; stipules membranous, from widely triangular base somewhat abruptly subulate-acuminate, 2–3 mm, nearly free from each other, glabrous; petiole 0.5–1 cm, like rachis slender, glabrous; leaflets in (1 or)2 or 3 pairs, narrowly elliptic, 5–20 × 2.5–8 mm, abaxially glabrous or to loosely covered with ± appressed white hairs, adaxially glabrous, apex rounded to retuse. Racemes 3–14(–20) cm, loosely many flowered; peduncle 2–9 cm, subglabrous or sparsely to loosely covered with very short, subappressed to ascending, mainly black hairs; bracts 0.5–2 mm, glabrous or with

a few black hairs. Calyx 2.5–3 mm, tube subglabrous or sparsely black hairy; teeth all close together at lower side, 0.1–0.5 mm, densely black hairy on outer and inner sides. Petals white, cream, orange, or red; standard suborbicular, ca. 6 × 4 mm, apex emarginate; wings ca. 6 mm; keel ca. 5 mm. Legumes with a stipe 0.5–1.5 mm, obovoid, 5–6 mm, 4–5 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, with a slender, persistent style, 2-locular; valves thin, cross-wrinkled, glabrous.

- 300–2000 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi.

124. *Astragalus dependens* Bunge, Bull. Acad. Imp. Sci. Saint-Pétersbourg 26: 471. 1880.

悬垂黄耆 xuan chui huang qi

Plants 30–35 cm tall, caespitose, with white hairs 0.1–0.3 mm, partly with some black hairs mixed in. Stems several to numerous, branched at base, rather densely covered with subappressed to spreading hairs. Leaves 3–7 cm, subsessile; stipules 2–3 mm, free, sparsely hairy; rachis slender, loosely to rather densely subappressed hairy; leaflets in 6 or 7 pairs, narrowly elliptic, 5–12 × 1.5–3 mm, abaxially loosely to rather densely subappressed hairy, adaxially glabrous, apex obtuse to slightly emarginate. Racemes 2–3 cm, densely many flowered, soon strongly elongating; peduncle 4–10 cm, loosely to rather densely covered with appressed white hairs 0.05–1.5 mm, toward raceme sometimes also with black hairs; bracts whitish membranous, 1–1.5 mm, sparsely black ciliate. Flowers subsessile. Calyx 2–2.5 mm, loosely covered with appressed black and a few white hairs 0.1–0.15 mm; teeth 0.3–0.5 mm. Petals orange; standard 5–6 mm, limb obovate, 3–3.5 mm wide, apex slightly emarginate; wings 4.5–5.5 mm, limbs oblong, very deeply incised, often more than 1/2 of length, bifurcate, lower segment filiform to linear, upper distinctly wider; keel 4–4.5 mm. Legumes sessile, widely ellipsoid, ca. 4 mm, ca. 3 mm high and ca. 2 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, with a persistent style ca. 2 mm, 2-locular; valves finely transverse-rugulose, glabrous. Seed 1 in each locule.

- 2100–2900 m. Gansu, Qinghai.

125. *Astragalus guinanicus* Y. H. Wu, Bull. Bot. Res., Harbin 17: 33. 1997.

贵南黄耆 gui nan huang qi

Plants 50–70 cm tall. Stems sparsely covered with short

black hairs. Leaves 7–10 cm, subsessile; stipules 3–4 mm, narrowly triangular, black hairy; leaflets in 8 pairs, linear, 20–30 × 1–2.5 mm, abaxially with appressed white hairs, adaxially glabrous, apex acuminate. Racemes 28–32 cm, loosely 25–50-flowered; peduncle ca. 20 cm, covered with short black hairs; bracts white membranous, 3–4 mm, black hairy. Calyx 4–5 mm, rather densely black hairy; teeth 2–2.5 mm. Petals purple; standard obovate, ca. 10 × 5.5 mm, apex obtuse to emarginate; wings 7–8 mm, limbs obtuse at apex; keel ca. 5 mm. Ovary hairy or glabrous. Legumes globose, ca. 4 mm in diam.

- About 3200 m. Qinghai (Guinan).

No material of this species could be investigated.

126. *Astragalus huiningensis* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 69. 1980.

会宁黄耆 *hui ning huang qi*

Astragalus huiningensis var. *psilocarpus* K. T. Fu.

Plants up to 30 cm tall; hairs subappressed to nearly spreading, tangled, white, in inflorescence also a few black, 0.1–0.3 mm. Stems many, 10–15 cm, branched, densely to rather densely hairy. Leaves 1.5–3 cm, subsessile; stipules 1–2 mm, subglabrous or sparsely to loosely hairy; rachis hairy like stem; leaflets in 5–8 pairs, narrowly elliptic to elliptic, 2–4 × 1–2 mm, abaxially loosely to rather densely hairy, adaxially glabrous or nearly so, apex rounded to emarginate. Racemes 1.5–3.5 cm, loosely 10–15-flowered; peduncle 5–15 cm, densely white hairy, partly glabrescent; bracts whitish membranous, scarcely ca. 1 mm, white and black hairy. Calyx 2–2.5 mm, loosely covered with mostly white hairs; teeth widely triangular, 0.2–0.4 mm. Petals yellow; standard obovate, ca. 5 × 3 mm, apex emarginate; wings ca. 5 mm, limbs deeply obliquely incised to bilobed; keel ca. 5 mm. Legumes sessile, ovoid, 4–5 mm, ca. 3 mm high and ca. 2.5 mm wide, slightly keeled ventrally, deeply and narrowly grooved dorsally, very shortly acuminate, 2-locular; valves with dark, cross-wrinkled and partly netlike elevated nerves, sparsely covered with very short appressed white hairs or glabrescent.

- Gansu, Ningxia, Qinghai, Shaanxi, Sichuan.

127. *Astragalus melilotoides* Pallas, Reise Russ. Reich. 3: 748. 1776.

草木樨状黄耆 *cao mu xi zhuang huang qi*

Plants 45–90 cm tall, furnished with appressed nearly only white hairs 0.05–0.2 mm. Stems 35–80 cm, strongly branched, glabrous or with a few scattered hairs. Leaves 1–4 cm, subsessile; stipules narrowly triangular, 1–1.5 mm, white hairy; rachis slender, sparsely to very sparsely hairy or glabrous; leaflets in (1 or) 2 or 3 pairs, upper 3 subflabellately crowded, linear to narrowly oblong or narrowly cuneate-obovate and then widest near apex, 5–20(–30) × 1–4(–6) mm, abaxially loosely to rather densely hairy, adaxially sparsely hairy or sometimes nearly glabrous, apex rounded to retuse. Racemes 4–8 cm, loosely many flowered, elongating in fruit up to 16 cm; peduncle 4–11 cm, sparsely to loosely hairy; bracts ca. 1 mm, glabrous. Calyx 1.5–2 mm, loosely hairy; teeth all close together at lower side, 0.3–0.5 mm. Petals white, cream, yellow, purple, or violet with dark

spots; standard suborbicular, 5–5.5 × ca. 5 mm, apex emarginate; wings 5–5.5 mm, limbs obliquely incised; keel ca. 4.5 mm. Legumes sessile, ellipsoid, ca. 4 mm, ca. 2.5 mm high and ca. 2 mm wide, slightly keeled ventrally, deeply grooved dorsally, rounded at apex, 2-locular; valves glabrous. Seed 1 in each locule.

Steppes, stony or sandy slopes; 200–2600 m. Gansu, Hebei, Heilongjiang, Hunan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Mongolia, Russia (Siberia)].

128. *Astragalus satoi* Kitagawa, Bot. Mag. (Tokyo) 48: 99. 1934.

小米黄耆 *xiao mi huang qi*

Plants 40–80 cm tall, glabrous with exception of pedicels and calyx. Stems erect, up to 70 cm, strongly branched. Leaves 3–9 cm; stipules membranous, 2–3 mm; petiole 0.3–0.7 cm, like rachis slender; leaflets in 3–7 pairs, narrowly elliptic, 7–15 × 1.5–2.5 mm, apex obtuse. Racemes 4–8 cm, loosely many flowered; peduncle 4–8 cm; bracts 0.5–2 mm. Calyx 2.5–3 mm, tube subglabrous or sparsely white hairy; teeth all close together at lower side, 0.5–1 mm, sparsely white hairy on outer and inner sides. Petals white; standard suborbicular, ca. 5 × 4 mm, apex emarginate; wings ca. 4.5 mm, limbs slightly obliquely emarginate; keel ca. 4 mm. Legumes subsessile, widely obovoid to subglobose, ca. 3.5 mm, rounded at apex, with a slender, persistent style, 2-locular; valves thin, cross-wrinkled, glabrous.

- 300–2000 m. Gansu, Nei Mongol, Shaanxi.

129. *Astragalus tenuis* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 15: 768. 1842.

细叶黄耆 *xi ye huang qi*

Astragalus melilotoides Pallas var. *tenuis* (Turczaninow) Ledebour.

Plants 20–45 cm tall, vegetative parts glabrous or very sparsely furnished with appressed nearly only white hairs 0.05–0.2 mm. Stems erect, 20–25 cm, branched, glabrous or with a few scattered hairs. Leaves 2–8 cm, subsessile or with a petiole up to 0.8 mm; stipules whitish or greenish membranous, 1–3 mm, narrowly triangular or with subulate tip; rachis slender, glabrous or very sparsely hairy; leaflets in 1(or 2) pairs, sometimes only 1 terminal leaflet present, linear, 10–30 × 0.5–1.5 mm, abaxially sparsely to rather densely covered with ± appressed to subappressed hairs, adaxially glabrous or sparsely hairy, apex rounded to retuse. Racemes 4–8 cm, loosely many flowered, elongating in fruit; peduncle 4–11 cm, glabrous; bracts 0.5–1 mm, glabrous or with a few hairs. Calyx 1.5–2 mm, loosely covered with appressed white hairs 0.05–0.1 mm; teeth all crowded at lower side, 0.3–0.5 mm. Petals white, cream, yellow, purple, or violet with dark spots; standard orbicular, 4–5.5 × ca. 5 mm, apex emarginate; wings 5–5.5 mm, limbs obliquely emarginate; keel ca. 4.5 mm. Legumes sessile, widely obliquely ellipsoid, 2.5–4 mm, 2–2.5 mm high and ca. 2 mm wide, rounded at apex, 2-locular; valves transversely rugulose, glabrous.

Hebei, Nei Mongol [Mongolia, Russia (Siberia)].

21. *Astragalus* sect. *Brachycarpus* Borissova in Komarov, Fl. URSS 12: 877. 1946.

短果组 duan guo zu

Plants perennial with a slender, mostly branched caudex, acaulescent or nearly acaulescent or with well-developed, mostly slender, prostrate to ascending stems; hairs basifixed. Leaves imparipinnate; stipules shortly adnate to petiole or free, sometimes distinctly vaginate-connate behind stem. Racemes mostly distinctly pedunculate, capitate to shortly cylindrical, densely few to many flowered, sometimes elongated in fruit. Flowers small, subsessile. Calyx campanulate to more rarely shortly tubular-campanulate. Petals violet, purplish, or yellow, glabrous; standard mostly without distinct claw; wings shorter than standard, limbs rounded or emarginate at tip; keel shorter than wings or all petals of nearly same length. Legumes small, globose to ovoid, mostly sessile, 2-locular or 1-locular, with thin walls, often distinctly cross-wrinkled. Seeds 2 or 4 or rarely few.

Thirty-six species: Afghanistan, China, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; 24 species (18 endemic) in China.

- 1a. Rachis at least with partly spreading hairs.
- 2a. Some leaflets adaxially glabrous but most of them spreading hairy on both surfaces; wing limbs obtriangular, widest below widely retuse tip, ca. 3.5×2 mm; plants 3–4 cm tall 140. *A. malcolmii*
- 2b. Leaflets with appressed to ascending hairs, mostly glabrous adaxially; wing limbs oblong to obovate, relatively narrower; plants mostly distinctly taller.
- 3a. Leaflets on both surfaces silvery hairy with ascending hairs up to 1 mm; standard ca. 8 mm 138. *A. luteiflorus*
- 3b. Leaflets adaxially glabrous.
- 4a. Bracts 1–3 mm; calyx 3–4 mm.
- 5a. Leaflets in 6–9 pairs, $9-27 \times 2-7$ mm, at base of petiolule with crowded, minute, sessile glands; calyx covered with ascending predominantly black hairs; standard 8–10 mm, rounded to slightly emarginate; ovary and legumes hairy 137. *A. longiracemosus*
- 5b. Leaflets in 4–7 pairs, $4-8 \times 1-3$ mm or $6-20 \times 1-3$ mm, mostly folded, without minute sessile glands; calyx covered with subappressed to appressed white and black hairs; standard 7–8 mm; ovary (and legumes) glabrous or sparsely hairy.
- 6a. Leaflets ca. $3 \times$ as long as wide, $4-8 \times 1-3$ mm; peduncles covered with spreading white hairs; wing limbs obovate, rounded 143. *A. nanshanicus*
- 6b. Leaflets ca. $6 \times$ as long as wide, $6-20 \times 1-3$ mm; peduncles covered with appressed and spreading predominantly black hairs; wing limbs narrowly oblong, obliquely emarginate 148. *A. pseudoversicolor*
- 4b. Bracts 3–6 mm; calyx at least 5 mm.
- 7a. Plants 15–35 cm tall; leaves 4–7 cm; leaflets ca. $5 \times$ as long as wide, $10-20 \times 2-4$ mm; calyx ca. 4 mm; wing limbs deeply obliquely incised 134. *A. handelii*
- 7b. Plants 5–12 cm tall; leaves up to 4 cm; leaflets ca. $3 \times$ as long as wide; calyx 5–6 mm; wing limbs truncate to retuse.
- 8a. Calyx covered with ascending to spreading hairs up to 1 mm; standard limb widely ovate, abruptly contracted at base into short claw; wing limbs obliquely emarginate; legumes densely covered with ascending to spreading white and black hairs up to 1 mm 142. *A. mieheorum*
- 8b. Calyx covered with appressed to ascending hairs 0.3–0.6 mm; standard limb obovate, somewhat abruptly to gradually passing into claw; wing limbs rounded at apex; ovary glabrous (ripe legumes unknown) 153. *A. valerii*
- 1b. Rachis with appressed or partly ascending hairs.
- 9a. Leaflets obovate or triangular-obovate, at most $2 \times$ as long as wide, apex mostly \pm deeply and widely emarginate; legumes 1-locular 141. *A. melanostachys*
- 9b. Leaflets at apex acute to rounded, if slightly emarginate, then distinctly more than $2 \times$ as long as wide; legumes incompletely to mostly completely 2-locular in all species with known fruits.
- 10a. Wing limbs distinctly asymmetrically incised near tip; stems well developed, up to 10–20 cm.
- 11a. Leaflets linear, $6-8 \times$ as long as wide, $8-20 \times 1.5-2.5$ mm, loosely hairy adaxially; calyx 2.5–3 mm, with partly very short (less than 0.05 mm) hairs 149. *A. rytidocarpus*
- 11b. Leaflets wider, $3-5 \times$ as long as wide, glabrous adaxially; calyx at least 3 mm with hairs 0.5–0.8 mm.
- 12a. Stem rather densely covered with hairs 0.4–0.6 mm; bracts 4–5 mm; calyx 4–4.5 mm, with appressed to ascending hairs; limb of standard rounded at apex, base somewhat abruptly contracted into short claw 150. *A. sagastaigolensis*
- 12b. Stem loosely covered with hairs 0.1–0.3 mm; bracts 1–3 mm; calyx 3–4 mm, with appressed to subappressed hairs; limb of standard retuse to slightly emarginate at apex, base without distinct claw 139. *A. mahoschanicus*

- 10b. Wing limbs rounded to slightly retuse at tip.
- 13a. Leaflets abaxially glabrous or only at midvein and margins with scattered hairs; stems glabrous or very sparsely hairy 152. *A. tulinovii*
- 13b. Leaflets abaxially sparsely to rather densely hairy; stems mostly distinctly hairy.
- 14a. Limb of standard elliptic to rhombic-elliptic, apex deeply and widely incised; legumes obtriangular to globose, at tip widely truncate, 3.5–4 mm, ca. 2 mm high and 4–5 mm wide, strongly compressed from dorsal side, often wider than long 151. *A. thomsonii*
- 14b. Limb of standard only slightly retuse to emarginate at apex; legumes as high as wide (in all species with known legumes).
- 15a. Petals whitish to yellowish, at least when dry (in *A. pseudojagnobicus* sometimes slightly pale violet-suffused).
- 16a. At least stipules of lower leaves high connate behind stem 146. *A. pseudojagnobicus*
- 16b. All stipules free or lower ones very shortly connate.
- 17a. Ovary and legumes hairy.
- 18a. Stems up to 20 cm, in upper part white and black hairy; rachis white and black hairy; leaflets elliptic, 15–25 × 6–13 mm; standard ca. 10 × 5–6 mm 147. *A. pseudomahoschanicus*
- 18b. Stems up to 10 cm, like rachis only white hairy; leaflets narrowly elliptic, 3–12 × 1–3 mm; standard 5–7 × up to 3.3 mm 132. *A. densiflorus*
- 17b. Ovary (and legumes) glabrous.
- 19a. All stipules ovate, black ciliate; leaflets in 4 or 5 pairs; calyx 4.5–5 mm with hairs 0.3–0.5 mm 144. *A. pishanxianensis*
- 19b. Upper stipules linear-acute, loosely white and black hairy; leaflets in 5–8 pairs; calyx 5–6 mm with hairs 0.5–1 mm 130. *A. athranthus*
- 15b. Petals violet or blue-violet also in dry state (in *A. densiflorus* sometimes pale violet or yellowish in dry state).
- 20a. Stipules glabrous or only ciliate.
- 21a. Plants 20–50 cm tall; leaves 4–9 cm; leaflets 7–20 × 2.5–6 mm; legumes smooth, covered with appressed to slightly ascending hairs 136. *A. kunlunensis*
- 21b. Plants up to 25 cm tall; leaves 2–4 cm, if up to 7 cm, then stems only 2–5 cm; leaflets 3–15 × 1–4 mm; legumes cross-wrinkled, covered with ± spreading hairs.
- 22a. Stems mostly short, 2–5(–7) cm, loosely to rather densely hairy like leaflets abaxially; bracts 2–4 mm; calyx 3–4 mm, teeth 1.5–2 mm; limb of standard elliptic, ca. 3.2 mm wide 132. *A. densiflorus*
- 22b. Stems 10–25 cm, sparsely to loosely hairy, soon glabrescent; leaflets abaxially sparsely hairy; bracts 1–2.5 mm; calyx 2–3 mm, teeth 1–1.5 mm; limb of standard suborbicular 135. *A. heterodontus*
- 20b. Stipules appressed hairy, at least those of upper leaves.
- 23a. Calyx densely covered with appressed hairs, sitting on minute tubercles, which can be easily examined only when hairs are gone; wing limbs slightly emarginate; legumes covered with appressed to nearly spreading hairs 145. *A. porphyrocalyx*
- 23b. Calyx hairs without minute tubercles, at least partly ascending or spreading; wing limbs rounded or truncate; legumes with only spreading hairs or glabrous (ovary).
- 24a. Plants 4–5 cm tall; at least lower stipules high connate behind stem; calyx ca. 3 mm, with ascending to spreading hairs; wing limbs obtriangular, widest at truncate tip 133. *A. despectus*
- 24b. Plants 6–25 cm tall; all stipules free or lowest very shortly connate; calyx mostly longer, with ascending hairs; wing limbs narrowly oblong, obtuse 131. *A. brachysemia*

130. *Astragalus athranthus* Podlech & L. R. Xu, Novon 17: 228. 2007.

黑药黄耆 *hei yao huang qi*

Plants ca. 15 cm tall. Caudex with ± elongated, slender,

branched stolons. Stems 3–10 cm, loosely to densely covered with appressed hairs 0.3–0.5 mm, basal parts and stolons glabrous. Leaves 3.5–5.5 cm; stipules adnate to petiole for 1–2 mm, those of lower leaves membranous, triangular, 3–4 mm, shortly vaginate-connate behind stem, glabrous or sparsely

hairy, those of upper leaves greenish, narrowly triangular, 5–7 mm, free from each other, loosely white and black hairy; petiole 1–1.5 cm, like rachis loosely covered with appressed to slightly ascending, tangled hairs 0.3–0.5 mm; leaflets in 5–8 pairs, narrowly elliptic, 6–18 × 2–3.5 mm, abaxially loosely to densely appressed hairy, adaxially glabrous, apex obtuse to acute. Racemes ovoid, ca. 3 cm, densely many flowered; peduncle 4–7 cm, rather densely hairy; bracts whitish membranous, 4(–5) mm, black hairy. Calyx 5–6 mm, ± densely covered with slightly ascending black hairs 0.5–1 mm; teeth 2–3 mm. Petals yellowish when dry; standard oblong-obovate, ca. 9 × 4 mm, apex emarginate; wings ca. 7 mm, limbs obovate-spatulate, truncate; keel ca. 6 mm. Ovary sessile, widely ovoid, glabrous. Legumes unknown.

• Qinghai.

131. *Astragalus brachysema* Podlech & L. R. Xu, Novon 17: 229. 2007.

短柄黄耆 *duan bing huang qi*

Plants ca. 25 cm tall. Stems 13–15 cm, rather densely covered with subappressed white hairs 0.1–0.3 mm, soon glabrescent. Leaves 4–7 cm; stipules greenish, narrowly triangular, 3.5–6 mm, very shortly adnate to petiole, otherwise free, sparsely to loosely predominantly black hairy; petiole 0.5–1 cm, like rachis loosely white or white and black hairy; leaflets in 4–6 pairs, narrowly elliptic, 10–20 × 2–5 mm, abaxially loosely covered with appressed white hairs 0.2–0.5 mm, adaxially glabrous, apex subobtuse to obtuse. Racemes cylindric, ca. 5 cm, densely many flowered; peduncle 6–8 cm, hairy like stem, toward raceme increasingly covered with more spreading black hairs; bracts whitish membranous, 2–4 mm, black hairy. Calyx ca. 4 mm, ± densely covered with ascending black hairs ca. 0.5 mm; teeth 1.5–2 mm. Petals violet, in dry state very pale lilac; standard obovate, ca. 6 × 3.5 mm, apex rounded; wings ca. 5 mm; keel ca. 4 mm. Ovary with a stipe ca. 0.5 mm, subglobose, glabrous. Legumes unknown.

• Sichuan.

132. *Astragalus densiflorus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 329. 1842.

密花黄耆 *mi hua huang qi*

Plants 7–20 cm tall. Stems 2–5(–7) cm, loosely to rather densely covered with appressed white hairs 0.4–0.5 mm. Leaves 2–7 cm; stipules 4–5 mm, ciliate, lower ones shortly vaginateconnate behind stem; petiole 0.6–2 cm, like rachis loosely to rather densely appressed white hairy; leaflets in 4–6 pairs, narrowly elliptic, 3–12 × 1–3 mm, abaxially loosely to rather densely appressed hairy, adaxially glabrous. Racemes densely many flowered; peduncle 3–10 cm, rather densely appressed white hairy, below raceme also black hairy; bracts whitish membranous, 2–4 mm, black hairy. Calyx 3–4(–5) mm, ± densely covered with ascending black hairs; teeth 1.5–2 mm. Petals violet; standard elliptic, 5–7 × up to 3.3 mm, apex slightly emarginate; wings 5.8–6 mm; keel 4–4.5 mm. Legume subsessile, globose, ca. 3 mm thick, rounded at apex without beak, 2-locular; valves cross-wrinkled, with spreading white and black hairs. Seeds 2.

Grasslands, steppes; 1500–3800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan].

133. *Astragalus despectus* Podlech & L. R. Xu, Novon 17: 229. 2007.

合托叶黄耆 *he tuo ye huang qi*

Plants small, 4–5 cm tall, subcaulescent to shortly caulescent. Stem 1–3.5 cm, lowest internodes glabrous, next internode densely covered with ascending hairs, upper ones loosely covered with appressed white hairs 0.2–0.3 mm. Leaves 2–2.5 cm; stipules ovate, ca. 5 mm, very shortly adnate to petiole, lower ones and those of leafless stolons high vaginateconnate, upper ones free from each other, sparsely white or black hairy; petiole up to 0.5 cm, like rachis loosely to rather densely covered with appressed white hairs 0.1–0.2 mm, with black hairs mixed in; leaflets in 5–8 pairs, narrowly elliptic, 3–7 × 1.5–3 mm, abaxially loosely covered with appressed white hairs 0.1–0.3 mm, adaxially glabrous, apex obtuse. Racemes globose, 1–1.5 cm in diam., densely ca. 20-flowered; peduncle 1.5–2 cm, loosely to rather densely covered with subappressed white hairs 0.1–0.2 mm, with some longer, mostly black hairs up to 0.5 mm mixed in; bracts whitish membranous, 1.5–3 mm, sparsely black hairy. Calyx ca. 3 mm, densely covered with ascending to spreading, tangled, predominantly black hairs 0.4–0.6 mm; teeth 1–1.5 mm. Petals mauve; standard suborbicular, ca. 5.5 × 3.5 mm; wings ca. 4 mm, limbs obtriangular, widest below widely truncate tip; keel ca. 4 mm. Ovary sessile, globose, glabrous. Legumes unknown.

• Xizang.

134. *Astragalus handelii* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 20. 1936.

头序黄耆 *tou xu huang qi*

Plants 15–35 cm tall, covered with hairs 0.2–0.6 mm. Stems several, glabrous in basal parts, otherwise loosely to rather densely covered with ascending white and sometimes with some black hairs. Leaves 4–7 cm, upper subsessile, lower with a petiole up to 1.5 cm; stipules 3–6 mm, shortly adnate to petiole, white and black hairy or only ciliate at margin, lower ones shortly connate behind stem, upper ones free; rachis loosely to rather densely covered with ascending to spreading predominantly white hairs; leaflets in 5–8 pairs, linear to narrowly elliptic, 10–20 × 2–4 mm, abaxially loosely to densely appressed white hairy, adaxially glabrous, apex obtuse to acute. Racemes ovoid to oblong, densely many flowered; peduncle 6–9 cm, white hairy, toward raceme also increasingly black hairy; bracts linear-acuminate, 4–6 mm, sparsely black hairy. Calyx ca. 4 mm, loosely to rather densely covered with subappressed to ascending predominantly black hairs; teeth 1.5–2.5 mm. Petals whitish yellow or yellow; standard ovate, 9–10 × 4–4.5 mm, apex emarginate; wings 7–7.5 mm, limbs widened toward widely and deeply incised tip; keel ca. 5 mm. Ovary sessile, globose, white hairy. Legumes unknown.

• 1800–3700 m. Gansu, Qinghai, Sichuan.

135. *Astragalus heterodontus* Borissova, Trudy Tadzhikistansk. Bazy 2: 161. 1936.

异齿黄耆 *yi chi huang qi*

Plants 10–25 cm tall. Stems sparsely to loosely covered with very short appressed hairs, soon glabrescent. Leaves 2–4 cm; stipules 2–4 mm, shortly ciliate at margin, lower ones shortly vaginate-connate behind stem, upper ones nearly free; petiole 0.5–2 cm, like rachis loosely covered with appressed white and sometimes also black hairs 0.1–0.25 mm; leaflets in 5–7(or 8) pairs, narrowly elliptic, 5–12 × 3–4 mm, sparsely appressed hairy abaxially, glabrous adaxially, apex obtuse. Racemes densely many flowered; peduncle 2–8 cm, in upper part loosely covered with appressed black hairs; bracts linear, 1–2.5 mm, sparsely black hairy. Calyx 2–3(–4) mm, appressed black hairy, more rarely with some white hairs; teeth unequal, 1–1.5 mm. Petals intensely violet (also in dry state); standard widely elliptic to suborbicular, 5–8 × 4–5 mm, apex rounded to slightly incised; wings 5–7 mm; keel 4–5 mm. Legumes angled-globose, 3–4 mm, rounded at apex without beak, deeply grooved dorsally, 2-locular; valves thin, cross-wrinkled, covered with spreading white and black hairs.

3500–4900 m. Qinghai, Xinjiang, Xizang [Tajikistan].

136. *Astragalus kunlunensis* H. Ohba, S. Akiyama & S. K. Wu, J. Jap. Bot. 70: 27. 1995.

昆仑黄耆 *kun lun huang qi*

Plants 20–50 cm tall, caespitose. Stems 5–30 cm, with ± long internodes, sparsely to loosely covered with appressed to subappressed white or black and white hairs 0.1–0.3 mm. Leaves 4–9 cm; stipules 3–5 mm, subglabrous, shortly to distinctly vaginate-connate behind stem; petiole 1–3.5 cm, together with rachis sparsely to loosely white hairy like stem; leaflets in 5–7(–9) pairs, elliptic to narrowly elliptic, 7–20 × 2.5–6 mm, often folded, abaxially sparsely to loosely appressed white hairy, adaxially glabrous, apex obtuse to slightly emarginate. Racemes capitate to ovoid, densely 10–30-flowered, strongly elongated at fruiting time and up to 10 cm; peduncle 5–18 cm, loosely covered with appressed to slightly ascending black and white hairs; bract ca. 2 mm, sparsely black hairy. Calyx 3.5–4 mm, loosely covered with appressed black hairs 0.05–0.2 mm; teeth ca. 1 mm. Petals purplish or white; standard widely obovate to orbicular, ca. 7 × 5–6.5 mm, apex slightly emarginate; wings 5–6 mm; keel 4–5 mm. Legumes sessile, angled-globose, 3–4 mm in diam., grooved ventrally and dorsally, rounded at apex with obliquely inserted persistent style, 2-locular; valves cross-wrinkled, loosely to rather densely covered with appressed to ascending black and white hairs 0.1–0.3 mm.

• Xinjiang (Kunlun Shan).

137. *Astragalus longiracemosus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 114. 1996.

长序黄耆 *chang xu huang qi*

Plants 20–35 cm tall. Stems several, loosely covered with spreading rigid white hairs and below nodes with black hairs 0.2–0.3 mm. Leaves 3–8 cm; stipules 3–7 mm, very shortly adnate to petiole, otherwise free, sparsely white and/or black hairy; petiole 0.3–2 cm, together with rachis white or black and white hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, (7–)9–27 × 2–7 mm, at base of petiolule with crowded, minute,

sessile glands, abaxially densely to rather densely covered with appressed to subappressed or partly ascending hairs up to 0.5 mm, adaxially glabrous, apex obtuse to subacute or sometimes slightly retuse. Racemes 2–5 cm, densely many flowered; peduncle 3–6 cm, in lower part loosely covered with spreading white and black hairs up to 0.3 mm, in upper part mostly black hairy; bracts 2–3 mm, sparsely black hairy. Calyx 3–4 mm, densely covered with ascending predominantly black hairs up to 0.5 mm; teeth 1–2 mm. Petals pale pink, violet, or white; standard obovate, 8–10 × ca. 5 mm, apex rounded to slightly emarginate; wings 7–8 mm, limbs narrowly obovate, rounded at apex; keel ca. 5 mm. Legumes 4–5 mm, 2.5–3 mm high, 2-locular; valves transversely rugose, densely covered with white hairs, with a few black hairs mixed in. Seeds 2.

• Lakeshores; ca. 3100 m. Qinghai (Qinghai Hu).

138. *Astragalus luteiflorus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 113. 1996.

黄花黄耆 *huang hua huang qi*

?*Astragalus mahoschanicus* Handel-Mazzetti var. *subeicus* K. T. Fu.

Plants 10–20 cm tall. Stems branched at base, densely covered with ascending to spreading white hairs 0.5–1 mm and with a few black hairs. Leaves 2.5–4.5 cm; stipules 3–5 mm, lower ones distinctly and upper ones scarcely vaginate-connate behind stem; petiole 0.3–1 cm, together with rachis hairy like stem; leaflets in 7–9 pairs, narrowly elliptic, 3–15 × 1–3.5(–5) mm, both surfaces densely silvery hairy with ascending hairs up to 1 mm, apex obtuse to subacute. Racemes cylindric, 2.5–4 cm, densely many flowered; peduncle 5–10 cm, hairy like stem but toward raceme with increasingly black hairs; bracts whitish membranous, 2–3.5 mm, white and black hairy. Calyx 4–5 mm, rather densely covered with subappressed to ascending white and black or predominantly white hairs up to 0.8 mm; teeth 1.5–2 mm. Petals whitish or yellowish; standard obovate, ca. 8 × 5–5.5 mm, apex emarginate; wings 6.5–7 mm, limbs obliquely incised at tip; keel 5–5.5 mm. Legume globose, ca. 3 mm in diam.; valves white tomentose.

• About 3400 m. Qinghai (Nan Shan).

139. *Astragalus mahoschanicus* Handel-Mazzetti, Oesterr. Bot. Z. 82: 247. 1933.

马衔山黄耆 *ma xian shan huang qi*

Plants up to 15–40 cm tall. Stems several, up to 20 cm, branched, loosely covered with subappressed white hairs 0.1–0.3 mm and with some black hairs. Leaves 5–8 cm; stipules 3–5 mm, free from each other, sparsely black and white hairy; petiole 1–2 cm, like rachis sparsely covered with subappressed to ascending black and white hairs up to 0.3 mm; leaflets in 5–7(–9) pairs, narrowly elliptic, 7–20 × 1.5–4(–6) mm, abaxially loosely hairy, adaxially glabrous, apex obtuse to shortly acuminate. Racemes 2–4.5 cm, densely 10- to many flowered; peduncle 5–10 cm, loosely covered with subappressed white and toward raceme increasingly black hairs; bracts whitish membranous, 1–3 mm, sparsely black or black and white hairy. Calyx 3–4 mm, loosely to rather densely covered with subappressed

predominantly black hairs up to 0.8 mm; teeth 1.5–2 mm. Petals yellow, fading reddish; standard elliptic to rhombic-elliptic, 7–8 × ca. 3.5 mm, apex slightly incised; wings 5–6 mm, limbs asymmetrically incised; keel 4–5 mm. Legume sessile, nearly globose, ca. 3 mm in diam., rounded ventrally and dorsally, nearly beakless, 2-locular; valves rather thick, covered rather densely with ascending white hairs intermixed with black hairs. Seeds 2.

• 1800–4500 m. Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang.

Astragalus mahoschanicus var. *mengdaensis* Y. H. Wu (Acta Bot. Yunnan. 20: 40. 1998) and *A. mahoschanicus* var. *multipilosus* Y. H. Wu (loc. cit.: 39) do not agree with *A. mahoschanicus* or with the species *A. longiracemosus* and *A. luteiflorus*, all occurring in Qinghai Province. Without having seen the types, it is not possible to get a clear opinion about their taxonomic status.

140. *Astragalus malcolmii* Hemsley & H. Pearson, J. Linn. Soc., Bot. 35: 172. 1902.

短茎黄耆 *duan jing huang qi*

Plants small, 3–4 cm tall, acaulescent to subacaulescent, covered with ± spreading white and black hairs 0.1–0.5 mm. Stems, if present, up to 0.5 cm, loosely hairy. Leaves 1–2 cm, sessile; stipules (2–)3 mm, very shortly adnate to petiole, often shortly connate before petiole, behind stem distinctly vaginate-connate, lower ones glabrous, upper ones sparsely to loosely black hairy; rachis hairy like stem; leaflets in 4–7 pairs, elliptic, 2–6 × 1.5–2.5 mm, mostly folded, abaxially loosely to densely spreading white hairy, often with some black hairs mixed in, some leaflets adaxially glabrous but most sparsely to loosely spreading hairy, apex obtuse. Racemes globose, 1–1.5 cm in diam., densely ca. 20-flowered; peduncle subterminal, 1–2.5 cm, loosely to rather densely covered with predominantly black hairs 0.2–0.5 mm; bracts whitish membranous, 2–3 mm, sparsely black hairy. Calyx campanulate, 3.5–4 mm, densely covered with ascending to spreading, tangled, predominantly black hairs 0.4–0.6 mm; teeth unequal, 1.5–2 mm. Petals mauve; standard suborbicular, 7–8 × 5–5.5 mm, emarginate; wings 5–5.5 mm, limbs obtriangular, widest below widely retuse tip; keel ca. 4.5 mm. Ovary with a stipe ca. 0.5 mm, ellipsoid, glabrous, 2-ovuled. Legumes unknown.

• Qinghai, Xizang, Yunnan.

141. *Astragalus melanostachys* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 21. 1868.

黑穗黄耆 *hei sui huang qi*

Astragalus bracteosus Klotzsch (1862), not Boissier & Noë (1856).

Plants (5–)10–30 cm tall. Stems several to numerous, glabrous or more rarely sparsely covered with appressed white hairs 0.2–0.3 mm. Leaves (2–)3–7 cm; stipules 2–6(–8) mm, shortly to ± high vaginate-connate behind stem, sparsely black and white ciliate or toward apex also with appressed hairs; petiole ± as long as rachis or shorter, like rachis sparsely covered with ascending black and white or only white hairs 0.3–0.8 mm; leaflets in 5–7(–9) pairs, triangular-obovate to more rarely

orbicular-cordate or narrowly obovate, 3–10(–14) × (1–)1.5–6(–8) mm, abaxially sparsely to loosely appressed hairy, especially at midvein and margins, sometimes nearly glabrous, adaxially glabrous, apex retuse to distinctly emarginate or more rarely rounded, mostly minutely mucronulate. Racemes 1–3 cm, densely many flowered; peduncle 6–16(–20) cm, loosely covered with appressed white and black hairs, toward raceme increasingly with black hairs up to 1.2 mm, more rarely only sparsely hairy or nearly only with white hairs; bracts 3–5(–8) mm, black hairy. Bracteoles sometimes present, 1–1.5 mm. Calyx 4–6 mm, rather densely covered with spreading, curly, predominantly black hairs up to 1 mm, more rarely only with white hairs; teeth 2–3 mm. Petals pink-red to red, fading violet; standard rhombic-elliptic, (5–)6–7(–8.5) × 2.5–3.2 mm, apex emarginate; wings (4.5–)5.5–6.5(–7) mm; keel (4–)4.5–5.5(–7) mm. Legumes ovoid, 4–6 mm, 2–3 mm high and 1.5–2 mm wide, keeled ventrally, ± deeply grooved dorsally, distinctly beaked, 1-locular; valves covered rather densely with ascending black hairs, rarely hairs white. Seeds 2.

Alpine meadows, riversides; 3100–5000 m. Xinjiang [Afghanistan, India, Kashmir, Pakistan, Tajikistan, Uzbekistan].

142. *Astragalus mieheorum* Podlech & L. R. Xu, Novon 14: 219. 2004.

青东黄耆 *qing dong huang qi*

Astragalus densiflorus Karelin & Kirilov var. *konlonicus* H. Ohba, S. Akiyama & S. K. Wu.

Plants 7–12 cm tall. Stems 1–2 cm, densely covered with ascending to spreading white or black and white hairs 0.5–0.8 mm. Leaves 2–4(–5.5) cm; stipules 3–6 mm, lower ones shortly vaginate-connate behind stem, sparsely predominantly black hairy; petiole 0.5–1 cm, with rachis hairy like stem; leaflets in (3 or)4–6 pairs, narrowly elliptic, 5–14 × 1.5–4.5 mm, abaxially rather densely covered with tangled, ascending, white hairs up to 1 mm, adaxially glabrous, apex obtuse to acute. Racemes 1.5–3 cm, densely many flowered; peduncle 2–4 cm, densely covered with ascending to spreading, tangled, white or black and white or only black hairs up to 1 mm; bracts linear-acute, 4–6 mm, black hairy. Calyx 5–6 mm, ± densely covered with ascending to nearly spreading, tangled, black hairs up to 1 mm; teeth (1.5–)2–3.5 mm. Petals violet, in dry state often pale yellowish brown; standard widely ovate, 8–9.5 × 5–6.5 mm, apex retuse to slightly emarginate; wings 6.5–7(–8) mm, limbs truncate to incised at tip; keel 5.5–6 mm. Legume globose, ca. 4 mm in diam., rounded at apex without beak but with persistent glabrous style, 2-locular; valves densely covered with ascending to spreading, partly straight, partly curly, white and black hairs up to 1 mm.

• High alpine steppes; 4000–4900 m. Qinghai, Xinjiang.

143. *Astragalus nanshanicus* Podlech & L. R. Xu, Novon 14: 219. 2004.

南山黄耆 *nan shan huang qi*

Plants tall, up to 30 cm or more, basal parts unknown. Stem up to 30 cm, loosely to rather densely covered with spreading white hairs and sometimes below nodes with a few

black hairs 0.15–0.3 mm. Leaves 2–4.5 cm; stipules 2.5–3 mm, free, loosely to rather densely covered with ascending to nearly spreading white hairs, at base also black hairy; petiole 0.3–1 cm, together with rachis white hairy like stem; leaflets in 4–6 pairs, narrowly elliptic, 4–8 × 1–3 mm, mostly folded, abaxially rather densely covered with subappressed to ascending hairs up to 0.3 mm, adaxially glabrous, apex rounded to slightly emarginate. Racemes at anthesis short, densely many flowered, distinctly elongating in fruit; peduncle 1–6 cm, white hairy like stem; bracts 2–2.5 mm, sparsely black hairy. Calyx ca. 3 mm, rather densely covered with subappressed, black and white hairs up to 0.5 mm; teeth 1–1.5 mm. Petals violet; standard widely elliptic, ca. 7 × 4.5 mm, apex emarginate; wings ca. 5.5 mm, limbs obovate, rounded at apex; keel ca. 4 mm. Ovary sessile, nearly globose, glabrous. Legumes unknown.

- About 3600 m. Qinghai (Qinghai Nanshan).

144. *Astragalus pishanxianensis* Podlech, Feddes Repert. 116: 57. 2005.

皮山黄耆 pi shan huang qi

Plants 20–25 cm tall. Caudex with ± elongated, slender, branched stolons. Stems 15–20 cm, loosely to rather densely covered with appressed to ascending white hairs 0.3–0.6 mm, below nodes often predominantly black hairy, mostly glabrous at base. Leaves 4–5 cm, uppermost subsessile, others with a petiole 0.6–2 cm; stipules greenish, ovate, 4–5 mm, free from petiole and from each other, all black ciliate; petiole and rachis loosely to rather densely covered with appressed to subappressed, tangled, white hairs up to 0.5 mm, with black hairs mixed in; leaflets in 4 or 5 pairs, narrowly elliptic to elliptic, 5–13 × 1–4.5 mm, abaxially loosely to rather densely covered with appressed white hairs 0.3–0.5 mm, adaxially glabrous, apex rounded to subacute. Racemes capitate to ovoid, 2–3 cm, densely many flowered, slightly elongating with age; peduncle 3–7 cm, rather densely white hairy like rachis, toward raceme increasingly with black hairs; bracts whitish membranous, linear, ca. 5 mm, black hairy. Calyx 4.5–5 mm, rather densely covered with subappressed to ascending black hairs 0.3–0.5 mm; teeth 1.5–2 mm. Petals whitish to yellow; standard obovate, ca. 8 × 5 mm, apex slightly emarginate; wings ca. 7 mm, limbs obovate; keel ca. 6 mm. Ovary very shortly stipitate, ovoid, glabrous. Legumes unknown.

- About 3300 m. Xinjiang.

145. *Astragalus porphyrocalyx* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 67. 1980.

紫萼黄耆 zi e huang qi

Plants up to 25 cm tall. Stems 12–15 cm, branched at base, sparsely to loosely covered with appressed white and some black hairs 0.1–0.3 mm. Leaves 2–4 cm; stipules 2–3 mm, lower ones shortly vaginate-connate behind stem, loosely mostly black hairy; petiole 0.5–1 cm, like rachis loosely to rather densely appressed white or white and black hairy; leaflets in 4–7 pairs, narrowly elliptic, 4–12 × 0.8–3 mm, abaxially loosely to rather densely covered with appressed hairs 0.1–0.3 mm, adaxially glabrous. Racemes globose to ovoid, rather densely many flowered; peduncle 1–8 cm, loosely covered with mainly white hairs in basal part and mainly black hairs in upper

part; bracts 1.5–2.5 mm, black hairy. Calyx 3–3.5 mm, ± densely covered with appressed black hairs sitting on very minute whitish tubercles; teeth 1–1.5 mm. Petals lilac; standard widely ovate, ca. 7 × 3.5 mm, apex emarginate; wings ca. 6 mm, limbs obovate, emarginate; keel ca. 4.5 mm. Legume sessile, widely ellipsoid, 4–5 mm, 3–3.5 mm thick, widely rounded to truncate at apex without beak, 2-locular; valves strongly cross-wrinkled, with subappressed to somewhat spreading white and black hairs. Seeds 2.

- 3800–4200 m. Qinghai, Sichuan, Xizang.

146. *Astragalus pseudojagnobicus* Podlech & L. R. Xu, Novon 14: 220. 2004.

喀什黄耆 ka shi huang qi

Plants up to 25 cm tall, with appressed to subappressed hairs 0.1–0.3 mm. Stems several, sparsely to loosely white hairy, below nodes also black hairy. Leaves 4–7 cm; stipules white and black hairy, lower ones high connate behind stem; petiole 1–2.5 cm, like rachis loosely hairy; leaflets in 4–6 pairs, elliptic, 5–12 × 3–6 mm, abaxially loosely to rather densely appressed white hairy, adaxially glabrous, apex rounded to distinctly retuse. Racemes globose-ovoid, soon elongating up to 4 cm, many flowered; peduncle 6–10 cm, loosely covered in lower part with only white and in upper part also increasingly with black hairs; bracts 1.5–2 mm, black hairy. Calyx 3–4 mm, loosely to rather densely covered with black and a few white hairs; teeth 1.2–1.5 mm. Petals (when dry) whitish to slightly pale violet tinged, keel mostly violet at tip; standard obovate, ca. 10 × 5 mm, apex slightly emarginate; wings ca. 7 mm, limbs obovate, rounded at apex; keel ca. 5 mm. Ovary ovoid. Legumes unknown.

- W Xinjiang.

147. *Astragalus pseudomahoschanicus* Podlech, Feddes Repert. 120: 48. 2009.

类马衔山黄耆 lei ma xian shan huang qi

Plants 25–30 cm tall, in basal parts loosely covered with appressed white hairs, in upper parts sparsely with white and black hairs 0.3–0.5 mm. Leaves 7–9 cm; stipules 7–10 mm, free from petiole and from each other, sparsely white and black hairy; petiole 1–2 cm, rachis white and black hairy; leaflets in 5–7 pairs, elliptic, 15–25 × 6–13 mm, abaxially loosely appressed white hairy, adaxially glabrous. Racemes ovoid to shortly cylindrical, 3–4 cm, densely many flowered; peduncles 9–11 cm, hairy like rachis; bracts 5–6 mm, black hairy. Calyx ca. 5 mm, loosely to rather densely with predominantly black hairs; teeth 2–2.5 mm. Petals yellowish when dry; standard elliptic, ca. 10 × 5–6 mm, apex emarginate; wings ca. 8 mm, limbs narrowly obtriangular, widest at retuse tip; keel ca. 6 mm. Legumes sessile, globose, ca. 4 mm in diam., beakless, densely covered with spreading white and black hairs ca. 1 mm.

- Sichuan, Xinjiang.

148. *Astragalus pseudoversicolor* Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 71. 1980.

类变色黄耆 lei bian se huang qi

Astragalus golubojensis Podlech & L. R. Xu.

Plants 20–40 cm tall. Stems branched at base, up to 30 cm, loosely to rather densely covered with appressed to spreading white hairs 0.2–0.3 mm. Leaves 3–8 cm, subsessile; stipules 3.5–4 mm, free, sparsely white hairy; rachis sparsely to loosely hairy like stem; leaflets in 4–7 pairs, narrowly elliptic, 6–20 × 1–3 mm, abaxially loosely to rather densely covered with subappressed to ascending hairs up to 0.3 mm, adaxially glabrous, apex obtuse. Racemes 1–4 cm, densely many flowered, distinctly elongating with age; peduncle 6–10 cm, loosely to densely covered with appressed to spreading white or toward raceme also with black hairs; bracts whitish membranous, 1.5–2 mm, sparsely predominantly black hairy. Calyx 3.5–4 mm, loosely to rather densely appressed white and black hairy; teeth 1.5–2 mm. Petals purple, blue, or nearly white; standard obovate, 7–8 × 4–4.5 mm, apex slightly emarginate; wings 5–6 mm, limbs slightly bilobed; keel 4–5 mm. Ovary subsessile, glabrous. Legumes unknown.

- About 3000 m. Qinghai, Sichuan, Xizang.

149. *Astragalus rytidocarpus* Ledebour, Fl. Altaic. 3: 315. 1831.

橙果黄耆 cheng guo huang qi

Plants 8–18(–30) cm tall, covered with hairs 0.1–0.3 mm. Stems mostly several, base mostly densely and middle and upper part loosely hairy; hairs subappressed to ascending, white, at nodes also black. Leaves 4–6 cm; stipules 2–3 mm, shortly to distinctly connate behind stem and partly around petiole, with white and sometimes also with black hairs; petiole 0.8–2.5 cm, like rachis loosely white hairy; leaflets in 4 or 5 pairs, linear, 8–20 × 1.5–2.5 mm, abaxially somewhat densely and adaxially loosely covered with appressed white hairs, apex obtuse to very narrowly retuse. Racemes 1–2 cm, densely many flowered; peduncle 3–7 cm, loosely white and black hairy; bracts whitish, 1–1.5 mm, white and predominantly black hairy. Calyx 2.5–3 mm, loosely to rather densely covered with sometimes partly very short (less than 0.05 mm) appressed black hairs; teeth 0.8–1 mm. Petals pale violet; standard widely elliptic to suborbicular, 6–6.5 × 4–4.5 mm, apex retuse to emarginate; wings 4.5–5 mm, limbs bilobed; keel 4–4.5 mm. Legumes sessile, erect or obliquely spreading, obliquely ovoid to nearly globose, 4–5 mm, 3–4(–4.5) mm high and wide, slightly keeled ventrally, deeply grooved dorsally, retuse at apex, with a ± straight beak 1.5–2 mm, 2-locular; valves strongly cross-wrinkled, loosely covered with short, subappressed, black and white hairs. Seed 1 in each locule.

Gansu [Mongolia, Russia (Siberia)].

150. *Astragalus sagastaigolensis* N. Ulziykhutag ex Podlech & L. R. Xu, Novon 14: 220. 2004.

萨格斯台黄耆 sa ge si tai huang qi

Plants ca. 15 cm tall, with hairs 0.3–0.6 mm. Stems many, rather densely appressed to subappressed white hairy, with some black hairs mixed in, especially at nodes. Leaves 3–6 cm, subsessile; stipules 4–6 mm, free, sparsely to loosely covered with subappressed predominantly black hairs; rachis hairy like stem;

leaflets in 6–9 pairs, narrowly elliptic, 8–15 × 2–5 mm, abaxially rather densely appressed hairy, adaxially glabrous, apex obtuse. Racemes 2–3 cm, densely many flowered; peduncle 2.5–5 cm, hairy like stem, toward raceme with increasingly black hairs; bracts 4–5 mm, with subappressed to ascending predominantly black hairs. Calyx 4–4.5 mm, loosely to rather densely covered with subappressed to ascending black hairs; teeth ca. 2 mm. Petals whitish when dry; standard elliptic, 8.5–9.5 × ca. 4 mm, rounded at apex; wings ca. 7 mm, limbs obtriangular, distinctly dilated to unequally, widely emarginate tip; keel ca. 5 mm. Legumes globose, ca. 3 mm in diam., rounded ventrally, deeply grooved dorsally, rounded at apex, beakless, 2-locular; valves rather densely covered with subappressed to slightly ascending white and black hairs up to 0.8 mm. Seeds 2.

- Xinjiang (Junggar Pendi).

151. *Astragalus thomsonii* Podlech, Sendtnera 6: 140. 1999.

汤母森黄耆 tang mu sen huang qi

Plants up to 35 cm tall, covered with hairs 0.2–0.5 mm. Stems mostly several, erect, loosely covered with subappressed to ascending white hairs. Leaves 2.5–6 cm, upper ones often sessile; stipules 3–4 mm, lower ones high connate behind stem, upper ones only shortly connate or free, glabrous; petiole of lower leaves 1–3 cm, like rachis sparsely subappressed white hairy; leaflets in 5 or 6 pairs, narrowly elliptic, 6–16 × 2–4 mm, abaxially when young densely and with age loosely appressed white hairy, adaxially glabrous, apex narrowly rounded to subacute. Racemes ovoid, densely many flowered; peduncle 5–10 cm, sparsely to loosely covered with appressed white hairs, toward raceme hairs increasingly ascending and black; bracts 2–3 mm, white and black hairy. Calyx 3–3.5 mm, densely appressed white and black hairy; teeth 1–1.5 mm. Standard widely elliptic, 6–8 × 4–5 mm, apex emarginate; wings 5–6 mm; keel 4–4.5 mm. Legumes 3.5–4 mm, ca. 2 mm high and 4–5 mm wide, obtriangular to nearly globose as seen from dorsal side, cuneate at base, widely truncate at apex with persistent style, widely flattened ventrally, narrowly and deeply grooved dorsally, 2-locular; valves with conspicuous transverse ridges at dorsal side, covered with subappressed white and predominantly black hairs. Seeds 2.

3600–5300 m. Xizang [India, Kashmir, Nepal].

152. *Astragalus tulinovii* O. Fedtschenko, Fl. Pamir. 27. 1903.

土力黄耆 tu li huang qi

Plants 8–20 cm tall. Stems glabrous or in upper parts sometimes sparsely to loosely covered with ± appressed white and black hairs 0.1–0.3 mm. Leaves 2–4 cm; stipules 3–6 mm, glabrous or with sparse black and white hairs at margins and apex, lower ones ± high connate; petiole 0.5–1.2 cm, like rachis sparsely subappressed white and black hairy; leaflets in 3–5 pairs, narrowly elliptic, 5–8 × 1–3 mm, glabrous or abaxially sparsely hairy, apex obtuse to subacute. Racemes 1.5–2.5 cm, densely many flowered; peduncle 5–8 cm, loosely white hairy, toward raceme increasingly black hairy; bracts 4–5 mm, sparsely black hairy. Calyx ca. 5 mm, ± densely black villous; teeth ca. 2.5 mm. Petals whitish; standard widely obovate to suborbicular, 7–8 × 4–5 mm, apex retuse; wings 6–7 mm; keel

4.5–5 mm. Legume ovoid-globose, 3–4 mm, ca. 3 mm high and wide, rounded at apex without beak but sometimes with persistent style, 2-locular; valves smooth, covered with spreading white and black hairs. Seeds 2.

3300–5500 m. Xinjiang [Kashmir, N Pakistan, Tajikistan].

153. *Astragalus valerii* N. Ulziykhutag, *Novosti Sist. Vyssh. Rast.* 30: 111. 1996.

瓦来黄耆 *wa lai huang qi*

Plants 5–10 cm tall, with appressed to spreading hairs 0.3–0.6 mm. Stems loosely to densely covered with white hairs, below nodes also with black hairs. Leaves 1.5–3 cm; stipules 4–7 mm, loosely black hairy or white and black hairy, adnate to

petiole for 0.5–2 mm, lower ones connate behind stem to middle; petiole 0.5–1 cm, like rachis loosely to rather densely hairy; leaflets in 5–8 pairs, narrowly elliptic, 4–13 × 1.5–4.5 mm, abaxially with appressed to ascending hairs, adaxially glabrous, apex obtuse to subacute. Racemes 1–2.5 cm, densely many flowered; peduncle longer than leaves, densely spreading white hairy, below raceme also black hairy; bracts 4–6 mm, white and black hairy. Calyx 5–6 mm, loosely covered with appressed to ascending predominantly black hairs; teeth 2–3 mm. Petals yellowish, honey-colored; standard widely elliptic to obovate, 6.5–9 × 3.5–5 mm, apex retuse to emarginate; wings 5–6.5 mm, rounded at apex; keel 4–6.5 mm. Ovary sessile, ovoid, glabrous. Legumes unknown.

• 3600–3800 m. Qinghai, Xinjiang.

22. *Astragalus* sect. *Hemiphragmium* (W. D. J. Koch) Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 21. 1868.

囊果组 *nang guo zu*

Phaca sect. *Hemiphragmium* W. D. J. Koch, *Syn. Fl. Germ. Helv.* 180. 1836.

Plants perennial, with ± well-developed stems, with basifixed hairs. Stipules free from petiole or shortly adnate, ± high connate behind stem. Racemes borne on short or mostly rather long peduncle, at anthesis dense, becoming loose. Bracteoles absent. Calyx campanulate. Petals lilac-violet or whitish, with violet-tipped keel, rarely yellowish white; wings deeply incised to bilobed at apex. Ovary with a stipe (1–)2–4 mm. Legumes with a rather long stipe rarely shorter than calyx, at least (2–)3–4 mm, pendulous, 1-locular or 2-locular; valves mostly membranous, glabrous.

Twenty-one species: China, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; Europe; two species in China.

- 1a. Plants 5–17 cm tall, with exception of calyx subglabrous, with hairs 0.02–0.2 mm; leaflets 2–8 mm; petals lilac to violet; legumes bladderlike inflated, 15–25 mm, 8–10 mm high, shortly acuminate 154. *A. beketowii*
 1b. Plants 20–50 cm tall, more densely hairy with hairs 0.2–1 mm; leaflets 8–22 mm; petals whitish with violet-tipped keel; legumes narrowly oblong, 12–18 mm, 4–5 mm high, with a hooked beak ca. 2 mm 155. *A. vaginatus*

154. *Astragalus beketowii* (Krasnov) B. Fedtschenko, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 24: 202. 1905 [“*beketowi*”].

斑果黄耆 *ban guo huang qi*

Oxytropis beketowii Krasnov, *Bot. Zap.* 2: 15. 1887–1888; *Astragalus polychromus* Freyn.

Plants 5–17 cm tall, with very short appressed or ascending hairs 0.05–0.2 mm. Stems several, 1–7(–10) cm, prostrate, glabrous. Leaves 1.5–5 cm; stipules 4–5 mm, connate behind stem to more than 1/2 of length, ciliate with white or black and white hairs; petiole much shorter than to rarely nearly as long as rachis, like rachis nearly glabrous; leaflets in 4–7 pairs, ± glaucous, narrowly elliptic to ovate, 2–8 × 0.5–3 mm, abaxially subglabrous or sparsely hairy on both surfaces, adaxially glabrous, apex subacute or rarely obtuse. Racemes short, densely 5–16-flowered; peduncle 2–7 cm, subglabrous, toward raceme increasingly with white and black hairs; bracts 2–4 mm, subglabrous. Calyx 6–8 mm, loosely covered with appressed to spreading predominantly black hairs; teeth slightly unequal, 1.5–2 mm. Petals lilac to violet, with a dark spot at keel tip; standard obovate, 14–16 × ca. 8 mm, apex incised; wings 12–14 mm, deeply incised and bilobed; keel 9–11 mm. Legumes with a slender stipe ca. 3 mm, pendulous, bladderlike inflated, obliquely ovoid, 15–25 mm, 8–10 mm high, 1-locular; valves glabrous, red spotted.

Alpine slopes; 2500–4300 m. Xinjiang [Kyrgyzstan, Mongolia, Tajikistan].

155. *Astragalus vaginatus* Pallas, *Sp. Astragal.* 46. 1800.

鞘叶黄耆 *qiao ye huang qi*

Plants 20–50 cm tall, covered with flexuous-curly, subappressed to ascending or even spreading hairs 0.2–1 mm. Stems solitary or several, erect, loosely to rather densely covered with white hairs up to 0.4 mm, at nodes also with black hairs. Leaves 4–10 cm; stipules 4–6 mm, loosely covered with white or mixed white and black hairs, distinctly connate behind stem; petiole 0.3–1.5 cm, like rachis rather densely covered with ± spreading hairs; leaflets in 6–9 pairs, narrowly elliptic, 8–22 × 1–6 mm, abaxially rather densely subappressed hairy, adaxially glabrous, or both surfaces with nearly spreading hairs up to 0.8(–1) mm, apex acute. Racemes loosely to rather densely many flowered, 3–6 cm, elongating in fruit up to 13 cm; peduncle 6–23 cm, loosely subappressed hairy; bracts 2–4 mm, white and black hairy. Calyx 5–6 mm, covered with subappressed to ± spreading predominantly white or mixed white and black hairs up to 0.5 mm; teeth 1.5–2 mm. Petals whitish, tip of keel violet; standard obovate, 11–14 × 6–8 mm, apex deeply incised; wings 9–11 mm, limbs deeply bilobed; keel 7–9 mm. Legumes pendulous, with a stipe 6–9 mm, narrowly oblong, 12–18 mm, 4–5 mm high and 2.5–3 mm wide, long acuminate at base, shortly acuminate at apex into a hooked beak ca. 2 mm, strongly keeled ventrally, rounded dorsally, 2-locular; valves glabrous.

Steppic mountain slopes. NW Xinjiang [Kazakhstan, Russia (Siberia)].

23. Astragalus sect. **Poliothrix** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 48. 1868.

多枝组 duo zhi zu

Astragalus sect. *Polycladi* Y. C. Ho.

Plants ± caespitose, with several to numerous, well-developed, often procumbent to ascending, mostly slender stems, rarely acaulescent or nearly so, especially in strongly trampled plants; hairs basifixed. Leaves subsessile or with a short petiole; stipules free from petiole or nearly so, all or those of lower leaves only often high connate behind stem. Racemes mostly several in upper leaf axils, ± dense; bracts mostly whitish membranous. Flowers with short pedicel. Standard longer than wings, mostly emarginate at apex, often without distinct claw; wings longer than keel, limbs obtuse or rounded at apex. Legumes sessile, subsessile, or with a distinct stipe, distinctly to semicircular curved, rarely slightly curved, 1-locular or more rarely incompletely 2-locular; valves thin. Seeds few, mostly 2 or 4.

Thirty-three species: Afghanistan, Bhutan, China, India, Kashmir, Mongolia, Nepal, N Pakistan; 28 species (24 endemic) in China.

- 1a. Stems, rachises, and peduncles covered at least partly with ascending to spreading hairs.
- 2a. Plants covered with subbasifixed to extremely asymmetrically bifurcate hairs, with a very short obtuse appendix at base; peduncles 1–2 cm; calyx teeth 0.3–0.5 mm; ovary and legumes hairy 167. *A. minutidentatus*
- 2b. Plants with basifixed hairs; peduncles and calyx teeth distinctly longer.
- 3a. Calyx ca. 3 mm; standard ca. 7 mm; ovary and legumes sessile, rather densely white hairy 163. *A. hysophilus*
- 3b. Calyx 4–5 mm; standard at least 8 mm but often distinctly longer (up to 11 mm); ovary with a stipe 1–3 mm, sessile only in *A. mekongensis*.
- 4a. Stipules 2–3 mm; peduncles, bracts, and calyx only with white hairs; keel 8.5–10 mm, as long as wings 165. *A. maowensis*
- 4b. Stipules distinctly longer; peduncles, bracts, and calyx at least partly black hairy; keel up to 7 mm, shorter than wings.
- 5a. Stipules 4–5 mm, lower ones high vaginate-connate, upper ones free from each other; calyx covered with appressed to ascending black hairs 0.1–0.3 mm, teeth 1–1.5 mm; wing limbs obovate, distinctly widened toward apex; ovary glabrous 161. *A. golmunensis*
- 5b. Stipules 6–12 mm, all distinctly vaginate-connate; calyx covered with black and white hairs up to 0.8–1 mm, teeth 2–3 mm; wing limbs narrowly oblong, not widened toward tip; ovary hairy.
- 6a. Leaflets of main stem leaves in 7 or 8 pairs, adaxially loosely hairy; bracts predominantly white hairy; petals violet; ovary shortly stipitate, white hairy 171. *A. oreocharis*
- 6b. Leaflets of main stem leaves in 10–13 pairs, adaxially glabrous or sparsely hairy; bracts black hairy; petals white; ovary and legumes sessile, white and black hairy 166. *A. mekongensis*
- 1b. Stems, rachises, and peduncles with appressed to subappressed hairs or glabrous.
- 7a. Leaflets in 11–15 pairs, adaxially glabrous; bracts 1.5–2 mm, predominantly black hairy 164. *A. jiazaensis*
- 7b. Leaflets in at most 12 pairs, at least most leaves with distinctly fewer pairs of leaflets, if in some leaves up to 15 pairs, then at least mostly hairy adaxially and bracts white or predominantly white hairy.
- 8a. Leaflets 1–4(–5) mm.
- 9a. Standard 9–10 mm or longer.
- 10a. Plants 2–6 cm tall; stipules 1–2 mm; peduncles ca. 1 cm; racemes 3–6-flowered; petals in life pale yellow; ovary subsessile 179. *A. yangii*
- 10b. Plants 10–20 cm tall; stipules 3–5 mm; peduncles up to 15 cm; racemes 10–15-flowered; petals violet; ovary with a stipe 1–2 mm 170. *A. nanjiangianus*
- 9b. Standard at most 8 mm but mostly distinctly shorter.
- 11a. Stems, rachises, peduncles, and legumes glabrous 157. *A. baxoiensis*
- 11b. Stems, rachises, peduncles, and legumes hairy.
- 12a. Leaflets hairy adaxially 169. *A. montivagus*
- 12b. Leaflets glabrous adaxially.
- 13a. Leaflets narrowly elliptic, 1–5 × 0.3–1 mm; petals white with violet-tipped keel; legumes incompletely 2-locular 180. *A. yunningensis*
- 13b. Leaflets elliptic, 1–4 × 0.6–2 mm; petals blue to purple; legumes 1-locular ... 159. *A. cobresiophilus*
- 8b. At least most leaflets distinctly longer.
- 14a. Plants in vegetative parts completely glabrous 158. *A. blandulus*
- 14b. Plants hairy.
- 15a. Stems, rachises, and peduncles sparsely covered with white and black hairs up to 0.3(–0.4) mm and often also with very short bladderlike-globose hairs 0.05–0.1 mm, sometimes subglabrous 175. *A. sikkimensis*

- 15b. Stems, rachises, and peduncles without bladderlike-globose hairs, these elongated, not flattened also if short; peduncles distinctly longer.
- 16a. Calyx 2.5–3 mm, teeth up to 1 mm 182. *A. zacharensis*
- 16b. Calyx at least 3 mm but often longer, at least lower teeth distinctly longer.
- 17a. Leaflets adaxially sparsely to loosely hairy (only in *A. austrotibetanus* more often some leaflets glabrous adaxially).
- 18a. Bracts white ciliate; standard 10–11 mm 177. *A. sungpanensis*
- 18b. Bracts white and black hairy; standard 7–9 mm.
- 19a. Stems and rachises with appressed to ascending hairs 0.5–0.8 mm; stipules 6–9 mm; leaflets up to 14 mm, acute to subobtusate; bracts 3–4 mm, predominantly white hairy; standard limb suborbicular; ovary and legumes sessile 156. *A. austrotibetanus*
- 19b. Stems and rachises with appressed hairs 0.2–0.4 mm; stipules up to 5 mm; leaflets up to 10 mm, rounded to emarginate; bracts 2–3 mm, white and black hairy; standard limb narrower, elliptic to obovate; ovary and legumes with a stipe 1–2 mm.
- 20a. Leaves sessile to subsessile; standard 6–7 mm; legumes incompletely 2-locular 172. *A. polycladus*
- 20b. Leaves, at least lower ones, with a petiole 1–2 cm; standard 7–9(–10) mm; legumes 1-locular 176. *A. strictus*
- 17b. Leaflets adaxially glabrous or sometimes with a few scattered hairs only.
- 21a. Standard 6–7 mm; ovary and legumes sessile to subsessile.
- 22a. Stipules 2–3 mm; leaves 3–4 cm; leaflets in 4–6 pairs; ovary glabrous 181. *A. yutianensis*
- 22b. Stipules 4–9 mm; leaves 5–12 cm; leaflets in 8–12 pairs; ovary white hairy.
- 23a. Stipules 6–9 mm, all high connate behind stem, sparsely to loosely hairy; petals mauve; standard 6–8 × ca. 5 mm, widely elliptic to transversely elliptic 178. *A. tibeticola*
- 23b. Stipules 4–6 mm, upper ones free from each other, glabrous or only sparsely ciliate; petals white, violet tipped; standard 5–7 × 4–4.5 mm, widely obovate 160. *A. euchlorus*
- 21b. Standard 9 mm or longer; ovary and legumes with a stipe 1.5–3.5 mm.
- 24a. Calyx 3–4 mm.
- 25a. Stems 8–20(–30) cm; stipules glabrous or sparsely ciliate; leaflets 4–8(–15) × 1.5–4(–8) mm; legumes with a stipe ca. 3 mm, 7–8 mm, ca. 3 mm high, rather densely black hairy 162. *A. havianus*
- 25b. Stems 4–6 cm; stipules sparsely to loosely white and black hairy; leaflets 4–7 × 1.5–3 mm; legumes sessile, 4–5 mm, ca. 1.8 mm high, glabrous 173. *A. praeteritus*
- 24b. Calyx at least 4.5 mm but mostly longer.
- 26a. Peduncles 0.5–1.2 cm, glabrous or nearly so 183. *A. zayuensis*
- 26b. Peduncles at least 3 cm but mostly distinctly longer, distinctly hairy.
- 27a. Stems and peduncles black hairy; stipules 3–7 mm, glabrous or with a few black or white hairs; bracts white and black ciliate; calyx densely covered with black hairs 0.3–0.5 mm 174. *A. pullus*
- 27b. Stems and peduncles predominantly white hairy; stipules 5–10 mm, loosely to rather densely white hairy; bracts loosely predominantly black hairy; calyx loosely covered with black hairs 0.2–0.4 mm and with white hairs 0.5–0.7 mm 168. *A. monbeigii*

156. *Astragalus austrotibetanus* Podlech & L. R. Xu, Sendtnera 7: 195. 2001.

藏南黄耆 zang nan huang qi

Plants up to 30 cm, vegetative parts covered with subappressed to ascending, often flexuous, white hairs 0.5–1.5 mm. Stems ± erect, loosely to rather densely hairy. Leaves 4–8 cm, subsessile; stipules 6–9 mm, lower ones behind stem distinctly

connate, loosely hairy; rachis hairy like stem; leaflets in 12–15 pairs, narrowly elliptic to elliptic, 5–14 × 1.5–7 mm, abaxially loosely to rather densely hairy, adaxially glabrous or subglabrous to sparsely hairy, apex acute to obtuse. Racemes 2–5 cm, rather loosely many flowered; peduncle 2–7 cm, hairy like stem but mostly also with black hairs toward raceme; bracts 3–4 mm, predominantly white but also black hairy. Calyx 4–5 mm, rather densely covered with subappressed to ascending white hairs 0.5–1 mm and with mostly somewhat shorter black hairs; teeth 1.5–3 mm. Petals blue-violet; standard widely elliptic to suborbicular, 7–8(–9) × 5–6(–7) mm; wings 5.5–7(–8) mm; keel 5–6(–7) mm. Legumes subsessile, obliquely ellipsoid, curved, 6–7 mm, 2–2.5 mm high and wide, keeled ventrally, flattened to shallowly grooved dorsally, acute, often with hooked persistent style, 1-locular; valves rather densely covered with ascending white or white and black hairs up to 0.8 mm.

- 3400–5100 m. Qinghai, Xizang.

The Chinese record of *Astragalus leucocephalus* Graham ex Benth (FRPS 42(1): 220. 1993) is referable to *A. austrotibetanus*.

157. *Astragalus baxoiensis* Podlech & L. R. Xu, *Novon* 17: 241. 2007.

八宿黄耆 ba su huang qi

Plants 6–12 cm tall, densely caespitose, furnished with appressed hairs. Stems up to 6 cm, slender, glabrous. Leaves 1.5–4.5 cm; stipules often reflexed, 2–3 mm, nearly free from petiole, distinctly connate behind stem, sparsely hairy to sometimes glabrous; petiole 0.5–1 cm, like rachis glabrous or with scattered hairs up to 0.3 mm; leaflets in 5–8(or 9) pairs, elliptic, 2–3 × 1–1.5 mm, abaxially especially at midvein sparsely covered with appressed hairs up to 0.3 mm, adaxially glabrous, apex subobtuse. Racemes short, rather densely 4–8-flowered; peduncle 2–3.5 cm, glabrous; bracts whitish membranous, ovate to narrowly triangular, 1–2 mm, sparsely white and black hairy. Calyx campanulate, ca. 3 mm, loosely covered with appressed white and black hairs 0.1–0.3 mm; teeth 1–1.5 mm. Petals pale purple; standard widely elliptic to orbicular, ca. 8 × 4.5 mm, apex emarginate; wings ca. 7 mm; keel ca. 6 mm. Legumes with a stipe ca. 1 mm, ellipsoid, ca. 5 mm, ca. 2 mm high and ca. 2.5 mm wide, keeled ventrally, grooved dorsally, acute with hooked persistent style, 1-locular; valves glabrous.

- About 4200 m. Sichuan, Xizang.

158. *Astragalus blandulus* Podlech & L. R. Xu, *Feddes Rept.* 117: 225. 2006.

温和黄耆 wen he huang qi

Plants ca. 25 cm tall, vegetative parts glabrous. Stems several, ca. 20 cm, near base ca. 3 mm thick. Leaves 3.5–5 cm, subsessile; stipules green, 4–5 mm, adnate to petiole for 1–2 mm, those of lower leaves shortly connate behind stem, those of upper leaves free from each other; leaflets in 9–11 pairs, narrowly elliptic to elliptic, 4–12 × 2–5 mm, apex rounded to acute. Racemes densely many flowered; peduncle 1.5–6 cm, glabrous or sparsely covered with black hairs up to 0.1 mm; bracts whitish, linear-acute, 2–3 mm, very sparsely minutely black hairy. Calyx campanulate, 4.5–5 mm, sparsely covered

with appressed black hairs up to 0.1 mm; teeth 2–2.5 mm. Standard ca. 8 × 6.5 mm, apex emarginate; wings ca. 7 mm; keel ca. 5.5 mm. Legumes sessile, obliquely ellipsoid, 4–5 mm, ca. 2.5 mm high and wide, 1-locular; valves glabrous or at ventral suture with a few white and black hairs.

- Xizang (Gyangzê).

159. *Astragalus cobresiophilus* Podlech & L. R. Xu, *Sendtnera* 7: 196. 2001.

雅鲁黄耆 ya lu huang qi

Plants up to 12 cm tall, with appressed to subappressed hairs. Stems prostrate to ascending, up to 5 cm, loosely furnished with somewhat flattened white hairs 0.1–0.2 mm, partly glabrescent. Leaves 1–3.5 cm; stipules 2–3.5 mm, all distinctly connate behind stem, sparsely hairy to sometimes glabrous; petiole short, with rachis sparsely to loosely hairy like stem; leaflets in 5–8 pairs, elliptic, 1–4 × 0.6–2 mm, abaxially sparsely to loosely covered with appressed hairs up to 0.3 mm, adaxially glabrous, apex rounded to emarginate. Racemes 3–10-flowered; peduncle 1.5–5 cm, sparsely to loosely hairy like stem but hairs increasingly black toward raceme; bracts 1–1.5 mm, white and black hairy. Calyx (2.5–)3–4 mm, loosely covered with appressed black hairs 0.1–0.3 mm and more rarely also with some white hairs; teeth unequal, 0.3–1.5 mm. Petals blue to purple; standard widely elliptic to orbicular, 6–7 × ca. 5 mm; wings ca. 5.5 mm; keel ca. 5 mm. Legumes subsessile or with a stipe ca. 1 mm, pendulous, narrowly ellipsoid, curved, ca. 6 mm, ca. 2 mm high and wide, acute with hooked persistent style, 1-locular; valves loosely covered with appressed black hairs 0.1–0.2 mm, soon glabrescent.

- 3300–5100 m. Qinghai, Xinjiang, Xizang.

160. *Astragalus euchlorus* K. T. Fu, *Bull. Bot. Res.*, Harbin 2(4): 67. 1982.

深绿黄耆 shen lü huang qi

Plants 30–40 cm tall, sparsely hairy. Stems glabrous or very sparsely covered with subappressed to ascending predominantly black hairs 0.1–0.25 mm. Leaves (3–)5–10 cm, subsessile or with short petiole; stipules 4–6 mm, behind stem connate in lower 1/2, glabrous or sparsely ciliate; rachis glabrous or hairy like stem but mostly with predominantly white hairs; leaflets in 8–12 pairs, narrowly elliptic, 5–13 × 2–6 mm, abaxially sparsely and adaxially very sparsely covered with subappressed hairs 0.5–0.8 mm, apex rounded to widely emarginate. Racemes 2–4 cm, many flowered; peduncle 8–11(–19) cm, sparsely black hairy like stem; bracts 2–3.5 mm, sparsely black hairy. Calyx 4–4.5 mm, densely covered with subappressed black hairs 0.3–0.5 mm; teeth 2–2.5 mm. Petals white, violet tipped; standard widely obovate, 5–7 × 4–4.5 mm; wings 5–6 mm; keel 4.5–5.5 mm. Ovary subsessile, densely appressed predominantly white hairy. Legumes unknown.

- About 3400 m. Sichuan.

161. *Astragalus golmunensis* Y. C. Ho, *Bull. Bot. Lab. N. E. Forest. Inst.*, Harbin 1980(8): 61. 1980.

格尔木黄耆 ge er mu huang qi

Astragalus golmunensis var. *paucipilus* Y. H. Wu.

Plants 25–40 cm tall, covered with mostly spreading hairs 0.1–0.3 mm. Stems ascending to erect, sparsely to loosely white hairy, below nodes also black hairy. Leaves 3.5–6 cm; stipules 4–5 mm, lower ones distinctly to high connate behind stem, upper ones amplexicaul but free from each other, all mostly white ciliate; petiole short, like rachis loosely predominantly white hairy; leaflets of lower leaves in 4–6 pairs, mostly flat, elliptic, 4–8 × 2–4.5 mm, apex rounded to slightly emarginate, those of upper leaves in 6–9 pairs, narrowly elliptic, 8–12 × 3–4 mm, mostly folded, apex obtuse, all abaxially loosely to rather densely and adaxially loosely covered with appressed to subappressed white hairs. Racemes ovoid to oblong, many flowered; peduncle 8–10 cm, loosely to rather densely covered in basal part with predominantly white and in upper part with predominantly black hairs; bracts 3–3.5 mm, sparsely black hairy. Calyx ca. 4 mm, loosely to rather densely covered with subappressed to ascending black hairs; teeth unequal, 1–1.5 mm. Petals violet; standard ovate, 8–9 × ca. 5 mm; wings ca. 7 mm; keel ca. 5 mm. Ovary with a stipe ca. 1 mm, glabrous. Legumes unknown.

• 4100–4500 m. Qinghai.

162. *Astragalus havianus* E. Peter, Acta Horti Gothob. 12: 37. 1938.

华山黄耆 hua shan huang qi

Astragalus havianus var. *pallidiflorus* Y. C. Ho; *A. tataricus* Franchet var. *major* H. T. Tsai & T. T. Yu.

Plants up to 30 cm tall, sparsely hairy or subglabrous, rarely ± densely hairy, with appressed white and in inflorescence also black hairs 0.15–0.35 mm. Stems subglabrous to sparsely hairy. Leaves 3–7.5 cm; stipules green, 3–4 mm, ± high vaginate-connate behind stem, glabrous or sparsely ciliate; petiole short, like rachis sparsely to loosely hairy; leaflets in (5–)7–9 pairs, elliptic, 4–8(–15) × 1.5–4(–8) mm, flat, abaxially sparsely hairy, adaxially glabrous, rarely hairy on both surfaces, apex subacute. Racemes at anthesis densely 8–12-flowered, at fruiting time distinctly elongated; peduncle 4–6 cm, sparsely to loosely white hairy; bracts 1–1.5 mm, sparsely ciliate. Calyx 3–4 mm, sparsely to loosely white and black hairy; teeth unequal, 0.5–1.2 mm. Petals blue or pale purple; standard obovate, ca. 10 × 5–6 mm; wings ca. 9 mm; keel ca. 8 mm. Legumes with a stipe distinctly longer than calyx tube, obliquely ellipsoid, 7–8 mm, ca. 3 mm high, attenuate at both ends, dorsally shallowly grooved, with a short beak, nearly 1-locular; valves at first rather densely hairy, when ripe only with scattered black hairs.

• Loessic soil; 800–2000 m. Gansu, Qinghai, Shaanxi, Sichuan.

163. *Astragalus hysophilus* Podlech & L. R. Xu, Feddes Repert. 117: 226. 2006.

高地黄耆 gao di huang qi

Plants ca. 20 cm tall, loosely caespitose. Stems several, 10–17 cm, branched at base, sparsely to rather densely covered with appressed to subappressed or partly slightly ascending to spreading white hairs 0.2–0.4 mm, in basal part glabrescent. Leaves 4–7 cm; stipules 2.5–4 mm, free from petiole, behind

stem distinctly vaginate-connate, sparsely to loosely appressed to subappressed white hairy; petiole 0.5–1.5 cm, with rachis hairy like stem; leaflets in 8 or 9 pairs, narrowly elliptic, 5–10 × 2–4 mm, abaxially sparsely to rather densely covered with subappressed tangled white hairs 0.5–0.8 mm, adaxially glabrous, apex acute to subobtusate. Racemes ovoid, rather loosely 10–12-flowered; peduncle 5–6 cm, hairy like stem but in upper part with very few black hairs mixed in; bracts 1–2 mm, white or predominantly white hairy. Calyx ca. 3 mm, loosely to rather densely covered with subappressed tangled white hairs 0.3–0.5 mm and with shorter appressed black hairs; teeth 1–1.5 mm. Petals whitish when dry; standard widely obovate-orbicular, ca. 7 × 6 mm, apex emarginate; wings ca. 6 mm; keel ca. 5 mm. Legumes sessile, obliquely ellipsoid, curved, 5–6 mm, ca. 2 mm high and ca. 1.5 mm wide, with a beak ca. 0.5 mm, incompletely 2-locular; valves rather densely covered with slightly ascending white hairs 0.2–0.3 mm, with some black hairs mixed in.

• E Xizang (Mainling).

164. *Astragalus jiazaensis* Podlech & L. R. Xu, Novon 17: 242. 2007.

加查黄耆 jia cha huang qi

Plants up to 25 cm tall. Stems several, ± erect, sparsely to loosely covered with subappressed to slightly ascending white hairs 0.2–0.6 mm, with some shorter black hairs mixed in. Leaves 6–10 cm, upper ones subsessile, lower ones with a petiole 1.5–2.5 cm; stipules 5–6 mm, lower ones shortly connate behind stem, upper ones free from each other, all sparsely to loosely covered with subappressed, at margins with ± spreading, white hairs 0.4–1 mm; rachis sparsely hairy like stem; leaflets in 11–15 pairs, narrowly elliptic to elliptic, 8–15 × 1–4 mm, abaxially loosely covered with subappressed hairs 0.4–0.6 mm, adaxially glabrous, apex acute to acuminate. Racemes 2.5–4 cm, rather densely many flowered; peduncle 4–7 cm, sparsely hairy like stem; bracts 1.5–2(–3) mm, predominantly black hairy. Calyx 3–4 mm, loosely covered with subappressed black and white hairs 0.2–0.5 mm; teeth unequal, upper 0.5–0.8 mm, 3 lower 1.5–1.8 mm. Petals pale violet, keel with deep-purple tip; standard widely obovate, ca. 7 × 3–3.5 mm, apex deeply emarginate; wings ca. 5.5 mm; keel ca. 4.5 mm. Legumes sessile, narrowly ellipsoid, curved, 6–7 mm, ca. 2.5 mm high and wide, very shortly acuminate, 1-locular; valves loosely covered with appressed black hairs 0.2–0.3 mm, glabrescent with age.

• E Xizang (Gyaca).

165. *Astragalus maowensis* Podlech & L. R. Xu, Sendtnera 7: 200. 2001.

茂文黄耆 mao wen huang qi

Astragalus aridicola P. C. Li (1989), not Sosnowsky (1948, “*aridicolus*”).

Plants 5–12 cm tall (grazed, probably distinctly taller), furnished with hairs mostly 0.2–0.4 mm. Stem loosely to densely hairy. Leaves (4–)8–12 cm; stipules 2–3 mm, connate behind stem to middle, densely hairy; petiole short, like rachis sparsely

to loosely covered with spreading white hairs, at base also with some black or predominantly with black hairs; leaflets in 8–11 pairs, in lateral branches in fewer pairs, narrowly elliptic, 10–16 × 3.5–7 mm, abaxially loosely to rather densely covered with appressed hairs 0.5–0.8 mm, adaxially glabrous or sparsely hairy like abaxial surface, apex subacute to obtuse. Racemes ovoid, many flowered; peduncle 3–7 cm, loosely spreading white hairy; bracts 2–3 mm, white hairy. Calyx ca. 5 mm, sparsely to loosely subappressed white hairy; teeth 2–3 mm. Petals white-green or white; standard elliptic, 9–11 × ca. 5 mm; wings 8–10 mm; keel 8.5–10 mm. Legumes (unripe) pendulous, with a stipe ca. 3 mm, white hairy.

- Sichuan (Maowen).

166. *Astragalus mekongensis* Podlech, Feddes Repert. 120: 54. 2009.

湄公黄耆 mei gong huang qi

Plants ca. 20 cm tall. Stems 12–16 cm, densely covered with appressed to ascending or even spreading white hairs 0.2–0.3 mm. Leaves 5–10 cm; stipules 6–10 mm, all distinctly connate behind stem, densely hairy; petiole up to 2 cm, hairy like stem; leaflets of main stem leaves in 10–13 pairs, 8–15 × 2.5–6 mm, abaxially rather densely hairy, adaxially glabrous or sparsely hairy. Racemes rather densely 10–20-flowered; peduncle 5–7 cm, covered with ascending to spreading white hairs, below raceme also with black hairs; bracts ca. 4 mm, black hairy. Calyx 4.5–5 mm, rather densely covered with subappressed black hairs 0.3–0.8 mm; teeth subulate, longer ones 2.5–3 mm. Petals white, tip of keel sometimes purple; standard 9–10 × 4.5–5 mm, without distinct claw, apex emarginate; wings ca. 8 mm; keel 6–6.5 mm. Legumes (unripe) sessile, slightly curved, 5–7 mm, ca. 2 mm high, densely white and black hairy.

- 3300–3400 m. E Xizang.

167. *Astragalus minutidentatus* Y. C. Ho, Bull. Bot. Res., Harbin 1(3): 108. 1981.

小齿黄耆 xiao chi huang qi

Plants furnished with ± flattened hairs, mostly with an acute appendix at base and therefore subbasifixed. Stems prostrate to ascending, up to 12 cm, densely to rather densely hairy; hairs subappressed to ascending, in upper part to spreading, white, at nodes also black. Leaves 2.5–4 cm, subsessile; stipules 2–3 mm, lower ones distinctly connate behind stem, hairy; rachis subappressed white hairy; leaflets in 6–10 pairs, elliptic, 3–7 × 1.5–3.5 mm, abaxially somewhat densely covered with subappressed, ± straight, white hairs, adaxially loosely covered with subappressed flexuous hairs, apex rounded to emarginate. Racemes densely 6–8-flowered; peduncle 1–2 cm, with ascending to spreading white and black hairs; bracts 1.5–2 mm, white and black hairy. Calyx ca. 4 mm, subappressed black hairy; teeth 0.2–0.5 mm. Petals lilac; standard obovate, ca. 9 × 3.5 mm; wings ca. 9 mm; keel ca. 8 mm. Ovary subsessile, white hairy, without a visible septum. Legumes with a stipe ca. 2 mm, ± erect, obliquely ellipsoid, 5–7 mm, ca. 3 mm high and wide, with a beak ca. 1 mm, 1-locular; valves loosely to rather densely covered with subappressed to slightly ascending black hairs 0.1–0.3 mm, sometimes also with white hairs when young.

2100–4900 m. Xizang [Bhutan, India, Nepal].

168. *Astragalus monbeigii* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 243. 1915.

异长齿黄耆 yi chang chi huang qi

Astragalus pullus N. D. Simpson var. *pubifolius* C. C. Ni & P. C. Li.

Plants up to 30 cm tall. Stems sparsely to loosely or in upper part to rather densely hairy; hairs appressed, white, at nodes also black, 0.1–0.3 mm. Leaves 7–12 cm; stipules 5–10 mm, behind stem distinctly connate, sometimes up to 3/4 of length, appressed white hairy; petiole 1.5–4.5 cm, with rachis sparsely to loosely hairy like stem; leaflets in 7–10 pairs, elliptic, 8–16 × 3–7 mm, abaxially sparsely to loosely covered with subappressed to ascending or even partly spreading white hairs 0.6–1 mm, adaxially glabrous or sparsely hairy like abaxial surface, apex rounded to acute or very shortly mucronulate. Racemes ovoid, up to 20-flowered; peduncle 5–11 cm, sparsely white, below raceme increasingly black hairy; bracts 3–4 mm, predominantly black hairy. Calyx 5–7 mm, loosely covered with appressed black hairs 0.2–0.4 mm and sometimes with some white hairs 0.5–0.7 mm; teeth unequal 2.5–4.5 mm. Petals violet; standard widely ovate to rhombic-orbicular, 10.5–12 × 7–8 mm; wings 8–11 mm; keel 7–9 mm. Legumes ± spreading, with a stipe ca. 2 mm, 5–6 mm, 2–2.5 mm high and wide, with a minute beak, incompletely 2-locular; valves loosely ± appressed white and black hairy.

- 3200–4800 m. Qinghai, Sichuan, Xizang, Yunnan.

169. *Astragalus montivagus* Podlech & L. R. Xu, Feddes Repert. 117: 227. 2006.

如多黄耆 ru duo huang qi

Plants 7–20 cm tall, caespitose. Stems numerous, 3–16 cm, loosely covered with subappressed white hairs 0.2–0.4 mm. Leaves 1.5–5.5 cm; stipules 3–4 mm, behind stem connate to middle or higher up, subglabrous or sparsely hairy; petiole 0.5–2 cm, with rachis loosely to rather densely hairy like stem; leaflets in 6–9 pairs, narrowly elliptic to obovate, 2–5 × 0.8–2 mm, abaxially loosely to rather densely and adaxially loosely covered with subappressed white hairs 0.3–0.6 mm, apex obtuse. Racemes rather densely 8–15-flowered; peduncle 3–8 cm, sparsely white hairy like stem, with some black hairs mixed in; bracts ca. 1 mm, white ciliate. Calyx ca. 3 mm, rather densely covered with subappressed white hairs 0.3–0.6 mm, with shorter black hairs mixed in, especially toward teeth; teeth unequal, 0.7–1 mm. Petals light purple in life; standard rhombic-elliptic, 6–7 × 4–4.5 mm, apex emarginate; wings 6–6.5 mm; keel ca. 6 mm. Legumes with a stipe ca. 1 mm, narrowly oblong, distinctly curved, 4–5 mm, ca. 1.5 mm high and wide, acute, 1-locular; valves loosely covered with appressed white hairs ca. 0.3 mm, sometimes with a few black hairs mixed in.

- Xizang.

170. *Astragalus nanjiangianus* K. T. Fu, Bull. Bot. Res., Harbin 2(4): 69. 1982.

南疆黄耆 nan jiang huang qi

Plants 10–20 cm tall. Stems sparsely covered with appressed white hairs 0.2–0.3 mm. Leaves 2.5–3.5 cm; stipules 3–5 mm, behind stem connate to middle, sparsely to loosely appressed black or black and white hairy; petiole short, with rachis hairy like stem; leaflets in 6–8 pairs, elliptic, 3–4 × 1.5–2 mm, abaxially more densely appressed white hairy, adaxially glabrous or sparsely appressed white hairy, apex obtuse to slightly retuse. Racemes short, 10–15-flowered; peduncle 3.5–15 cm, sparsely to loosely hairy like stem but toward raceme hairs increasingly black; bracts 1.5–3 mm, sparsely black hairy. Calyx 4–5 mm, loosely covered with appressed black hairs 0.05–0.3 mm, sometimes also with some white hairs; teeth 1–2 mm. Petals violet; standard obovate to elliptic, 9–10 × ca. 5 mm; wings 8–9 mm; keel ca. 7 mm. Ovary with a stipe 1–2 mm, slightly white hairy. Legumes unknown.

- 2500–3200 m. Xinjiang.

171. *Astragalus oreocharis* Podlech & L. R. Xu, Feddes Rept. 117: 228. 2006.

山黄耆 shan huang qi

Plants ca. 30 cm tall. Stems few, erect, 15–20 cm, rather densely furnished with white, appressed to subappressed and partly ascending, sometimes curved, tangled hairs 0.5–1 mm, with some spreading hairs mixed in, in upper part also with some black hairs. Leaves 7–10 cm; stipules 8–12 mm, shortly adnate to petiole, behind stem distinctly connate, densely to rather densely hairy like stem; petiole 1–3 cm, with rachis hairy like stem; leaflets in 7 or 8 pairs, elliptic, 10–20 × 3–7 mm, abaxially somewhat densely and adaxially loosely covered with subappressed to slightly ascending, partly curved, tangled hairs 0.8–1 mm, apex obtuse to slightly retuse. Racemes 4–5 cm, loosely many flowered; peduncle 6–10 cm, hairy like stem; bracts 4–5 mm, predominantly white hairy. Calyx ca. 5 mm, densely covered with subappressed black hairs 0.2–0.5 mm and with white hairs up to 1 mm; teeth 2–2.5 mm. Petals violet, partly even when dry; standard elliptic, ca. 9 × 5.5 mm, apex emarginate; wings ca. 8 mm; keel ca. 7 mm. Ovary with a stipe ca. 1 mm, white hairy. Legumes unknown.

- Xizang.

172. *Astragalus polycladus* Bureau & Franchet, J. Bot. (Morot) 5: 23. 1891.

多枝黄耆 duo zhi huang qi

Astragalus decumbens Komarov; *A. nigrescens* Franchet (1890), not Pallas (1800), nor Nuttall (1847), nor (Hooker) A. Gray (1862); *A. polycladus* var. *glabricarpus* Y. H. Wu; *A. polycladus* var. *nigrescens* E. Peter.

Plants 10–50 cm tall; hairs ± subappressed, in vegetative parts nearly only white, in inflorescence also black. Stems sparsely to loosely covered with hairs 0.2–0.4 mm. Leaves 4–6 cm, sessile; stipules 3–4 mm, behind stem distinctly connate, sometimes up to 3/4 of length, upper ones sometimes nearly free, all hairy or subglabrous; rachis loosely hairy; leaflets in 5–11 pairs, narrowly elliptic, 4–9(–14) × 2–4(–5) mm, abaxially loosely to densely and adaxially sparsely to loosely covered with hairs 0.5–1 mm, apex rounded to emarginate. Ra-

cemes ovoid to shortly cylindric, rather densely many flowered; peduncle 3–8 cm, loosely or in upper part more densely covered with white or black hairs 0.2–0.3 mm; bracts 2–3 mm, white and black hairy. Calyx 3–4 mm, loosely covered with black hairs 0.1–0.3 mm and mostly with some white hairs 0.5–0.7 mm; teeth 0.8–2.5 mm. Petals pale violet, with darker keel; standard elliptic, 6–7 × 3–4; wings 5–6 mm; keel 5–5.5 mm. Legumes spreading to slightly pendulous, with a stipe ca. 2 mm, 5–10 mm, 1.8–3 mm high and wide, with a minute beak, incompletely 2-locular; valves rather densely covered with subappressed to ascending white or white and black hairs 0.3–0.4 mm.

- Meadows, roadsides, light scrub; 2000–4500 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan.

173. *Astragalus praeteritus* Podlech & L. R. Xu, Feddes Rept. 117: 228. 2006.

贡觉黄耆 gong jue huang qi

Plants ca. 10 cm tall, loosely caespitose. Stems several, 4–6 cm, branched at base, sparsely to loosely covered with appressed to subappressed white hairs 0.1–0.4 mm, at nodes also with black hairs, partly glabrescent. Leaves 2–3 cm, subsessile or with a petiole up to 0.8 cm; stipules 3–4 mm, adnate to petiole for ca. 1 mm, behind stem high distinctly vaginate-connate, sparsely to loosely subappressed white and black hairy; rachis sparsely to loosely covered with subappressed white hairs up to 0.3 mm; leaflets in 7–10 pairs, elliptic, 4–7 × 1.5–3 mm, abaxially at midrib and margins loosely furnished with subappressed white hairs 0.5–0.8 mm, otherwise glabrous or with scattered hairs only, adaxially glabrous, apex rounded. Racemes ovoid, rather densely ca. 10-flowered; peduncle 1.5–3 cm, hairy like stem but in upper part with some black hairs mixed in; bracts ca. 2 mm, white hairy. Calyx ca. 4 mm, sparsely covered with appressed black hairs 0.1–0.3 mm, with some white hairs mixed in; teeth 1.5–2 mm. Petals whitish yellow when dry; standard elliptic, ca. 11 × 5.5 mm, apex slightly emarginate; wings ca. 8 mm; keel ca. 6.5 mm. Legumes sessile, obliquely oblong, slightly curved, 4–5 mm, ca. 1.8 mm high and wide, with a beak ca. 0.5 mm, 1-locular; valves glabrous.

- E Xizang (Gonjo).

174. *Astragalus pullus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 125. 1913.

黑毛黄耆 hei mao huang qi

Plants up to 30 cm tall, ± subappressed hairy. Stems very sparsely covered with black hairs 0.2–0.5 mm. Leaves 5–10 cm; stipules 3–7 mm, behind stem distinctly connate to 1/2 of length, upper ones sometimes nearly free, glabrous to subglabrous; petiole 1.5–2.2 cm, like rachis sparsely white or white and black hairy; leaflets in 7–11 pairs, narrowly elliptic, 5–12 × 2–5 mm, abaxially sparsely white hairy, adaxially glabrous or very sparsely hairy, apex rounded to slightly retuse. Racemes ovoid, rather densely 13–15-flowered; peduncle 7–14 cm, loosely hairy like stem; bracts 3–4 mm, white and black ciliate. Calyx 5–6 mm, densely black hairy; teeth 2.5–3 mm. Petals blue; standard elliptic, 10–11 × 5–5.5 mm; wings 8.5–9 mm; keel 8–8.5 mm. Ovary with a stipe ca. 2 mm, narrowly

ellipsoid, sparsely white hairy to glabrous. Legumes with a stipe 3–4 mm, slightly curved, 8–9 mm, ca. 2.5 mm high and ca. 2 mm wide, shortly acuminate, incompletely 2-locular; valves loosely covered with subappressed black hairs 0.1–0.3 mm.

• Meadows, roadsides, light scrub; 2600–3700 m. Sichuan, Xizang, Yunnan.

175. *Astragalus sikkimensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 23. 1868.

锡金黄耆 xi jin huang qi

Astragalus inconspicuus Baker; *A. tenuicaulis* Bunge.

Plants up to 60 cm tall, sparsely covered with wide, distinctly flattened or sometimes bladderlike hairs. Stems ascending to erect, with ± long internodes, sparsely to loosely covered with appressed, partly bladderlike-globose, white or also black hairs 0.05–0.3 mm or nearly glabrous, in uppermost part of stem densely to more densely hairy, sometimes branched. Leaves 3–7 cm, subsessile or with short petiole; stipules 1.5–4 mm, ± distinctly and sometimes high connate behind stem, subglabrous; rachis hairy like stem; leaflets in 5–11 pairs, elliptic to obovate, 3–8 × 1–4 mm, sparsely to loosely covered with appressed white hairs 0.2–0.5 mm abaxially, glabrous adaxially, apex emarginate or more rarely rounded; leaves of lateral branches smaller in all parts. Racemes ovoid, loosely to densely 3- to many flowered, strongly elongated in fruit; peduncle 1–4 cm, loosely to rather densely hairy like stem but mostly with predominantly black hairs; bracts 1.5–3 mm, white or black hairy. Calyx 4.5–6 mm, loosely to rather densely covered with appressed black hairs 0.2–0.3 mm; teeth 0.7–2 mm. Petals pale pinkish to purple; standard elliptic, 8–12 × 4–5 mm; wings 8–10 mm; keel 8–10 mm. Legumes with a stipe 1–2 mm, 5–10 mm, 3–4 mm high and wide, with a straight or bent beak 1–1.5 mm, 1-locular; valves densely covered with appressed to ascending black hairs up to 0.2 mm, sometimes also with minute bladderlike-globose hairs.

Riversides, hillsides among herbs; 2700–4600 m. Xizang [Bhutan, India, Nepal].

176. *Astragalus strictus* Graham ex Benth in Royle, Ill. Bot. Himal. Mts. 198. 1835.

笔直黄耆 bi zhi huang qi

Astragalus ladakensis Balakrishnan.

Plants 8–30 cm tall, appressed hairy. Stems sparsely to loosely covered with white and a few or sometimes also more black hairs 0.3–0.6 mm. Leaves 4–7 cm; stipules 3.5–6.5 mm, at least lower ones ± distinctly and sometimes high connate behind stem, loosely to rather densely covered with mostly white hairs up to 1 mm; petiole 1–2 cm, with rachis hairy like stem; leaflets in 8–12 pairs, narrowly elliptic to elliptic, (3–)4–10 × 1–4.5 mm, abaxially somewhat densely hairy, adaxially sparsely to loosely hairy, apex narrowly rounded to slightly emarginate. Racemes ovoid, densely up to 20-flowered; peduncle 5–8 cm, sparsely to loosely hairy like stem; bracts 2–3 mm, white and black hairy. Calyx 3.5–4 mm, rather densely covered with appressed white hairs up to 1 mm and with mostly shorter black hairs, sometimes with predominantly black hairs; teeth 1–2

mm. Petals pale pinkish to purple; standard elliptic, 7–9 × 4–5.5(–6) mm; wings 6–8 mm; keel 5.5–7 mm. Legumes with a stipe ca. 2 mm, 6–8 mm, ca. 3 mm high and ca. 2 mm wide, with a beak 0.5–1 mm, 1-locular; valves loosely covered with subappressed white and black hairs 0.3–0.7 mm.

Alpine steppic grasslands, stony slopes; 3000–5600 m. Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Kashmir, Nepal].

177. *Astragalus sungpanensis* E. Peter, Acta Horti Gothob. 12: 34. 1938.

松潘黄耆 song pan huang qi

Astragalus polycladus Bureau & Franchet var. *magniflorus* Y. H. Wu; *A. sungpanensis* f. *albiflorus* Y. H. Wu.

Plants up to 28 cm tall; hairs appressed to subappressed, in vegetative parts only white, in inflorescence also black. Stems loosely covered with hairs up to 0.3 mm. Leaves 4–8 cm, subsessile; stipules 3–4 mm, behind stem distinctly vaginate-connate, often reflexed, white ciliate; rachis loosely hairy; leaflets in 8–14 pairs, elliptic, 4–8 × 2–4 mm, abaxially somewhat densely and adaxially sparsely to loosely covered with hairs up to 1 mm, apex rounded to retuse. Racemes ovoid, many flowered; peduncle 4–7 cm, loosely white, toward raceme also black hairy; bracts ca. 2 mm, white ciliate. Calyx 4–5 mm, covered with a few appressed white hairs up to 0.5 mm and loosely to rather densely covered with much shorter, subappressed to slightly ascending, black hairs; teeth 1.5–2.5 mm. Petals violet; standard obovate, 10–11 × 5–5.5 mm; wings 9–10 mm; keel 7.5–8 mm. Ovary with a slender stipe 1–1.5 mm, densely white hairy. Legumes with a stipe 1–2 mm, oblong, distinctly curved, 7–8 mm, 2–3 mm high and wide, with a very short beak, 1-locular; valves rather densely covered with appressed black hairs 0.4–0.5 mm with some white hairs mixed in.

• 3000–4600 m. Gansu, Qinghai, Sichuan.

178. *Astragalus tibeticola* Podlech & L. R. Xu, Novon 14: 224. 2004.

藏黄耆 zang huang qi

Plants 15–25 cm tall. Stems branched at base, sparsely to loosely covered with appressed to subappressed white hairs 0.4–0.7 mm, at nodes also with black hairs. Leaves 6–12 cm; stipules 6–9 mm, high vaginate-connate behind stem, sparsely to loosely appressed, mostly white hairy; petiole 1–3 cm, like rachis loosely white hairy; leaflets in 9–11 pairs, narrowly elliptic, 7–17 × 3–6 mm, abaxially sparsely furnished with appressed white hairs 0.5–1 mm, adaxially glabrous, apex rounded to slightly emarginate. Racemes ovoid, rather loosely 7–15-flowered; peduncle 5–6 cm, hairy like stem but in upper part with predominantly black hairs; bracts 2.5–3 mm, predominantly black hairy. Calyx 4–5 mm, rather densely covered with appressed black hairs 0.2–0.3 mm and with fewer, slightly longer white hairs; teeth 1.5–2 mm. Petals mauve with whitish center, keel purplish mauve; standard widely elliptic to transversely elliptic, 6–8 × ca. 5 mm; wings ca. 6 mm; keel ca. 5 mm. Legumes sessile, obliquely ellipsoid, 4–7 mm, 2–2.5 mm high and 2.5–3 mm wide, with a beak ca. 0.5 mm, incompletely 2-locular; valves loosely covered with subappressed white or black hairs 0.2–0.4 mm.

- Xizang.

179. *Astragalus yangii* C. Chen & Z. G. Qian, *Acta Bot. Yunnan.* 19: 237. 1997.

竟生黄耆 jing sheng huang qi

Plants 2–6 cm tall. Stems ascending to erect, appressed hairy or nearly glabrous. Leaves 1.5–3 cm, subsessile; stipules 1–2 mm; leaflets in 4–7 pairs, elliptic to obovate, 2–3 × ca. 1.5 mm, abaxially densely and adaxially sparsely appressed hairy, rounded to retuse. Racemes 3–6-flowered; peduncle ca. 1 cm; bracts sparsely hairy. Calyx 3–4 mm, with appressed black hairs; teeth 1.5–2 mm. Petals pale yellowish; standard elliptic, ca. 10 × 5 mm; wings ca. 9 mm; keel ca. 8 mm. Ovary subsessile, linear, glabrous. Legumes unknown.

- About 4200 m. NW Yunnan (Zhongdian).

180. *Astragalus yunningensis* H. T. Tsai & T. T. Yu, *Bull. Fan Mem. Inst. Biol.* 9: 267. 1940.

永宁黄耆 yong ning huang qi

Plants 2–20 cm tall, caespitose. Stems numerous, 2–16 cm, very sparsely covered with appressed white hairs 0.1–0.4 mm or nearly glabrous. Leaves 1–5.5 cm; stipules 2.5–4 mm, connate behind stem to middle, subglabrous or sparsely white appressed hairy; petiole very short or up to 2 cm, with rachis very sparsely to loosely hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, 1–5 × 0.3–1(–2) mm, abaxially loosely to rather densely covered with appressed white hairs, adaxially glabrous or sparsely to rather loosely hairy, apex subacute to retuse or emarginate. Racemes 5–11-flowered; peduncle 1.5–3.5 cm, slender, appressed white hairy; bracts 0.5–1.5 mm. Calyx 2–3 mm, loosely covered with appressed white and predominantly black or only black hairs 0.1–0.3 mm; teeth up to 1 mm. Petals white, keel with violet tip; standard rhombic-suborbicular, 6–7 × 4–4.5 mm, apex emarginate; wings ca. 5.5 mm, limbs narrowed toward apex, subacute; keel ca. 5 mm. Legumes with a stipe ca. 1 mm, narrowly obliquely ellipsoid, slightly curved, 5–6 mm, 1.8–2 mm high and wide, incompletely 2-locular; valves rather densely covered with appressed white or white and black hairs 0.1–0.3 mm.

- Sichuan, Xinjiang, Xizang, Yunnan.

181. *Astragalus yutianensis* Podlech & L. R. Xu, *Feddes Repert.* 117: 229. 2006.

于田黄耆 yu tian huang qi

Plants ca. 25 cm tall. Stems several to many, up to 20 cm, branched at base, sparsely to somewhat loosely covered with appressed to subappressed white hairs 0.02–0.2 mm, with a few black hairs mixed in, at nodes also with black hairs. Leaves 3–4 cm; stipules 2–3 mm, shortly adnate to petiole, those of lower leaves behind stem vaginate-connate, those of upper leaves free from each other, sparsely hairy or subglabrous; petiole 0.5–1 cm, hairy like stem; leaflets in 4–6 pairs, narrowly elliptic to elliptic, 4–8 × 1.5–3 mm, abaxially sparsely to loosely hairy like stem, adaxially glabrous, apex obtuse. Racemes ovoid,

rather densely 7–15-flowered; peduncle 7–12 cm, hairy like stem but in upper part hairs increasingly black; bracts 2–3 mm, sparsely predominantly black hairy. Calyx 3–4 mm, loosely covered with appressed black hairs ca. 0.1 mm; teeth 1–1.5 mm. Petals probably violet, whitish when dry; standard widely elliptic, ca. 7 × 5 mm, apex emarginate; wings ca. 6 mm, limbs obovate-spatulate, widest near widely rounded tip; keel ca. 5 mm. Ovary subsessile, glabrous. Legumes unknown.

- Xinjiang (Kunlun Shan).

182. *Astragalus zacharensis* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg. Sér.* 7, 11(16): 23. 1868.

小果黄耆 xiao guo huang qi

Astragalus hulunensis P. Y. Fu & Y. A. Chen; *A. tataricus* Franchet; *Phaca brachycarpa* Turczaninow.

Plants up to 50 cm tall; hairs appressed to subappressed, in vegetative parts nearly only white, in inflorescence also black. Stems sparsely to loosely covered with white hairs 0.1–0.3 mm. Leaves 2–5 cm; stipules 1.5–2.5 mm, behind stem distinctly vaginate-connate, sometimes to middle, loosely hairy or white ciliate; petiole short, with rachis sparsely to loosely hairy like stem; leaflets in 6–11 pairs, narrowly elliptic, 2–6 × 1–2.5 mm, abaxially loosely covered with hairs 0.5–1 mm, adaxially glabrous or hairy only at margins, apex obtuse to retuse. Racemes ovoid, rather densely 5–12-flowered, later elongating; peduncle 1.5–6 cm, loosely hairy like stem; bracts ca. 1 mm, white ciliate. Calyx 2.5–3 mm, loosely black and white hairy; teeth 0.3–1 mm. Petals white to pale violet; standard elliptic to orbicular, 6.5–8 × (3–)4–5 mm; wings 6–7 mm; keel 6–7.5 mm. Legumes nodding, with a stipe 1–2 mm, 5–7 mm, ca. 2 mm high and wide, very shortly acuminate, 1-locular; valves rather densely covered with appressed white hairs up to 0.3 mm.

1000–3400 m. Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang [Mongolia].

We have seen no material of *Astragalus hulunensis*. According to the description, it most probably belongs to *A. zacharensis*, although it was described as a member of *A. sect. Komaroviella*.

183. *Astragalus zayuensis* C. C. Ni & P. C. Li, *Acta Phytotax. Sin.* 18: 369. 1980.

察隅黄耆 cha yu huang qi

Plants sparsely hairy. Stems strongly branched, nearly glabrous or hairy when young. Leaves 3–4 cm, subsessile; stipules ca. 3 mm, sparsely hairy, behind stem connate to middle; rachis hairy or nearly glabrous; leaflets in 4–6 pairs, narrowly elliptic, 4–7 × 2–3 mm, sparsely hairy abaxially, glabrous adaxially, apex emarginate. Racemes 4- or 5-flowered; peduncle 0.5–1.2 cm, subglabrous. Calyx ca. 5 mm, sparsely covered with white and black hairs or subglabrous; teeth ca. 1.7 mm. Petals purple-red; standard elliptic, ca. 9 × 5 mm; wings ca. 8 mm; keel ca. 7.5 mm. Legumes with a stipe ca. 3.5 mm, oblong, ca. 10 mm, 3–4 mm high, with a short beak, 1-locular; valves sparsely white hairy.

- About 1700 m. SE Xizang (Zayü).

24. Astragalus sect. **Chrysopteri** Y. C. Ho, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(8): 56. 1980 [*“Chrysopterus”*].

金翼组 jin yi zu

Plants herbaceous, with long developed stems. Stem and rachis subglabrous to glabrous. Stipules free from petiole and from each other. Inflorescences several in axil of upper stem. Pedicels 1–2 mm. Bracteoles absent. Petals yellow; wings shorter than standard, limbs with a long, linear-acute auricle 2–4.5 mm, mostly as long as or longer than claw; keel longer than wings. Stigma glabrous. Legumes keeled ventrally and dorsally, 1-locular, with thin walls.

- Two species: China.

- 1a. Leaflets glabrous adaxially, sparsely covered abaxially with hairs 0.1–0.3 mm; calyx glabrous or with a few hairs at upper margins and teeth; petals all of nearly equal length, 8–13 mm; legumes glabrous 185. *A. chrysopterus*
 1b. Leaflets adaxially very sparsely and abaxially more densely covered with hairs 0.6–1 mm; calyx white and black hairy; standard and keel 14–15 mm, wings ca. 10 mm; legumes black or white and black hairy 184. *A. brevialetus*

184. Astragalus brevialetus H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 9: 257. 1940.

金翼黄耆 jin yi huang qi

短翼黄耆 duan yi huang qi

Astragalus chrysopterus var. *wutaicus* Handel-Mazzetti;
A. coronilloides Ulbrich.

Plants up to 60 cm tall, rather sparsely hairy. Stems several, ascending to erect, sparsely covered with appressed white hairs 0.2–0.3 mm. Leaves 5–9 cm, subsessile; stipules 3–5(–9) mm, spreading, glabrous or with a few hairs at margins; leaflets in 5–9 pairs, narrowly ovate to narrowly elliptic, 7–15 × 4–5 mm, abaxially somewhat densely and adaxially very sparsely covered with appressed white hairs 0.6–1 mm, apex rounded to slightly retuse. Racemes 1.5–2.5 cm, rather densely 6–12-flowered, later somewhat elongating and loose; peduncle 5–9 cm, white and black hairy; bracts 1–2 mm. Calyx 4–5 mm, black and white hairy; teeth ca. 2 mm. Petals pale yellow; standard ovate, 14–15 × ca. 7 mm, apex widely emarginate; wings ca. 10 mm, limbs ca. 6 × 2 mm, auricle linear, 2–3 mm, acute; keel 14–15 mm. Legumes obliquely ellipsoid, curved, 10–12 mm, 2.5–3 mm high, long attenuate at base; valves sparsely covered with black or mixed black and white hairs.

Plants up to 60(–100) cm tall; hairs appressed to subappressed, white, in inflorescence also black, 0.1–0.3 mm. Stem slender, sometimes branched in lower part or throughout length, glabrous or subglabrous. Leaves (2–)4–7 cm, subsessile; stipules soon falling, 3–5(–9) mm, mostly reflexed, glabrous; rachis very sparsely mostly white hairy to subglabrous; leaflets in 5–11 pairs (in leaves of lateral branches in 3 or 4 pairs only), remote, narrowly elliptic, (4–)7–14 × (2–)3–5 mm, abaxially sparsely hairy, adaxially glabrous, apex obtuse or slightly retuse to very shortly acuminate. Racemes 6–10 cm, remotely 6–20-flowered; peduncle (0.8–)2–6 cm, subglabrous; bracts 1.5–5 mm, mostly falling, subglabrous. Calyx 4–6 mm, glabrous or rarely rather densely covered with subappressed black hairs; teeth 1–3 mm. Standard widely obovate, 9–13 × 5–7 mm, apex widely emarginate; wings 8–12 mm, limbs 6–8 × 1.5–2.5 mm, auricle linear, 2–4 mm, as long as slightly curved claw, acute; keel 10–13 mm. Legumes obliquely ellipsoid, 8–10 mm, ca. 4 mm high and wide, long attenuate at base; valves glabrous.

- About 2600 m. Sichuan (Muli).

- 1600–3700 m. Gansu, Hebei, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

185. Astragalus chrysopterus Bunge, Mélanges Biol. Bull. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 10: 51. 1877.

25. Astragalus sect. **Ebracteolati** N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 253. 1915.

无小苞组 wu xiao bao zu

Plants herbaceous, with developed stem; hairs basifixed. Stipules free from petiole and from each other. Inflorescence solitary on 1 stem. Pedicels 2–3.5 mm. Petals yellow; standard with a very short claw; wings as long as or shorter than standard, limbs rounded at apex, with a long, linear-acute auricle mostly as long as claw; keel often longer than wings. Legumes with a slender stipe 5–8 mm, 1-locular, with thin walls.

- Two species: China.

- 1a. Leaflets in 1 or 2 pairs, 8–20 × 7–13 mm; calyx rather densely covered with blackish brown hairs; legumes 15–18 mm, densely black hairy 187. *A. smithianus*
 1b. Leaflets in 5–10 pairs, 5–14 × 3–5 mm; calyx sparsely covered with white and blackish hairs; legumes 18–28 mm, covered with blackish hairs 0.3–0.6 mm and with white hairs up to 1 mm 186. *A. craibianus*

186. Astragalus craibianus N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 240. 1915.

Plants 10–18 cm tall, sparsely covered with subappressed to ascending, white to mostly dark brownish or blackish hairs 0.5–1 mm. Stems ascending to erect, 3–12 cm, glabrous. Leaves 4–8 cm; stipules 8–15 mm, glabrous or very sparsely ciliate; petiole 1–2 cm, like rachis mostly glabrous; leaflets in 5–10 pairs, narrowly elliptic, 5–14 × 3–5 mm, abaxially sparsely

川西黄耆 chuan xi huang qi

Astragalus craibianus var. *baimashanensis* C. Chen & Z. G. Qian; *A. saccatocarpus* K. T. Fu.

hairy or subglabrous, adaxially glabrous, apex obtuse to subacute, shortly acuminate-mucronulate. Racemes 2–3 cm, rather densely 4–9-flowered; peduncle solitary on 1 stem, 3–7 cm, sparsely hairy; bracts 5–10 mm, sparsely ciliate. Calyx 6–7 mm, sparsely to rather loosely covered with white and predominantly brownish to blackish hairs; teeth 3–4 mm. Petals bronzy yellow; standard widely obovate to suborbicular, 14–16 × 8–10 mm, strongly recurved above claw, apex rounded to scarcely emarginate; wings 15–16 mm, limbs ca. 10 × 4 mm, auricle narrow, 3–3.5 mm, apex acute; keel 15–16 mm. Style with minute hairlets below stigma. Legumes inflated obovoid, 18–28 mm, ca. 5 mm high and 9–10 mm wide, rounded ventrally and dorsally, with a minute beak; valves rather densely covered with subappressed to slightly ascending blackish hairs 0.3–0.6 mm and with longer white hairs up to 1 mm.

- 3300–4800 m. Sichuan, Yunnan.

26. *Astragalus* sect. *Pseudotapinodes* Podlech & L. R. Xu, *Sendtnera* 7: 199. 2001.

假短茎组 *jia duan jing zu*

Similar to *Astragalus* sect. *Poliothrix* but plants acaulescent to subacaulescent, at most up to 10 cm tall. Stipules adnate to or distinctly connate before petiole. Legumes incompletely 2-locular, so far as known (not 1-locular).

Seven species: Bhutan, China, India, Nepal; six species (four endemic) in China.

- 1a. Standard 6–7 mm.
- 2a. Leaflets 2–4 × 1–2 mm, adaxially hairy toward margins; peduncle only with white hairs; legumes loosely predominantly white hairy 192. *A. orbicularifolius*
- 2b. Leaflets 4–8 × 2–3.5 mm, glabrous adaxially; peduncle toward raceme with black hairs; legumes densely black hairy 191. *A. longiscapus*
- 1b. Standard 9–12 mm.
- 3a. Stipules adnate to petiole for 1–2 mm and connate to each other before petiole further up; leaflets in 8–11 pairs, 4–9 mm; ovary and legumes black hairy 193. *A. rigidulus*
- 3b. Stipules not as above; leaflets in at most 8 pairs, up to 5 mm; ovary white hairy or glabrous.
- 4a. Plants ca. 10 cm tall, with stems up to 4 cm; leaves 3–5 cm; peduncles glabrous; ovary glabrous 190. *A. dingjiensis*
- 4b. Plants 1.5–5 cm tall, acaulescent or nearly so; leaves 1–2 cm; peduncles hairy; ovary glabrous or hairy.
- 5a. Stem, if present, glabrous; leaflets 3–5 × 1–1.5 mm, glabrous or with a few hairs only; peduncle inconspicuous, up to 3 mm, densely black hairy; calyx 3–4 mm, covered with flexuous black hairs up to 0.3 mm; ovary glabrous 189. *A. dickorei*
- 5b. Stem, if present, loosely hairy; leaflets 1–3 × 0.5–1.5 mm, adaxially sparsely to loosely hairy, abaxially densely to rather densely hairy; peduncle 3–15 mm, white and black hairy; calyx covered with black hairs 0.1–0.3 mm and with white hairs 0.6–1 mm; ovary white hairy 188. *A. conaensis*

188. *Astragalus conaensis* Podlech & L. R. Xu, *Sendtnera* 7: 198. 2001.

错那黄耆 *cuo na huang qi*

Plants acaulescent to subacaulescent, 2–5 cm tall; hairs subappressed, in vegetative parts white, in inflorescence also black, 0.4–0.5 mm. Stems or basal leaf-rosettes numerous, stems if present up to 0.5 cm, loosely hairy. Leaves 1–2 cm; stipules 3–4 mm, distinctly connate before petiole, behind stem connate to middle, rather densely hairy; petiole short, like rachis rather densely hairy; leaflets in 3–7 pairs, elliptic, 1–3 × 0.5–1.5 mm, abaxially densely to rather densely hairy, adaxially sparsely to loosely hairy, apex obtuse. Racemes 2–5-flowered; peduncle 0.3–0.5 cm, white and black hairy; bracts 1.5–2.5 mm, predominantly black hairy. Calyx 4–5 mm, densely to ra-

187. *Astragalus smithianus* E. Peter, *Acta Horti Gothob.* 12: 52. 1938.

无毛叶黄耆 *wu mao ye huang qi*

Plants 8–12 cm tall, subacaulescent, nearly glabrous, only in inflorescence with predominantly dark brown hairs. Stem 1.5–3 cm. Leaves 4–8 cm; stipules 7–12 × 1.5–4 mm; petiole 2.5–4 cm; leaflets in 1 or 2 pairs, ovate to widely elliptic, 8–20 × 7–13 mm, apex slightly emarginate. Racemes 0.5–1 cm, 1–4-flowered; peduncle solitary on 1 stem, 4.5–7.5 cm, sparsely to loosely black and white hairy in upper part; bracts 3–5 mm, with blackish brown hairs. Calyx 5–6 mm, rather densely appressed dark brown hairy; teeth ca. 3 mm. Standard suborbicular, 12–13 × 8–9 mm, apex emarginate; wings 15–16 mm, limbs 12–13 × 3–3.5 mm, auricle narrow, 4–4.5 mm; keel 14–15 mm. Legumes (immature) obovoid, 15–18 mm, densely black hairy.

- 4800–5000 m. Qinghai, Sichuan.

ther densely covered with appressed black hairs 0.1–0.3 mm and with subappressed white hairs 0.6–1 mm; teeth 2–2.5 mm. Petals deeply violet; standard widely elliptic to suborbicular, ca. 9 × 6 mm; wings ca. 8 mm; keel ca. 8 mm. Ovary with a slender stipe ca. 1 mm, narrowly ellipsoid, white hairy. Legumes unknown.

- 4600–5200 m. Xizang.

189. *Astragalus dickorei* Podlech & L. R. Xu, *Sendtnera* 7: 199. 2001.

地科黄耆 *di ke huang qi*

Plants acaulescent, 1.5–2 cm tall, subglabrous in vegetative parts. Leaves 1–1.5 cm, subsessile, glabrous or leaflets with a few white hairs up to 0.4 mm; stipules 3–4 mm, adnate to

petiole for 1.5–2 mm, vaginate-connate behind stem for 1–2 mm, toward apex and at margins with white and black hairs up to 0.3 mm; leaflets in 3 or 4 pairs, narrowly elliptic, 3–5 × 1–1.5 mm, apex obtuse. Racemes short, densely 4- or 5-flowered; peduncle inconspicuous, up to 3 mm, densely covered with subappressed to slightly ascending black hairs ca. 0.3 mm; bracts 3–4 mm, rather densely hairy like peduncle. Calyx 3–4 mm, rather densely covered with flexuous black hairs up to 0.3 mm; teeth 1.5–2 mm. Petals blue-violet; standard elliptic, ca. 10 × 6 mm; wings ca. 9 mm; keel ca. 5 mm. Ovary sessile, glabrous. Legumes unknown.

- About 4800 m. W Sichuan.

190. *Astragalus dingjiensis* C. C. Ni & P. C. Li, *Acta Phytotax. Sin.* 17(2): 109. 1979.

定结黄耆 ding jie huang qi

Plants ca. 10 cm tall, subcaulescent, densely caespitose; hairs subappressed, often ± flexuous, tangled, 0.3–0.8 mm, only white in vegetative parts with exception of stipules. Stems up to 4 cm, prostrate to ascending-erect, loosely covered with mostly straight hairs. Leaves 3–5 cm; stipules 3–4(–5) mm, adnate to petiole for ca. 1 mm, high connate behind stem, often only with 2 short triangular tips, loosely to rather densely hairy; petiole 1–2 cm, like rachis loosely hairy; leaflets in 5–8 pairs, oblong, ca. 4 mm, abaxially appressed white hairy, adaxially glabrous. Racemes 4–6-flowered; peduncle 1.5–2 cm, glabrous. Petals reddish; standard 10–12 mm, with short claw 1–2 mm; wings 8.5–9 mm; keel 6–7 mm. Ovary sessile, glabrous. Legumes unknown.

- 2900–5000 m. Qinghai, Xizang.

191. *Astragalus longiscapus* C. C. Ni & P. C. Li, *Acta Phytotax. Sin.* 17(2): 108. 1979.

长梗黄耆 chang geng huang qi

Plants acaulescent or nearly so, 4–9 cm tall. Stems, if present, up to 1 cm but mostly absent. Leaves 3.5–9 cm; stipules 4–5 mm, adnate to petiole for 1.5–2 mm, vaginate-connate behind stem for 1–2 mm, toward apex at margins with white and black hairs up to 0.4 mm; petiole 2.5–6 cm, like rachis loosely to rather densely covered with subappressed to ascending white and also some black hairs; leaflets in 3–5 pairs, narrowly elliptic, 4–8 × 2–3.5 mm, often folded, abaxially loosely to densely white hairy like rachis, adaxially glabrous, apex obtuse. Racemes ca. 1 cm, densely 4–10-flowered; peduncle 1.5–4 cm, hairy like rachis but toward raceme often with more black hairs; bracts ca. 2 mm, sparsely to loosely white and black hairy. Calyx 3–4 mm, rather densely covered with subappressed to ascending black and sometimes also a few white hairs 0.3–0.4 mm; teeth 1.5–2 mm. Petals purple; standard widely obovate, ca. 7 × 4.5 mm, without distinct claw; wings ca. 6 mm; keel ca.

5 mm. Legumes (immature) sessile, ca. 6 mm, ca. 2 mm high and ca. 3 mm wide, densely covered with appressed black hairs.

- 4000–4700 m. Xizang [Nepal].

192. *Astragalus orbicularifolius* P. C. Li & C. C. Ni, *Acta Phytotax. Sin.* 17(2): 112. 1979.

圆叶黄耆 yuan ye huang qi

Plants ca. 10 cm tall, subcaulescent, densely caespitose, vegetative parts covered with appressed to subappressed white hairs 0.2–0.3 mm. Stems up to 1 cm, glabrous. Leaves 2–5 cm; stipules 5–7 mm, adnate to petiole for 2–4 mm, behind stem connate to middle, glabrous or toward apex sparsely hairy; petiole 0.5–2 cm, like rachis loosely hairy; leaflets in 4–6 pairs, elliptic, 2–4 × 1–2 mm, abaxially loosely to rather densely hairy, adaxially hairy only along margins, apex rounded to slightly retuse. Racemes 4–7-flowered; peduncle 1–3 cm, loosely white hairy; bracts ca. 3 mm, black and white hairy. Calyx ca. 3.5 mm, predominantly subappressed black hairy, but also with some longer grayish or white hairs; teeth 1–1.5 mm. Petals red-purple; standard widely elliptic to suborbicular, 6–7 × ca. 4 mm, without distinct claw; wings ca. 5 mm; keel ca. 4.5 mm. Legumes sessile, obliquely ovoid to obliquely ellipsoid, 5–6 mm, 3–3.5 mm high and wide, apex shortly acuminate, incompletely 2-locular; valves transversely rugulose, loosely covered with appressed white hairs 0.1–0.2 mm, sometimes also with a few black hairs.

- 5000–5500 m. Xizang.

193. *Astragalus rigidulus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7*, 11(16): 23. 1868.

坚硬黄耆 jian ying huang qi

Plants 4–8 cm tall, subcaulescent to shortly caulescent, with appressed to subappressed hairs 0.1–0.3 mm. Stems up to 3 cm, glabrous or nearly so. Leaves 3–7 cm; stipules 3–5 mm, adnate to petiole for 1–2 mm, sometimes distinctly connate before petiole, shortly connate behind stem, glabrous or ciliate; petiole 1–2 cm, like rachis glabrous or with scattered hairs only; leaflets in 8–11 pairs, narrowly elliptic, 4–9 × 1–3.5 mm, abaxially sparsely to loosely covered with subappressed to slightly ascending white hairs, adaxially glabrous, apex obtuse to subacute. Racemes rather densely 4–7-flowered; peduncle 0.3–0.7 cm, rather densely subappressed white or black hairy; bracts 3–4 mm, sparsely to loosely black hairy or subglabrous. Calyx 4–6 mm, densely appressed black hairy; teeth 2–3 mm. Petals purple-red; standard elliptic, 9–11 × 4.5–5 mm, apex emarginate; wings 7–9 mm; keel ca. 6 mm. Legumes sessile, ellipsoid, inflated, ca. 20 mm, ca. 8 mm high and wide, scarcely keeled ventrally by prominent nerve, acuminate at apex, incompletely 2-locular; valves sparsely appressed black hairy, glabrous or nearly so when fully ripe.

- Alpine slopes; 4000–4500 m. Xizang [Bhutan, India (Sikkim)].

27. *Astragalus* sect. *Irinaea* Borissova in Komarov, *Fl. URSS* 12: 880. 1946.

极矮组 ji ai zu

Plants perennial, covered with hairs partly basifixed, partly with a very short subbasal acute appendix and therefore extremely asymmetrically medifixed. Stipules minute, very shortly to shortly adnate to petiole, otherwise free. Racemes pedunculate, loose to rather dense. Flowers with short pedicels. Calyx campanulate. Standard widely and deeply incised; limbs of wings rounded at apex.

Stigma glabrous or with minute hairlets. Legumes (unknown in Chinese species) linear, curved, keeled ventrally, grooved dorsally, 1-locular or 2-locular; valves thin.

Seven species: Afghanistan, China, India, Pakistan, Tajikistan; one species (endemic) in China.

194. *Astragalus nanellus* H. T. Tsai & T. T. Yu, Bull. Fan Mem. Inst. Biol. 7: 25. 1936.

极矮黄耆 ji ai huang qi

Plants 3–12 cm tall, subcaulescent, caespitose, covered with appressed to subappressed white hairs 0.2–0.3 mm, partly basifixed but mostly with a very short subacute basal appendix and therefore extremely asymmetrically bifurcate. Stems very short or rarely up to 10 cm and then ascending. Leaves 1.5–6 cm; stipules 2–3 mm, glabrous, nearly free from petiole; petiole 0.5–2 cm, rather densely hairy; leaflets in 3–5 pairs, elliptic to

widely obovate, 2–4 × 2–3 mm, both surfaces rather densely spotted with minute blackish dots, abaxially loosely to rather densely hairy, adaxially loosely hairy, often only in basal 1/2, rounded at apex. Racemes short, 3–9-flowered; peduncle 0.5–2 cm, loosely to rather densely hairy; bracts 0.5–1 mm, white hairy. Calyx ca. 3 mm, loosely covered with short appressed white hairs; teeth 1–1.6 mm. Petals violet (according to collector); standard suborbicular, ca. 6 × 5 mm, with a very short claw; wings ca. 5 mm; keel ca. 4 mm. Ovary ellipsoid, glabrous. Legumes unknown.

• About 3200 m. W Sichuan.

28. *Astragalus* sect. *Lotidium* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 5. 1868.

伞序组 san xu zu

Astragalus sect. *Longistipitati* Y. C. Ho; *A.* sect. *Umbellati* N. D. Simpson.

Plants biennial or perennial, rarely annual, with prostrate to erect or long creeping stems, with short basifixed hairs. Stipules free or shortly adnate to petiole, connate behind stem or not. Flowers pedicellate, umbellate, subumbellate, or in a loose raceme. Petals purplish or rarely white, yellow, or pink; wing limbs mostly obtuse at apex; keel as long as or distinctly longer than wings. Ovary and legumes mostly stipitate; legumes linear, erect, 2-locular or rarely 1-locular.

Thirteen species: China, Japan; 13 species (12 endemic) in China.

- 1a. Whole plant covered with spreading hairs 0.3–0.5(–0.8) mm 205. *A. wushanicus*
 1b. Plant covered with appressed to sometimes slightly ascending hairs (only *A. zhouquinus* with spreading hairy stem).
 2a. Stipules all or at least those of lower leaves behind stem distinctly, often high vaginate-connate.
 3a. Keel as long as or longer than standard and distinctly longer than wings; ovary and legumes glabrous or rarely sparsely hairy.
 4a. Leaflets hairy adaxially; standard 10–13 mm, wings 9–10 mm, and keel 12–13 mm; ovary and legumes glabrous 195. *A. davidii*
 4b. Leaflets glabrous adaxially; standard 8–10 mm, wings 6–9 mm, and keel 8–10 mm; ovary and legumes glabrous or hairy 202. *A. sutchuenensis*
 3b. Keel distinctly shorter than standard but as long as wings; ovary and legumes hairy.
 5a. Leaflets in 3–5 pairs; peduncles 4–7 cm; bracts linear-acute, 2–3.5 mm; standard ca. 11 × 7–9 mm, suborbicular 201. *A. souliei*
 5b. Leaflets in 5–9 pairs; peduncles 1–3 cm; bracts subulate, 0.5–1 mm; standard 11–12 × 5–6 mm, obovate.
 6a. Stipules 3–5 mm; leaflets in 8 or 9 pairs, sparsely hairy adaxially, both surfaces very densely spotted with minute dark purplish dots; calyx teeth unequal, short ones ca. 1 mm, longer ones 2–2.2 mm 206. *A. yangtzeanus*
 6b. Stipules ca. 2 mm; leaflets in 5–8 pairs, glabrous adaxially, without purplish dots; calyx teeth unequal, short ones 0.6–0.8 mm, longer ones ca. 1.2 mm 196. *A. fangensis*
 2b. Stipules all free from one another (in *A. tungensis* stipules in short lateral branches connate).
 7a. Leaflets in 9–12 pairs; bracts 2–3 mm 203. *A. tungensis*
 7b. Leaflets in at most 9 pairs, but mostly distinctly fewer; bracts up to 1.5 mm.
 8a. Stems covered with short spreading hairs; leaflets 2–3 × 1.5–2.5 mm; standard 6.5–7 mm 207. *A. zhouquinus*
 8b. Stems appressed hairy or subglabrous to glabrous; leaflets distinctly larger; standard at least 8 mm but mostly distinctly longer.
 9a. Plants 9–10 cm tall, with an erect stem 2–3 cm, with minute globose hairs in lower part and with appressed hairs 0.2–0.4 mm in upper part; stipules clasping stem but free from each other 197. *A. nankotaizanensis*
 9b. Plants prostrate, with partly creeping stems 15–50 cm, sparsely hairy to subglabrous or glabrous, never with globose hairs; stipules not clasping stem.

- 10a. Stems, rachises, and peduncles covered with very short hairs 0.05–0.1 mm; leaflets abaxially with hairs 0.5–0.7 mm, both surfaces densely spotted with minute dark purple dots; petals all of equal length, ca. 8.5 mm 204. *A. wolungensis*
- 10b. Stems, rachises, and peduncles covered with longer hairs 0.1–0.8 mm; leaflets without purple dots; standard and keel of equal length but distinctly longer than wings, if all of nearly same length, then standard ca. 11 mm.
- 11a. Leaflets very narrowly elliptic, 4–9 × 0.5–1.5 mm; standard ca. 7 × 9 mm, limb wider than long, transversely elliptic; style below stigma with a long line of minute hairlets; stems not prostrate, not rooting at nodes 199. *A. sciadophorus*
- 11b. Leaflets elliptic, less than 2 × as long as wide, glabrous adaxially; standard with limb always distinctly longer than wide; style below stigma glabrous; stems prostrate, often rooting at nodes.
- 12a. Leaflets with a hairy petiolule 0.5–1 mm, glabrous abaxially or with scattered hairs only; peduncle glabrous; legumes glabrous, with a beak 9–10 mm; stems not rooting at nodes 198. *A. nokoensis*
- 12b. Leaflets without a hairy petiolule, sparsely hairy abaxially; peduncle sparsely hairy; legumes mostly hairy, at least when young, with a shorter beak; stems rooting at nodes 200. *A. sinicus*

195. *Astragalus davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 214; Pl. David. 2: 32. 1885 [“*davidii*”].

宝兴黄耆 *bao xing huang qi*

Astragalus davidii var. *acutidentatus* P. C. Li; *A. gonggamontis* P. C. Li.

Plants perennial, 15–30 cm tall, with mostly appressed white hairs 0.1–0.5 mm. Stems branched, ascending to erect or sometimes prostrate, sparsely hairy, soon glabrescent. Leaves 2–6 cm, subsessile; stipules 3–4 mm, ovate, behind stem connate to middle or even higher, sparsely hairy; rachis sparsely covered with very short, partly minute and subglobose hairs; leaflets in 5–8 pairs, narrowly elliptic, 3–10 × 1.5–4 mm, both surfaces sparsely to loosely covered with subappressed to ascending hairs up to 0.5 mm, sometimes adaxially glabrous with age, apex obtuse to retuse. Racemes loosely 3–7-flowered, in fruit elongating and with remote fruits; peduncle 2–4.5 cm, hairy like stem; bracts 1–1.5 mm, ciliate. Calyx 3.5–4 mm, loosely subappressed hairy; teeth (0.5–)1.5–2 mm. Petals pale pink; standard widely ovate, 10–13 × 5–6.5 mm, apex emarginate; wings 9–10 mm; keel 12–13 mm. Legumes erect, with a stipe 5–7 mm, straight or slightly curved, 20–35 mm, 2–3 mm high and wide, sharply keeled ventrally, widely grooved dorsally, with a slender beak up to 3 mm; valves glabrous or rarely sparsely hairy.

• Sichuan.

196. *Astragalus fangensis* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 242. 1915.

房县黄耆 *fang xian huang qi*

Plants caespitose, with appressed white hairs 0.2–0.3 mm. Stems several, prostrate to ascending, up to 25 cm, sparsely to loosely hairy. Leaves 3–7 cm; stipules 1–2(–3) mm, high connate behind stem, subglabrous or sparsely hairy; petiole 0.5–2 cm, like rachis sparsely hairy; leaflets in 5–8 pairs, elliptic, 4–9(–10) × 3–5(–8) mm, abaxially sparsely hairy, adaxially glabrous, apex retuse to emarginate. Racemes short, rather loosely 2–4-flowered; peduncle mostly solitary on 1 stem, 1(–1.5) cm,

loosely hairy; bracts 0.5–1 mm, sparsely hairy. Calyx 4–5 mm, subglabrous to sparsely hairy; teeth unequal, 0.6–1.2 mm. Petals pale yellow to purplish; standard elliptic, (10–)12 × ca. 5 mm, apex retuse; wings ca. 10 mm, limbs narrowly triangular, widest at base, apex subacute; keel ca. 10 mm. Ovary with a stipe ca. 1.5 mm, narrowly linear, very shortly appressed hairy. Legumes unknown.

• About 1300 m. Hubei.

197. *Astragalus nankotaizanensis* Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 152. 1931.

南口台黄耆 *nan kou tai huang qi*

Plants perennial, 9–10 cm tall, with only white hairs. Caudex with long subterranean, branched stolons. Stems several, 2–3 cm, ascending, in lower part furnished with minute globose hairs, in upper part loosely to rather densely covered with appressed white hairs 0.2–0.4 mm. Leaves 4–7 cm; stipules 3–5 mm, clasping stem but not connate, ciliate; petiole 1.5–2.5 cm, like rachis appressed hairy; leaflets in 6–8 pairs, elliptic, 7–12 × 3–6 mm, abaxially loosely covered with appressed hairs 0.4–0.7 mm, adaxially glabrous or sparsely hairy, apex rounded. Racemes subumbellate, 2–5-flowered; peduncle 4–6 cm, appressed hairy; bracts 1–1.5 mm, hairy. Calyx ca. 5 mm, loosely covered with appressed hairs 0.4–0.7 mm; teeth 1.5–2 mm. Petals bright yellow; standard elliptic, 12–12.5 × ca. 6 mm, apex emarginate; wings 11–13 mm; keel ca. 15 mm. Legumes (unripe) with a stipe ca. 2 mm, slightly upcurved, ca. 13 mm, ca. 1.5 mm high, with a slender beak 3–4 mm; valves rather densely covered with subappressed hairs 0.4–0.5 mm.

• About 3700 m. Taiwan (Nanhu Dashan).

198. *Astragalus nokoensis* Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 151. 1931.

台湾黄耆 *tai wan huang qi*

Plants annual. Stems prostrate, pale brownish, 40–50 cm, glabrous. Leaves 3.5–12 cm; stipules papery, 1–2 mm; leaflets in 5 or 6 pairs, with hairy petiolules 0.5–1 mm, obovate, 6–3 × 4–7 mm, glabrous or abaxially with scattered hairs, apex

rounded to retuse or emarginate. Racemes umbellate to subumbellate; peduncle 8–19 cm, glabrous; bracts very short, hairy. Calyx campanulate, tube ca. 5 × 3 mm. Standard obovate, ca. 11 × 6 mm; wings ca. 10 mm; keel ca. 10 mm. Ovary oblong, glabrous. Legumes ca. 15 × 3 mm, with a beak 9–10 mm, glabrous.

- 2700–3000 m. Taiwan.

199. *Astragalus sciadophorus* Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 2, 5: 236; *Pl. David*. 1: 84. 1883.

辽西黄耆 *liao xi huang qi*

Plants ca. 15 cm tall. Stem ca. 8 cm, slender, branched, loosely covered with subappressed to ascending white hairs 0.6–0.8 mm. Leaves 1.5–3 cm; stipules 2.5–3 mm, free, sparsely to loosely hairy; petiole 0.5–1 cm, with rachis hairy like stem; leaflets in 3–5 pairs, narrowly elliptic, 4–9 × 0.5–1.5 mm, both surfaces loosely covered with subappressed to ascending hairs 0.6–0.8(–1) mm, apex acute. Racemes densely 4–6-flowered; peduncle 7–8 cm, slender, sparsely to loosely white hairy, toward raceme also with black hairs; bracts whitish, ca. 2 mm, with predominantly black hairs. Calyx ca. 3.5 mm, loosely covered with subappressed predominantly blackish hairs 0.3–0.5 mm; teeth 1–1.5 mm. Petal color unknown; standard transversely elliptic, ca. 7 × 9 mm, apex very widely and shallowly emarginate; wings ca. 6.5 mm; keel ca. 7.5 mm. Style hairy in lower part, below stigma with a long line of minute hairlets. Legumes (very unripe) subsessile, narrowly ellipsoid, at least 6 mm, densely covered with subappressed to slightly ascending white hairs 0.6–0.8 mm.

- Hebei.

200. *Astragalus sinicus* Linnaeus, *Mant. Pl.* 1: 103. 1767.

紫云英 *zi yun ying*

Astragalus lotoides Pallas; *A. sinicus* var. *macrocalyx* Ulbrich.

Plants annual or short-lived perennial, sparsely covered with appressed white hairs 0.1–0.6 mm. Stems intricately branched, ascending to nearly erect or prostrate to creeping, with long internodes, up to 30 cm, sparsely hairy to subglabrous, rooting at nodes. Leaves 2.5–10 cm; stipules 2–3 mm, free, ciliate; petiole much shorter than to as long as rest of leaf, like rachis sparsely hairy; leaflets in 3–5 pairs, obovate to obcordate, 5–17 × 3–13 mm, abaxially sparsely appressed hairy, adaxially glabrous or with a few scattered hairs, apex widely rounded to distinctly emarginate. Racemes umbellate, 4–10-flowered; peduncle erect, 2.5–25 cm, sparsely hairy; bracts 0.3–1 mm, ciliate. Calyx 3–5 mm, loosely to rather densely or more rarely scarcely covered with appressed, wide and flattened, white hairs 0.1–0.3 mm; teeth 1–2(–3) mm. Petals white, pink, light red, or purple, rarely creamy yellow or yellow; standard ovate, 9–14 × 5–8 mm, apex incised; wings 7–11 mm; keel 9–14 mm. Legumes with a stipe 2–3 mm, 12–20 mm, 2.5–3.5 mm high and wide, with a slender beak up to 5 mm; valves thin, blackish, loosely hairy.

Wet places, riversides, as a weed in rice fields, widespread in E

Asia; 100–3000 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan].

201. *Astragalus souliei* N. D. Simpson, *Notes Roy. Bot. Gard. Edinburgh* 8: 246. 1915.

蜀西黄耆 *shu xi huang qi*

Plants perennial, 10–25 cm tall, sparsely covered with appressed white hairs 0.2–1 mm. Stems several, erect to ascending, very sparsely hairy to glabrescent. Leaves 3–7 cm; stipules 1–3 mm, very shortly adnate to petiole, high connate behind stem, subglabrous to loosely hairy; petiole 1–2.5 cm, like rachis sparsely hairy; leaflets in 3–5(or 6) pairs, widely elliptic, 4–6 × 2.5–4.5 mm, abaxially sparsely to rather loosely hairy, more glaucous and densely spotted with blackish dots, adaxially obscurely brownish green and sparsely hairy to subglabrous, apex rounded to slightly retuse. Racemes short, rather loosely 3–6-flowered; peduncle 4–7 cm, very scarcely or higher up rather loosely hairy; bracts 2–3.5 mm, hairy. Calyx 5–6.5 mm, sparsely to loosely hairy; teeth 2–3 mm. Petals ?yellow; standard widely obovate to suborbicular, 11–13 × 7–9 mm, apex incised to nearly bilobed; wings ca. 10 mm; keel ca. 10 mm. Stigma with minute hairlets. Legumes with a stipe 1–2 mm, erect, straight, 25–30 mm, appressed hairy.

- 2000–2900 m. Sichuan.

202. *Astragalus sutchuenensis* Franchet, *Pl. Delavay*. 160. 1889.

四川黄耆 *si chuan huang qi*

Astragalus wexianensis Y. C. Ho.

Plants perennial, with subappressed white hairs 0.5–0.8 mm. Stems several, prostrate, up to 40 cm, very scarcely hairy to glabrescent. Leaves 2–5 cm, nearly sessile; stipules free, ca. 4 mm, sparsely hairy; rachis sparsely hairy; leaflets in 4–7 pairs, elliptic to obovate, rounded to distinctly emarginate, 3–9 × 2–5 mm, adaxially glabrous and abaxially sparsely hairy or both surfaces to loosely hairy. Racemes at first densely, later rather loosely, 4–9-flowered; peduncle 3–5 cm, very sparsely to rather loosely hairy; bracts ca. 1 mm, ciliate, soon falling. Calyx 3.5–5 mm, sparsely hairy to nearly glabrous; teeth unequal, 1.5–3 mm. Petals white, yellowish, or pink; standard widely elliptic, 8–10(–13) × 5–6 mm, apex deeply emarginate; wings 6–9(–10.5) mm; keel 8–10(–13) mm. Stigma with minute hairs. Legumes with a stipe 2–7 mm, erect, narrowly linear, straight to slightly curved, 15–25 mm, ca. 4 mm high and wide, with a beak 1–2 mm, 2-locular; valves blackish, glabrous to loosely appressed hairy when young.

- 400–3300 m. Gansu, Sichuan.

203. *Astragalus tungensis* N. D. Simpson, *Notes Roy. Bot. Gard. Edinburgh* 8: 246. 1915.

洞川黄耆 *dong chuan huang qi*

Plants ca. 30 cm tall, white hairy. Stem sparsely covered with subappressed hairs 0.1–0.3 mm, in axils of middle leaves with lateral branches up to 5 cm. Leaves of main stem 4–5 cm,

subsessile; stipules of main stem free, sparsely hairy, those of lateral branches shorter, high connate behind stem; rachis loosely to rather densely hairy; leaflets in 9–12 pairs, narrowly elliptic, 6–8 × 2–3 mm, abaxially loosely and adaxially scarcely covered with rigid subappressed hairs 0.4–0.5 mm, apex deeply emarginate. Racemes loosely 8–12-flowered; peduncle 3–6 cm, hairy like stem; bracts 2–3 mm, white hairy. Calyx 4–5 mm, loosely to rather densely hairy; teeth 1.5–2 mm. Standard ca. 13 × 6 mm, apex widely incised; wings ca. 10.5 mm; keel ca. 13 mm. Legumes (unripe) with a stipe ca. 4 mm, narrowly linear, glabrous.

- About 2000 m. Sichuan.

204. *Astragalus wolungensis* P. C. Li, Acta Bot. Yunnan. 11: 295. 1989.

卧龙黄耆 wo long huang qi

Plants up to 25 cm tall, with appressed white hairs 0.05–0.7 mm. Stems several, prostrate to ascending, sparsely covered with hairs up to 0.1 mm to glabrous. Leaves 2.5–5 cm, subsessile; stipules 3–4 mm, free, sparsely ciliate; rachis hairy like stem; leaflets in 7 or 8 pairs, narrowly elliptic, 4–9 × 1.5–3 mm, both surfaces densely spotted with dark purplish minute dots, abaxially loosely and adaxially sparsely covered with hairs 0.5–0.7 mm, or adaxially glabrous, apex acute. Racemes loosely 3- or 4-flowered; peduncle 2–3.5 cm, sparsely hairy like stem; bracts ca. 1 mm, hairy. Calyx 3–4 mm, very sparsely covered with very short hairs; teeth 0.5–1 mm. Petals yellowish; standard obovate, ca. 8.5 × 4.5 mm, apex emarginate; wings ca. 8.5 mm; keel ca. 8.5 mm. Legumes (immature) with a stipe ca. 5 mm, ca. 10 mm; valves thin, brown, glabrous.

- Sichuan.

205. *Astragalus wushanicus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 248. 1915.

巫山黄耆 wu shan huang qi

Plants perennial, covered with spreading white hairs 0.3–0.8 mm. Stems up to 30 cm, prostrate to ascending, branched, loosely hairy. Leaves 7–14 cm, those of lateral branches distinctly shorter; stipules 3–5 mm, nearly free from petiole, mostly distinctly connate behind stem, sparsely hairy or glabrous; petiole 0.5–4.5 cm, like rachis loosely to rather densely hairy; leaflets in 5–8 pairs, elliptic to obovate, 6–12 × 3–6 mm, abaxially and at margins sparsely to loosely hairy, adaxially glabrous, apex retuse to emarginate. Racemes loosely 3–5-flowered; peduncle 1–3 cm, rather densely hairy; bracts ca. 1 mm, hairy. Calyx 3–3.5 mm, loosely hairy; teeth ca. 1 mm. Petals pink; stan-

dard obovate, 9–11.5 × ca. 5 mm, apex emarginate; wings 8–10 mm; keel 8–10 mm. Legumes with a stipe ca. 3 mm, erect, 10–15 mm, 2–3 mm high and 3–4 mm wide, with a beak ca. 1 mm, 1-locular; valves loosely covered with subappressed to slightly ascending white hairs 0.2–0.3 mm.

- Sichuan.

206. *Astragalus yangtzeanus* N. D. Simpson, Notes Roy. Bot. Gard. Edinburgh 8: 249. 1915.

扬子黄耆 yang zi huang qi

Plants perennial, covered with subappressed to slightly ascending white hairs 0.3–0.6 mm. Stems up to 20 cm, prostrate to ascending, branched in lower parts, sparsely hairy to subglabrous. Leaves 3–5 cm, subsessile, those of lateral branches distinctly shorter; stipules 3–5 mm, mostly reflexed, adnate to petiole for up to 1 mm, mostly distinctly connate behind stem, ciliate, otherwise sparsely hairy or glabrous; rachis sparsely hairy; leaflets in 8 or 9 pairs, narrowly elliptic, 4–8 × 1.5–3 mm, both surfaces very densely spotted with minute, dark purplish dots, abaxially somewhat densely hairy, adaxially sparsely hairy, apex obtuse. Racemes loosely 2–8-flowered; peduncle 2–3 cm, loosely hairy; bracts ca. 1 mm, hairy. Calyx 5–6 mm, loosely hairy; teeth very unequal, shorter ones ca. 1 mm, longer ones 2–2.2 mm. Petals white; standard obovate, 11–12 × ca. 5 mm, apex deeply incised; wings 10–10.5 mm; keel ca. 10 mm. Legumes (very immature) with a stipe ca. 3 mm, densely white hairy.

- 100–300 m. Sichuan.

207. *Astragalus zhouquinus* K. T. Fu, Acta Bot. Boreal.-Occid. Sin. 11: 342. 1991.

舟曲黄耆 zhou qu huang qi

Plants perennial, caespitose. Stems several, prostrate to ascending, 10–18 cm, covered with short, spreading, white hairs. Leaves 1.5–3 cm, subsessile; stipules ca. 2 mm, free, white hairy; rachis covered with appressed white hairs; leaflets in 5–9 pairs, elliptic, 2–3 × 1.5–2.5 mm, abaxially somewhat densely hairy, adaxially sparsely hairy, apex rounded to slightly emarginate. Racemes subumbellate, 4–8-flowered; peduncle ca. 1.5 cm, sparsely appressed hairy, after anthesis elongating; bracts ca. 1 mm, hairy. Calyx ca. 3 mm, sparsely appressed white hairy; teeth ca. 1.2 mm. Petals purple; standard widely obovate, up to 7 × 5 mm, apex emarginate; wings ca. 6.5 mm; keel ca. 7 mm. Legumes with a stipe ca. 2 mm, 11–12 mm, ca. 2 mm high; valves covered with appressed white hairs.

- Gansu.

29. *Astragalus* sect. *Lithoon* (Nevski) Gontscharow in Komarov, Fl. URSS 12: 98. 1946.

棉果组 mian guo zu

Lithoon Nevski, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 4: 255. 1937.

Plants perennial, herbaceous, with long, hollow, stout stems; hairs basifixed, white or yellowish. Stipules green, free from petiole, connate behind stem. Flowers large, in sessile, few-flowered racemes. Calyx tubular to slightly ventricose. Petals glabrous, yellow, second pair of filaments at base of free part spreading ciliate. Legumes sessile, ovoid-globose, 2-locular; walls very thick, hard leathery, consisting of 2 different layers of parenchyma and a very thin inner fiber-layer, with a narrow hollow, few seeded.

One species: Afghanistan, China, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran).

208. *Astragalus sieversianus* Pallas, Sp. Astragal. 15. 1800.

棉果黄耆 mian guo huang qi

Lithoon sieversianum (Pallas) Nevski.

Plants strong, 60–150 cm tall. Stem up to 20 mm thick, very densely covered with ± spreading hairs up to 4 mm. Leaves 15–25 cm; stipules up to 35 mm, nearly amplexicaul at base, ciliate; petiole 1–3 cm, like rachis densely spreading hairy; leaflets in 8–12 pairs, narrowly ovate to elliptic, 35–50 × 14–23 mm, abaxially densely covered with ± appressed hairs

0.5–2.5 mm, adaxially glabrous, apex rounded. Racemes 3–9-flowered; bracts 10–18 mm, densely ciliate. Calyx 20–22 mm, densely ± spreading hairy; teeth 8–10 mm. Standard widely ovate, 34–39 × 17–21 mm, apex deeply emarginate; wings 28–34 mm; keel 27–31 mm. Legumes 15–20 mm, ca. 15 mm in diam., rounded ventrally and dorsally, with a beak ca. 3 mm, nearly completely hidden in dense indumentum of tangled, mostly spreading hairs up to 5 mm.

700–2500 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

30. *Astragalus* sect. *Alopecias* (Steven) Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 58. 1868.

苦豆子组 ku dou zi zu

Alopecias Steven, Bull. Soc. Imp. Naturalistes Moscou 29(2): 143. 1856.

Plants perennial, herbaceous, with well-developed stem and white, rarely reddish, basifixed hairs. Stipules greenish, shortly adnate to petiole. Racemes with a short stout peduncle, densely many flowered, globose to cylindrical; bracts filiform to linear. Bracteoles absent (in Chinese species). Flowers subsessile or with short pedicel. Calyx campanulate to tubular, mostly slightly to rarely distinctly inflated ellipsoid, with subulate teeth. Petals glabrous or more rarely hairy; wing limbs obtuse at apex. Legumes mostly included into calyx, sessile, mostly short, 2-locular.

Forty-nine species: Afghanistan, China, Mongolia, Russia (Siberia); C and SW Asia, Europe; four species (one endemic) in China.

- 1a. Standard hairy 211. *A. burqinensis*
 1b. All petals glabrous.
 2a. Racemes cylindrical, 9–13 cm; bracts 6–9 mm; calyx 20–25 mm 209. *A. alopecias*
 2b. Racemes ovoid, up to 6 cm, if sometimes up to 9.5 cm, then calyx 12–19 mm; bracts 10–20 mm.
 3a. Leaflets in 17–27 pairs, ovate to elliptic, mostly 20–30 × 10–15 mm; calyx 12–19 mm, with teeth 5–7 mm 210. *A. alopecurus*
 3b. Leaflets in 12–17 pairs, widely ovate to widely elliptic, 8–25 × 5–20 mm; calyx 15–23 mm, with teeth 8–11 mm 212. *A. vulpinus*

209. *Astragalus alopecias* Pallas, Sp. Astragal. 12. 1800.

长果黄耆 chang guo huang qi

Plants 40–90 cm tall. Stem up to 7 mm thick, very densely covered with soft spreading hairs. Leaves 10–23 cm; stipules 6–12 mm, hairy; petiole 2–3 cm, like rachis rather densely spreading hairy; leaflets in 20–25 pairs, ovate to elliptic, 10–16 × 7–10 mm, abaxially densely subappressed hairy, adaxially glabrous or sparsely hairy, apex rounded to subacute. Racemes subsessile, cylindrical, 9–13 cm; bracts 6–9 mm, hairy. Flowers subsessile. Calyx tubular-campanulate, 20–25 mm, spreading hairy; teeth 9–12 mm. Petals yellow, glabrous; standard ovate, 15–21 × ca. 8 mm, apex obtuse; wings 14–20 mm; keel 13–19 mm. Legumes ovoid, 6–7 mm, 3–4 mm high, densely hairy.

NW Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

210. *Astragalus alopecurus* Pallas, Sp. Astragal. 11. 1800.

狐尾黄耆 hu wei huang qi

Astragalus maximus Willdenow.

Plants 50–90 cm tall. Stem up to 10 mm thick, with ascending hairs. Leaves 20–30 cm; stipules 10–18 mm, hairy; petiole 1–3 cm, like rachis rather densely covered with ascending hairs; leaflets in 17–27 pairs, ovate to elliptic, mostly 20–30 × 10–15 mm, abaxially sparsely hairy, adaxially gla-

brous, apex obtuse. Racemes subsessile or with a peduncle up to 1 cm, ovoid to cylindrical, 5–9.5 cm; bracts 10–20 mm, hairy. Calyx 12–19 mm, slightly inflated, spreading hairy; teeth 5–7 mm. Petals yellow, glabrous; standard elliptic, ca. 20 × 5–7 mm, rounded at apex; wings 18–20 mm; keel ca. 18 mm. Legumes ovoid, ca. 7 mm, ca. 4 mm high, densely hairy.

NW Xinjiang [Kazakhstan, Russia (Siberia); SW Asia (Caucasus, Turkey), Europe].

211. *Astragalus burqinensis* Podlech & L. R. Xu, Novon 14: 216. 2004.

布尔津黄耆 bu er jin huang qi

Plants at least 30–40 cm tall. Stem erect, glabrous or just below stipules and at base of stipules sparsely hairy. Leaves 20–30 cm, glabrous; stipules ca. 15 mm, narrowly triangular, shortly adnate to petiole; petiole 2.5–7 cm; leaflets in 13–15 pairs, widely ovate, 12–30 × 10–22 mm, apex rounded to slightly emarginate. Racemes (in fruit) cylindrical, 7–9 cm; peduncle very short, up to 1 cm, densely covered with spreading hairs 1–2 mm; bracts 12–18 mm, ciliate with spreading hairs 1.5–2.5 mm. Calyx 12–19 mm, densely covered with ascending to spreading hairs 2–5 mm; teeth 5–7 mm. Petals yellow; standard elliptic, 27–28 × ca. 9 mm, hairy, apex emarginate; wings unknown; keel ca. 27 mm. Legumes oblong, 12–14 mm, 7–9 mm high and 4–7 mm wide, with a beak ca. 2 mm; valves netlike wrinkled, loosely covered with subappressed soft hairs up to 3 mm.

- About 600 m. Xinjiang (Burqin).

212. *Astragalus vulpinus* Willdenow, Sp. Pl. 3: 1259. 1802.

序尾黄耆 xu wei huang qi

Astragalus lagocephalus Fischer & C. A. Meyer.

Plants 30–40 cm tall. Stem 4–6 mm thick, glabrous or sparsely spreading hairy. Leaves 10–25 cm; stipules 10–20 mm, ciliate; petiole 2–3 cm, like rachis loosely ± spreading hairy; leaflets in 12–17 pairs, widely ovate to elliptic, 8–25 × 5–20

mm, abaxially sparsely or rarely to densely appressed hairy, adaxially glabrous, apex rounded to retuse. Racemes subsessile or with a peduncle up to 2 cm, ovoid, 4–6 × 3–5 cm; bracts 10–20 mm, hairy. Calyx 15–23 mm, slightly inflated, spreading hairy; teeth 8–11 mm. Petals yellow, glabrous; standard elliptic, 20–28 × 9–11 mm, apex emarginate; wings 18–26 mm; keel 17–25 mm. Legumes ovoid, ca. 10 mm, ca. 6 mm high; valves slightly wrinkled, sparsely hairy.

W Xinjiang [Kazakhstan, Russia (Siberia); Europe].

31. *Astragalus* sect. *Myobroma* (Steven) Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 33. 1868.

短缩茎组 duan suo jing zu

Myobroma Steven, Bull. Soc. Imp. Naturalistes Moscou 29(2): 150. 1856.

Plants perennial, acaulescent or with distinct stems, sometimes subshrubby, with basifixed hairs. Leaves imparipinnate, sometimes with hardened rachises; stipules mostly adnate to petiole. Racemes sessile or with a well-developed peduncle, 1- to many flowered. Calyx mostly tubular, more rarely campanulate. Petals mostly yellow, often fading red or from beginning red or purplish, of very different shapes and sizes, glabrous or hairy. Style sometimes with hairy stigma or hairy below stigma (but not in Chinese species). Legumes very variable, 1-locular to 2-locular.

About 275 species: from Europe and N Africa to Siberia, China, and India; 18 species (three endemic) in China.

31a. *Astragalus* “Caprini group”

短缩茎群 duan suo jing qun

Plants acaulescent to caulescent. Leaflets always in pairs, in upper part glabrous or hairy but never cottonlike. Calyx tubular or campanulate. Petals glabrous or rarely hairy; wings and especially keel mostly distinctly shorter than standard, wing limbs rounded at apex, auricles of wings mostly short, rarely up to 3 mm; limbs of keel straight or ± triangular, never with minute teeth at upper edge. Legumes of very different sizes.

About 195 species: from Europe and N Africa to Siberia, China, and India; 14 species (three endemic) in China.

1a. Standard and wings hairy.

2a. Leaflets on both surfaces densely covered with appressed hairs; calyx 13–21 mm; standard 23–28 mm 219. *A. nicolaii*

2b. Leaflets glabrous adaxially; calyx 9–15 mm; standard 14–19 mm.

3a. Stipules green; leaves 7–10 cm, sessile or with very short petiole; legumes with a stipe 1–3 mm 220. *A. orbiculatus*

3b. Stipules whitish membranous; leaves 15–30 cm; petiole 4–7 cm; legumes sessile 217. *A. lasiopetalus*

1b. All petals glabrous.

4a. Plants completely glabrous.

5a. Plants acaulescent; leaflets in 7 or 8 pairs, suborbicular; peduncle 15–18 cm; racemes as long as peduncle, remotely up to 20-flowered 216. *A. fukangensis*

5b. Plants caulescent, rarely acaulescent; leaflets in 10–15 pairs, ovate; peduncle much shorter; racemes 5–9-flowered.

6a. Plants glabrous or sometimes in part to loosely hairy, acaulescent or with a stem sometimes up to 7 cm; stipules 10–20 mm, narrowly ovate, not distinctly nerved; peduncle 0.5–2 cm 223. *A. psilosepalus*

6b. Plants always completely glabrous, with a stem up to 20 cm; stipules 20–30 mm, narrowly triangular, very long acuminate, distinctly longitudinally nerved; peduncle 8–9 cm 218. *A. luculentus*

4b. Plants at least in part hairy.

7a. Stipules distinctly longitudinally nerved; inflorescence often with some black hairs; petiole and rachis often at least partly hardening toward end of vegetation period and persistent.

8a. Plants densely or sparsely covered with hairs 1–2(–2.5) mm; leaflets mostly hairy on both surfaces 224. *A. rhizanthus*

8b. Plants sparsely covered with hairs 0.3–0.7(–1) mm; leaflets glabrous adaxially.

9a. Standard 19–23 mm; auricles of wing limbs ca. 1 mm; ovary and legumes subsessile, hairy 221. *A. pindrensis*

9b. Standard 24–27 mm; auricles of wing limbs 2–2.5 mm; ovary and legumes with a stipe 2–4 mm, glabrous 226. *A. webbiana*

7b. Stipules without distinct longitudinal nerves; plants never with black hairs.

10a. Leaflets adaxially glabrous or hairy; keel limbs slightly obliquely elliptic, stretched straight forward 225. *A. schanginianus*

- 10b. Leaflets adaxially glabrous.
- 11a. Keel limbs large, at least as long as wing limbs, only connate in proximal 1/3.
- 12a. Keel always longer than wings, limbs much larger (longer and wider) than wing limbs; petiole and rachis slender 215. *A. flexus*
- 12b. Keel ca. as long as wings, limbs as long as wing limbs; petiole and rachis stout, at base 2–3 mm thick; leaflets with whitish cartilaginous margins, with long hairs sitting on small tubercles 213. *A. austrodshungaricus*
- 11b. Keel limbs always shorter than wing limbs, connate nearly to top.
- 13a. Stipules 10–20 mm, free from petiole; leaves 12–35 cm; leaflets 8–30 × 5–22 mm, glabrous or abaxially sparsely hairy; calyx glabrous or with a few hairs at teeth only 223. *A. psilosepalus*
- 13b. Stipules distinctly shorter, if upper ones up to 15 mm, then adnate to petiole for 3–5 mm; leaves up to 16 cm; leaflets up to 10(–14) × ca. 6 mm, abaxially sparsely to rather densely hairy; calyx at least in upper part distinctly hairy.
- 14a. Stipules adnate to petiole for 3–5 mm; leaflets densely crowded to touching; calyx 13–15(–17) mm, teeth 5–6 mm; legumes sessile, with a beak 3–5 mm, covered with hairs up to 3 mm 214. *A. charguschanus*
- 14b. Stipules adnate to petiole up to 1 mm; leaflets not densely crowded; calyx 11–12 mm, teeth 2.5–4 mm; legumes with a stipe ca. 3 mm, with a beak ca. 2 mm, covered with hairs 1–2 mm 222. *A. przhewalskianus*

213. *Astragalus austrodshungaricus* Goloskokov, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Kazakhsk. S.S.R. 2: 15. 1964.

南准噶尔黄耆 nan zhun ga er huang qi

Plants 20–30 cm tall, acaulescent or subacaulescent, with thin, long, white hairs. Stem, if present, up to 3 cm, glabrous. Leaves 15–20(–25) cm; stipules 15–20 mm, adnate to petiole for 3–5 mm, ciliate; petiole 4–8 cm, like rachis sparsely to rather densely covered with spreading hairs 1.5–3 mm; leaflets in (6–)8–10 pairs, remote, widely elliptic to nearly orbicular, 12–25(–27) × 8–20(–22) mm, abaxially sparsely to loosely nearly spreading hairy, at margins mostly narrowly whitish cartilaginous, often minutely denticulate by base of hairs, adaxially glabrous, apex rounded to slightly emarginate. Racemes 2–10 cm, loosely 4–6(–8)-flowered; peduncle 6–12 cm, spreading hairy; bracts 8–12 mm, hairy. Calyx 15–18 mm, sparsely and in upper part more densely covered with long spreading hairs; teeth 3–4(–5) mm. Petals yellow; standard oblong to obovate, 30–34 × 10–12 mm, apex emarginate; wings 26–32 mm, auricle 1.5–2 mm; keel 26–32 mm. Legumes with a stipe 7–12(–15) mm, 25–45 mm, 12–15 mm high and 15–20 mm wide, widely rounded ventrally, widely flattened dorsally, with a beak 2–3 mm, incompletely 2-locular; valves thinly leathery, glabrous or sparsely covered with long spreading hairs.

Xinjiang [Kazakhstan].

214. *Astragalus charguschanus* Freyn, Bull. Herb. Boissier, sér. 2, 4: 764. 1905.

卡尔古斯黄耆 ka er gu si huang qi

Astragalus pamiricus (B. Fedtschenko) B. Fedtschenko; *A. staintonianus* Ali; *A. tianschanicus* Bunge var. *pamiricus* B. Fedtschenko.

Plants 5–15 cm tall, acaulescent, caespitose, with white hairs 1–2(–2.5) mm. Leaves 5–9(–10) cm; stipules adnate to petiole for 3–5 mm, lower ones 8–10 mm, glabrous, upper ones up to 15 mm, ciliate; petiole 2.5–5 cm, in basal part glabrous or sparsely spreading hairy, in upper part ± densely spreading

hairy like rachis; leaflets in 12–21 pairs, densely crowded to touching at margins, ovate, 4–6(–9) × 2–4(–6) mm, abaxially loosely to rather densely ± spreading hairy, adaxially glabrous, margins long rigidly comblike ciliate. Racemes crowded, with a glabrous peduncle 0.3–0.5(–0.7) cm, 3–5-flowered; bracts 4–7(–10) mm, ciliate. Calyx (11–)13–15(–17) mm, in basal part glabrous or scarcely hairy, toward teeth more densely spreading hairy; teeth 5–6 mm. Petals glabrous, creamy yellow; standard obovate, (18–)19–22 × 8–10 mm, apex emarginate; wings (17–)18–21 mm, auricle ca. 1 mm; keel 15–17 mm. Legumes sessile, (10–)14–18 mm, 4–5 mm high and wide, with a beak 3–5 mm, incompletely 2-locular; valves thin but tough, covered with spreading hairs up to 3 mm.

Xinjiang [Afghanistan, Pakistan, Tajikistan].

215. *Astragalus flexus* Fischer, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 307. 1844.

弯花黄耆 wan hua huang qi

Astragalus pentapetaloides Bunge.

Plants 18–30 cm tall, acaulescent, sparsely covered with white hairs 0.5–1.5 mm, at rachis up to 2 mm. Leaves 12–30 cm; stipules 8–17(–20) mm, adnate to petiole for 2–4 mm, glabrous or hairy at margin and apex; petiole 4–7 cm, like rachis glabrous or sparsely spreading hairy; leaflets in 7–13 pairs, remote, widely obovate to suborbicular, 8–18 × 7–17 mm, abaxially sparsely to densely appressed hairy or subglabrous, adaxially glabrous, apex rounded to slightly retuse. Racemes loosely (10–)15–25-flowered; peduncle 5–12 cm, glabrous or sparsely spreading hairy; bracts 5–9 mm, sparsely ciliate. Calyx curved, 13–17(–20) mm, glabrous or in upper part and at teeth sparsely and shortly hairy; teeth 1.5–3 mm. Petals yellow; standard elliptic to obovate, (25–)30–35 × 9–11 mm, apex emarginate; wings 20–26 mm; keel longer than wings, (21–)24–29 mm, limbs ± straight or slightly curved. Legumes with a stipe 6–8 mm, ovoid, 16–25 mm, 8–9 mm high and 10–12 mm wide, widely rounded ventrally and dorsally, with a straight beak 2–3 mm, incompletely 2-locular; valves glabrous or sparsely hairy.

Sandy steppes. Xinjiang [Kazakhstan, Turkmenistan, Uzbekistan; SW Asia (Iran), Europe].

216. *Astragalus fukangensis* Podlech & L. R. Xu, Novon 17: 230. 2007.

阜康黄耆 fu kang huang qi

Plants ca. 40 cm tall, acaulescent, completely glabrous. Leaves ca. 35 cm; stipules ca. 10 mm, adnate to petiole for ca. 2 mm; petiole 8–10 cm, like rachis 1.5–2.5 mm thick, rigid, slightly hardened; leaflets in 7 or 8 pairs, remote, widely elliptic to suborbicular, 15–25 × 12–22 mm, apex rounded to retuse. Racemes as long as peduncle, remotely up to 20-flowered; peduncle 15–18 cm, up to 2.5 mm thick; bracts 8–10 mm. Flowers unknown. Legumes with a stipe 3–4 mm, ellipsoid, 17–18 mm, 9–12 mm high and 9–10 mm wide, slightly keeled ventrally, widely rounded dorsally, with a triangular beak ca. 2 mm, incompletely 2-locular; valves thinly leathery, straw-colored.

• Xinjiang (Fukang).

217. *Astragalus lasiopetalus* Bunge, Delect. Sem. Horti Bot. Dorpat. 1839: 7. 1839.

毛瓣黄耆 mao ban huang qi

Astragalus lasianthus C. A. Meyer; *A. ulacholensis* B. Fedtschenko.

Plants 20–40 cm tall, subacaulescent to caulescent, ± densely covered with soft white hairs 0.5–3 mm. Stems (1–)3–15 cm, densely spreading hairy. Leaves 15–30 cm; stipules 10–15 mm, adnate to petiole for ca. 1 mm, loosely hairy, toward margins densely hairy; petiole 4–7 cm, like rachis densely covered with spreading hairs 2–3 mm; leaflets in 9–12(–15) pairs, ovate to elliptic, 10–25(–32) × 7–16(–20) mm, abaxially sparsely covered with ascending hairs, adaxially glabrous or nearly so, apex rounded and mostly with a minute cusp. Racemes densely (2–)6–10-flowered; peduncle 0.5–4 cm, spreading hairy; bracts 8–14(–20) mm, hairy. Calyx campanulate, 12–15(–18) mm, villous; teeth 9–10 mm. Petals yellow, standard and wings hairy; standard oblong-pandurate, 14–18 mm, distinctly constricted in middle, apex slightly emarginate; wings 11–16 mm; keel 9–11 mm, limbs ± straight. Legumes sessile, 12–18 mm, 6–8 mm high and 3–4 mm wide, with a beak 1–2 mm, mostly completely 2-locular; valves thin, long villous.

Riversides, meadows, dry slopes, often in saline soils; 1800–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Uzbekistan].

218. *Astragalus luculentus* Podlech & L. R. Xu, Novon 17: 230. 2007.

光滑黄耆 guang hua huang qi

Plants ca. 35 cm tall, completely glabrous. Stems stout, 3–4 mm in diam., ca. 20 cm. Leaves 25–30 cm; stipules 20–30 mm (much smaller in branches sprouting after grazing), narrowly triangular, very long acuminate, distinctly longitudinally nerved, free from petiole; petiole 8–11 cm; leaflets in 11–15 pairs, ovate, 20–35 × 8–18 mm (much smaller in branches sprouting after grazing), apex subacute to rounded, often minutely mucronulate. Racemes distributed along whole stem, with a peduncle 8–9 cm, loosely 5–9-flowered; bracts 10–15

mm. Calyx 12–13 mm; teeth unequal, 2–4 mm. Petals yellow; standard ca. 25 mm; keel ca. 15 mm; other petal data missing. Legumes subsessile, oblong, straight, 18–25 mm, 5–8 mm high and ca. 9 mm wide, rounded with prominent, thickened nerve ventrally, deeply and widely grooved dorsally, with a narrowly triangular beak 1–2 mm, incompletely 2-locular; valves leathery.

• Xinjiang.

219. *Astragalus nicolaii* Borissova in Komarov, Fl. URSS 12: 119. 1946 [*“nicolai”*].

木垒黄耆 mu lei huang qi

Astragalus songoricus Gontscharow, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 152. 1938, not *A. songoricus* Pallas (1800), nor *A. songaricus* K. Koch (1853).

Plants 15–28(–40) cm tall, acaulescent, white hairy. Leaves 15–36 cm; stipules whitish, distinctly longitudinally nerved, (6–)10–20 mm, adnate to petiole for 3–5 mm, lower ones ciliate, upper ones densely hairy; petiole 4–10 cm, like rachis densely covered with spreading very unequal hairs 0.5–2.5 mm; leaflets in 15–29 pairs, ± elliptic, 8–24 × 5–12 mm, both surfaces densely appressed hairy, apex obtuse to subacute. Racemes loosely 2–7-flowered; peduncle 1–7 cm, spreading hairy; bracts 8–20 mm, hairy. Calyx 13–21 mm, ± densely long spreading hairy; teeth unequal, 4–9 mm. Petals yellow, hairy; standard elliptic to obovate, 23–28 mm, apex emarginate; wings 19–23 mm; keel 15–18 mm. Legumes sessile, 15–17 mm, 6–10 mm high and 5–7 mm wide, with a curved beak ca. 2 mm, 2-locular; valves leathery, loosely spreading hairy.

Stony slopes. Xinjiang [Kazakhstan].

220. *Astragalus orbiculatus* Ledebour, Fl. Altaic. 3: 311. 1831.

圆形黄耆 yuan xing huang qi

Plants 20–60 cm tall, white hairy. Stems solitary or several, densely covered with spreading short hairs, with longer hairs up to 2.5 mm. Leaves 7–10 cm, sessile or with very short petiole; stipules green, 6–15 mm, very shortly adnate to petiole, densely spreading hairy; rachis loosely to densely covered with long spreading hairs; leaflets in 9–14 pairs, elliptic, 6–15 × 4–9 mm, abaxially densely and adaxially sparsely to densely covered with subappressed hairs, more rarely both surfaces sparsely hairy or adaxially glabrous, apex rounded or more rarely slightly emarginate. Racemes 2–3 cm, loosely 3–7-flowered; peduncles several, along nearly entire length of stem, 2–4 cm, spreading hairy; bracts 8–12 mm, hairy. Calyx 9–14 mm, with long spreading hairs; teeth 4–7 mm. Petals yellowish white, standard and wings hairy; standard narrowly oblong-pandurate, 14–19 × 3–5 mm, in or below middle slightly constricted, apex emarginate; wings 13–16 mm; keel 8–11 mm. Legumes with a stipe 1–3 mm, 14–17 mm, 5–7 mm high and 5–6 mm wide, with a very short beak, 2-locular; valves thin, hairy.

Fallow lands, wastelands, pastures; 400–2900 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

221. *Astragalus pindrensis* (Bentham ex Baker) Ali, Kew Bull. 13: 312. 1958.

明铁盖黄耆 ming tie gai huang qi

Astragalus candolleanus Royle ex Benth. var. *pindreensis* Benth. ex Baker, Fl. Brit. India 2: 133. 1876; *A. rhizanthus* Royle ex Benth. var. *pindreensis* (Benth. ex Baker) Podlech.

Plants acaulescent or subacaulescent; hairs white, in inflorescence also black, 0.5–1(–1.2) mm. Leaves 5–16 cm; stipules with longitudinal nerves, 6–10 mm, adnate to petiole for 2–4 mm, ciliate at margins or sometimes sparsely hairy; petiole 1.5–6 cm, like rachis sparsely to loosely subappressed to sometimes nearly spreading hairy, mostly hardening and persistent, sometimes somewhat pungent with age; leaflets in 7–15 pairs, narrowly elliptic, 4–12 × 1–4 mm, abaxially sparsely hairy, adaxially glabrous or more rarely sparsely hairy. Racemes subsessile, 1–4-flowered; bracts 5–8 mm. Calyx 12–15 mm, shortly appressed black or black and white or rarely only white hairy; teeth 3–5 mm. Petals yellow; standard narrowly obovate to obovate, 19–23 × 6–8 mm, apex emarginate; wings 17–22 mm; keel 15–18 mm. Legumes subsessile, 10–19 mm, 4–7 mm high and wide, with a straight to slightly curved beak up to 4 mm, incompletely to nearly fully 2-locular; valves subappressed hairy.

Subalpine to alpine meadows and stony slopes; 2600–4300 m. Xinjiang (Kunlun Shan), Xizang [Afghanistan, India, Kashmir, Pakistan].

222. *Astragalus przhewalskianus* Podlech & N. Ulziykhutag, Mitt. Bot. Staatssamml. München 25: 366. 1988.

波氏黄耆 *bo shi huang qi*

Plants 4–20 cm tall, acaulescent, with white or reddish when mature hairs up to 3 mm. Leaves 3–20 cm; stipules 5–7 mm, shortly adnate to petiole, glabrous, or upper ones ciliate; petiole 1–5 cm, like rachis sparsely to loosely spreading hairy; leaflets in 10–18 pairs, narrowly ovate to elliptic, 2–10 × 1–3.5 mm, mostly folded, abaxially sparsely to rather densely covered with ascending hairs, adaxially glabrous. Racemes subsessile, 1- or 2-flowered; bracts 6–8 mm, ciliate. Calyx 11–12 mm, basal part nearly glabrous, upper part sparsely to loosely spreading hairy; teeth 2.5–4 mm. Petals yellow, fading purplish; standard obovate, ca. 20 × 7 mm, apex emarginate; wings ca. 19 mm; keel ca. 17 mm. Legumes with a stipe ca. 3 mm, 8–12 mm, 5–7 mm high and 5–6 mm wide, with a beak ca. 2 mm, incompletely 2-locular; valves thin but tough, loosely covered with very thin ± spreading hairs 1–2 mm.

W Xinjiang [Kazakhstan].

223. *Astragalus psilosepalus* Podlech & L. R. Xu, Novon 17: 231. 2007.

光萼黄耆 *guang e huang qi*

Plants 20–35 cm tall, acaulescent or shortly caulescent, glabrous except for ovary or sparsely white hairy. Stem, if present, up to 7 cm. Leaves 12–35 cm; stipules 10–20 mm, free from petiole, glabrous; petiole 4–8 cm, at base up to 2 mm thick, like rachis glabrous or loosely covered with spreading hairs 1–2 mm; leaflets in 10–15 pairs, ovate, 8–30 × 5–22 mm, glabrous or at margins and abaxially at midvein sparsely covered with spreading hairs ca. 1 mm, apex rounded to very shortly acuminate. Racemes very loosely 5–7-flowered; peduncle 0.5–2 cm; bracts 5–12 mm, glabrous or loosely hairy. Calyx 11–13 mm, glabrous or with a few spreading hairs at teeth; teeth unequal,

3–5 mm. Petals yellow or greenish yellow; standard oblong to elliptic, 24–25 × 8–9 mm, apex emarginate; wings 20–22 mm; keel 17–18 mm. Ovary with a stipe 1–1.5 mm, hairy. Legumes ellipsoid, ca. 20 mm, ca. 10 mm high.

• Xinjiang.

The Chinese record of *Astragalus sewertzowii* Bunge from Xinjiang (FRPS 42(1): 210. 1993) is possibly based on a misidentification of *A. psilosepalus*. *Astragalus sewertzowii* is not known to occur in China.

224. *Astragalus rhizanthus* Royle ex Benth. in Royle, Ill. Bot. Himal. Mts. 200. 1835.

畸形黄耆 *ji xing huang qi*

Plants herbaceous or subshrubby, acaulescent to distinctly caulescent, white hairy, inflorescence sometimes also with black hairs. Stems, if present, up to 25 cm, spreading hairy. Leaves 5–12(–17) cm; stipules distinctly longitudinally nerved, adnate to petiole for 3–5 mm, lower ones 5–7 mm, glabrous or ciliate, upper ones 10–15 mm, mostly densely long hairy; petiole 1–3 cm, like rachis loosely to rather densely covered with ascending hairs 1–2(–2.5) mm, sometimes toward end of vegetation period hardening and persistent to next year; leaflets in 6–20(–28) pairs, elliptic to widely elliptic, 4–8(–14) × 2–5(–6) mm, mostly on both surfaces densely subappressed hairy, more rarely adaxially sparsely hairy to glabrous, very rarely hairy only at midvein abaxially, apex subacute to slightly retuse. Racemes subsessile (mostly in acaulescent plants) or with a hairy to subglabrous peduncle 0.5–5 cm, loosely 3–5-flowered; bracts 8–10 mm, hairy. Calyx 12–14(–16) mm, loosely to densely spreading white or white and black hairy; teeth 5–8 mm. Petals yellow; standard obovate, 18–23 × 8–12 mm, apex emarginate; wings 17–21 mm; keel 14–15 mm. Legumes subsessile, oblong, 10–17(–20) mm, 4–7 mm high and wide, with a straight or curved beak 3–10 mm, 2-locular; valves leathery, loosely to densely covered with spreading hairs.

Subalpine to alpine meadows and stony slopes; 1800–5000 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Nepal, Pakistan].

- 1a. Leaflets in (12–)15–20(–28) pairs, mostly densely hairy; inflorescence mostly only white hairy; legumes with a beak 3–5 mm 224a. subsp. *rhizanthus*
- 1b. Leaflets in 6–13 pairs, sparsely hairy to glabrous; inflorescence predominantly black hairy; legumes with a beak up to 10 mm 224b. subsp. *candolleanus*

224a. *Astragalus rhizanthus* subsp. *rhizanthus*

畸形黄耆(原亚种) *ji xing huang qi* (*yuan ya zhong*)

Astragalus anomalus Bunge; *A. badrinathensis* M. P. Sharma; *A. malacophyllus* Bunge.

Plants mostly acaulescent but sometimes with ± long stems. Leaflets in (12–)15–20(–28) pairs, mostly densely hairy. Inflorescence mostly only white hairy. Legumes 5–7 mm high and wide, at both ends shortly narrowed, rounded or slightly grooved dorsally, with a beak 3–5 mm.

Subalpine to alpine meadows and stony slopes; 1800–5000 m. Xinjiang [Afghanistan, India, Kashmir, Pakistan].

224b. *Astragalus rhizanthus* subsp. *candolleanus* (Royle ex Benth) Podlech, Mitt. Bot. Staatssamml. München 25: 184. 1988.

短梗畸形黄耆 *duan geng ji xing huang qi*

Astragalus candolleanus Royle ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

Plants mostly with developed stems. Leaflets in 6–13 pairs, mostly relatively glabrous. Inflorescence mostly black hairy. Legumes at both ends long narrowed, 10–15(–20) mm, 4–5 mm high and ca. 4 mm wide, deeply grooved dorsally, with a beak up to 10 mm.

Subalpine to alpine meadows and stony slopes; 2100–4000 m. Xizang [India, Kashmir, Nepal, Pakistan].

The two subspecies are not easy to distinguish in flowering state, especially because of the high polymorphism of *Astragalus rhizanthus* subsp. *rhizanthus*. The legumes are necessary for exact determination.

225. *Astragalus schanginianus* Pallas, Sp. Astragal. 77. 1802.

卡通黄耆 *ka tong huang qi*

Astragalus schanginianus subsp. *neoschanginianus* Goloskokov.

Plants 20–40 cm tall, acaulescent or shortly caulescent, covered with white hairs 0.5–2 mm, at rachis and legumes up to 4 mm. Stems 1–5 cm, glabrous or spreading hairy. Leaves 10–40 cm; stipules whitish, 8–16 mm, adnate to petiole for 3–5 mm, glabrous or sparsely hairy, more rarely to densely hairy; petiole 4–10 cm, like rachis subglabrous or sparsely, more rarely densely covered with spreading unequal hairs 0.5–3(–4) mm; leaflets in 15–23 pairs, narrowly elliptic to narrowly ovate, 12–25 × 6–12 mm, abaxially sparsely to loosely, rarely to densely, appressed hairy, adaxially glabrous or to loosely appressed hairy, apex rounded to subacute. Racemes loosely 5–12-flowered; peduncle 1.5–6 cm, sparsely to loosely spreading hairy; bracts 10–15 mm, hairy. Calyx 10–19 mm, glabrous or

loosely spreading hairy; teeth 4–7 mm. Petals yellow; standard obovate, 23–26 × 8–10 mm, apex slightly emarginate; wings 20–23 mm; keel (16–)17–18 mm, limbs slightly obliquely elliptic, straightly stretched forward. Legumes with a stipe 1–3 mm, 15–27 mm, 6–8 mm high and 5–6 mm wide, with a slender beak 2–5 mm, 2-locular; valves glabrous or loosely to densely covered with spreading hairs.

Under bushes, in open dry plains. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia)].

226. *Astragalus webbianus* Graham ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

藏西黄耆 *zang xi huang qi*

Astragalus minutifoliolatus Wendelbo.

Plants subshrubby, acaulescent to shortly caulescent, with white hairs 0.3–0.7(–1) mm, inflorescence also with black hairs. Stems, if present, up to 5 cm. Leaves 8–22 cm; stipules distinctly longitudinally nerved, 10–15 mm, adnate to petiole for 3–5 mm, lower ones ciliate and often hairy at base, upper hairy, often connate around petiole for 1–3 mm; petiole 3–6 cm, like rachis sparsely to loosely covered with ascending hairs up to 1 mm, toward end of vegetation period hardening and often spiny, persistent to next year or even longer; leaflets in 17–23 pairs, elliptic to obovate, 2–9 × 1–4.5 mm, abaxially and at margins sparsely ± appressed hairy, adaxially glabrous, apex rounded to slightly retuse. Racemes 2–5-flowered; peduncles several, 0.5–1.5 cm, appressed hairy; bracts 8–10 mm, with white and also black hairs. Bracteoles often present, up to 2 mm. Calyx 15–17 mm, sparsely to rather densely covered with ascending white and blackish to black hairs; teeth 4–8 mm. Petals yellow; standard obovate, 24–27 × 9–11 mm, apex emarginate; wings 22–23 mm; keel 19–21 mm. Legumes with a stipe 3–4 mm, 20–25 mm, 5–6 mm high and 8–10 mm wide, narrowly grooved ventrally and dorsally, with a straight beak 3–4 mm, 2-locular; valves glabrous.

Moraines, among debris in alpine zone; 3600–5000 m. Xizang [Afghanistan, India, Kashmir, Pakistan].

31b. *Astragalus* “*Purpurascens* group”

布河黄耆群 *bu he huang qi qun*

Plants acaulescent or nearly so, with white hairs. Calyx tubular. Petals always glabrous, mostly fading red or purple, mostly of nearly equal length; auricles of wings mostly large, 2–4 mm; limbs of keel with widely curved lower edge and mostly sigmoid upper edge, tip therefore often slightly beaklike, upper edge for whole length or in upper part furnished with minute teeth. Legumes mostly with leathery vaulted valves.

Seventy-nine species: Afghanistan, China, Mongolia, Pakistan, Russia; C and SW Asia, E Europe; four species in China.

- 1a. Plants 6–12 cm tall; racemes subsessile, 2-flowered; bracts 4–6 mm; legumes with a stipe 1–2 mm, 10–15 mm 230. *A. taldicensis*
- 1b. Plants distinctly taller; racemes with a distinct peduncle, mostly with more flowers; bracts distinctly longer; legumes with a much longer stipe, 15–28 mm.
- 2a. Leaflets in 18–30 pairs, narrowly elliptic, 5–12 × 2–4 mm; racemes 2- or 3-flowered 228. *A. buchtormensis*
- 2b. Leaflets in 9–17 pairs, ovate to obovate, 8–15 × 4–11 mm; racemes 6–15-flowered.
- 3a. Peduncle 4–8 cm, glabrous or sparsely hairy; bracteoles absent 227. *A. altaicola*
- 3b. Peduncle 6–14 cm, densely hairy; bracteoles present, linear, 2–3 mm 229. *A. neochorgosicus*

227. *Astragalus altaicola* Podlech, Sendtnera 1: 270. 1993.

阿尔泰黄耆 a er tai huang qi

Astragalus altaicus Bunge (1868), not Pallas (1800).

Plants 15–35 cm tall, acaulescent, sparsely hairy to subglabrous. Leaves 11–25 cm; stipules 10–15 mm, ciliate, adnate to petiole for 4–5 mm; petiole 3–5 cm, like rachis glabrous or more rarely sparsely to loosely covered with long hairs; leaflets in 9–14 pairs, remote, ovate to obovate, 8–15 × 6–11 mm, mostly glabrous or ciliate, apex rounded to slightly retuse. Racemes 6–8 cm, loosely 6–15-flowered; peduncle 4–8 cm, glabrous or sparsely hairy; bracts 6–11 mm, ciliate. Calyx 12–15 mm, glabrous, rarely sparsely to rather densely covered all over with spreading hairs 1.5–3 mm; teeth 3–4 mm. Petals yellow; standard obovate, 23–25 × 9–10 mm; wings 17–19 mm; keel 16–19 mm. Legumes with a stipe 4–5 mm, 17–28 mm, 9–10 mm high and 10–12 mm wide, with a beak 1–2 mm, 2-locular; valves glabrous.

Sand, steppic meadows, *Pinus* forests. Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

228. *Astragalus buchtormensis* Pallas, Sp. Astragal. 76. 1802.

布河黄耆 bu he huang qi

Plants 10–22 cm tall, acaulescent, covered with ± spreading hairs up to 3 mm. Leaves 10–20 cm; stipules 10–15 mm, sparsely to densely hairy, adnate to petiole for 2–4 mm; petiole 2–6 cm, like rachis loosely to densely hairy; leaflets in 18–30 pairs, narrowly elliptic, 5–12 × 2–4 mm, often folded, abaxially loosely to rather densely hairy, adaxially glabrous, apex rounded to slightly retuse. Racemes 2- or 3-flowered; peduncle 1–5 cm, loosely hairy; bracts 7–13 mm, ciliate. Calyx 10–14 mm, loosely to densely hairy especially in upper part, rarely in basal part glabrous; teeth 4–5 mm. Petals yellow; standard elliptic to obovate, 20–24 × 8–10(–12) mm, apex emarginate; wings 19–22 mm; keel 16–20 mm. Legumes with a stipe 2–5 mm, (10–)15–20 mm, 6–8 mm high and wide, with a straight beak 3–5 mm, incompletely 2-locular; valves thin leathery, loosely covered with long spreading hairs, more rarely glabrous.

Steppic meadows in the forest-free zone. Xinjiang [Kazakhstan, Russia; SW Asia (Caucasus), Europe].

32. *Astragalus* sect. *Gontscharoviella* Kamelin, Bot. Zhurn. (Moscow & Leningrad) 59: 1754. 1974.

刚查诺夫组 gang cha nuo fu zu

Plants acaulescent to subacaulescent, with only basifixed white hairs. Leaflets verticillate in several approximate to remote whorls. Calyx tubular. Petals glabrous; standard mostly pandurate, more rarely obovate. Legumes small, with thin walls.

Nineteen species: mountains of Afghanistan, W China, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; two species in China.

1a. Rachis with hairs 1–2 mm; leaflets 4–8 verticillate; calyx in basal part subglabrous or at least distinctly less

hairy than in upper part; legumes 8–15 mm 231. *A. alatavicus*

1b. Rachis with hairs 0.3–1 mm; leaflets 4–6 verticillate; calyx densely hairy throughout; legumes 12–18 mm 232. *A. pamirensis*

231. *Astragalus alatavicus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 344. 1842.

阿拉套黄耆 a la tao huang qi

229. *Astragalus neochorgosicus* Podlech, Mitt. Bot. Staats-samml. München 25: 624. 1988.

新霍尔果斯黄耆 xin huo er guo si huang qi

Plants 18–25 cm tall, acaulescent or nearly so, covered with mostly spreading hairs up to 2 mm. Leaves 15–25 cm; stipules 8–12 mm, adnate to petiole for 3–5 mm, ciliate or sparsely hairy; petiole 3–7 cm, like rachis loosely to rather densely hairy; leaflets in 15–17 pairs, ovate to obovate, 8–15 × 4–8 mm, abaxially loosely to densely covered with short appressed to ascending hairs, adaxially glabrous, apex rounded and sometimes with a minute cusp. Racemes 6–13 cm, very loosely 6–10-flowered; peduncle 6–14 cm, densely hairy; bracts 7–13 mm, hairy. Bracteoles present, linear, 2–3 mm. Calyx 12–16 mm, sparsely to loosely hairy; teeth 2–5 mm. Petals yellow; standard obovate, 26–27 × 8–10 mm, in lower part slightly constricted; wings 23–24 mm; keel 21–22 mm. Legumes with a stipe 7–9 mm, 18–20 mm, 7–8 mm high and 10–11 mm wide, widely flattened ventrally and dorsally, with a beak 1–2 mm, 2-locular; valves loosely hairy or glabrous when completely ripe.

W Xinjiang [Kyrgyzstan].

230. *Astragalus taldicensis* Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 344. 1896.

假黄耆 jia huang qi

Astragalus mendax Freyn; *A. pamiro-altaicus* Lipsky.

Plants 6–12 cm tall, acaulescent, furnished with mostly spreading hairs 0.3–1.5(–2) mm. Leaves 4–12 cm; stipules 5–12 mm, adnate to petiole for 3–5 mm, ciliate; petiole 0.5–2 cm, like rachis rather densely hairy; leaflets in 10–18 pairs, narrowly elliptic, 4–8 × 2–3 mm, abaxially rather densely or sometimes sparsely covered with ascending hairs, adaxially glabrous, apex rounded or slightly retuse. Racemes subsessile, 2-flowered; bracts 4–6 mm, hairy. Calyx 12–14 mm, sparsely hairy; teeth 3–4 mm, ciliate. Petals yellow, fading red; standard obovate, 22–25 × 9–12 mm, apex emarginate; wings 20–22 mm; keel 16–18 mm. Legumes with a stipe 1–2 mm, 10–15 mm, 6–8 mm high and wide, with a beak 3–4 mm, incompletely 2-locular; valves hairy.

From the *Juniperus* zone up to the alpine zone; 2000–4800 m. Xinjiang [Kyrgyzstan, Tajikistan].

in 10–18 approximate whorls, narrowly elliptic to narrowly obovate, 3–8(–15) × 1.5–2.5(–3) mm, mostly folded, abaxially rather densely covered with appressed to ascending hairs, adaxially glabrous, apex rounded. Racemes 3–5-flowered; peduncle 0.2–0.6(–2.5) cm, spreading hairy; bracts 4–8 mm, hairy. Calyx 10–15 mm, very sparsely to loosely, more rarely rather densely, spreading hairy, at base often completely glabrous; teeth 2–3 mm. Petals yellow, fading reddish; standard oblong-pandurate, 20–26 × 7–10 mm, in lower 1/3 distinctly constricted, apex deeply incised; wings 19–24 mm; keel 16–22 mm. Legumes with a stipe 2–3 mm, 8–15 mm, 4–5 mm high and 3–4 mm wide, with a beak ca. 2 mm, incompletely 2-locular; valves rather densely covered with ascending hairs.

Stony ground in subalpine to alpine zones; 1700–3400 m. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

232. *Astragalus pamirensis* Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 344. 1896.

帕米尔黄耆 pa mi er huang qi

Astragalus alatavicus Karelin & Kirilov var. *pamirensis*

33. *Astragalus* sect. *Erionotus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 32. 1868.

毛被组 mao bei zu

Plants acaulescent to caulescent, with basifixed white hairs. Leaflets always in pairs, adaxially with long, flexuous, cottonlike hairs (when mature sometimes falling as a whole and then leaflets adaxially nearly glabrous). Calyx campanulate to tubular. Petals hairy (in Chinese species) or glabrous. Legumes mostly small.

Twenty-five species: Afghanistan, NW China, N Pakistan; C Asia, SW Asia (Iran); two species in China.

- 1a. Keel 12–18 mm, limbs obliquely elliptic to triangular, 4–6 mm; calyx tube ca. 10 mm; style below stigma with minute nipplelike hairs 233. *A. floccosifolius*
 1b. Keel 14–22 mm, limbs narrowly elliptic, 8–10 mm; calyx tube 10–16 mm; style below stigma glabrous 234. *A. lanuginosus*

233. *Astragalus floccosifolius* Sumnevicz, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1937(9–10): 2. 1937.

丛毛叶黄耆 cong mao ye huang qi

Plants 15–35(–50) cm tall, caulescent or more rarely subacaulescent. Stems (1–)3–15(–30) cm, loosely to rather densely covered with spreading hairs up to 1 mm. Leaves 10–25(–30) cm; stipules 6–11 mm, adnate to petiole for 2–4 mm, ciliate and mostly loosely to rather densely subappressed hairy; petiole 3–7 cm, like rachis loosely to rather densely covered with ascending or more rarely spreading hairs 0.2–1 mm; leaflets in 18–30(–40) pairs, narrowly elliptic, 6–20 × 2–6 mm, abaxially loosely to rather densely appressed hairy, adaxially densely cottonlike hairy, often glabrescent with age, apex rounded to shortly acuminate. Racemes sessile or with a peduncle 1–3(–5) cm and hairy like stem, loosely (1–)3–10(–12)-flowered; bracts 3–6 mm, hairy. Calyx 14–17 mm, densely covered with ascending hairs; tube ca. 10 mm; teeth 4–8 mm. Petals yellow, appressed hairy; standard obovate-pandurate, 18–24 × 8–11 mm, in lower part slightly constricted, apex emarginate; wings 16–22 mm; keel 12–18 mm, limbs obliquely elliptic to triangular, 4–6 mm. Style below stigma with minute nipplelike hairs.

(Franchet) B. Fedtschenko; *A. myriophyllus* Bunge (1880), not (Pallas) Pallas (1802).

Plants 13–20 cm tall, caespitose, acaulescent or subacaulescent, densely covered with mostly spreading hairs 0.3–0.5(–1) mm. Leaves 5–20 cm; stipules with longitudinal nerves, 7–12 mm, adnate to petiole for 3–5 mm, at margin and sometimes toward apex loosely to densely hairy; petiole 2.5–5 cm, like rachis densely spreading hairy; leaflets 4–6 verticillate in 8–14(–20) approximate whorls, narrowly elliptic to narrowly obovate, 5–10 × 2–4 mm, mostly folded, abaxially densely villous with appressed to spreading hairs, adaxially glabrous or nearly so, apex rounded to subacute. Racemes 3–4 cm, 5–15-flowered; peduncle 1–5 cm, densely spreading hairy; bracts 3–5(–8) mm, densely ciliate. Calyx 13–15 mm, densely spreading hairy; teeth 2–4 mm. Petals yellow, fading red; standard obovate-pandurate, 20–21 × 8–9 mm, in lower 1/3 slightly constricted, apex deeply incised; wings 19–20 mm; keel 17–18 mm. Legumes with a stipe 2–3 mm, 12–18 mm, 4–5 mm high and wide, with a beak 2–3 mm, incompletely 2-locular; valves densely villous.

Sandy and stony ground in subalpine to alpine zones; 2800–4200 m. Xinjiang [Kyrgyzstan, Tajikistan].

Legumes with a stipe 1–4 mm, 11–17 mm, 4–6 mm high and wide, with a straight beak 1–2.5 mm, incompletely 2-locular; valves densely covered with nearly spreading hairs up to 2 mm.

Loessic soil, ephemeral steppes, under bushes; 800–2300(–3100) m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

234. *Astragalus lanuginosus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 409. 1841.

棉毛黄耆 mian mao huang qi

Astragalus anrachaicus Goloskokov; *A. xinjiangnensis* Y. C. Ho.

Plants 15–30 cm tall, caulescent, covered with mostly spreading hairs up to 3 mm. Stems ascending to erect, densely hairy. Leaves 10–15 cm; stipules 7–15 mm, densely hairy, adnate to petiole for 2–3 mm; petiole and rachis loosely to rather densely hairy; leaflets in 20–26 pairs, ovate to obovate, 5–12 × 4–8 mm, abaxially rather densely subappressed hairy, adaxially loosely cottonlike hairy, often glabrescent with age, apex obtuse to retuse. Racemes 2–6-flowered; peduncles several, often along whole stem, 0.5–2 cm; bracts 5–10 mm, hairy. Calyx 15–

23(–27) mm, hairy; tube 10–16 mm; teeth subulate, 5–8 mm. Petals pale yellow, hairy; standard obovate-pandurate, 20–29 mm, slightly constricted in lower part, apex slightly emarginate; wings 18–26 mm; keel 14–22 mm, limbs narrowly elliptic, 8–10 mm. Legumes pendulous, with a stipe 2–7 mm, 14–20 mm,

5–6 mm high and 4–5 mm wide, with a beak 2–4 mm, 2-locular; valves densely appressed to spreading hairy.

Artemisia steppes, semideserts, riverbanks, as a weed in crops, from plains to the mountain zone. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

34. *Astragalus* sect. *Aegacantha* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 42. 1868.

刺叶柄组 ci ye bing zu

Shrubs spiny, much-branched, often cushionlike with basifixed hairs. Leaves paripinnate with spiny rachis; stipules adnate to petiole, often amplexicaul; leaflets mostly strongly becoming smaller toward tip of leaves. Racemes shortly pedunculate, with few pedicellate flowers. Bracteoles sometimes present. Calyx tubular, ruptured by fruit. Standard emarginate. Legumes incompletely to completely 2-locular with leathery valves.

Fifty-six species: mostly in Afghanistan, also in W China, N India, Kashmir, Nepal, Pakistan, C Asia, and SW Asia (Iran); three species in China.

1a. Petals hairy 235. *A. lasiosemius*
1b. Petals glabrous.

2a. Leaflets in 4–6 pairs, mostly hairy on both surfaces; stems of current year up to 40 cm 236. *A. multiceps*

2b. Leaflets in 8–14 pairs, glabrous adaxially; stems of current year 1–2(–10) cm 237. *A. oplites*

235. *Astragalus lasiosemius* Boissier, Diagn. Pl. Orient., ser. 1, 9: 96. 1849.

毛果黄耆 mao guo huang qi

Astragalus genistoides Boissier; *A. latistylus* Freyn; *A. latistylus* subsp. *aridus* Freyn; *A. psilopterus* Bunge.

Plants to 30 cm tall, strongly branched, with appressed to spreading only white hairs 0.2–1.5 mm, at calyx up to 3 mm. Stems of current year 2–8(–15) cm, hairy, glabrescent with age. Leaves 3–5 cm; stipules 3–8 mm, semiamplexicaul, adnate to petiole for 1–2 mm, hairy; petiole 1–2.5 cm; rachis rigid, spiny, obliquely erect, hairy, glabrescent with age, free tip 2–3 × as long as uppermost leaflets; leaflets in 5–8 pairs, elliptic to obovate, lower ones 3–6(–9) × 1.5–3 mm, mostly folded, hairy, apex rounded to retuse. Racemes 1–3-flowered; peduncle 0.1–2.5 cm; bracts 2–4 mm. Calyx 12–15 mm, hairy; teeth 2–5 mm. Petals yellow, hairy; standard obovate, 15–26 × 8–11 mm; wings 14–25 mm; keel 13–22 mm. Legumes 11–18 mm, 5–7 mm high, with a beak 1.5–3 mm, incompletely to nearly completely 2-locular; valves leathery, densely hairy.

Steppic stony plains, *Pinus* and *Cedrus* forests, montane to alpine zones; 2400–4300 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

236. *Astragalus multiceps* Wallich ex Benth in Royle, Ill. Bot. Himal. Mts. 199. 1835.

二尖齿黄耆 er jian chi huang qi

Astragalus bicuspis Fischer.

Plants to 60 cm tall, mostly branched at base, with ± spreading hairs 0.4–2 mm, vegetative parts only white hairy. Stems of current year up to 40 cm, villous. Leaves 2.5–4.5 cm, spreading; stipules 4.5–9 mm, semiamplexicaul, adnate to petiole for 1.5–2 mm, ciliate, otherwise glabrous or hairy; petiole 0.5–1 cm; rachis thin, hairy, free spiny tip ± as long as uppermost leaflets; leaflets in 4–6 pairs, obovate, lower ones 5–11 × 3–4 mm, hairy on both surfaces or more rarely glabrous adaxi-

ally, apex rounded to retuse. Racemes subsessile or with a peduncle rarely up to 1.4 cm, 1–3-flowered; bracts 3–5 mm, ciliate. Bracteoles sometimes present. Calyx 9–15 mm, rather densely white hairy, sometimes also with shorter black hairs; teeth 2.5–5 mm. Petals yellow, glabrous; standard obovate, 15–26 × 7–10 mm; wings 14–23 mm; keel 13–19 mm. Legumes subsessile, 10–15 mm, 3–5 mm high, compressed laterally, with a beak 2–5 mm, incompletely 2-locular; valves leathery, densely hairy.

1300–3300 m. Xizang [India, Kashmir].

237. *Astragalus oplites* Benth in R. Parker, Bull. Misc. Inform. Kew 1921: 270. 1921.

刺叶柄黄耆 ci ye bing huang qi

Astragalus cicerifolius Royle ex Bunge (1868), not Royle ex Fischer (1853); *A. zanskarensis* Benth in R. Parker ex Bunge subsp. *oplites* (Benth in R. Parker) I. Deml.

Plants mostly branched at base; hairs appressed to ± spreading, in vegetative parts only white, in inflorescence partly blackish, up to 1.5 mm, at calyx and legume up to 2–3 mm. Stems more than 20 cm, parts of current year 1–2(–10) cm, hairy. Leaves 5–7 cm, erect; stipules 7–15 mm, semiamplexicaul, adnate to petiole for 2–4 mm, glabrous or hairy; petiole 1–2.5 cm; rachis glabrous, free tip ± as long as uppermost leaflets; leaflets in 8–14 pairs, obovate, lower ones 4–11 × ca. 2.5 mm, abaxially rather densely hairy, adaxially glabrous, apex rounded to retuse. Racemes 3–5-flowered; peduncle 1–2 cm, hairy; bracts 3–8, mostly ca. 5 mm, ciliate, rarely hairy. Bracteoles sometimes present, 0.5–1.5 mm. Calyx 10–15 mm, always with black and white hairs; teeth 2.5–5 mm. Petals yellow, glabrous; standard elliptic to obovate, 17–25 × 6–8(–10) mm; wings 15–23 mm; keel 14–21 mm. Legumes subsessile, 10–15 mm, ca. 4 mm high, with a straight beak 2.5–5 mm, incompletely 2-locular; valves leathery, spreading hairy.

Xinjiang, Xizang [India, Kashmir].

35. Astragalus sect. **Eremophysa** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 62. 1868.

沙孚组 sha fu zu

Plants perennial, with well-developed stems, covered with soft, white, basifixed hairs. Leaves imparipinnate with mostly remote, ± orbicular leaflets; stipules shortly adnate to petiole or free. Racemes sessile or with a distinct peduncle, at anthesis rather densely many flowered, later distinctly elongated. Bracteoles mostly present. Flowers subsessile. Calyx at anthesis tubular to slightly swollen, later strongly bladderlike inflated and distinctly netlike nerved. Petals yellow, included in calyx. Fruit included in calyx, distinctly stalked, ellipsoid to ovoid, ± fully 2-locular, with few seeds.

Thirteen species: steppes of European Russia and Caucasus to Kazakhstan, from N Africa (Egypt) through SW Asia to Pakistan and NW China; two species in China.

1a. Stem with spreading hairs; ovary and legumes densely hairy 238. *A. lehmannianus*

1b. Stem with subappressed hairs; ovary and legumes glabrous 239. *A. sphaerophysa*

238. Astragalus lehmannianus Bunge, Arbeiten Naturf. Vereins Riga 1: 252. 1847.

菟荑黄耆 jian jia huang qi

Plants 35–65 cm tall, with tangled spreading hairs. Stem 25–50 cm, hairy, glabrescent with age. Leaves 15–27 cm; stipules 8–9 mm, adnate to petiole, hairy; petiole short, like rachis hairy; leaflets in 7–10 pairs, (10–)15–25(–30) mm long and wide, abaxially hairy, adaxially glabrous. Racemes sessile or with a hairy peduncle up to 2 cm, (7–)9–14 cm, many flowered; bracts 5–6 mm, hairy. Bracteoles 3–4 mm. Calyx at anthesis 11–15 mm, tubular to slightly inflated, densely velvety-villous; teeth 4–5 mm; fruiting calyx ovoid to inflated globose, 17–22 mm, finely netlike nerved, velvety. Petals yellow; standard ovate to orbicular, 16–20 mm, apex slightly emarginate; wings as long as standard; keel 15–19 mm. Legumes with a stipe 2–3 mm, included in calyx, 7–9 mm, with a beak 1–2 mm; valves thin, velvety.

Sandy soil, dunes. Xinjiang [Kazakhstan, Turkmenistan, Uzbekistan; SW Asia (Caucasus), Europe].

239. Astragalus sphaerophysa Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 338. 1842.

球孚黄耆 qiu fu huang qi

Plants 27–50 cm tall. Stem 23–37 cm, lower part glabrescent or glabrous, upper part sparsely to loosely covered with subappressed hairs 0.5–1 mm. Leaves 10–15 cm; stipules 8–12 mm, high adnate to petiole, at margins with hairs up to 2 mm; petiole 2–3 cm, like rachis sparsely to loosely spreading hairy; leaflets in 4–7 pairs, remote, (14–)20–30 mm, abaxially rather densely subappressed hairy, adaxially glabrous. Racemes sessile, 3–5 cm, densely many flowered, at fruiting time elongated up to 8 cm; bracts 8–10 mm, villous at margins. Bracteoles 5–7 mm. Calyx at anthesis 12–14 mm, tubular to slightly inflated, hairy only in upper part and at teeth; teeth 4–5 mm; fruiting calyx ovoid to inflated globose, 17–22 mm, finely netlike nerved, nearly glabrous with exception of upper margins and teeth. Petals yellow; standard ± orbicular, 15–20 mm, apex slightly emarginate; wings as long as standard; keel 14–18 mm. Legumes with a slender stipe 3–4 mm, included in calyx, 5–9 mm, ca. 3.5 mm high and wide, with a beak 1–2 mm; valves thin, glabrous.

Sandy soil, dunes. NW Xinjiang [Kazakhstan].

36. Astragalus sect. **Uliginosi** A. Gray, Proc. Amer. Acad. Arts 6: 196. 1864.

湿地组 shi di zu

Astragalus sect. *Euodmus* Bunge.

Plants perennial, herbaceous, with medifixed to asymmetrically bifurcate hairs. Stems long, erect. Stipules free from petiole, vaginate-connate behind stem. Racemes many flowered, with a long peduncle. Bracteoles sometimes present. Calyx shortly tubular. Petals glabrous. Legumes sessile, keeled or rounded ventrally, grooved dorsally, 1-locular to 2-locular; valves thinly leathery.

Seven species: Afghanistan, China, India, Japan, Kashmir, Korea, Mongolia, Pakistan, Russia; C and SW Asia; three species (one endemic) in China.

1a. Bracteoles present; ovary and legumes densely hairy; legumes nodding 240. *A. peduncularis*

1b. Bracteoles absent; legumes obliquely erect to erect.

2a. Stem 30–70 cm; leaflets narrowly elliptic, 20–40 × 5–15 mm, glabrous adaxially; calyx teeth 1.5–3 mm; ovary and legumes glabrous 242. *A. uliginosus*

2b. Stem 5–10 cm; leaflets elliptic, 10–25 × 5–12 mm, sparsely hairy adaxially; calyx teeth 4–5 mm; ovary and legumes black hairy 241. *A. qitaiensis*

240. Astragalus peduncularis Royle ex Benth in Royle, III. Bot. Himal. Mts. 199. 1835.

青藏黄耆 qing zang huang qi

Astragalus corydalinus Bunge.

Plants 25–70 cm tall, covered with mostly ± medifixed hairs. Stems several, 20–60 cm, often with very short lateral branches, densely hairy; hairs appressed, often flexuous, white, at nodes also black, 0.3–0.5 mm, a few ascending up to 1 mm. Leaves 5–10 cm, subsessile; stipules 6–8 mm, high vaginate-

connate behind stem, loosely to rather densely appressed hairy; rachis rather densely white hairy; leaflets in 7–13 pairs, narrowly elliptic, 7–19(–25) × 1.5–7 mm, abaxially loosely to densely appressed hairy, adaxially glabrous or subglabrous, apex rounded or obtuse, mostly very shortly mucronulate. Racemes up to 10 cm, rather densely many flowered; peduncle 6–23 cm, hairy like stem; bracts 3–5 mm, black and white hairy. Bracteoles 1–2 mm. Calyx 8–10 mm, loosely covered with appressed to ascending, mostly asymmetrically bifurcate to subbasifixed, black or mixed white and black hairs; teeth unequal, 1–2 mm. Petals greenish white, standard often ± purple tinged; standard obovate, 14–17 × 6–8 mm, apex emarginate; wings 12–13 mm; keel 11–12 mm. Legumes sessile, nodding, 11–20 mm, 4–5 mm high and 5–6 mm wide, with a beak 1–2 mm, 1-locular to incompletely 2-locular; valves densely black and white hairy, glabrous with age.

Steppes, open scrub and woodlands; 1100–3700 m. Qinghai, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

241. *Astragalus qitaiensis* Podlech & L. R. Xu, *Novon* 17: 253. 2007.

奇台黄耆 qi tai huang qi

Plants ca. 30 cm tall, covered with ± medifixed, appressed hairs. Stems of current year 5–10 cm, sparsely to loosely covered with white hairs 0.3–0.5 mm, at nodes sometimes with black hairs mixed in. Leaves 10–12 cm; stipules 7–15 mm, high vaginate-connate behind stem, loosely to rather densely covered with symmetrically or asymmetrically bifurcate white hairs 0.2–0.5 mm; petiole 3–4 cm, with rachis sparsely to loosely white hairy like stem; leaflets in 9 or 10 pairs, elliptic, 10–25 × 5–12 mm, both surfaces sparsely covered with white hairs 0.3–0.5 mm, apex rounded to slightly retuse. Racemes ca. 4 cm, densely many flowered; peduncle 8–10 cm, subglabrous; bracts 4–5 mm, sparsely black ciliate. Calyx 9–10 mm, loosely covered with medifixed, appressed, black hairs 0.2–0.4 mm and

with symmetrically or asymmetrically bifurcate white hairs 0.5–0.7 mm; teeth 4–5 mm. Petals probably pale greenish yellow; standard elliptic, 15–16 × ca. 5 mm, emarginate; wings ca. 14 mm; keel ca. 13 mm. Legumes sessile, obliquely erect, ca. 10 mm, ca. 3 mm high and wide, with a beak 1–2 mm, incompletely 2-locular; valves thinly leathery, densely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly ascending, ± flexuous, black hairs 0.2–1 mm, partly glabrescent with age.

• Xinjiang.

242. *Astragalus uliginosus* Linnaeus, *Sp. Pl.* 2: 757. 1753.

湿地黄耆 shi di huang qi

Astragalus nertschinskensis Freyn.

Plants (25–)45–90 cm tall. Stems usually several, erect, 30–70 cm, rather sparsely hairy; hairs medifixed, appressed, white, at nodes also black, 0.3–0.4 mm. Leaves 10–20 cm; stipules 6–10 mm, connate behind stem, rather densely white hairy; petiole 1.5–4 cm, with rachis sparsely to loosely hairy like stem; leaflets in 10–13 pairs, narrowly elliptic, 20–40 × 5–15 mm, abaxially loosely appressed white hairy, adaxially glabrous, apex obtuse or minutely mucronulate. Racemes 3–6 cm, many flowered; peduncle 3–10 cm, loosely to rather densely covered with symmetrically to mostly asymmetrically bifurcate hairs up to 0.8 mm; bracts 5–6 mm, sparsely black ciliate. Calyx 8–9 mm, loosely covered with medifixed, short, appressed, mostly black hairs; teeth 1.5–3 mm. Petals pale greenish yellow, keel violet tipped; standard elliptic, 14–18 × 5–6 mm, apex emarginate; wings 10–14 mm; keel 9–12 mm. Legumes sessile, obliquely erect, 9–13 mm, 3.5–4 mm high and 4–5 mm wide, 2-locular; valves thinly leathery, glabrous.

Mesophytic meadows, riversides, margins of coniferous forests. Heilongjiang, Jilin, Liaoning, Nei Mongol [Kazakhstan, N Korea, Mongolia, Russia (Far East, Siberia)].

37. *Astragalus* sect. *Brachycephali* N. D. Simpson, *Notes Roy. Bot. Gard. Edinburgh* 8: 262. 1915 [*“Brachycephalae”*].

短序组 duan xu zu

Plants perennial, herbaceous, with well-developed stem; hairs bifurcate, often with mostly spreading basifixed hairs mixed in. Stipules free from petiole, connate behind stem. Racemes umbellate to globose, with a well-developed peduncle. Bracteoles present. Calyx campanulate-tubular. Standard slightly longer than wings and keel, without distinct claw. Legumes sessile or stipitate, incompletely to completely 2-locular, with thin, glabrous walls.

One species: Bhutan, China, S Korea.

243. *Astragalus bhotanensis* Baker in J. D. Hooker, *Fl. Brit. India* 2: 126. 1876.

地八角 di ba jiao

Astragalus bhotanensis var. *montigenus* Handel-Mazzetti; *A. brachycephalus* Franchet; *A. brachycephalus* var. *minor* Pampanini; *A. hamulosus* H. Léveillé.

Plants 20–90 cm tall, with symmetrically or asymmetrically bifurcate appressed hairs 0.3–0.8 mm, often with mostly ± spreading, longer, basifixed hairs mixed in. Stems mostly several, prostrate or ascending to erect, hollow, 2–6 mm thick, gla-

brous or sparsely to rather densely covered with medifixed hairs. Leaves 4–20 cm; stipules shortly connate behind stem or up to 1/4 of length, sparsely white and black hairy; petiole 0.5–3.5 cm, like rachis sparsely to rather densely covered with medifixed hairs up to 2 mm and sometimes sparsely with spreading basifixed hairs; leaflets in 10–17 pairs, narrowly elliptic, 5–23 × 3–13 mm, abaxially loosely to rather densely covered with appressed, medifixed hairs, adaxially glabrous or rarely with very few long basifixed hairs, rounded at apex. Racemes dense, ± umbellate-globose, 8–20-flowered; peduncle 4–15 cm, sparsely to loosely covered with appressed, medifixed hairs and sometimes also longer, ± spreading, basifixed, white

hairs; bracts 4–8 mm, glabrous or ciliate. Bracteoles 2–3 mm. Calyx 5–8 mm, sparsely to loosely covered with predominantly black, very short, sometimes also longer hairs up to 0.5 mm; teeth 2–3.5 mm. Petals dark purple to blue-purple or more rarely yellow or standard and keel purplish and wings white;

standard obovate, 10–14 × 4–6.5 mm; wings 9–12 mm; keel 8–10 mm. Legumes sessile, linear, 15–30 mm, 2.5–4 mm high and wide, with a short straight beak, incompletely 2-locular.

600–2800 m. Gansu, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, S Korea].

38. *Astragalus* sect. *Craccina* (Steven) Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 97. 1868.

旱生组 han sheng zu

Craccina Steven, Bull. Soc. Imp. Naturalistes Moscou 29(2): 144. 1856.

Perennials with well-developed or rarely short stems, rarely subshrubby, with bifurcate white and black hairs. Stipules nearly free from petiole, at least those of lower leaves vaginate-connate behind stem. Racemes loose, more rarely dense, borne on well-developed peduncle. Calyx campanulate or shortly tubular-campanulate. Flowers mostly small. Petals purplish or violet, rarely white; standard often without distinct claw; wings as long as or mostly longer than keel, with obtuse to incised tip. Legumes sessile or shortly stipitate, narrowly oblong to narrowly ellipsoid, grooved dorsally, incompletely to completely 2-locular, more rarely 1-locular.

Twenty-one species: China, Mongolia, Russia (Siberia); C Asia, SW Asia (Iran), Europe; seven species (three endemic) in China.

- 1a. Leaflets linear or very narrowly oblong, more than 4 × as long as wide.
 2a. Plants small, 7–20 cm tall; leaflets in mostly 3–5 pairs; wing limbs distinctly obliquely emarginate; legumes 2-locular 247. *A. miniatum*
 2b. Plants large, 20–80 cm tall; leaflets in 6–11 pairs; wing limbs obtuse.
 3a. Stem and rachis with hairs 0.1–0.25 mm; bracts ca. 1 mm; calyx 2–2.5 mm, with predominantly white hairs; legumes incompletely to nearly completely 2-locular 244. *A. consanguineus*
 3b. Stem and rachis with hairs 0.3–0.8 mm; bracts 1.5–3 mm; calyx 3(–4) mm, with predominantly black hairs; legumes nearly 1-locular 249. *A. sulcatus*
 1b. Leaflets wider, less than 2–3 × as long as wide.
 4a. Leaflets in 1 pair or in uppermost leaves only 1 terminal 246. *A. hotianensis*
 4b. Leaflets in at least 3 pairs, but mostly in more.
 5a. All stipules vaginate-connate to middle; wing limbs subobtuse; calyx teeth 2–2.5 mm; legumes sessile or subsessile, 1-locular 248. *A. miyalomontis*
 5b. All or only lower stipules shortly connate; wing limbs incised; calyx teeth up to 1.5 mm; legumes sessile or stipitate, incompletely or completely 2-locular.
 6a. Calyx teeth 0.1–0.8 mm; legumes with a stipe 3–5 mm, incompletely 2-locular, covered with medifixed black or white and black hairs 245. *A. discolor*
 6b. Calyx teeth 1–1.5 mm; legumes sessile, completely 2-locular, covered with symmetrically or asymmetrically or even subbasifixed white hairs 250. *A. variabilis*

244. *Astragalus consanguineus* Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 22. 1841.

亚黄耆 ya huang qi

Plants (20–)30–50 cm tall; hairs medifixed, appressed, 0.1–0.25 mm. Stems mostly several, erect, (15–)30–50 cm, weakly branched in lower part, sparsely to more rarely loosely white hairy or sometimes with scattered hairs only. Leaves 4–6 cm; stipules 2–3 mm, covered with scattered appressed hairs, lower ones shortly vaginate-connate, upper ones free from each other; petiole 0.5–1 cm, with rachis hairy like stem; leaflets in 6–9 pairs, narrowly elliptic, 6–12 × 2–3 mm, abaxially sparsely appressed hairy, adaxially glabrous, apex subobtuse to sometimes slightly retuse. Racemes 1.5–3 cm, loosely few to many flowered, elongating in fruit; peduncle 1.5–7 cm, very sparsely white and black hairy or subglabrous; bracts ca. 1 mm, white and black ciliate. Calyx 2–2.5 mm, sparsely white hairy, sometimes with a few black hairs mixed in; teeth 0.5–0.8 mm. Petals pale violet; standard elliptic to obovate, 6–8 mm, apex emarginate; wings 5.5–6.5 mm; keel 4.5–5 mm. Legumes sessile, slightly curved, 7–10 mm, 1.5–2 mm high, with a beak 0.5–1

mm, incompletely to nearly fully 2-locular; valves thin, loosely white hairy.

Xinjiang [Kazakhstan, Russia (Siberia)].

245. *Astragalus discolor* Bunge, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 33. 1877.

灰叶黄耆 hui ye huang qi

Astragalus biondianus Ulbrich; *A. ulachanensis* Franchet.

Plants 30–40 cm tall; hairs medifixed, appressed, in vegetative parts only white. Stems several, ascending or erect, 15–25 cm, sparsely to densely covered with hairs 0.2–0.3 mm. Leaves 3–5 cm, subsessile; stipules 1–2 mm, lower ones shortly vaginate-connate, upper ones only semiamplexicaul, all sparsely hairy; rachis densely hairy like stem; leaflets in 6–11 pairs, narrowly elliptic, 2–7(–10) × 1–2.5(–4) mm, abaxially sparsely to rather densely and adaxially sparsely to loosely covered with appressed hairs 0.4–0.5 mm, or adaxially glabrous, apex obtuse to rounded or slightly emarginate. Racemes loosely 10–22-flowered; peduncle 4–6 cm, erect, loosely white hairy; bracts

0.6–1 mm, mostly white hairy. Calyx 4–5 mm, rather densely covered with appressed white hairs 0.2–0.4 mm and with mostly distinctly shorter black hairs; teeth 0.1–0.8 mm. Petals white or pale blue; standard rhombic-elliptic to elliptic, 10–15 × 4.5–6 mm, apex emarginate; wings 10–14 mm, limbs obliquely incised; keel 8–11 mm. Legumes (unripe) with a stipe 3–5 mm, 12–15 mm, 2–2.5 mm high and wide, with a short beak, loosely to densely covered with very short, appressed, white or black or black and white hairs (in one plant).

• Semideserts, steppes; 1000–1500 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi.

246. *Astragalus hotianensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 68. 1983 [*“hotanensis”*].

和田黄耆 he tian huang qi

Plants 30–50 cm tall. Stems several, ascending to erect, 3–5 mm thick, near base furnished with globose, white villous buds. Leaves 1–3 cm, upper sessile, lower with a distinct petiole; stipules 1–3 mm, white hairy; leaflets 3 or in upper leaves sometimes only 1, narrowly elliptic, 10–20 × 3–5 mm, both surfaces loosely covered with medifixed, appressed hairs, apex acute. Racemes loosely 6–8-flowered; peduncle 3–5 cm, appressed white hairy; bracts 1.5–2 mm. Calyx 4–6 mm, campanulate, densely appressed white hairy; teeth ca. 1 mm. Petals whitish pink, purplish when dry; standard obovate-pandurate, 8–12 × ca. 5 mm, apex emarginate, slightly constricted below middle; wings 7–11 mm; keel 7–10 mm. Legumes (unripe) sessile, linear, upcurved, 10–15 mm, with white appressed hairs.

• Xinjiang.

247. *Astragalus miniatus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 98. 1868.

细弱黄耆 xi ruo huang qi

Astragalus ervoides Turczaninow.

Plants 7–20 cm tall; hairs appressed, ± medifixed, in vegetative parts only white, in inflorescence black, 0.3–0.5 mm. Stems several, ascending to erect, slender, sparsely to loosely hairy. Leaves 3–7 cm; stipules 2–3 mm, connate behind stem to middle, sparsely hairy; petiole 1–2 cm, like rachis sparsely to loosely hairy; leaflets in 3–5(–7) pairs, linear, (4–)6–15 × 0.5–1 mm, often folded, abaxially sparsely to loosely hairy, adaxially glabrous, apex distinctly emarginate. Racemes loosely 4–12-flowered; peduncle 5–10 cm, sparsely white hairy; bracts 0.5–1 mm, ciliate with mostly subbasifixed black hairs. Calyx 3–4 mm, loosely covered with predominantly black hairs; teeth 0.5–1 mm. Petals pinkish red; standard rhombic-elliptic to widely rhombic-elliptic, ca. 9 × 5–6.5 mm, apex deeply incised; wings ca. 9 mm, limbs obliquely and deeply incised; keel ca. 6 mm. Legumes sessile, obliquely erect to spreading, 8–12 mm, ca. 2 mm high and wide, with a subulate beak 0.6–1 mm, 2-locular; valves loosely to rather densely covered with subappressed to ascending white hairs.

Steppes, stony slopes, saline soil; 1200–2800 m. Heilongjiang, Nei Mongol, Xinjiang [Mongolia, Russia (Siberia)].

248. *Astragalus miyalomontis* P. C. Li, Acta Bot. Yunnan. 11: 288. 1989.

米亚罗黄耆 mi ya luo huang qi

Plants 10–20 cm tall; hairs appressed, symmetrically to slightly asymmetrically bifurcate, white. Main stem prostrate, branched, side stems ascending to erect, branched, up to 15 cm, loosely to rather densely covered with hairs 0.3–0.5 mm. Leaves 1.5–3 cm; stipules ca. 3 mm, free from petiole but shortly connate to each other in front of petiole, behind stem vaginate-connate to middle, rather densely hairy; petiole 0.5–1 cm, with rachis densely to rather densely hairy like stem; leaflets in (4–)6 or 7 pairs, elliptic to obovate, 2.5–5 × 1.5–3 mm, apex emarginate, both surfaces loosely covered with hairs 0.4–0.7 mm. Racemes short, rather densely 4–7-flowered; peduncle 1–2.5 cm, loosely hairy like stem; bracts ca. 1 mm, partly covered with basifixed hairs. Calyx 4–5 mm, rather densely hairy; teeth 2–2.5 mm. Petals reddish; standard elliptic, ca. 11 × 5 mm, apex emarginate; wings ca. 10 mm; keel ca. 8 mm. Legumes shortly stipitate, erect, linear, in upper part distinctly upcurved, 10–12 mm, ca. 2 mm high and ca. 1.5 mm wide, with a beak ca. 1 mm, 1-locular; valves thin, loosely covered with appressed to subappressed hairs ca. 3 mm.

• Bushes, meadows in forests; ca. 2500 m. Sichuan (Lixian).

249. *Astragalus sulcatus* Linnaeus, Sp. Pl. 2: 756. 1753.

纹茎黄耆 wen jing huang qi

Astragalus leptostachys Pallas.

Plants 20–80 cm tall, sparsely hairy; hairs mostly strongly asymmetrically bifurcate to subbasifixed, appressed, 0.3–0.8 mm. Stems mostly several, erect, with numerous non-flowering branches in leaf axils, sparsely to loosely hairy, sometimes glabrous. Leaves 4–8 cm, sessile; stipules 3–4 mm, those on lateral branches shorter, lower ones shortly to distinctly connate behind stem, upper ones free, sparsely hairy or glabrous; rachis hairy like stem; leaflets in leaves of main stem in 8–11 pairs, linear to narrowly oblong, 10–25 × 1–4(–7) mm, those at lateral branches mostly shorter and narrower, glabrous or abaxially sometimes with scattered appressed white hairs. Racemes 3–6 cm, remotely 6–20-flowered; peduncle 2.5–4 cm, sparsely covered with white and black hairs 0.2–0.3 mm; bracts 1.5–3 mm, sparsely black ciliate. Calyx 3(–4) mm, sparsely covered with black and sometimes also with some white hairs up to 0.3 mm; teeth linear, 0.8–1.2 mm. Petals pale violet; standard elliptic to rhombic-ovate, 6.5–8 × 4–4.5 mm, apex deeply incised; wings 5–7 mm; keel 4.5–5 mm. Legumes sessile, obliquely ascending, straight, 9–11 mm, 2–3 mm high and 1.5–2 mm wide, subtriquetrous in cross section, subacute, nearly 1-locular to slightly incompletely 2-locular; valves thin, sparsely covered with appressed white or predominantly black hairs up to 0.5 mm.

Gravelly steppes, moist meadows, saline soil. Gansu, Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)]; Europe].

250. *Astragalus variabilis* Bunge, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 33. 1877.

变异黄耆 bian yi huang qi

Astragalus dulanensis Y. H. Wu; *A. loczyi* Kanitz.

Plants 10–20 cm tall; hairs appressed to subappressed, ± medifixed, white, or in inflorescence also a few black, 0.3–0.5 mm. Stems several to many, branched at base, 6–15 cm, rather densely hairy. Leaves 2–4 cm; stipules ca. 2 mm, connate behind stem, sparsely hairy; petiole 1–1.5 cm; leaflets in 3(or 4) pairs, elliptic, 7–13 × 1.5–8 mm, abaxially rather densely hairy, adaxially subglabrous to sparsely hairy, sometimes densely hairy on both surfaces, apex rounded to widely retuse or emarginate. Racemes loosely to rather densely 5–20-flowered; peduncle 2–4 cm, rather densely hairy; bracts 0.5–1 mm, hairy. Calyx 3–5 mm, loosely to rather densely covered with white and some-

times also with a few black hairs; teeth subulate, 1–1.5 mm. Petals pale purplish to purple; standard elliptic, 9–11 × 4–5 mm, apex slightly emarginate to deeply incised; wings 8–8.5 mm, limbs distinctly incised; keel 6–7 mm. Legumes sessile, obliquely erect, slightly curved, slightly to distinctly torulose, 11–16 mm, 3–3.5 mm high and 1.5–2 mm wide, shortly acuminate, 2-locular; valves rather densely covered with appressed, symmetrically or asymmetrically bifurcate to partly subbasifixed, white hairs 0.3–0.5 mm, partly glabrescent with age.

Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia].

39. *Astragalus* sect. *Onobrychides* A. Gray, Proc. Amer. Acad. Arts 6: 197. 1864.

驴豆组 lǘ dòu zǔ

Astragalus sect. *Onobrychium* Bunge.

Plants with well-developed stem, covered with appressed to spreading, medifixed to slightly or strongly, even extremely, asymmetrically bifurcate or partly subbasifixed hairs. Stipules small, membranous, free from petiole, distinctly vaginate-connate behind stem. Peduncles straight, mostly shorter than stems. Bracteoles absent. Calyx tubular or campanulate, ruptured by legumes. Petals glabrous. Legumes 2-locular to more rarely incompletely 2-locular.

Eighty-nine species: mostly in SW Asia (Caucasus, Iran, and Turkey), spreading into Europe, other parts of SW Asia, C Asia, Pakistan, China, Mongolia, Russia, and Japan; two species in China.

- 1a. Leaflets in 4–7 pairs, 2–5 × 1–2 mm; standard 8–9 mm 251. *A. laspurensis*
 1b. Leaflets in 6–16 pairs, 5–25 × 2–7 mm; standard 12–16 mm 252. *A. laxmannii*

251. *Astragalus laspurensis* Ali, Phytol. (Horn) 11: 139. 1966.

西巴黄耆 xī bā huáng qī

Plants 15–22 cm tall; hairs in vegetative parts ± medifixed, distinctly flattened, appressed, white, 0.3–0.5 mm. Stems several, branched at base, slender, loosely to rather densely hairy. Leaves 1.5–4 cm, subsessile or lower ones with a short petiole; stipules 2–3 mm, behind stem vaginate-connate to middle or even higher up, loosely to rather densely hairy; rachis slender, hairy like stem; leaflets in (3 or) 4–7 pairs, obovate, 2–5 × 1–2 mm, both surfaces rather densely hairy, apex obtuse to slightly retuse. Racemes capitate, densely 10–12-flowered; peduncle 3.5–7.5 cm, hairy like stem; bracts 2–3 mm, with strongly asymmetrically bifurcate to basifixed predominantly black hairs. Calyx 5–7 mm, loosely to rather densely covered with subbasifixed to basifixed, ± spreading, white or white and black hairs ca. 1 mm; teeth 2–2.5 mm. Petals pale purple to yellow when dry; standard elliptic, 8–9 × ca. 3.5 mm, without distinct claw, apex deeply incised; wings ca. 8 mm; keel 6.5–7 mm. Ovary sessile, covered with white hairs up to 1 mm. Legumes unknown.

3000–4600 m. Xinjiang [Pakistan].

252. *Astragalus laxmannii* Jacquin, Hort. Bot. Vindob. 3: 22. 1776 [*“laxmanni”*].

斜茎黄耆 xié jīng huáng qī

Astragalus adsurgens Pallas; *A. albus* Širjaev; *A. austrosibiricus* Schischkin; *A. fujisanensis* Miyabe & Tatewaki; *A.*

inopinatus Borissova; *A. longispicatus* Ulbrich; *A. oostachys* E. Peter.

Plants 10–60 cm tall; hairs appressed, ± medifixed, in vegetative parts mostly only white, 0.3–0.6 mm. Stems mostly several, sometimes branched, prostrate to ascending or erect, sparsely hairy to glabrescent. Leaves 3–15 cm; stipules 4–10 mm, behind stem vaginate-connate to middle, sparsely hairy; petiole very short or up to 2.5 cm, like rachis sparsely to loosely hairy; leaflets in 6–16 pairs, narrowly elliptic, 5–25 × 2–7 mm, both surfaces sparsely to loosely hairy or adaxially subglabrous to glabrous, apex subacute to obtuse. Racemes ellipsoid, many flowered; peduncle 3–14 cm, sparsely hairy with white or black hairs; bracts 2–4 mm, with few black and white hairs. Calyx 5–7(–8) mm, sparsely to loosely, more rarely rather densely, covered with black and white or only black hairs 0.2–0.3 mm; teeth 1–3.5 mm. Petals purple to bluish violet, mostly yellow when dry; standard elliptic to slightly rhombic-elliptic, 12–16 × 5–6 mm, emarginate; wings 10–13 mm; keel 8–10 mm. Legumes sessile, distinctly curved, 20–30 mm, ca. 2 mm high and wide, 2-locular; valves loosely to rather densely covered with flexuous subappressed white hairs or appressed white and shorter black hairs.

Dry stony gravelly sandy soil in mixed forests, wet meadows, riverbanks, fallows; below 3700 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Mongolia, Russia (Far East, Siberia)].

40. *Astragalus* sect. *Ornithopodium* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 100. 1868.

鸟爪组 niǎo zhuǎ zǔ

Plants herbaceous or subshrubby, with developed stems, covered with ± medifixed to strongly asymmetrically bifurcate hairs.

Leaves imparipinnate, with 1–12 pairs of leaflets; stipules free from petiole or shortly adnate to it, vaginate-connate behind stem, more rarely upper ones or all free from each other. Inflorescences usually long, loosely to remotely flowered, rarely short, densely flowered, elongated in fruit. Petals free, pink, reddish, or more rarely violet, mostly violet when dry; wings shorter than standard and longer than keel, limbs rounded at apex or incised. Legumes linear, long, often slightly to more rarely distinctly constricted between seeds, 2-locular; valves leathery, appressed hairy or rarely glabrous.

Thirty-eight species: N Africa, C Asia to China and Mongolia, SW Asia (Caucasus, Iran, Turkey), Europe; 12 species (eight endemic) in China.

- 1a. Leaflets in 1–4 pairs.
- 2a. Leaflets elliptic, ca. 2 × as long as wide; calyx 7–8 mm; standard 13–15 mm 255. *A. hamiensis*
- 2b. Leaflets linear to narrowly elliptic, ca. 6 × as long as wide; calyx 11–14 mm; standard at least 19 mm.
- 3a. Plants herbaceous; leaflets in 1–3 pairs, 10–45 × 2–6 mm; calyx teeth 4–5 mm; petals white, standard 19–21 mm; ovary and legumes subsessile, legumes 25–45 mm 258. *A. kifonsanicus*
- 3b. Plants subshrubby; leaflets in 3 or 4 pairs, 7–20 × 1–3 mm; calyx teeth 1–1.5 mm; petals pink to pale violet, standard 24–25 mm; ovary and legumes distinctly stipitate; legumes 12–15 mm 253. *A. chorgosicus*
- 1b. Leaflets in at least 4 pairs but mostly in distinctly more.
- 4a. Petals all or only wings and keel pale yellow.
- 5a. Plants herbaceous, only with white hairs; standard ca. 15 mm 263. *A. shadiensis*
- 5b. Plants subshrubby, at least in calyx also with black hairs; standard at least 20 mm but mostly distinctly longer.
- 6a. Stipules 5–9 mm; bracts 4–5 mm; calyx covered with appressed to ascending, symmetrically or asymmetrically bifurcate, flexuous hairs; standard 25–27 × 10–11 mm 262. *A. maiusculus*
- 6b. Stipules distinctly shorter; bracts 1.5–2 mm; calyx covered with appressed, medifixed hairs; standard 20–24 × 7–8 mm.
- 7a. Stems very densely hairy; stipules 3–5 mm, those of lower leaves high connate; calyx 8–10 mm; limbs of wings minutely incised, wings and keel yellow, standard purple; legumes covered with ± symmetrically to slightly asymmetrically bifurcate, appressed hairs 256. *A. huochengensis*
- 7b. Stems loosely hairy; stipules 2–3 mm, shortly connate; calyx 11–13 mm; limbs of wings distinctly and often deeply obliquely incised, all petals pale yellow; legumes covered with strongly asymmetrically bifurcate, ascending to spreading hairs 254. *A. dsharkenticus*
- 4b. Petals all white, pink, purple, or violet.
- 8a. Leaflets adaxially glabrous or with a few scattered hairs only; calyx up to 8 mm; standard up to 14 mm.
- 9a. Stipules 5–7 mm, all high connate behind stem; bracts 2–4 mm; calyx 5–6 mm, covered with black hairs up to 1 mm and with strongly asymmetrically bifurcate white hairs up to 1.2 mm; legumes 25–30 mm 260. *A. leansanicus*
- 9b. Stipules 6–10 mm, only those of lowest leaves very shortly connate, all others free; bracts 5–10 mm; calyx ca. 8 mm, covered with medifixed only white hairs up to 0.8 mm; legumes ca. 15 mm 264. *A. supralaevis*
- 8b. Leaflets distinctly hairy adaxially; calyx 9–12 mm; standard at least 16 mm but mostly longer.
- 10a. Calyx teeth 4–5 mm; standard ca. 16 mm; legumes 17–20 mm, with a very short beak 259. *A. lanzhouensis*
- 10b. Calyx teeth 1–3 mm; standard 20–22 mm; legumes at least 22 mm but mostly distinctly longer, with a distinct beak 2–6 mm.
- 11a. Leaflets in 4–6 pairs; legumes sparsely covered with medifixed to asymmetrically bifurcate, appressed white hairs 261. *A. limprichtii*
- 11b. Leaflets in 6–10 pairs; legumes villous with asymmetrically bifurcate, subappressed to ascending or spreading white hairs up to 1 mm and with fewer, more appressed and shorter black hairs 257. *A. karkarensis*

253. *Astragalus chorgosicus* Lipsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 26: 257. 1907.

霍尔果斯黄耆 *huo er guo si huang qi*

Plants subshrubby, 20–32 cm tall, vegetative parts with appressed, ± medifixed, only white hairs 0.5–0.8 mm. Stems several, branched, old parts lignified, stems of current year up to 8 cm, loosely hairy, sometimes glabrescent. Leaves 3–5 cm; stipules 2–3 mm, adnate to petiole for 1–1.5 mm, behind stem connate to middle, sparsely hairy or nearly glabrous; petiole 0.5–1 cm, like rachis loosely to rather densely hairy; leaflets in

3 or 4 pairs, narrowly elliptic to linear, 7–20 × 1–3 mm, both surfaces loosely hairy, apex obtuse to subacute. Racemes 4–8 cm, loosely 5–10-flowered; peduncle 5–18 cm, sparsely to loosely hairy; bracts 1.5–2 mm, sparsely black and white hairy. Calyx 11–12 mm, sparsely covered with subappressed white and black hairs 0.3–0.5 mm; teeth 1–1.5 mm. Petals pink or pale violet; standard narrowly obovate to oblong, 24–25 × 7–8 mm, apex emarginate, slightly constricted in middle; wings 21–23 mm; keel ca. 20 mm. Legumes with a stipe 3–5 mm, oblong, straight, 12–15 mm, 3–4 mm high and 2–3 mm wide, with a straight beak 1–1.5 mm, 2-locular; valves glabrous or with scattered hairs.

Mountain slopes, arid bushes; 600–1200 m. NW Xinjiang [Kazakhstan].

254. *Astragalus dsharkenticus* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 11. 1947.

托木尔黄耆 tu mu er huang qi

Astragalus dsharkenticus var. *gongliuensis* S. B. Ho.

Plants subshrubby, 12–20 cm tall, with appressed ± medifixed hairs 0.5–1 mm. Stems several, branched at base, old parts lignified, stems of current year 3–10 cm, loosely hairy, sometimes glabrescent. Leaves 4–8 cm; stipules 2–3 mm, shortly adnate to petiole, shortly connate behind stem, sparsely black and white hairy or nearly glabrous; petiole 1.2–2.5 cm, like rachis loosely hairy; leaflets in 4–9 pairs, narrowly elliptic, 5–20 × 3–4 mm, abaxially loosely hairy, adaxially sparsely hairy, apex rounded to subacute. Racemes short, densely 5–10-flowered; peduncle 5–15 cm, sparsely to loosely hairy; bracts 1.5–2 mm, sparsely black and white hairy. Calyx 11–13 mm, loosely covered with subappressed predominantly black hairs, sometimes on ventral side with predominantly white and on dorsal side with predominantly black hairs; teeth 2–2.5 mm. Petals pale yellow; standard obovate, 20–22 × 7–8 mm, apex deeply emarginate, slightly constricted below middle; wings 16–19 mm, limbs oblong, apex obliquely and deeply emarginate; keel 13–17 mm. Legumes with a stipe ca. 2 mm, erect to spreading, linear, slightly to distinctly upcurved to nearly semicircular, 25–30 mm, 3–3.5 mm high and wide, with a straight beak ca. 1 mm, 2-locular; valves densely covered with ascending to spreading, strongly asymmetrically bifurcate, white hairs up to 1.2 mm and with mostly distinctly shorter and more symmetrically bifurcate black hairs.

Steppes; ca. 1800 m. NW Xinjiang [Kazakhstan, Kyrgyzstan].

Astragalus dsharkenticus var. *gongliuensis* is said to differ from the typical variety mainly by its 6–13 (instead of 4–9) pairs of leaflets.

255. *Astragalus hamiensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 43. 1983.

哈密黄耆 ha mi huang qi

Astragalus banzragczii N. Ulziykhutag; *A. centraligobicus* Z. Y. Chu & Y. Z. Zhao.

Plants 12–40 cm tall, caespitose, with appressed ± medifixed white hairs. Stems several to numerous, ascending to erect, sparsely to loosely covered with hairs 0.3–0.5 mm, often strongly glabrescent with age. Leaves 3–5 cm; stipules nearly semiamplexicaul, 3–4 mm, shortly adnate to petiole, loosely hairy; petiole 0.5–2.5 cm, like rachis loosely hairy; leaflets in (2 or) 3 or 4 pairs, remote, ± elliptic, 10–20 × 4–10 mm, both surfaces loosely covered with hairs 0.8–1 mm, apex acute or acuminate. Racemes 4–15-flowered; peduncle 5–8 cm, hairy like stem; bracts 3–4 mm, sparsely to loosely hairy. Calyx 7–8 mm, loosely to rather densely hairy; teeth unequal, 1–2 mm. Petals whitish to pinkish; standard obovate, 13–15 × 6–7 mm, apex emarginate; wings 11–13 mm; keel 13–14 mm. Legumes sessile, erect, linear, straight to slightly curved, 25–40 mm, 2–3 mm high and wide, with a straight beak 1–2 mm, 2-locular;

valves slightly knobby by seeds, loosely covered with appressed hairs up to 1 mm.

Gansu, Nei Mongol, Xinjiang [Mongolia].

256. *Astragalus huochengensis* Podlech & L. R. Xu, Novon 17: 238. 2007.

金沟河黄耆 jin gou he huang qi

Plants up to 30 cm tall, covered with appressed ± medifixed hairs. Stems several, loosely to rather densely covered with white or black and white hairs 0.5–0.7 mm. Leaves 3–8 cm; stipules 3–5 mm, very shortly adnate to petiole, lower ones high connate behind stem, often up to 3/4 of length or higher up, upper ones shortly connate, sparsely to loosely hairy; petiole 1–3 cm, with rachis hairy like stem; leaflets in 7–10 pairs, narrowly elliptic, 5–10 × 1.5–2.5 mm, abaxially loosely to rather densely covered with hairs ca. 1 mm, adaxially glabrous, apex obtuse to minutely acuminate. Racemes rather densely 10–15-flowered, elongating in fruit; peduncle 7–11 cm, sparsely to loosely white or black and white hairy like stem; bracts ca. 2 mm, sparsely white and black hairy. Calyx ca. 10 mm, rather densely covered with ± medifixed, subappressed, white and black hairs 0.5–1 mm; teeth 1–3 mm. Petals of lower flowers purple, of upper flowers yellow; standard narrowly rhombic-obovate, 23–24 × ca. 7 mm, apex slightly emarginate; wings ca. 21 mm, limbs obliquely emarginate; keel ca. 19 mm. Legumes (unripe) sessile, erect, linear, slightly curved, at least 25 mm, ca. 2 mm high and wide, with a short, straight beak 1–2 mm, 2-locular; valves densely covered with symmetrically or asymmetrically bifurcate, appressed, white hairs 0.5–0.8 mm.

• Xinjiang.

257. *Astragalus karkarensis* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 17. 1947.

直荚黄耆 zhi jia huang qi

Plants herbaceous, with appressed to subappressed, ± medifixed, mostly white hairs 0.5–0.8 mm. Stems 5–15(–20) cm, very densely hairy. Leaves 2–6(–9) cm; stipules 2–3 mm, shortly adnate to petiole, distinctly to high connate behind stem, hairy; petiole 1–2 cm, like rachis densely covered with subappressed to partly ascending hairs; leaflets in 6–10 pairs, narrowly elliptic, 5–12(–16) × 1.5–3 mm, both surfaces densely to rather densely hairy, apex obtuse. Racemes ovoid, rather densely 5–14-flowered; peduncle 3–11 cm, densely hairy; bracts 2.5–3 mm, with extremely asymmetrically bifurcate to basifixed mainly black hairs. Calyx 9–11 mm, densely covered with flexuous, ascending, on ventral side predominantly white, on dorsal side predominantly black hairs; teeth 1–2 mm. Petals whitish violet; standard obovate, ca. 22 × 7 mm, apex emarginate; wings ca. 20 mm, limbs oblong-spatulate, apex obliquely incised; keel ca. 16 mm. Legumes subsessile, spreading, linear, straight or scarcely curved, 22–35 mm, ca. 3 mm high and wide, with a subulate, straight beak 4–6 mm, 2-locular; valves villous with asymmetrically bifurcate, subappressed to ascending or spreading, white hairs up to 1 mm and with fewer, more appressed, shorter, black hairs.

Steppes. Xinjiang [Kazakhstan, Kyrgyzstan].

258. *Astragalus kifonsanicus* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 64. 1905.

鸡峰山黄耆 ji feng shan huang qi

Plants herbaceous, 15–40 cm tall, vegetative parts covered with appressed, \pm medifixed, white hairs 0.8–1.2 mm. Stems branched at base, densely hairy. Leaves 3–6 cm, sessile or subsessile; stipules 4–6 mm, free from petiole but connate in front of petiole up to 1 mm, slightly to high vaginate-connate behind stem, sometimes up to top, rather densely appressed hairy; rachis densely to rather densely hairy; leaflets in 1–3 pairs, narrowly elliptic, 10–45 \times 2–6 mm, abaxially mostly densely hairy, adaxially loosely hairy, apex acute to acuminate. Racemes 2.5–6 cm, rather densely 6–20-flowered; peduncle 5–13 cm, loosely to rather densely white hairy; bracts 2–5 mm, with partly strongly asymmetrically bifurcate and at margins basifixed hairs. Calyx 11–14 mm, rather densely white or black and white hairy; teeth 4–5 mm. Petals whitish; standard narrowly elliptic to narrowly obovate, 19–21 \times 5–6 mm, apex deeply incised; wings 17–18 mm; keel 14–16 mm. Legumes subsessile, spreading, linear, straight or slightly curved, 25–45 mm, 2.5–3 mm high and 2–2.5 mm wide, with a subulate, straight beak ca. 3 mm, 2-locular; valves slightly netlike wrinkled, loosely covered with appressed white hairs ca. 1 mm.

• Bushes, forest margins; 400–2000 m. Gansu, Henan, Shaanxi, Shanxi.

259. *Astragalus lanzhouensis* Podlech & L. R. Xu, Sendtnera 7: 185. 2001.

兰州黄耆 lan zhou huang qi

Astragalus stenoceras C. A. Meyer var. *longidentatus* S. B. Ho.

Plants 10–25 cm tall, with \pm medifixed, appressed to subappressed hairs. Stems branched near base, densely to rather densely covered with appressed mostly white hairs 0.6–1 mm. Leaves 2–5 cm; stipules 3–4 mm, free from petiole, high vaginate-connate behind stem, white hairy; petiole 0.5–1 cm, like rachis loosely to rather densely white hairy; leaflets in 8–12 pairs, narrowly elliptic, 7–15 \times 1–3 mm, both surfaces loosely hairy, apex acute. Racemes at fruiting time 2–4 cm, loosely 4–8-fruited; peduncle 2.5–8.5 cm, loosely hairy; bracts 3–4 mm, sparsely white and black hairy. Calyx 11–12 mm, loosely hairy; hairs subappressed, white and black, mostly predominantly white, ca. 1 mm; teeth 4–5 mm. Standard narrowly elliptic-oblong, ca. 16 \times 6.5 mm, apex emarginate; wings ca. 14 mm; keel ca. 11 mm. Legumes subsessile, obliquely erect or spreading, shortly stipitate, linear, slightly curved, terete, 17–20 mm, 2–2.4 mm thick, with a straight beak ca. 1 mm, nearly fully 2-locular; valves thin but tough, loosely to rather densely covered with appressed to subappressed, somewhat flexuous, white hairs 0.6–0.8 mm.

• Loessic steppes; 1200–2600 m. C Gansu.

260. *Astragalus leansanicus* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 62. 1905.

莲山黄耆 lian shan huang qi

Plants up to 40 cm tall, covered with appressed, mostly \pm medifixed, in vegetative parts only white hairs up to 1 mm. Stems several to numerous, very sparsely to loosely hairy. Leaves 3–6 cm; stipules 5–7 mm, very shortly adnate to petiole, high vaginate-connate behind stem, glabrous or ciliate; petiole 0.5–1 cm, like rachis loosely hairy; leaflets in 5–8 pairs, \pm narrowly elliptic, 5–10(–15) \times 1.5–4(–6) mm, abaxially sparsely to loosely hairy, adaxially glabrous or with few hairs, apex obtuse to emarginate. Racemes rather densely 6–15-flowered; peduncle 6–10 cm, sparsely white hairy; bracts 2–4 mm, sparsely ciliate with subbasifixed to basifixed white and black hairs. Calyx 5–6 mm, sparsely to loosely covered with strongly asymmetrically to nearly symmetrically bifurcate black hairs 0.3–1 mm and with mostly fewer and slightly longer, strongly asymmetrically bifurcate white hairs up to 1.2 mm; teeth 1–2 mm. Petals purple; standard obovate, ca. 14 \times 5–6 mm, apex emarginate; wings 12–13 mm; keel ca. 10 mm. Legumes sessile, erect, linear, straight or very slightly curved, 25–30 mm, ca. 2 mm high and wide, with a straight beak 1–2 mm, 2-locular; valves sparsely covered with appressed white hairs 0.5–1.2 mm.

• 1000–2200 m. Gansu, Shaanxi, Shanxi.

261. *Astragalus limprichtii* Ulbrich, Repert. Spec. Nov. Regni Veg. Beih. 12: 422. 1922.

长管萼黄耆 chang guan e huang qi

Plants up to 40 cm tall, with appressed, medifixed, mostly white hairs 0.3–0.8 mm. Stems prostrate to ascending or erect, slender, branched, densely hairy. Leaves 3–8 cm, subsessile or with a petiole up to 1.5 cm; stipules 4–5 mm, free from petiole, high vaginate-connate behind stem, sparsely to loosely hairy; rachis densely hairy; leaflets in 4–6 pairs, narrowly elliptic, 8–12 \times 2–4 mm, abaxially more densely hairy, adaxially sparsely to loosely hairy. Racemes loosely 8–10-flowered; peduncle 3.5–6 cm, densely hairy; bracts 1–2 mm, sparsely white and black hairy. Calyx 10–12 mm, sparsely white and black hairy; teeth 2–3 mm. Petals pale violet; standard obovate, ca. 20 \times 5–6 mm, apex emarginate; wings ca. 18 mm; keel ca. 15 mm. Legumes subsessile, erect, linear, slightly curved, 30–40 mm, ca. 3 mm high and ca. 2.5 mm wide, with a beak 2–4 mm, 2-locular; valves sparsely covered with medifixed to asymmetrically bifurcate, appressed, white hairs 0.6–1 mm.

• 300–1100 m. Henan, Shaanxi, Shanxi, Xinjiang.

262. *Astragalus maiusculus* Podlech & L. R. Xu, Novon 17: 239. 2007.

买依尔黄耆 mai yi er huang qi

Plants ca. 20 cm tall. Stems several, branched, old parts lignified, stems of current year 1–5 cm, very densely hairy; hairs \pm medifixed, appressed to subappressed, white, near nodes also black, 0.8–1 mm. Leaves 5–15 cm; stipules 5–9 mm, very shortly adnate to petiole, shortly but distinctly vaginate-connate behind stem, densely hairy; petiole 3–9 cm, like rachis sparsely to loosely covered with subappressed to ascending, symmetrically to strongly asymmetrically bifurcate hairs 0.8–1.5 mm; leaflets in 5–8 pairs, remote, elliptic, 5–10 \times 2–6 mm, both surfaces loosely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly ascending hairs 1.2–2 mm,

apex rounded. Racemes short, densely 3–5-flowered; peduncle 2–4 cm, loosely to rather densely white and black hairy like rachis; bracts 4–5 mm, white and black or predominantly black hairy. Calyx 13–14 mm, slightly inflated, rather densely covered with symmetrically or asymmetrically bifurcate, subappressed to ascending, flexuous, on dorsal side and at teeth predominantly black, on ventral side often predominantly white hairs 0.8–1 mm; teeth 2–3 mm. Petals pale yellow; standard obovate, 25–27 × 10–11 mm, deeply and widely emarginate; wings 23–24 mm, limbs narrowly oblong, obliquely and sometimes deeply emarginate; keel ca. 20 mm. Ovary subsessile, linear, white hairy. Legumes unknown.

- N Xinjiang (Toli).

263. *Astragalus shadiensis* L. R. Xu, Zhao Y. Chang & Podlech, *Acta Bot. Boreal.-Occid. Sin.* 27: 170. 2007.

沙地黄耆 sha di huang qi

Astragalus sadiensis Podlech, L. R. Xu & Zhao Y. Chang.

Plants 20–25 cm tall, only white hairy. Stems few, densely covered with medifixed, appressed hairs 0.5–0.8 mm. Leaves 4–5 cm; stipules ca. 3 mm, only those of lowest leaves shortly connate behind stem, others free from each other, all rather densely appressed hairy; petiole 1–1.5 cm, with rachis densely hairy like stem, at insertion of leaflets and leaflet petiole with ± spreading, strongly to extremely asymmetrically bifurcate hairs ca. 0.8 mm; leaflets in 4 pairs, narrowly elliptic, 7–12 × 1.5–3 mm, both surfaces loosely to rather densely covered with medifixed, appressed hairs 0.6–1 mm, apex acute to shortly acuminate. Racemes loosely 2–10-flowered; peduncle 3–5 cm, hairy like stem; bracts 2–3 mm, loosely hairy. Calyx ca. 10 mm, loosely to rather densely covered with subappressed, ± medifixed, white hairs 0.5–0.8 mm, at margins of teeth also with strongly asymmetrically bifurcate hairs; teeth unequal, 2–3 mm.

Petals yellow; standard ca. 15 × 5 mm, apex emarginate; wings ca. 12 mm; keel ca. 12 mm. Legumes (unripe) ca. 25 mm, ca. 2 mm high, shortly acuminate; valves loosely covered with medifixed, appressed hairs 0.5–0.8 mm.

- Xinjiang.

The holotype of *Astragalus sadiensis* Podlech et al., conserved at PE, belongs to the same gathering as that of *A. shadiensis* L. R. Xu et al., conserved at LZD. The name *Astragalus shadiensis* has priority (published mid-January 2007) over *A. sadiensis* (published 20 June 2007).

264. *Astragalus supralaevis* Podlech & L. R. Xu, *Novon* 17: 240. 2007.

德钦黄耆 de qin huang qi

Plants at least 35 cm tall (basal parts missing), covered with appressed, mostly ± medifixed, white hairs 0.3–0.5 mm. Stems loosely to rather densely hairy. Leaves 10–16 cm; stipules 6–10 mm, very shortly adnate to petiole, only those of lowest leaves shortly connate behind stem, all others free from each other, loosely to rather densely hairy; petiole 2–2.5 cm, hairy like stem; leaflets in 9–12 pairs, narrowly elliptic, 12–22 × 4–9 mm, abaxially sparsely to loosely hairy, adaxially glabrous, apex obtuse to rounded. Racemes loosely many flowered, elongating in fruit up to 8 cm; peduncle 10–11 cm, hairy like stem; bracts 5–10 mm, loosely to rather densely hairy. Calyx ca. 8 mm, densely to rather densely hairy; teeth unequal, 2–3 mm. Petals pink; standard obovate to elliptic, ca. 13 × 5 mm, apex emarginate; wings ca. 12 mm; keel ca. 10 mm. Legumes (unripe) sessile, linear, slightly curved, ca. 15 mm, ca. 3 mm high, with a short, straight beak ca. 2 mm; valves loosely hairy, soon glabrescent.

- About 3300 m. NW Yunnan (Baima Shan).

41. *Astragalus* sect. *Xiphidium* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér.* 7, 11(16): 123. 1868.

疏花组 shu hua zu

Plants shrubby, subshrubby, or herbaceous, perennial, with well-developed stems, covered with bifurcate or more rarely to subbasifixed hairs. Leaves imparipinnate; stipules free or adnate to petiole, otherwise free from each other. Racemes mostly loose, borne on a well-developed peduncle. Bracteoles absent. Flowers shortly pedicellate. Calyx tubular. Petals glabrous; wing limbs mostly rounded at apex to retuse or slightly emarginate. Legumes sessile, or more rarely stipitate, 2-locular; valves leathery.

About 165 species: Afghanistan, China, Kashmir, Mongolia, Pakistan, Russia (Siberia); N Africa (Egypt), C and SW Asia, Europe; 13 species (two endemic) in China.

- 1a. Plants subshrubby to shrubby, up to 120 cm.
 - 2a. Bracts 2.5–4 mm, white and black hairy; calyx covered with subbasifixed to basifixed, subappressed to ascending, white hairs 0.6–1.8 mm and with ± medifixed, appressed, black hairs 0.3–0.6 mm; standard with tongue-like narrowed tip 270. *A. gontscharovii*
 - 2b. Bracts 1–2 mm, black ciliate; calyx covered with strongly asymmetrically bifurcate, flexuous, ascending, white hairs up to 1 mm and with subappressed black hairs 0.1–0.3 mm; standard without tongue-like narrowed tip 267. *A. arbuscula*
- 1b. Plants herbaceous, if slightly subshrubby, then only up to 35 cm tall.
 - 3a. Leaflets in 2–4 pairs.
 - 4a. Calyx 11–13 mm; standard slightly constricted below middle.
 - 5a. Leaflets narrowly elliptic, 4–14 × 1–3 mm; petals purple or dirty yellowish violet; legumes ca. 20 mm, covered with symmetrically to strongly asymmetrically bifurcate white hairs 1–1.5 mm and with fewer shorter black hairs 266. *A. anfractuosus*

- 5b. Leaflets filiform, 8–20 × 0.3–0.5 mm; petals yellow; legumes 30–35 mm, covered with medifixed predominantly black hairs 0.3–0.5 mm 271. *A. laetabilis*
- 4b. Calyx 8–10 mm; standard not or distinctly constricted.
- 6a. Leaves 6–16 cm with a long petiole ± as long as rachis; calyx with white hairs only 276. *A. sogotensis*
- 6b. Leaves 1–5 cm, subsessile; calyx white and black hairy.
- 7a. Stipules ca. 2 mm; leaflets linear, 4–15(–20) × 1–1.5 mm; bracts 1–1.5 mm; calyx covered with medifixed, at dorsal side predominantly appressed black hairs 0.3–0.5 mm and at ventral side with subappressed to ascending, longer, predominantly white hairs; standard obovate 269. *A. compressus*
- 7b. Stipules 3–5 mm; leaflets narrowly oblong, 12–20 × 2–4 mm; bracts 2.5–4 mm; calyx covered with strongly asymmetrically bifurcate, appressed to ascending, white hairs 0.8–1 mm and with medifixed, appressed, black hairs 0.2–0.3 mm; standard rhombic-elliptic, distinctly constricted below middle 274. *A. polyceras*
- 3b. Leaflets at least in 4, but mostly in more and up to 9, pairs.
- 8a. Peduncles equaling or slightly longer than leaves.
- 9a. Calyx densely covered with subappressed to spreading, strongly asymmetrically bifurcate, white hairs 0.3–1.2 mm and with often much shorter black hairs 265. *A. amabilis*
- 9b. Calyx covered with appressed, medifixed, predominantly black hairs.
- 10a. Calyx 11–15 mm; petals pink, often suffused with yellow or green; standard 24–27 mm ... 273. *A. macrotropis*
- 10b. Calyx 9–12 mm; petals white or violet; standard 20–22 mm 272. *A. macrolobus*
- 8b. Peduncles 1.5–3 × as long as leaves.
- 11a. Leaflets in 9–12 pairs; bracts 3–4 mm; calyx 10–12 mm; petals yellowish, standard ca. 25 mm; legumes 40–45 mm, black hairy 275. *A. pseudoamabilis*
- 11b. Leaflets in 5–9 pairs; bracts 1–2 mm; calyx up to 10 mm; petals purple to lilac, standard up to 22 mm; legumes 20–35 mm, white and black hairy.
- 12a. Stems and leaves sparsely hairy; calyx 6–7 mm 268. *A. ceratoides*
- 12b. Stems and leaves densely to very densely hairy; calyx 8–10 mm 277. *A. stenoceras*

265. *Astragalus amabilis* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 113. 1938.

喜黄耆 xi huang qi

Plants 8–15 cm tall, vegetative parts covered with medifixed, appressed, white hairs up to 1(–1.5) mm, stipules and rachis with black hairs mixed in. Stems up to 10 cm, densely hairy. Leaves 3–4 cm; stipules 2.5–4 mm, densely hairy; petiole 0.5–1 cm, densely hairy; leaflets in 5 or 6 pairs, elliptic, 7–9 × 3–4.5 mm, abaxially rather densely and adaxially loosely covered with tangled hairs up to 1.5 mm. Racemes densely 5–10-flowered; peduncle ca. 3 cm, hairy like rachis; bracts 2–4 mm, white and black hairy. Calyx 14–16 mm, densely covered with subappressed to ascending or even spreading, strongly asymmetrically bifurcate white hairs up to 1.3 mm and with often much shorter black hairs; teeth 3–4 mm. Petals purplish violet; standard obovate, 19–24 × 8–10 mm, apex emarginate; wings 18–23 mm; keel 17–20 mm. Legumes sessile, narrowly linear, erect to spreading, 25–40 mm, with a subulate beak 1.5–2 mm, densely covered with subappressed to ascending, asymmetrically bifurcate white hairs up to 1 mm.

Xinjiang [Kazakhstan].

266. *Astragalus anfractuosus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 125. 1868.

曲之黄耆 qu zhi huang qi

Plants 7–18 cm tall, vegetative parts covered with medifixed white hairs 0.3–1 mm, stipules and nodes also with some black hairs. Stems mostly several, slender, prostrate to ascending or rarely erect, loosely appressed hairy. Leaves 2–4.5 cm; stip-

ules 2–4 mm, nearly free from petiole, rather densely hairy; petiole 1–1.5 cm, like rachis slender, rather densely appressed hairy; leaflets in 2–4 pairs, remote, linear to narrowly elliptic, 4–10 × 1–2 mm, abaxially rather densely appressed hairy, adaxially loosely appressed hairy, apex obtuse to subacute. Racemes short, rather loosely (2–)4–7-flowered; peduncle 2–11 cm, slender, rather loosely hairy; bracts 1–2 mm, white or black and white hairy. Calyx 11–13 mm, densely or more rarely loosely covered with appressed white hairs 0.8–1 mm and with mostly shorter black hairs; teeth 1.5–2 mm. Petals purplish or dirty yellowish violet, rarely pale yellowish; standard rhombic-elliptic to obovate, 20–21 × 7.5–9 mm, slightly constricted below middle, apex truncate to slightly retuse; wings 18–20 mm; keel 15–17 mm. Legumes (unripe) sessile, linear, erect to horizontally spreading, ca. 20 mm, ca. 2 mm high, shortly attenuate; valves densely covered with appressed to subappressed, ± symmetrically to strongly asymmetrically bifurcate, often flexuous, partly distinctly flattened, white hairs 1–1.5 mm and with much fewer and shorter black hairs.

Gravelly areas; 2700–3700 m. Xinjiang, Xizang [Kashmir].

The Chinese record of *Astragalus gladiatus* Boissier (FRPS 42(1): 306. 1993) is referable to *A. anfractuosus*.

267. *Astragalus arbuscula* Pallas, Sp. Astragal. 19. 1800.

木黄耆 mu huang qi

Astragalus eremothamnus Karelin & Kirilov; *A. horizontalis* Karelin & Kirilov.

Plants subshrubs, 50–120 cm tall, covered with mostly medifixed, appressed, in vegetative parts nearly only white

hairs 0.6–1(–1.2) mm. Stems several, branched near base, older parts (10–)30–80 cm, ligneous, covered with longitudinally splitting bark; branches of current year 5–20(–30) cm, densely hairy. Leaves 3–5 cm, sessile; stipules 3–4 mm, shortly adnate to petiole, densely hairy; rachis 1–2 cm, rather densely hairy; leaflets in 2–4 pairs, linear, (8–)12–40 × (1–)1.5–3(–7) mm, abaxially somewhat densely and adaxially loosely hairy, apex acute. Racemes ovoid, 2–3(–4) cm, densely 8–22-flowered; peduncle 7–10 cm, densely hairy; bracts 1–2(–3) mm, mostly black ciliate. Calyx 7–10 mm, sparsely to densely covered with strongly asymmetrically bifurcate, flexuous, ascending, white hairs up to 1 mm and with distinctly shorter, subappressed, black hairs 0.1–0.3 mm; teeth 1.5–2 mm. Petals purple; standard rhombic, 15–19 × ca. 6 mm, apex retuse; wings 14–17 mm; keel 11–14 mm. Legumes sessile, spreading or rarely nodding, straight, 20–30 mm, (1.5–)2 mm thick, apex shortly acuminate; valves densely covered with symmetrically or asymmetrically bifurcate, appressed, black hairs 0.3–0.6 mm and with distinctly asymmetrically bifurcate, appressed to slightly ascending, white hairs 0.6–0.8 mm, rarely only with white hairs.

Steppes, semideserts. NW Xinjiang [Kazakhstan, Russia (Siberia)].

268. *Astragalus ceratoides* M. Bieberstein, Fl. Taur.–Caucas. 3: 492. 1819.

角黄耆 jiao huang qi

Astragalus ceratoides var. *montanus* Ledebour; *A. stenolobus* Bunge.

Plants 12–40 cm tall, vegetative parts with ± medifixed, appressed, mostly white hairs 0.5–0.8 mm. Stems mostly several to many, erect or ascending at base, loosely hairy. Leaves 3–6 cm; stipules 2–3 mm, nearly free from petiole, hairy; petiole 0.5–1.5 cm, like rachis slender, loosely hairy; leaflets in 5–7(–9) pairs, narrowly elliptic, 5–15 × 1–4 mm, abaxially loosely hairy, adaxially glabrous or sparsely hairy. Racemes subumbellate to capitate, 5–10-flowered; peduncle 9–20 cm, sparsely hairy; bracts 1.5–2 mm, black hairy, at margins with extremely asymmetrically bifurcate hairs. Calyx 6–7 mm, rather densely covered with predominantly black hairs 0.3–0.5 mm; teeth 1–1.5 mm. Petals purplish lilac; standard obovate, 18–22 × 7–10 mm, apex retuse; wings 16–17 mm; keel 15–16 mm. Legumes sessile, obliquely erect or starlike spreading, linear, 25–35 mm, 2–3 mm high and wide, acuminate; valves densely covered with ± appressed, asymmetrically bifurcate, white hairs up to 0.8 mm and with distinctly shorter black hairs.

Stony mountain slopes, steppes. NW Xinjiang [Kazakhstan, Russia (Siberia)].

269. *Astragalus compressus* Ledebour, Fl. Altaic. 3: 304. 1831.

扁序黄耆 bian xu huang qi

Plants 6–30 cm tall. Stems several, ligneous at base, prostrate to erect, branched, parts of current year 1–12 cm, very densely covered with medifixed, appressed, white hairs 0.6–0.8 mm. Leaves 1–5 cm, sessile or petiole up to 1 cm, with rachis hairy like stem; stipules ca. 2 mm, very shortly adnate to petiole, white hairy; leaflets in 3(or 4) pairs, linear, 4–15(–20)

× 1–1.5 mm, abaxially rather densely and adaxially loosely covered with medifixed, appressed hairs ca. 1 mm. Racemes 2.5–3 cm, 5–12-flowered; peduncle 4–6(–20) cm, hairy like stem; bracts 1–1.5 mm, black and white hairy. Calyx 8–10 mm, covered with medifixed hairs, at dorsal side with predominantly appressed black hairs 0.3–0.5 mm and at ventral side with subappressed to ascending, longer, predominantly white hairs, sometimes all over with white hairs; teeth 0.5–1.5 mm. Petals lilac-purple; standard obovate, 18–22 × 7–9 mm, apex emarginate; wings 17–20 mm; keel 15–17 mm. Legumes 12–28 mm, 2–3 mm high and ca. 1.5 mm wide, shortly acuminate; valves densely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly or partly distinctly ascending, white hairs 0.4–0.8 mm, with some black hairs mixed in.

Sandy and gravelly soil near rivers and lakes. Gansu, Xinjiang [Kazakhstan, Russia (Siberia)].

270. *Astragalus gontscharovii* Vassilczenko in Komarov, Fl. URSS 12: 887. 1946.

半灌黄耆 ban guan huang qi

Plants subshrubby, up to 100 cm tall, vegetative parts with appressed, medifixed, white hairs. Stems ligneous in lower part, branched, parts of current year up to 30 cm, densely covered with hairs 0.5–0.8 mm. Leaves 3–8 cm, sessile; stipules 3–4 mm, nearly free from petiole, hairy, at margins with short basifixed hairs; rachis rather densely hairy; leaflets in 3–5 pairs, 7–20(–25) × 1.5–4(–7) mm, abaxially loosely to rather densely and adaxially sparsely to loosely covered with hairs up to 1.3 mm. Racemes capitate, densely many flowered; peduncle 7–12 cm, erect, densely hairy; bracts 2.5–4 mm, with black and white hairs. Calyx 10–15 mm, sparsely to densely covered with subbasifixed to basifixed, subappressed to ascending, white hairs 0.6–1.8 mm and with ± medifixed, appressed, black hairs 0.3–0.6 mm; teeth 2–5 mm. Petals pale violet to white; standard elliptic, 16–18 × ca. 7 mm, slightly constricted in lower 1/3, in upper 1/3 tongue-like narrowed, emarginate; wings 14–16 mm; keel 10–11 mm. Legumes sessile, obliquely ascending, 20–30 mm, 2.5–3 mm in diam., with a breakable beak 3–5 mm; valves covered with appressed black and scattered white hairs.

Mountain meadows. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

271. *Astragalus laetabilis* Podlech & L. R. Xu, Novon 17: 234. 2007.

丝叶黄耆 si ye huang qi

Plants subshrubby, ca. 30 cm tall, covered with medifixed, appressed hairs. Stems shortly ligneous in lower part, parts of current year up to 18 cm, loosely furnished with hairs 0.4–0.5 mm. Leaves 2–4.5 cm; stipules 1.5–3 mm, hairy like stem; petiole 0.8–2 cm, very slender, with rachis loosely to rather densely hairy like stem; leaflets in 2–4 pairs, filiform, (4–)8–20 × 0.3–0.5 mm, both surfaces loosely covered with hairs 0.5–1 mm. Racemes 2.5–4 cm, 3–7-flowered; peduncle 6–11 cm, hairy like stem; bracts 1.5–2 mm. Calyx 11–12 mm, rather densely covered with white and black hairs 0.5–1 mm; teeth 2–3 mm. Petals yellow; standard obovate, ca. 20 × 7–8 mm, in middle constricted, apex emarginate; wings ca. 18 mm; keel ca.

15 mm. Legumes (not fully ripe) linear, straight, 30–35 mm, ca. 2 mm high and wide, shortly acuminate; valves densely covered with \pm medifixed, appressed, predominantly black hairs 0.3–0.5 mm.

• Xizang.

272. *Astragalus macrolobus* M. Bieberstein, Fl. Taur.-Caucas. 3: 493. 1819.

长荚黄耆 chang jia huang qi

Astragalus macroceras C. A. Meyer ex Bongard.

Plants 10–20(–50) cm tall. Stems of current year 1.5–8(–20) cm, mostly ascending at base, very densely covered with appressed white hairs. Leaves 3–7 cm; stipules 3–5 mm, free or shortly adnate to petiole, hairy; petiole 1–2 cm; leaflets in 5–7 pairs, 5–12 \times 1.5–4 mm. Racemes 4–5 cm, rather loosely 7–15-flowered; peduncle 3–8 cm, appressed white hairy; bracts ca. 2 mm, black or white and black hairy. Calyx 9–12 mm, appressed, predominantly black hairy; teeth ca. 2 mm. Petals white or violet; standard obovate, 20–22 mm, apex retuse; wings 15–17 mm; keel 13–14 mm. Legumes sessile, obliquely erect, slightly curved, 20–30 mm, 2–2.5 mm high and wide, with a subulate beak ca. 1 mm; valves appressed white hairy, with some black hairs mixed in.

Stony mountain steppes. Xinjiang [Mongolia, Russia (Siberia)].

The Chinese records of *Astragalus ortholobiformis* Sumnevitz from Gansu and Xinjiang (FRPS 42(1): 310. 1993) are possibly based on misidentifications of some forms of *A. macrolobus* (a difficult group). No Chinese material of *A. ortholobiformis* has been seen; it is a rare species of W Kazakhstan.

273. *Astragalus macrotropis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 127. 1868.

长龙骨黄耆 chang long gu huang qi

Astragalus stenoceras C. A. Meyer var. *macranthus* Bunge.

Plants 15–22 cm tall, with \pm medifixed, appressed hairs 0.4–1.5 mm. Stems mostly several, erect, loosely to rather densely covered with mostly white hairs. Leaves 3–7 cm; stipules 2.5–3.5 mm, shortly adnate to petiole, hairy; petiole 1–2.5 cm, with slender rachis hairy like stem; leaflets in 4–7(–9) pairs, 5–12 \times 1.5–4 mm, abaxially loosely and adaxially sparsely covered with white hairs 0.8–1.5 mm. Racemes short to subumbellate, 3–5-flowered; peduncle 4–9 cm, loosely hairy like stem; bracts 2–2.5 mm, sparsely mainly black hairy, at margins with subbasifixed hairs. Calyx 11–15 mm, loosely to rather densely covered with predominantly black hairs 0.3–0.5(–0.8) mm; teeth 1.5–2.5 mm. Petals pink; standard obovate, 24–27 \times 8–10 mm, apex emarginate, slightly constricted below middle; wings 20–23 mm; keel 18–21 mm. Legumes sessile, obliquely erect or starlike spreading, 25–40 mm, ca. 2 mm high and wide, with a straight beak 1–2 mm; valves densely covered with short, at ventral side predominantly black, at dorsal side predominantly white hairs.

Stony mountain steppes, wastelands; ca. 1000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

274. *Astragalus polyceras* Karelín & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 332. 1842.

多角黄耆 duo jiao huang qi

Plants subshrubby, 30–40 cm tall, vegetative parts covered with medifixed, appressed hairs. Stems in older parts ligneous, 5–12 cm, branched, parts of current year 10–25(–30) cm, very densely covered with white hairs 0.7–0.9 mm. Leaves 3–5 cm; stipules (2–)3–5 mm, densely white hairy; petiole 0.3–0.7 cm, with rachis densely hairy like stem; leaflets in 2 or 3 pairs, 12–20(–30) \times (1–)2–4 mm, abaxially densely and adaxially loosely to rather densely or more rarely sparsely covered with hairs 1–1.5 mm. Racemes 6–11(–14) cm, loosely to remotely (4–)9–15-flowered; peduncle 4–8 cm, densely white hairy like stem; bracts 2–4 mm, white and black hairy. Calyx 8–11 mm, densely covered with strongly asymmetrically bifurcate, subappressed to ascending, \pm flexuous, white hairs 0.8–1 mm and with \pm medifixed, flexuous, appressed, black hairs 0.2–0.3 mm; teeth 2–2.5 mm. Petals purple; standard rhombic-elliptic to rhombic-obovate, 16–21 \times ca. 8 mm, apex emarginate, mostly distinctly constricted below middle; wings 15–19 mm; keel 14–15 mm. Legumes sessile, straight or slightly curved, 23–31 mm, 1.5–2 mm high and 2–3 mm wide, with a straight beak 1–2 mm; valves densely covered with symmetrically to predominantly strongly asymmetrically bifurcate, appressed to predominantly ascending, white hairs up to 1 mm and sometimes with shorter, appressed, black hairs.

Xinjiang [Kazakhstan].

275. *Astragalus pseudoamabilis* Podlech & L. R. Xu, Feddes Repert. 120: 50. 2009.

类喜黄耆 lei xi huang qi

Plants ca. 30 cm tall, covered with appressed, medifixed hairs. Stems 10–20 cm, loosely to rather densely covered with white hairs 0.3–0.5 mm and some black hairs mixed in. Leaves 8–10 cm; stipules 3–4 mm, white and black hairy; petiole 1.5–3 cm, with rachis hairy like stem; leaflets in 9–12 pairs, 10–13 \times 3–5 mm, abaxially sparsely to loosely and adaxially very sparsely hairy. Racemes densely 10–15-flowered; peduncle 13–18 cm, sparsely to loosely hairy like stem; bracts 3–4 mm, black hairy. Calyx 10–12 mm, loosely black hairy; teeth ca. 2 mm. Petals yellowish; standard narrowly elliptic, ca. 25 \times 7 mm, apex emarginate; wings 18–21 mm; keel ca. 16 mm. Legumes (unripe) sessile, erect to spreading, narrowly linear, 40–45 mm, 1.5–2 mm high, with a subulate beak 1.5–2 mm, densely covered with appressed, symmetrically or asymmetrically bifurcate, black hairs up to 0.6 mm.

• 1200–1900 m. NW Xinjiang.

276. *Astragalus sogotensis* Lipsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 26: 178. 1907.

索戈特黄耆 suo ge te huang qi

Plants herbaceous to subshrubby, 25–30 cm tall, covered with \pm medifixed, appressed, only white hairs 0.8–1.2 mm. Stems branched, 4–10 cm, very densely hairy. Leaves 6–16 cm; stipules 1.5–2 mm, shortly adnate to petiole, densely hairy; petiole 2–12 cm, like rachis densely hairy; leaflets in 2 or 3

pairs, 12–30 × 1–2 mm, both surfaces rather densely hairy. Racemes (7–)12–18 cm, remotely 8–10-flowered; peduncle 8–15 cm, rather densely hairy; bracts 2–3 mm, hairy, at margins with strongly asymmetrically bifurcate to basifixed hairs. Calyx 8–10 mm, densely hairy; teeth ca. 2 mm. Petals pale purplish; standard elliptic, 10–20 × ca. 7 mm, apex emarginate; wings 15–17 mm; keel 12–13 mm. Legumes sessile, erect, straight or slightly curved, 21–23 mm, ca. 2 mm high and wide, with a subulate beak 2–2.5 mm; valves with scattered short, appressed hairs.

Gravelly steppes. NW Xinjiang [Kazakhstan].

277. *Astragalus stenoceras* C. A. Meyer in Bongard & C. A. Meyer, *Verz. Saisang-nor Pfl.* 23. 1841.

狭荚黄耆 xia jia huang qi

Plants 12–25 cm tall, subshrubby, vegetative parts covered with medifixed, appressed hairs. Stems mostly several, older parts ligneous, branched near base, parts of current year 3–12 cm, very densely covered with mostly white hairs 0.6–0.8 mm.

Leaves 2–5 cm; stipules 1–2 mm, shortly adnate to petiole, hairy; petiole 0.5–1.5 cm, with rachis slender, loosely to densely hairy like stem; leaflets in 5–7 pairs, narrowly elliptic, 4–11 × 0.5–2 mm, both surfaces loosely to densely covered with white hairs. Racemes capitate-umbellate, 4–8(–10)-flowered; peduncle 5–10 cm, loosely to densely hairy like stem; bracts 1–1.5 mm, white and black hairy. Calyx 8–10 mm, densely covered with ± asymmetrically bifurcate, subappressed, white hairs 0.5–0.8 mm (predominantly adaxially) and with more symmetrically bifurcate, shorter, black hairs (predominantly abaxially); teeth 0.5–1.5 mm. Petals lilac; standard obovate, 20–22 × ca. 8 mm, apex emarginate; wings 18–20 mm; keel 16–18 mm. Legumes shortly stipitate, erect to obliquely erect or spreading, straight, 20–35 mm, 1.5–2 mm high, ca. 1 mm wide, with a straight, slender beak 1–2 mm; valves rather densely covered with appressed to subappressed, asymmetrically bifurcate, white hairs ca. 1 mm and with more symmetrically bifurcate, shorter, black hairs.

Steppes and steppelike meadows in dry mountain regions. Xinjiang [Kazakhstan, Mongolia, Russia (Siberia), Tajikistan].

42. *Astragalus* sect. *Corethrums* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 98. 1868.*

帚状组 zhou zhuang zu

Plants perennial, acaulescent or subacaulescent, furnished with medifixed or partly asymmetrically bifurcate hairs. Leaves imparipinnate; stipules ± adnate to petiole, otherwise free. Racemes borne on a long peduncle, loosely flowered, rarely dense at beginning of anthesis and elongating with age. Bracteoles absent. Calyx campanulate to campanulate-tubular. Petals purple, rose, or violet; wing limbs often distinctly incised. Legumes narrowly ovoid to narrowly oblong, keeled ventrally, grooved dorsally, fully 2-locular or nearly so.

Twelve species: China, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; six species (three endemic) in China.

- 1a. Calyx 10–15 mm, with subbasifixed, spreading, white hairs 1–1.5 mm and with shorter black hairs 278. *A. angustissimus*
 1b. Calyx shorter, with appressed hairs.
 2a. Plants with sterile shoots; leaves of sterile shoots 1–2 cm, with 1 or 2 pairs of small leaflets 2–3 mm; leaves of flowering shoots 3–7 cm, leaflets in (2 or)3 or 4 pairs, linear, 10–15 × 1–1.5 mm; petals probably yellow 279. *A. chaidamuensis*
 2b. Plants without sterile shoots; leaves and leaflets all of equal size; petals pink, purple, or violet.
 3a. Calyx 8–11 mm, teeth 2–4 mm; legumes linear, ca. 2 mm in diam.; racemes rather dense, short, up to 4 cm.
 4a. Stipules 1.5–2.5 mm; leaflets in 3 or 4(or 5) pairs; standard below middle slightly constricted; wing limbs obtuse 280. *A. hesiensis*
 4b. Stipules 4–5 mm; leaflets in 2 or 3 pairs; standard not constricted; wing limbs distinctly emarginate 283. *A. yumenensis*
 3b. Calyx shorter, at most up to 8 mm, teeth 1–1.5 mm; legumes 2.5–3.5 mm high; racemes distinctly longer, remotely flowered.
 5a. Wings (12–)14–15 mm, limbs distinctly incised to obliquely bilobed; keel 10–11 mm; legumes 6–10 mm, rather densely white and black hairy 282. *A. scoparius*
 5b. Wings ca. 19 mm, limbs obtuse; keel ca. 16 mm; legumes 14–20 mm, glabrous or with scattered hairs only 281. *A. kessleri*

278. *Astragalus angustissimus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 135. 1868.*

狭叶黄耆 xia ye huang qi

Plants subshrubby, (10–)15–35(–45) cm tall, subacaulescent to shortly caulescent. Stems ligneous in lower parts, parts of current year 1–3(–5) cm, very densely covered with medifixed, appressed, white hairs 0.2–0.3 mm. Leaves (3–)5–12(–14) cm; stipules 5–12 mm, glabrous; petiole 2–3(–5) cm,

like rachis loosely to rather densely white hairy; leaflets 5–11(–14) pairs, narrowly linear, (13–)20–30 × 1–2(–3) mm, abaxially densely and adaxially sparsely to loosely covered with medifixed, appressed hairs 0.8–1 mm, apex acute. Racemes 3–4 cm, 12–20-flowered, elongating in fruit up to 6–14 cm; peduncle (5–)10–18 cm, hairy; bracts 4–10 mm, white and black hairy. Calyx 10–15 mm, tubular, densely covered with subbasifixed, ± spreading, white hairs 1–1.5 mm and especially at dorsal side with mostly shorter and more appressed black

hairs; teeth 2–4 mm. Petals yellow; standard narrowly elliptic, 22–25 × 6–7.5 mm, apex slightly retuse; wings 17–18 mm; keel 14–15 mm. Legumes sessile, erect, ellipsoid, 8–12 mm, 3–4 mm high and 4–5 mm wide, with a slightly curved beak 3–4 mm, incompletely 2-locular; valves densely covered with strongly asymmetrically bifurcate, appressed, white hairs 0.8–1 mm, in upper part with mostly shorter black hairs mixed in.

NW Xinjiang [Kazakhstan, Kyrgyzstan].

279. *Astragalus chaidamuensis* (S. B. Ho) Podlech & L. R. Xu, *Novon* 14: 222. 2004.

柴达木黄耆 *chai da mu huang qi*

Astragalus kronenburgii B. Fedtschenko var. *chaidamuensis* S. B. Ho, *Bull. Bot. Res.*, Harbin 3(1): 42. 1983.

Plants ca. 18 cm tall, nearly acaulescent, caespitose, vegetative parts covered with medifixed, appressed, white hairs 0.3–1 mm. Stems branched at base, parts of current year, if developed, up to 0.5 cm, densely hairy. Leaves of sterile shoots 1–2 cm; stipules ca. 2 mm, densely hairy; petiole 0.5–1 cm, with 1 or 2 pairs of small leaflets 2–3 mm. Leaves of flowering shoots 3–7 cm; petiole 1–2 cm, like rachis densely hairy; leaflets in (2 or) 3 or 4 pairs, linear, 10–15 × 1–1.5 mm, both surfaces ± densely hairy, apex acute. Racemes subumbellate, 3–7-flowered; peduncle 5–14 cm, loosely to rather densely white hairy; bracts 1–2 mm, sparsely furnished with mostly basifixed white and black hairs. Calyx ca. 10 mm, loosely to rather densely covered with medifixed, appressed, white hairs 0.5–1 mm and mostly slightly shorter black hairs; teeth 2.2–3 mm. Petals probably yellow; standard elliptic, 15–17 × 6–7 mm, apex emarginate; wings ca. 15 mm, limbs deeply incised; keel ca. 12 mm. Ovary with a stipe ca. 2 mm, linear, white hairy. Legumes unknown.

• 3000–3300 m. Gansu, Qinghai, ?Xinjiang.

The Chinese record of *Astragalus nematodes* Bunge ex Boissier from Xinjiang (FRPS 42(1): 264. 1993) is possibly based on a misidentification of *A. chaidamuensis*. *Astragalus nematodes* is not known to occur in China.

280. *Astragalus hesiensis* N. Ulziykhutag, *Novosti Sist. Vyssh. Rast.* 33: 142. 2001.

河西黄耆 *he xi huang qi*

Plants 20–40 cm tall, acaulescent to subacaulescent, rather densely caespitose. Stems several to numerous, branched at base, sometimes 2–6(–10) cm, densely white hairy. Leaves 4–12 cm; stipules 1.5–2.5 mm, white hairy; petiole 2–5 cm, like rachis densely appressed white hairy; leaflets in 3 or 4(or) 5 pairs, linear to narrowly elliptic, 10–20(–23) × 1–2(–3) mm, both surfaces appressed hairy. Racemes 2–3 cm, rather densely many flowered, elongating in fruit up to 12 cm; peduncle 6–20 cm, slender, appressed white hairy; bracts 1.5–2.5 mm, sparsely appressed black hairy. Calyx 8–11 mm, densely appressed white and sparsely black hairy; teeth 2–2.5 mm. Petals pink; standard 14–18 mm, limb narrowly obovate, in middle slightly constricted, apex retuse; wings 12–15 mm; keel 10–12 mm. Legumes stipitate, linear, 14–18 mm, ca. 2 mm high and wide, with a beak 1–2 mm; valves densely appressed white and black hairy.

• Gansu (Nan Shan).

281. *Astragalus kessleri* Trautvetter, *Bull. Soc. Imp. Naturalistes Moscou* 33(1): 496. 1860.

凯斯列黄耆 *kai si lie huang qi*

Plants 20–27 cm tall, nearly acaulescent, caespitose. Stems up to 1 cm, densely covered with remnants of old stipules and petioles, very densely appressed hairy. Leaves 4–6 cm; stipules 3–4 mm, ± densely covered with subappressed, medifixed, white hairs ca. 1 mm; petiole 2–3 cm, like rachis loosely hairy, hardening with age and partly persistent; leaflets in 5 or 6 pairs, narrowly linear-elliptic, 8–20 × 1–2 mm, both surfaces loosely to rather densely appressed hairy, apex subacute. Racemes 5–8(–15) cm, remotely flowered; peduncle 8–12 cm, sparsely hairy; bracts 1.5–2 mm, subglabrous. Calyx tubular, 7–8 mm, loosely covered with appressed, medifixed, black hairs 0.3–0.4 mm and with slightly longer white hairs; teeth ca. 1 mm. Standard narrowly obovate, ca. 20 mm, apex slightly retuse; wings ca. 19 mm; keel ca. 16 mm. Legumes with a stipe ca. 1 mm, pendulous, narrowly oblong, 14–20 mm, 2.5–3 mm high, apex shortly acuminate; valves glabrous or with scattered, appressed, white hairs.

Xinjiang [Kazakhstan].

282. *Astragalus scoparius* Schrenk in Fischer & C. A. Meyer, *Enum. Pl. Nov.* 1: 82. 1841.

帚黄耆 *zhou huang qi*

Astragalus scoparius f. *minutus* Lipsky.

Plants subacaulescent, 16–30(–40) cm tall, vegetative parts with ± medifixed, appressed, white hairs 0.5–1 mm. Stems several, up to 2.5 cm, very densely hairy. Leaves 6–10(–13) cm; stipules 3–4 mm, hairy; petiole 2–5 cm, like rachis densely hairy; leaflets in 3–6 pairs, narrowly elliptic, 5–15(–18) × 2–4(–7) mm, both surfaces loosely to rather densely hairy, apex acute to acuminate. Racemes 7–22 cm, remotely 10–20-flowered; peduncle 10–22 cm, rather densely white hairy; bracts 1–1.5 mm, subglabrous. Calyx 6–7 mm, loosely to rather densely white and black hairy; teeth unequal, 0.8–1.5 mm. Petals violet; standard obovate, 15–18 × 6–7 mm, apex emarginate; wings 14–15 mm, limbs incised to deeply unequally bilobed; keel 10–11 mm. Legumes sessile, erect, narrowly ellipsoid, 6–10 mm, 3–3.5 mm high and 2.8–3 mm wide, with a slender style 3–4 mm; valves rather densely covered with ± appressed, ± medifixed, white and black hairs, partly glabrescent with age.

Stony mountain slopes; 700–1500 m. Xinjiang [Kazakhstan].

The Chinese record of *Astragalus pseudoscoparius* Gontscharov (FRPS 42(1): 265. 1993) is referable to *A. scoparius*.

283. *Astragalus yumenensis* S. B. Ho in S. Y. Jin & Y. L. Chen, *Cat. Type Spec. Herb. China*, 419. 1994.

玉门黄耆 *yu men huang qi*

Plants 15–30 cm tall, shortly caulescent. Stems several, 2–10 cm, densely covered with medifixed, appressed, white hairs 0.6–1 mm. Leaves 5–12 cm; stipules 4–5 mm, hairy; petiole 2–5 cm, like rachis densely hairy; leaflets in 2 or 3 pairs, linear,

10–25 × 1–3 mm, both surfaces sparsely to rather densely appressed hairy. Racemes 3–4 cm, rather dense; peduncle 7–15 cm, hairy; bracts 2–3 mm, loosely predominantly black hairy. Calyx narrowly tubular, 8–12 mm, rather densely covered with appressed white and predominantly black hairs; teeth 2–4 mm. Petals purplish red; standard narrowly obovate, 17–20 × 6–7 mm, apex retuse; wings 14–18 mm, limbs distinctly emarginate; keel 10–15 mm. Legumes sessile, straight to slightly

curved, 10–15 mm, ca. 2 mm high and wide, shortly acuminate at apex, 2-locular; valves with appressed white and black or with predominantly black hairs.

- Arid slopes; 1900–2100 m. W Gansu.

This name was originally published by S. B. Ho (Bull. Bot. Res., Harbin 3(1): 65. 1983) but not validly so because two gatherings were indicated as types (*Vienna Code*, Art. 37.2).

43. *Astragalus* sect. *Ammodytes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 109. 1868.

喜沙组 xi sha zu

Plants perennial, dwarf, caespitose, psammophytic, with prostrate stems covered with bifurcate hairs. Stipules adnate to petiole and nearly fully vaginate-connate behind stem and around petiole. Racemes subsessile, 1- or 2-flowered. Calyx tubular. Legumes short, 2-locular, few seeded.

One species: China, Kazakhstan, Mongolia, Russia (Siberia), Uzbekistan.

284. *Astragalus ammodytes* Pallas, Reise Russ. Reich. 2: 742. 1773.

喜沙黄耆 xi sha huang qi

Plants 3–6 cm tall, forming prostrate, rather dense mats, white hairy. Stems 0.5–4(–6) cm, very densely tomentose with symmetrically to extremely asymmetrically bifurcate to sub-basifixed, partly curly or flexuous, tangled, ascending to spreading hairs up to 1 mm. Leaves 1.5–3(–4) cm; stipules 3–4 mm, adnate to petiole for ca. 1 mm, nearly fully connate into a sheath surrounding stem and base of petiole, triangular bidentate at apex, densely ± appressed hairy; petiole 1–2 cm, like rachis rather densely covered with subappressed to partly as-

ending hairs up to 0.5 mm; leaflets in 2–4 pairs, close together, subflabellate, narrowly obovate to obovate, 4–6 × 1.5–2 mm, densely appressed hairy, rounded at apex. Racemes sessile or with a hairy peduncle 2–3 mm, 1- or 2-flowered; bracts 2–2.5 mm, densely hairy. Flowers subsessile. Calyx tubular, 8–15 mm, densely subappressed hairy; teeth 1–2 mm. Petals pink, rarely white; standard ca. 1 × 6–7 mm, slightly constricted below middle, apex emarginate; wings 14–20 mm, limbs rounded to slightly obliquely emarginate, auricle very short; keel 11–18 mm. Legumes sessile, 4–5 mm, 2.5–3 mm high and 4–5 mm wide, densely white tomentose.

Sandy soil. Gansu, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia), Uzbekistan].

44. *Astragalus* sect. *Erioceras* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 109. 1868.

毛角组 mao jiao zu

Plants perennial, with short to rather long stems, rarely subcaulescent, covered with appressed to spreading bifurcate hairs. Leaves imparipinnate; stipules free or adnate to petiole. Racemes with a peduncle equaling or exceeding leaves (rarely very short), short, subumbellate. Bracteoles absent. Calyx tubular to campanulate-tubular. Petals violet, rarely yellow or purple; wing limbs obtuse to emarginate. Legumes sessile to subsessile, linear or narrowly oblong to narrowly ellipsoid, ± curved, rarely straight, grooved or rounded dorsally, 2-locular or nearly so, rarely incompletely 2-locular; valves leathery, covered with ascending to spreading hairs.

Forty-four species: Afghanistan, China, Mongolia, Pakistan; C Asia, SW Asia (Iran), E Europe; six species (four endemic) in China.

1a. Leaflets in 1–3 pairs.

2a. Stipules free from petiole, covered with extremely asymmetrically bifurcate hairs; leaflets 8–23 × 1.5–3.5 mm; bracts 2–4 mm, white and black hairy; calyx 7–10 mm, covered with extremely asymmetrically bifurcate to basifixed, appressed to ascending hairs; legumes 8–11 mm 286. *A. habaheensis*

2b. Stipules adnate to petiole for 0.5–1 mm, covered with slightly asymmetrically bifurcate hairs; leaflets 5–10 × 1.5–3 mm; bracts 1.5–2 mm, predominantly black hairy; calyx 9–11 mm, covered with symmetrically or asymmetrically bifurcate, ascending to spreading hairs; legumes 10–17 mm 285. *A. arcuatus*

1b. Leaflets in at least (3 or) 4 pairs but mostly in distinctly more.

3a. Stem, rachis, and peduncle covered with spreading hairs.

4a. Plants with a short stem 1–3 cm; stipules 3–9 mm; leaflets in 9–16 pairs; bracts 5–9 mm; calyx 12–15 mm; legumes 12–15 mm 289. *A. pilutschensis*

4b. Plants acaulescent; stipules 1–2 mm; leaflets in 3–7 pairs; bracts 3–4 mm; calyx 11–12 mm; legumes 30–40 mm 290. *A. yangchangii*

3b. Stem, rachis, and peduncle with ± appressed hairs.

5a. Bracts 5–7 mm; calyx 12–13 mm; petals yellow, standard narrowly oblong-ovate, ca. 20 × 4.5 mm 287. *A. kuldshensis*

- 5b. Bracts ca. 2 mm; calyx at most up to 10 mm; petals purple or violet, standard obovate, 18–22 × ca. 7 mm 288. *A. petraeus*

285. *Astragalus arcuatus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 407. 1841.

弯弓黄耆 wan gong huang qi

Plants 5–15 cm tall, subshrubby, loosely caespitose. Stems of current year 1–7(–10) cm, very densely covered with symmetrically to slightly asymmetrically bifurcate, subappressed to ascending or partly spreading, tangled, white hairs 0.8–1 mm. Leaves 1.5–2.5 cm; stipules 2–3 mm, rather densely covered with subappressed to ascending hairs, at margins also with basifixed hairs; petiole 0.5–1 cm, with slender rachis rather densely hairy like stem; leaflets in 2 or 3(or 4) pairs, 5–10 × 1.5–3 mm, abaxially somewhat densely and adaxially sparsely to loosely covered with ± medifixed, ascending to spreading hairs up to 1 mm. Racemes 2–3 cm, 2–5(–7)-flowered; peduncle 1–3 cm, densely covered with symmetrically or asymmetrically bifurcate, spreading hairs up to 0.5 mm; bracts 1.5–2 mm, sparsely white and predominantly black hairy. Calyx 9–11 mm, densely covered with symmetrically or asymmetrically bifurcate, ascending to partly spreading, white hairs 0.8–1 mm and especially at dorsal side with ± medifixed, appressed, distinctly shorter, black hairs; teeth 1–1.5 mm. Petals violet; standard obovate, 18–25 × 7–9 mm, apex emarginate; wings 17–22 mm; keel 16–19 mm. Legumes slightly curved, 10–17 mm, 3.5–4 mm high and 2–2.5 mm wide, apex shortly acuminate; valves densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 1.5–2 mm.

Xinjiang [Kazakhstan, Russia (European part)].

The Chinese record of *Astragalus subarcuatus* Popov (FRPS 42(1): 278. 1993) is referable to *A. arcuatus*.

286. *Astragalus habaheensis* Y. X. Liou, Fl. Desert. Reipubl. Popul. Sin. 2: 444. 1987.

哈巴河黄耆 ha ba he huang qi

Plants subshrubby, ca. 10 cm tall, caespitose. Stems of current year 4–8 cm, very densely tomentose, with ± medifixed, flexuous, white hairs 0.5–0.8 mm. Leaves 2–3 cm; stipules 2–4 mm, free from petiole, densely hairy; petiole 0.5–0.8 cm, with rachis ± hairy like stem; leaflets in 1–3(or 4) pairs, 8–23 × 1.5–3.5 mm, both surfaces densely or adaxially sometimes only sparsely hairy like stem, apex acute. Racemes rather densely 6–8-flowered; peduncle 1.5–4 cm, hairy like stem; bracts 2–4 mm, white and black hairy. Calyx 7–10 mm, tubular to slightly inflated, rather densely covered with strongly asymmetrically bifurcate to basifixed, subappressed to ascending, flexuous, white hairs 0.8–1 mm, with shorter black hairs mixed in, especially at teeth; teeth 1–2.5 mm. Petals purple-red, drying partly to yellowish; standard obovate, ca. 21 × 9 mm, apex emarginate; wings ca. 18 mm; keel ca. 17 mm. Legumes sessile, 8–11 mm, 3–4 mm high and 2.5–3 mm wide, with a beak ca. 1 mm; valves densely white to yellowish villous, with basifixed to subbasifixed spreading hairs 2–3 mm and with some short hairs 0.3–0.5 mm mixed in.

• Xinjiang.

287. *Astragalus kuldshensis* Bunge, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 374. 1880.

伊宁黄耆 yi ning huang qi

Plants 16–20 cm tall, only white hairy. Stems several, branched at base, ascending, very densely covered with ± medifixed hairs 0.6–0.8 mm. Leaves 5–12 cm; stipules 7–8 mm, adnate to petiole for ca. 3 mm, rather densely covered with strongly asymmetrically bifurcate hairs ca. 1 mm, hairs also basifixed at margins; petiole 1.5–4 cm, with rachis hairy like stem; leaflets in 7–10 pairs, 8–12 × 3–4 mm, both surfaces loosely covered with appressed, ± medifixed hairs 0.8–1.2 mm. Racemes ellipsoid, densely many flowered; peduncle sparsely hairy like stem; bracts 5–7 mm, with ± spreading, strongly asymmetrically bifurcate to basifixed hairs. Calyx 12–13 mm, slightly inflated, rather densely covered with strongly asymmetrically bifurcate to basifixed, ascending hairs 1.2–1.5(–2) mm; teeth 3–3.5 mm. Petals yellow; standard narrowly oblong-ovate, ca. 20 × 4.5 mm, apex retuse; wings ca. 17 mm, limbs laterally and unequally incised; keel ca. 15 mm. Legumes sessile, included in calyx; valves villous with ascending, strongly asymmetrically bifurcate to basifixed hairs 0.6–0.8 mm.

• NW Xinjiang.

288. *Astragalus petraeus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 333. 1842.

喜石黄耆 xi shi huang qi

Astragalus irkeschtami B. Fedtschenko; *A. xylorrhizus* Bunge.

Plants 5–30 cm tall, vegetative parts covered with ± medifixed, appressed hairs 0.6–1 mm. Stems several, 1.5–7 cm, densely covered with mostly white hairs. Leaves 4–8 cm; stipules 3–4 mm, adnate to petiole for 1–2 mm, often shortly connate behind stem, white and black or only white hairy; petiole 1–2 cm, like rachis densely white hairy; leaflets in 4–7 pairs, 6–15 × 3–8 mm, both surfaces densely covered with appressed hairs ca. 1 mm. Racemes short, rather densely 10–18-flowered; peduncle 8–11 cm, densely covered with appressed white hairs, toward raceme increasingly black hairy; bracts ca. 2 mm, white and predominantly black hairy, at margins mainly with subbasifixed to basifixed hairs. Calyx 8–10 mm, densely covered with tangled, spreading or ascending, extremely asymmetrically bifurcate to subbasifixed, white hairs up to 1 mm and especially on abaxial side with shorter, more symmetrically bifurcate, black hairs; teeth 2–3 mm. Petals violet; standard obovate, 18–22 × ca. 7 mm, constricted below middle, apex emarginate; wings 17–20 mm; keel 14–17 mm. Legumes sessile, pendulous, distinctly upcurved-falcate, 20–30 mm, 2–3 mm thick, apex shortly acuminate; valves densely covered with spreading or ascending, extremely asymmetrically bifurcate to subbasifixed, white hairs up to 1 mm and especially on adaxial side with shorter, more symmetrically bifurcate, black hairs.

Desertic mountain slopes; 2800–3200 m. Xinjiang [Kazakhstan, Kyrgyzstan].

289. *Astragalus pilutschensis* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 33: 137. 2001.

皮鲁斯黄耆 pi lu si huang qi

Plants 10–15 cm tall, subcaulescent, covered with bifurcate, spreading hairs. Stems (0.5–)1–2(–3) cm, ascending to erect, densely covered with short and long white hairs. Leaves 6–12 cm; stipules (2–)3–9 mm, adnate to petiole, densely white hairy; petiole 1.5–4 cm, like rachis covered with ascending to spreading white hairs; leaflets in 9–16 pairs, 8–16 × (3–)4–6 mm, abaxially densely and adaxially sparsely hairy. Racemes 2–4 cm, at first densely, later on rather loosely many flowered; peduncle 2–5(–8) cm, with white hairs, toward raceme predominantly black hairy; bracts 5–9 mm, white and black hairy. Calyx 12–16 mm, densely villous, with rigid white and black hairs, at nerves and teeth more black hairy and so slightly black striate; teeth 3–5.5 mm. Petals yellow; standard elliptic to narrowly obovate, 21–25 × 7–8 mm, apex slightly retuse; wings 20–23 mm; keel 19–22 mm. Ovary stipitate, oblong, white hairy; style glabrous. Legumes unknown.

• NW Xinjiang.

290. *Astragalus yangchangii* Podlech & L. R. Xu, Novon 17: 235. 2007.

托里黄耆 tuo li huang qi

Plants 8–12 cm tall, acaulescent. Leaves 4–9 cm; stipules 1–2 mm, free from petiole, densely covered with ± medifixed, appressed, tangled, white hairs ca. 1 mm, at margins also with basifixed hairs; petiole 2–4 cm, like rachis densely covered with partly flexuous, tangled, ascending to spreading, ± medifixed, white hairs 0.5–1 mm; leaflets in 3–7 pairs, 5–10 × 3–5 mm, abaxially densely and adaxially loosely to rather densely covered with symmetrically or asymmetrically bifurcate, flexuous, tangled, ascending to spreading, white hairs ca. 1 mm. Racemes (in fruit) rather densely 2–6-flowered; peduncle 3–8 cm, white hairy like rachis, just below raceme with some black hairs mixed in; bracts (2–)3–4 mm, with strongly asymmetrically bifurcate, predominantly black hairs. Calyx 11–12 mm, rather densely villous, with ± symmetrically to extremely asymmetrically bifurcate, flexuous, tangled, ascending to spreading, white hairs 0.5–1 mm and especially at dorsal (lower) side and teeth with shorter black hairs; teeth subulate, 2–3 mm. Petals unknown. Legumes sessile, linear, ± erect, straight or slightly curved, (20–)30–40 mm, 2.5–3.5 mm high and wide, with a beak 1–2 mm; valves densely covered with symmetrically or asymmetrically bifurcate, ± appressed, white hairs 0.5–0.6 mm and with extremely asymmetrically bifurcate, ascending to spreading hairs ca. 1 mm.

• Xinjiang.

45. *Astragalus* sect. *Helmia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 111. 1868.

乌拉尔组 wu la er zu

Plants often dwarf, acaulescent or nearly so, caespitose, covered with bifurcate hairs. Stipules free or adnate to petiole, vaginateconnate behind stem. Racemes shortly to long pedunculate, rarely subsessile, few or up to 20-flowered; bracts whitish hyaline. Flowers with a short pedicel or subsessile. Calyx campanulate to tubular. Petals yellow or purple. Legumes sessile to subsessile, compressed laterally or inflated, keeled ventrally, narrowly grooved to flattened dorsally, 1-locular to 2-locular; valves thinly leathery, densely covered with mostly spreading hairs.

Twenty-four species: China, India, Kashmir, Mongolia, Nepal, Pakistan; C Asia, E Europe to Siberia; 16 species (ten endemic) in China.

- 1a. Leaves simple, 10–50 × ca. 1 mm 298. *A. efoliolatus*
 1b. Leaflets in at least 1 pair but mostly in more.
 2a. Leaflets in 10–13 pairs, villous with spreading hairs; bracts 4–5 mm; petals yellow 304. *A. pendulotopetalus*
 2b. Leaflets in 1–6 pairs, covered with ± appressed hairs; bracts shorter; petals mostly purple to violet.
 3a. Standard up to 10(–11) mm.
 4a. Leaflets linear, 8–10 × as long as wide.
 5a. Plants 3–12 cm tall, at base with numerous non-flowering off-shoots; calyx campanulate, 4–6 mm; wing limbs retuse to slightly emarginate 303. *A. nematodioides*
 5b. Plants without non-flowering off-shoots; calyx tubular; wing limbs distinctly emarginate 306. *A. vladimirii-komarovii*
 4b. Leaflets narrowly elliptic, up to 5 × as long as wide.
 6a. Leaflets in 4 or 5 pairs, 6–10 × 1–2 mm; legumes 2-locular, subacute, without beak 296. *A. divnogorskajae*
 6b. Leaflets in 1–3 pairs, 1–6 × 0.5–1 mm; legumes 1-locular or incompletely 2-locular, with a beak 1–2 mm.
 7a. Stipules 1.5–2 mm, white and black hairy; standard ca. 10 mm; peduncles 4–9 cm; legumes ca. 1.5 mm high and ca. 1 mm wide, subappressed hairy, incompletely 2-locular 297. *A. dshangartensis*
 7b. Stipules 3–5 mm, white hairy; standard 6–8 mm; peduncles 1–2.5 cm; legumes inflated, with ± spreading hairs, nearly 1-locular 291. *A. arnoldii*
 3b. Standard distinctly longer.
 8a. Leaflets 10–30(–40) mm; stipules 4–12 mm, adnate to petiole for 3–4 mm.
 9a. Calyx 7–10 mm, widely campanulate, base slightly inflated ovoid, urn-shaped, only white hairy; standard 15–20 × 6–7 mm, obovate, below middle slightly constricted 294. *A. cupulicalycinus*

- 9b. Calyx at least 10 mm, tubular, at least with some black hairs; standard at least 20 mm but mostly distinctly longer, not constricted.
- 10a. Only stipules of lower leaves connate, those of upper leaves free from each other; leaflets with hairs all similar, 0.5–1 mm; standard 20–23 mm, ovate with rather long claw; legumes covered with extremely asymmetrically bifurcate, spreading, flexuous hairs ca. 1 mm, 1-locular 292. *A. burtschumensis*
- 10b. All stipules high connate behind stem; leaflets with hairs 0.5–0.8 mm and with distinctly thicker hairs 1–1.8 mm; standard 21–30 mm, obovate with short claw; legumes unknown 302. *A. eergisiensis*
- 8b. Leaflets up to 11(–15) × ca. 3 mm; stipules up to 5 mm, free from petiole or shortly adnate to it.
- 11a. Stipules 1–3 mm; standard up to 17 mm, elliptic or obovate, never constricted; legumes (ovary) appressed hairy.
- 12a. Stipules 1–2 mm, nearly free from petiole, behind stem shortly connate; leaflets in 2–5 pairs; bracts ca. 1 mm, white and black hairy; calyx covered with subappressed, flexuous, black hairs with some longer, spreading, white and black hairs; legumes (immature) linear, falcate, ca. 15 mm 305. *A. persimilis*
- 12b. Stipules 2–3 mm, adnate to petiole for ca. 1 mm, behind stem connate to top; leaflets in 1 pair; bracts 1.5–3 mm, predominantly white hairy; calyx densely covered with appressed white and black hairs; legumes unknown 300. *A. hoshanbaoensis*
- 11b. Stipules 2.5–5(–6) mm; standard 17–24(–26) mm, in middle slightly constricted or not; legumes villous, with spreading hairs.
- 13a. Stipules free from petiole; calyx 7–8 mm; standard narrowly elliptic-pandurate, ca. 6 mm wide, constricted in middle; wing limbs obliquely incised; legumes (6–)8–10 mm, nearly 1-locular 293. *A. chomutowii*
- 13b. Stipules shortly adnate to petiole; calyx at least 8 mm but mostly distinctly longer and up to 12 mm; standard 8–10 mm wide, if only ca. 6 mm wide (in *A. kasachstanicus*) then oblong, not constricted, and wing limbs obtuse; legumes 18–23 mm, 2-locular.
- 14a. Standard oblong, ca. 6 mm wide; wing limbs obtuse; legumes with tangled, flexuous, spreading hairs ca. 3 mm, sitting on small tubercles 301. *A. kasachstanicus*
- 14b. Standard obovate, 8–10 mm wide; wing limbs retuse or incised; hairs of legumes not sitting on small tubercles.
- 15a. Petals pale yellowish or white; standard obovate, not constricted; wing limbs slightly retuse; legumes with a stipe 1–2 mm 295. *A. depauperatus*
- 15b. Petals pale purplish; standard constricted in middle; wing limbs distinctly emarginate; legumes sessile 299. *A. heptapotamicus*

291. *Astragalus arnoldii* Hemsley & H. Pearson, J. Linn. Soc., Bot. 35: 172. 1902.

团垫黄耆 tuān diān huáng qī

Astragalus arnoldii f. *albiflorus* Y. H. Wu; *A. culcitiformis* P. C. Li & C. C. Ni; *A. li-nii* Gómez-Sosa; *A. monticola* P. C. Li & C. C. Ni (1979), not Philippi (1864); *A. roborovskiyi* N. Ulziykhutag.

Plants 3–5 cm tall, nearly acaulescent, forming compact mats; hairs appressed, mostly ± medifixed, in vegetative parts white, 0.5–1 mm. Leaves 1–2 cm; stipules 3–5 mm, adnate to petiole up to 1/2, shortly connate behind stem, loosely to densely white hairy; petiole 0.8–1.5 cm, like slender rachis rather densely hairy; leaflets in 1–3 pairs, 1–5 × 0.5–1 mm, often folded, both surfaces rather densely hairy. Racemes rather densely 4–8-flowered, somewhat elongated in fruit; peduncle 1–2.5 cm, slender, rather densely hairy; bracts 1.5–2 mm, with few black hairs. Calyx 3–4 mm, loosely to rather densely predominantly black hairy; teeth 0.5–1 mm. Petals purplish to violet; standard nearly orbicular, 6–8 × 4–5 mm, apex emarginate; wings 6–7.5 mm; keel 5.5–6.5 mm. Legumes sessile,

slightly curved, (6–)8–10 mm, strongly inflated, with a slender beak 1–1.5 mm, nearly 1-locular; valves villous with white hairs.

High alpine slopes; 4000–5500 m. Qinghai, Xinjiang, Xizang [India (Sikkim), Kashmir, Nepal].

292. *Astragalus burtschumensis* Sumnevicz, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1933 (1–2): 7. 1933.

布尔楚黄耆 bù er chū huáng qī

Plants 14–18 cm tall, shortly caulescent, densely caespitose, appressed white hairy. Stems several, up to 4 cm. Leaves 7–9 cm; stipules hairy, of lower leaves connate, those of upper leaves free from each other; leaflets in 1 pair, very rarely in 2 pairs, ovate to elliptic, 28–35 × 13–17 mm, covered with hairs 0.5–1 mm. Racemes pedunculate, 2–6-flowered, at fruiting time together with peduncle as long as leaves. Calyx tubular, ca. 11 mm, hairy; teeth 1–1.5 mm. Petals violet; standard ovate, 20–23 × ca. 11 mm, with a rather long claw, apex emarginate; wings ca. 19 mm, limbs narrowly oblong, apex emarginate; keel ca. 17 mm. Legumes sessile, nodding, narrowly oblong, 16–20

mm, 6–8 mm high; valves white hairy, hairs spreading, flexuous, ca. 1 mm.

• NW Xinjiang.

293. *Astragalus chomutowii* B. Fedtschenko, Bull. Herb. Boissier 7: 826. 1899 [*“chomutowi”*].

中天山黄耆 *zhong tian shan huang qi*

Plants 2–8 cm tall, nearly acaulescent, densely caespitose, often forming compact mats; hairs appressed, mostly ± medifixed, in vegetative parts only white, 0.5–1 mm. Leaves 0.5–4 cm; stipules 3–5 mm, free from petiole, high connate behind stem, often up to top, loosely to rather densely white hairy; petiole 0.2–2 cm, like rachis densely hairy; leaflets in 1–3 pairs, narrowly elliptic, 3–7(–15) × 1–2.5 mm, mostly folded, both surfaces densely hairy. Racemes short, rather densely 3–7(–15)-flowered; peduncle 1–4(–6) cm, densely covered with appressed white hairs; bracts 2.5–4 mm, with white and sometimes also black hairs. Calyx 7–8 mm, densely white and black hairy; teeth 2–2.5 mm. Petals violet; standard narrowly elliptic-pandurate, 20(–22) × ca. 6 mm, sometimes slightly constricted below middle, apex emarginate; wings 16–18(–20) mm, limbs narrowly oblong, apex obliquely incised; keel 13–14(–16) mm. Legumes sessile, oblong, slightly curved, (6–)8–10 mm, strongly inflated, with a slender beak 1–1.5 mm, nearly 1-locular; valves villous with white hairs.

Alpine slopes; 3700–3800 m. Qinghai, Xinjiang [Kyrgyzstan, Tajikistan].

294. *Astragalus cupulicalycinus* S. B. Ho & Y. C. Ho, Bull. Bot. Res., Harbin 3(1): 47. 1983.

杯萼黄耆 *bei e huang qi*

Plants 7–10 cm tall, subacaulescent, covered with appressed to subappressed, medifixed, white hairs 0.5–1 mm. Stems short, 1–2 cm, very densely hairy. Leaves 5–7 cm; stipules 4–9 mm, adnate to petiole for 3–4 mm, distinctly to high vaginate-connate behind stem, sparsely to loosely hairy; petiole 2–4 cm, like rachis densely hairy; leaflets in 1 or 2 pairs, 10–25 × 4–8 mm, both surfaces densely to rather densely or adaxially only loosely hairy. Racemes rather densely 5–8-flowered; peduncle 4–8 cm, hairy like stem; bracts ca. 2 mm, hairy. Calyx widely campanulate, 7–10 mm, rather densely hairy, base slightly inflated ovoid, urn-shaped; teeth ca. 2 mm. Petals reddish purple; standard obovate, 15–20 × 6–7 mm, below middle slightly constricted, apex emarginate; wings 13–15 mm; keel 11–13 mm. Legumes sessile, ca. 12 mm, ca. 3 mm high and ca. 5 mm wide, apex subacute; valves rather densely hairy.

• Xinjiang.

295. *Astragalus depauperatus* Ledebour, Fl. Altaic. 3: 314. 1831.

疆北黄耆 *jiang bei huang qi*

Astragalus eriobolus Bunge.

Plants (3–)6–15 cm tall, loosely caespitose, furnished with medifixed, appressed hairs. Stems of current year 0.5–4 cm, densely white hairy. Leaves 3–7(–10) cm; stipules 3–5 mm, shortly adnate to petiole, behind stem shortly connate, hairy;

petiole 1.5–4 cm, like slender rachis densely white hairy; leaflets in 2–4(–6) pairs, 5–11 × 1.5–3(–4) mm, both surfaces rather densely hairy. Racemes subumbellate, loosely 2–5-flowered; peduncle 3–6 cm, white hairy; bracts (1–)2–3.5 mm, white hairy. Calyx 9–12 mm, with appressed white and black hairs; teeth ca. 3 mm. Petals pale yellowish or white, keel violet tipped; standard obovate, 18–24(–26) × 8–9(–10) mm, apex retuse; wings 15–20(–23) mm; keel 13–18(–20) mm. Legumes with a stipe 1–2 mm, straight to slightly curved, 18–23 mm, 4–5 mm high and 2–2.5 mm wide, compressed laterally, 2-locular; valves densely hispid-lanate with spreading white hairs.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

296. *Astragalus divnogorskajae* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 33: 140. 2001.

疆西黄耆 *jiang xi huang qi*

Plants up to 5–7 cm tall, acaulescent to subacaulescent, forming loose mats. Stems numerous, very short, slender. Leaves 1–3 cm; stipules small, adnate to petiole, sometimes amplexicaul, white hairy; petiole 0.5–1 cm; leaflets in 4 or 5 pairs, narrowly elliptic, 6–10 × 1–2 mm, both surfaces densely appressed hairy. Racemes 1–2 cm, rather loosely 8–20-flowered, elongating in fruit up to 4 cm; peduncle ascending, 3–10 cm, covered with appressed white hairs, below raceme also with black hairs; bracts 1–1.5 mm, mostly black hairy. Calyx 4–5 mm, densely appressed white and black hairy; teeth ca. 2 mm. Petals pale bluish to yellowish with violet tips; standard 9–11 mm, limb orbicular, apex retuse; wings 8–9 mm; keel 7–8.5 mm. Legumes curved, 9–12 mm, 2.5–3 mm high, keeled ventrally; valves with long, ascending, white hairs.

• W Xinjiang.

297. *Astragalus dshangartensis* Sumnevicz, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1933(1–2): 5. 1933.

詹加尔特黄耆 *zhan jia er te huang qi*

Plants 5–10 cm tall, acaulescent, densely caespitose. Leaves 2–3 cm; stipules 1.5–2 mm, covered with ascending white and black hairs; petiole 1.5–2 cm, like rachis densely appressed white hairy; leaflets in 2 or 3 pairs, narrowly elliptic, 4–6 × 1(–1.5) mm, abaxially densely and adaxially only toward margins covered with appressed hairs, silvery-canescens. Racemes 1–2 cm, loosely 5–7-flowered; peduncle 4–9 cm, slender, white hairy, below raceme also with black hairs; bracts 1–1.5 mm, black or white and black hairy. Calyx ca. 4 mm, covered with white and predominantly black hairs; teeth ca. 1.5 mm. Petals pink-violet; standard nearly orbicular, ca. 10 × 6 mm, apex emarginate; wings ca. 8.5 mm; keel ca. 8 mm. Legumes sessile, narrowly oblong, 7–10 mm, ca. 1.5 mm high and ca. 1 mm wide, attenuate at both ends, laterally compressed, with a slender beak 1.5–2 mm, incompletely 2-locular; valves densely covered with subappressed white hairs.

Mountain slopes; 1900–3100 m. Xinjiang [Kyrgyzstan].

298. *Astragalus efoliolatus* Handel-Mazzetti, Oesterr. Bot. Z. 85: 215. 1936.

单叶黄耆 *dan ye huang qi*

Plants acaulescent, covered with mostly medifixed white hairs 1(–1.5) mm. Leaves sessile, simple; stipules 4–6 mm, nearly free from petiole, often high vaginate-connate behind stem, glabrous or sparsely hairy, at margins often with basifixed hairs; leaf blade linear, 10–50 × ca. 1 mm, flat or folded, both surfaces loosely to rather densely appressed hairy. Racemes sessile or with a short, hairy peduncle, loosely up to 8-flowered; bracts 1–2 mm, sparsely hairy, at margins with basifixed hairs. Calyx ca. 5 mm, loosely to rather densely appressed hairy; teeth ca. 2.5 mm. Petals red-purple or violet; standard oblong-pan-durate, ca. 8 × 3 mm, without distinct claw, distinctly constricted in middle, apex emarginate; wings ca. 7 mm; keel ca. 6 mm. Legumes (immature) sessile, linear-oblong, with a short beak, densely white hairy.

• Gansu, Nei Mongol, Ningxia, Shaanxi.

299. *Astragalus heptapotamicus* Sumnevicz, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1933 (5–6): 7. 1933.

七溪黄耆 *qi xi huang qi*

Astragalus poljakovii Popov; *A. wensuensis* S. B. Ho.

Plants 2–4 cm tall, acaulescent, densely caespitose, vegetative parts densely covered with appressed to subappressed, ± medifixed, white hairs 0.5–1 mm. Leaves 0.5–4 cm; stipules 2.5–4(–6) mm, shortly adnate to petiole, behind stem connate to middle or even higher up, rather densely hairy; petiole 0.3–1.5 cm, like rachis densely hairy; leaflets in (1 or)2–4 pairs, close together, 2–6 × 1–2 mm, flat or boot-shaped to folded, both surfaces densely hairy. Racemes (1 or)2–5-flowered; peduncle 0.3–3 cm, hairy like rachis; bracts 1.5–3 mm, hairy, margins with subbasifixed hairs. Calyx 9–10(–13) mm, densely covered with symmetrically or asymmetrically bifurcate, subappressed, white hairs 0.5–0.8 mm and often with much shorter black hairs especially at dorsal side; teeth 1.5–3.5 mm. Petals pale purplish; standard obovate, 17–22 × 9–10 mm, slightly constricted below middle, apex emarginate; wings 15–20 mm, limbs obliquely incised; keel 13–17 mm. Legumes subsessile, 18–22 mm, 3.5–5 mm high and ca. 2 mm wide, apex acuminate; valves densely villous with ascending to spreading white hairs 0.5–3 mm, glabrescent with age.

1700–2400 m. Xinjiang [Kazakhstan].

300. *Astragalus hoshanbaoensis* Podlech & L. R. Xu, Novon 17: 235. 2007.

善宝黄耆 *shan bao huang qi*

Plants 2–3 cm tall, acaulescent or nearly so, densely caespitose, forming compact mats; hairs appressed, white, in inflorescence also black. Stems, if present, up to 1 cm, very densely covered with medifixed hairs 0.5–0.6 mm. Leaves 0.5–1 cm; stipules 2–3 mm, adnate to petiole for ca. 1 mm, behind stem connate to top, lower ones glabrous or ciliate only at margins, uppermost ones loosely hairy like stem, at margins with asymmetrically bifurcate to subbasifixed hairs; petiole 0.3–0.6 cm, with rachis densely hairy like stem; leaflets in 1 pair, close together, narrowly obovate, 3–5 × 1–2 mm, flat or boot-shaped to folded, both surfaces densely covered with appressed, medifixed hairs 0.5–0.8 mm. Racemes 2–8-flowered; peduncle 0.3–

3 cm, densely white hairy like stem, below rachis with some black hairs mixed in; bracts 1.5–3 mm, white hairy, sometimes with black hairs mixed in, at margins with subbasifixed hairs. Calyx 6–7 mm, densely covered with medifixed, appressed, white and black hairs 0.3–0.8 mm; teeth ca. 1 mm. Petals pale purplish with darker keel; standard obovate, 13–14 mm, ca. 5 mm high, apex emarginate; wings 12–13 mm; keel ca. 11 mm. Ovary with a stipe ca. 1 mm, white hairy. Legumes unknown.

• NW Xinjiang.

301. *Astragalus kasachstanicus* Goloskokov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 111. 1957.

哈萨克黄耆 *ha sa ke huang qi*

Plants 5–10(–15) cm tall, acaulescent to subacaulescent, loosely to densely caespitose. Stems, if present, 0.5–3 cm, appressed white hairy, densely enveloped by stipules. Leaves 2–5 cm; stipules 2–4 mm, adnate to petiole, behind stem connate to middle, appressed white hairy; petiole (1–)2–3 cm, like slender rachis densely covered with medifixed, appressed, white hairs 0.5–0.8 mm; leaflets in 1–3 pairs, (5–)7–10(–15) × (2–)3–5(–8) mm, terminal leaflet larger than lateral ones, both surfaces densely or more rarely loosely to rather densely covered with medifixed, appressed, white hairs 1–1.2 mm. Racemes densely 2- or 3(or 4)-flowered; peduncle 3–5(–8) cm, rather densely white hairy like rachis; bracts 1–3 mm, appressed white and black hairy. Calyx (8–)10–12 mm, rather densely covered with ± medifixed, flexuous, appressed, white and predominantly black hairs 0.2–0.5 mm; teeth 1–2(–3) mm. Petals yellow; standard oblong, 17–22 × ca. 6 mm, apex scarcely emarginate; wings 16–20 mm; keel 15–18 mm. Legumes subsessile, straight, (15–)18–20(–22) mm, 4–5 mm high and ca. 3 mm wide, with a beak 1–2 mm, 2-locular; valves densely covered with soft, flexuous, tangled, spreading, white hairs ca. 3 mm, sitting on small tubercles; valves therefore warty.

Xinjiang [Kazakhstan, Mongolia].

302. *Astragalus eerqisiensis* Zhao Y. Chang, L. R. Xu & Podlech, Acta Bot. Boreal.-Occid. Sin. 27: 170. 2007.

额尔齐斯黄耆 *e er qi si huang qi*

Plants 5–10 cm tall, acaulescent to subacaulescent; hairs appressed to subappressed, medifixed, white, at calyx sometimes also black. Stems, if present, 1–2 cm, very densely covered with hairs 1–1.2 mm. Leaves 2.5–9 cm; stipules 6–12 mm, adnate to petiole for 3–4 mm, distinctly to high vaginate-connate behind stem, densely hairy, at margins partly with basifixed hairs; petiole 1–6 cm, with rachis densely hairy like stem; leaflets in 1 or 2 pairs, 10–30(–40) × 3–12(–15) mm, both surfaces densely to rather densely or adaxially only loosely covered with thin medifixed hairs 0.5–0.8 mm and with distinctly thicker hairs 1–1.8 mm. Racemes loosely 2–5-flowered; peduncle 1–3.5 cm, hairy like stem; bracts 2–5 mm, sparsely white hairy, sometimes with some black hairs mixed in. Calyx 10–13 mm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed, white hairs 0.5–0.8 mm and often with ± medifixed black hairs 0.15–0.4 mm mixed in; teeth

1.5–2 mm. Petals violet; standard obovate, 21–30 × 9–11 mm, apex emarginate; wings 20–24 mm; keel 16–20 mm. Ovary sessile, white hairy. Legumes unknown.

- Xinjiang.

303. *Astragalus nematodioides* H. Ohba, S. Akiyama & S. K. Wu, *J. Jap. Bot.* 70: 16. 1995.

类线叶黄耆 *lei xian ye huang qi*

Astragalus caudiculosus Komarov; *A. ui-eilakensis* F. Ghahremaninejad.

Plants 3–12 cm tall, acaulescent or nearly so, caespitose. Stems, if present, up to 2(–4) cm, prostrate to ascending, branched, with numerous, short, non-flowering off-shoots and few-flowering stems, densely covered with symmetrically or asymmetrically bifurcate, subappressed, white hairs 0.7–1 mm. Leaves 1–4 cm; stipules 1.5–3 mm, adnate to petiole for 0.5–1 mm, vaginate-connate behind stem to middle or higher up, rather densely hairy; petiole 0.5–2 cm, with very slender rachis hairy like stem; leaflets in 2–6 pairs, 3–10 × 0.5–1.5 mm, both surfaces densely hairy, with incurved margins or partly folded. Racemes 2–4 cm, loosely 4–12-flowered; peduncle 2.5–13 cm, slender, densely to rather densely white hairy like stem; bracts 1–1.5 mm, white and black hairy. Calyx campanulate, 4–6 mm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed, white and black hairs 0.5–0.9 mm; teeth 2–3 mm. Petals purple; standard orbicular, 7–10 × 5–8 mm, apex emarginate; wings 6–8 mm; keel 6–7.5 mm. Legumes curved, 10–15 mm; valves densely covered with subappressed to ascending, strongly asymmetrically bifurcate to subbasifixed, white hairs ca. 1 mm.

- 2400–3700 m. S Xinjiang (Kunlun Shan).

304. *Astragalus pendulatopetalus* S. B. Ho & Z. H. Wu, *Acta Bot. Boreal.-Occid. Sin.* 8: 133. 1988.

琴瓣黄耆 *qin ban huang qi*

Plants 2–5 cm tall, vegetative parts densely covered with ± medifixed, spreading, white hairs 0.4–0.5 mm. Stem, if present, very short. Leaves 3–4 cm, subsessile; stipules ca. 2.5 mm, adnate to petiole for ca. 1 mm, connate behind stem for 1.5–2 mm, hairy; rachis hairy; leaflets in 10–13 pairs, 4–5 × 1.5–2 mm, both surfaces, though abaxially more densely, spreading hairy. Racemes 3- or 4-flowered; peduncle ca. 3 cm, hairy; bracts 4–5 mm, hairy. Calyx inflated tubular, 10–12 mm, covered with ± spreading, symmetrically bifurcate hairs 0.6–1 mm and with appressed, symmetrically or asymmetrically bifurcate, white hairs 0.1–0.2 mm, with some gray hairs mixed in; teeth 2.5–3 mm. Petals yellow; standard obovate-pandurate,

20–22 × ca. 7 mm, in middle distinctly constricted, apex emarginate; wings 19–21 mm; keel ca. 17 mm. Ovary sessile, hairy. Legumes unknown.

- Steppes; 400–600 m. Xinjiang.

305. *Astragalus persimilis* Podlech & L. R. Xu, *Novon* 17: 236. 2007.

类中天山黄耆 *lei zhong tian shan huang qi*

Plants ca. 5 cm tall, acaulescent or nearly so, vegetative parts covered with appressed, ± medifixed, only white hairs. Stems, if present, up to 1 cm, very densely covered with hairs ca. 0.5 mm. Leaves 1.5–3 cm; stipules 1–2 mm, nearly free from petiole, behind stem shortly connate or to middle, loosely to rather densely hairy, at margins also with basifixed hairs; petiole 0.5–1.2 cm, with rachis hairy like stem; leaflets in 2–5 pairs, 2–6 × 1–1.5 mm, both surfaces very densely covered with hairs ca. 1 mm. Racemes short, rather densely 6–8-flowered; peduncle 2–3 cm, densely hairy like leaflets; bracts ca. 1 mm, white and black hairy. Calyx 7–8 mm, rather densely covered with ± medifixed, subappressed, flexuous, black hairs 0.5–1 mm, with some longer, ascending, white and black hairs mixed in; teeth ca. 1 mm. Petals violet; standard elliptic, ca. 17 × 6 mm, apex emarginate; wings ca. 14 mm; keel ca. 13 mm. Legumes (immature) sessile, linear, pendulous, distinctly falcate, ca. 15 mm, apex acuminate; valves densely covered with symmetrically to strongly asymmetrically bifurcate, appressed, white hairs 0.5–1 mm.

- Xinjiang.

306. *Astragalus vladimirii-komarovii* B. Fedtschenko, *Sborn. President Akad. Nauk V. L. Komarov*, 742. 1939 [*“vladimirii-komarovi”*].

卡乌洛夫黄耆 *ka wu luo fu huang qi*

Plants 10–20 cm tall, subacaulescent. Stems of current year 1–3 cm, densely covered with short white hairs. Leaves 3–5 cm; stipules connate behind stem; petiole long; leaflets in 3 or 4 pairs, linear, 7–9 × 0.5–1 mm, appressed white hairy. Racemes subumbellate-capitate, 5- or 6-flowered; peduncle longer than leaves, appressed white hairy; bracts minute. Flowers subsessile. Calyx tubular, appressed white and black hairy; teeth unequal, upper 2 narrowly triangular, ca. 1/3 of tube length, lower 3 subulate, longer. Petals purple-violet; standard ca. 10 mm, limb slightly emarginate; wings shorter than standard, limbs narrowly oblong, slightly dilated toward emarginate tip; keel slightly shorter than wings, limbs oblong-curved. Ovary narrowly oblong, hairy. Legumes unknown.

- About 2800 m. Xinjiang (Kashi Diqu).

46. *Astragalus* sect. *Ammotrophus* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 11(16): 111. 1868.

沙地组 *sha di zu*

Plants herbaceous or slightly subshrubby, with developed stems covered with minutely warty, medifixed hairs. Stipules whitish hyaline, small, free from petiole to shortly adnate to it, ± high connate behind stem. Inflorescence borne on a long peduncle, a short raceme or umbellate to subumbellate. Bracteoles absent. Calyx tubular, at length slightly inflated, ruptured by legume. Limbs of wings emarginate to bilobed at tip. Legumes subsessile, oblong, compressed laterally, rounded dorsally, 2-locular or nearly so, villos, few seeded.

Seven species: China, Mongolia, Russia (Siberia); C Asia; three species in China.

- 1a. Lower stipules connate behind stem, upper ones free; bracts 3–5 mm; calyx 12–16 mm, teeth 2–3 mm; standard 20–26 mm; wing limbs 19–22 mm, slightly emarginate at tip 308. *A. megalanthus*
 1b. All stipules distinctly connate behind stem; bracts 1.5–3 mm; calyx mostly 9–10 mm, teeth 1–2 mm; standard 18–21 mm; wing limbs 12–16 mm.
 2a. Leaflets elliptic to ovate, 2–5 × 0.8–3 mm, both surfaces rather densely hairy; calyx covered with medifixed, appressed, white and shorter black hairs; wing limbs deeply bilobed 309. *A. saratagius*
 2b. Leaflets widely obovate, 6–12 × 4–12 mm, adaxially glabrous or rarely to loosely hairy; calyx covered with subbasifixed, appressed to ascending, white hairs; wing limbs rounded 307. *A. albicans*

307. *Astragalus albicans* Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 21. 1841.

革果黄耆 *ge guo huang qi*

Plants 18–30(–40) cm tall, only furnished with white hairs. Stems several, 10–20(–32) cm, very densely covered with ± medifixed, appressed hairs 0.6–0.8 mm. Leaves 6–7(–11) cm; stipules 3–5 mm, shortly adnate to petiole, behind stem connate to middle or even higher up, sparsely hairy to subglabrous; petiole 1–2(–3) cm, with rachis loosely to densely hairy like stem; leaflets in 6–11(–14) pairs, widely obovate, (3–)6–12(–15) × 4–12 mm, abaxially sparsely to rather densely covered with medifixed, appressed hairs 0.6–0.8 mm, adaxially glabrous or with a few scattered hairs only, more rarely sparsely to loosely hairy. Racemes 2–2.5 cm, rather loosely 6–10-flowered; peduncle 1.5–6 cm, densely to rather densely hairy like stem; bracts 2–3 mm, white hairy. Calyx 9–10 mm, slightly inflated, rather densely covered with mostly subbasifixed, subappressed to ascending, often curly or flexuous, tangled hairs 0.5–0.8 mm; teeth 1–2 mm. Petals purple; standard elliptic, 18–21 × 7–8 mm, apex emarginate; wings 16–19 mm, limbs rounded; keel 14–16 mm. Legumes sessile, obliquely erect, 8–13 mm, 3.5–5 mm high and wide, with a curved beak 1–1.5 mm; valves densely villous with ascending to spreading, flexuous, tangled hairs 1–2.5 mm.

Xinjiang [Kazakhstan, Mongolia].

308. *Astragalus megalanthus* Candolle, Astragalogia, 165. 1802.

大花黄耆 *da hua huang qi*

Plants 10–18 cm tall, loosely caespitose, vegetative parts covered with ± medifixed, appressed to subappressed, white hairs. Stems several, parts of current year 2–6 cm, very densely covered with hairs ca. 1 mm. Leaves 4–15 cm; stipules 3–7 mm, adnate to petiole for 1–2 mm, lower ones ovate-triangular, distinctly connate behind stem, upper narrowly triangular, free from each other, sparsely to loosely hairy, at margins also with basifixed hairs; petiole 3.5–6 cm, with rachis loosely to rather densely hairy like stem; leaflets in 7–10 pairs, 5–15 × 2–5 mm, abaxially somewhat densely and adaxially loosely covered with mostly slightly asymmetrically bifurcate hairs 1.5–2 mm. Racemes 3–4 cm, rather densely 5–10-flowered; peduncle 1.5–7 cm, sparsely to loosely covered with subappressed white hairs; bracts 3–5 mm, with white or white and black hairs, at margins with basifixed hairs. Calyx 12–16 mm, at anthesis tubular, soon

slightly inflated ovoid but ruptured by legume, densely covered with tangled, subappressed to ascending, white hairs 1–2 mm and also, especially toward teeth, with mostly shorter black hairs; teeth 2–3 mm. Petals violet, drying yellow; standard obovate, 20–26 × ca. 7 mm, slightly to distinctly constricted in lower 1/3, apex emarginate; wings 19–22 mm, limbs obliquely emarginate; keel 16–19 mm. Legumes sessile, partly enclosed in ruptured calyx, 9–11 mm, ca. 5 mm high and ca. 3 mm wide, with a beak ca. 1 mm; valves densely covered with strongly asymmetrically bifurcate, spreading, white hairs 1–1.2 mm, glabrescent with age and minutely warty.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

309. *Astragalus saratagius* Bunge, Izv. Imp. Obsc. Ljubit. Estestv. Moskovsk. Univ. 26(2): 269. 1880.

阿赖山黄耆 *a lai shan huang qi*

Astragalus saratagius var. *minutiflorus* S. B. Ho.

Plants 15–35 cm tall, vegetative parts covered with mostly medifixed, appressed, white hairs 0.5–1 mm. Stems several, branched at base, loosely to rather densely hairy. Leaves 1.5–4.5 cm; stipules 1.5–3 mm, shortly or up to 2/3 connate behind stem, sparsely to loosely hairy, margins partly with strongly asymmetrically bifurcate hairs; petiole 0.3–1 cm, like slender rachis rather densely hairy; leaflets in 6–8(–10) pairs, elliptic to ovate, 2–5(–7) × 0.8–3(–4) mm, both surfaces rather densely hairy. Racemes short, ovoid to capitate, densely 5–15(–22)-flowered; peduncle 2.4–10 cm, loosely to rather densely white hairy; bracts 1.5–3 mm, with white and sometimes a few black hairs, margins with strongly asymmetrically bifurcate to basifixed hairs. Calyx at anthesis tubular, 9–10 mm, at length slightly inflated but ruptured by legume, loosely to rather densely covered with subappressed white and distinctly shorter black hairs, sometimes glabrescent; teeth 1–1.5 mm. Petals violet, keel with a dark violet tip; standard obovate, 18–20(–24) × 6–7 mm, slightly constricted below middle, apex narrowly retuse; wings 15–20 mm, limbs deeply bilobed; keel 12.5–16 mm. Legumes sessile, 7–11 mm, ca. 3 mm high and ca. 2 mm wide, with a curved beak 1.5–2 mm; valves densely covered with subappressed to slightly ascending, subbasifixed to basifixed, white hairs up to 1.5 mm and with fewer, much shorter, ± medifixed, black hairs.

Subalpine steppes; 2000–3000 m. Xinjiang [Kyrgyzstan, Tajikistan, Uzbekistan].

47. *Astragalus* sect. *Leucophysa* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 112. 1868.

白泡果组 *bai pao guo zu*

Plants perennial, herbaceous, with a developed stem; hairs bifurcate. Leaves imparipinnate; stipules free from petiole or very

shortly adnate to it, otherwise free. Racemes short, ± capitate, with a distinct peduncle. Bracteoles absent. Calyx campanulate to tubular. Petals glabrous; wing limbs rounded at apex. Legumes sessile, bladderlike inflated, completely or more rarely incompletely 2-locular; valves membranous.

Six species: China, Kazakhstan, Mongolia; one species in European Russia; five species (three endemic) in China.

- 1a. Leaflets in 2 or 3 pairs; petals yellowish; standard ca. 8 mm 311. *A. qingheensis*
 1b. Leaflets in at least 5 pairs; petals pink, purple, or violet; standard at least 16 mm.
 2a. Leaves 10–30 cm; petiole as long as rachis or longer; legumes with a beak 4–10(–14) mm.
 3a. Leaflets in 5–8 pairs, widely elliptic, 4–10 × 3–9 mm; legumes 10–15 mm, with a beak 5–6 mm 313. *A. toksunensis*
 3b. Leaflets in 6–14 pairs, elliptic, 10–24 × 6–11 mm; legumes 17–26 mm, with a beak
 4–10(–14) mm 314. *A. urunguensis*
 2b. Leaves up to 18 cm; petiole much shorter than rachis; legumes with a beak up to 3 mm.
 4a. Stems covered with strongly flexuous, ± spreading hairs up to 0.4 mm and sparsely with ± straight,
 spreading hairs up to 1.5 mm; legumes inflated ovoid, 12–17 mm, 11–14 mm high and 7–8 mm
 wide, densely and shortly velvety and loosely furnished with spreading hairs up to 1.5 mm 310. *A. candidissimus*
 4b. Stems covered with asymmetrically to strongly asymmetrically bifurcate, often flexuous,
 subappressed to ascending, white hairs ca. 1 mm; legumes globose, 13–15 mm, covered with
 asymmetrically to strongly asymmetrically bifurcate, tangled, subappressed to ascending,
 white hairs 1–1.5 mm 312. *A. steinbergianus*

310. *Astragalus candidissimus* Ledebour, Fl. Altaic. 3: 309. 1831.

亮白黄耆 liang bai huang qi

Plants 15–30 cm tall, densely white tomentose-villous. Stems solitary or several, 10–20 cm, ascending to erect, very densely covered with strongly flexuous, ± spreading hairs up to 0.4 mm and sparsely with ± straight, spreading hairs up to 1.5 mm. Leaves 2.5–13 cm; stipules 4–7 mm, densely covered with tangled, subappressed to ascending hairs 0.2–1.5 mm; petiole 0.8–2.5(–5) cm, with rachis hairy like stem; leaflets in 5–12 pairs, 3–15 × 2.5–8 mm, both surfaces densely hairy like stipules. Racemes short, densely 5–15-flowered; peduncle 1.5–7 cm, hairy like stem; bracts 8–9 mm, densely hairy. Calyx 9–10 mm, densely shortly tomentose and with a few spreading hairs up to 1 mm; teeth 2–4 mm. Petals pinkish violet; standard obovate, 16–17 × 7.5–8 mm, sometimes slightly constricted below middle, apex deeply incised; wings 14–15.5 mm; keel 13–14 mm. Legumes inflated ovoid, 12–17 mm, 11–14 mm high and 7–8 mm wide, deeply grooved ventrally and dorsally, with a straight beak ca. 3 mm; valves densely and shortly velvety and loosely furnished with spreading hairs up to 1.5 mm.

NW Xinjiang [Kazakhstan, Mongolia].

311. *Astragalus qingheensis* Y. X. Liou, Fl. Desert. Reipubl. Popul. Sin. 2: 444. 1987.

清河黄耆 qing he huang qi

Plants ca. 17 cm tall, subshrubby. Stems of current year erect, covered with appressed to ascending hairs. Leaves 2–2.5 cm; stipules 2–3 mm, with appressed to ascending hairs; petiole short; leaflets in 2 or 3 pairs, narrowly elliptic, 3–10 × 1.5–2.5 mm, both surfaces white hairy, apex acute. Racemes densely 6–12-flowered; peduncle 4–7 cm; bracts 2–3 mm, linear-acute. Calyx 4–6 mm, covered with ascending white and black hairs; teeth ca. 1 mm. Petals yellowish; standard oblong, ca. 8 × 2.5 mm, apex truncate; wings ca. 8 mm; keel shorter than wings. Legumes (unripe) ovoid, 5–6 mm; valves densely covered with white and black hairs.

• Xinjiang (Qinghe).

312. *Astragalus steinbergianus* Sumnevicz, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1934(2–3): 3. 1934.

蒙西黄耆 meng xi huang qi

Astragalus candidissimus Ledebour var. *pauciflorus* Krylov & Sergievskaya.

Plants 8–23 cm tall. Stems solitary or several, 2–10 cm, very densely covered with asymmetrically to strongly asymmetrically bifurcate, often flexuous, subappressed to ascending, white hairs ca. 1 mm. Leaves 5–18 cm; stipules 5–7 mm, rather densely hairy like stem; petiole 2–5 cm, with rachis densely hairy like stem; leaflets in 7–14 pairs, (5–)7–15 × 4–8 mm, both surfaces densely to rather densely covered with asymmetrically bifurcate white hairs 1–1.5 mm, abaxially with ± flexuous, tangled, subappressed hairs, adaxially with ± appressed, straight hairs. Racemes short, densely (3–)5–8-flowered; peduncle (2–)3–7 cm, densely hairy like stem; bracts 4–8 mm, with subbasifixed to basifixed white hairs. Calyx 11–12 mm, densely covered with symmetrically or asymmetrically bifurcate, flexuous, subappressed to slightly ascending, white hairs ca. 1 mm, with a few short black hairs mixed in; teeth unequal, 1.2–3.5 mm. Petals pinkish violet; standard obovate, 18–19 × ca. 7 mm, apex emarginate; wings 17–18 mm; keel 15–16 mm. Legumes globose, 13–15 in diam., slightly grooved ventrally, distinctly grooved dorsally, with a beak 1–2 mm; valves densely covered with asymmetrically to strongly asymmetrically bifurcate, tangled, subappressed to ascending, white hairs 1–1.5 mm.

Xinjiang [Kazakhstan].

313. *Astragalus toksunensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 50. 1983.

托克逊黄耆 tuo ke xun huang qi

Plants up to 35 cm tall, all parts covered with short, ascending, white hairs. Stems 3–8 cm, branched at base. Leaves 10–30 cm; stipules shortly adnate to petiole; petiole up to 2 × as

long as rachis; leaflets in 5–8 pairs, widely elliptic, 4–10 × 3–9 mm, both surfaces spreading hairy, apex obtuse. Racemes loosely 7–10-flowered; peduncle 1–2 cm; bracts longer than pedicels. Calyx 10–15 mm; teeth filiform, 3–4 mm. Petals purplish; standard obovate-pandurate, 20–22 × 7–8 mm, constricted in middle, apex emarginate; wings 18–20 mm; keel 16–18 mm. Legumes sessile, inflated ovoid, 10–15 mm, 6–10 mm high, grooved dorsally, with a narrowly triangular beak 5–6 mm; valves white lanate.

• Xinjiang (Toksun).

314. *Astragalus urunguensis* N. Ulziykhutag, Byull. Moskovsk. Obsch. Isp. Prir., Otd. Biol. 95: 75. 1990.

乌伦古黄耆 *wu lun gu huang qi*

Plants 25–40 cm tall. Stems 8–20 cm, ascending to erect,

shortly white lanate. Leaves 10–30 cm; stipules 7–14 mm, subappressed white hairy; petiole 2–9 cm, like rachis covered with subappressed short hairs; leaflets in 6–14 pairs, mostly elliptic, 10–24 × 6–11 mm, both surfaces gray hairy with subappressed, long, white hairs. Racemes 2–3 cm, densely 9–15-flowered; peduncle 1.5–7(–11) cm, densely covered with short white hairs; bracts 4–11 × 0.5–1.5 mm, white hairy. Calyx 11–15 mm, with subappressed white hairs; teeth 2–3.5 mm. Petals pink-violet; standard oblong-obovate to rarely suborbicular, 16–21 mm, apex retuse; wings 14–18 mm; keel 11–16 mm. Legumes inflated ovoid, 17–26 mm, 10–15 mm high, grooved ventrally and dorsally, with a beak 4–10(–14) mm, incompletely 2-locular; valves transversely nerved, covered with long spreading and short appressed white hairs.

• Xinjiang.

48. *Astragalus* sect. *Cystium* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 113. 1868.

泡荚组 *pao jia zu*

Plants subcaulescent, covered with bifurcate hairs. Stipules adnate to petiole and connate behind stem. Racemes with a long peduncle. Calyx tubular. Petals violet. Legumes bladderlike inflated, grooved ventrally and dorsally, 2-locular; valves membranous.

Six species: China, Pakistan, Russia; C Asia, SW Asia (Caucasus, Iran, Turkey), E Europe; one species in China.

315. *Astragalus masanderanus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 114. 1868.

乌恰黄耆 *wu qia huang qi*

Astragalus skorniakowii B. Fedtschenko; *A. skorniakowii* var. *wuqiaensis* S. B. Ho.

Plants 10–30 cm tall, acaulescent or nearly so, covered with ± appressed to subappressed, mostly ± symmetrically to slightly asymmetrically bifurcate hairs 0.5–0.8(–1.1) mm. Stems, if present, up to 2.5(–3.5) cm, densely white hairy. Leaves 5–20 cm; stipules 5–12 mm, connate behind stem to middle, loosely white hairy with some black hairs mixed in, soon glabrescent or partly glabrous; petiole 2–8 cm, like rachis sparsely to loosely white hairy; leaflets in mostly 10–20 pairs, 6–14 × 1.5–3 mm, abaxially loosely and adaxially sparsely to loosely white hairy. Racemes 2–4 cm, rather densely few to

many flowered, elongating in fruit up to 13 cm; peduncle 4–20 cm, sparsely to more rarely rather loosely white hairy, in upper part often also with black hairs or subglabrous; bracts 3–6 mm, sparsely black hairy. Calyx mostly 10(–13) mm, tubular to slightly inflated, loosely to densely black or black and white hairy; teeth 2–3 mm. Petals violet; standard obovate to rhombic-elliptic, 20–25 × 6–7 mm, apex widely emarginate to retuse; wings 17–22 mm, limbs narrowly obovate-obtriangular, widest near obliquely incised tip; keel 15–19 mm. Legumes sessile, ovoid to globose, bladderlike inflated, 16–30 mm, 10–15(–20) mm high and wide, grooved ventrally and dorsally, with a straight beak ca. 1 mm; valves glabrous or covered with scattered appressed white or black hairs.

Foothill and mountain semideserts and deserts; below 3200 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

49. *Astragalus* sect. *Paracystium* Gontscharow in Komarov, Fl. URSS 12: 881. 1946.

类泡荚组 *lei pao jia zu*

Plants similar to *Astragalus* sect. *Cystium*, acaulescent to shortly caulescent, covered with bifurcate hairs. Stipules ± adnate to petiole, otherwise free. Racemes with a short peduncle, loosely few flowered. Legumes bladderlike inflated, 2-locular; valves rigidly membranous to leathery.

Five species: China, Kazakhstan, Mongolia, Uzbekistan; SW Asia (Caucasus), E Europe; one species in China.

316. *Astragalus pallasii* Sprengel, Mant. Prim. Fl. Hal. 48. 1807.

毛叶黄耆 *mao ye huang qi*

Astragalus inderiensis Claus; *A. lasiophyllus* Ledebour.

Plants 5–10 cm tall, acaulescent to shortly caulescent, caespitose. Stems, if present, up to 5 cm, densely covered with ± medifixed, appressed to subappressed, white hairs up to 1

mm. Leaves 2.5–8 cm; stipules 3–5 mm, mostly ± appressed hairy; petiole 1–3 cm, like rachis rather densely covered with appressed to partly ascending, mostly ± medifixed hairs; leaflets in 4–7 pairs, 4–8 × 1–3 mm, adaxially glabrous or with scattered hairs along margins, abaxially densely to rather densely covered with subappressed to spreading hairs. Racemes 2–5-flowered; peduncle 2–6 cm, with appressed to ascending hairs; bracts ca. 1.5 mm, predominantly white hairy. Calyx 13–16 mm, rather densely covered with symmetrically or asymmetri-

cally bifurcate, ± subappressed, black (predominantly at dorsal side) and white (predominantly at ventral side) hairs up to 0.5 mm; teeth 2–2.5 mm. Petals pale lilac; standard narrowly obovate, 23–28 × ca. 8 mm, in middle slightly constricted, apex slightly emarginate; wings 22–27 mm; keel 19–25 mm. Legumes subsessile, inflated ovoid, 18–24 mm, 10–12 mm in

diam. with a curved beak ca. 2 mm; valves thin, sparsely covered with strongly asymmetrically bifurcate to subbasifixed, spreading, white hairs up to 2 mm.

Artemisia steppes, on saline, rarely sandy, soil. Xinjiang [Kazakhstan, Uzbekistan].

50. *Astragalus* sect. *Tanythrix* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 114. 1868.

毛冠组 mao guan zu

Astragalus sect. *Pseudoroesei* N. Ulziykhutag.

Plants perennial, with lignified stem bases, covered with ascending to spreading bifurcate hairs. Stems well developed, prostrate. Stipules adnate to petiole, otherwise free. Racemes borne on short peduncles, densely capitate. Bracteoles absent. Calyx campanulate-tubular, ruptured by legume. Petals glabrous or all hairy; standard at base hastately angularly passing into claw; wing limbs bilobed. Legumes small, incompletely 2-locular, many seeded.

Two species: NW China, Kazakhstan, Russia (Siberia); two species (one endemic) in China.

- 1a. Calyx 11–14 mm; petals hairy, rarely glabrous; standard 13–17 mm 318. *A. roseus*
 1b. Calyx 9–10 mm; petals glabrous; standard 10–11 mm 317. *A. pseudoroeseus*

317. *Astragalus pseudoroeseus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 33: 135. 2001.

类毛冠黄耆 lei mao guan huang qi

Plants 5–10 cm tall. Stems 3–5 cm, prostrate, white or gray lanate with bifurcate hairs. Leaves 3–6 cm; stipules 4–5 mm, covered with ascending hairs; petiole 1–2.5 cm, like rachis densely white villous; leaflets in 9–13 pairs, 4–7 × 3–4 mm, both surfaces densely covered with ascending hairs. Racemes subsessile, capitate, ca. 1.5 cm, with densely villous peduncle 0.3–0.5(–1) cm; bracts 6–9 mm, spreading hairy. Calyx 9–10 mm, densely white villous; teeth 4–5 mm. Petals pink to pink-violet, glabrous; standard 10–11 mm, limb oblong, apex emarginate; wings 9–10.5 mm; keel 8–9.5 mm. Legumes with a stipe ca. 1 mm, narrowly oblong, 7–8 mm, ca. 3 mm high, with a short, oblique beak; valves densely white villous.

• Xinjiang.

318. *Astragalus roseus* Ledebour, Fl. Altaic. 3: 330. 1831.

毛冠黄耆 mao guan huang qi

Plants 10–20 cm tall, white hairy. Stems 7–15 cm, prostrate to erect, densely to very densely covered with symmetrically or asymmetrically bifurcate, ascending to spreading hairs ca. 2 mm. Leaves (5–)7–13 cm; stipules 5–10 mm, adnate to petiole for ca. 1 mm, spreading hairy; petiole 1.5–4.5 cm, with rachis hairy like stem; leaflets in 9–13 pairs, 8–15 × 3–6 mm, both surfaces densely covered with ± medifixed, spreading hairs 2–3 mm. Racemes 2–2.5 cm, densely many flowered; peduncle distributed over whole length of stem, mostly 1–4 cm, hairy like stem; bracts 5–10 mm, spreading hairy. Calyx 11–14 mm, densely white villous; teeth filiform, 6–9 mm. Petals pink, all partly covered with short appressed hairs on upper or outer side, rarely glabrous; standard narrowly oblong, 13–17 × ca. 4 mm, apex emarginate; wings 11–15 mm; keel 9–11 mm. Legumes sessile, 7–9 mm, 4–5 mm high and ca. 3 mm wide, with a reflexed beak ca. 1 mm; valves densely covered with spreading white hairs.

On sand. Xinjiang [Kazakhstan, Russia (Siberia)].

51. *Astragalus* sect. *Trachycercis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 114. 1868.

糙叶组 cao ye zu

Astragalus sect. *Borodiniani* B. Fedtschenko; *A.* sect. *Deserti* S. B. Ho.

Plants acaulescent or nearly so, mostly caespitose, with bifurcate to basifixed, mostly only white hairs. Stipules shortly to high adnate to petiole, otherwise free. Racemes subsessile or more rarely with a short peduncle, 1–8(–10)-flowered. Wing limbs rounded to emarginate. Legumes sessile, short, included in calyx or exceeding and rupturing calyx, mostly 2-locular.

Seventy-seven species: Afghanistan, China, Mongolia, Russia; C Asia, SW Asia (Caucasus, Iran, Iraq, Turkey), Europe; 43 species (29 endemic) in China.

- 1a. At least some leaves with only 1 leaflet.
 2a. Calyx 5–7 mm; petals pink; standard 12–15 mm.
 3a. Basal leaves with 1 terminal leaflet, other leaves with 1 additional pair of leaflets; plants with ± medifixed, appressed hairs; racemes with a peduncle 2–5 cm 361. *A. visibilis*
 3b. All leaves with only 1 terminal leaflet; plants at stipules and calyx with strongly asymmetrically bifurcate to basifixed, ascending to spreading hairs 359. *A. vellestris*
 2b. Calyx 10–12 mm; petals yellow; standard 21–23 mm.

- 4a. Leaves partly with only 1 terminal leaflet, partly with an additional pair of leaflets, leaflets obovate, 6–15 × 3–6 mm; bracts ca. 8 mm; legumes subglobose, 4–5 mm 341. *A. muschketowii*
- 4b. Leaves always with only 1 terminal leaflet, widely elliptic, 8–16 × 8–12 mm; bracts 3–4 mm; legumes narrowly ellipsoid, 15–18 mm, ca. 6 mm high 340. *A. monophyllus*
- 1b. All leaves (ignore terminal ones) with at least 1 pair of leaflets.
- 5a. Leaflets in 1–3(or 4) pairs.
- 6a. Calyx 6–9 mm; bracts up to 7 mm.
- 7a. Standard 12–13 mm 322. *A. brevivexillatus*
- 7b. Standard ca. 16 mm or longer.
- 8a. Stipules 2–3 mm; leaflets only in 1 pair; calyx black hairy; petals pink; standard ca. 21 mm, keel ca. 15 mm 328. *A. gregorii*
- 8b. Stipules longer; leaflets at least partly in 2 or 3 pairs; calyx white hairy; petals whitish, yellow, or purplish.
- 9a. Stipules 2.5–4 mm; leaflets in 3 pairs; bracts 1–1.5 mm; standard ca. 16 mm, keel ca. 11 mm; calyx with medifixed, appressed hairs 358. *A. trijugus*
- 9b. Stipules longer; leaflets in 1–3 pairs; bracts distinctly longer; standard 19–20 mm, if standard only ca. 16 mm (*A. porphyreus*), then calyx with basifixed, spreading hairs.
- 10a. Racemes with a peduncle 2–3 cm, 5–7-flowered; bracts ciliate, otherwise glabrous 353. *A. secretus*
- 10b. Racemes sessile, 1–3-flowered; bracts hairy.
- 11a. Calyx with ± medifixed, appressed hairs; keel ca. 16 mm 360. *A. vescus*
- 11b. Calyx with basifixed, ± spreading hairs; keel 12–13 mm or ca. 18 mm.
- 12a. Leaflets in 3 or 4 pairs, adaxially sparsely and abaxially rather densely covered with hairs ca. 1 mm; bracts ca. 7 mm; standard ca. 22 mm, keel ca. 18 mm 319. *A. acceptus*
- 12b. Leaflets in 1 or 2 pairs, adaxially loosely to rather densely and abaxially more densely covered with hairs 0.3–0.5 mm; bracts ca. 3 mm; standard 16–17 mm, keel 12–13 mm 347. *A. porphyreus*
- 6b. Calyx at least (8–)9 mm, but mostly and at least partly longer; bracts (7–)8–12 mm.
- 13a. Standard 13–15 mm 348. *A. pseudoborodinii*
- 13b. Standard (16–)20–24 mm.
- 14a. Keel ca. 1/2 as long as standard.
- 15a. Stipules 5–7 mm, ciliate, otherwise glabrous; calyx tube glabrous at least in lower 1/2 326. *A. glabritubus*
- 15b. Stipules 7–12 mm, densely hairy; calyx hairy all over 345. *A. parvicarinatus*
- 14b. Keel distinctly more than 1/2 as long as standard.
- 16a. Petiole and rachis at least partly covered with spreading hairs.
- 17a. Petiole and rachis covered with medifixed hairs 0.4–0.6 mm; bracts ca. 3 mm 333. *A. jiuquanensis*
- 17b. Petiole and rachis covered with medifixed hairs ca. 1 mm and with basifixed hairs up to 2 mm; bracts 8–10 mm 346. *A. perbrevis*
- 16b. Petiole and rachis covered with appressed hairs.
- 18a. Some leaves with only 1 leaflet, others with an additional pair of leaflets; bracts ca. 8 mm, with hairs up to 0.8 mm; standard 22–23 mm 341. *A. muschketowii*
- 18b. Leaves with 1 or 2 pairs of leaflets; bracts 10–12 mm, with hairs up to 1.5 mm; standard ca. 20 mm 320. *A. borodinii*
- 5b. Leaflets in more pairs.
- 19a. Rachis with appressed to ascending hairs.
- 20a. Plants in parts furnished with black hairs 356. *A. testiculatus*
- 20b. Plants only with white hairs.
- 21a. Leaflets adaxially glabrous.
- 22a. Stipules 4–5 mm; leaflets 2–6 × 0.8–2.5 mm; bracts ca. 5 mm; calyx 6–7 mm, with teeth 1.5–2 mm, covered with subbasifixed to basifixed hairs; standard 15–18 mm 343. *A. occultus*
- 22b. Stipules 5–7(–10) mm; leaflets 5–13(–19) × 1–3(–5) mm; bracts 6–9 mm; calyx ca. 9 mm, with teeth 4–6 mm, covered with asymmetrically bifurcate hairs; standard 21–26 mm 324. *A. galactites*
- 21b. Leaflets on both surfaces sparsely to densely hairy.
- 23a. Standard 15–16 mm.
- 24a. Leaflets in 6–9 pairs; bracts 3–4 mm; calyx 8–9 mm, with teeth ca. 2 mm 330. *A. hebecarpus*
- 24b. Leaflets in 3–6 pairs; bracts 7–8 mm; calyx 10–12 mm, with teeth 4–6 mm 349. *A. pseudohypogaeus*
- 23b. Standard distinctly longer.
- 25a. Calyx 7–9 mm.
- 26a. Standard 20–30 × 6–7 mm, narrowly oblong-pandurate, slightly to distinctly constricted below middle 321. *A. brevifolius*
- 26b. Standard 18–21 × 8–9 mm, ovate to obovate, not constricted.

- 27a. Racemes sessile, 1–3-flowered; calyx covered with strongly asymmetrically bifurcate to basifixed, tangled, flexuous, \pm spreading hairs 336. *A. levidensis*
- 27b. Raceme with a peduncle 0.3–1.4(–4) cm, 3–5-flowered; calyx covered with \pm medifixed, appressed hairs 351. *A. scaberrimus*
- 25b. Calyx 10–15 mm.
- 28a. Plants caulescent with stem up to 15 cm; peduncle distinct, 0.5–3 cm; calyx after anthesis slightly inflated 327. *A. gracilidentatus*
- 28b. Plants acaulescent; racemes sessile; calyx always tubular.
- 29a. Hairs of rachis and leaflets 1.8–3 mm; calyx with subappressed to slightly ascending hairs up to 1.5 mm, teeth 4–6 mm; standard 16–19 mm, constricted below middle; legumes with a beak 5–8 mm 352. *A. scabrisetus*
- 29b. Hairs of rachis and leaflets up to 1 mm; calyx with other kind of hairs, teeth shorter, at most up to 4 mm; standard mostly longer, not constricted below middle; legumes minutely acuminate (unknown in *A. ningxiaensis*).
- 30a. Stipules 4–5 mm, with spreading, partly basifixed hairs; bracts 10–11 mm, with spreading hairs; calyx with spreading, partly basifixed hairs up to 1.2 mm; standard 23–27 mm 342. *A. ningxiaensis*
- 30b. Stipules 4–12 mm, with \pm appressed, asymmetrically bifurcate hairs; bracts 3–5 mm, with appressed to ascending hairs; calyx with ascending, asymmetrically bifurcate hairs 1.5–2.5 mm, teeth 2–3 mm; standard 18–22 mm 334. *A. junatovii*
- 19b. Rachis with at least partly spreading hairs.
- 31a. Standard and wings hairy 323. *A. filidens*
- 31b. All petals glabrous.
- 32a. Racemes with a distinct peduncle 1–3 cm, 6–10-flowered.
- 33a. Stipules 10–15 mm, adnate to petiole for 3–5 mm; calyx 10–12 mm; standard obovate, base gradually narrowed 325. *A. geerwusuensis*
- 33b. Stipules 5–6 mm, nearly free from petiole; calyx 15–16 mm; standard obovate-pandurate, below middle constricted, base angularly passing into claw 337. *A. lustricola*
- 32b. Racemes sessile or subsessile.
- 34a. Leaflets in (9 or) 10–17 pairs.
- 35a. Stipules 3–7 mm; leaflets 3–6 \times 1.5–3 mm; standard narrowly ovate; wing limbs slightly emarginate 335. *A. lang-ranii*
- 35b. Stipules 6–12 mm; leaflets larger; standard narrowly obovate, often slightly constricted in middle; wing limbs obtuse.
- 36a. Leaflets on both surfaces covered with spreading hairs; bracts ca. 12 mm; petals yellow 344. *A. ordosicus*
- 36b. Leaflets covered at least partly with subappressed to ascending hairs; bracts up to 10 mm; petals white or purple in life (often drying to yellowish brown).
- 37a. Leaflets adaxially with subappressed hairs; bracts 7–10 mm; calyx teeth 5–7 mm; petals purple in life; standard 18–21 mm, obovate, widely cuneate at base; legumes 8–9 mm, ca. 3 mm high, with a beak 3–5 mm 329. *A. grubovii*
- 37b. Leaflets on both surfaces with ascending hairs; bracts ca. 5 mm; calyx teeth 2.5–5 mm; petals whitish; standard 22–28 mm, slightly constricted below middle, with a short claw; legumes 10–14 mm, ca. 5 mm high, shortly acuminate 331. *A. hsinbaticus*
- 34b. Leaflets in 4–11 pairs.
- 38a. Leaflets in 4(or 5) pairs; calyx ca. 8 mm; standard ca. 17 mm 355. *A. tesquorum*
- 38b. Leaflets in mostly distinctly more pairs; calyx and standard distinctly longer.
- 39a. Leaflets covered with symmetrically to slightly asymmetrically bifurcate, appressed to slightly ascending hairs; bracts ca. 2 mm 338. *A. lychnobius*
- 39b. Leaflets covered with ascending to spreading hairs; bracts distinctly longer.
- 40a. Calyx 15–18 mm; standard 27–32 mm 332. *A. hypogaeus*
- 40b. Calyx at most up to 13 mm; standard up to 25 mm.
- 41a. Rachis partly appressed to subappressed hairy, with few to many spreading hairs mixed in; calyx covered with ascending to spreading, flexuous hairs up to 1 mm and with spreading, straight hairs up to 2 mm.
- 42a. Plants covered only with white hairs; stipules 10–15 mm; leaflets elliptic to widely elliptic, 3–4 \times 2–2.5 mm, rounded; flowers subsessile; standard elliptic 357. *A. transecticola*
- 42b. Bracts, pedicels, and calyx with black hairs mixed in; stipules 6–8 mm; leaflets narrowly elliptic, 5–10 \times 1.5–3 mm, acute; flowers with pedicel 2–3 mm; standard obovate, below middle slightly constricted 339. *A. macriculus*

- 41b. Rachis only with spreading hairs; calyx with strongly asymmetrically bifurcate to basifixed, ascending to spreading hairs 1–2 mm.
- 43a. Stipules 4–8 mm, sparsely to loosely covered with \pm medifixed, subappressed to ascending hairs 0.7–1 mm, at margins also with \pm basifixed hairs ca. 1.5 mm; leaflets elliptic to ovate, 3–5 \times 1.5–3.5 mm; bracts 3–5 mm, very sparsely to sparsely hairy 350. *A. pseudoscaberrimus*
- 43b. Stipules 10–15 mm, loosely covered with basifixed, spreading hairs 1–2 mm; leaflets widely obovate to orbicular, 4–6 \times 3.5–5.5 mm; bracts 5–7 mm, more densely hairy 354. *A. sinkiangensis*

319. *Astragalus acceptus* Podlech & L. R. Xu, Novon 17: 243. 2007.

德令哈黄耆 *de ling ha huang qi*

Plants 4–5 cm tall, acaulescent, densely caespitose, only white hairy. Leaves 2–6 cm; stipules 5–8 mm, adnate to petiole for ca. 3 mm, densely covered with \pm symmetrically or asymmetrically bifurcate, subappressed hairs 1–1.5 mm; petiole 1–3 cm, like rachis slender, densely covered with \pm medifixed, subappressed hairs 0.4–0.6 mm; leaflets in 3 or 4 pairs, 4–8 \times 1.8–3 mm, abaxially rather densely and adaxially sparsely covered with medifixed, appressed hairs ca. 1 mm. Racemes sessile, 1- or 2-flowered; bracts ca. 7 mm, sparsely covered with basifixed hairs 0.8–1 mm. Calyx 9–10 mm, densely covered with strongly asymmetrically bifurcate to basifixed, flexuous, tangled, white hairs 0.7–1 mm; teeth 2.5–3 mm. Petals yellowish when dry; standard oblong, ca. 22 \times 6–7 mm, slightly constricted below middle, apex emarginate; wings ca. 19 mm, limbs narrowly oblong, laterally incised; keel ca. 18 mm. Ovary sessile, white hairy. Legumes unknown.

• Qinghai.

320. *Astragalus borodini* Krasnov, Bot. Zap. 2: 15. 1887–1888 [*“borodini”*].

东天山黄耆 *dong tian shan huang qi*

Astragalus hypogaeus Ledebour var. *borodini* (Krasnov) Krasnov; *A. projecturus* Sumnevich.

Plants 3–10 cm tall, only white hairy. Leaves 2–5 cm; stipules 8–10 mm, adnate to petiole for 4–5 mm, sparsely covered with subappressed, subbasifixed to basifixed hairs and at margins with spreading, basifixed cilia ca. 1 mm; petiole 1–3 cm, like rachis covered with \pm medifixed, appressed hairs 0.8–1 mm; leaflets mostly in 2 pairs, obovate, 8–20 \times 3–8 mm, both surfaces rather densely hairy like petiole. Racemes sessile, 2- or 3-flowered; bracts 10–12 \times ca. 1.5 mm, densely hairy like stipules. Calyx 11–13 mm, densely covered with ascending to \pm spreading, tangled, subbasifixed to basifixed hairs up to 2 mm; teeth 2.5–4 mm. Petals yellow; standard narrowly obovate, ca. 20 \times 7 mm, apex slightly emarginate to rounded; wings ca. 15 mm, limbs rounded at apex; keel ca. 13 mm. Legumes 4–5 mm, 3–4.5 mm high, slightly compressed laterally, abruptly contracted into a beak ca. 1 mm, incompletely 2-locular to \pm 1-locular; valves densely covered with subappressed hairs.

Xinjiang [Kazakhstan, Kyrgyzstan].

321. *Astragalus brevifolius* Ledebour, Fl. Altaic. 3: 334. 1831.

短叶黄耆 *duan ye huang qi*

Plants 3–6 cm tall, covered with mostly medifixed, ap-

pressed, only white hairs 0.3–0.8 mm. Leaves 2–4 cm; stipules 3–6 mm, adnate to petiole for 1–2 mm, subglabrous to loosely hairy; petiole 0.5–2 cm, like rachis rather densely hairy; leaflets in (2 or)3 or 4 pairs, narrowly elliptic, 4–10 \times 1–3 mm, both surfaces sparsely to rather densely hairy. Racemes subsessile, 1- or 2-flowered; bracts 4–5 mm, at margins with subbasifixed hairs. Calyx 7–9 mm, rather densely hairy; teeth 1–2.5 mm. Petals yellow; standard narrowly elliptic to narrowly obovate, 20–30 \times 6–7 mm, slightly constricted below middle; wings 18–25 mm, limbs obtuse to slightly emarginate; keel 16–21 mm. Legumes oblong, slightly curved, 2-locular; valves covered with appressed hairs.

Nei Mongol, Xinjiang [Mongolia, Russia (Siberia)].

322. *Astragalus brevixillatus* Podlech & L. R. Xu, Novon 17: 243. 2007.

短旗瓣黄耆 *duan qi ban huang qi*

Plants 5–6 cm tall, acaulescent, caespitose, only with white hairs. Leaves 3–6 cm; stipules ca. 2 mm, shortly adnate to petiole, hairy like rachis; petiole 2–4 cm, like rachis densely covered with appressed, symmetrically or asymmetrically bifurcate hairs ca. 1 mm; leaflets in 2 pairs, narrowly elliptic to elliptic, 7–15 \times 3–5 mm, both surfaces densely covered with mostly \pm medifixed, appressed hairs 2–2.5 mm. Racemes sessile, 3- or 4-flowered; bracts 4–7 mm, with basifixed hairs up to 1 mm. Calyx ca. 8 mm, rather densely covered with subbasifixed to basifixed, ascending to spreading, tangled hairs ca. 1 mm; teeth filiform, 3–4 mm. Petals probably yellow; standard oblong, ca. 12 \times 4 mm, apex rounded; wings ca. 12 mm, limbs obtuse; keel ca. 9 mm. Legumes sessile, ca. 5 mm, ca. 2 mm high and wide, with a rigid beak 4–5 mm, incompletely 2-locular; valves densely covered with appressed to ascending, tangled, medifixed to basifixed hairs 0.5–1 mm.

• Xinjiang.

323. *Astragalus filidens* Podlech & L. R. Xu, Novon 17: 244. 2007.

丝齿黄耆 *si chi huang qi*

Plants 6–8 cm tall, acaulescent or subacaulescent, caespitose, densely covered with ascending to spreading, bifurcate, only white hairs. Stems, if present, up to 2 cm, densely covered with symmetrically or asymmetrically bifurcate, ascending to spreading, flexuous, tangled hairs 0.5–0.8 mm. Leaves 3–6 cm; stipules 3–5 mm, shortly adnate to petiole, hairy like stem; petiole 1–2.5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate, ascending to spreading, tangled hairs 0.5–0.8 mm and with strongly asymmetrically bifurcate, spreading hairs up to 2.5 mm; leaflets in 5–9 pairs, narrowly

elliptic to elliptic, 4–9 × 2–3 mm, partly folded, both surfaces densely covered with symmetrically or asymmetrically bifurcate, ascending to partly spreading, tangled hairs 1.5–2.5 mm. Racemes subsessile, 4- or 5-flowered; bracts 7–8 mm, with mostly strongly asymmetrically bifurcate hairs 0.8–1.5 mm. Calyx 10–12 mm, densely covered with mostly strongly asymmetrically bifurcate, ascending to spreading, tangled hairs 1.5–2.5 mm; teeth filiform, 5–6 mm. Petals probably whitish or yellow, standard abaxially and wings on outer side loosely covered with ± asymmetrically bifurcate, flexuous, appressed hairs; standard oblong-pandurate, ca. 15 × 4–4.5 mm, below middle distinctly constricted, toward base widened and obtusely angularly passing into short, cuneate claw, apex emarginate; wings ca. 14 mm, limbs distinctly incised; keel ca. 10 mm. Ovary sessile, densely white hairy. Legumes unknown.

- NW Xinjiang.

324. *Astragalus galactites* Pallas, Sp. Astragal. 85. 1802.

乳白花黄耆 ru bai hua huang qi

Astragalus otosemius Kitagawa; *A. zhaolingicus* K. T. Fu.

Plants 3–12 cm tall, often forming compact mats, only white hairy. Leaves 3–12 cm; stipules 5–7(–10) mm, adnate to petiole for 2–3 mm, loosely to rather densely covered with strongly asymmetrically bifurcate, subappressed hairs, sometimes glabrescent, margins with basifixed, ± spreading hairs up to 1.5 mm; petiole 1–5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate, appressed hairs 0.6–0.8 mm; leaflets in 4–8 pairs, narrowly elliptic, 5–13(–19) × 1–3(–5) mm, abaxially loosely to rather densely hairy like rachis, adaxially glabrous or rarely with scattered hairs toward margins. Racemes many, forming dense, capitate synflorescences around base of leaves, (1 or)2–4-flowered; peduncle up to 0.5 cm, densely hairy; bracts 6–9 mm, with subbasifixed to basifixed hairs up to 1.5 mm. Calyx (6–)8–10 mm, densely covered with subappressed to ascending, asymmetrically bifurcate hairs up to 1.5 mm; teeth (2.5–)4–6 mm. Petals whitish, tip of standard and keel often violet; standard oblong-pandurate, (18–)21–26 × 6–7 mm, slightly to distinctly constricted in lower 1/3, apex retuse to emarginate; wings (14–)18–22 mm; keel (14–)18–20 mm. Legumes white hairy.

Steppes. Gansu, Nei Mongol, Shaanxi [Mongolia, Russia (Siberia)].

325. *Astragalus geerwusuensis* H. C. Fu, Fl. Intramongol., ed. 2, 3: 671. 1989.

格尔乌苏黄耆 ge er wu su huang qi

Plants 10–15 cm tall, with bifurcate spreading hairs. Leaves 5–10 cm; stipules 10–15 mm, adnate to petiole for 3–5 mm, loosely hairy; petiole 2–5 cm; leaflets in 4–9 pairs, elliptic, 8–14 × 3–8 mm, both surfaces spreading hairy. Racemes 7–10-flowered; peduncle 1–2 cm, hairy; bracts ca. 12 mm. Calyx 10–12 mm, densely hairy; teeth 5–6 mm. Petals yellow; standard elliptic-obovate, 15–20 × 6–7 mm, apex slightly emarginate; wings 17–20 mm; keel 15–18 mm. Legumes oblong-ovoid, with a long beak; valves densely white hairy.

- Steppes. Nei Mongol.

326. *Astragalus glabritubus* Podlech & L. R. Xu, Novon 17: 244. 2007.

秃萼筒黄耆 tu e tong huang qi

Plants 3–4 cm tall, acaulescent, very densely compactly caespitose, only white hairy. Leaves 1–2.5 cm; stipules 5–7 mm, adnate to petiole up to middle, at margins with spreading, basifixed cilia ca. 0.8 mm, otherwise glabrous; petiole 0.6–1.8 cm, like rachis slender, densely covered with medifixed, appressed hairs 0.4–0.6 mm; leaflets in 1(or)2 pairs, narrowly obovate, 4–9 × 1.5–2.2 mm, mostly folded, both surfaces loosely to rather densely covered with medifixed, appressed hairs 0.5–0.8 mm. Racemes sessile, 2- or 3-flowered; bracts 8–12 mm, margins comblike ciliate with basifixed hairs. Calyx 8–10 mm, tube glabrous; teeth ca. 4 mm, at margins comblike ciliate with basifixed hairs up to 0.8 mm. Petals white; standard narrowly obovate, ca. 20 × 5 mm, apex emarginate; wings ca. 15 mm; keel ca. 9 mm. Ovary shortly stipitate, subglobose, appressed white hairy. Legumes unknown.

- Steppes. NW Xinjiang.

327. *Astragalus gracilidentatus* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 51. 1983.

线齿黄耆 xian chi huang qi

Plants up to 30 cm tall, caulescent, loosely caespitose, white subappressed hairy. Stems numerous, up to 15 cm, densely covered with medifixed hairs 1–1.2 mm. Leaves 7–12 cm; stipules of lower leaves 4–5 mm, those of upper leaves 7–9 mm, free, loosely covered with hairs 0.8–1.2 mm; petiole 3–5 cm, like rachis covered with symmetrically or asymmetrically bifurcate hairs 0.8–1.5 mm; leaflets in 5–8 pairs, 3–8 × 2–4 mm, abaxially somewhat densely and adaxially loosely covered with ± medifixed hairs. Racemes 3–8-flowered; peduncle 0.5–3 cm, rather densely hairy; bracts 5–7 mm, hairy. Calyx 10–12 mm, ± densely hairy like rachis; teeth 4–6 mm. Petals purplish, yellowish when dry; standard oblong-pandurate, (13–)15–20 × 5–5.5 mm, slightly constricted in lower 1/3, apex emarginate; wings (8–)11–15 mm; keel (6–)9–12 mm. Legumes sessile, ovoid, 5–6 mm.

- Xinjiang.

328. *Astragalus gregorii* B. Fedtschenko & Basilevskaja in Grumm-Grzhimailo, Zap. Mongolij i Urjango Kraj 3(2): 815. 1930.

格热高尔黄耆 ge re gao er huang qi

Plants 4–7 cm tall, with ± medifixed, in vegetative parts white hairs. Leaves 1.5–3 cm; stipules 2–3 mm, shortly adnate to petiole, sparsely appressed hairy; petiole 0.5–1 cm, rather densely covered with appressed hairs 0.6–0.8 mm; leaflets in 1 pair, narrowly elliptic, 3–5 × ca. 1.5 mm, both surfaces densely to rather densely appressed hairy. Racemes with a peduncle 1–2 cm, 2–4-flowered. Calyx ca. 7 mm, rather densely covered with appressed black hairs 0.2–0.5(–0.8) mm and with a few white hairs 0.8–1.2 mm; teeth 1.5–2 mm. Petals pink; standard elliptic, ca. 21 × 10 mm, apex widely emarginate; wings ca. 19 mm; keel ca. 15 mm. Ovary substipitate, linear, white hairy. Legumes unknown.

Steppes. Xinjiang [Mongolia].

329. *Astragalus grubovii* Sanchir, Bot. Zhurn. (Moscow & Leningrad) 59: 367. 1974.

荒漠黄耆 huang mo huang qi

Astragalus alaschanensis H. C. Fu; *A. dengkouensis* H. C. Fu; *A. scabrisetus* Bongard var. *multijugus* Handel-Mazzetti.

Plants 10–15 cm tall, densely covered with ascending to ± spreading, ± symmetrically or asymmetrically bifurcate, only white hairs 0.5–1(–1.2) mm. Stems, if present, very short, densely villous. Leaves 9–17 cm; stipules 6–10 mm, adnate to petiole for 2–2.5 mm, densely hairy; petiole 3–7 cm, with rachis hairy like stem; leaflets in (6–)10–13 pairs, elliptic to obovate, 4–15 × 2.5–7 mm, abaxially densely to rather densely and adaxially loosely covered with subappressed to ascending or even spreading hairs. Racemes subsessile, few to 10-flowered; bracts 7–10 mm, hairy. Calyx 11–14 mm, densely villous; teeth 5–7 mm. Petals purplish, drying yellowish brown; standard obovate, 18–21 × ca. 7 mm, apex slightly emarginate; wings 16–18 mm; keel 14–16 mm. Legumes 8–10 mm, ca. 3 mm high and ca. 2 mm wide, with a subulate, straight or slightly curved beak 3–5 mm, incompletely 2-locular; valves densely covered with tangled, ascending, partly strongly asymmetrically bifurcate, flexuous hairs up to 1.2 mm.

Gansu, Nei Mongol, Ningxia [Mongolia].

330. *Astragalus hebecarpus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 53. 1983.

茸毛果黄耆 rong mao guo huang qi

Plants 10–15 cm tall, covered with subappressed, symmetrically or asymmetrically bifurcate, only white hairs 1–2 mm. Stems 1–2 cm, densely hairy. Leaves 7–15 cm; stipules 5–7 mm, adnate to petiole for ca. 2 mm, hairy; petiole 3–6 cm, like rachis loosely to rather densely hairy; leaflets in 6–9 pairs, narrowly elliptic, 5–20 × 1.5–5 mm, both surfaces loosely to rather densely hairy. Racemes 4- or 5-flowered; peduncle 1–1.5 cm, hairy; bracts 3–4 mm, with mostly basifixed hairs. Calyx 8–9 mm, rather densely hairy; teeth ca. 2 mm. Petals pale yellow; standard narrowly elliptic, ca. 15 × 4 mm, apex emarginate; wings ca. 13 mm; keel ca. 12 mm. Legumes ca. 15 mm, 6–7 mm high and ca. 2 mm wide, with a subulate beak ca. 1 mm, incompletely 2-locular; valves rather densely covered with subappressed to ascending, flexuous-tangled, extremely asymmetrically bifurcate hairs up to 2.5 mm.

• Xinjiang.

331. *Astragalus hsinbaticus* P. Y. Fu & Y. A. Chen, Fl. Pl. Herb. Chin. Bor.-Orient. 5: 175. 1976.

新巴黄耆 xin ba huang qi

Plants 4–15 cm tall, covered with mostly ascending to spreading, bifurcate, only white hairs. Leaves 8–18 cm; stipules 7–10 mm, adnate to petiole for ca. 2 mm, sparsely to loosely furnished with strongly asymmetrically bifurcate, subappressed hairs up to 2 mm, at margins with basifixed hairs; petiole 3–5 cm, like rachis loosely to rather densely covered with flexuous, asymmetrically to symmetrically bifurcate hairs 1–2(–2.5) mm;

leaflets in 10–12 pairs, elliptic to obovate, 7–15 × 3–8 mm, both surfaces loosely to rather densely covered with ascending, ± medifixed hairs. Bracts ca. 5 mm, sparsely hairy. Flowers crowded at base of leaves. Calyx 11–15 mm, densely covered with flexuous, ± medifixed hairs 1–1.5 mm; teeth 2.5–5 mm. Petals whitish; standard narrowly obovate, 22–28 × ca. 6 mm, slightly constricted below middle, apex slightly retuse; wings 21–23 mm; keel 15–16 mm. Legumes 10–14 mm, ca. 5 mm high, slightly compressed laterally, shortly acuminate, 2-locular; valves densely villous, with spreading, asymmetrically bifurcate hairs ca. 2 mm.

Heilongjiang, Nei Mongol [Mongolia].

332. *Astragalus hypogaeus* Ledebour, Icon. Pl. 1: t. 95. 1829.

留土黄耆 liu tu huang qi

Plants 6–10 cm tall, acaulescent, caespitose, mostly spreading white hairy. Leaves 4–12(–14) cm; stipules 10–12 mm, adnate to petiole for 2–3 mm, densely covered with subbasifixed or at margins basifixed, subappressed hairs ca. 1.5 mm; petiole 0.8–3 cm, like rachis densely to rather densely covered with ± symmetrically to slightly asymmetrically bifurcate, flexuous, tangled, spreading hairs ca. 1 mm and with much fewer, straight, extremely asymmetrically bifurcate hairs ca. 1.5 mm; leaflets in 4–6(–8) pairs, obovate, 5–15 × 4.5–9 mm, abaxially rather densely covered with ascending to spreading hairs, adaxially loosely covered with subappressed to slightly ascending hairs; hairs 0.6–1.2 mm. Racemes subsessile, 2–5-flowered; bracts ca. 12 mm, linear-acute, loosely covered with subbasifixed to basifixed, nearly spreading hairs up to 2 mm. Calyx 15–18 mm, densely villous with symmetrically to strongly asymmetrically bifurcate, appressed to spreading hairs 1.5–2 mm; teeth 5–7 mm. Petals pale yellowish; standard oblong to narrowly obovate, (25–)27–32(–38) × 7–9 mm, slightly constricted below middle, base slightly to distinctly triangular-hastate, apex emarginate; wings 20–25(–29) mm, limbs unequally emarginate to bilobed; keel 18–22 mm. Legumes sessile, nearly inflated globose, 5–6 mm, with a beak 1–1.5 mm, 2-locular; valves densely covered with short hairs.

Xinjiang (Altay) [Kazakhstan, Kyrgyzstan, Russia (Siberia)].

333. *Astragalus jiuquanensis* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 56. 1983.

酒泉黄耆 jiu quan huang qi

Plants 5–10 cm tall, acaulescent, densely covered with only white hairs. Leaves 1.5–6 cm; stipules 7–10 mm, densely covered with basifixed to asymmetrically bifurcate hairs up to 1.5 mm; petiole 0.8–3 cm, like rachis densely covered with ± medifixed, subappressed to partly ± spreading hairs 0.4–0.6 mm; leaflets in 2 or 3 pairs, elliptic to obovate, 5–9 × 2–5 mm, abaxially densely to rather densely and adaxially loosely covered with appressed, medifixed hairs up to 1 mm. Racemes sessile, few flowered; bracts ca. 3 mm, ciliate with basifixed hairs. Calyx 9–11 mm, densely covered with tangled, ± spreading, basifixed hairs up to 1.5 mm; teeth 3–5 mm. Petals whitish yellow; standard obovate, 22–24 × 6–9 mm, apex emarginate; wings 21–22 mm, limbs obliquely bilobed; keel 16–19 mm. Legumes 5–6 mm, ca. 3 mm high and ca. 4 mm wide, with

a beak 1–1.5 mm, 1-locular; valves densely covered with ascending to spreading hairs ca. 0.5 mm.

• Gansu.

334. *Astragalus junatovii* Sanchir, Bot. Zhurn. (Moscow & Leningrad) 59: 368. 1974.

尤那托夫黄耆 you na tuo fu huang qi

Plants 2–15 cm tall, acaulescent or nearly so, densely covered with subappressed to ascending, mostly asymmetrically bifurcate, white hairs up to 2 mm. Stems absent or rarely up to 3 cm, subglabrous to loosely hairy. Leaves 3–10(–15) cm; stipules 4–12 mm, loosely to densely hairy, at margins with basifixed hairs; petiole ± as long as rachis, densely covered with ascending hairs up to 1 mm; leaflets in 4–7 pairs, narrowly elliptic, 2–16 × 0.8–4 mm, both surfaces densely covered with appressed hairs. Racemes subsessile, loosely 2–4-flowered; bracts 3–5 mm, hairy. Calyx 10–15 mm, densely covered with tangled, ascending hairs 1.5–2.5 mm; teeth 2–3 mm. Petals white, standard with a violet blotch in center, keel violet tipped; standard obovate, 18–22 × ca. 7 mm, scarcely constricted in middle, apex emarginate; wings 16–21 mm, limbs obliquely emarginate; keel 13–19 mm. Legumes 3–7 mm, 3–5 mm high, with a minute beak; valves white lanate.

Steppes. Gansu, Nei Mongol, Ningxia [Mongolia].

335. *Astragalus lang-ranii* Podlech, Novon 14: 225. 2004.

盐生黄耆 yan sheng huang qi

Astragalus salsugineus Karelin & Kirilov var. *multijugus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 52. 1983, not *A. multijugus* Candolle (1825).

Plants ca. 10 cm tall, shortly caulescent, densely covered with symmetrically or asymmetrically bifurcate, spreading, white hairs up to 2 mm. Stems up to 5 cm, densely tomentose. Leaves 8–12 cm; lower stipules 3–4 mm, upper 5–7 mm, all densely hairy; petiole 3–4 cm, like rachis hairy; leaflets in 11–13 pairs, elliptic, 3–6 × 1.5–3 mm, both surfaces covered with tangled, ± spreading hairs. Racemes loosely 4–6-flowered; peduncle 1–1.5 cm, hairy like stem; bracts 4–6 mm, loosely white hairy, partly with basifixed hairs. Calyx 12–13 mm, densely covered with short to long spreading, tangled hairs; teeth 2.5–4 mm. Petals pale purple; standard narrowly ovate, 20–22 × ca. 7 mm, ± rounded at apex; wings ca. 19 mm; keel ca. 15 mm. Legumes ovoid-oblong, ca. 12 mm, with a short beak, incompletely 2-locular.

• Steppes. Ningxia.

336. *Astragalus levidensis* Podlech & L. R. Xu, Novon 17: 245. 2007.

光萼齿黄耆 guang e chi huang qi

Plants 5–8 cm tall, acaulescent or nearly so, caespitose, mostly appressed hairy. Leaves (1.5–)2–5 cm; stipules 5–8 mm, adnate to petiole for 3–4 mm, densely covered with symmetrically to strongly asymmetrically bifurcate, at margins also basifixed white hairs 0.5–1.5 mm; petiole (0.5–)1–2.5 cm, like rachis slender, densely to rather densely covered with ± medifixed white hairs 0.4–0.5 mm; leaflets in 4–6 pairs, elliptic, 3–7

× 1–3 mm, both surfaces loosely or abaxially more densely covered with medifixed hairs 0.5–0.7 mm. Racemes sessile, 1–3-flowered; bracts 4–5 mm, white hairy. Calyx 7–9 mm, densely covered with strongly asymmetrically bifurcate, flexuous, tangled, ± spreading, white hairs 1–1.2 mm; teeth subulate, ca. 2 mm. Petals yellow when dry; standard obovate, 20–21 × ca. 7 mm, apex emarginate; wings 17–18 mm, limbs narrowly oblong, slightly dilated toward distinctly and obliquely incised tip; keel ca. 15 mm. Ovary sessile, narrowly oblong, white hairy. Legumes unknown.

• Qinghai.

337. *Astragalus lustricola* Podlech & L. R. Xu, Novon 17: 245. 2007.

荒野黄耆 huang ye huang qi

Plants 5–8 cm tall, acaulescent or nearly so, covered with ascending to spreading, bifurcate hairs. Stems, if present, very short, very densely tomentose. Leaves 7–9 cm; stipules 5–6 mm, free from petiole, sparsely to loosely furnished with medifixed to basifixed, subappressed to spreading hairs 0.8–1 mm; petiole 1.5–3 cm, like rachis densely covered with ± medifixed, partly flexuous, tangled, ascending to spreading, white hairs 0.5–0.8 mm and with much fewer, strongly to extremely asymmetrically bifurcate, straight, spreading hairs 1–1.5 mm; leaflets in 7–11 pairs, elliptic to obovate, 7–10 × 2–7 mm, both surfaces rather densely covered with ascending, straight or flexuous, ± medifixed hairs 1–1.5 mm. Racemes 6–10-flowered, with a peduncle hairy like rachis; bracts 5–6 mm, furnished with ± spreading white hairs up to 1.5 mm, with short black hairs mixed in, at margins with basifixed hairs. Calyx 15–16 mm, densely covered with flexuous, ± medifixed, subappressed to ascending, white hairs 0.8–1 mm and with strongly asymmetrically bifurcate, spreading, white hairs up to 2 mm, with some short, medifixed, black hairs mixed in; teeth 4–5 mm. Petals yellowish; standard obovate, ca. 20 × 8 mm, distinctly constricted in middle, apex emarginate; wings ca. 20 mm; keel ca. 17 mm. Legumes (unripe) ca. 15 mm, ca. 3 mm high, with a beak 3–4 mm; valves densely covered with subappressed, flexuous, ± medifixed, white hairs ca. 0.5 mm and with strongly asymmetrically bifurcate, straight, spreading hairs 1.5–2 mm.

• Xinjiang.

338. *Astragalus lychnobius* Podlech & L. R. Xu, Novon 17: 246. 2007.

喜光黄耆 xi guang huang qi

Plants 6–8 cm tall, acaulescent or nearly so, loosely caespitose, covered with bifurcate hairs. Stems, if present, up to 1 cm, very densely covered with strongly asymmetrically bifurcate, ascending to partly spreading, ± flexuous, tangled, white hairs 1–1.5 mm. Leaves 3–7 cm; stipules 4–5 mm, adnate to petiole for 1–2 mm, rather densely covered with symmetrically or asymmetrically bifurcate, subappressed to slightly ascending, white hairs ca. 0.5 mm, at margins with basifixed hairs; petiole 1.5–3 cm, like rachis densely covered with ± medifixed, subappressed to ascending hairs 0.5–1 mm and with a few strongly asymmetrically bifurcate, spreading hairs ca. 1 mm; leaflets in 8–10 pairs, narrowly elliptic to elliptic, 3–8 × 1.5–4 mm, both

surfaces densely to rather densely (when young) or loosely (when mature) covered with \pm symmetrically to slightly asymmetrically bifurcate, appressed to partly slightly ascending hairs 0.8–1.2 mm. Racemes subsessile, 1–4-flowered; bracts ca. 2 mm, densely white hairy, with some black hairs mixed in. Calyx 11–12 mm, densely covered with strongly asymmetrically bifurcate or subbasifixed, tangled, flexuous, white hairs 0.5–1 mm and with more medifixed black hairs, especially toward teeth, sometimes with 5 blackish longitudinal stripes; teeth 1–1.5 mm. Petal color probably whitish or yellow, yellowish when dry; standard obovate, ca. 25×9 mm, apex widely and deeply emarginate; wings ca. 21 mm, limbs narrowly obovate, widely obliquely emarginate; keel ca. 20 mm. Ovary sessile, narrowly oblong, very densely villous, with \pm spreading white hairs. Legumes unknown.

- Steppes. NW Xinjiang.

339. *Astragalus macriculus* Podlech & L. R. Xu, Novon 17: 247. 2007.

裕民黄耆 *yu min huang qi*

Plants 6–8 cm tall, caespitose, nearly acaulescent, covered with ascending to spreading, bifurcate hairs. Stems 1–1.5 cm, very densely covered with strongly asymmetrically bifurcate, ascending to partly spreading, \pm flexuous, tangled, white hairs 1–1.5 mm. Leaves 4–5 cm; stipules 6–8 mm, adnate to petiole for 1–2 mm, loosely hairy like stem, at margins with basifixed hairs; petiole 1.5–2 cm, like rachis densely covered with \pm medifixed, subappressed to ascending hairs 0.5–1 mm and with few, strongly asymmetrically bifurcate, spreading hairs 1.5–2 mm; leaflets in (4–)6–8 pairs, narrowly elliptic, $5–10 \times 1.5–3$ mm, often folded, both surfaces densely to rather densely covered with \pm medifixed, ascending hairs and with basifixed, ascending to spreading hairs 0.8–1 mm. Racemes subsessile, loosely 4- or 5-flowered; bracts 6–10 mm, with subbasifixed white hairs 1–1.5 mm and shorter black hairs. Calyx 11–12 mm, densely covered with symmetrically to strongly asymmetrically bifurcate, ascending, flexuous, tangled, white and black hairs up to 1 mm and with \pm straight, strongly asymmetrically bifurcate to basifixed, \pm spreading hairs up to 2 mm; teeth 2.5–3 mm. Petal color probably whitish or yellow; standard obovate, ca. 21×8 mm, apex emarginate, slightly constricted below middle; wings ca. 18 mm; keel 15–16 mm. Ovary sessile, densely white hairy. Legumes unknown.

- Steppes. NW Xinjiang.

340. *Astragalus monophyllus* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 473. 1880.

长毛莢黄耆 *chang mao jia huang qi*

Astragalus macrotrichus E. Peter.

Plants 2–3 cm tall, acaulescent, with exception of fruit covered with subappressed, only white hairs 2–3(–4) mm. Leaves 1.5–3 cm, 1-foliolate; stipules 6–8 mm, densely covered with asymmetrically bifurcate hairs, at margins with basifixed hairs; petiole 0.3–1.5 cm, densely covered with \pm medifixed hairs 1–2 mm; leaflets widely elliptic to rhombic-elliptic, $8–16 \times 8–12$ mm, both surfaces loosely covered with subappressed, medifixed hairs. Racemes 1- or 2-flowered; peduncle up to 1

cm, densely hairy; bracts 3–4 mm, ciliate with basifixed hairs. Calyx 10–12 mm, loosely to rather densely hairy; teeth 5–6 mm. Petals yellow; standard narrowly elliptic, ca. 21×5 mm, apex emarginate; wings ca. 16 mm; keel ca. 14 mm. Legumes 15–18 mm, ca. 6 mm high and ca. 4 mm wide, apex acuminate; valves very densely villous, with tangled, flexuous, ascending to spreading, asymmetrically to extremely asymmetrically bifurcate hairs 2–3 mm.

Gansu, Nei Mongol, Qinghai, Shanxi, Xinjiang [Mongolia, Russia (Siberia)].

341. *Astragalus muschketowii* B. Fedtschenko, Bull. Herb. Boissier 7: 825. 1899.

木斯克黄耆 *mu si ke huang qi*

Plants 3–10 cm tall, acaulescent to nearly so, covered with only white hairs. Leaves 2–5 cm; stipules 5–8 mm, densely covered with subappressed, subbasifixed to basifixed hairs, at margins ciliate; petiole 1–3 cm, like rachis covered with \pm medifixed, appressed to subappressed hairs 0.3–0.5 mm; leaflets mostly 1 or 3, obovate, $6–15 \times 3–6$ mm, both surfaces rather densely hairy like petiole. Racemes sessile, 2- or 3-flowered; bracts ca. 8 mm, densely covered with subbasifixed to basifixed, subappressed hairs up to 0.8 mm. Calyx 10–11 mm, densely villous with ascending to \pm spreading, tangled, subbasifixed to basifixed hairs up to 2 mm; teeth 2–3 mm. Petals in dry state yellow; standard obovate, $22–23 \times$ ca. 7 mm, apex slightly emarginate; wings 19–20 mm; keel ca. 16 mm. Legumes 4–5 mm, 3–4.5 mm high, slightly compressed laterally, abruptly contracted into a beak ca. 1 mm, incompletely 2-locular to nearly 1-locular; valves densely covered with subappressed hairs.

W Xinjiang (Pamir Shan) [Tajikistan].

342. *Astragalus ningxiaensis* Podlech & L. R. Xu, Novon 17: 247. 2007.

宁夏黄耆 *ning xia huang qi*

Plants 5–7 cm tall, acaulescent, densely caespitose, white hairy. Leaves 3–6 cm; stipules 4–5 mm, adnate to petiole for 1–2 mm, densely covered with strongly asymmetrically bifurcate to basifixed hairs 0.3–1 mm; petiole 1.5–3 cm, like rachis densely covered with \pm medifixed, appressed hairs 0.6–0.7 mm; leaflets in 4–6 pairs, narrowly elliptic to elliptic, $3–7 \times 1–2$ mm, abaxially rather densely covered with \pm medifixed, appressed hairs 0.8–1 mm, adaxially sparsely to rarely loosely hairy, sometimes only toward margins. Racemes sessile, 3- or 4-flowered; bracts 10–11 mm, covered with \pm spreading, basifixed hairs 0.5–0.8 mm. Calyx 10–12 mm, densely covered with subbasifixed to basifixed, tangled, \pm spreading hairs up to 1.2 mm; teeth 3.5–4 mm. Petals purple in life, yellowish when dry; standard narrowly obovate, 23–27 mm, apex emarginate; wings 21–25 mm, obliquely incised; keel 18–20 mm. Ovary sessile, narrowly oblong, white hairy. Legumes unknown.

- Ningxia.

343. *Astragalus occultus* Podlech & L. R. Xu, Novon 17: 248. 2007.

克郎河黄耆 *ke lang he huang qi*

Plants (including leaves) 5–7 cm tall, acaulescent or nearly so, densely caespitose, covered with only white hairs. Stems, if present, up to 0.5 cm, very densely covered with \pm medifixed, appressed hairs 0.5–0.7 mm. Leaves 5–7 cm; stipules 4–5 mm, adnate to petiole for ca. 2 mm, loosely to rather densely covered with symmetrically or asymmetrically bifurcate, appressed hairs, at margins with basifixed hairs; petiole 2.5–3 cm, like rachis densely to very densely hairy like stem; leaflets in 7–10 pairs, remote, narrowly elliptic, 2–6 \times 0.8–2.5 mm, abaxially densely to rather densely hairy like rachis, adaxially glabrous or rarely with scattered hairs toward margins. Racemes sessile, 1- or 2-flowered; bracts ca. 5 mm, densely covered with strongly asymmetrically bifurcate to basifixed hairs 0.8–1 mm. Calyx 6–7 mm, densely covered with ascending, subbasifixed to basifixed hairs 1–1.5 mm; teeth 1.5–2 mm. Petals probably yellowish or whitish; standard elliptic, 15–18 \times 5–6 mm, apex emarginate; wings 15–17 mm; keel 14–15 mm. Ovary sessile, narrowly ellipsoid, white hairy. Legumes unknown.

• Gansu, Xinjiang.

344. *Astragalus ordosicus* H. C. Fu, Fl. Intramongol., ed. 2, 3: 671. 1989.

鄂尔多斯黄耆 *e er duo si huang qi*

Plants 10–20 cm tall, subacaulescent. Stems very short. Leaves 10–22 cm; stipules 8–12 mm, white hairy; petiole 4–6 cm; leaflets in 9–17 pairs, obovate to elliptic, 6–12 \times 3–6 mm, both surfaces covered with spreading hairs. Racemes many, sessile, 1- or 2-flowered; bracts ca. 12 mm, loosely white hairy. Calyx ca. 12 mm, densely covered with spreading hairs; teeth ca. 4 mm. Petals yellow; standard oblong-obovate, 20–22 \times ca. 5 mm, slightly constricted in middle, without distinct claw, apex emarginate; wings ca. 20 mm; keel ca. 18 mm. Legumes sessile, ovoid, 10–15 mm, with a short, slightly curved beak; valves densely covered with spreading white hairs.

• Steppes. Nei Mongol.

345. *Astragalus parvicarinatus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 55. 1983.

短龙骨黄耆 *duan long gu huang qi*

Plants 5–10 cm tall, acaulescent or nearly so, caespitose, only white hairy. Stems, if present, up to 1 cm, densely covered with subappressed hairs. Leaves 2–4(–8) cm; stipules 7–12 mm, adnate to petiole up to middle, densely villous with spreading hairs up to 1 mm; petiole 1.5–2(–4) cm, like rachis covered with medifixed, appressed hairs 0.3–0.5 mm; leaflets in (1 or) 2 or 3 pairs, obovate, 4–7 \times 1.5–3 mm, abaxially densely and adaxially loosely covered with medifixed, appressed hairs up to 1 mm. Racemes sessile, few flowered; bracts 6–7 mm, ciliate with \pm spreading, basifixed hairs. Calyx tubular, 8–9 mm, densely covered with \pm spreading, tangled, basifixed hairs up to 1 mm; teeth 3–4 mm. Petals white or yellowish; standard narrowly elliptic, 17–20 \times ca. 4 mm, apex emarginate; wings 16–17 mm; keel 9–10 mm. Legumes widely ellipsoid (as seen from adaxial side), ca. 5 mm, ca. 2 mm high and ca. 4 mm wide, with a filiform beak ca. 2 mm; valves rather densely covered with subappressed, medifixed hairs.

• Steppes. Nei Mongol, Ningxia.

346. *Astragalus perbrevis* Podlech & L. R. Xu, Novon 17: 248. 2007.

紫色黄耆 *zi se huang qi*

Plants 2–3 cm tall, acaulescent, very densely caespitose, only white hairy. Leaves 1.5–3 cm; stipules 8–10 mm, adnate to petiole for 1–3 mm, densely covered with basifixed, subappressed to slightly ascending hairs up to 2.5 mm; petiole 0.6–1 cm, like rachis densely covered with \pm medifixed, flexuous, subappressed to ascending hairs ca. 1 mm and with basifixed, straight, spreading hairs up to 2 mm; leaflets in 1–3 pairs, narrowly elliptic, 5–10 \times 2–3.5 mm, both surfaces densely covered with medifixed, ascending hairs ca. 1.5 mm. Racemes sessile, few flowered; bracts 8–10 mm, rather densely covered with basifixed hairs ca. 1 mm. Calyx ca. 12 mm, densely covered with symmetrically or asymmetrically bifurcate, flexuous, subappressed to ascending hairs ca. 1 mm and with basifixed, straight, ascending to nearly spreading hairs 2–3 mm; teeth ca. 3 mm. Petals whitish yellow when dry; standard obovate, ca. 25 \times 9 mm, apex deeply emarginate; wings ca. 22 mm, limbs narrowly obovate, deeply emarginate to obliquely bilobed; keel ca. 21 mm. Ovary sessile, densely white hairy. Legumes unknown.

• Steppes. NW Xinjiang.

347. *Astragalus porphyreus* Podlech & L. R. Xu, Novon 17: 249. 2007.

博乐黄耆 *bo le huang qi*

Plants 2–4 cm tall, acaulescent, densely caespitose, only white hairy. Leaves 0.8–1.5 cm; stipules 5–6 mm, adnate to petiole for ca. 3 mm, loosely to rather densely covered with basifixed, subappressed hairs up to 1 mm; petiole 0.3–0.7 cm, like rachis very densely covered with medifixed, appressed hairs 0.4–0.6 mm; leaflets in 1 or 2 pairs, obovate, 3–6 \times 1.2–3 mm, mostly boot-shaped or folded, especially toward apex, abaxially somewhat densely and adaxially loosely to rather densely covered with appressed, medifixed hairs 0.3–0.5 mm. Racemes sessile, 1- or 2-flowered; bracts ca. 3 mm, with basifixed hairs 0.5–1 mm. Calyx 8–9 mm, densely to rather densely covered with subbasifixed to basifixed, spreading, tangled hairs 0.5–1 mm; teeth 2–2.5 mm. Petals purplish in life, whitish yellowish when dry; standard oblong, 16–17 \times 4.5–5.5 mm, below middle constricted, base angular-auriculate, somewhat abruptly contracted into short claw, apex emarginate; wings 14–15 mm; keel 12–13 mm. Ovary sessile, white hairy. Legumes unknown.

• W Xinjiang.

348. *Astragalus pseudoborodini* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 54. 1983.

西域黄耆 *xi yu huang qi*

Astragalus baischinticus N. Ulziykhutag.

Plants 3–7 cm tall, acaulescent or nearly so, hairy. Leaves 1.5–4 cm; stipules 3–4 mm, loosely to rather densely covered with predominantly basifixed, spreading, white hairs up to 1 mm; petiole 1–3 cm, like rachis densely covered with ap-

pressed, medifixed hairs 0.5–0.8 mm; leaflets in 1 or 2 pairs, narrowly elliptic to narrowly obovate, 4–8 × 1.5–3 mm, both surfaces densely covered with appressed, medifixed hairs 0.5–0.8 mm. Racemes sessile, 2- or 3-flowered; bracts ca. 10 mm, hairy like stipules. Calyx 9–11 mm, densely covered with spreading, predominantly basifixed, white hairs up to 1 mm, often sitting on small tubercles; teeth 3–5 mm. Petals pale yellow; standard narrowly oblong, 13–15 × ca. 5 mm, rounded at apex; wings 12–13 mm; keel ca. 11 mm. Ovary narrowly ellipsoid, white hairy. Legumes unknown.

- Nei Mongol, Xinjiang.

349. *Astragalus pseudohypogaeus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 58. 1983.

类留土黄耆 lei liu tu huang qi

Plants 6–10 cm tall, subcaulescent, only white hairy. Stems ca. 1 cm, densely covered with subappressed, extremely asymmetrically bifurcate to subbasifixed hairs 1–1.8 mm. Leaves 5–10 cm; stipules loosely to rather densely hairy like stem; petiole as long as rachis, like rachis densely covered with subappressed to partly slightly spreading, nearly symmetrically to strongly asymmetrically bifurcate hairs 1–1.8 mm; leaflets in 3–6 pairs, obovate, 8–13 × 4–8 mm, abaxially rather densely and adaxially loosely covered with ± medifixed, subappressed hairs 1.2–2.5 mm. Bracts 7–8 mm, with strongly asymmetrically bifurcate hairs. Flowers crowded around base of leaves. Calyx 10–12 mm, densely covered with subappressed to ascending, strongly asymmetrically bifurcate hairs up to 2 mm; teeth 4–6 mm. Petals whitish reddish; standard oblong, 15–16 × 4–5 mm, apex retuse; wings 12–14 mm; keel 9–10 mm. Legumes (immature) 10–15 mm, with a slightly curved beak 4–7 mm; valves spreading hairy.

- Xinjiang.

350. *Astragalus pseudoscaberrimus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 57. 1983.

拟糙叶黄耆 ni cao ye huang qi

Plants 3–10 cm tall, acaulescent or nearly so, caespitose, sometimes forming low, dense cushions, only white hairy. Stems, if present, up to 1 cm, very densely covered with spreading, symmetrically or asymmetrically bifurcate, tangled hairs 0.5–1 mm. Leaves 3–6 cm; stipules 4–8 mm, adnate to petiole for ca. 1 mm, sparsely to loosely covered with ± medifixed, subappressed to ascending hairs 0.7–1 mm, at margins also with ± basifixed hairs ca. 1.5 mm; petiole 1.5–3 cm, with rachis densely to very densely hairy like stem; leaflets in 3–10 pairs, elliptic to ovate, 3–5 × 1.5–3.5 mm, both surfaces densely or adaxially loosely covered with ± medifixed, ascending to partly spreading, tangled hairs 0.8–1.5 mm. Racemes subsessile, 1–6-flowered; bracts 3–5 mm, sparsely to very sparsely hairy, margins with basifixed hairs. Calyx 12–13 mm, densely to very densely covered with ascending to partly spreading, strongly to extremely asymmetrically bifurcate, tangled hairs 1–2 mm; teeth 1.5–3 mm. Petals whitish yellow; standard obovate, 20–24 × 6–6.5 mm, below middle slightly constricted, apex emarginate; wings slightly shorter than standard; keel 16–17 mm. Legumes sessile, 7–10 mm, 3–4 mm

high and wide, acuminate at apex, 2-locular; valves densely covered with strongly asymmetrically bifurcate to basifixed, spreading, tangled hairs 1–1.5 mm.

- Gansu, Nei Mongol, Xinjiang.

351. *Astragalus scaberrimus* Bunge, Enum. Pl. China Bor. 17. 1833.

糙叶黄耆 cao ye huang qi

Astragalus giraldianus Ulbrich; *A. harmsii* Ulbrich.

Plants 8–15 cm tall, acaulescent to more rarely shortly caulescent, covered with appressed to subappressed, ± medifixed, only white hairs up to 1 mm. Stems, if present, up to 5 cm, densely hairy. Leaves 3–10(–14) cm; stipules 4–7 mm, densely hairy; petiole 1.5–3(–5) cm, like rachis rather densely hairy; leaflets in 3–6(–8) pairs, narrowly elliptic to elliptic, 4–12(–15) × 2–5(–7) mm, both surfaces sparsely to rather densely hairy. Racemes loosely 3–5-flowered; peduncle 0.3–1.5(–3.5) cm, appressed white hairy; bracts 2–3 mm, hairy. Calyx 7–9 mm, densely covered with appressed hairs; teeth 2–2.5(–4) mm. Petals yellow, standard and keel often suffused with violet; standard ovate, 20–21 × 8–9 mm, apex retuse to emarginate; wings 16–17 mm; keel 12–13 mm. Legumes somewhat curved, acuminate, 10–13 mm, 3.5–4 mm high and ca. 3 mm wide; valves densely covered with appressed white hairs 0.3–0.8 mm, sometimes partly glabrescent with age.

Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Mongolia, Russia (Siberia)].

352. *Astragalus scabrisetus* Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 26. 1841.

粗毛黄耆 cu mao huang qi

Plants 5–15 cm tall, acaulescent or nearly so, only white hairy. Stems, if present, very short, rarely up to 4 cm, densely hairy. Leaves 3–12 cm; stipules 5–6 mm, densely covered with strongly asymmetrically bifurcate, subappressed hairs, at margins with basifixed, ± spreading cilia up to 1.5 mm; petiole 1–5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate, appressed to subappressed hairs 1.8–3 mm; leaflets in 3–6(–8) pairs, elliptic, 5–13 × 2.5–5(–8) mm, adaxially loosely to rather densely and abaxially somewhat more densely hairy like rachis. Racemes many, subsessile, 2–4-flowered, forming dense, capitate synflorescences around base of leaves; bracts 6–12 mm, with subbasifixed to basifixed hairs up to 1.5 mm. Calyx 10–12 mm, densely covered with subappressed to ascending, asymmetrically bifurcate hairs up to 1.5 mm; teeth 4–6 mm. Petals whitish, tip of standard and keel often violet; standard obovate, 16–19 × 5–6 mm, constricted below middle, apex emarginate; wings 14–17 mm; keel 12–14 mm. Legumes 6–8 mm, ca. 3 mm high and ca. 5 mm wide, acuminate into straight or slightly curved beak 6–8 mm; valves rather densely covered with asymmetrically bifurcate, subappressed to ascending hairs up to 1.5 mm, sometimes partly glabrescent with age.

Xinjiang [Kazakhstan, Mongolia, Uzbekistan].

353. *Astragalus secretus* Podlech & L. R. Xu, Novon 17: 250. 2007.

粘线黄耆 nian xian huang qi

Plants 3.5–6 cm tall, acaulescent, caespitose, only white hairy. Leaves 2.5–3 cm; stipules ca. 4 mm, adnate to petiole for ca. 2 mm, densely covered with \pm medifixed, appressed hairs up to 1 mm, at margins with basifixed hairs; petiole 0.8–2 cm, like rachis densely to very densely covered with medifixed, appressed hairs 0.5–0.7 mm; leaflets in 1–3 pairs, obovate, 5–10 \times 1.5–4 mm, both surfaces very densely covered with appressed, medifixed hairs 0.8–1.2 mm. Racemes 5–7-flowered, with a peduncle 2–3 cm and hairy like rachis; bracts 2–4 mm, at margins with subbasifixed to basifixed hairs, otherwise glabrous. Calyx 7–8 mm, densely covered with symmetrically to strongly asymmetrically bifurcate, appressed hairs 0.8–1 mm; teeth 1–2 mm. Petals yellow; standard obovate, ca. 17 \times 8 mm, apex retuse; wings ca. 16 mm; keel ca. 13 mm. Ovary sessile, white hairy. Legumes unknown.

• Steppes. NW Xinjiang.

354. *Astragalus sinkiangensis* Podlech & L. R. Xu, Novon 17: 250. 2007.

赛里木黄耆 sai li mu huang qi

Plants ca. 8 cm tall, acaulescent, caespitose. Leaves 5–8 cm; stipules 10–15 mm, adnate to petiole for ca. 1 mm, loosely covered with basifixed, spreading, white hairs 1–2 mm; petiole 1.5–2 cm, like rachis rather densely covered with symmetrically or asymmetrically bifurcate, \pm spreading, tangled hairs 0.5–1 mm and with some basifixed longer hairs up to 2 mm; leaflets in 7–9 pairs, widely obovate to suborbicular, 4–6 \times 3.5–5.5 mm, abaxially rather densely and adaxially sparsely to loosely covered with symmetrically or asymmetrically, partly flexuous, ascending to spreading, white hairs 0.5–0.8 mm, with a few basifixed, straight, longer hairs mixed in. Racemes sessile, 1- or 2-flowered; bracts 5–7 mm, hairy like stipules. Calyx 10–12 mm, densely covered with extremely asymmetrically bifurcate to basifixed, spreading hairs 1–2 mm; teeth ca. 4 mm. Petals white; standard oblong-pandurate, ca. 25 \times 8 mm, in lower 1/3 slightly constricted, base widened, hastate-auriculate, apex emarginate; wings 22–23 mm, limbs slightly retuse; keel ca. 21 mm. Ovary sessile, ellipsoid, densely white hairy. Legumes unknown.

• Steppes. N Xinjiang.

355. *Astragalus tesquorum* Podlech & L. R. Xu, Novon 17: 251. 2007.

干草原黄耆 gan cao yuan huang qi

Plants 3–5 cm tall, acaulescent, densely caespitose, covered with ascending to spreading, bifurcate, white hairs. Leaves 2–5 cm; stipules 4–8 mm, adnate to petiole for ca. 1 mm, rather densely covered with basifixed, ascending hairs 0.5–0.8 mm; petiole 1–2.5 cm, like rachis rather densely covered with symmetrically to strongly asymmetrically, ascending to spreading, \pm flexuous, tangled hairs 1–1.8 mm; leaflets in 4(or 5) pairs, elliptic to obovate, 3–7 \times 1.5–4 mm, often folded, both surfaces rather densely covered with \pm medifixed, ascending to partly \pm

spreading hairs 1.5–2.5 mm. Racemes subsessile, ca. 3-flowered; bracts 7–8 mm, hairy like stipules. Calyx ca. 8 mm, rather densely covered with symmetrically to strongly asymmetrically bifurcate or partly basifixed, ascending to spreading hairs up to 1.2 mm; teeth ca. 2 mm. Petals in life purplish, yellowish when dry; standard obovate, ca. 17 \times 7 mm, distinctly constricted below middle, apex emarginate; wings ca. 17 mm; keel ca. 15 mm. Ovary sessile, densely white hairy. Legumes unknown.

• W Xinjiang.

356. *Astragalus testiculatus* Pallas, Sp. Astragal. 82. 1802.

卵果黄耆 luan guo huang qi

Plants 5–12 cm tall, acaulescent or nearly so, loosely to densely caespitose. Stems, if rarely present, up to 2–3(–6) cm, ascending, very densely covered with symmetrically to mostly strongly asymmetrically bifurcate, tangled, mostly spreading hairs of different lengths from 1–2 mm. Leaves (2–)5–12 cm; stipules 6–12 mm, adnate to petiole for ca. 2 mm, densely to very densely hairy like stem; petiole 2–4 cm, with rachis densely hairy like stem; leaflets in 7–13 pairs, narrowly elliptic, 2–13 \times 1–4 mm, both surfaces very densely covered with \pm symmetrically or asymmetrically bifurcate, subappressed to slightly ascending hairs 1–1.5 mm. Racemes several, crowded at base of leaves, subsessile or with a peduncle up to 2–6 cm, 2–4-flowered; bracts 7–10 mm, covered with asymmetrically bifurcate, subappressed to partly \pm spreading, white hairs, apex sometimes with short black hairs. Calyx 10–12 mm, rather densely covered with strongly asymmetrically bifurcate, tangled, ascending to partly spreading, white hairs 1.5–2 mm and, especially in upper part and at teeth, with mostly shorter black hairs, rarely without black hairs; teeth 2–3 mm. Petals whitish or pinkish or pale violet; standard oblong-pandurate, 18–25(–28) \times 7–8(–10) mm, scarcely to distinctly constricted below middle, apex retuse; wings 18–21(–25) mm; keel 14–19(–21) mm. Legumes sessile, 9–18 mm, 6–9 mm high and wide, acute, incompletely 2-locular; valves densely villous, with strongly asymmetrically bifurcate, ascending to spreading, tangled, white hairs ca. 2 mm.

Xinjiang [Kazakhstan, Russia (Siberia), Tajikistan, Turkmenistan; SW Asia (Caucasus, Iran), E Europe (Russia, Ukraine)].

357. *Astragalus transecticola* Podlech & L. R. Xu, Novon 17: 251. 2007.

路边黄耆 lu bian huang qi

Plants 3–5 cm tall, acaulescent, caespitose, densely covered with ascending to spreading, bifurcate, only white hairs. Leaves 2–4.5 cm; stipules 10–15 mm, adnate to petiole for ca. 3 mm, with spreading, basifixed hairs 1–2 mm; petiole 0.6–1.5 cm, like rachis densely covered with symmetrically or asymmetrically bifurcate or basifixed, subappressed to spreading, tangled hairs 0.8–1.5 mm; leaflets in 6 or 7 pairs, elliptic to widely elliptic, 3–4 \times 2–2.5 mm, both surfaces densely covered with asymmetrically to strongly asymmetrically bifurcate, ascending to partly spreading, tangled hairs 0.8–1 mm or adaxially loosely covered with subappressed hairs. Racemes subsessile, ca. 2-flowered; bracts 10–12 mm, with basifixed hairs ca. 1 mm. Calyx 12–13 mm, densely covered with symmetrically or

asymmetrically bifurcate, flexuous, tangled hairs 0.5–1 mm and with basifixed, \pm spreading, straight hairs up to 2 mm; teeth 3–4 mm. Petal color probably whitish or yellow; standard elliptic, ca. 21×8 mm, apex emarginate; wings 19–20 mm, limbs distinctly obliquely emarginate; keel ca. 17 mm. Ovary sessile, densely white hairy. Legumes unknown.

- W Xinjiang.

358. *Astragalus trijugus* Podlech & L. R. Xu, Novon 17: 252. 2007.

三棱黄耆 san leng huang qi

Plants 6–7 cm tall, shortly caulescent, caespitose, with \pm medifixed, appressed, white hairs. Stems many, procumbent to ascending, 1.5–3 cm, very densely covered with hairs 0.8–1 mm. Leaves 2–5 cm; stipules 2.5–4 mm, adnate to petiole for 1–1.5 mm, densely hairy like stem; petiole 1–3 cm, with rachis densely hairy like stem; leaflets in 3 pairs, elliptic, $3-8 \times 1.5-4$ mm, both surfaces loosely to densely covered with hairs 0.6–0.8 mm. Racemes 2–4-flowered; peduncle 1–3 cm, loosely to densely hairy like stem; bracts 1–1.5 mm, hairy, at margins also with basifixed hairs. Calyx 8–9 mm, densely hairy like stem; teeth ca. 2 mm. Petals yellow when dry; standard obovate, ca. 16×8 mm, apex widely emarginate; wings ca. 14 mm, limbs obliquely incised; keel ca. 11 mm. Ovary sessile, narrowly oblong, sparsely white hairy. Legumes unknown.

- Hebei.

359. *Astragalus vallestris* Kamelin, Novosti Sist. Vyssh. Rast. 15: 173. 1979.

线沟黄耆 xian gou huang qi

Plants 2–4 cm tall, acaulescent, covered with white hairs. Leaves 1–2.5 cm, with only 1 leaflet; stipules ca. 4 mm, densely covered with appressed to ascending, strongly asymmetrically bifurcate to basifixed hairs up to 1 mm; petiole 0.5–1 cm, densely covered with symmetrically or asymmetrically bifurcate, appressed to subappressed hairs 0.3–0.8 mm; leaflets narrowly elliptic, $6-18 \times 2-6$ mm, both surfaces densely covered with appressed, mostly \pm medifixed hairs 0.6–1.1 mm, apex acute. Racemes sessile. Calyx ca. 7 mm, loosely to rather densely covered with subbasifixed to basifixed, \pm spreading hairs 1–1.5 mm; teeth 2–2.5 mm. Petals pink; standard oblong to obovate-pandurate, $12-15 \times$ ca. 5 mm, slightly constricted near base, apex rounded; wings ca. 12 mm; keel 7–8 mm.

52. *Astragalus* sect. *Podochreati* W. D. J. Koch, Syn. Fl. Germ. Helv. 186. 1836.

灰白毛组 hui bai mao zu

Plants perennial, acaulescent, covered with bifurcate, mostly appressed hairs. Stipules adnate to petiole, otherwise free from each other. Racemes mostly borne on a long peduncle. Bracteoles mostly present (absent in Chinese species). Calyx tubular. Legumes mostly 2-locular, with leathery walls.

About 140 species: mostly in SW Asia (Caucasus, Iran, and Turkey), spreading into Europe, N Africa, other parts of SW Asia, C Asia, Afghanistan, Pakistan, and China; one species in China.

362. *Astragalus platyphyllus* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 345. 1842.

宽叶黄耆 kuan ye huang qi

Ovary with a stipe ca. 1 mm, ellipsoid, white hairy. Legumes unknown.

- Xinjiang [Mongolia].

360. *Astragalus vescus* Podlech & L. R. Xu, Novon 17: 252. 2007.

辛辣黄耆 xin la huang qi

Plants 2–3 cm tall, acaulescent, caespitose, only white hairy. Leaves 1.5–2 cm; stipules 4–5 mm, adnate to petiole for 1–1.5 mm, loosely to rather densely covered with symmetrically or asymmetrically bifurcate, appressed hairs up to 1 mm, at margins with basifixed hairs; petiole 0.5–1.2 cm, like rachis densely to rather densely covered with medifixed, appressed hairs 0.3–0.5 mm; leaflets in 2 or 3 pairs, obovate, $2-5 \times 0.5-2.2$ mm, abaxially somewhat densely and adaxially loosely covered with appressed, medifixed hairs up to 1 mm. Racemes sessile, 1- or 2-flowered; bracts ca. 3 mm, hairy, margins with basifixed hairs. Calyx 8–9 mm, densely to rather densely covered with \pm medifixed, appressed hairs 0.5–0.6 mm; teeth 2–2.5 mm. Petals white, suffused with red; standard obovate, ca. 19×8 mm, apex rounded; wings ca. 18 mm; keel ca. 16 mm. Ovary sessile, white hairy. Legumes unknown.

- Xinjiang.

361. *Astragalus visibilis* Podlech & L. R. Xu, Novon 17: 253. 2007.

明媚黄耆 ming mei huang qi

Plants 4–7 cm tall, acaulescent, with \pm medifixed, appressed, white hairs 0.8–1 mm. Leaves 2–5 cm; stipules 3–4 mm, adnate to petiole for 1–2 mm, densely hairy, at margins also with basifixed hairs; petiole 1–2.5 cm, very densely hairy; leaflets in basal leaves solitary, in other leaves 3, close together, elliptic to obovate or partly narrowly obovate, $10-18 \times 3-8$ mm, both surfaces very densely hairy. Racemes densely 8–10-flowered; peduncle 2–5 cm, very densely hairy; bracts ovate, 1.5–2 mm, loosely hairy, margins with basifixed hairs. Calyx 5–7 mm, densely white hairy; teeth subulate, 2–3 mm. Petals pink; standard ca. 14×8 mm, slightly constricted in lower 1/3, without distinct claw, apex slightly emarginate; wings ca. 12 mm; keel ca. 10 mm. Ovary sessile, densely white hairy. Legumes unknown.

- Xinjiang.

Plants 10–35 cm tall, with appressed, in vegetative parts only white, \pm medifixed hairs 0.5–0.8 mm. Leaves 5–25 cm; stipules 10–13 mm, densely covered with appressed hairs; petiole 2–11 cm, like rachis loosely to rather densely hairy; leaflets

in 4–8 pairs, elliptic, 6–25 × 4–15 mm, sparsely to loosely hairy. Racemes ovoid to cylindrical, rather densely many flowered; peduncle 6–30 cm, loosely to rather densely hairy, hairs white, toward raceme increasingly black; bracts 3–7 mm, sparsely hairy and ciliate. Bracteoles absent. Calyx 7–10 mm, loosely white and predominantly black hairy; teeth 2–4 mm. Petals violet; standard narrowly oblong-elliptic, 20–25 × 6–8

mm, apex retuse or obtuse; wings 16–20 mm, limbs retuse to emarginate; keel 13–17 mm. Legumes sessile, erect, 10–13 mm, 4–4.5 mm high and ca. 4 mm wide, with a slender beak 2–3 mm; valves loosely white hairy, glabrescent to nearly glabrous with age.

Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

53. *Astragalus* sect. *Cytisodes* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 127. 1868.

金雀组 jin que zu

Plants shrubby, acaulescent or caulescent, with bifurcate hairs. Stipules mostly ± connate behind stem or rarely free (in Chinese species). Bracteoles absent. Calyx tubular. Legumes sessile, mostly large, ± gradually narrowed into a prominent, rigid, long beak, 2-locular.

Fourteen species: C Asia to China, SW Asia (Iran); two species (one endemic) in China.

- 1a. Stems with appressed hairs 1–1.5 mm; leaflets with appressed to slightly ascending hairs; calyx rather densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 1.5–2 mm and with few, more symmetrically bifurcate, subappressed, flexuous hairs 0.5–1 mm, with black hairs mixed in; legumes 15–25 mm, with subbasifixed, spreading hairs 1–2 mm, soon glabrescent 364. *A. yanerwoensis*
- 1b. Stems with appressed to ascending and partly spreading hairs up to 2 mm; leaflets with at least partly spreading hairs; calyx densely covered on ventral side with shaggy, ± spreading, mostly asymmetrically to strongly asymmetrically bifurcate, predominantly white hairs up to 2 mm, on dorsal side with predominantly appressed to ascending, shorter black hairs 0.5–1 mm; legumes 20–50 mm, with ± subbasifixed spreading hairs up to 3 mm and with some medifixed, very short appressed hairs 363. *A. ornithorrhynchus*

363. *Astragalus ornithorrhynchus* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 10: 19, 102. 1947.

雀喙黄耆 que hui huang qi

Plants 10–18 cm tall, subacaulescent. Stems up to 2 cm, very densely covered with subappressed to ascending or sometimes nearly spreading, ± medifixed, white hairs up to 2 mm. Leaves 5–10 cm; stipules 5–7 mm, nearly free from petiole and from each other, rather densely hairy; petiole 2–3 cm, like rachis loosely to rather densely covered with nearly spreading, symmetrically to strongly asymmetrically bifurcate hairs up to 1.5 mm; leaflets in 5–7 pairs, 5–12 × 2–3.5 mm, both surfaces loosely to rather densely covered with ascending to spreading white hairs up to 2.5 mm. Racemes short, 2–12-flowered; peduncle 4–11 cm, loosely to rather densely white hairy; bracts 3–8 mm, predominantly black hairy. Calyx tubular, 13–17 mm, densely covered on ventral side with ± spreading, mostly asymmetrically bifurcate, predominantly white hairs up to 2 mm, on dorsal side with ± appressed, shorter, black hairs 0.5–1 mm; teeth 2–3 mm. Petals purple; standard ovate, ca. 25 × 10 mm, with a short claw, apex emarginate; wings 22–23 mm, limbs bilobate; keel 20–21 mm. Legumes sessile, linear, terete, slightly curved, 20–50 mm, 2.5–3 mm in diam., with a straight beak 5–10 mm; valves rather densely covered with strongly asymmetrically bifurcate, spreading, white hairs up to 2 mm and with some very short, ± appressed, ± medifixed, white hairs.

Gravelly slopes, gravelly flood lands. Qinghai, Xinjiang [Kazakhstan].

364. *Astragalus yanerwoensis* Podlech & L. R. Xu, Novon 17: 234. 2007.

长喙黄耆 chang hui huang qi

Astragalus pavlovianus Gamajunova var. *longirostris* S. B. Ho.

Plants 12–25 cm tall, caulescent, shrubby. Stems in older parts ligneous, parts of current year 5–10 cm, very densely hairy; hairs medifixed, appressed, white, at nodes also black, 1–1.5 mm. Leaves 2.5–5 cm; stipules 3–7 mm, shortly adnate to petiole, densely covered with white and sometimes also black hairs; petiole 1–2 cm, like rachis densely to rather densely covered with medifixed, appressed, white hairs 0.8–1 mm and with more spreading, asymmetrically bifurcate hairs 1.5–2 mm; leaflets in 4–6 pairs, 7–15 × 3–5 mm, both surfaces sparsely to rather densely covered with appressed to slightly ascending, medifixed hairs 1–2 mm. Racemes loosely to rather densely 10–12-flowered; peduncle 1.5–4 cm, loosely to densely hairy, hairs symmetrically or asymmetrically bifurcate, ± flexuous, appressed to slightly ascending or more rarely also spreading, white, toward raceme sometimes also black, 0.5–1.5 mm; bracts 4–6 mm, with ± spreading, partly basifixed, white and black hairs. Calyx ca. 15 mm, rather densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 1.5–2 mm and with few, more symmetrically bifurcate, subappressed, flexuous hairs 0.5–1 mm, with black hairs mixed in; teeth 2–3 mm. Petals pale violet or yellow; standard obovate, ca. 24 mm, slightly constricted in middle, with a rather long claw, apex emarginate; wings ca. 22 mm; keel ca. 20 mm. Legumes sessile, 15–25 mm (without beak), slightly curved, attenuate into a rigid beak 6–10 mm; valves densely covered with subbasifixed, ± spreading, white hairs 1–2 mm, sometimes completely glabrous.

• Xinjiang.

54. Astragalus sect. **Ammodendron** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 128. 1868.

沙生组 sha sheng zu

Plants shrubby or subshrubby, with well-developed stems very densely covered with short, appressed, medifixed hairs. Stipules membranous, shortly adnate to petiole, high vaginate-connate behind stem, often up to top; leaflets in 1–3 pairs, rarely in more. Petals mostly lilac to violet, small. Legumes sessile, ± ovoid, ± keeled ventrally, mostly rounded to flat dorsally, 2-locular or rarely incompletely 2-locular; valves densely covered with long, soft, ± spreading, basifixed hairs and often also with short, appressed, ± medifixed hairs.

Seventy-three species: Afghanistan, China, Pakistan; N Africa (Egypt), C and SW Asia, E Europe; five species (one endemic) in China.

1a. Leaflets in 1 or 2 pairs.

2a. Plants shrubby with hardening and persistent, subspiny rachises; calyx 6–7(–8) mm; standard 13–15 mm 365. *A. brachypus*

2b. Plants subshrubby; rachises not hardening and subspiny; calyx 4–5 mm; standard 8–9 mm 368. *A. iliensis*

1b. Leaflets in 2 or 3(or 4) pairs.

3a. Petiole stout, ca. 1.5 mm thick; leaflets in 3 pairs; standard with a claw longer than limb; legumes 10–12 mm, with subbasifixed, spreading hairs 2–3 mm, mostly sitting on small tubercles, without very short hairs 369. *A. macrostephanus*

3b. Petiole slender; leaflets in 2 or 3 pairs, basal leaves with only 1 pair; standard with a claw not longer than limb; legumes 5–8 mm, with both spreading hairs up to 1.5 mm and very short appressed hairs.

4a. Leaflets in 2 or 3(or 4) pairs, 4–15(–20) mm; raceme 4–10 cm, bracts ca. 2 mm; calyx 6–7 mm; standard at base gradually narrowed 366. *A. cognatus*

4b. Leaflets in 2 or 3 pairs, 15–30 mm; raceme 3–4 cm, bracts ca. 1 mm; calyx 5–5.5 mm; standard limb abruptly contracted into a rather long claw 367. *A. gebleri*

365. Astragalus brachypus Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 79. 1841.

盐木黄耆 yan mu huang qi

Astragalus halodendron Bunge.

Plants 60–90 cm tall, shrubby. Stems of current year 10–40 cm, very densely covered with medifixed, appressed hairs 0.7–1 mm. Leaves (1.5–)2–4 cm; stipules 2–5 mm, rather densely covered with asymmetrically bifurcate, appressed hairs, glabrescent to glabrous with age; petiole 0.2–0.5 cm, with short rachis hairy like stem, hardening, subspiny, persistent; leaflets in 1 pair, those of lower leaves sometimes in 2 pairs, 15–35(–50) × (1.5–)2–3(–4) mm, in brachyblast leaves often only 10–15 mm, both surfaces densely to rather densely covered with ± medifixed, appressed hairs 0.5–1(–1.5) mm. Racemes 3–8(–13) cm, loosely 6- to many flowered; peduncle 2–4 cm; bracts 1–2 mm. Calyx 6–7(–8) mm, densely covered with symmetrically or asymmetrically bifurcate, white hairs 0.6–0.8 mm; teeth 0.5–1.2 mm. Petals purple; standard rhombic-elliptic, 13–15 × ca. 6 mm, apex slightly emarginate; wings (10–)11–12 mm; keel (9–)10–11 mm. Legumes 5–7(–8) mm, 3(–4) mm high and 2–2.5 mm wide, with a beak ca. 1 mm, 2-locular; valves densely covered with soft, basifixed, ascending, white hairs ca. 2 mm and with very short, subappressed hairs.

Xinjiang [Kazakhstan].

366. Astragalus cognatus Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 81. 1841.

沙丘黄耆 sha qiu huang qi

Astragalus cognatus var. *brachybotrys* Trautvetter.

Plants 35–50 cm tall, subshrubby, all parts mostly very densely covered with appressed, often somewhat flexuous, only

white hairs. Stems of current year very densely covered with ± medifixed hairs 0.8–1 mm. Leaves 4–10 cm; stipules 3–4 mm, appressed hairy; petiole 2–4 cm, hairy like stem; leaflets in 2 or 3(or 4) pairs, 4–15(–20) × 2–5(–8) mm, both surfaces densely covered with ± medifixed, appressed hairs ca. 1 mm. Racemes 4–10 cm, remotely 4–8-flowered; peduncle 3–6 cm, densely appressed hairy; bracts ca. 2 mm, hairy. Calyx 6–7 mm, densely covered with medifixed, flexuous, appressed hairs ca. 0.5 mm; teeth 0.5–1 mm. Petals pale violet; standard elliptic to obovate, 13–15 × 5–6 mm, apex slightly emarginate; wings 11–13 mm; keel 10–12 mm. Legumes 6–8 mm, 4–5 mm high and 3.5–4 mm wide, with a beak 1–2 mm, incompletely 2-locular; valves densely covered with tangled, ascending to spreading, ± flexuous, basifixed, white hairs 1–1.5 mm and with subappressed, ± medifixed, very short hairs.

Xinjiang [Kazakhstan].

367. Astragalus gebleri Bongard in Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 24. 1841.

准噶尔黄耆 zhun ga er huang qi

Plants 30–40 cm tall, subshrubby, covered with appressed, ± medifixed, white hairs 0.8–1.2 mm. Stems of current year 7–15 cm, very densely hairy. Leaves 3.5–10 cm; stipules 2–4 mm, densely hairy; petiole 1.5–3 cm, like rachis very densely hairy; leaflets in 2 or 3 pairs (in lowermost leaves in 1 pair), 15–30 × 2–6 mm, both surfaces rather densely to very densely hairy. Racemes 3–4 cm, remotely 4–6-flowered; peduncle 1–5 cm, densely hairy; bracts ca. 1 mm, hairy. Calyx 5–5.5 mm, densely appressed white hairy; teeth 0.5–1 mm. Petals pale purplish; standard widely rhombic-elliptic, 13–14 × 5.5–6 mm, somewhat abruptly narrowed into long claw, apex deeply emarginate; wings 12–13 mm; keel 8–10 mm. Legumes 5–8 mm, 3.5–5 mm high and 2.5–3.5 mm wide, with a beak 2–3 mm; valves

rather densely covered with strongly asymmetrically bifurcate to subbasifixed spreading hairs up to 1.5 mm and with very short subappressed hairs.

Xinjiang [Kazakhstan].

368. *Astragalus iliensis* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 20. 1866.

伊犁黄耆 yi li huang qi

Plants 30–60(–80) cm tall, subshrubby, densely covered with appressed, ± medifixed, only white hairs 0.5–1 mm. Stems of current year up to 20 cm. Leaves 3–5 cm; stipules 2–3(–4) mm, lower ones connate behind stem, upper ones mostly free, sparsely to loosely hairy, at margins with strongly asymmetrically bifurcate to basifixed hairs; petiole 0.5–1 cm, like rachis densely to rather densely hairy; leaflets in 1 or 2 pairs, 20–35 × 2.5–4 mm, both surfaces rather densely hairy. Racemes 5–12 cm, remotely many flowered; peduncle 2–5 cm, densely hairy; bracts 1–2 mm, hairy. Calyx 4–5 mm, densely covered with partly flexuous, tangled, subappressed hairs; teeth ca. 1 mm. Petals purple; standard ovate, 8–9 × ca. 3.5 mm, apex slightly emarginate; wings 7–8 mm; keel 6–7 mm. Legumes 4–5 mm, ca. 2 mm high, slightly compressed laterally, with a beak ca. 1 mm; valves densely villous with spreading, soft, white hairs.

Xinjiang [Kazakhstan].

55. *Astragalus* sect. *Bulimoides* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 130. 1868.

球刺组 qiu ci zu

Plants subspherical spiny shrublets, strongly branched, furnished with medifixed, appressed, white hairs. Petioles and rachises hardened, persistent, spiny. Racemes 1- or 2-flowered, subsessile. Bracteoles absent. Legumes sessile, drooping, incompletely 2-locular, few seeded.

One species: China, Kazakhstan.

370. *Astragalus unijugus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 130. 1868.

对叶黄耆 dui ye huang qi

Astragalus oligophyllus Schrenk (1844), not Boissier (1843).

Plants (12–)15–23(–32) cm tall, covered with hairs 0.5–0.8 mm. Stems densely hairy. Leaves (3–)4–8 cm; stipules 1.5–4 mm, adnate to petiole for 1–2 mm, loosely to rather densely hairy; petiole 2–4 cm, like rachis sparsely to loosely hairy;

369. *Astragalus macrostephanus* (S. B. Ho) Podlech & L. R. Xu, Novon 14: 217. 2004.

霍城黄耆 huo cheng huang qi

Astragalus iliensis Bunge var. *macrostephanus* S. B. Ho, Bull. Bot. Res., Harbin 3(1): 68. 1983.

Plants ca. 35 cm tall, covered with medifixed, appressed, white hairs. Stems of current year up to 30 cm, very densely covered with hairs 0.3–0.6 mm. Leaves 8–12 cm; stipules 2–4 mm, lower ones distinctly connate behind stem, upper ones mostly free, sparsely to loosely hairy, at margins with strongly asymmetrically bifurcate to basifixed hairs; petiole 0.5–1 cm, like rachis stout, at base up to 1.5 mm thick, hairy like stem; leaflets in 3 pairs, 12–25 × 3–5 mm, abaxially loosely to rather densely with somewhat shorter hairs, adaxially loosely covered with hairs 0.6–0.8 mm. Racemes 5–12 cm, very remotely 10–12-flowered; peduncle 6–10 cm, hairy like stem; bracts 1–1.5 mm, sparsely hairy. Calyx 5–6 mm, rather densely covered with hairs 0.3–0.4 mm; teeth ca. 1 mm. Standard widely elliptic, ca. 13 × 5 mm, below middle somewhat abruptly contracted into claw longer than limb, apex emarginate; wings ca. 12 mm; keel ca. 10 mm. Legumes 10–12 mm, 4–5 mm high and wide, with a curved beak ca. 1 mm; valves densely villous with subbasifixed, ± spreading, tangled, soft hairs 2–3 mm, mostly sitting on depressed tubercles.

• Xinjiang.

leaflets in 1(or 2) pairs and an early falling terminal leaflet, narrowly linear, 10–20 × 1–1.5 mm, sparsely to loosely or rather densely hairy on both surfaces, apex acute. Racemes loosely 1- or 2(–4)-flowered; bracts 1.5–2 mm, hairy. Calyx 6–7 mm, loosely to rather densely hairy; teeth 1–1.5 mm, often recurved. Petals pink; standard elliptic to obovate, 10–12 × ca. 4 mm, apex slightly emarginate; wings 9–10 mm; keel 8–9 mm. Legumes oblong, 6–9 mm, ca. 3 mm high and ca. 2 mm wide, with a beak 0.5–1 mm; valves finally completely glabrous.

Xinjiang [Kazakhstan].

56. *Astragalus* sect. *Chaetodon* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 136. 1868.

须毛组 xu mao zu

Plants perennial, herbaceous, subcaulescent or nearly so, sometimes with well-developed stem covered with ± spreading, bifurcate hairs. Stipules mostly adnate to petiole, otherwise free. Inflorescences subsessile or with a stout peduncle up to 5 cm or rarely up to 20 cm. Bracteoles absent. Calyx tubular at anthesis, at length scarcely to strongly bladderlike inflated, villous with long spreading hairs, ruptured by legume or not. Legumes sessile or subsessile, often included in calyx, villous with spreading hairs, few seeded.

Seventeen species: C Asia to China, Pakistan, and Kashmir; two species in China.

1a. Plants subcaulescent; stems 0.5–2 cm; peduncles 0.6–2.2 cm, bracts 7–12 mm; legumes 8–12 mm 371. *A. breviscapus*
1b. Plants caulescent; stems 2–12 cm; peduncles 2–5(–8) cm, bracts 4–8 mm; legumes 11–16 mm 372. *A. saccocalyx*

371. *Astragalus breviscapus* B. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 24: 234. 1905.

短梗黄耆 duan geng huang qi

Astragalus oophorus Freyn (1905), not S. Watson (1871).

Plants 6–13 cm tall, subcaulescent to shortly caulescent, vegetative parts covered with white hairs. Stems several, 0.5–2(–5) cm; very densely covered with unequally bifurcate, tangled, ascending hairs 0.8–1 mm. Leaves 2–11 cm; stipules nearly free from petiole, loosely hairy; petiole 0.8–4.5 cm, like rachis loosely to densely covered with unequally bifurcate, ascending to spreading hairs 1–2 mm; leaflets in 3–6 pairs, 5–18 × 2–13 mm, abaxially loosely to densely and adaxially loosely hairy like rachis. Racemes 3.5–6(–8) × 3.5(–4) cm, densely many flowered; peduncle 0.6–2.2 cm, densely hairy like rachis; bracts 7–12 mm, with strongly asymmetrically bifurcate to basifixed, spreading, white or black and white hairs. Calyx at anthesis or later in fruit inflated ovoid, 17–22 mm, rather densely covered with strongly asymmetrically bifurcate to basifixed, ± spreading, white hairs 2–3 mm, sometimes with shorter black hairs mixed in; teeth 5–8(–9) mm. Petals pinkish violet, drying yellow; standard obovate-pandurate, (17–)20–24(–27) × ca. 7 mm, slightly constricted below middle; wings (14–)20–23(–27) mm; keel nearly as long as wings. Legumes sessile, 8–12 mm, 3.5–4 mm high, compressed laterally, with a reflexed beak 2.5–3 mm, nearly 2-locular; valves with spreading white hairs ca. 3 mm.

Xinjiang (W Kunlun Shan) [Kashmir, Kyrgyzstan, Tajikistan].

372. *Astragalus saccocalyx* Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 83. 1841.

袋萼黄耆 dai e huang qi

Astragalus suidunensis Bunge.

Plants 5–17 cm tall, vegetative parts covered with ± medifixed, appressed to ascending, white hairs. Stems 2–12 cm, densely covered with appressed hairs 0.5–0.8 mm. Leaves (3–)4–8 cm; stipules (2–)3–5 mm, adnate to petiole for 1–2 mm, white hairy; petiole 1–2 cm, like rachis slender, rather densely covered with subappressed to ascending hairs 0.8–1 mm; leaflets in (4 or)5–9 pairs, elliptic or narrowly elliptic, (5–)7–13 × 3–6 mm, abaxially densely and adaxially sparsely covered with subappressed to partly ascending hairs 1.2–1.5 mm. Racemes 2.5–5 cm, loosely few flowered; peduncle 2–5(–8) cm, rather densely hairy like rachis, below raceme also with black hairs; bracts 4–8 mm, with ascending white and black, at margins basifixed hairs up to 2 mm. Calyx at beginning of anthesis tubular, slightly inflated, soon bladderlike ovoid, 15–20 mm, at fruiting time not ruptured by legume, rather densely covered with ascending, asymmetrically bifurcate to subbasifixed, white hairs 1–2 mm and sparsely, toward teeth more densely, with black hairs; teeth 3–7 mm. Petals pinkish violet; standard oblong-obovate, 20–27 × ca. 8 mm, slightly constricted below middle, apex emarginate; wings 20–24 mm; keel 19–23 mm. Legumes sessile, 11–16 mm, 2.5–3.5 mm high, slightly compressed laterally, with a straight beak 1–3 mm, 2-locular; valves sparsely covered with spreading hairs.

Xinjiang [Kazakhstan].

57. *Astragalus* sect. *Cysticalyx* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 135. 1868.

囊萼组 nang e zu

Plants subshrubby, with well-developed stems; hairs bifurcate. Stipules adnate to petiole, otherwise free, rarely lower ones vaginate-connate only at base. Inflorescences capitate to subumbellate, with a rather long peduncle. Bracteoles absent. Calyx tubular at beginning of anthesis, soon bladderlike inflated, enclosing legume. Petals yellow. Legumes sessile, 2-locular or rarely nearly 1-locular, covered with spreading hairs.

Seventeen species: China, Mongolia; C Asia; eight species (one endemic) in China.

- 1a. Stem with only black hairs 379. *A. tyttocarpus*
 1b. Stem with white or white and black hairs.
 2a. Calyx covered with subappressed hairs; standard 15–16 mm 378. *A. scleropodius*
 2b. Calyx covered with ascending or mainly spreading hairs.
 3a. Leaflets adaxially glabrous, abaxially with scattered hairs only; peduncles with few scattered hairs;
 calyx teeth 4–5 mm 373. *A. cysticalyx*
 3b. At least some leaflets hairy adaxially, all sparsely to rather densely hairy abaxially; peduncles mostly
 distinctly hairy; calyx teeth 2–3 mm.
 4a. Fruiting calyx 12–13 mm, covered with symmetrically to strongly asymmetrically bifurcate,
 ascending, predominantly black hairs; standard 16–18 mm; legumes covered with spreading
 predominantly black hairs ca. 1 mm, without distinctly shorter hairs 377. *A. majevskianus*
 4b. Fruiting calyx 14 mm or longer, covered with strongly asymmetrically to basifixed,
 predominantly longer white hairs and with distinctly shorter black hairs; standard mostly
 distinctly longer; legumes covered with predominantly white or golden yellowish hairs
 and with or without shorter black hairs.
 5a. Leaflets elliptic, 10–20 × 4–11 mm; longer white calyx hairs ascending; standard narrowly
 oblong, 17–25 × ca. 6 mm, constricted in middle 374. *A. dendroides*
 5b. Leaflets distinctly relatively narrower; longer white calyx hairs at least partly spreading;
 standard obovate, if narrowly oblong, then not constricted.

- 6a. Leaflets in 3 or 4 pairs, narrowly elliptic, 10–35 × 4–10 mm; peduncles 3–5 cm, sparsely white hairy to subglabrous; standard obovate, 20–26 × 8–10 mm; legumes villous with long, golden yellowish hairs, on ventral side with shorter black hairs mixed in 380. *A. xanthotrichos*
- 6b. Leaflets in 4–7 pairs, mostly linear; peduncles 9–15 cm, ± densely hairy; standard shorter; legumes (ovary) with white hairs.
- 7a. Leaflets narrowly linear, 10–20 × 1–1.5 mm; standard narrowly oblong, ca. 19 × 4 mm; wing limbs obtuse 375. *A. gongliuensis*
- 7b. Leaflets linear to very narrowly elliptic, 13–22 × 2–4 mm; standard obovate, constricted below middle, ca. 20 × 6 mm; wing limbs obliquely emarginate 376. *A. leucocladus*

373. *Astragalus cysticalyx* Ledebour, Fl. Ross. 1: 643. 1843.

囊萼黄耆 nang e huang qi

Astragalus physocalyx Karelin & Kirilov (1841), not Fischer (1837).

Plants subshrubby, up to 60 cm tall, vegetative parts sparsely covered with ± medifixed, appressed, white hairs 0.5–1 mm. Stems branched, old parts ligneous; stems of current year 7–17 cm, sparsely hairy. Leaves 6–9 cm, subsessile; stipules 5–9 mm, adnate to petiole for 1–2 mm, sparsely covered with appressed, mostly white hairs; rachis sparsely appressed hairy; leaflets in 4 or 5 pairs, 13–35 × 4–8 mm, covered with scattered hairs abaxially, glabrous adaxially. Racemes ovoid, (3.5–)4–6 × ca. 3.5 cm, densely many flowered; peduncle 8–15(–22) cm, with scattered appressed hairs; bracts 5–9 mm, with spreading black hairs. Calyx at anthesis tubular, ca. 12 mm, later enlarged, spherical-ovoid, 13–14 mm, villous, rather densely covered with ± spreading, basifixed, white hairs 1–1.5 mm and toward teeth increasingly covered with distinctly shorter, ± appressed, subbasifixed to strongly asymmetrically bifurcate, black hairs; teeth 4–5 mm. Petals dingy yellow; standard narrowly obovate, 18–20 × 5–6 mm, apex slightly emarginate; wings 19–20 mm; keel 14–17 mm. Legumes included in persistent calyx, sessile, oblong, ca. 10 mm, densely villous with ± spreading white hairs.

Xinjiang [Kazakhstan].

374. *Astragalus dendroides* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 339. 1842.

树黄耆 shu huang qi

Plants subshrubby, up to 100 cm tall, covered with mostly appressed and ± medifixed hairs 0.5–1(–1.2) mm. Stems in parts of current year densely to rather densely covered with appressed white hairs, at nodes sometimes also with some black hairs. Leaves 3–9 cm; stipules 5–8(–10) mm, adnate to petiole for 2–3 mm, loosely to rather densely white and black hairy; petiole 0.4–1.2 cm, like rachis loosely white hairy; leaflets in 4 or 5(or 6) pairs, (5–)10–20 × (3–)4–11 mm, abaxially loosely to rather densely hairy, adaxially glabrous or sparsely hairy, rarely loosely appressed hairy. Racemes shortly cylindrical, 3–7 cm, densely many flowered; peduncle 3–14 cm, loosely covered with white hairs, toward raceme increasingly black hairy; bracts 4–7(–8) mm, with mostly subbasifixed to basifixed black and sometimes a few white hairs. Calyx 10–13 mm, during anthesis becoming inflated ovoid, at least up to 15 mm and up to 7 mm in diam., loosely to rather densely covered with subbasifixed to basifixed, nearly straight, ascending, white hairs up to 1.8 mm and with much shorter, symmetrically or asymmetrically bifur-

cate, flexuous, subappressed, black hairs; teeth 2–2.5 mm. Petals greenish yellow; standard oblong, 17–25 × ca. 6 mm, slightly constricted in lower part, apex slightly emarginate; wings 16–18 mm; keel 13–15 mm. Legumes sessile, included in calyx, 9–11 mm, ca. 4 mm high and ca. 2.5 mm wide, with a beak up to 2 mm, 2-locular; valves densely covered with ascending to spreading, basifixed, white hairs up to 2 mm and sitting on indistinct tubercles and with some strongly asymmetrically bifurcate, spreading, partly very short, black hairs.

Steppes. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

375. *Astragalus gongliuensis* Podlech & L. R. Xu, Novon 17: 233. 2007.

巩留黄耆 gong liu huang qi

Plants subshrubby, 25–45 cm tall. Stems branched, older parts ligneous, 3–4 cm, parts of current year up to 20 cm, very densely covered with medifixed, appressed, white hairs ca. 1 mm, toward nodes with scattered black hairs mixed in. Leaves 4–8 cm, subsessile; stipules 4–6 mm, adnate to petiole for 1–2 mm, densely appressed hairy like stem; rachis densely white hairy like stem; leaflets in 5–7 pairs, 10–20 × 1–1.5 mm, abaxially densely and adaxially sparsely to loosely covered with medifixed hairs 1–1.5 mm. Racemes 3–4 × ca. 3 cm, densely ca. 12-flowered; peduncle 10–13 cm, densely hairy like stem, toward raceme with some black hairs mixed in; bracts 3–4 mm, covered with subbasifixed to basifixed, spreading, white hairs 1–1.5 mm, with shorter black hairs mixed in. Calyx at anthesis tubular, soon inflated ovoid, ca. 14 mm, loosely covered with strongly to extremely asymmetrically bifurcate, ascending to spreading, white hairs 1–2 mm and with more symmetrically bifurcate, subappressed, black hairs 0.5–1 mm. Petals yellow; standard narrowly oblong, ca. 19 × 4 mm, apex emarginate; wings ca. 17 mm; keel ca. 16 mm. Ovary sessile, densely covered with subbasifixed, ascending, white hairs at least 1.5 mm. Legumes unknown.

• Xinjiang.

376. *Astragalus leucocladus* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 27. 1866.

白枝黄耆 bai zhi huang qi

Plants 30–45 cm tall, densely covered with mostly ± medifixed hairs. Stems branched at base, those of current year 9–16 cm, densely covered with white hairs 0.5–0.8 mm, at nodes also with black hairs. Leaves 4–6 cm, subsessile; stipules 4–7 mm, adnate to petiole for up to 1 mm, covered with white and predominantly black hairs; rachis loosely to rather densely hairy

like stem; leaflets in 4–6 pairs, 13–22 × 2–4 mm, abaxially loosely and adaxially sparsely covered with appressed white hairs 1–1.5 mm. Racemes short, densely 8–12-flowered; peduncle 9–15 cm, rather densely hairy like stem; bracts 4–5 mm, covered with mostly strongly asymmetrically bifurcate to basifixed, spreading, black and white hairs ca. 1 mm. Calyx at anthesis ca. 12 mm, tubular, rather densely covered with mostly strongly asymmetrically bifurcate, ± spreading, white hairs up to 1.5 mm and with shorter, mostly more symmetrically medifixed, black hairs; teeth 2–2.5 mm; calyx soon becoming inflated, at fruiting time ovoid, ca. 15 × 6–7 mm, loosely hairy. Petals yellow; standard obovate, ca. 20 × 6 mm, slightly constricted in middle, apex emarginate; wings 17–18 mm, limbs obliquely emarginate; keel 15–16 mm. Legumes included in calyx, ca. 10 mm, ca. 3 mm high (immature), with a slender beak ca. 2 mm, 2-locular; valves densely covered with mostly basifixed, spreading, white hairs ca. 2 mm and with much shorter black hairs up to 0.5 mm.

Steppes. Xinjiang [Kazakhstan].

377. *Astragalus majevskianus* Krylov, Sist. Zаметki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1932(3): 1. 1932.

富蕴黄耆 fu yun huang qi

Plants 25–50(–100) cm tall, densely covered with mostly ± medifixed hairs. Stems branched, old parts long, ligneous; parts of current year 9–16 cm, densely covered with white and black hairs 0.4–0.8 mm. Leaves 3–7 cm; stipules 4–7 mm, adnate to petiole for ca. 1.2 mm, covered with white and predominantly black hairs; petiole 0.5–1 cm, like rachis sparsely to loosely white and black hairy; leaflets in 5 or 6(–8) pairs, 7–25 × 1–4(–10) mm, both surfaces or more rarely only abaxially sparsely covered with white and sometimes a few black hairs up to 1.2 mm. Racemes 4–5 cm, densely many flowered, at fruiting time elongating up to 10 cm; peduncle 4–7 cm, sparsely to loosely white and black hairy; bracts 3–4 mm, covered with mostly strongly asymmetrically bifurcate to basifixed, spreading, black and sometimes a few white hairs. Calyx at anthesis 10–11 mm, tubular, rather densely covered with ± symmetrically to strongly asymmetrically bifurcate, ascending, black and sometimes a few white hairs up to 1 mm; teeth 2.5–3 mm; calyx soon becoming inflated, at fruiting time ovoid, 12–13(–14) mm, ca. 5 mm in diam., loosely hairy. Petals pale yellow; standard obovate, 16–18 × ca. 7 mm, slightly constricted in middle, apex emarginate; wings 15–17 mm; keel 14–16 mm. Legume included in calyx, 8–9 mm, ca. 2.5 mm high (immature), compressed laterally, with a beak ca. 1 mm, 2-locular; valves densely covered with mostly basifixed, spreading, white and predominantly black hairs ca. 1 mm.

Forest margins; ca. 1600 m. Xinjiang [Kazakhstan, Mongolia].

378. *Astragalus scleropodius* Ledebour, Fl. Altaic. 3: 326. 1831.

硬柄黄耆 ying bing huang qi

Plants subshrubby, 30–50 cm tall. Stems of current year 5–25 cm, slender, sparsely to rather densely covered with medifixed, appressed, white hairs 0.3–0.5 mm, at nodes with black

hairs mixed in. Leaves 2.5–6 cm; stipules 4–8 mm, adnate to petiole for ca. 2 mm, loosely appressed white and black hairy; petiole 0.5–1.5(–2) cm, with rachis sparsely to loosely hairy like stem; leaflets in 5–10 pairs, 10–28 × (3–)4–7 mm, abaxially covered with medifixed, appressed hairs 0.7–1 mm, adaxially glabrous or nearly so. Racemes 3–8 cm, 1-sided, 8- to many flowered; peduncle up to 6(–8) cm, sparsely hairy; bracts 4–7 mm, sparsely covered with basifixed, black or mixed white and black hairs. Calyx already during anthesis inflated ovoid, ca. 13 mm, loosely covered with subappressed, mostly subbasifixed, white hairs 0.7–1 mm and with shorter, bifurcate, black hairs; teeth 2.5–4 mm. Petals yellow; standard obovate, 15–16 mm, apex emarginate; wings 14–15 mm. Legumes with a beak 1–1.5 mm, 2-locular; valves covered with spreading black and very sparsely with white hairs.

Xinjiang [Kazakhstan].

379. *Astragalus tyttocarpus* Gontscharov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 148. 1946.

细果黄耆 xi guo huang qi

Astragalus woldemarii Juzepczuk; ?*A. woldemarii* var. *atrotrichocladus* S. B. Ho.

Plants subshrubby, 25–45 cm tall. Stems branched, parts of current year (3–)5–15(–20) cm, densely appressed white hairy, with scattered or toward nodes more numerous black hairs mixed in. Leaves 4–7 cm, subsessile; stipules 4–6 mm, adnate to petiole, lower ones connate at base, covered with appressed black and mostly with fewer white hairs; rachis appressed hairy; leaflets in 5–8 pairs, (10–)12–35 × 2–4 mm, abaxially sparsely covered with appressed hairs, adaxially covered with scattered hairs. Racemes (4–)6–10 cm, densely few to many flowered; peduncle up to 12 cm, appressed white hairy, toward raceme with black hairs mixed in; bracts (2–)4–5 mm, black hairy. Calyx in fruit narrowly ovoid, 8–11 mm, sparsely covered with ascending white hairs and subappressed, short, black hairs; teeth 2–2.5 mm. Petals dirty yellow; standard elliptic-pandurate, 17–20 mm, slightly constricted below middle, apex scarcely emarginate; wings 15–16 mm. Legumes ca. 5 mm, ca. 2.5 mm high, with a beak 1–1.5 mm, 2-locular; valves covered with subappressed white and black hairs.

Xinjiang [Kazakhstan, Kyrgyzstan].

In China, *Astragalus woldemarii* var. *atrotrichocladus* S. B. Ho (Bull. Bot. Res., Harbin 3(4): 56. 1983) is said to differ from the typical plant by its higher growth, 50–100 cm tall, young stems with black hairs only, and leaves white hairy on both surfaces. Because we have not seen the type, we cannot determine if it is a separate species. Therefore, we have not made a formal transfer of this variety to *A. tyttocarpus*.

380. *Astragalus xanthotrichos* Ledebour, Fl. Altaic. 3: 324. 1831.

黄毛黄耆 huang mao huang qi

Plants subshrubby, 20–50(–90) cm tall, vegetative parts covered with medifixed, appressed, mostly white hairs 0.8–1 mm. Stems of current year 6–13 cm, often branched at base, densely hairy. Leaves 3–7 cm; stipules 5–8 mm, adnate to petiole for ca. 2 mm, densely hairy, sometimes soon glabrescent;

petiole 0.7–1.2 cm, like rachis loosely to rather densely hairy; leaflets in 3 or 4 pairs, 10–35 × 4–10(–12) mm, abaxially sparsely to loosely covered with appressed hairs 0.8–1.5 mm, adaxially sparsely hairy or nearly glabrous. Racemes subspherical, 3–5 cm in diam., 4–8-flowered; peduncle 3–5 cm, sparsely white hairy to partly subglabrous; bracts 4–7 mm, white and black hairy. Calyx at anthesis ca. 12 mm, tubular, rather densely covered with basifixed to subbasifixed, spreading, white hairs 1–1.5 mm and with strongly asymmetrically bifurcate, shorter,

mostly subappressed to ascending, black hairs; teeth subulate, 2.5–3 mm; calyx at fruiting time ovoid, 15–18 mm. Petals yellow; standard obovate, 20–26 × 8–10 mm, apex widely retuse; wings 18–23 mm; keel 18–22 mm. Legumes 12–14 mm, ca. 3.5 mm high, with a beak 1–1.5 mm, 2-locular; valves villous with spreading white and golden hairs, at apex and sometimes also on ventral side with shorter black hairs mixed in.

Xinjiang [Kazakhstan].

58. *Astragalus* sect. *Hypsophili* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 136. 1868 [*"Hypsophilus"*].

雪地组 xue di zu

Plants perennial, herbaceous, caulescent, covered with symmetrically or asymmetrically bifurcate hairs. Stipules free from petiole, high vaginate-connate behind stem. Racemes borne on long peduncles, spherical, few flowered. Bracteoles absent. Calyx at beginning of anthesis tubular, soon elongating and becoming inflated, bladderlike ovoid in fruit, not ruptured by legume. Legumes shortly stipitate, small, keeled ventrally, grooved dorsally, compressed laterally, incompletely 2-locular.

Four species: China, one also in C Asia and from Afghanistan to India; four species (three endemic) in China.

- 1a. Leaflets on both surfaces densely hairy 383. *A. nivalis*
 1b. Leaflets adaxially glabrous, abaxially sparsely to loosely hairy.
 2a. Calyx 12–14 mm in flower, 14–16 mm in fruit; standard 23–27 mm 381. *A. burchan-buddaicus*
 2b. Calyx 8–11 mm in flower, 10–12 mm in fruit; standard 18–21 mm.
 3a. Plants 25–35 cm tall; peduncles 5–18 cm, sparsely to very sparsely hairy; calyx with black hairs 0.4–1.2 mm and with white hairs up to 1.5 mm; ovary with a stipe 1.5–2 mm 384. *A. yechengensis*
 3b. Plants 12–20 cm tall; peduncles 1–3 cm, rather densely hairy; calyx with black hairs 0.3–0.5 mm and with slightly longer white hairs; ovary subsessile 382. *A. kukunoricus*

381. *Astragalus burchan-buddaicus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 104. 1996.

布尔卡黄耆 bu er ka huang qi

Plants 20–40 cm tall, loosely caespitose, vegetative parts covered with ± medifixed, appressed hairs 0.4–0.8 mm. Stems many, branched at base, 6–35 cm, loosely white hairy, below nodes mostly also with black hairs. Leaves 4–6 cm; stipules 5–10 mm, sparsely to loosely covered with white or black and white hairs; petiole 1–1.5 cm, like rachis loosely to rather densely white hairy; leaflets in 6–8 pairs, 5–10 × 2–4 mm, abaxially loosely white hairy, adaxially glabrous. Racemes spherical, 1.5–3 cm, densely 5–8-flowered; peduncle 4–7 cm, hairy; bracts 5–8 mm, mostly black hairy. Calyx at anthesis tubular, 12–14 mm, soon inflated, spherical to ovoid, 14–16 mm, loosely to rather densely covered with appressed to ascending, symmetrically to strongly asymmetrically bifurcate, black hairs 0.2–0.5 mm and with ascending to partly ± spreading, white hairs up to 1 mm; teeth 1–1.5(–2) mm. Petals pale pink; standard narrowly obovate, 23–27 × 5–8 mm, constricted below middle, apex widely emarginate; wings 20–24 mm, limbs obtriangular, widest at obliquely bilobed tip; keel 16–20 mm. Legumes with a stipe 1–2 mm, included in calyx, 7–9 mm, 3–3.5 mm high, compressed laterally, with a strongly bent style 0.6–2 mm, incompletely 2-locular; valves densely covered with ascending to spreading, subbasifixed to basifixed, white hairs up to 1.5 mm and often also with much shorter black hairs.

• Qinghai.

382. *Astragalus kukunoricus* N. Ulziykhutag, Novosti Sist. Vyssh. Rast. 30: 107. 1996.

青海黄耆 qing hai huang qi

Astragalus nivalis Karelin & Kirilov var. *aureocalycatus* S. B. Ho.

Plants 12–20 cm tall, caespitose. Stems several, branched at base, densely to very densely covered with somewhat flattened, medifixed, appressed, white hairs 0.3–0.6 mm. Leaves 1–6 cm; stipules 4–6 mm, loosely white hairy, partly glabrescent; petiole 0.3–2 cm, together with rachis hairy like stem; leaflets in 5–8 pairs, 2–8 × 1–3 mm, abaxially sparsely to loosely appressed white hairy, adaxially glabrous or subglabrous. Racemes 1–2.5 cm, few flowered; peduncle 1–3 cm, rather densely hairy; bracts 3–4(–5) mm, white and black hairy, at margins with basifixed hairs. Calyx at anthesis tubular, 8–11 mm, soon inflated and ovoid to globose, 10–12 mm, loosely to rather densely covered with appressed, ± medifixed, black hairs 0.3–0.5 mm and with ascending, strongly asymmetrically bifurcate to basifixed, slightly longer, tangled, white hairs; teeth 0.5–1.5 mm. Petals pale lilac or white with violet-tipped keel; standard narrowly obovate, 18–21 × ca. 7 mm, apex retuse; wings 16–19 mm; keel 13–16(–17) mm. Legumes with a stipe 0.7–1 mm, 9–10 mm, 3–3.5 mm high, nearly without or with an inconspicuous, reflexed beak.

• Gansu, Qinghai, Xinjiang.

383. *Astragalus nivalis* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 341. 1842.

雪地黄耆 xue di huang qi

Astragalus nathaliae Meffert; *A. orthanthoides* Borissova; *A. orthanthus* Freyn.

Plants 8–25 cm tall, loosely caespitose, covered with mostly medifixed hairs. Stems 4–15 cm, loosely covered with appressed white hairs 0.3–0.5 mm. Leaves 2–4 cm; stipules 2–4 mm, sparsely to loosely covered with appressed white or black or white and black hairs; petiole 0.5–1 cm, like rachis slender, rather densely white hairy; leaflets in 4–8 pairs, (1–)2–8 × 1–4 mm, both surfaces densely covered with appressed hairs. Racemes densely 5–10-flowered; peduncle 2–5(–8) cm, hairy; bracts 2–5 mm, mostly black hairy. Calyx at anthesis tubular, 8–13 mm, soon bladderlike inflated, spherical to ovoid, 10–15(–17) mm, rather densely covered with appressed to ascending, symmetrically to strongly asymmetrically bifurcate, black hairs 0.1–1 mm and with ± spreading, rarely subappressed, subbasifixed to basifixed, mostly longer, white hairs in different relations; teeth 1–2 mm. Petals violet or pink; standard obovate, 17–21 × 7–9 mm, constricted below middle, apex emarginate; wings 17–20 mm, limbs obtriangular, widest at obliquely bilobed tip; keel 14–17 mm. Legumes with a stipe 0.5–1.5 mm, included in calyx, 5–9 mm, 3–3.5 mm high, compressed laterally, with a strongly bent slender style 0.6–2 mm, incompletely 2-locular; valves densely covered with spreading, subbasifixed to basifixed, white hairs up to 1.5 mm and often also with much shorter black hairs.

Gansu, Qinghai, Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Tajikistan].

384. *Astragalus yechengensis* Podlech & L. R. Xu, Novon 17: 236. 2007.

叶城黄耆 *ye cheng huang qi*

Plants 25–35 cm tall. Stems several, densely covered with medifixed, appressed, white hairs 0.3–0.6 mm, with some black hairs mixed in, especially toward nodes. Leaves 3–7 cm; stipules 3–4 mm, free from petiole, high connate behind stem, loosely white and black hairy, partly glabrescent with age; petiole 0.4–1.5 cm, with rachis hairy like stem; leaflets in 5–8 pairs, 4–7 × 1.5–3 mm, abaxially sparsely to loosely covered with appressed white hairs 0.4–0.8 mm, adaxially glabrous. Racemes ca. 3 cm, densely 8–10-flowered; peduncle 5–18 cm, sparsely to very sparsely hairy like stem; bracts 3–4 mm, with strongly asymmetrically bifurcate to basifixed white and black hairs. Calyx at anthesis narrowly ellipsoid, ca. 11 mm, loosely covered with subappressed, symmetrically to strongly asymmetrically bifurcate, flexuous, black hairs 0.4–1.2 mm and with fewer, strongly asymmetrically bifurcate to basifixed, white hairs 1–1.5 mm; teeth ca. 1 mm. Petals probably white with violet-tipped keel or pale violet; standard narrowly obovate, 19–20 × ca. 7 mm, apex retuse; wings 16–17 mm; keel 14–15 mm. Ovary with a stipe 1.5–2 mm, white and black hairy. Legumes unknown.

• Xinjiang (Kashi Diqu).

59. *Astragalus* sect. *Laguropsis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 137. 1868.

兔尾组 *tu wei zu*

Plants perennial, acaulescent or nearly so, with bifurcate hairs. Stipules shortly or high adnate to petiole, otherwise free or more rarely distinctly vaginate-connate. Inflorescences with a well-developed peduncle, densely mostly many flowered. Bracteoles absent. Calyx tubular at beginning of anthesis, at length bladderlike inflated. Legumes mostly included in calyx, sessile to subsessile, rarely distinctly stipitate, 2-locular or 1-locular.

Forty-three species: Afghanistan, China, Mongolia, Russia (Siberia); C Asia, SW Asia (Caucasus, Iran, Turkey), E Europe; 17 species (eight endemic) in China.

- 1a. Petals purple or violet (in *A. dilutus* sometimes yellow with purple keel), sometimes drying yellowish brown, but mostly purple.
- 2a. Calyx 7–8 mm; bracts 2–2.5 mm; standard ca. 15 mm; stipules high connate behind stem 387. *A. chamaephyton*
- 2b. Calyx and standard longer, bracts mostly longer; stipules free from each other.
 - 3a. Calyx teeth ca. 0.5 mm; plants only white hairy 390. *A. grum-grshimailoi*
 - 3b. Calyx teeth longer; plants at least at calyx teeth but mostly elsewhere with black hairs, if only with white hairs (*A. sabuletorum*), then calyx teeth 3–4 mm.
 - 4a. Standard 20–24 × ca. 7 mm, rhombic-elliptic, without distinct claw; leaflets in 4–9 pairs 399. *A. tekesensis*
 - 4b. Standard at most up to 20 mm, with a ± distinct claw; leaflets in mostly fewer pairs.
 - 5a. Most leaflets more than 10 mm and up to 15–25 mm; wings 2–4 mm shorter than standard.
 - 6a. Leaflets in 3–5 pairs, in basal leaves often only in 1 or 2 pairs; bracts 5–10 mm; calyx covered with spreading hairs; legumes sessile 392. *A. laguroides*
 - 6b. Leaflets in 5–9 pairs; bracts 3–5 mm; calyx covered with appressed hairs; legumes with a stipe 1–1.5 mm 396. *A. sabuletorum*
 - 5b. Leaflets up to 10 mm; wings as long as standard or ca. 1 mm shorter.
 - 7a. Leaflets in 2–4 pairs; bracts white and black hairy; calyx covered with spreading hairs 394. *A. obtusifoliolus*
 - 7b. Leaflets in at least 4 pairs, but mostly in more; bracts white hairy; calyx appressed hairy.
 - 8a. Calyx at anthesis 9–10 mm, with teeth 1–1.5 mm; standard limb elliptic; petals pale purple or yellow with purple keel 388. *A. dilutus*
 - 8b. Calyx at anthesis 13–14 mm, with teeth 2.5–3.5 mm; standard limb obovate-pandurate; petals purplish 395. *A. ochrius*

- 1b. Petals all yellow.
- 9a. Stipules 4–7 mm, adnate to petiole for ca. 2 mm, sometimes connate in front of petiole higher up, always connate behind stem up to 3/4 of length 397. *A. sphaerocystis*
- 9b. Stipules never connate behind stem or around petiole.
- 10a. Leaves 1–2 cm; leaflets in 1 or 2 pairs 400. *A. wenquanensis*
- 10b. Leaves longer; leaflets in more pairs.
- 11a. Standard ca. 14 mm 393. *A. novissimus*
- 11b. Standard at least 17 mm but mostly longer.
- 12a. Calyx covered with appressed hairs.
- 13a. Stipules 4–10 mm, adnate to petiole for 2–4 mm; calyx teeth 3–7 mm; legumes sessile, 7–8 mm, covered with asymmetrically bifurcate, ascending to spreading hairs 398. *A. taiyuanensis*
- 13b. Stipules 3–5 mm, very shortly adnate to petiole; calyx teeth up to 3 mm; legumes stipitate, longer, covered with medifixed, appressed hairs.
- 14a. Wing limbs deeply bilobed; ovary and legumes with a stipe 3–3.5 mm, grooved dorsally, incompletely 2-locular 401. *A. zaissanensis*
- 14b. Wing limbs slightly emarginate; ovary and legumes with a stipe 1–1.5 mm, narrowly rounded dorsally, 2-locular 391. *A. kurtschumensis*
- 12b. Calyx covered with spreading hairs.
- 15a. Leaflets in 2–5 pairs; stipules 10–17 mm; bracts 6–9 mm 386. *A. baotouensis*
- 15b. Leaflets in at least 4 pairs but in most leaves in distinctly more; stipules up to 8 mm; bracts at most up to 5 mm.
- 16a. Stipules 6–8 mm, high adnate to petiole, covered with strongly asymmetrically bifurcate hairs; leaflets 5–10 × 1.5–4 mm, very densely silvery hairy; peduncles longer than leaves 385. *A. arkalycensis*
- 16b. Stipules very shortly adnate to petiole, covered with medifixed hairs; leaflets mostly longer and distinctly wider, 6–25 × 4–13 mm, densely but not silvery hairy; peduncles shorter than leaves 389. *A. ellipsoideus*

385. *Astragalus arkalycensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 139. 1868.

边塞黄耆 bian sai huang qi

Astragalus ellipsoideus Ledebour var. *abbreviatus* Ledebour.

Plants 5–15 cm tall, acaulescent, densely matlike caespitose. Leaves 5–10 cm; stipules 6–8 mm, high adnate to petiole, densely white hairy; petiole 2.5–5 cm, slender, densely appressed white hairy; leaflets in (5–)7–11(–14) pairs, 5–10 × 1.5–4 mm, both surfaces silvery hairy with dense appressed hairs. Racemes spherical to shortly ellipsoid, 3–4 cm, densely many flowered; peduncle 6–15 cm, stout, densely covered with medifixed, appressed, white hairs; bracts 4–5 mm, white or white and black hairy. Calyx at anthesis tubular, ca. 10 mm, later on inflated ovoid and 13–15 mm, rather densely covered with spreading white hairs, at teeth with black hairs mixed in; teeth 2.5–3 mm. Petals yellow; standard narrowly obovate, 18–22 × 5–6 mm, apex emarginate; wings 17–20 mm; keel 16–19 mm. Legumes 9–10 mm, 3–4 mm high, shortly acuminate, 2-locular; valves densely covered with short spreading hairs.

Gansu, Nei Mongol, Ningxia, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

386. *Astragalus baotouensis* H. C. Fu, Fl. Intramongol., ed. 2, 3: 670. 1989.

包头黄耆 bao tou huang qi

Plants 15–30 cm tall, subacaulescent, caespitose. Leaves 10–30 cm; stipules 10–17 mm, densely appressed hairy; petiole

5–15 cm; leaflets in 2–5 pairs, 10–30(–35) × 3–12 mm, both surfaces appressed hairy. Racemes ovoid to oblong, 3–7 × 3–3.5 cm, densely many flowered; peduncle as long as or shorter than leaves, covered with white or also black hairs; bracts 6–9 mm, white ciliate. Calyx tubular at anthesis, soon inflated ovoid, 12–15 mm, densely villous with spreading white hairs; teeth 5–6 mm, white and black hairy. Petals yellow; standard 20–22 mm, limb obovate, slightly emarginate; wings ca. 20 mm; keel ca. 18 mm. Ovary sessile, narrowly ellipsoid, densely white hairy. Legumes unknown.

• Nei Mongol.

387. *Astragalus chamaephyton* Podlech & L. R. Xu, Novon 17: 238. 2007.

低矮黄耆 di ai huang qi

Plants ca. 7 cm tall, acaulescent, vegetative parts covered with medifixed, appressed, white hairs 0.5–0.8 mm. Leaves 1.5–2.5 cm; stipules ca. 3 mm, adnate to petiole for ca. 1 mm, high connate behind stem, loosely to rather densely subappressed hairy; petiole 0.5–1 cm, like rachis very densely hairy; leaflets in 2 or 3 pairs, 4–7 × 1.5–2.5 mm, both surfaces densely hairy. Racemes globose to ovoid, 2–3 cm, densely 12–15-flowered; peduncle ca. 4 cm, rather densely hairy like rachis, toward raceme with increasingly black hairs; bracts 2–2.5 mm, with strongly asymmetrically bifurcate to basifixed white and black hairs. Calyx soon becoming inflated ovoid, 7–8 mm, loosely covered with strongly asymmetrically bifurcate to basifixed, tangled, spreading, white and black hairs; teeth ca. 1 mm. Petals violet; standard narrowly oblong, ca. 15 × 5 mm, mostly slightly

constricted in lower 1/3, apex rounded; wings ca. 14 mm, limbs obliquely emarginate; keel ca. 13 mm. Ovary sessile, glabrous. Legumes unknown.

• Xinjiang.

388. *Astragalus dilutus* Bunge, Delect. Sem. Horti Bot. Dorpat. 1840: 7. 1840.

浅黄耆 qian huang qi

Plants 3–10 cm tall, acaulescent, caespitose, with mostly ± symmetrically medifixed, appressed to subappressed hairs 0.8–1.5 mm. Leaves 2–7 cm; stipules 3–4 mm, adnate to petiole for ca. 1 mm, densely covered with subappressed white hairs; petiole 1–2.5 cm, like rachis densely hairy; leaflets in 4–6 pairs, 4–8(–12) × 2–4(–5) mm, very densely covered on both surfaces with subappressed hairs. Racemes subspherical to ovoid, densely 8–15-flowered; peduncle 1–7(–10) cm, densely white hairy, toward raceme with black hairs mixed in; bracts 3–5 mm, covered with partly strongly asymmetrically bifurcate white hairs especially at margins. Calyx at anthesis tubular, 9–10 mm, loosely covered with appressed black and white hairs; teeth 1–1.5 mm; fruiting calyx slightly elongated, up to 12 mm, inflated ellipsoid; teeth up to 2 mm. Petals pale purplish to yellowish with purple keel; standard elliptic, 17–20 × 5–6 mm, distinctly emarginate; wings 16–19 mm; keel 13–15 mm. Legumes included in calyx, subsessile, 8–10 mm, 3–3.5 mm high and 1.5–2 mm wide, with a beak ca. 1 mm, 2-locular; valves rather densely covered with strongly asymmetrically bifurcate, spreading, white hairs up to 2 mm.

Xinjiang [Mongolia, Russia (Siberia)].

389. *Astragalus ellipsoideus* Ledebour, Fl. Altaic. 3: 319. 1831.

胀萼黄耆 zhang e huang qi

Astragalus ellipsoideus var. *kuldshensis* Basilevskaja; *A. transiliensis* Gontscharov.

Plants 13–27 cm tall, acaulescent to subacaulescent, caespitose, vegetative parts covered with ± medifixed, appressed, white hairs 0.8–1 mm. Leaves 7–20 cm; stipules 5–8 mm, very shortly adnate to petiole, densely hairy; petiole 2–7 cm, like rachis stout, densely hairy; leaflets in 4–8 pairs, 6–25 × 4–13 mm, both surfaces densely hairy. Racemes ovoid, (4–)5–6 cm, 3–3.5 cm in diam., very densely many flowered; peduncle stout, 12–19 cm, covered with appressed white hairs; bracts 2–5 mm, with mostly basifixed, white or black hairs. Calyx at anthesis tubular, ca. 10 mm; teeth 2–2.5 mm; fruiting calyx inflated ovoid, 12–18 mm, rather densely covered with basifixed, tangled, spreading, white hairs 1–2 mm and often, especially at teeth, with black hairs mixed in; teeth (2–)4–6 mm. Petals yellowish; standard obovate, 20–24 × 7–10 mm, apex widely emarginate; wings 19–23 mm, limbs narrowly oblong to obtriangular-spatulate, obliquely emarginate; keel 17–19 mm. Legumes enclosed in calyx, with a stipe ca. 1 mm, 12–15 mm, ca. 4 mm high, 2-locular; valves densely covered with spreading white hairs 1.5–2 mm.

Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Kazakhstan, Mongolia].

390. *Astragalus grum-grshimailoi* Palibin, Bull. Herb. Boissier, sér. 2, 8: 158. 1908.

胶黄耆 jiao huang qi

Plants subacaulescent, caespitose, white sericeous. Stems 1–1.5 cm. Leaves 4–5 cm; stipules 1–1.5 mm, shortly adnate to petiole, hairy; petiole 1.5–2 cm; leaflets in (6–)8 or 9 pairs, narrowly elliptic, 5–6(–7) × 2–2.5 mm, both surfaces covered with appressed, medifixed hairs. Racemes ovoid, 3–4 cm, 4–9-flowered; peduncle 3–3.5 cm, appressed hairy; bracts 1–1.5 mm. Calyx at beginning of anthesis tubular, 9–13 mm, ca. 4 mm in diam., soon enlarging and inflated, ellipsoid to ovoid, covered with short, medifixed, appressed hairs; teeth ca. 0.5 mm. Petals pale yellowish brown when dry; standard 20–21 mm; wings 18–19 mm; keel 15–16 mm. Legumes unknown.

• Xinjiang.

391. *Astragalus kurtshumensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 139. 1868.

库尔楚黄耆 ku er chu huang qi

Plants 12–15 cm tall, acaulescent or nearly so, caespitose, vegetative parts densely covered with medifixed, appressed, white hairs 0.8–1 mm. Stems, if present, up to 2 cm, densely hairy. Leaves 5–15 cm; stipules 3–5 mm, densely hairy; petiole 3–7 cm, like rachis loosely to rather densely hairy; leaflets in 4–12 pairs, 6–14 × 3–6 mm, both surfaces densely hairy. Racemes spherical, densely 8–12-flowered; peduncle 8–12 cm, densely to rather densely white hairy; bracts 2–3(–5) mm, with appressed white or black and white hairs, at margins with basifixed hairs. Calyx at anthesis tubular, 9–12 mm, soon inflated ovoid and 13–14 mm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed, black and white hairs in different proportions up to 0.8 mm; teeth 1.5–3 mm. Petals pale yellow; standard narrowly obovate, 18–24 × ca. 7 mm, apex slightly emarginate; wings 16–20 mm; keel 13–18 mm. Legumes with a stipe 1–1.5 mm, enclosed in calyx, 11–13 × ca. 1.5 mm, compressed laterally, 2-locular; valves covered with appressed, medifixed, white hairs.

Nei Mongol, Ningxia, Xinjiang [Kazakhstan, Mongolia].

392. *Astragalus laguroides* Pallas, Reise Russ. Reich. 3: 750. 1776.

兔尾黄耆 tu wei huang qi

Astragalus gobi-altaicus N. Ulziykhutag; *A. lagurus* Pallas; *A. lupulinus* Pallas var. *laguroides* (Pallas) Basilevskaja.

Plants 5–16(–20) cm tall, acaulescent or nearly so, vegetative parts covered with medifixed, appressed, white hairs 0.8–1.1 mm. Stems, if present, up to 1.5 cm, densely hairy. Leaves 3–14 cm; stipules 6–7(–10) mm, adnate to petiole for 2(–3) mm, hairy; petiole 1.5–5 cm, like rachis densely to rather densely hairy; leaflets in 3–5(–8) pairs, in basal leaves often only in 1 or 2 pairs, 8–25 × 3–8 mm, both surfaces rather densely hairy, apex acute. Racemes ovoid, 2–6 cm, densely many flowered; peduncle 2–11 cm, rather densely covered with symmetrically or asymmetrically bifurcate, appressed to subappressed, white hairs 0.4–1 mm, toward raceme sometimes also

with some black hairs mixed in; bracts 5–10 mm, covered with asymmetrically bifurcate, at margins with basifixed, white hairs. Calyx at anthesis tubular, soon becoming inflated ovoid, 11–14 mm, loosely to rather densely covered with asymmetrically bifurcate to basifixed, tangled, spreading, white hairs 1–2 mm, with some black hairs mixed in; teeth 3–6 mm. Petals violet; standard narrowly obovate, 17–20 × 6–7 mm, mostly slightly constricted in middle, apex emarginate; wings 14–17 mm; keel 13–15 mm. Legumes included in calyx, sessile, oblong, 7–8 mm, with a hooked beak ca. 1 mm, 1-locular; valves covered with spreading white hairs.

Xinjiang [Mongolia, Russia (Siberia)].

393. *Astragalus novissimus* Podlech & L. R. Xu, *Novon* 14: 223. 2004.

小花兔尾黄耆 xiao hua tu wei huang qi

Astragalus laguroides Pallas var. *micranthus* S. B. Ho.

Plants 8–12 cm tall, acaulescent, with only white hairs. Leaves 3–6 cm; stipules 3–4 mm, nearly free from petiole, appressed hairy, margin with basifixed hairs; petiole 1–3 cm, like rachis loosely to rather densely covered with medifixed, appressed hairs 0.5–1 mm; leaflets in 2–4 pairs, in basal leaves often only in 1 or 2 pairs, 7–12 × 3–5 mm, both surfaces densely to rather densely covered with medifixed, appressed hairs 1.5–2(–3) mm, apex acute. Racemes ovoid, 3–5 cm, densely many flowered; peduncle 3.5–6 cm, loosely to rather densely covered with medifixed, appressed hairs 0.5–1 mm; bracts ca. 2 mm, covered with mostly basifixed hairs. Calyx 11–12 mm, tubular at beginning of anthesis, soon inflated ovoid, rather densely covered with subbasifixed to basifixed, spreading, straight, white hairs 2–3 mm; teeth 3–4 mm. Standard elliptic, ca. 14 × 5 mm, slightly constricted below middle, apex slightly emarginate; wings ca. 13 mm; keel ca. 12 mm. Ovary sessile, hairy. Legumes unknown.

• Nei Mongol.

394. *Astragalus obtusifoliolus* (S. B. Ho) Podlech & L. R. Xu, *Sendtnera* 7: 200. 2001.

钝叶黄耆 dun ye huang qi

Astragalus nobilis Bunge & B. Fedtschenko var. *obtusifoliolus* S. B. Ho, *Bull. Bot. Res.*, Harbin 3(4): 58. 1983.

Plants 7–8 cm tall, acaulescent, vegetative parts covered with ± medifixed, appressed, white hairs. Leaves 2–6 cm; stipules ca. 5 mm, adnate to petiole for 2–3.5 mm, densely covered with hairs up to 1 mm, at margins also with basifixed hairs; petiole 1–3 cm, like rachis densely covered with hairs 0.5–1 mm; leaflets in 2–4 pairs, 4–9 × 2–5 mm, both surfaces densely hairy like rachis, apex rounded to very shortly acuminate. Racemes shortly ovoid, densely many flowered; peduncle 4–5 cm, densely to rather densely white hairy like rachis, in upper part with a few black hairs mixed in; bracts 4–5 mm, with white and black hairs, at margins with basifixed hairs. Calyx soon inflated ovoid, 9–11 mm, 7–9 mm in diam., loosely covered with ± spreading, basifixed to subbasifixed, white hairs 1–1.5 mm and with fewer and slightly shorter, ± medifixed, subappressed, black hairs, whole surface finely rugulose-warty; teeth 1–2 mm.

Petals purple-red (according to diagnosis); standard ovate, ca. 20 × 7 mm, somewhat abruptly constricted in lower 1/3, apex emarginate; wings ca. 18 mm, limbs narrowly oblong, obliquely emarginate; keel 13–15 mm. Legumes subsessile, oblong, 6–7 mm, 3–3.5 mm high and ca. 2 mm wide, with a slender, hooked beak ca. 2 mm with persistent style, 2-locular; valves densely covered with subappressed to partly ascending, subbasifixed, white hairs 0.5–0.8 mm.

• Xinjiang.

395. *Astragalus ochrias* Bunge, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 24: 33. 1877.

中宁黄耆 zhong ning huang qi

Astragalus transiliensis Gontscharow var. *microphyllus* S. B. Ho.

Plants 10–20 cm tall, acaulescent. Leaves 2.5–7 cm; stipules ca. 3 mm, free from each other; petiole 1.5–2.5 cm, like rachis densely covered with medifixed, appressed, white hairs 0.4–0.6 mm; leaflets in 6 or 7 pairs, 3–6 × 1–2.5 mm, both surfaces densely covered with appressed hairs ca. 0.8 mm, apex subacute. Racemes subglobose to ovoid, dense; peduncle 4–8 cm, densely covered with medifixed, appressed, white hairs 0.4–0.5 mm; bracts 2–3 mm, white hairy, at margins also with basifixed hairs. Calyx 12–13 mm, at beginning of anthesis tubular, slightly inflated, later on inflated cylindrical, densely covered with symmetrically or asymmetrically bifurcate, subappressed, flexuose, white hairs 0.8–1 mm, at teeth with some black hairs mixed in; teeth 2.5–4 mm. Petals ?purplish. Standard obovate-oblong-pandurate, ca. 19 × 7 mm, distinctly constricted below middle, apex emarginate; wings ca. 19 mm, limbs narrowly obovate, obliquely emarginate; keel ca. 18 mm. Ovary sessile, narrowly ellipsoid, densely covered with subappressed to ascending white hairs up to 1 mm.

Nei Mongol, Ningxia, Qinghai [Mongolia].

396. *Astragalus sabuletorum* Ledebour, *Fl. Altaic.* 3: 321. 1831.

粗沙黄耆 cu sha huang qi

Plants 7–20 cm tall, nearly acaulescent. Stems of current year at most up to 2 cm, very densely covered with appressed, medifixed, white hairs 0.8–1 mm. Leaves (4–)7–12(–17) cm; stipules ca. 5 mm, adnate to petiole for 2–3 mm, densely covered with appressed to subappressed white hairs; petiole (1.5–)3–7 cm, with rachis densely hairy like stem; leaflets in 5–9 pairs, 7–16(–22) × 3–7(–9) mm, densely covered on both surfaces with appressed, silky, white hairs. Racemes 3–4 cm, densely 6–12-flowered; peduncles 5–16 cm, mostly shorter than leaves, loosely to rather densely white hairy like stem; bracts 3–5(–7) mm, sparsely white hairy, especially at margins with basifixed hairs. Calyx initially tubular, becoming inflated cylindrical-ovoid, 8–11(–12) mm, densely covered with appressed to subappressed, asymmetrically to strongly asymmetrically bifurcate to even partly subbasifixed, white hairs ca. 1 mm; teeth (2–)3–4 mm. Petals pink; standard obovate, 18–20 mm, slightly constricted below middle, apex emarginate; wings 15–16 mm; keel 13–14 mm. Legumes shortly stipitate, 9–11 mm, ca. 3 mm wide,

with a straight, subulate beak 1–2 mm, 2-locular; valves densely appressed white hairy.

Xinjiang [Kazakhstan].

397. *Astragalus sphaerocystis* Bunge, Beitr. Fl. Russl. 97. 1852.

球囊黄耆 qiu nang huang qi

Astragalus baisensis Sumnevicz.

Plants 6–18 cm tall, acaulescent, loosely caespitose, vegetative parts with mostly \pm medifixed, appressed to subappressed hairs 0.8–1 mm. Leaves 2.5–10 cm; stipules 4–7 mm, adnate to petiole for ca. 2 mm, sometimes before petiole higher up shortly connate, connate behind stem up to 3/4 of length, densely covered with subappressed white hairs, at margins with basifixed or subbasifixed hairs; petiole 0.7–3.5 cm, like rachis densely hairy; leaflets in 3–6 pairs, 5–12 \times 2–5(–7) mm, both surfaces very densely hairy. Racemes subspherical to ovoid, densely many flowered, 2.5–4(–8) cm; peduncle 4–12 cm, loosely to rather densely covered with subappressed white hairs, toward raceme also with black hairs; bracts 3–5 mm, covered with strongly asymmetrically bifurcate and especially at margins basifixed white and black hairs. Calyx at anthesis tubular, 10–11 mm, rather densely covered with subappressed, strongly asymmetrically bifurcate, white hairs up to 1.5 mm and with distinctly shorter, \pm medifixed, black hairs; teeth 1.5–2(–2.5) mm; fruiting calyx slightly elongated, bladderlike inflated ovoid, loosely hairy. Petals pale yellowish to whitish; standard oblong-elliptic, 17–18 \times 5–6 mm, slightly constricted in lower 1/3, apex emarginate; wings 16–17 mm, limbs narrowly oblong, obliquely emarginate; keel 13–14 mm. Legumes included in calyx, sessile, 5–10 mm, ca. 3 mm high, compressed laterally, with a short beak, nearly fully 2-locular; valves rather densely hairy, hairs subappressed to ascending, tangled, white, sometimes also some black, up to 1.5 mm.

Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia].

398. *Astragalus taiyuanensis* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 60. 1983.

太原黄耆 tai yuan huang qi

Plants 15–20 cm tall, acaulescent to subacaulescent, caespitose, covered with mostly \pm medifixed, appressed, white hairs. Leaves 6–11 cm; stipules 4–10 mm, adnate to petiole for 2–4 mm, densely hairy; petiole 2–3.5 cm, like rachis densely covered with hairs 0.8–1 mm; leaflets in 5–7 pairs, 5–12 \times 1.5–5 mm, both surfaces rather densely covered with hairs 0.8–1 mm. Racemes globose to ovoid, 3–4 cm, rather densely 5–9-flowered; peduncle 5–12 cm, loosely to densely hairy; bracts 2–3 mm, loosely hairy. Calyx inflated ellipsoid, 12–13 mm, loosely covered with appressed hairs 0.4–1 mm; teeth 3–7 mm. Petals yellowish; standard narrowly oblong-elliptic, 20–22 \times ca. 6 mm, apex emarginate; wings 19–20 mm, limbs narrowly oblong, obliquely emarginate; keel 18–19 mm. Legumes included in calyx, sessile, 7–8 mm, ca. 3 mm high and ca. 2 mm wide, with beak ca. 1 mm, incompletely 2-locular; valves densely covered with asymmetrically bifurcate, tangled, ascending to spreading, white hairs 1–1.5 mm.

• Shaanxi, Shanxi.

399. *Astragalus tekesensis* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 53. 1983.

特克斯黄耆 te ke si huang qi

Plants 10–30 cm tall, subacaulescent. Stems 2–6 cm, with appressed hairs. Leaves 7–17 cm; stipules 3–5 mm, ?free, covered with ascending white hairs; petiole 3–7 cm; leaflets in 4–9 pairs, 10–20 \times 3–7 mm, both surfaces with appressed white hairs. Racemes 4–8 cm, rather densely many flowered; peduncle 4.5–9 cm, loosely covered with appressed white hairs; bracts greenish, 7–10 mm, at margins white and black hairy. Calyx 8–13 mm, at anthesis tubular, soon inflated ovoid, covered with spreading white and black hairs; teeth 3–5 mm, with predominantly black hairs. Petals purple; standard rhombic-elliptic, 20–24 \times ca. 7 mm, without distinct claw, apex emarginate; wings 18–22 mm, limbs narrowly oblong, obliquely emarginate; keel 16–20 mm. Ovary with a stipe ca. 1.5 mm, densely covered with \pm spreading white hairs. Legumes unknown.

• Xinjiang.

400. *Astragalus wenquanensis* S. B. Ho, Bull. Bot. Res., Harbin 3(4): 58. 1983.

温泉黄耆 wen quan huang qi

Plants small, 2–5 cm tall, acaulescent or nearly so. Leaves 1–2 cm; stipules adnate to petiole, white ciliate; petiole longer than rachis, like rachis appressed white hairy; leaflets in 1 or 2 pairs, elliptic or obovate, 4–8 \times 2–4 mm, both surfaces covered with \pm medifixed, appressed hairs. Racemes capitate, densely 5–7-flowered; peduncle 1–2.5 cm, with appressed white hairs, toward racemes also sometimes with black hairs; bracts white villous at margins, longer than pedicels. Calyx from beginning inflated ovoid, 7–13 mm, red suffused, with white and black hairs; teeth 1–2 mm. Petals whitish; standard obovate, 16–18 \times 7–8 mm, in middle slightly constricted, apex emarginate; wings 15–17 mm; keel 14–15 mm. Ovary nearly glabrous. Legumes unknown.

• Xinjiang.

401. *Astragalus zaissanensis* Sumnevicz, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1934(2–3): 4. 1934.

斋桑黄耆 zhai sang huang qi

Plants 6–15 cm tall, nearly acaulescent; hairs appressed, \pm medifixed, in vegetative parts mostly white, 0.5–0.8 mm. Stems, if present, 0.5–2 cm, densely hairy. Leaves 5–11 cm; stipules 3–4 mm, shortly adnate to petiole, densely hairy; petiole 2–5 cm, like rachis densely hairy; leaflets in 3–7 pairs, 4–12 \times 1.5–4 mm, both surfaces very densely hairy. Racemes rather densely 5–11-flowered; peduncle 3–8 cm, densely white hairy; bracts 3–4 mm, sparsely hairy or only ciliate with mostly basifixed white hairs. Calyx at anthesis ca. 7 mm, tubular, loosely to rather densely white hairy; teeth narrowly triangular, ca. 1 mm; fruiting calyx inflated ovoid, 14–15 mm, 6–7 mm in diam., loosely covered with white and some black hairs. Petals sulfur-

yellow; standard elliptic, 20–22 × 5–9 mm, constricted in lower part, apex emarginate; wings 18–20 mm, limbs narrowly oblong, bilobed; keel 15–16 mm. Ovary with a stipe up to 3.5 mm. Legume enclosed in calyx, 8–10 mm, 3–4 mm high, in-

completely 2-locular; valves densely covered with appressed white hairs.

Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

140. OXYTROPIS Candolle, *Astragalogia*, ed. 4^o, 66; ed. f^o, 53. 1802, nom. cons.

棘豆属 *ji dou shu*

Zhu Xiangyun (朱相云); Stanley L. Welsh, Hiroyoshi Ohashi

Spiesia Necker ex Kuntze.

Perennial herbs or cushionlike shrublets, caulescent or acaulescent, with glandular trichomes, glands, or scalelike or slender basifixed trichomes. Stipules conspicuous, membranous, papery, leathery, scarious, herbaceous, or leaflike, usually persistent, free or adnate to petiole, distinct or connate. Leaves usually imparipinnate, rarely appearing paripinnate by apical leaflet reduced to a spine (*Oxytropis aciphylla*, *O. hystrix*, and *O. tragacanthoides*), rarely 1-foliolate (*O. monophylla* and *O. neimongolica*); leaflets alternate, opposite, subopposite, verticillate, or subverticillate; leaflet blades various in shape, base ± oblique. Inflorescences racemes, spicate or capitate, dense or lax, with 1 to many flowers; bracts usually triangular or lanceolate-triangular. Bracteoles absent or sometimes narrowly triangular. Calyx campanulate, tubular-campanulate, or tubular, with 5 subequal lobes. Corolla various in color, petals clawed; standard various in shape, apex rounded, emarginate, or 2-lobed; wings variously shaped, apex rounded or emarginate; keel variously shaped, apex beaked with vascular bundles reaching beak apex. Stamens diadelphous with 9 connate filaments and 1 ± distinct filament. Ovary sessile or stipitate, glabrous or pubescent. Legume sessile or stipitate, membranous or leathery, enveloped by calyx or exerted from calyx, usually 1-locular or ± 2-locular, septum absent, narrow, or wide.

About 310 species: Africa, Asia, Europe, North America; 133 species (74 endemic) in three subgenera and 20 sections (five endemic) in China.

The genus *Oxytropis* resembles *Astragalus* but is distinguished from the latter in having several species with glandular trichomes, several species with verticillate leaflets (although these are present in *A. alatavicus* and *A. pamirensis*; see pp. 402–403), leaflets basally oblique, and vascular bundles reaching the apex of the corolla keel beak.

The following taxa were reported in FRPS (42(2): 1–145. 1998) but are not treated here. The authors have not seen any Chinese material of these taxa, and in most cases their reported occurrence in China is based on misidentifications in literature covering plants occurring outside of China (except for *Oxytropis falcata* var. *maquensis* which is based on a type from S Gansu): *O. altaica* (Pallas) Persoon, *O. ambigua* (Pallas) Candolle, *O. ampullata* (Pallas) Persoon, *O. biloba* Saposhnikow, *O. bogdoshanica* Jurtzev, *O. caespitosula* Gontscharow, *O. cana* Bunge, *O. chantengriensis* Vassilczenko, *O. chionophylla* Schrenk, *O. chorgossica* Vassilczenko, *O. confusa* Bunge, *O. cuspidata* Bunge, *O. falcata* Bunge var. *maquensis* C. W. Chang, *O. fetisowii* Bunge, *O. floribunda* (Pallas) Candolle, *O. gorbunovii* Borissova, *O. ketmenica* Saposhnikow, *O. kyzitalensis* Vassilczenko, *O. lamuginosa* Komarov, *O. longibracteata* Karelin & Kirilov, *O. macrobotrys* Bunge, *O. martjanovii* Krylov, *O. microsphaera* Bunge, *O. pellita* Bunge, *O. platonychchia* Bunge, *O. rhynchophysa* Schrenk, *O. sarkandensis* Vassilczenko, *O. saurica* Saposhnikow, *O. schrenkii* Trautvetter, *O. semenowii* Bunge, *O. sulphurea* (Fischer) Ledebour, *O. thomsonii* Benthham ex Bunge.

The following taxa are based on Chinese types but are not treated here because additional study is needed to determine if any of these should be recognized or whether they belong to existing taxa: *Oxytropis barkultagi* Grubov & Vassilczenko, *O. burchan-buddae* Grubov & Vassilczenko, *O. candolleorum* Vassilczenko, *O. dehra-duni* Vassilczenko, *O. dschagastaica* Grubov & Vassilczenko, *O. dumbedanica* Grubov & Vassilczenko, *O. kumbelica* Grubov & Vassilczenko, *O. larionovii* Grubov & Vassilczenko, *O. lutchensis* Franchet.

There are additional taxa reported as occurring in China in various publications, but most if not all of these reports are based on misidentifications of Chinese plants in treatments that cover areas outside of China.

Artificial keys

- 1a. Shrubs; leaf rachises persistent or modified as a thorn Key 1 (p. 454)
- 1b. Herbs; leaf rachises sometimes persistent but never modified as a thorn.
 - 2a. Corolla standard and keel pubescent on outer surface Key 2 (p. 454)
 - 2b. Corolla standard and keel glabrous on outer surface.
 - 3a. Plants caulescent, with 1–4 apparent internodes.
 - 4a. Corolla yellow, yellowish, or white Key 3 (p. 454)
 - 4b. Corolla some shade of purple, blue, pink, or less commonly white Key 4 (p. 454)
 - 3b. Plants acaulescent, with no apparent internodes.
 - 5a. Plants glandular, especially on inflorescence and floral parts; leaflets (at least some) verticillate or not verticillate Key 5 (p. 455)
 - 5b. Plants non-glandular or with appressed or yellowish glandular trichomes.
 - 6a. Leaves with leaflets scattered or opposite, none verticillate.
 - 7a. Corolla yellow or white Key 9 (p. 457)
 - 7b. Corolla some shade of purple, blue, or pink Key 10 (p. 457)

- 6b. Leaves with at least some leaflets verticillate.
 8a. Corolla yellow, yellowish white, or white Key 6 (p. 456)
 8b. Corolla purple, violet, bluish purple, or rarely white.
 9a. Plants with appressed glandular trichomes Key 7 (p. 456)
 9b. Plants non-glandular or glandular but in some part glands not appressed Key 8 (p. 456)

Key 1

- 1a. Leaves lacking terminal leaflet, rachis apex spinescent; legume nut-form in shape, thickly leathery 131. *O. aciphylla*
 1b. Leaves with a terminal leaflet, rachis ultimately persistent as a thorn; legume vesicular, membranous.
 2a. Leaves 7–11(–13)-foliolate; racemes 2–5-flowered; calyx 1–1.4 cm, lobes 2–4 mm 132. *O. tragacanthoides*
 2b. Leaves 19–31-foliolate; racemes 1- or 2-flowered; calyx 0.9–1.1 cm, lobes 1.2–2 mm 133. *O. hystrix*

Key 2

- 1a. Corolla white; leaflet blades narrowly elliptic; calyx lobes 3–4 mm 119. *O. lhasaensis*
 1b. Corolla purple, bluish purple, violet, blue, or rarely white; leaflet blades oblong, elliptic, or ovate-lanceolate;
 calyx lobes 4.5–9 mm.
 2a. Plants 10–35 cm tall; calyx lobes 4.5–5 × ca. 1.2 mm 120. *O. sericopetala*
 2b. Plants 7–9 cm tall; calyx lobes 7–9 × ca. 3 mm 121. *O. parasericopetala*

Key 3

- 1a. Corolla white, keel beak (0.5–)2.5–3 mm; bracts 5–10 mm 28. *O. nutans*
 1b. Corolla yellow, pale yellowish, or rarely red, keel beak 0.2–1 mm; bracts 1.5–7(–8) mm.
 2a. Corolla standard 6–7 mm; calyx ca. 4 mm; bracts ca. 1.5 mm 40. *O. sinkiangensis*
 2b. Corolla standard 8–17 mm; calyx 5.8–11.4 mm; bracts 2–8 mm.
 3a. Bracts ca. 2 mm; corolla standard 0.8–0.9 cm, keel ca. 6.7 mm; legume stipe ca. 7 mm 44. *O. gueldenstaedtioides*
 3b. Bracts 4–8 mm; corolla standard 0.9–1.7 cm, keel 7–14 mm; legume stipe 0–2 mm.
 4a. Calyx 7–10 mm, lobes 3.5–4.5 mm.
 5a. Leaves 11–15-foliolate; peduncle 10–35 cm; legume body 2–3 × 0.5–0.6 cm 42. *O. meinshausenii*
 5b. Leaves 15–29-foliolate; peduncle 3–12 cm; legume body 1.5–2 × 1–1.5 cm 43. *O. pilosa*
 4b. Calyx 5.8–11.5 mm, lobes 2–8 mm.
 6a. Leaflet blades 2.5–3 cm; calyx 5.8–7.2(–8.5) mm 41. *O. ochrocephala*
 6b. Leaflet blades 0.5–2(–3) cm; calyx 6.5–11.5 mm.
 7a. Legume body (1–)1.5–2.5 cm; bracts ca. 4 mm 45. *O. ochroleuca*
 7b. Legume body 0.8–1.2 cm; bracts 6–7 mm 46. *O. kansuensis*

Key 4

- 1a. Plants with impressed yellow glands; leaflets at least moderately spaced; racemes 2–6-flowered; beak of
 corolla keel 0.4–0.7 mm 26. *O. tudanensis*
 1b. Plants non-glandular; leaflets variously arranged; racemes variously flowered; beak of corolla keel various.
 2a. Plants (3–)4–10(–12) cm tall.
 3a. Leaves (0.5–)1–3 cm, 9–15-foliolate; leaflet blades (1–)2–5 mm 30. *O. tianschanica*
 3b. Leaves 2–8 cm, 15–25(–29)-foliolate; leaflet blades 3–10(–12) mm.
 4a. Racemes many flowered; corolla standard 5–9(–14) mm.
 5a. Leaves 5–20 cm; leaflet blades 5–25 × 2–9 mm; peduncle 7–25 cm or more 32. *O. deflexa*
 5b. Leaves 2–5(–8) cm; leaflet blades 3–10(–12) × 1.5–5 mm; peduncle 1.4–6(–8) cm.
 6a. Calyx 4–5 mm; corolla standard 5–9 mm, keel beak ca. 0.3 mm 34. *O. hirsutiuscula*
 6b. Calyx 5–7 mm; corolla standard 9–14 mm, keel beak 1.5–2 mm 49. *O. dichroantha*
 4b. Racemes (4–)6–8(or 9)-flowered; corolla standard (9–)11–13(–15) mm.
 7a. Plants 8–12 cm tall; leaves (17 or)19- or 21-foliolate; peduncle 7–11 cm; calyx ca. 4 mm 38. *O. chinglingensis*
 7b. Plants 3–7 cm tall; leaves 9–19-foliolate; peduncle 2–9 cm; calyx 5–9 mm.
 8a. Leaves 11–19-foliolate; leaflet blades 7–15 mm; racemes 7–9-flowered; corolla standard
 1.2–1.3(–1.5) cm 48. *O. hirsuta*
 8b. Leaves 9- or 11-foliolate; leaflet blades 2.5–6 mm; racemes 2–5-flowered; corolla standard
 0.9–1.1 cm 56. *O. latialata*
 2b. Plants (3–)10–80(–100) cm tall.
 9a. Leaves 21-foliolate or more on at least some leaves (only to 23-foliolate in *O. maqinensis* and *O.*
xinglongshanica).
 10a. Corolla standard 1–1.2 cm; corolla keel beak 0.2–0.5 mm; legume stipe 1.5–2 mm, body
 1.2–1.6 cm 47. *O. qinghaiensis*

- 10b. Corolla standard (0.5–)0.7–1.5 cm; corolla keel beak, legume stipe, and legume body not simultaneously within same range as above.
- 11a. Calyx 7.5–11(–11.2) mm; corolla standard 1.5–1.6 cm 52. *O. maqinensis*
- 11b. Calyx (2.2–)4–8(–10) mm; corolla standard (0.5–)0.7–1.5 cm.
- 12a. Racemes 3–10(–15)-flowered.
- 13a. Calyx lobes 1.5–2 mm; corolla standard (5–)7–8(–10) mm 50. *O. glabra*
- 13b. Calyx lobes 2.5–4.7 mm; corolla standard (10–)11–14 mm 58. *O. melanocalyx*
- 12b. Racemes many flowered.
- 14a. Corolla wings (5–)6–7 mm, keel beak 0.2–0.5 mm 50. *O. glabra*
- 14b. Corolla wings 8–14 mm, keel beak 0.5–2.5 mm.
- 15a. Leaves 5–6 cm; peduncle ca. 6 cm 55. *O. densiflora*
- 15b. Leaves (3–)5–20 cm; peduncle mainly over 6 cm.
- 16a. Corolla standard 0.8–1.2 cm, keel 0.7–0.9 cm; calyx (3–)5–7(–8) mm.
- 17a. Corolla standard 8–9 mm, keel 8–9 mm 32. *O. deflexa*
- 17b. Corolla standard 8–12 mm, keel 7–8 mm 57. *O. lapponica*
- 16b. Corolla standard 1–1.5 cm, keel (0.9–)1–1.3 cm; calyx (7–)8(–10) mm.
- 18a. Leaflet blades 14–20 mm; beak of corolla keel 1.5–1.7 mm 54. *O. xinglongshanica*
- 18b. Leaflet blades 3–14 mm; beak of corolla keel 1–1.5 mm.
- 19a. Stipules 10–12 mm 29. *O. penduliflora*
- 19b. Stipules 6–8 mm 53. *O. giraldii*
- 9b. Leaves 9–21-foliolate (rarely 25-foliolate in *O. podoloba* and *O. zekogensis*).
- 20a. Plants 3–4 cm tall; leaves 9- or 11-foliolate 56. *O. latialata*
- 20b. Plants (3–)5–80(–100) cm tall; leaves (7–)11–21(–29)-foliolate.
- 21a. Plants 3–13 cm tall; racemes 6–9-flowered.
- 22a. Leaves 1.5–4 cm; leaflet blades 4–7 mm; corolla standard 0.9–1 cm, keel beak short; legume body 1–1.2 cm 31. *O. gerzeensis*
- 22b. Leaves 5–9 cm; leaflet blades 7–15 mm; corolla standard 1.2–1.3 cm, keel beak 2.5–3 mm; legume body 1.5–2 cm 48. *O. hirsuta*
- 21b. Plants (5–)10–80(–100) cm tall; racemes 3–9-flowered or more.
- 23a. Racemes 3–12-flowered.
- 24a. Racemes 3–5-flowered, dense or compact 39. *O. sitaipaiensis*
- 24b. Racemes 3–12-flowered, rather lax.
- 25a. Corolla keel 1–1.4 cm; stipules ca. 3 mm; bracts ca. 1.5 mm 36. *O. taochensis*
- 25b. Corolla keel ca. 0.8 cm; stipules 5–7 mm; bracts 3–6 mm 37. *O. zekogensis*
- 23b. Racemes 8- to many flowered.
- 26a. Leaflet blades 1.4–2 cm; corolla standard 1.1–1.5 cm, wings 1.1–1.4 cm 54. *O. xinglongshanica*
- 26b. Leaflet blades (0.4–)0.5–1.4 cm (but to 2.5 cm in *O. glabra*); corolla standard (0.5–)0.6–1 cm, wings 0.5–1 cm.
- 27a. Calyx 6–8 mm, lobes 3–4 mm 59. *O. subpodoloba*
- 27b. Calyx (2.2–)4–5 mm, lobes 1.2–2.5 mm.
- 28a. Leaves 2–4 cm; peduncle 1.5–3 cm; corolla wings ca. 5.5 mm 35. *O. ganningensis*
- 28b. Leaves (3–)5–15 cm; peduncle (2–)4.5–20 cm; corolla wings (5–)6–10 mm.
- 29a. Calyx lobes 2.4–2.5 mm; corolla wings ca. 10 mm; leaflet blades oblong 51. *O. podoloba*
- 29b. Calyx lobes 1.2–2 mm; corolla wings (5–)6–8 mm; leaflet blades linear, lanceolate, ovate-lanceolate, narrowly ovate, or elliptic.
- 30a. Leaflet blades ca. 1 mm wide; racemes (1–)4–7 cm; beak of corolla keel ca. 1.5 mm 33. *O. yekenensis*
- 30b. Leaflet blades (1–)3–7 mm wide; racemes 4–7 cm; beak of corolla keel 0.2–0.5 mm 50. *O. glabra*

Key 5

- 1a. Leaflets not verticillate.
- 2a. Stipules ca. 4 mm; racemes 1–3-flowered; calyx with scalelike glands; legume body 1–1.7 cm 25. *O. squammulosa*
- 2b. Stipules ca. 10 mm; racemes 5–10-flowered; calyx and/or other herbage usually with dense but not scalelike glands; legume body 2.2–5 cm 27. *O. falcata*
- 1b. Leaflets, at least some, verticillate (except in some *O. pseudomyriophylla*).
- 3a. Corolla pale or dirty yellow, standard apex shortly acuminate; stipules hard 5. *O. muricata*
- 3b. Corolla various purplish, bluish, or violet colors (rarely yellow or white in *O. microphylla*), standard apex rounded; stipules herbaceous or membranous.
- 4a. Racemes (6–)8–20-flowered; legume without glands.
- 5a. Stipules (10–)12–15 mm; calyx 10–13 mm, lobes 2–4 mm; corolla standard 1.9–2.5 cm; legume subglobose, bladderlike inflated, membranous 6. *O. trichophylla*

- 5b. Stipules 3.2–4.3 mm; calyx ca. 7.5 mm, lobes ca. 1 mm; corolla standard ca. 1.7 cm; legume lanceolate-ovoid, not bladderlike inflated, leathery 7. *O. pseudomyriophylla*
- 4b. Racemes 3–6-flowered; legume glandular.
- 6a. Plants (4–)5–15 cm tall; stipules conspicuously white pilose and long persistent; leaflets in (10–)13–27 whorls; leaflet blades 2–3 mm; corolla standard 1.9–2 cm; legume falcately cylindrical 8. *O. microphylla*
- 6b. Plants 22–35 cm tall; stipules not markedly white pilose or long persistent; leaflets in 3–5 whorls; leaflet blades 5–15 mm; corolla standard ca. 2.2 cm; legume cylindrical 9. *O. pseudoglandulosa*

Key 6

- 1a. Plants to 25 cm tall; leaflets 4–24 mm; beak of corolla keel 1.2–1.8 mm; legume sessile 15. *O. ochrantha*
- 1b. Plants to 40 cm tall; beak of corolla keel 1–1.5 mm; legume substipitate or shortly stipitate.
- 2a. Leaves 10–19 cm; leaflets 1–3 cm, mostly opposite but some verticillate; bracts longer than calyx; corolla yellow, keel beak ca. 1 mm 16. *O. ochrolongibracteata*
- 2b. Leaves 5–8 cm; leaflets 0.4–0.7 cm, mostly verticillate; bracts shorter than calyx; corolla white, keel beak 1–1.5 mm 17. *O. gamdoensis*

Key 7

- 1a. Beak of corolla keel (1.5–)1.8–3.8 mm; leaflets in 12–16(–50) whorls; bracts 8–15 mm 12. *O. myriophylla*
- 1b. Beak of corolla keel 1.5–2.5 mm; leaflets in (2 or)3–12 whorls and some or most leaflets merely opposite; bracts 3–10 mm.
- 2a. Calyx 0.9–1 cm; herbage non-glandular; legume stipitate 13. *O. trichophora*
- 2b. Calyx (1–)1.2–1.7 cm; herbage with appressed yellowish or glandular trichomes; legume sessile 14. *O. bicolor*

Key 8

- 1a. Plants with appressed or yellowish glandular trichomes.
- 2a. Beak of corolla keel (1.5–)1.8–3.8 mm; leaflets in 12–16(–50) whorls; bracts 8–15 mm 12. *O. myriophylla*
- 2b. Beak of corolla keel 1.5–2.5 mm; leaflets in (2 or)3–12 whorls and some or most leaflets merely opposite; bracts 3–10 mm.
- 3a. Calyx 0.9–1 cm; herbage non-glandular; legume stipitate 13. *O. trichophora*
- 3b. Calyx (1–)1.2–1.7 cm; herbage with appressed yellowish or glandular trichomes; legume sessile 14. *O. bicolor*
- 1b. Plants non-glandular.
- 4a. Plants caulescent or shortly caulescent (acaulescent in some *O. racemosa*).
- 5a. Plants shortly caulescent, stems neither diffuse nor many branched; racemes 7–10-flowered; leaves 5–14 cm, with 6–13 whorls of 4–6 leaflets 21. *O. racemosa*
- 5b. Plants definitely caulescent, stems diffuse and often many branched; racemes 1–3-flowered; leaves 3–5 cm, with 2–5 whorls of 3 or 4 leaflets 23. *O. ramosissima*
- 4b. Plants strictly acaulescent.
- 6a. Plants (1.5–)2–6 cm tall; leaves (0.5–)1–5 cm; racemes 1–3-flowered.
- 7a. Leaves (0.5–)1–3 cm, with 6–12 whorls of 4–6 leaflets; corolla standard 1.4–2.2 cm, keel beak 0.5–1.1 mm; plants turf- or cushion-forming 22. *O. chionobia*
- 7b. Leaves 3–5 cm, with 2–4 whorls of 3 or 4 leaflets; corolla standard 2.1–3.2 cm, keel beak ca. 2 mm; plants caespitose 24. *O. langshanica*
- 6b. Plants (3–)5–20(–40) cm tall; leaves (2.5–)3–20(–30) cm; racemes 5–15-flowered or more (few flowered in *O. shanxiensis*).
- 8a. Leaves of 3 kinds, i.e., with a solitary leaflet, with 7–15 opposite leaflets, and with 3 or 4 whorls of 3 or 4 leaflets each; corolla standard 1.5–1.6 cm 10. *O. shanxiensis*
- 8b. Leaves with leaflets in (1–)3–18 whorls or some leaves with leaflets in whorls and others opposite or alternate (if with 3 kinds as above, then plants not from Shandong or Shanxi); corolla standard 1.4–2.5(–3) cm.
- 9a. Leaflets in (7–)12–18 whorls; corolla standard (1.4–)1.5–2.5(–3) cm.
- 10a. Corolla standard 2.5–3 cm; legume body 2–2.5 cm 18. *O. przewalskii*
- 10b. Corolla standard 2–2.5 cm; legume body 1–1.6 cm.
- 11a. Plants 5–8 cm tall; leaves 5–7 cm; calyx lobes ca. 2 mm 11. *O. lanata*
- 11b. Plants 11–40 cm tall; leaves (5–)10–30 cm; calyx lobes 3.5–4.5 mm 12. *O. myriophylla*
- 9b. Leaflets in (1–)3–10 whorls (or not verticillate for some leaves); corolla standard 1.4–1.8(–2.3) cm.
- 12a. Calyx (1–)1.2–1.7 cm, lobes (2–)3.5–7 mm; corolla standard 1.4–2.3 cm 14. *O. bicolor*
- 12b. Calyx 0.6–1 cm, lobes 1–3.5 mm; corolla standard 1.4–1.8 mm.
- 13a. Leaves 3–6 cm; leaflets in 4 or 5 whorls; peduncle 3–5 cm; calyx 8–10 mm 19. *O. pumila*
- 13b. Leaves 7–20(–25) cm; leaflets in (1–)3–9 whorls; peduncle 6–11(–19) cm; calyx 6–8.3(–10) mm 20. *O. oxyphylla*

Key 9

- 1a. Leaves 1-foliolate.
- 2a. Petiole 2–5 cm; corolla light yellow, yellow, yellowish green, red, whitish green, or white; ovary pubescent 129. *O. neimonggolica*
- 2b. Petiole 0.5–1 cm; corolla purple; ovary glabrous 130. *O. monophylla*
- 1b. Leaves 3-foliolate or more.
- 3a. Leaves 3-foliolate 64. *O. diversifolia*
- 3b. Leaves 5-foliolate or more.
- 4a. Racemes 2- or 3-flowered; corolla white; leaflet blades not more than 4 mm 82. *O. biflora*
- 4b. Racemes (2 or)3- to many flowered; corolla variously colored (sometimes white in *O. argentata* but not a Xizang species); leaflet blades at least some greater than 4 mm (only 2–3 mm in *O. holanshanensis* but not a Xizang species).
- 5a. Corolla standard ca. 0.7 cm; calyx 2.5–3 mm 95. *O. holanshanensis*
- 5b. Corolla standard 1.2–2.6 cm; calyx 6–14 mm.
- 6a. Racemes much longer than leaves; calyx 6–7 mm 93. *O. ladyginii*
- 6b. Racemes shorter to slightly longer than leaves; calyx 8–14 mm.
- 7a. Racemes dense and many flowered; corolla standard ca. 1.3 cm, keel beak 0.5–1 mm 65. *O. maduoensis*
- 7b. Racemes dense and 2–8-flowered, or if many flowered then lax; corolla standard 1.7–2.6 cm, keel beak 1–2.5 mm.
- 8a. Plants 2–3 cm tall; leaves 1.5–4 cm, 13–19-foliolate; legume ca. 1.2 cm 104. *O. stracheyana*
- 8b. Plants 5–20 cm tall; leaves 3–15 cm, 7–25(–31)-foliolate; legume 1.7–2.5 cm.
- 9a. Calyx 1.2–1.3 cm; corolla standard 1.7–2 cm, apex emarginate 68. *O. ciliata*
- 9b. Calyx 0.8–1(–1.2) cm; corolla standard 2–2.6 cm, apex rounded.
- 10a. Leaves (9–)19–25(–31)-foliolate; racemes subcompact, 3–5-flowered; beak of corolla keel 2–2.5 mm 77. *O. pseudohirsuta*
- 10b. Leaves 7–11-foliolate; racemes lax, many flowered; beak of corolla keel 1–1.5 mm 122. *O. argentata*

Key 10

- 1a. Petals pubescent on outer surfaces.
- 2a. Plants 10–35 cm tall; leaves 7–20 cm; leaflet blades 0.6–2.5 cm; calyx lobes 4.5–5 mm; corolla standard 0.9–1.2 cm 120. *O. sericopetala*
- 2b. Plants 7–9 cm tall; leaves 3–5 cm; leaflet blades 0.8–1.2 cm; calyx lobes 7–9 mm; corolla standard 1.8–2 cm 121. *O. parasericeopetala*
- 1b. Petals glabrous on outer surfaces.
- 3a. Corolla standard auriculate above claw, standard tapering into 2 auricles at base 62. *O. auriculata*
- 3b. Corolla standard tapering (sometimes abruptly) to claw or widened in basal half, not auriculate.
- 4a. Corolla standard oblong, widened in basal half 61. *O. sichuanica*
- 4b. Corolla standard variously shaped, not widened in basal half.
- 5a. Corolla standard contracted at middle, tapering at base, lamina obovate 60. *O. guinanensis*
- 5b. Corolla standard not contracted at middle, base various, lamina various.
- 6a. Plants with rigid spreading trichomes 63. *O. hirta*
- 6b. Plants variously glabrous, subglabrous, or otherwise pubescent, but not with rigid spreading trichomes (though sometimes with spreading trichomes).
- 7a. Plants (including leaves and racemes) at tallest point mostly exceeding 10 cm in height Key 10a
- 7b. Plants (including leaves and racemes) not or seldom exceeding 10 cm in height Key 10b (p. 458)

Key 10a

- 1a. Corolla standard 0.5–1(–1.1) cm.
- 2a. Beak of corolla keel 0.5 mm or shorter; calyx 4–7 mm.
- 3a. Stipules triangular; leaves 19–29-foliolate; inflorescences 5–14-flowered; peduncle (2.5–)11–19(–30) cm; calyx 5–6 113. *O. qilianshanica*
- 3b. Stipules linear-lanceolate or ovate; leaves 9–19(or 21)-foliolate; inflorescences 6–10-flowered; peduncle 2–3 cm or 4–15 cm; calyx 5–9 mm.
- 4a. Stipules linear-lanceolate; racemes lax; peduncle 2–3 cm; calyx lobes as long as tube 92. *O. avisoides*
- 4b. Stipules ovate; racemes compact; peduncle 4–15 cm; calyx lobes shorter than tube 126. *O. proboscidea*
- 2b. Beak of corolla keel 1–2.5 mm; calyx 2.5–6(–8) mm.
- 5a. Racemes compactly globose; beak of corolla keel ca. 2.5 mm 89. *O. globiflora*
- 5b. Racemes not compactly globose; beak of corolla keel 1–2 mm.
- 6a. Legume body 5–6 mm 100. *O. imbricata*

- 6b. Legume body (5–)8–15 mm.
- 7a. Peduncle 2–4 × as long as subtending leaves; leaflets more than 29 at least for some leaves.
- 8a. Peduncle ca. 2 × as long as subtending leaves; corolla standard 5.5–7 mm, apex emarginate; legume body 5–10 mm 94. *O. filiformis*
- 8b. Peduncle 3–4 × as long as subtending leaves; corolla standard 6–11 mm, apex rounded; legume body 10–15 mm 124. *O. lehmannii*
- 7b. Peduncle shorter than to somewhat surpassing subtending leaves; leaflets 25 or fewer for all leaves.
- 9a. Calyx 3–3.5 mm, lobes ca. 1 mm 97. *O. tashkurensis*
- 9b. Calyx (3.5–)4–6 mm, lobes (1–)1.2–3 mm.
- 10a. Racemes 7–13-flowered; calyx lobes ca. 1.2 mm; beak of corolla keel ca. 1.5 mm; legume stipe 2–2.5 mm 102. *O. fragiliphylla*
- 10b. Racemes 15–20-flowered or many flowered; calyx lobes 2.5–3 mm; beak of corolla keel ca. 2 mm; legume stipe (0.7–)1–2 mm.
- 11a. Stipules 4–5 mm; calyx 5–6 mm, lobes 2.5–3 mm; legume 11–13 × 4.5–5.5 mm 67. *O. lanceatifoliola*
- 11b. Stipules 5–10 mm; calyx (3.5–)4–5 mm, lobes 1–2 mm; legume 8–9 × ca. 3 mm 90. *O. pagobia*
- 1b. Corolla standard (0.7–)1–2.2(–3) cm.
- 12a. Calyx (9–)10–15 mm; corolla standard (1.5–)1.7–3 cm.
- 13a. Leaflets more than 31 on at least some leaves; beak of corolla keel ca. 1 mm.
- 14a. Plants 20–40 cm tall; bracts 7–9 mm; calyx lobes 1–2.2 mm; corolla standard apex slightly emarginate, keel 1.8–2 cm 115. *O. songarica*
- 14b. Plants (6–)10–21 cm tall; bracts 12–15 mm; calyx lobes 3–5 mm; corolla standard apex 2-lobed, keel 1.5–1.7 cm 87. *O. alpina*
- 13b. Leaflets never more than 29 per leaf; beak of corolla keel (1–)1.5–3 mm.
- 15a. Racemes 3–13-flowered; beak of corolla keel 1–1.5 mm.
- 16a. Bracts 4–5 mm; corolla standard 1.8–2 cm; legume 0.7–0.8 mm 1. *O. sacciformis*
- 16b. Bracts 8–18 mm; corolla standard 2.1–2.7 cm; legume ca. 1.5 cm 110. *O. latibracteata*
- 15b. Racemes many flowered; beak of corolla keel 2–3 mm.
- 17a. Plants 10–18 cm tall; leaves 13- or 15-foliolate; leaflet blades 0.8–1 cm; corolla standard ca. 1.5 cm, wings 1.2–1.3 cm 88. *O. pseudofrigida*
- 17b. Plants 20–40 cm tall; leaves 15–29-foliolate; leaflet blades 1–2.5 cm; corolla standard 2.3–3 cm, wings ca. 2 cm 112. *O. grandiflora*
- 12b. Calyx 3–10(–10.5) mm; corolla standard 0.7–1.7(–2) cm.
- 18a. Racemes 2–8(–10)-flowered.
- 19a. Corolla standard 1.5–2 cm with an emarginate apex, wings 1.6–1.8 cm, keel ca. 1.3 cm; legume sessile 74. *O. anertii*
- 19b. Corolla standard 1.2–1.3 cm with a 2-lobed apex, wings 1–1.2 cm, keel 1–1.1 cm; legume with a 2–4 mm stipe 81. *O. yunnanensis*
- 18b. Racemes many flowered (5–12-flowered in *O. barkolensis*).
- 20a. Leaves 1.5–5 cm, 11–15-foliolate 4. *O. trichocalycina*
- 20b. Leaves (3–)5–30 cm, 13–35(–41)-foliolate.
- 21a. Calyx 6.3–10 mm.
- 22a. Stipules 1.8–2.5 cm; corolla standard 1.4–2 cm, apex emarginate 111. *O. barkolensis*
- 22b. Stipules 1–1.7 cm; corolla standard 0.9–1.7 cm, apex rounded.
- 23a. Stipules ca. 1 cm; leaflet apices acuminate; corolla standard with a broadly oblong lamina, wings apically emarginate, keel beak 3–4 mm 114. *O. pseudocoerulea*
- 23b. Stipules 1.4–1.7 cm; leaflet apices acute to subtruncate; corolla standard with a suborbicular to broadly ovate lamina, wings apically rounded, keel beak 0.8–1.5 mm 116. *O. mollis*
- 21b. Calyx 3–7 mm.
- 24a. Beak of corolla keel 2.2–3 mm 101. *O. caerulea*
- 24b. Beak of corolla keel 0.5–2 mm.
- 25a. Leaflet blades 1.9–2.8 cm; peduncle 17–40 cm; corolla standard ca. 1.6 cm, keel 1.5–1.6 cm 86. *O. qitaiensis*
- 25b. Leaflet blades 0.3–2 cm; peduncle 10–25 cm; corolla standard 0.7–1 cm, keel 0.8–0.9 cm.
- 26a. Plants to 30 cm tall; racemes lax; peduncle with sparse appressed white trichomes; calyx 3.6–5 mm; corolla standard 7–10 mm; legume stipitate 96. *O. merkensis*
- 26b. Plants only to 12 cm tall; racemes dense; peduncle with spreading white long trichomes; calyx 6–7 mm; corolla standard ca. 10 mm; legume sessile 118. *O. qingnanensis*

Key 10b

- 1a. Corolla standard (1.3–)1.7–2.6 cm; calyx 8–16 mm.
- 2a. Plants 10–15 cm tall; legume body 0.6–0.8 cm.
- 3a. Racemes dense; bracts triangular, 4–5 mm; calyx ca. 1 cm 1. *O. sacciformis*

- 3b. Racemes lax; bracts linear, ca. 6 mm; calyx 1.1–1.3 cm 2. *O. sziwangensis*
- 2b. Plants 1–10 cm tall; legume body 1–3 cm.
- 4a. Leaves (2–)5–10 cm (1–2 cm in *O. leptophylla* var. *turbinata*).
- 5a. Leaflets 13–21; corolla wings ca. 1.5 cm; legume body oblong 76. *O. moellendorffii*
- 5b. Leaflets 5–13; corolla wings 1.8–2 cm; legume body ovoid.
- 6a. Leaves 5–9-foliolate; corolla standard 2–3 cm with a subelliptic lamina, keel ca. 1.8 cm; legume ca. 0.8 cm wide 71. *O. inschanica*
- 6b. Leaves 9–13-foliolate; corolla standard 1.8–2.3 cm with a suborbicular lamina, keel 1.5–1.7 cm; legume 1.2–1.5 cm wide 72. *O. leptophylla*
- 4b. Leaves 2–6 cm.
- 7a. Leaves 21–27-foliolate; corolla standard apically 2-lobed and reflexed 73. *O. wutaiensis*
- 7b. Leaves 5–21-foliolate; corolla standard apically emarginate (sometimes 2-lobed in *O. rupifraga*) and not reflexed.
- 8a. Leaves 15–21-foliolate; leaflet blades 1–2 mm wide; calyx 0.8–1.2 cm; corolla standard 1.5–2 cm, wings 1–1.6 cm, keel beak ca. 1 mm 127. *O. rupifraga*
- 8b. Leaves 5–15-foliolate; leaflet blades (1.5–)2–4 mm wide; calyx (1–)1.2–1.6 cm; corolla standard (1.8–)2–2.6 cm, wings 1.7–2.5 cm, keel beak 1.5–3 mm.
- 9a. Racemes only 2- or 3-flowered; bracts 3–6 mm; leaves 7–11-foliolate 69. *O. poncinsii*
- 9b. Racemes 1–7-flowered; bracts 6–14 mm; leaves 7–15-foliolate.
- 10a. Plants 1–3 cm tall; leaves 5–11-foliolate; bracts 0.6–1 cm; corolla keel 1.5–1.7 cm, beak 2–3 mm 70. *O. eriocarpa*
- 10b. Plants (1–)3–8 cm tall; leaves 9–15-foliolate; bracts 1–1.4 cm; corolla keel 1.7–1.8 cm, beak 1.5–2 mm 75. *O. assiensis*
- 1b. Corolla standard 0.5–1.3(–1.4) cm; calyx 3–9(–15) mm.
- 11a. Racemes many flowered (few to ca. 10 in *O. immersa*).
- 12a. Calyx 9–15 mm; corolla standard 1–1.4 cm, keel beak 2.5–3 mm 4. *O. trichocalycina*
- 12b. Calyx 3–8 mm; corolla standard 0.6–1.3 cm, keel beak (0.3–)1–2 mm.
- 13a. Leaves 5–9(–15)-foliolate 3. *O. bella*
- 13b. Leaves 13–21(–25)-foliolate.
- 14a. Beak of corolla keel 0.3–0.5 mm.
- 15a. Leaves 15–21-foliolate; corolla standard apically emarginate, keel beak ca. 0.3 mm 66. *O. linearibracteata*
- 15b. Leaves at least some 21–25-foliolate; corolla standard apically subrounded, keel beak ca. 0.5 mm 109. *O. valerii*
- 14b. Beak of corolla keel (0.7–)1–2 mm.
- 16a. Racemes rather globose; corolla standard 7–8.5 mm, wings 7–8 mm 90. *O. pagobia*
- 16b. Racemes ± elongate; corolla standard 9–11 mm, wings 9.5–12 mm.
- 17a. Stipules ca. 1 cm; corolla wings 10–12 mm, keel beak ca. 2 mm 105. *O. longialata*
- 17b. Stipules 5–6 mm; corolla wings ca. 9.5 mm, keel beak ca. 1 mm 128. *O. immersa*
- 11b. Racemes (1 or)2–10-flowered.
- 18a. Calyx 3–3.4 mm, lobes 1/2 or more as long as tube.
- 19a. Leaves ca. 5 cm; calyx lobes ca. 3 mm; corolla purple, standard 6.5–7.5 mm 84. *O. yanchiensis*
- 19b. Leaves 1–2 cm; calyx lobes ca. 1.6 mm; corolla red, standard 7–8 mm 103. *O. tukemansuensis*
- 18b. Calyx (3–)4–9 mm, lobes 1/4–1/2 as long as tube.
- 20a. Leaves 21–25-foliolate; legume linear in profile 123. *O. malloryana*
- 20b. Leaves variously 9–25(–29)-foliolate; legume various but seldom if ever linear in profile.
- 21a. Racemes (2–)5–10-flowered; beak of corolla keel ca. 0.5 mm (ca. 1.5 mm in *O. reniformis*).
- 22a. Leaves 9- or 11-foliolate.
- 23a. Peduncle ca. 2 × as long as leaves; calyx 0.8–1 cm; leaves 1.5–2.5 cm; leaflet blades 3–4 mm 91. *O. baxoiensis*
- 23b. Peduncle as long as leaves; calyx 1.1–1.3 cm; leaves 3–4 cm; leaflet blades 4–7 mm 117. *O. reniformis*
- 22b. Leaves (9 or)11–19(or 21)-foliolate.
- 24a. Corolla standard 5–8 mm; leaves 1–3 cm; legume body 0.9–1.2 cm 107. *O. densa*
- 24b. Corolla standard 8–13 mm; leaves 2–7 cm; legume body 1.3–2.5 cm 108. *O. humifusa*
- 21b. Racemes 2–5(–8)-flowered; beak of corolla keel 0.3–1(–1.5) mm.
- 25a. Corolla standard 0.9–1.5(–2.1) cm, keel beak 1–1.6 mm.
- 26a. Leaves 0.5–1.5 cm; peduncle ca. 2 × as long as leaves 106. *O. vermicularis*
- 26b. Leaves (0.8–)2–8 cm; peduncle subequal to leaves or only slightly surpassing them.
- 27a. Peduncle 4–10 cm; legume body 4–7 mm wide 128. *O. immersa*
- 27b. Peduncle 0.5–5(–6.5) cm; legume body 3–4 mm wide.
- 28a. Racemes lax; calyx 4–6 mm, lobes ca. 1.5 mm; legume with a 2–3 mm stipe, body ca. 1 cm 99. *O. krylovii*

- 28b. Racemes compact; calyx 6–9(–13) mm, lobes 1.5–4 mm; legume sessile or substipitate, body 1–2 cm.
 29a. Calyx lobes 1.5–1.7 mm; corolla standard 0.9–1.3 cm, apex emarginate 78. *O. platysema*
 29b. Calyx lobes (1.8–)3–4 mm; corolla standard 1–1.5(–2.1) cm, apex 2-lobed 83. *O. pauciflora*
- 25b. Corolla standard 0.5–1 cm, keel beak 0.3–1 mm.
 30a. Peduncle longer than leaves; calyx 4(–4.8) mm; legume body ca. 13 × 5 mm 98. *O. saposhnikovii*
 30b. Peduncle shorter than, subequal to, or only slightly surpassing leaves; calyx 3–6 mm; legume body 5–12 × 2–3 mm (unknown in *O. cinerascens*).
 31a. Corolla standard 5–7(–8) mm, keel beak 0.3–0.4 mm.
 32a. Leaves 2–7 cm; peduncle subequal to or slightly longer than leaves; legume 10–12 mm, shortly stipitate 79. *O. pusilla*
 32b. Leaves 1–2 cm; peduncle shorter than leaves, less than 1 cm; legume 5–6 mm, stipe as long as calyx tube 80. *O. brevipedunculata*
 31b. Corolla standard 6–10 mm, keel beak 0.5–1 mm.
 33a. Plants 7–10 cm tall; leaves 2.5–6 cm; peduncle ± equaling leaves; bracts ca. 3 mm 85. *O. cinerascens*
 33b. Plants 3–5 cm tall; leaves 0.5–3 cm; peduncle somewhat surpassing leaves; bracts 1–1.5 mm 125. *O. savellanica*

Key to subgenera

- 1a. Shrublets, usually pulvinate; leaf rachises and petioles persistent 3. *O.* subg. *Traganthoxytropis* (p. 499)
 1b. Herbs, perennial; leaf rachises not persistent but petioles sometimes persistent.
 2a. Legume enveloped by calyx, indehiscent 1. *O.* subg. *Ptiloxytropis*
 2b. Legume exerted from calyx, dehiscent when mature 2. *O.* subg. *Oxytropis* (p. 461)

1. *Oxytropis* subg. *Ptiloxytropis* Bunge in Boissier, Fl. Orient. 2: 502. 1872.

柔毛棘豆亚属 rou mao ji dou ya shu

Herbs, acaulescent, markedly pubescent. Leaves imparipinnate, 5–15-foliolate; rachis not persistent as a spine. Racemes dense or lax, 3- to many flowered. Flowers 0.7–2 cm. Calyx long lobed; lobes 0.5–2 × as long as tube. Corolla bluish violet, purple, rose, reddish purple, or white. Legume 6–9 mm, included within calyx tube but sometimes splitting tube, indehiscent.

Five species in two sections: China, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; four species (two endemic) in two sections (one endemic) in China.

- 1a. Calyx inflated at anthesis, lobes shorter than tube 1. *O.* sect. *Mongolia*
 1b. Calyx not inflated at anthesis, lobes as long as or longer than tube 2. *O.* sect. *Ptiloxytropis* (p. 461)

1. *Oxytropis* sect. *Mongolia* H. C. Fu, Acta Phytotax. Sin. 20: 311. 1982.

长梗组 chang geng zu

Herbs, 10–15 cm tall, acaulescent. Leaves imparipinnate; leaflets not verticillate. Racemes 3–10-flowered; peduncle typically longer than leaves. Calyx inflated at late anthesis; lobes shorter than tube. Corolla standard 1.8–2 cm.

- Two species: China.

- 1a. Racemes dense; bracts triangular, 4–5 mm; calyx ca. 1 cm 1. *O. sacciformis*
 1b. Racemes lax; bracts linear, ca. 6 mm; calyx 1.1–1.3 cm 2. *O. siziwangensis*

1. *Oxytropis sacciformis* H. C. Fu, Acta Phytotax. Sin. 20: 311. 1982.

囊萼棘豆 nang e ji dou

Herbs, 10–15 cm tall, acaulescent, from a multiheaded caudex. Stipules narrowly triangular, ca. 1.5 cm × 2 mm, scarious, with long stout trichomes, basally connate. Leaves 1.5–8 cm, 7–17-foliolate; leaflet blades lanceolate, lanceolate-ovate, ovate, or elliptic, 3–20 × 1–2 mm, with appressed dense stout trichomes. Racemes dense, 3–10-flowered; peduncle 6–12 cm; bracts triangular, 4–5 × ca. 2 mm, with long stout trichomes. Calyx cylindric, becoming somewhat inflated, ca. 10 × 3 mm, with dense long stout trichomes; lobes subulate, 3–5 × ca. 0.5

mm, to 1/2 as long as tube. Corolla bluish violet; standard 1.8–2 cm, lamina spatulate, apex rounded to slightly emarginate; wings 1.5–1.7 cm, lamina obovate; keel ca. 1.4 cm, beak ca. 1.5 mm. Legume sessile, ovoid, 7–8 × ca. 4 mm, enveloped by calyx after anthesis, with dense whitish stout trichomes. Fl. Sep, fr. Sep.

- Sand dunes on slopes. Nei Mongol (Ulanqab Meng).

2. *Oxytropis siziwangensis* Y. Z. Zhao & Zong Y. Zhu, Acta Sci. Nat. Univ. Neimenggu 26: 721. 1995.

四子王棘豆 si zi wang ji dou

Herbs, to ca. 10 cm tall, acaulescent, from a shortly

branched multiheaded caudex. Stipules membranous, white hirsute, basally adnate to petiole. Leaves 1.5–8 cm, 7–11-foliolate; leaflet blades linear-lanceolate, 8–15 × 1–4 mm, abaxially densely appressed white pilose, adaxially glabrous or laxly appressed white pilose, base attenuate to narrowly cuneate. Racemes lax, 3–10-flowered; peduncle 5–9 cm, densely hirsute with spreading white stout trichomes; bracts linear, ca. 6 × 2 mm, glabrous or adaxially with appressed to spreading white

stout trichomes. Calyx cylindric or finally somewhat inflated, 11–13 × ca. 3 mm, externally hirsute; lobes subulate, 3–4 × ca. 0.5 mm. Corolla bluish violet; standard ca. 2 cm, lamina obovate, apex slightly emarginate; wings ca. 1.7 cm; keel ca. 1.5 cm, beak ca. 1.5 mm. Legume sessile, ovoid, ca. 6 × 4 mm, densely appressed whitish pilose, septum narrow. Fl. Jul, fr. unknown.

- Sandy areas. Nei Mongol (Ulanqab Meng).

2. *Oxytropis* sect. *Ptiloxytropis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 46. 1874.

柔毛棘豆组 rou mao ji dou zu

Herbs, 3–12 cm tall, acaulescent. Calyx not inflated at anthesis; lobes as long as or ± longer than tube. Corolla standard 0.7–1.4 cm.

Three species: China, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; two species in China.

- 1a. Calyx (4.5–)6–8 mm, lobes ± as long as tube; corolla standard (0.6–)0.7–0.9 cm, keel beak (0.3–)1 mm 3. *O. bella*
 1b. Calyx 9–15 mm, lobes ca. 2 × as long as tube; corolla standard 1–1.4 cm, keel beak 2.5–3 mm 4. *O. trichocalycina*

3. *Oxytropis bella* B. Fedtschenko ex O. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 303. 1903.

美丽棘豆 mei li ji dou

Oxytropis trichosphaera Freyn.

Herbs, 3–7(–9.5) cm tall, acaulescent, arising from a multiheaded caudex, caespitose, densely gray pubescent. Stipules with a lanceolate-triangular and ca. 3 × 2 mm free part, scarious, pubescent, adnate to petioles only at base. Leaves (1–)1.5–6 cm, 5–9(–15)-foliolate; petioles and rachis with spreading trichomes; leaflet blades linear to lanceolate-oblong, (3–)5–10 × 1–3 mm, both surfaces densely white pilose. Racemes 1–3 cm, compact, many flowered; peduncle 2.5–7.5 cm, as long as or longer than leaves, with white fine trichomes; bracts triangular, 3–5 × 1–2 mm, with appressed trichomes. Calyx broadly cylindric, not inflated, (4.5–)6–8 × 2–4 mm, with spreading dense white trichomes; lobes subulate, (2–)3–4 × ca. 0.5 mm, subequal to tube. Corolla purple, rose-red, or violet; standard (6–)7–9 mm, lamina orbicular, apex rounded to emarginate; wings lamina obovate, 6.5–8 mm; keel subequal to wings, beak (0.3–)1 mm. Legume shortly stipitate; body ovoid, (4–)6–8 × 2–3(–5) mm, sometimes enveloped by calyx or sometimes splitting calyx, with dense whitish long trichomes. Fl. Jun–Jul, fr. Jun–Jul.

Sandy areas, alpine gravelly areas; 3800–4300 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

4. *Oxytropis trichocalycina* Bunge ex Boissier, Fl. Orient. 2: 502. 1872.

毛齿棘豆 mao chi ji dou

Herbs, 3–12 cm tall, acaulescent, from a short multiheaded caudex. Stipules subulate to linear-lanceolate with a subulate linear free part, lanate with white soft trichomes, adnate to petioles nearly to middle, not connate. Leaves 1.5–5 cm, 11–15-foliolate; petiole and rachis with spreading dense cottonlike trichomes; leaflet blades linear-lanceolate, 3–11 mm, both surfaces densely sericeous-lanate. Racemes compact, many flowered; peduncle longer than leaves, densely and softly shortly lanate-pubescent mixed with sparse long trichomes; bracts linear-subulate, 5–10 mm, with soft lanate pubescence. Calyx campanulate, not inflated, 0.9–1.5 cm, densely lanate with spreading soft trichomes; lobes subulate, ca. 2 × as long as tube, densely plumose. Corolla purple; standard 1–1.4 cm, lamina oblong-ovate, apex rounded to retuse; wings slightly shorter than standard; keel subequal to wings, beak long subulate, 2.5–3 mm. Legume sessile, oblong-ovoid, 7–9 × 2.5–3 mm, inflated, thinly leathery, included in calyx, 1-locular, 2-seeded, with appressed white short trichomes, beak ca. 2 mm. Fl. May–Jun, fr. May–Jun.

S-facing slopes, in gravelly areas. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

2. *Oxytropis* subg. *Oxytropis*

棘豆亚属 ji dou ya shu

Herbs, caulescent or acaulescent, either with both glands and trichomes or only trichomes. Stipules free or adnate to petioles. Leaves imparipinnate; leaflets alternate, opposite, or whorled (verticillate). Corolla varying in color, large to medium-sized. Legume exerted from calyx, dehiscent when mature, adaxial septum and sometimes abaxial septum developed.

About 250 species in ca. 20 sections: circumboreal; 126 species (72 endemic) in 16 sections (four endemic) in China.

- 1a. Leaves 1-foliolate 18. *O.* sect. *Neimonggolicae* (p. 498)
 1b. Leaves 3- to many foliolate.

- 2a. Leaflets verticillate or both verticillate and opposite.
- 3a. Plants with glands; leaflets verticillate 3. *O.* sect. *Polyadena* (p. 462)
- 3b. Plants without glands; leaflets verticillate and opposite 4. *O.* sect. *Baicalia* (p. 464)
- 2b. Leaflets opposite on rachis, or sometimes alternate or subopposite, not verticillate.
- 4a. Plants with glands.
- 5a. Plants with conspicuous persistent stramineous petioles clothing caudex apices 5. *O.* sect. *Leucopodia* (p. 468)
- 5b. Plants lacking persistent petioles at caudex apices 6. *O.* sect. *Falcicarpae* (p. 469)
- 4b. Plants without glands.
- 6a. Plants caulescent, with conspicuous internodes.
- 7a. Corolla standard lamina usually orbicular, not contracted in middle, not widened at basal half, and without auricles 7. *O.* sect. *Mesogaea* (p. 469)
- 7b. Corolla standard lamina spatulate, oblong, or ovate-triangular.
- 8a. Corolla standard lamina spatulate, base tapering, middle contracted hence becoming 3-lobed 8. *O.* sect. *Dolichanthos* (p. 479)
- 8b. Corolla standard lamina oblong or ovate-triangular, base widened or tapering into 2 auricles.
- 9a. Corolla standard lamina oblong, widened in basal half, base widened and without auricles, apex emarginate 9. *O.* sect. *Sichuanicae* (p. 479)
- 9b. Corolla standard lamina ovate-triangular, base auriculate, apex obliquely cuneate 10. *O.* sect. *Auriculatae* (p. 480)
- 6b. Plants acaulescent, without conspicuous internodes or only exceptionally caulescent.
- 10a. Plants hirsute with spreading coarse long straight rigid trichomes; leaves 10–15 cm, with leaflets 1–5 cm 11. *O.* sect. *Brachytropis* (p. 480)
- 10b. Plants glabrous, with spreading trichomes, or densely pubescent but not hirsute; leaves never 10–15 cm with leaflets to 5 cm.
- 11a. Corolla standard and keel pubescent on outer surface 16. *O.* sect. *Sericopetalae* (p. 495)
- 11b. Corolla standard and keel not pubescent on any surface.
- 12a. Plants glabrous or with spreading trichomes; leaflet blades whitish green.
- 13a. Legume membranous; peduncle \pm as long as leaves 12. *O.* sect. *Xerobia* (p. 480)
- 13b. Legume scariosus; peduncle much longer than leaves 13. *O.* sect. *Eumorpha* (p. 486)
- 12b. Plants densely pubescent; leaflet blades yellowish gray or whitish gray.
- 14a. Plants covered with whitish gray trichomes; leaflet blades whitish gray 17. *O.* sect. *Orobia* (p. 496)
- 14b. Plants with yellowish gray or yellowish brown trichomes; leaflet blades yellowish gray or yellowish brown.
- 15a. Peduncle 1.5–9 cm 14. *O.* sect. *Janthina* (p. 491)
- 15b. Peduncle 2–38 cm 15. *O.* sect. *Oxytropis* (p. 493)

3. *Oxytropis* sect. *Polyadena* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 152. 1874.

多腺棘豆组 duo xian ji dou zu

Herbs, acaulescent, glandular. Leaves imparipinnate; leaflets verticillate. Racemes 3- to many flowered; peduncle 2–25 cm, shorter to longer than leaves. Corolla bluish purple, purple, or yellow. Ovary sessile or shortly stipitate, with 15–35 ovules. Legume usually inflated, 1- or \pm 2-locular.

Seven species: China, Himalayas, Mongolia, Russia; five species (two endemic) in China.

- 1a. Corolla pale or dirty yellow, standard apex shortly acuminate; stipules hard 5. *O.* *muricata*
- 1b. Corolla various purplish, bluish, or violet colors (rarely yellow or white in *O. microphylla*), standard apex rounded; stipules herbaceous or membranous.
- 2a. Racemes (6–)8–20-flowered; legume without glands.
- 3a. Stipules (10–)12–15 mm; calyx 10–13 mm, lobes 2–4 mm; corolla standard 1.9–2.5 cm; legume subglobose, bladderlike inflated, membranous 6. *O. trichophysa*
- 3b. Stipules 3.2–4.3 mm; calyx ca. 7.5 mm, lobes ca. 1 mm; corolla standard ca. 1.7 cm; legume lanceolate-ovoid, not bladderlike inflated, leathery 7. *O. pseudomyriophylla*
- 2b. Racemes 3–6-flowered; legume glandular.
- 4a. Plants (4–)5–15 cm tall; stipules conspicuously white pilose and long persistent; leaflets in (10–)13–27 whorls; leaflet blades 2–3 mm; corolla standard 1.9–2 cm; legume falcately cylindrical 8. *O. microphylla*
- 4b. Plants 22–35 cm tall; stipules not markedly white pilose or long persistent; leaflets in 3–5 whorls; leaflet blades 5–15 mm; corolla standard ca. 2.2 cm; legume cylindrical 9. *O. pseudoglandulosa*

5. *Oxytropis muricata* (Pallas) Candolle, *Astragalologia*, 86. 1802.

糙荚棘豆 cao jia ji dou

Phaca muricata Pallas, *Reise Russ. Reich.* 3: 746. 1776; *Astragalus muricata* (Pallas) Pallas.

Herbs, 5–12 cm tall, acaulescent, from a multiheaded caudex. Stipules with a lanceolate-subulate free part, densely yellowish villous with appressed long trichomes, glandular, adnate to petioles nearly to middle. Leaves 5–12(–20) cm; rachis with sparse trichomes and yellow glands; leaflets verticillate, in 15–18(–25) whorls, ca. 4 blades per whorl or rarely 2 and opposite; leaflet blades linear, lanceolate, or oblong, 4–6 × 1–2 mm, both surfaces with yellow glands, adaxially with appressed white trichomes, base rounded, apex acute. Racemes elongate, lax, several to many flowered; peduncle as long as or shorter than leaves, with appressed long trichomes and glands; bracts broadly lanceolate, ca. 10 × 3 mm, with appressed dense yellow glands, apex acute. Calyx cylindrical, 0.9–1.1 cm, with brown trichomes and pale yellow glands; lobes triangular, 2–3 × ca. 0.5 mm. Corolla pale to dirty yellow; standard 2.2–2.5 × ca. 0.7 cm, lamina elliptic-lanceolate, apex shortly acuminate; wings 1.7–2 × ca. 0.3 cm, lamina obovate, apex rounded; keel as long as wings, beak ca. 1 mm. Legume tapering cylindrical, 2–2.5 × 0.4–0.6 cm, leathery, ± 2-locular, glabrous and glandular, beak ca. 3 mm. Fl. Jun, fr. Jul. $2n = 32$.

Hillsides. Ningxia [N Mongolia, Russia (Siberia)].

6. *Oxytropis trichophysa* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 22(1): 158. 1874.

毛泡棘豆 mao pao ji dou

Herbs, 12–20 cm tall, acaulescent, from a multiheaded caudex, tuft-forming, clothed with many persistent stipules and leaves. Stipules with a lanceolate free part, (10–)12–15 × 3–5 mm, membranous, glandular and glabrous or strigose, adnate to petiole base, connate-sheathing, margin densely white ciliate with stout trichomes, apex acuminate. Leaves (4–)5–12.5(–18) cm; petiole 1–4.5 cm; petiole and rachis firm, sparingly and finely spreading villous and tubercular-glandular; leaflets verticillate, in 12–28 whorls, 4–6 blades per whorl; leaflet blades oblong-ovate to ovate, 2–5(–7) × 0.8–1.5 mm, slightly thickened, glabrous or with sparse short trichomes. Racemes subcapitate to elongate, (6–)8–20-flowered; peduncle 7–13 cm, shorter than to ± equaling leaves, with spreading trichomes and glands; bracts ovate-lanceolate to lanceolate-oblong, (5–)6–8 × 1–2 mm, herbaceous, with spreading white and black trichomes and glands, apex acute. Calyx cylindrical, 10–13 × ca. 3 mm, slightly inflated, with appressed black and white trichomes and glands; lobes lanceolate, 2–4 × ca. 0.5 mm. Corolla violet to purple; standard 1.9–2.5 cm, lamina suborbicular to obliquely spatulate, apex rounded; wings 1.8–2.1 cm, lamina obliquely triangular-spatulate, apex emarginate; keel 1.7–2 cm, beak 2–3.3 mm. Legume sessile; body bladderlike inflated, 1.6–2 cm, membranous, whitish and blackish villous and glandular, beak 2–3 mm. Fl. Jun–Aug, fr. Jun–Aug.

Gravelly slopes and valleys. Gansu, Xinjiang [Mongolia, Russia (W Siberia)].

7. *Oxytropis pseudomyriophylla* S. H. Cheng ex X. Y. Zhu, H. Ohashi & Y. B. Deng, *J. Jap. Bot.* 74: 127. 1999.

拟多叶棘豆 ni duo ye ji dou

Herbs, 10–25(–30) cm tall, acaulescent, from a simple to copiously branched multiheaded caudex. Stipules narrowly triangular, 3.2–4.3 × 1.7–2.6 mm, herbaceous to membranous, with rigid trichomes, highly adnate to petiole, veins conspicuous. Leaves 12–15 cm, with yellowish brown trichomes; leaflets verticillate or opposite, in 15–27 whorls or pairs, 2–4 blades per node; leaflet blades narrowly oblong, lanceolate, or elliptic, 6–9 × 2–2.5 mm, both surfaces with dense glandular trichomes. Racemes elongate, lax, (5–)8–20-flowered; peduncle 7–25 cm, much surpassing leaves; bracts ovate, ca. 6.5 × 2.5 mm, with yellowish brown trichomes and glands. Calyx cylindrical, ca. 7.5 × 3 mm, with yellowish brown trichomes; lobes subulate, ca. 1 × 0.2 mm. Corolla purple; standard ca. 1.7 × 0.4 cm, lamina narrowly obovate, apex rounded; wings ca. 1.6 cm, lamina obovate, apex rounded; keel ca. 1.2 cm, beak 1.5–2 mm. Legume sessile; body lanceolate-ovoid, leathery, with glandular trichomes. Fl. May–Sep, fr. May–Sep.

• Hillsides, roadsides along fields; 1400–2600 m. Gansu, Ningxia, Shanxi.

8. *Oxytropis microphylla* (Pallas) Candolle, *Astragalologia*, 83. 1802.

小叶棘豆 xiao ye ji dou

Phaca microphylla Pallas, *Reise Russ. Reich.* 3: 744. 1776; *Astragalus microphyllus* (Pallas) Pallas (1802), not Linnaeus (1753); *Oxytropis chiliophylla* Royle ex Benth; *O. grenardii* Franchet; *O. ingrata* Freyn; *O. polyadenia* Freyn; *O. tibetica* Bunge.

Herbs, (4–)5–15 cm tall, acaulescent, from a multiheaded caudex. Branches conspicuously white villous-pilose, with persistent stipules at base. Stipules narrowly triangular, ca. 5 × 1.5 mm, membranous, densely yellowish villous or with spreading to ascending whitish trichomes and with glands, basally connate. Leaves (2–)4–6(–7) cm; leaflets verticillate, in (10–)13–27 whorls; leaflet blades lanceolate-ovate to narrowly elliptic, 2–3 × 0.5–1 mm. Racemes compact to rather lax, becoming 2–5 cm, 3–6-flowered; peduncle 2–5(–7) cm, shorter to longer than leaves, densely villous and with glands; bracts triangular, 7–8 × 2–3 mm, villous and with glands. Calyx cylindrical, 9–10 × ca. 3 mm, whitish and blackish villous and with glands; lobes subulate, 2–2.7 × ca. 0.5 mm. Corolla purple, pink, bluish purple, light bluish violet, violet, yellow, or white; standard 1.9–2 cm, lamina elliptic, apex rounded; wings 1.5–1.7 cm, lamina obovate, apex retuse; keel 1.3–1.5 cm, beak 1–1.6(–2) mm. Legume sessile or subsessile; body falcate-oblong in profile, (1.2–)1.7–3 × 0.5–0.7 cm, erect-ascending, abaxially deeply sulcate, whitish and blackish villous or glabrous and tubercular-glandular. Fl. May–Sep, fr. Jul–Sep. $2n = 16, 16 + 2B$.

Hillsides, valley slopes, gravelly river terraces, hillsides in *Stipa* grasslands, ice terraces, high-elevation grasslands, *Carex-Arenaria* communities in stony open limestone areas, sandy areas, *Caragana* scrub;

2700–5200 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

9. *Oxytropis pseudoglandulosa* Gontscharow ex Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 18. 1955.

拟腺棘豆 ni xian ji dou

Herbs, 22–35 cm tall, acaulescent, from a multiheaded caudex. Branches clothed with marcescent stipules. Stipules lanceolate to narrowly lanceolate, 0.8–1.4 cm, thinly membranous, densely pilose, basally adnate to petiole, shortly connate,

apex subulate-acuminate to obtuse. Leaves 3–20 cm; petiole 1–5 cm; leaflets verticillate, in 3–5 whorls; leaflet blades linear to linear-oblong, 0.5–1.5 cm, abaxially tubercular-glandular. Racemes rather lax, 3–6-flowered; peduncle 6–13 cm, subequal to leaves, with spreading trichomes. Calyx cylindric, 1.1–1.5 cm, with appressed black and white trichomes and with glandular trichomes; lobes 3–4 mm. Corolla purple; standard ca. 2.2 cm, lamina elliptic, apex rounded; wings 1.6–1.8 cm; keel ca. 1.6 cm, beak ca. 1.5 mm. Legume cylindric. Fl. Jun–Aug, fr. Jun–Aug.

- Sandy areas along Qinghai Hu; 3000–3100 m. Qinghai.

4. *Oxytropis* sect. *Baicalia* Steller ex Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 135. 1874.

轮叶棘豆组 lun ye ji dou zu

Oxytropis sect. *Arenicola* C. W. Chang.

Herbs, acaulescent or caulescent, non-glandular (except for glands between leaflets and sometimes on bracts; but glands indicated for *Oxytropis myriophylla*, *O. lanata*, and *O. bicolor*). Leaves with leaflets verticillate or verticillate and opposite. Racemes 1- to many flowered; peduncle 3–20 cm. Legume (unknown in *O. shanxiensis*) sessile or shortly stipitate; body ovoid-oblong, ovoid, or globose, 1–2.5 cm, usually inflated, 1- or ± 2-locular, with 15–35 seeds.

About 40 species: Afghanistan, China, Himalayas, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Turkmenistan, Uzbekistan; North America; 15 species (eight endemic) in China.

1a. Corolla yellow, yellowish white, or white.

2a. Plants to 25 cm tall; leaflets 4–24 mm; beak of corolla keel 1.2–1.8 mm; legume sessile 15. *O. ochrantha*

2b. Plants to 40 cm tall; beak of corolla keel 1–1.5 mm; legume substipitate or shortly stipitate.

3a. Leaves 10–19 cm; leaflets 1–3 cm, mostly opposite but some verticillate; bracts longer than calyx; corolla yellow, keel beak ca. 1 mm 16. *O. ochrolongibracteata*

3b. Leaves 5–8 cm; leaflets 0.4–0.7 cm, mostly verticillate; bracts shorter than calyx; corolla white, keel beak 1–1.5 mm 17. *O. qamdoensis*

1b. Corolla various purplish, bluish, reddish, or violet colors and usually 2-colored (rarely white in *O. oxyphylla*).

4a. Plants with appressed or yellowish glandular trichomes.

5a. Beak of corolla keel (1.5–)1.8–3.8 mm; leaflets in 12–16(–50) whorls; bracts 8–15 mm 12. *O. myriophylla*

5b. Beak of corolla keel 1.5–2.5 mm; leaflets in (2 or)3–12 whorls and some or most leaflets merely opposite; bracts 3–10 mm.

6a. Calyx 0.9–1 cm; herbage non-glandular; legume stipitate 13. *O. trichophora*

6b. Calyx (1–)1.2–1.7 cm; herbage with appressed yellowish or glandular trichomes; legume sessile 14. *O. bicolor*

4b. Plants non-glandular.

7a. Plants caulescent or shortly caulescent (acaulescent in some *O. racemosa*).

8a. Plants shortly caulescent, stems neither diffuse nor much branched; racemes 7–10-flowered; leaves 5–14 cm, with 6–13 whorls of 4–6 leaflets 21. *O. racemosa*

8b. Plants definitely caulescent, stems diffuse and often much branched; racemes 1–3-flowered; leaves 3–5 cm, with 2–5 whorls of 3 or 4 leaflets 23. *O. ramosissima*

7b. Plants strictly acaulescent.

9a. Plants (1.5–)2–6 cm tall; leaves (0.5–)1–5 cm; racemes 1–3-flowered.

10a. Leaves (0.5–)1–3 cm, with 6–12 whorls of 4–6 leaflets; corolla standard 1.4–2.2 cm, keel beak 0.5–1.1 mm; plants turf- or cushion-forming 22. *O. chionobia*

10b. Leaves 3–5 cm, with 2–4 whorls of 3 or 4 leaflets; corolla standard 2.1–3.2 cm, keel beak ca. 2 mm; plants caespitose 24. *O. langshanica*

9b. Plants (3–)5–20(–40) cm tall; leaves (2.5–)3–20(–30) cm; racemes 5–15-flowered or more (few flowered in *O. shanxiensis*).

11a. Leaves of 3 kinds, i.e., with a solitary leaflet, with 7–15 opposite leaflets, and with 3 or 4 whorls of 3 or 4 leaflets each; corolla standard 1.5–1.6 cm 10. *O. shanxiensis*

11b. Leaves with leaflets in (1–)3–18 whorls or some leaves with leaflets in whorls and others opposite or alternate (if with 3 kinds as above, then plants not from Shandong or Shanxi); corolla standard 1.4–2.5(–3) cm.

- 12a. Leaflets in (7-)12-18 whorls; corolla standard (1.4-)1.5-2.5(-3) cm.
 13a. Corolla standard 2.5-3 cm; legume body 2-2.5 cm 18. *O. przewalskii*
 13b. Corolla standard 2-2.5 cm; legume body 1-1.6 cm.
 14a. Plants 5-8 cm tall; leaves 5-7 cm; calyx lobes ca. 2 mm 11. *O. lanata*
 14b. Plants 11-40 cm tall; leaves (5-)10-30 cm; calyx lobes 3.5-4.5 mm 12. *O. myriophylla*
 12b. Leaflets in (1-)3-10 whorls (or not verticillate for some leaves); corolla standard
 1.4-1.8(-2.3) cm.
 15a. Calyx (1-)1.2-1.7 cm, lobes (2-)3.5-7 mm; corolla standard 1.4-2.3 cm 14. *O. bicolor*
 15b. Calyx 0.6-1 cm, lobes 1-3.5 mm; corolla standard 1.4-1.8 cm.
 16a. Leaves 3-6 cm; leaflets in 4 or 5 whorls; peduncle 3-5 cm; calyx 8-10 mm 19. *O. pumila*
 16b. Leaves 7-20(-25) cm; leaflets in (1-)3-9 whorls; peduncle
 6-11(-19) cm; calyx 6-8.3(-10) mm 20. *O. oxyphylla*

10. *Oxytropis shanxiensis* X. Y. Zhu, *Nordic J. Bot.* 23: 279. 2005.

山西棘豆 *shan xi ji dou*

Herbs, 7-15 cm tall, acaulescent, from a short few-headed caudex. Stipules narrowly triangular, 7-11 × 1-2 mm, herbaceous, with white trichomes, adnate to petiole base, apical ca. 2/3 free. Leaves 5-13 cm, of 3 types: first type with leaves 1-foliolate eophylls (early produced leaves), petiole 1.3-2.6 cm, leaf blade narrowly ovate to ovate, 1.5-1.7 × ca. 0.5 cm, apex acute; second type with leaves 7-15-foliolate, to 13 cm, leaflets opposite, leaflet blade apices acuminate to acute; third type with leaves verticillate, leaflets in 3 or 4 whorls, 3 or 4 blades per whorl, leaflet blades narrowly ovate to lanceolate-elliptic, 6-10 × 0.5-1 mm. Racemes few flowered; peduncle 3-16 cm, curved when young, soft, shorter than leaves at anthesis but almost as long as leaves in fruit; bracts narrowly ovate, 2.5-4.5 × 0.5-1 mm, with white trichomes. Calyx campanulate, 7-9 mm, with white trichomes; tube 4-4.5 mm; lobes subulate, 3-4 × ca. 0.2 mm. Corolla purple; standard 1.5-1.6 × 0.5-0.6 cm, lamina broadly ovate, apex emarginate; wings ca. 1.2 cm, lamina obovate, apex rounded; keel 1.1-1.3 cm, beak ca. 1 mm. Ovary pubescent. Legume unknown. Fl. Jun-Aug.

- Grasslands on hillsides. Shandong, Shanxi.

11. *Oxytropis lanata* (Pallas) Candolle, *Astragalogia*, 89. 1802.

绵毛棘豆 *mian mao ji dou*

Phaca lanata Pallas, *Reise Russ. Reich.* 3: 746. 1776.

Herbs, 5-8 cm tall, acaulescent, from a much-branched multiheaded caudex, tuft- or mat-forming, clothed with marcescent stipules, sericeous. Stipules membranous, adnate to petiole. Leaves 5-7 cm; leaflets verticillate, in 12-18 whorls, 4-8 blades per whorl, arranged on opposite sides of rachis; leaflet blades oblong to linear, 3-12 × 1-2.5 mm, softly lanate-pubescent, apex obtuse. Racemes compact, a broad ovoid head, many flowered; peduncle shorter to slightly longer than leaves, densely spreading lanate. Calyx cylindrical, 11-12 × 3-3.5 mm; lobes triangular-lanceolate, ca. 2 mm. Corolla reddish pink to purple; standard 2-2.5 cm, lamina ovate-orbicular and 1-1.2 cm wide, apex rounded to barely emarginate; wings 1.8-2 cm, lamina longer than claw; keel 1.5-1.6 cm, beak ca. 2 mm. Legume ovoid-oblong, 12-14 × ca. 6 mm, slightly inflated, thinly leathery, ± 2-locular, softly lanate. Fl. Jun-Jul, fr. unknown. *2n* = 16.

Sandy areas; ca. 1200 m. Nei Mongol [Russia (Siberia)].

12. *Oxytropis myriophylla* (Pallas) Candolle, *Astragalogia*, 87. 1802.

多叶棘豆 *duo ye ji dou*

Phaca myriophylla Pallas, *Reise Russ. Reich.* 3: 745. 1776; *Astragalus myriophyllus* (Pallas) Pallas; *Oxytropis davidii* Franchet; *O. myriophylloides* Hurusawa.

Herbs, 11-40 cm tall, acaulescent, from a multiheaded caudex, tufted, with appressed white and yellow trichomes or with some long spreading trichomes. Stipules ovate-lanceolate, membranous, with appressed dense yellow elongate trichomes, connate to middle, apex subulate-acuminate. Leaves (5-)10-30 cm; leaflets verticillate, in 12-16(-50) whorls, 4-8 blades per whorl, arranged on opposite sides of rachis; leaflet blades linear, oblong, or lanceolate, 3-15 × 1-3 mm, both surfaces with dense long trichomes, base rounded, apex acuminate. Racemes compact, many flowered; peduncle 8-17 cm, shorter than to ca. 1.5 × as long as leaves, covered with spreading long thin trichomes; bracts lanceolate, 0.8-1.5 cm, with long trichomes. Flowers ascending. Calyx tubular, 1.1-1.4(-1.6) cm, with long trichomes; lobes lanceolate, 3.5-4.5 mm, both surfaces with trichomes. Corolla pale purple drying bluish; standard lamina oblong and 1.8-2.5 cm, apex rounded to emarginate; wings 1.5-2 cm, apex acute; keel 1.2-2 cm, beak (1.5-)1.8-3.8 mm. Legume erect-ascending, substipitate; body ovoid-oblong, 10-16 × 3-5 mm, leathery, ± 2-locular, with dense long trichomes, beak 5-7 mm. Fl. May-Jun, fr. Jul-Aug. *2n* = 16.

Hillsides, grasslands, rocky mountain slopes, prairies, sandy areas, *Betula* forest margins; 200-2600 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shanxi [Mongolia, Russia].

13. *Oxytropis trichophora* Franchet, *J. Bot. (Morot)* 4: 303. 1809.

毛序棘豆 *mao xu ji dou*

Oxytropis shensiana Ulbrich.

Herbs, 10-20 cm tall, acaulescent, from a multiheaded caudex. Branches with white long stout trichomes and yellowish or glandular trichomes. Stipules with a lanceolate free part, membranous, basally adnate to petiole, apex acute. Leaves 2.5-6(-8) cm; leaflets verticillate, in (2-)7-12 whorls, 3 or 4 blades per whorl and some also arranged on opposite sides of rachis; leaflet blades ovate to narrowly lanceolate, 2-8 × 1-2 mm. Racemes capitate or lax, few to many flowered; peduncle (6-)10-20 cm, thick, erect, slightly to greatly longer than leaves; bracts

ovate, 4–5 mm, with long trichomes, apex acute. Calyx cylindrical, 9–10 mm, with white long trichomes; lobes lanceolate-linear, 2.5–5 mm. Corolla basally almost white and apically blue; standard 1.5–2 × 0.7–0.9 cm, lamina broadly ovate, apex rounded to emarginate; wings 1.5–1.7 cm; keel ca. 1.4 cm, beak 1.5–2.5 mm. Legume stipitate; body ovoid-oblong, leathery, with white long trichomes. Fl. May, fr. Aug.

• Hillsides, roadsides, grasslands; 800–2000 m. Gansu, Hebei, Henan, Shaanxi, Shanxi.

14. *Oxytropis bicolor* Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 91. 1835.

地角儿苗 *di jiao er miao*

Oxytropis angustifolia Ulbrich; *O. bicolor* f. *luteola* (C. W. Chang) X. Y. Zhu & H. Ohashi; *O. bicolor* var. *luteola* C. W. Chang.

Herbs, 5–20 cm tall, acaulescent, from a simple or multi-headed caudex, with appressed yellowish or glandular trichomes. Stipules narrowly triangular, ca. 1.8 × 0.3 cm, membranous, villous, basally connate. Leaves 3–20 cm; rachis with glands; leaflets at least some verticillate, in 3–10 whorls per leaf or with blades arranged on opposite sides of rachis; leaflet blades linear, ovate, or triangular, 3–25 × 1–5 mm. Racemes dense to lax, (7–)10–25-flowered; peduncle 4–20 cm, mostly shorter than leaves, rather densely whitish villous; bracts triangular, 3–10 × 1–3 mm, whitish villous. Calyx cylindrical, (10–)12–17 × 2–4 mm, with whitish and blackish trichomes; lobes subulate to triangular, (2–)3.5–7 × ca. 0.5 mm. Corolla bluish purple, purple, dark purple, reddish purple, pink, red, blue, purplish yellow, or pale yellow; standard 1.4–2.3 cm, lamina elliptic, apex emarginate; wings (1.2–)1.4–1.6(–2) cm, lamina obliquely obovate, apex emarginate to rounded; keel 1–1.4(–1.6) cm, beak (1.5–)2–2.5 mm. Legume sessile, ovoid-oblong, 1.7–2.4 × 0.4–0.5 cm, inflated, leathery, villous, septum ca. 1.5 mm wide. Fl. Apr–Jul, fr. Jun–Aug.

Hillsides, weedy slopes, scrub, field margins, grasslands, grassland margins, dry places, riverbanks, *Salix* scrub, roadsides, sandy places, floodplains, loess areas, S-facing slopes at base of hills, gravelly slopes and sandy sites in alpine areas; 400–2700 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Mongolia].

15. *Oxytropis ochrantha* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 188. 1832.

黄毛棘豆 *huang mao ji dou*

Oxytropis chrysotricha Franchet; *O. daqingshanica* Y. Z. Zhao & Zong Y. Zhu; *O. ochrantha* var. *albopilosa* P. C. Li; *O. ochrantha* f. *diversicolor* H. C. Fu & Ma; *O. ochrantha* subsp. *diversicolor* (H. C. Fu & Ma) P. C. Li; *O. ochrantha* var. *diversicolor* (H. C. Fu & Ma) G. Z. Qian; *O. turczaninowii* Jurtzev.

Herbs, usually 10–25 cm tall, acaulescent, from a multi-headed caudex, with appressed yellow long trichomes. Stipules broadly ovate, herbaceous, with dense yellow long trichomes, basally adnate to petiole, apex acute. Leaves 8–20 cm; leaflets (at least some typically) verticillate, in 1–9 whorls but apically 1 to several leaflets reduced to 2 opposite blades; leaflet blades

ovate, oblong-ovate, lanceolate, or linear, 0.6–2.5 × 0.3–1 cm, abaxially with long trichomes when mature, adaxially glabrous, apex acuminate to acute. Racemes elongate, compact to rather lax, many flowered; peduncle 8–11(–16.5) cm; bracts lanceolate, almost as long as calyx, with yellow long trichomes. Calyx cylindrical, 0.8–1.2(–1.3) cm, with yellow long trichomes; lobes lanceolate-linear, (3.5–)5.5–7 mm, slightly shorter or as long as tube. Corolla white or yellowish white; standard 1.4–2.1 cm, lamina obovate-oblong, apex rounded; wings 1.7–1.8 cm, lamina spatulate-elliptic, apex rounded; keel 1.5–1.8 cm, beak 1.2–3 mm. Legume sessile, ca. 1.8 × 0.8 cm, inflated, membranous. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Meadows, weedy and grassy hillsides, dry valleys, sandy areas; 500–4800 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Mongolia].

16. *Oxytropis ochrolongibracteata* X. Y. Zhu & H. Ohashi, Cathaya 11–12: 75. 2000.

长苞黄花棘豆 *chang bao huang hua ji dou*

Oxytropis ochrocephala Bunge var. *longibracteata* P. C. Li, Fl. Xizang. 2: 859. 1985, not *O. longibracteata* Karelin & Kirilov (1841).

Herbs, 35–40 cm tall or more, acaulescent, from a multi-headed caudex. Stems with 3–5 or more apparent internodes, thick, erect. Stipules ovate, herbaceous, with appressed dense long trichomes, free from petiole, connate at base, distinct parts triangular. Leaves 10–19 cm; node between petiole and leaflets with pale brown glands and appressed dense long trichomes; leaflets 17–25, mainly opposite but some verticillate, 2–4 blades per whorl; leaflet blades lanceolate, ovate-lanceolate, or lanceolate-oblong, 1–3 cm, both surfaces with short trichomes. Racemes many flowered; peduncle 10–25 cm, erect, with dense curved trichomes; bracts linear-lanceolate, longer than calyx. Calyx cylindrical, 1.2–1.3 cm, membranous, with long trichomes; lobes subulate, ca. 6 mm. Corolla yellow; standard 1.1–1.7 cm, lamina obovate, apex emarginate; wings oblong, 1.3–1.5 cm; keel as long as wings, beak ca. 1 mm. Legume shortly stipitate; body oblong, 1.2–1.5 cm, inflated, membranous, 1-locular, with appressed black trichomes, beak curved. Fl. Jun–Aug, fr. Jul–Sep.

• Hillsides, roadsides, dry valleys, shrubby hillsides, streamsides, alpine meadows and scrub; 1700–4300 m. Gansu, Xizang.

17. *Oxytropis qamdoensis* X. Y. Zhu, Y. F. Du & H. Ohashi, Novon 12: 430. 2002.

昌都棘豆 *chang du ji dou*

Herbs, 7–40 cm tall or more, acaulescent, from a 1-headed or rarely multiheaded caudex. Stipules narrowly triangular, 3.5–8.8 × 2–3 mm, herbaceous, with white trichomes, basally adnate to petiole. Leaves 5–8 cm, with white trichomes; leaflets mostly verticillate, in 9 or 11 whorls, 4(–6) blades per whorl or blades opposite apically on rachis; leaflet blades ovate to oblong-ovate, 4–7 × 1.5–5 mm, both surfaces with white trichomes but when young with dense grayish white trichomes, apex acuminate to acute. Racemes elongate, rather lax, many flowered; peduncle 5–13.5 cm, shorter than leaves at anthesis, longer than leaves in fruit; bracts ovate, 4.5–7.5 × 2–3 mm,

with white trichomes. Calyx subcylindric, 1.1–1.2 cm, with white trichomes; tube ca. 6 mm; lobes lanceolate, 4–6 × ca. 0.1 mm. Corolla white; standard 1.6–1.9 × 0.6–0.7 cm, lamina broadly obovate and narrowed to base, apex 2-lobed; wings ca. 1.5 cm, lamina obovate, apex emarginate; keel 1.2–1.7 cm, beak 1–1.5 mm. Legume substipitate; body ovoid, ca. 1.6 × 0.7 cm, membranous, with white trichomes, beak ca. 6.5 mm. Fl. Jul–Aug, fr. Jul–Aug.

- Among shrubs on dry and stony slopes; 3200–3300 m. Xizang.

18. *Oxytropis przewalskii* Komarov, Repert. Spec. Nov. Regni Veg. 13: 227. 1914.

哈密棘豆 ha mi ji dou

Herbs, usually 10–20 cm tall, acaulescent, from a multi-headed caudex. Stipules herbaceous. Leaves 4–10 cm, with white short cottonlike trichomes; leaflets verticillate, almost sessile, in 7–18 whorls, 3–6 blades per whorl; leaflet blades broadly elliptic, elliptic, or orbicular, apex acute. Racemes 8–10-flowered or more; peduncle 6–16 cm, slender, ca. 2 × as long as leaves, with sparse white trichomes; bracts ovate-lanceolate, shorter than calyx. Calyx cylindric, 1–1.5 cm, with white and black short cottonlike trichomes; lobes triangular, ca. 2.5 mm, ca. 1/5 as long as tube. Corolla purplish blue; standard 2.5–3 cm; keel beak incurved. Legume sessile, globose, 2–2.5 cm, inflated, membranous, with appressed short cottonlike trichomes, abaxial suture with septum, adaxial suture deeply grooved, beak short. Fl. Jul, fr. unknown.

- Sunny slopes. Xinjiang.

19. *Oxytropis pumila* Fischer ex Candolle, Prodr. 2: 279. 1825.

普米腊棘豆 pu mi la ji dou

Herbs, 3–6 cm tall, acaulescent, from a simple or branching caudex. Stipules with a broadly triangular short free part, scarious to herbaceous, long ciliate at margin, adnate to petiole, connate for most of length. Leaves 3–6 cm, densely covered with spreading long thin trichomes; leaflets verticillate, in 4 or 5 whorls, 4 blades per whorl; leaflet blades elliptic, 1–1.5 cm. Racemes subglobose, compact, 7–12-flowered; peduncle 3–5 cm, subequal to or longer than leaves; bracts linear, nearly half as long as calyx. Calyx broadly cylindric, 8–10 mm, covered with spreading white and black long trichomes; lobes 1–2.5 mm, much shorter than tube. Corolla violet; standard 1.5–1.8 cm, lamina broadly suborbicular-ovate, apex emarginate; wings 1.3–1.4 cm, apex emarginate; keel slightly shorter than wings, beak 1.5–2 mm. Legume sessile, ovoid-globose, 1.2–1.3 cm, bladderlike, membranous, 1-locular, covered with spreading long soft trichomes, beak curved. Fl. Jul, fr. unknown.

- Xinjiang.

20. *Oxytropis oxyphylla* (Pallas) Candolle, Astragalogia, 84. 1802.

尖叶棘豆 jian ye ji dou

Phaca oxyphylla Pallas, Reise Russ. Reich. 3: 743. 1776; *Oxytropis andaensis* P. H. Huang & L. H. Zhuo; *O. arenaria* Jurtzev; *O. chankaensis* Jurtzev; *O. hailarensis* Kitagawa; *O. hailarensis* f. *chankaensis* (Jurtzev) Kitagawa; *O. hailarensis*

var. *chankaensis* (Jurtzev) Kitagawa; *O. hailarensis* f. *leiocarpa* (H. C. Fu) P. Y. Fu & Y. A. Chen; *O. hailarensis* f. *psilocarpa* (Kitagawa) Kitagawa; *O. hulunbailensis* H. C. Fu & S. H. Cheng; *O. hulunbailensis* var. *leiocarpa* H. C. Fu; *O. lanata* (Pallas) Candolle var. *psilocarpa* Kitagawa; *O. oxyphylla* var. *leiocarpa* (H. C. Fu) Y. Z. Zhao; *O. oxyphylla* var. *psilocarpa* (Kitagawa) G. Z. Qian; *O. selengensis* Bunge; *O. selengensis* var. *longiscapa* Hurusawa; *O. verticillaris* Ledebour (1842), not Candolle (1802).

Herbs, 7–20(–25) cm tall, acaulescent, arising from a subterranean long-branched multiheaded caudex, appressed sericeous. Stipules broadly ovate to triangular-ovate, 5–9 mm, herbaceous, densely appressed white or yellow sericeous. Leaves 2.5–14 cm; leaflets at least some verticillate or sometimes subverticillate, in (1–)3–9 whorls, 3 or 4 blades per whorl; leaflet blades linear-lanceolate, oblong-lanceolate, or linear, 1–2 cm × 1–3 mm, both surfaces sericeous. Racemes capitate, 5–15-flowered; peduncle 6–11(–19) cm, equal to or longer than leaves; bracts lanceolate to narrowly lanceolate, 2.5–6 mm, membranous, sericeous with appressed white long trichomes, apex acute. Calyx cylindric, 6–8.3(–10) mm, with intermixed black and white long trichomes, base oblique; lobes linear-lanceolate, 1.8–3.5 mm. Corolla purple, pale purple, or rarely white; standard 1.4–1.8 cm, lamina elliptic-ovate, apex rounded; wings 1.2–1.6 cm, lamina obliquely obovate, apex obliquely truncate to rounded; keel 1–1.4 cm, beak 1.5–2.5 mm. Legume sessile, ovoid, 1–2 × 0.7–1.2 cm, inflated, spreading-ascending, membranous, with white or sometimes black trichomes. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Sandy open hillsides, semistabilized sand dunes, gravelly areas, grasslands; 500–2700 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi [Korea].

21. *Oxytropis racemosa* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 187. 1832.

砂珍棘豆 sha zhen ji dou

Oxytropis acutirostrata Ulbrich; *O. gracillima* Bunge; *O. gracillima* f. *albiflora* (P. Y. Fu & Y. A. Chen) H. C. Fu; *O. koreana* Nakai; *O. psammocharis* Hance; *O. psammocharis* f. *albiflora* P. Y. Fu & Y. A. Chen; *O. psammocharis* subsp. *mongolica* H. C. Fu; *O. racemosa* f. *albiflora* (P. Y. Fu & Y. A. Chen) C. W. Chang.

Herbs, 5–30 cm tall, acaulescent or shortly caulescent with 1 or 2 apparent internodes, from a multiheaded caudex. Stipules ovate, herbaceous, pubescent. Leaves 5–14 cm; petiole and rachis with appressed long trichomes; leaflets verticillate, in 6–13 whorls, 4–6 blades per whorl; leaflet blades oblong, linear, or lanceolate, 5–10 × 1–2 mm, both surfaces with appressed white long trichomes, base cuneate, margin incurved, apex acute. Racemes to 4 cm, lax, 7–10-flowered; peduncle 6.5–7.5(–10) cm, with slightly curved trichomes; bracts lanceolate, shorter than calyx. Calyx broadly cylindric, 4–7 mm; lobes linear, 1–3 mm, with short trichomes. Corolla purple to pale purple; standard 7–12 mm, apex rounded to emarginate; wings 7.5–11 mm, lamina ovate-oblong, apex rounded; keel 7.2–9.5 mm, beak (0.6–)1–2 mm. Legume sessile, ovoid, 7–10 mm and ± as wide, inflated, membranous, with appressed short trichomes, septum ca. 0.5

mm wide, adaxial suture concave, beak hooked. Fl. May–Jul, fr. Jun–Oct.

Sandy places on hillsides, dry valleys, grasslands, damp places, sandy or gravelly floodplains and riverbanks, semistabilized sand dunes; 200–2300 m. Gansu, Hebei, Henan, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [Korea, Mongolia].

"*Oxytropis tunliaoensis*" (P. F. Fu & C. Y. Li, Fl. Pl. Herb. Chin. Bor.-Orient. 2: 188. 1959) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

22. *Oxytropis chionobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 148. 1874.

雪地棘豆 xue di ji dou

Oxytropis oligantha Bunge.

Herbs, (1.5–)2–6 cm tall, acaulescent, from a multiheaded caudex, tuft- or cushion-forming, with dense silvery white trichomes. Caudex branches with persistent petioles. Stipules broadly ovate with a triangular free part, herbaceous, with appressed white trichomes, adnate to petiole, apex acute. Leaves (0.5–)1–3 cm; petiole and rachis with appressed, spreading, or ascending white trichomes; leaflets verticillate, in 6–12 whorls, 4–6 blades per whorl; leaflet blades narrowly ovate to lanceolate, 1–3.5 × 0.5–1.5 mm. Racemes 1- or 2(or 3)-flowered; peduncle obsolete or to as long as leaves, spreading silvery white villous and apically mixed with blackish trichomes; bracts lanceolate, 4–7 × 1–3 mm, whitish and blackish villous. Calyx cylindrical, 10–15 × 2–4 mm, with whitish cottonlike trichomes and sometimes mixed with black trichomes; lobes linear-lanceolate, 4–5 × ca. 0.5 mm, apex obtuse. Corolla bluish purple; standard 1.4–2.2 cm, lamina ovate, apex emarginate; wings 1.4–1.7 cm, lamina apically truncate; keel (1.2–)1.4–1.6 cm, beak 0.5–1 mm. Legume sessile, ellipsoid, ovoid, or oblong-ovoid, 1.3–2 × 0.5–0.7 cm, slightly inflated, leathery to thinly leathery, ± 2-locular, appressed to spreading white and black villous, beak ca. 2 mm. Fl. Jun–Jul, fr. Jul–Aug.

Base and top of hills, grasslands, gravelly alpine slopes; 2500–4600 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

23. *Oxytropis ramosissima* Komarov, Repert. Spec. Nov. Regni Veg. 13: 227. 1914.

多枝棘豆 duo zhi ji dou

5. *Oxytropis* sect. *Leucopodia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 130. 1874.

鳞萼棘豆组 lin e ji dou zu

Herbs, acaulescent. Petioles ± woody and persistent but not spiny. Herbage (especially bracts, peduncles, and calyces) with stalked or scalelike glands. Peduncle obsolete or to 2 cm. Legume substipitate; body ovoid.

One species: China, Mongolia, Russia.

25. *Oxytropis squammulosa* Candolle, Astragalogia, 79. 1802.

鳞萼棘豆 lin e ji dou

Oxytropis leucopodia Ledebour; *O. squammulosa* var. *purpurea* G. Z. Qian.

Herbs, (2.5–)3–7 cm tall, acaulescent, from a simple or

Herbs, 10–20 cm tall or taller, caulescent, with appressed white trichomes. Stems prostrate, with several to many evident internodes, many branched. Stipules linear-lanceolate to lanceolate, 3–6 mm, herbaceous, with spreading white long trichomes, free from petiole, basally connate, apex acute. Leaves 3–5 cm; leaflets verticillate or rarely opposite, in 2–5 whorls, 3 or 4 blades per whorl; leaflet blades linear to narrowly oblong, 5–10 × 1–3 mm, both surfaces with dense white trichomes, base cuneate, margin involute, apex acute. Racemes 1–3-flowered; peduncle 5–8 mm, with appressed white trichomes; bracts linear-lanceolate, 2–3 mm, with white trichomes, apex acute. Calyx broadly cylindrical, ca. 5 × 2 mm, with appressed white trichomes; lobes lanceolate-subulate, shorter than tube. Corolla bluish purple; standard 1.1–1.3(–1.5) cm, lamina obovate, apex emarginate; wings 1.1–1.2(–1.3) cm, apex rounded to emarginate; keel 9–10(–11.2) mm, beak 1–1.2 mm. Legume sessile, ellipsoid, ovoid, or oblong-ovoid, 0.8–1.6 × 0.6–1.2 cm, leathery to thinly so, densely pubescent, beak 0.8–1 mm. Fl. May–Aug, fr. Aug–Sep.

• Active and partially stabilized sand dunes and sandy slopes; 900–1400 m. Gansu, Nei Mongol, Shaanxi.

24. *Oxytropis langshanica* H. C. Fu, Fl. Intramongol., ed. 2, 3: 672. 1989.

狼山棘豆 lang shan ji dou

Herbs, acaulescent, 3–5 cm tall, from a multiheaded caudex, clothed with marcescent stipules and leaf bases, appressed gray villous. Stipules triangular, herbaceous, appressed villous with long trichomes, adnate to petiole, basally connate. Leaves 3–5 cm; rachis densely long hirsute; leaflets verticillate or sometimes subverticillate, in 2–5 whorls, 3 or 4 blades per whorl or merely opposite; leaflet blades linear to linear-lanceolate, 4–8 × 1–1.5 mm, both surfaces appressed pilose with long trichomes, base rounded, margin usually involute, apex acute. Racemes 1–3-flowered; peduncle obsolete or to 3 cm, shorter than leaves, densely whitish villous; bracts ovate, ca. 4 mm, densely whitish villous, apex obtuse. Calyx cylindrical, 10–15 × 2–4 mm, white hirsute; lobes lanceolate, 3–5 × ca. 0.5 mm. Corolla purple; standard 2.1–3.2 cm, lamina rhombic, apex emarginate; wings 1.8–2 cm, lamina obliquely oblong, apex obtuse; keel ca. 1.6 cm, beak ca. 2 mm. Legume sessile, ovoid, ellipsoid, or oblong-ovoid, 1.6–2.3 × 0.8–1 cm, leathery to thinly leathery, densely hirtellous. Fl. and fr. May–Jun.

• Sandy deserts. Nei Mongol.

multiheaded caudex, clothed with stiff stramineous marcescent petioles with expanded or thickened bases. Stipules narrowly triangular, ca. 4 × 2 mm, membranous, basally connate, margin ciliate. Leaves (1.5–)3–7 cm, 7–19-foliolate; petiole expanded and clasping at base; leaflet blades lanceolate-linear, 5–15 × 1–2 mm, tightly involute, glabrous except for 1 or a few terminal

or lateral trichomes. Racemes 1–3-flowered; peduncle obsolete or to 2 cm; bracts triangular, 5–7 × ca. 3 mm, membranous, glandular, margin ciliate. Calyx cylindric, (10.6–)11–14 × ca. 4 mm, glabrous or with scalelike trichomes or raised conspicuous glands; tube 8–10 mm, glabrous or with yellowish glands; lobes subulate, 2–2.3 mm. Corolla yellow, white, blue, or purple; standard 2.5–2.7 cm, lamina spatulate, apex rounded; wings 2–2.2 cm, lamina obliquely obovate, apex rounded; keel spotted, 2–2.1 cm, beak 1–2 mm. Legume substipitate; body ovoid, 1–

1.7 × 0.7–0.8 cm, inflated, thickly leathery, prominently beaked. Fl. Apr–Jul, fr. Jul–Sep. $2n = 16$.

Hillsides, gravelly and sandy areas, in both damp and dry riparian sites; 1300–3300 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Xinjiang [Mongolia, Russia].

In *Oxytropis squammulosa*, there is a great variation in corolla color, and the presence of squamellae on the calyx and fruit is variable within a population or even on an individual plant.

6. *Oxytropis* sect. *Falcicarpae* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 9: 41. 1989 [*“Falcicarpa”*].

镰荚棘豆组 lian jia ji dou zu

Herbs, caulescent or acaulescent, glandular viscid. Leaves imparipinnate; leaflets not or rarely verticillate. Racemes 2–10-flowered; peduncle 1.5–10 cm or longer, shorter than to equaling leaves. Corolla standard usually orbicular, not contracted in middle, not widened at basal half, and without auricles.

- Two species: China.

1a. Plants caulescent, internodes apparent; stipules herbaceous; corolla wings emarginate at apex 26. *O. tudanensis*
1b. Plants acaulescent, without visible internodes; stipules membranous; corolla wings rounded at apex 27. *O. falcata*

26. *Oxytropis tudanensis* X. Y. Zhu, H. Ohashi & Si Feng Li, J. Jap. Bot. 74: 130. 1999.

土丹棘豆 tu dan ji dou

Herbs, to ca. 5 cm tall, caulescent, from a partially subterranean many-branched caudex. Stem with 1 or more apparent internodes, densely glandular or with yellowish brown trichomes. Stipules broadly ovate, 4–5 × 2–3 mm, herbaceous, pubescent, basally connate. Leaves 2–4 cm, 13–17-foliolate; petiole and rachis with yellowish brown trichomes; leaflet blades elliptic to ovate, 3.6–4.7 × 2.1–3.1 mm, both surfaces with glandular or yellowish brown trichomes. Racemes capitate, 2–5-flowered; peduncle 2–4 cm, shorter than leaves, sometimes with glands; bracts linear to narrowly elliptic, 4–5 × 0.4–0.5 mm, yellowish brown pubescent. Calyx cylindric, ca. 5 × 1.4 mm; lobes subulate, ca. 2.5 × 0.3 mm, subequal. Corolla bluish violet; standard ca. 8.6 × 8 mm, lamina broadly ovate, apex ± emarginate; wings ca. 7 mm, lamina narrowly obovate, apex emarginate; keel ca. 6 mm, beak ca. 0.4 mm. Legume unknown. Fl. Jul–Aug.

- Hillsides; 2800–4900 m. Gansu, Xizang.

27. *Oxytropis falcata* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 156. 1874.

镰荚棘豆 lian jia ji dou

Oxytropis hedinii Ulbrich; *O. holdererii* Ulbrich; *O.*

popovii Vassilczenko.

Herbs, 3–35 cm tall, acaulescent, from a multiheaded caudex, tuft-forming, clothed with marcescent petioles and stipules. Stipules narrowly triangular, ca. 10 × 3 mm, membranous, whitish or yellowish villous and sometimes with obscure glands, often with adherent sand grains, basally connate. Leaves 5–20 cm; leaflets opposite or alternate, some nearly or actually verticillate, either 11–19, 25–31, or 27–47 blades; leaflet blades lanceolate, oblong, or ovate, 5–15 × 1–4 mm, ± involute, with whitish long trichomes. Racemes rather lax, 5–10-flowered; peduncle (1.5–)3.5–10(–15) cm, subequal to or shorter than leaves; bracts triangular, 8–14 × 3–4(–6) mm, herbaceous, with trichomes and raised yellowish glands. Calyx cylindric, 10–18 × 3–4 mm, with whitish and blackish trichomes and dense glands or glands lacking; lobes subulate, 2.5–5 × ca. 0.5 mm. Corolla purple, pink, purplish white, blue, purplish blue, violet, red, or white; standard 2.4–2.6 cm, lamina ovate; wings 2–2.4 cm, lamina obovate, apex rounded; keel 1.9–2 cm, beak 1.1–2.5 mm. Legume reddish when young, erect-ascending, stipitate; stipe to 1.8 mm; body falcate-oblong, 2.2–5 cm × 4–8 mm, slightly inflated, leathery, villous and with or without glands. Fl. May–Aug, fr. Jul–Sep.

- Sunny slopes, river floodplains, riverside meadows, hillsides, grasslands, alpine meadows, sandy and stony areas, valley bottoms, desert grasslands, flooded places, *Picea* forests; 2700–5200 m. Gansu, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang.

7. *Oxytropis* sect. *Mesogaea* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 38. 1874.

长茎棘豆组 chang jing ji dou zu

Herbs, caulescent (but acaulescent in some *Oxytropis maqinensis*), with (1 or)2–6 conspicuous internodes, non-glandular (except *O. tudanensis*). Leaves with leaflets not verticillate. Racemes 6- to many flowered; peduncle 1.5–25 cm or longer, shorter to longer than leaves. Corolla standard broadly ovate, not contracted in middle, not widened at basal half, and without auricles. Legume shortly stipitate or stipitate; body cylindrical, narrowly ellipsoid, ovoid, or obovoid.

Thirty-two species: Afghanistan, Bhutan, China, India, Iran, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; 32 species (18 endemic) in China.

- 1a. Corolla yellow, pale yellowish, white, or rarely red.
- 2a. Corolla white, keel beak (0.5–)2.5–3 mm; bracts 5–10 mm 28. *O. mutans*
- 2b. Corolla yellow, pale yellowish, or rarely red, keel beak 0.2–1 mm; bracts 1.5–7(–8) mm.
- 3a. Corolla standard 6–7 mm; calyx ca. 4 mm; bracts ca. 1.5 mm 40. *O. sinkiangensis*
- 3b. Corolla standard 8–17 mm; calyx 5.8–11.4 mm; bracts 2–8 mm.
- 4a. Bracts ca. 2 mm; corolla standard 0.8–0.9 cm, keel ca. 6.7 mm; legume stipe ca. 7 mm 44. *O. gueldenstaedtioides*
- 4b. Bracts 4–8 mm; corolla standard 0.9–1.7 cm, keel 7–14 mm; legume stipe to 2 mm.
- 5a. Calyx 7–10 mm, lobes 3.5–4.5 mm.
- 6a. Leaves 11–15-foliolate; peduncle 10–35 cm; legume body 2–3 × 0.5–0.6 cm 42. *O. meinshausenii*
- 6b. Leaves 15–29-foliolate; peduncle 3–12 cm; legume body 1.5–2 × 1–1.5 cm 43. *O. pilosa*
- 5b. Calyx 5.8–11.5 mm, lobes 2–8 mm.
- 7a. Leaflet blades 2.5–3 cm; calyx 5.8–7.2(–8.5) mm 41. *O. ochrocephala*
- 7b. Leaflet blades 0.5–2(–3) cm; calyx 6.5–11.5 mm.
- 8a. Legume body (1–)1.5–2.5 cm; bracts ca. 4 mm 45. *O. ochroleuca*
- 8b. Legume body 0.8–1.2 cm; bracts 6–7 mm 46. *O. kansuensis*
- 1b. Corolla blue, purple, bluish purple, pale purple, or violet.
- 9a. Plants with impressed yellow glands; leaflets at least moderately spaced; racemes
2–6-flowered; beak of corolla keel 0.4–0.7 mm 26. *O. tudanensis* (*O. sect. Falcicarpae*)
- 9b. Plants non-glandular; leaflets variously arranged; racemes variously flowered; beak
of corolla keel various.
- 10a. Plants (3–)4–10(–12) cm tall.
- 11a. Leaves (0.5–)1–3 cm, 9–15-foliolate; leaflet blades (1–)2–5 mm 30. *O. tianschanica*
- 11b. Leaves 2–8 cm, 15–25(–29)-foliolate; leaflet blades 3–10(–12) mm.
- 12a. Racemes many flowered; corolla standard 5–9(–14) mm.
- 13a. Leaves 5–20 cm; leaflet blades 5–25 × 2–9 mm; peduncle 7–25 cm or more 32. *O. deflexa*
- 13b. Leaves 2–5(–8) cm; leaflet blades 3–10(–12) × 1.5–5 mm; peduncle 1.4–6(–8) cm.
- 14a. Calyx 4–5 mm; corolla standard 5–9 mm, keel beak ca. 0.3 mm 34. *O. hirsutiuscula*
- 14b. Calyx 5–7 mm; corolla standard 9–14 mm, keel beak 1.5–2 mm 49. *O. dichroantha*
- 12b. Racemes (4–)6–8(or 9)-flowered; corolla standard (9–)11–13(–15) mm.
- 15a. Plants 8–12 cm tall; leaves (17 or)19- or 21-foliolate; peduncle 7–11 cm; calyx ca. 4 mm 38. *O. chinglingensis*
- 15b. Plants 3–7 cm tall; leaves 9–19-foliolate; peduncle 2–9 cm; calyx 5–9 mm.
- 16a. Leaves 11–19-foliolate; leaflet blades 7–15 mm; racemes 7–9-flowered; corolla
standard 1.2–1.3(–1.5) cm 48. *O. hirsuta*
- 16b. Leaves 9- or 11-foliolate; leaflet blades 2.5–6 mm; racemes 2–5-flowered; corolla
standard 0.9–1.1 cm 56. *O. latialata*
- 10b. Plants (3–)10–80(–100) cm tall.
- 17a. Leaves 21-foliolate or more on at least some leaves (only to 23-foliolate in *O. maqinensis* and *O. xinglongshanica*).
- 18a. Corolla standard 1–1.2 cm, keel beak 0.2–0.5 mm; legume stipe 1.5–2 mm, body 1.2–1.6 cm 47. *O. qinghaiensis*
- 18b. Corolla standard (0.5–)0.7–1.6 cm; keel beak, legume stipe, and legume body not
simultaneously within same range as above.
- 19a. Calyx 7.5–11(–11.2) mm; corolla standard 1.5–1.6 cm 52. *O. maqinensis*
- 19b. Calyx (2.2–)4–8(–10) mm; corolla standard (0.5–)0.7–1.5 cm.
- 20a. Racemes 3–10(–15)-flowered.
- 21a. Calyx lobes 1.5–2 mm; corolla standard (0.5–)0.7–0.8(–1) cm; legume 3–5 mm in diam. 50. *O. glabra*
- 21b. Calyx lobes 2.5–4.7 mm; corolla standard (1–)1.1–1.4 cm; legume 7–12 mm in diam. 58. *O. melanocalyx*
- 20b. Racemes many flowered.
- 22a. Corolla wings (5–)6–7 mm, keel beak 0.2–0.5 mm 50. *O. glabra*
- 22b. Corolla wings 8–14 mm, keel beak 0.5–2.5 mm.
- 23a. Leaves 5–6 cm; peduncle ca. 6 cm 55. *O. densiflora*
- 23b. Leaves (3–)5–20 cm; peduncle mainly over 6 cm.
- 24a. Corolla standard 0.8–1.2 cm, keel 0.7–0.9 cm; calyx (3–)5–7(–8) mm.
- 25a. Corolla standard 0.8–0.9 cm, keel 8–9 mm; leaflets pilose or adaxially glabrous 32. *O. deflexa*
- 25b. Corolla standard 0.8–1.2 cm, keel 7–8 mm; leaflets with trichomes 57. *O. lapponica*
- 24b. Corolla standard 1–1.5 cm, keel (0.9–)1–1.3 cm; calyx (7–)8(–10) mm.
- 26a. Leaflet blades 14–20 mm; beak of corolla keel 1.5–1.7 mm 54. *O. xinglongshanica*
- 26b. Leaflet blades 3–14 mm; beak of corolla keel 1–1.5 mm.
- 27a. Stipules 10–12 mm; legume 10–15 × 3–4 mm 29. *O. penduliflora*
- 27b. Stipules 6–8 mm; legume (17–)20–25 × (7–)8–10 mm 53. *O. giraldii*

- 17b. Leaves 9–21-foliolate (rarely 25-foliolate in *O. podoloba* and *O. zekogensis*).
- 28a. Plants 3–4 cm tall; leaves 9- or 11-foliolate 56. *O. latialata*
- 28b. Plants (3–)5–80(–100) cm tall; leaves (7–)11–21(–29)-foliolate.
- 29a. Plants 3–13 cm tall; racemes 6–9-flowered.
- 30a. Leaves 1.5–4 cm; leaflet blades 4–7 mm; corolla standard 0.9–1 cm, keel beak short; legume body 1–1.2 cm 31. *O. gerzeensis*
- 30b. Leaves 5–9 cm; leaflet blades 7–15 mm; corolla standard 1.2–1.3 cm, keel beak 2.5–3 mm; legume body 1.5–2 cm 48. *O. hirsuta*
- 29b. Plants (5–)10–80(–100) cm tall; racemes 3–9-flowered or more.
- 31a. Racemes 3–12-flowered.
- 32a. Racemes 3–5-flowered, dense or compact 39. *O. sitaipaiensis*
- 32b. Racemes 3–12-flowered, rather lax.
- 33a. Corolla keel 1–1.4 cm; stipules ca. 3 mm; bracts ca. 1.5 mm 36. *O. taochensis*
- 33b. Corolla keel ca. 0.8 cm; stipules 5–7 mm; bracts 3–6 mm 37. *O. zekogensis*
- 31b. Racemes 8- to many flowered.
- 34a. Leaflet blades 1.4–2 cm; corolla standard 1.1–1.5 cm, wings 1.1–1.4 cm 54. *O. xinglongshanica*
- 34b. Leaflet blades (0.4–)0.5–1.4 cm (but to 2.5 cm in *O. glabra*); corolla standard (0.5–)0.6–1 cm, wings 0.5–1 cm.
- 35a. Calyx 6–8 mm, lobes 3–4 mm 59. *O. subpodoloba*
- 35b. Calyx (2.2–)4–5 mm, lobes 1.2–2.5 mm.
- 36a. Leaves 2–4 cm; peduncle 1.5–3 cm; corolla wings ca. 5.5 mm 35. *O. ganningensis*
- 36b. Leaves (3–)5–15 cm; peduncle (2–)4.5–20 cm; corolla wings (5–)6–10 mm.
- 37a. Calyx lobes 2.4–2.5 mm; corolla wings ca. 10 mm; leaflet blades oblong 51. *O. podoloba*
- 37b. Calyx lobes 1.2–2 mm; corolla wings (5–)6–8 mm; leaflet blades linear, lanceolate, ovate-lanceolate, narrowly ovate, or elliptic.
- 38a. Leaflet blades ca. 1 mm wide; racemes (1–)4–7 cm; beak of corolla keel ca. 1.5 mm ... 33. *O. yekenensis*
- 38b. Leaflet blades (1–)3–7 mm wide; racemes 4–7 cm; beak of corolla keel 0.2–0.5 mm 50. *O. glabra*

28. *Oxytropis nutans* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 61. 1866.

垂花棘豆 chui hua ji dou

Oxytropis qiemoensis H. Ohba, S. Akiyama & S. K. Wu.

Herbs, 14–50 cm tall, caulescent, with 1 or more apparent internodes, arising from much-branched caudex, sericeous with long trichomes. Stipules with a linear-lanceolate to triangular free part, with dense white trichomes, basally adnate to petiole, basal ca. 1/3 to most of length connate. Leaves 7–10 cm, 19–41-foliolate; petioles 3–4 cm, shorter than rachis, with spreading dense white trichomes and glands between petiole and rachis; leaflet blades ovate, lanceolate-ovate, oblong-lanceolate, or broadly ovate, 5–18 × 2–8 mm, both surfaces with spreading to ascending dense trichomes or sparsely yellow sericeous, base rounded, apex acute. Racemes at first compact but later elongating, 6–12 cm, many flowered; peduncle as long as or slightly longer than leaves, thick, with spreading dense white trichomes and apically mixed with pale yellow and black trichomes; bracts linear to linear-lanceolate, 5–10 mm, with trichomes. Flowers spreading-descending. Calyx campanulate, 7–10 mm, with mixed black and white trichomes; lobes linear, 2.5–3(–4) mm. Corolla yellow, bluish purple, or white; standard 1.5–2 cm, lamina ovate, apex emarginate; wings oblong, 1.4–1.6 cm, apex 2-lobed; keel 1.2–1.3 cm, beak (0.5–)2.5–3 mm. Legume stipitate; stipe ca. 2 mm; body oblong-ovoid to narrowly cylindrical, 1.4–1.8 × 0.4–0.5 cm, pendulous, thickly membranous, 1(or 2)-locular, densely black sericeous, apex acute. Fl. May–Jul, fr. Jun–Jul.

Valleys, forest margins, gravelly subalpine areas; 2500–4100 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

29. *Oxytropis penduliflora* Gontscharov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 186. 1940.

藍垂花棘豆 lan chui hua ji dou

Herbs, 14–33 cm tall, caulescent, with 1 or 2 or sometimes more apparent internodes, arising from a branched superficial or subterranean caudex. Stipules 1–1.2 cm, green, with long trichomes, margin ciliate. Leaves 5–16 cm, 21–31-foliolate; leaflet blades lanceolate to ovate-lanceolate, 3–14 × 2.5–5 mm, with appressed long trichomes, base rounded to acute, margin ciliate, apex acute. Racemes rather lax, 20–30-flowered; peduncle (6–)10–15(–17) cm, thick, much longer than leaves, with spreading trichomes and apically with dark brown and white trichomes; bracts linear-lanceolate, 3–7 mm, herbaceous, with long trichomes, margin ciliate, apex acute. Flowers spreading to declined. Calyx broadly cylindrical, 8–10 mm, with reddish yellow or white long trichomes and black trichomes; lobes linear to subulate, ca. 4 mm. Corolla blue; standard 1.3–1.5 cm, lamina orbicular-ovate, apex emarginate; wings ca. 1.2 cm, lamina oblong, apex rounded to emarginate; keel ca. 1.1 cm, beak ca. 1 mm. Legume shortly stipitate; body cylindrical, 10–15 × 3–4 mm, pendulous, membranous, with spreading black, white, or reddish black short trichomes. Fl. Jun–Jul, fr. Jul–Aug.

Dry hillsides, gravelly areas, alpine meadows; 2000–4100 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

30. *Oxytropis tianschanica* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 43. 1869.

天山棘豆 tian shan ji dou

Oxytropis brachycarpa Vassilczenko; *O. pulvinata* Saposchnikow.

Herbs, 4–5 cm tall, caulescent, from a multiheaded caudex, mat-forming, grayish white pubescent. Stems prostrate and diffuse, \pm mat-forming, with 1–4 or more apparent internodes, with appressed dense white trichomes. Stipules ovate-lanceolate, 3–5 mm, herbaceous, densely white pilose, adnate to petiole for most of length, basally connate. Leaves (0.5–)1–3 cm, 9–15-foliolate; petiole and rachis with spreading white trichomes; leaflets densely arranged; leaflet blades broadly elliptic to lanceolate, (1–)2–5 \times 1–3 mm, both surfaces with dense white trichomes, margin ciliate. Racemes compact, 5–10-flowered; peduncle 1.5–3.5 cm, as long as or longer than leaves, with white trichomes; bracts lanceolate, 3–5 mm, longer than pedicels, with white trichomes. Calyx cylindric, (5.5–)6–10 mm, densely villous with spreading long trichomes and black short trichomes; lobes subulate, as long as or sometimes slightly longer than tube. Corolla purple; standard 0.8–1.2 cm, lamina orbicular, apex \pm emarginate; wings oblong, 8–9 mm; keel 6–7 mm, beak (0.5–)1–1.5 mm. Legume stipitate; stipe 1–2 mm; body broadly ellipsoid-oblong, 10–15 \times 3–5 mm, thickly membranous, 2-locular, with white and black trichomes intermixed, septum ca. 0.3 mm wide, adaxial suture deeply grooved. Fl. Jun–Aug, fr. Jul–Aug. $2n = 16$.

Floodplain grasslands, saline grassy areas, sandy areas by rivers, rocky alpine areas; 3000–4400 m. Xinjiang, Xizang [Kyrgyzstan, Tajikistan].

31. *Oxytropis gerzeensis* P. C. Li, Fl. Xizang, 2: 859. 1985.

改则棘豆 *gai ze ji dou*

Herbs, 8–13 cm tall, caulescent, with 2 or more apparent internodes, horizontal or prostrate, with spreading sparse trichomes. Stipules herbaceous, with spreading trichomes, free from petiole, basal half connate. Leaves 1.5–4 cm, 12–17(–21)-foliolate; leaflet blades oblong, ovate-oblong, or lanceolate, 4–7 \times 2.5–3 mm, both surfaces densely sericeous with long trichomes. Racemes dense, 6–8-flowered; peduncle 2.5–4 cm, slender, slightly shorter than to as long as leaves, basally with appressed white and black long trichomes, apically with dense black ones; bracts narrowly lanceolate, shorter than calyx. Calyx 5.5–6 mm, with dense black short trichomes; lobes shorter than tube. Corolla purple; standard 8.5–10 mm, lamina broadly ovate, apex emarginate; wings 8–9 mm, lamina oblong, apex with 2 unequal lobes; keel shorter than wings, beak short. Legume (immature) shortly stipitate; body ovoid to ellipsoid, 10–12 \times 5–6 mm, tapering to a beak. Fl. and fr. Sep.

• Meadows; 3400–5200 m. Qinghai, Xinjiang, Xizang.

32. *Oxytropis deflexa* (Pallas) Candolle, Astragalogia, 96. 1802.

急弯棘豆 *ji wan ji dou*

Astragalus deflexus Pallas, Acta Acad. Sci. Imp. Petrop. 2: 268. 1779; *A. parviflorus* Lamarck; *A. retroflexus* Pallas.

Herbs, 2–12 cm tall, caulescent or less commonly acaulescent, with (0 or)1–7 apparent internodes, from a few- or several-headed caudex, subprostrate, with spreading or retrorse trichomes. Stipules lanceolate, herbaceous, with long trichomes, basally adnate to petiole, apex acute. Leaves 5–20 cm, (15–)21–31(–41)-foliolate; leaflet blades ovate-oblong, ovate, lanceo-

late-oblong, or lanceolate, 5–25 \times 2–8 mm, both surfaces pilose or adaxially glabrous, base rounded, apex acute. Racemes at first dense, becoming lax, 13–30-flowered; peduncle 7–25 cm or sometimes longer, villous-pilose; bracts linear, almost as long as calyx, membranous. Flowers declined. Calyx campanulate, (3–)6–7(–8) mm, with white and black trichomes intermixed; lobes lanceolate, as long as or shorter than tube. Corolla pale bluish purple; standard 8–9 \times ca. 5 mm, lamina obovate, apex rounded to emarginate; wings as long as standard, longer than keel, apex rounded; keel 8–9 mm, beak ca. 1 mm. Legume stipitate; stipe 2–4 mm; body oblong-ovoid, 10–20 \times 4–5 mm, pendulous, membranous, 1-locular, with spreading long trichomes, apex with a beak. Fl. and fr. Jun–Jul. $2n = 16$.

Gravelly slopes, valleys, among shrubs; 1600–3700 m. Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [Mongolia, Russia; North America].

33. *Oxytropis yekenensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 68. 1999.

野克棘豆 *ye ke ji dou*

Herbs, 15–25 cm tall, caulescent, with 1–3(or 4) apparent internodes, clump-forming from a well-developed multiheaded caudex, \pm whitish pubescent. Stipules subulate, 3–3.5 \times ca. 0.8 mm, with appressed trichomes, distinct or sometimes basally connate. Leaves 7–9 cm, laxly 15–19-foliolate; leaflet blades linear to narrowly ovate, 8–13 \times ca. 1 mm, margin involute, apex acute. Racemes lax, (1–)4–7 cm, many flowered; peduncle 7–19 cm or more, typically much longer than leaves; bracts linear-triangular, ca. 1.5 \times 0.2 mm, with whitish trichomes. Calyx campanulate, 4–4.5 \times ca. 2 mm, with whitish trichomes; lobes subulate, 1.2–2 \times ca. 0.2 mm. Corolla purple; standard 8–9 mm, lamina broadly ovate and 6–6.5 \times 5–5.5 mm, basally tapering into claw, apex rounded; wings ca. 8 mm, lamina oblong, apex rounded; keel ca. 8 mm, beak ca. 1.5 mm. Legume covered with trichomes when immature. Fl. May, fr. May.

• Hilly slopes; ca. 1400 m. Xinjiang.

34. *Oxytropis hirsutiuscula* Freyn, Bull. Herb. Boissier, sér. 2, 5: 1021. 1905.

短硬毛棘豆 *duan ying mao ji dou*

Oxytropis glabra Candolle var. *pamirica* B. Fedtschenko.

Herbs, 3–10 cm tall, caulescent, arising from a deeply subterranean multiheaded caudex. Stems very slender, with 3 or more apparent internodes, many branched, with whitish trichomes. Stipules with a broadly lanceolate distinct part, 4–6 mm, with sparse trichomes, adnate to petiole, basal half connate. Leaves 2–8 cm, 15–21-foliolate; leaflet blades ovate-oblong, oblong, elliptic, or lanceolate, 3–10 \times 1.5–3 mm, both surfaces with appressed white stiff trichomes. Racemes compact to rather lax, many flowered; peduncle 1.5–4.5 cm, shorter than leaves; bracts lanceolate, 2–3 mm, membranous, with sparse black trichomes, margin ciliate, apex acute. Calyx campanulate, 4–5 mm, with black and white trichomes intermixed; lobes subulate, ca. 1/2 as long as tube. Corolla purple; standard 5–9 mm, lamina orbicular, apex emarginate; wings almost as long as standard; keel slightly shorter than wings, beak ca. 0.3 mm. Legume stipitate; stipe to ca. 2.5 mm; body broadly cylindrical,

8–15 × 3–5 mm, pendulous, membranous, with appressed black short trichomes, abaxial suture round, adaxial suture deeply grooved, beak 1–2 mm. Fl. Jun–Aug, fr. Aug–Sep.

Meadows in alpine areas and along riversides; 3800–4300 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Russia (W Siberia), Tajikistan, Turkmenistan, Uzbekistan].

35. *Oxytropis ganningensis* C. W. Chang, Acta Phytotax. Sin. 23: 229. 1985.

陇东棘豆 long dong ji dou

Herbs, 35–50 cm tall or more, caulescent, from a simple or branched caudex. Stems thin, decumbent or sprawling, with 4 or more apparent internodes, with many branches, subglabrous or with spreading sparse white trichomes. Stipules subulate to triangular, with a 2–5 mm distinct part, with subspreading sparse white trichomes, apex acuminate. Leaves 2–4 cm, 7–17-foliolate; petiole ca. 2 mm; petiole and rachis with spreading sparse to dense white trichomes; leaflet blades linear-oblong to linear, 5–14 × 1–2 mm, both surfaces with subspreading white trichomes, base cuneate to subrounded, margin slightly incurved, apex acute. Racemes spiciform, 1.5–3.5 cm, many flowered; peduncle 1.5–3 cm, densely appressed pubescent; bracts subulate, 2–3 mm, densely appressed pubescent. Flowers 6–9 mm. Pedicel ca. 1 mm. Calyx often purplish, tubular-campanulate, ca. 5 mm, sparsely appressed pubescent; lobes subulate, 1–2 mm. Corolla blue; standard 6–9 mm, apex rounded; wings ca. 5.5 mm, lamina obliquely oblong, apex obtuse; keel ca. 5.5 × 1.5 mm, beak ca. 0.5 mm. Legume sessile or with a stipe to 1 mm; body ellipsoid, 10–12 × 3–4 mm, slightly inflated, subleathery, with subspreading white trichomes, septum ca. 0.5 mm wide, apex acute, beak 2.5–3 mm and recurved. Fl. Aug–Sep, fr. Sep–Oct.

• Valleys, grasslands on hillsides; 1100–1200 m. Gansu, Ningxia.

36. *Oxytropis taochensis* Komarov, Repert. Spec. Nov. Regni Veg. 13: 232. 1914.

洮河棘豆 tao he ji dou

Herbs, (5–)10–30 cm tall, caulescent, from a much-branched subterranean rhizomatous caudex, clump-forming. Stems thin, diffuse, with 2–6 apparent internodes, with short pubescence. Stipules ovate-lanceolate, ca. 3 mm, with short trichomes, basally connate, apex acute. Leaves (3–)5–8(–10) cm, (9–)13–17-foliolate; leaflet blades elliptic, ovate, broadly ovate, suborbicular, or lanceolate-ovate, 5–10 × 2–4 mm, both surfaces with appressed stout trichomes, base rounded, apex acute to rounded. Racemes compact but becoming elongate and lax in fruit, 3–10-flowered or more; peduncle 3.5–11.5 cm, longer than leaves, with short pubescence; bracts lanceolate, ca. 1.5 mm, almost as long as pedicels, membranous. Calyx campanulate, (5.2–)6–7.5(–10) mm, with black and white trichomes intermixed; lobes subulate, 2–3.5(–4.5) mm. Corolla purple and bluish purple; standard 10–14.2 × 6–8 mm, lamina obovate to ovate, apex rounded to emarginate; wings 10–13.5 × ca. 3 mm, lamina narrowly elliptic, apex 2-lobed; keel 1–1.4 cm, beak (0.5–)2.5–3.5 mm. Legume stipitate; stipe as long as calyx; body cylindrical, 2–3 × ca. 0.5 cm, erect or slightly incurved, inflated, 1-locular, with appressed short pubescence. Fl. Jun–Jul, fr. Jul–Sep.

• Meadows, roadsides, hilltops, sandy sites in valleys; 2000–3400 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan.

37. *Oxytropis zekogensis* Y. H. Wu, Acta Phytotax. Sin. 35: 350. 1997.

泽库棘豆 ze ku ji dou

Herbs, 20–40 cm tall, caulescent, from a superficial caudex. Stems purplish, prostrate to erect-ascending, with sparsely spreading white pubescence. Stipules with an ovate-lanceolate to lanceolate free part, 5–7 mm, with sparse trichomes, basal ca. 1/3 connate. Leaves 3–8 cm, 13–21(–25)-foliolate; petiole of basal leaves 0.2–2 cm but apical leaves sessile; rachis with spreading long trichomes; leaflet blades ovate to lanceolate, 3–10 × 2–6 mm, both surfaces with appressed white trichomes, base rounded, apex acute. Racemes dense and remaining subcapitate or shortly elongating in fruit, 5–12-flowered; peduncle 7–15 cm, erect, sparsely white pubescent but below inflorescence densely pubescent; bracts ovate-lanceolate, 3–6 mm, with sparse trichomes. Calyx campanulate, ca. 6 × 3 mm, with blackish brown and white trichomes; lobes subulate, ca. 2 mm. Corolla violet to purple; standard 1–1.1 cm, lamina ovate, apex emarginate; wings ca. 9 mm, apex obliquely emarginate; keel ca. 8 mm, beak ca. 1 mm. Legume with a short pedicel; body elliptical to cylindrical, 10–14 × 5–6 mm, inflated, with spreading white and brown short trichomes. Fl. and fr. Sep.

• Riversides and alpine meadows; 2700–3400 m. Qinghai.

38. *Oxytropis chinglingensis* C. W. Chang, Fl. Tsinling. 1(3): 446. 1981.

秦岭棘豆 qin ling ji dou

Oxytropis humilis C. W. Chang.

Herbs, 8–12 cm tall, caulescent, arising from a multi-headed caudex, tuft-forming. Stems slender, prostrate or sometimes ascending, with 1 or more apparent internodes. Stipules lanceolate, 5–8 mm, abaxially pubescent, margin ciliate, apex acuminate. Leaves ca. 8 cm, (17 or)19- or 21-foliolate; petiole and rachis slender, sparsely pubescent; leaflet blades ovate to ovate-lanceolate, 5–10 × 3–4.5 mm, midvein with trichomes, base cuneate to rounded, apex acute to rounded. Racemes compact, (4–)6–8-flowered; peduncle 7–11 cm, sparsely pubescent; bracts lanceolate, 3–5 mm, herbaceous, abaxially pubescent. Calyx campanulate, ca. 4 × 3 mm; lobes lanceolate, ca. 2 mm, densely black strigose. Corolla color unknown; standard ca. 1.2 × 0.8 cm, lamina broadly ovate, apex emarginate; wings ca. 11 × 3 mm, lamina oblong, apex emarginate; keel ca. 1.1 cm, beak ca. 0.5 mm. Legume shortly stipitate; body oblong-cylindrical, 9–13 × 4–5 mm, inflated, papery, with black trichomes, 1-locular, 8–12-seeded, adaxial suture slightly convex, apex acute, beak curved. Fl. May–Jul, fr. Jul–Aug.

• Sunny grasslands, meadows on sunny slopes; 1800–3900 m. Shaanxi, Xizang.

39. *Oxytropis sitaipaiensis* T. P. Wang ex C. W. Chang, Fl. Tsinling. 1(3): 446. 1981.

西太白棘豆 xi tai bai ji dou

Herbs, 10–13 cm tall, caulescent, arising from a multi-

headed buried caudex. Stems slender, caespitose, spreading, ascending, or erect, with 2 or more apparent internodes. Stipules narrowly triangular, 3–5 mm, membranous, with sparse trichomes, basally connate, margin ciliate, apex acute. Leaves 5–10 cm, 13–21-foliolate; petiole and rachis thin, sparsely pubescent; leaflet blades ovate, ovate-lanceolate, or elliptic, 8–10 × 2–4 mm, both surfaces with subappressed white trichomes, base rounded, apex acute. Racemes rather lax, 3–5-flowered; peduncle 5–6 cm, as long as or shorter than leaves, with sparse trichomes; bracts subulate, ca. 2 mm, membranous, sparsely pilose. Calyx campanulate, ca. 4 × 3 mm; lobes linear, 2–3 mm. Corolla purplish; standard ca. 11 × 3 mm, lamina elliptic; wings ca. 1 cm, lamina oblong, apex rounded; keel ca. 9.5 mm, beak ca. 1.5 mm. Legume stipitate; stipe ca. 7 mm; body oblong-ellipsoid, ca. 2.3 × 0.4 cm, inflated and slightly flattened, 1-locular, with dense white short trichomes, base narrowly cuneate, apex acute, beak ca. 3 mm. Fl. May–Jun, fr. Jun–Aug.

- Gravelly valley bottoms, hillsides; 1800–2000 m. Shaanxi.

1a. Leaves almost sessile 39a. var. *sitaipaiensis*
1b. Leaves with a 1–3 mm petiole 39b. var. *brevidentata*

39a. *Oxytropis sitaipaiensis* var. *sitaipaiensis*

西太白棘豆(原变种) xi tai bai ji dou (yuan bian zhong)

Leaves almost sessile. Fl. May–Jun, fr. Jul–Aug.

- Gravelly valley bottoms; ca. 1800 m. Shaanxi.

39b. *Oxytropis sitaipaiensis* var. *brevidentata* (C. W. Chang)
X. Y. Zhu & H. Ohashi, *Cathaya* 11–12: 112. 2000.

短萼齿棘豆 duan e chi ji dou

Oxytropis melanocalyx Bunge var. *brevidentata* C. W. Chang, *Fl. Tsinling* 1(3): 445. 1981.

Leaves with a 1–3 mm petiole. Fl. Jun, fr. Jun.

- Hillsides; ca. 2000 m. Shaanxi (Yangxian).

40. *Oxytropis sinkiangensis* S. H. Cheng ex C. W. Chang, *Acta Bot. Boreal.-Occid. Sin.* 8: 13. 1988.

新疆棘豆 xin jiang ji dou

Herbs, 10–60 cm tall, caulescent, evidently clump-forming from a superficial caudex. Stems erect or spreading-ascending, with spreading white short trichomes. Stipules triangular-lanceolate, 8–11 mm, herbaceous, with appressed trichomes, distinct, apex acuminate. Leaves 5–10 cm, 7–19-foliolate; petiole and rachis adaxially sulcate, with spreading white trichomes; leaflet blades oblong, broadly lanceolate, or oblong-ovate, 1.5–3 × 0.6–1 cm, with appressed white long trichomes, base rounded, apex acute. Racemes elongate and further elongating in fruit, many flowered; peduncle 7–20 cm, as long as or longer than leaves, basally with dense trichomes; bracts subulate, ca. 1.5 mm, membranous, with white long trichomes. Calyx campanulate, ca. 4 mm, with spreading dense white long trichomes sometimes mixed with appressed black short trichomes; lobes linear, ca. 1 mm. Corolla yellow; standard 6–7 mm, lamina orbicular and 4–5 mm wide, apex emarginate; wings ca. 5.5 mm, lamina oblong, apex emarginate; keel ca. 4 mm, beak ca. 0.3 mm. Legume stipitate; stipe ca. 4 mm; body oblong, pendulous,

inflated, thickly membranous, vesicular, 1-locular, without a septum, with semispreading white trichomes, beak ca. 2 mm. Fl. Jul–Aug, fr. Aug–Sep.

- Wastelands; 500–1000 m. Gansu, Xinjiang.

41. *Oxytropis ochrocephala* Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 22(1): 57. 1874.

黄花棘豆 huang hua ji dou

Herbs, 10–56 cm tall, caulescent, arising from a multi-headed caudex, tuft-forming. Stems erect or sprawling, with 2–5 or more apparent internodes, yellowish pilose. Stipules ovate with a triangular distinct part, herbaceous to papery, with dense to sparse long trichomes, free from petiole, basally connate. Leaves 3–19 cm, (11 or) 13–27(–39)-foliolate; rachis with pale brown glands and yellow long trichomes; leaflet blades ovate-lanceolate, 2.5–3 × 0.2–1 cm, both surfaces strigose with sparse short or long trichomes. Racemes compact, 8–14-flowered or more; peduncle (3.5–)10–25 cm, as long as to much longer than leaves, erect, with incurved long trichomes or strigose; bracts linear-lanceolate, ca. 4 mm, with dense trichomes. Calyx cylindrical, 5.8–7.2(–8.5) mm, vesicular, membranous, with dense trichomes; lobes linear-lanceolate, 2.2–5.1 mm. Corolla yellow; standard 1–1.7 cm, lamina broadly obovate, margin entire, apex emarginate; wings 1–1.2 cm; keel 0.8–1.2 cm, beak 0.3–0.6(–1) mm. Legume shortly stipitate to subsessile; body oblong, 1.2–1.5 cm, inflated, leathery, 1-locular, with dense short trichomes, beak incurved at apex. Fl. Jun–Aug, fr. Jul–Sep.

- Grasslands, weedy slopes and alpine meadows; 1800–4500 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang.

42. *Oxytropis meinshausenii* Schrenk, *Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg* 10: 254. 1842 [*“meinshauseni”*].

萨拉套棘豆 sa la tao ji dou

Herbs, 20–45 cm tall, caulescent, from a simple or several-branched caudex. Stems erect or ascending, with 2–4 or more apparent internodes, with spreading long trichomes. Stipules narrowly triangular, ca. 1.1 cm, herbaceous to membranous, with spreading white trichomes. Leaves 7–15 cm, 11–15-foliolate; petiole and rachis with spreading long trichomes; leaflet blades oblong-lanceolate to broadly lanceolate, 1–3 × 0.3–0.8 cm, both surfaces with spreading sparse long trichomes, base rounded, apex acute. Racemes compact to lax, several to many flowered; peduncle 10–35 cm, thick, longer than leaves, with spreading dark brown trichomes; bracts lanceolate, 5–8 mm, membranous, with white and black long trichomes, apex acuminate. Calyx campanulate, 8–10 mm, with black and white short trichomes; lobes linear, 4–5 mm. Corolla yellow; standard 1.3–1.5 × 0.8–1.2 cm, lamina orbicular, apex 2-lobed; wings shorter than standard; keel as long as wings, beak 0.5–1 mm. Legume stipitate; stipe 1.5–2 mm; body oblong-ovoid, 2–3 × 0.5–0.6 cm, erect, leathery, 2-locular, with spreading black and white trichomes. Fl. Jun–Aug, fr. Jun–Aug.

- Hillsides, alpine grasslands, between stones in valleys, roadsides, *Picea* forest margins; 1600–3600 m. Gansu, Sichuan, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

43. *Oxytropis pilosa* (Linnaeus) Candolle, *Astragalologia*, 91. 1802.

疏毛棘豆 shu mao ji dou

Astragalus pilosus Linnaeus, Sp. Pl. 2: 756. 1753.

Herbs, 20–50 cm tall, caulescent, arising from a superficial multiheaded caudex. Stems thick, erect, with many branches, with 4–8 or more apparent internodes, with spreading dense long trichomes. Stipules oblong-ovate to lanceolate, (0.6–)1–1.3 cm, herbaceous, with long trichomes, adnate to base of petiole, apex acute. Leaves 5–12 cm, 15–29-foliolate; petiole and rachis sulcate, with spreading trichomes; leaflet blades elliptic to lanceolate, 1–2.3 × 0.3–1 cm, both surfaces pubescent, base rounded, apex acute. Racemes dense but slightly elongating in fruit, many flowered, basally with dense trichomes; peduncle in uppermost axils, 3–12 cm, thick, longer than leaves, with appressed long trichomes; bracts linear-lanceolate, ca. 7 mm, herbaceous, with long trichomes, apex acute. Calyx broadly cylindrical, 7–9 mm, with trichomes; lobes subulate to linear, 3.5–4.5 mm. Corolla pale yellow; standard 0.9–1.4 cm, lamina broadly ovate, apex emarginate; wings 8–11 mm; keel 7–10.2 mm, beak 0.5–1 mm. Legume lanceolate-ovoid to cylindrical, 1.5–2 × 1–1.5 cm, ascending, leathery, 2-locular, with spreading dense white trichomes, septum developed, adaxial suture grooved, apex acute. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Valleys, SW-facing hilly areas, meadows, and shrublands; 1400–4300 m. Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

44. *Oxytropis gueldenstaedtioides* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 65. 1905.

米口袋状棘豆 mi kou dai zhuang ji dou

Herbs, ca. 15 cm tall, caulescent, with trichomes or glabrous. Stems with 2–4 apparent internodes, many branched. Stipules lanceolate, rarely connate at base. Leaves 6–8 cm, sessile, 27–39-foliolate; leaflet blades ovate-elliptic, 5–10 × 2–4 mm, abaxially with appressed lax trichomes, adaxially glabrous, base rounded, apex acute. Racemes few flowered; peduncle 6–8 cm; bracts linear, ca. 2 mm. Calyx broadly cylindrical, 8–10 × 2–3 mm, with lax white trichomes; lobes subulate, 4–7 mm. Corolla yellow; standard 8–9 mm, lamina obovate, apex emarginate; wings shorter than standard, apex obliquely emarginate; keel ca. 6.7 mm, slightly shorter than wings, claw ca. 3.3 mm, beak ca. 1 mm. Legume stipitate; stipe ca. 7 mm; body ovoid, 2–2.5 × 0.5–0.6 cm, inflated, membranous, 1-locular, glabrous or subglabrous, beak ca. 5 mm. Fl. Jun–Jul, fr. Jun–Jul.

• Grasslands on hillsides. Gansu, Shaanxi.

45. *Oxytropis ochroleuca* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 6. 1866.

淡黄棘豆 dan huang ji dou

Herbs, 5–30 cm tall, caulescent, tuft-forming, from a multiheaded caudex. Stems green, erect, with 2–4 apparent internodes, with sparse trichomes. Stipules connate as a sheath. Leaves 5–15(–19) cm, 21–33-foliolate; petiole and rachis with spreading trichomes; leaflet blades oblong-lanceolate to broadly elliptic, 8–20(–30) × 2–5(–8) mm, both surfaces green and with

sparse trichomes. Racemes ovoid-globose, dense, many flowered; peduncle 1/2–2/3 as long as leaves, with sparse white incurved trichomes and apically mixed with black short trichomes; bracts linear, ca. 4 mm, longer than calyx tube, membranous, with black trichomes. Calyx broadly cylindrical, 7–8 mm, with sparse black trichomes; lobes lanceolate-linear, 3–4 mm. Corolla pale yellow; standard 1.2–1.6 cm, lamina orbicular-ovate, apex 2-lobed; wings 1.1–1.2 cm; keel ca. 1 cm, apically spotted, beak very short. Legume stipitate; stipe 1–1.5 mm; body cylindrical-ovoid, (1–)1.5–2.5 × 0.4–0.6 cm, pendulous, with dense black and white trichomes, adaxial suture deeply grooved, beak apex hooked. Fl. Jun–Aug, fr. Jul–Sep.

Valleys, gravelly areas; 1600–1700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

46. *Oxytropis kansuensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 38. 1874.

甘肃棘豆 gan su ji dou

Oxytropis leucocephala Ulbrich; *O. longipedunculata* C. W. Chang; *O. thionantha* Ulbrich.

Herbs, (12–)15–40(–60) cm tall, caulescent, from a multiheaded caudex. Stems apparently sprawling, with (3 or)4 or 5 conspicuous internodes. Stipules narrowly triangular, ca. 5 × 2 mm, herbaceous, villous with whitish and blackish trichomes, basally connate. Leaves (2.5–)4–14(–20) cm, erect, 17–31(–35)-foliolate; leaflet blades lanceolate, elliptic, or ovate, 5–15(–18) × 2–6(–7) mm, glabrescent or sparsely spreading white villous. Racemes 3–15-flowered; peduncle 7–21(–30) cm, erect, ± as long as leaves, glabrescent or sparsely spreading white villous; bracts triangular, 6–7 × ca. 3 mm, membranous, contrasting with petal color, with whitish and blackish trichomes. Calyx campanulate, 6.5–11.5 × 2–4 mm, with whitish and blackish trichomes; lobes subulate, 2–8 × ca. 0.5 mm, shorter than to as long as tube. Corolla yellow, pale yellow, or rarely red; standard 1–1.7 cm, lamina ovate, apex emarginate; wings 0.8–1.5 cm, lamina obovate; keel 0.8–1.3 cm, beak 0.2–1 mm. Legume stipitate; stipe 1–1.5 mm; body oblong-ovoid, 8–12 × 3–10.5 mm, inflated, papery. Fl. Jun–Aug, fr. Jul–Sep.

Subalpine or alpine meadows, hillsides, weedy areas, dry forest margins, *Picea* forests, riverside grasslands, damp areas; 2200–3000 m. Gansu, Qinghai, Sichuan, Xizang [Nepal].

47. *Oxytropis qinghaiensis* Y. H. Wu, Novon 6: 187. 1996.

青海棘豆 qing hai ji dou

Oxytropis qinghaiensis Y. H. Wu (1997).

Herbs, 15–40 cm tall, caulescent, tufted, much branched from a superficial caudex. Stems prostrate or sprawling, with (0 or)1–4 or more apparent internodes, densely white hispid. Stipules triangular-lanceolate, white hispid, basal half connate. Leaves (1.8–)5–12 cm; leaflets 13–29, opposite or subopposite, subsessile; leaflet blades ovate, ovate-lanceolate, or lanceolate, 3–12 × 2–7 mm, both surfaces densely white long pilose or pilosulose, base rounded, apex acuminate to obtuse. Racemes initially capitate, elongating to 1.5–2.5 cm in fruit, 5–13-flowered; peduncle (3–)6–16 cm, surpassing leaves, with spreading to ascending trichomes, crinkly below, straight above; bracts

lanceolate, 4–7 mm, hispid. Calyx campanulate, (5–)6–8 mm, black and white hispid; lobes 1.8–2.7 mm, shorter than to as long as tube. Corolla purple to bluish purple, turning bluish with age; standard 1–1.1 cm, lamina obovate, apex slightly emarginate; wings 0.9–1.1 cm, apex rounded; keel 8–9.5 mm, beak 0.2–0.5 mm. Legume stipitate; stipe 1.5–2 mm; body oblong, 12–16 × 4.5–7 mm, densely white and black hispid, apex hooked. Fl. Jul–Aug, fr. Aug–Sep.

• Floodplains, sunny slopes, roadsides, pebble terraces, sandy areas; 3400–4700 m. Qinghai.

Y. H. Wu named *Oxytropis qinghaiensis* twice (Novon 6: 187. 1996; Acta Bot. Boreal.-Occid. Sin. 17: 109. 1997), each time with a different type, so the two names are homonyms but also taxonomic synonyms. An apparent third homonym (Y. H. Wu, Acta Bot. Yunnan. 19: 36. 1997) is actually *O. qingnanensis*; see the comments under that species (p. 495).

48. *Oxytropis hirsuta* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 55. 1874.

长硬毛棘豆 chang ying mao ji dou

Herbs, 3–7 cm tall, caulescent, tuft-forming, from a multi-headed caudex, with spreading white long thin trichomes. Stems ascending or sometimes erect, with 2–4 or more apparent internodes. Stipules linear-lanceolate, herbaceous, not connate. Leaves 5–9 cm, 11–19-foliolate; petiole and rachis with spreading long crisp trichomes; leaflet blades lanceolate, 7–15 × 2–2.5 mm, both surfaces with long trichomes but with spreading trichomes on adaxial surface. Racemes elongate spicate, lax, 7–9-flowered; peduncle 3–9 cm, slightly shorter than to rarely as long as leaves, with spreading trichomes; bracts linear-subulate, slightly shorter to longer than calyx tube. Calyx campanulate, 7–9 mm, like bracts covered with spreading white long trichomes; lobes filiform, as long as or slightly shorter than tube. Corolla violet-purple; standard 1.2–1.3(–1.5) × 0.9–1 cm, lamina elliptic, apex rounded; wings as long as standard, apex slightly emarginate; keel shorter than wings, beak long subulate and 2.5–3 mm. Legume with a ca. 1.5 mm pedicel; body narrowly cylindrical, 1.5–2 × 0.3–0.4 cm including beak, ± 2-locular, covered with spreading white long trichomes, septum ca. 1 mm wide at adaxial suture, apex acuminate, beak ca. 3 mm. Fl. and fr. Aug.

Grasslands on hillsides, steppes on stony and dry slopes, gravelly areas, deserts; 500–1400 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (W Siberia), Tajikistan, Turkmenistan, Uzbekistan].

49. *Oxytropis dichroantha* Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 78. 1841.

色花棘豆 se hua ji dou

Oxytropis algida Bunge.

Herbs, 4–10 cm tall, acaulescent, arising from a shortly branched caudex. Stipules ovate-lanceolate, 6–7 mm, adnate to petiole at base, connate nearly to middle. Leaves 3–6(–8) cm, 17–25(–29)-foliolate; petiole and rachis spreading villous with short trichomes; leaflet blades oblong-elliptic to oblong-ovate, 3–8(–12) × 2–5 mm, both surfaces sericeous. Racemes capitate to ovoid, dense, many flowered; peduncle as long as leaves, with appressed to spreading trichomes; bracts linear-lanceolate,

as long as to slightly shorter than calyx tube, with white trichomes, sometimes with rufous trichomes intermixed. Calyx campanulate, 5–7 mm, semispreading villous with short black and longer white trichomes; lobes linear-subulate, as long as or longer than tube. Corolla pinkish violet; standard 0.9–1.4 cm, lamina broadly ovate to orbicular, apex slightly emarginate; wings as long or nearly as long as standard, lamina oblong; keel shorter than standard and wings, beak 1.5–2 mm. Legume subsessile; body oblong-ellipsoid, 7–12 × ca. 4 mm, inflated, thinly leathery, ± 2-locular, spreading villous with white long trichomes, beak 1–1.5 mm. Fl. and fr. Jul–Aug.

Stony slopes and valleys in high mountain regions; 2200–3200 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

50. *Oxytropis glabra* Candolle, Astragalologia, 95. 1802.

小花棘豆 xiao hua ji dou

Astragalus glaber (Candolle) Lamarck (1811), not Candolle (1802), nor Michaux (1803); *Oxytropis diffusa* Ledebour; *O. drakeana* Franchet; *O. glabra* var. *drakeana* (Franchet) C. W. Chang; *O. glabra* var. *tenuis* Palibin; *O. glareosa* Vassilczenko; *O. salina* Vassilczenko; *O. tenuis* Palibin.

Herbs, (8–)20–80(–100) cm tall, caulescent, tuft-forming. Stems erect (or sprawling), with 2–4 or more apparent internodes from a multiheaded caudex, with many branches, with appressed trichomes. Stipules ovate to lanceolate-ovate, herbaceous, basally connate, distinct part (2–)5–10 mm. Leaves (3–)5–15 cm, 11–29-foliolate; leaflet blades lanceolate, ovate-lanceolate, or elliptic, (4–)5–25 × (1–)3–7 mm, abaxially sparsely pubescent, adaxially glabrous or strigose, base rounded to broadly truncate, apex acute to retuse. Racemes 4–7 cm, lax, few to many flowered; peduncle (2–)5–20 cm, slightly shorter to longer than leaves; bracts narrowly lanceolate, 1–2 mm, membranous, with sparse trichomes, apex acute. Flowers spreading to declined. Calyx campanulate, (2.2–)4–5 mm, appressed white pubescent; lobes lanceolate, triangular, or subulate, 1.5–2 mm. Corolla purple to bluish purple; standard (5–)7–8(–10) mm, lamina orbicular, apex slightly emarginate; wings (5–)6–7 mm, apex rounded; keel (4.2–)5–6 mm, beak 0.2–0.5 mm. Legume stipitate; stipe 1–2.5 mm; body sub-cylindrical, 1–2 × 0.3–0.5 cm, pendulous, slightly inflated, membranous, 1-locular, with appressed white or white and black trichomes, glabrescent, beak 1–1.5 mm. Fl. Jun–Sep, fr. Jul–Sep. $2n = 16$.

Hillsides, roadsides, sandy areas, scrub, damp places, floodplains, fields, sandy flats, semistabilized sand dunes, steppes, desert meadows; 400–4400 m. Gansu, Hebei, Henan, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia].

"*Oxytropis puberula*" (Borissova, Trudy Tadzhikistansk. Bazy 2: 169. 1936) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

51. *Oxytropis podoloba* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 327. 1842.

长柄棘豆 chang bing ji dou

Oxytropis brachybotrys Bunge.

Herbs, (7–)15–35 cm tall, caulescent, arising from a multi-headed caudex, tuft-forming. Stems green to grayish green, erect or ascending, with 3–5 or more apparent internodes, with appressed to spreading trichomes. Stipules lanceolate, 4–7 mm, herbaceous, basally connate. Leaves 3–7 cm, (11 or)13–21(–25)-foliolate; leaflet blades oblong, 5–10(–12) × (1.5–)2–4 mm, both surfaces with appressed trichomes. Racemes initially compact but elongating after anthesis, 8–12-flowered; peduncle 4.5–13 cm, much longer than leaves, apically with incurved trichomes; bracts linear, with white and black trichomes. Calyx campanulate, 4.5–5 mm, with black and white trichomes; lobes lanceolate, 2.4–2.5 mm, as long as tube. Corolla purple; standard 8–10 mm, apex rounded; wings ca. 1 cm, almost as long as standard; keel 7–8 mm, beak 1.4–2 mm. Legume stipitate; stipe ca. 5 mm; body lanceolate-oblong, 1.5–2 × 0.3–0.4 cm, pendulous, thinly leathery, with long trichomes, adaxial suture deeply grooved. Fl. May–Jun, fr. Jun–Jul.

Sandy and gravelly floodplains; ca. 3900 m. Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

52. *Oxytropis maqinensis* Y. H. Wu, Acta Bot. Yunnan. 19: 34. 1997.

玛沁棘豆 ma qin ji dou

Oxytropis maqinensis var. *deformisifloris* Y. H. Wu.

Herbs, 20–40 cm tall, caulescent, from slender rhizomatous multiheaded caudex. Stems erect with 2–4 apparent internodes, sparsely short pubescent. Stipules with an ovate-lanceolate to lanceolate distinct part, 0.9–1.2 cm, with dense white long trichomes, basal half connate. Leaves 5–10(–12) × (1.5–)2–4 mm, 15–23-foliolate; petiole and rachis with sparse trichomes; petiole 0.5–4 cm; leaflet blades ovate-lanceolate to oblong, 6–17 × 2–5 mm, both surfaces with appressed white trichomes, base rounded, apex acute. Racemes dense, many flowered; peduncle 10–16 cm; bracts lanceolate to ovate-lanceolate, 6–11 mm, with dense long trichomes. Calyx broadly cylindrical, 7.5–11(–11.2) × ca. 3 mm, with dense long trichomes; lobes linear, (3–)5–6 mm. Corolla pale purple; standard 1.5–1.6 cm, lamina ovate, ca. 8 mm wide, apex emarginate; wings 1.2–1.4 cm, lamina obliquely obovate and ca. 4 mm wide, apex retuse to slightly emarginate; keel 1–1.2 cm, beak ca. 1 mm. Legume sessile, cylindrical, 1.5–2 × ca. 0.4 cm, with spreading dense white and black short trichomes, adaxial suture deeply grooved, apex acute. Fl. Jul–Aug, fr. Aug–Sep.

• Gravelly areas, sunny slopes, meadows in alpine areas; 3300–4500 m. Qinghai.

53. *Oxytropis giraldii* Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 66. 1905.

华西棘豆 hua xi ji dou

Oxytropis ningxiaensis C. W. Chang.

Herbs, 20–45 cm tall, caulescent, arising from a multi-headed caudex, subglabrous with sparse trichomes or with appressed dense yellow trichomes. Stems erect or ascending, with 2–4 or more apparent internodes. Stipules ovate-triangular, 6–8 × ca. 3 mm, with sparse trichomes, distinct. Leaves 5–10 cm, (11–)21–31-foliolate; petiole and rachis with spreading yellow

trichomes or glabrous; leaflet blades ovate-lanceolate, elliptic, or oblong, 5–14 × (2–)3–5 mm, both surfaces with yellow long trichomes, base rounded, apex acute to obtuse. Racemes rather lax in both flower and fruit, many flowered; peduncle (3–)5–14 cm; bracts narrowly lanceolate, 3–7 mm, with sparse yellow trichomes. Calyx campanulate, 7–8 mm, with spreading black trichomes; lobes lanceolate, (2–)3–4 mm. Corolla blue to purple; standard 1–1.5 cm, lamina ovate and 8–10 mm wide, apex emarginate; wings 1–1.2(–1.4) cm, lamina elliptic, apex emarginate; keel 0.9–1.2 cm, beak 1–1.5 mm. Legume stipitate; stipe ca. 5 mm; body brown, oblong, ellipsoid, or subglobose, (1.7–)2–2.5 × (0.7–)0.8–1 cm, inflated, membranous to subleathery, 1-locular, with spreading sparse trichomes, septum 0.5(–0.8) mm wide, adaxial suture deeply grooved, beak very short to 3 mm. Fl. and fr. May–Aug.

• Wastelands, forested valleys, grasslands on hillsides; 2100–3600 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan.

54. *Oxytropis xinglongshanica* C. W. Chang, Taxon 53: 806. 2004.

兴隆山棘豆 xing long shan ji dou

Herbs, 20–50 cm tall, caulescent, sparsely appressed pubescent. Stems erect, with 2–4 or more apparent internodes. Stipules ovate-lanceolate with a triangular distinct part, ca. 8 mm, herbaceous, with dense white long trichomes, connate to middle, apex acute. Leaves 6–20 cm, 19–23-foliolate; petiole and rachis adaxially sulcate, with appressed sparse trichomes; leaflet blades ovate, oblong, or lanceolate, 1.4–2 × 0.5–0.9 cm, both surfaces with appressed sparse short trichomes, base rounded to broadly cuneate, apex acute. Racemes lax, many flowered; peduncle 7–18 cm, erect, with incurved white trichomes; bracts linear to narrowly ovate, 3–5 mm, herbaceous, with white short trichomes, apex acuminate. Calyx tubular-campanulate, ca. 8 × 3 mm, with appressed black and white short trichomes; lobes linear, (2.2–)3–5 mm. Corolla purple to bluish purple; standard 1.1–1.5 cm, lamina narrowly or broadly ovate and ca. 6 or 10 mm wide, apex emarginate; wings 1.1–1.4 cm, lamina ca. 3.3 or 4.5 mm wide, apex emarginate; keel 1–1.3 cm, beak 1.5–1.7 mm. Legume pale yellow brown, stipitate; stipe 2.5–3(–6) mm; body oblong, ca. 2.2 × 0.4 cm, inflated, subleathery, 1-locular, adaxially deeply grooved, with appressed black and white trichomes, septum ca. 0.5 mm wide, beak ca. 2 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Hillsides, valleys; 1800–2600 m. Gansu.

One of us (Welsh) considers that there is no fundamental difference between this species and *Oxytropis giraldii*.

- 1a. Corolla standard with lamina narrowly ovate, 1.1–1.4 × ca. 0.6 cm; wings ca. 1.1 cm, lamina ca. 3.3 mm wide 54a. var. *xinglongshanica*
- 1b. Corolla standard with lamina broadly ovate, ca. 1.5 × 1 cm; wings ca. 1.4 cm, lamina ca. 4.5 mm wide 54b. var. *obesusicorollata*

54a. *Oxytropis xinglongshanica* var. *xinglongshanica*

兴隆山棘豆(原变种) xing long shan ji dou (yuan bian zhong)

Corolla standard with lamina narrowly ovate, 1.1–1.4 × ca. 0.6 cm; wings ca. 1.1 cm, lamina ca. 3.3 mm wide. Fl. Jun–Jul, fr. Jul–Aug.

- Hillsides; 1800–2600 m. Gansu.

54b. *Oxytropis xinglongshanica* var. *obesusicorollata* Y. H. Wu in X. Y. Zhu et al., *Legumes China*, 636. 2007.

肥冠棘豆 *fei guan ji dou*

Corolla standard with lamina broadly ovate, ca. 1.5 × 1 cm; wings ca. 1.4 cm, lamina ca. 4.5 mm wide. Fl. Jun, fr. unknown.

- Valleys; ca. 2300 m. Gansu.

55. *Oxytropis densiflora* P. C. Li, *Acta Phytotax. Sin.* 18: 372. 1980.

密叶棘豆 *mi ye ji dou*

Herbs, 10–17 cm tall, caulescent, arising from a multi-headed caudex. Stems erect to spreading, with 2–4 or more apparent internodes, with many branches, with spreading dense white and black trichomes. Stipules lanceolate, 6–10 mm, thinly membranous, with sparse to dense white long trichomes, free from petiole, basally connate. Leaves (4–)5–6 cm, densely 21–33-foliolate; petiole and rachis with spreading long trichomes; leaflet blades oblong, narrowly oblong, oblong-lanceolate, or ovate-lanceolate, (6–)7–10 × 3–5 mm, abaxially with dense trichomes, adaxially with spreading sparse to dense white long trichomes. Racemes oblong, many flowered; peduncle ca. 6 cm, almost as long as leaves, with spreading dense white or mixed black and white trichomes. Calyx campanulate, 5–7 mm, with black and white long trichomes; lobes linear, slightly shorter than to ca. 1/2 as long as tube. Corolla bluish purple to purple; standard 1–1.2 cm, lamina orbicular to broadly ovate-rhombic, apex emarginate; wings narrowly oblong, 9–10 mm, slightly concave, apex rounded; keel shorter than wings, beak 0.5–0.7 mm. Legume stipitate; stipe equaling calyx tube; body oblong-cylindric or broadly oblong, ca. 1 cm or 1.5–1.7 cm, ca. 3 mm wide, pendulous, adaxial suture grooved, with dense white and black short trichomes, septum narrow. Fl. and fr. Aug.

- Slopes, grasslands; 3200–4000 m. Gansu, Xizang.

This species was misspelled as "*Oxytropis densifolia*" in FRPS (42(2): 102. 1998).

- 1a. Legume body oblong-cylindric,
1.5–1.7 cm 55a. var. *densiflora*
1b. Legume body broadly oblong,
ca. 1 cm 55b. var. *multiramosa*

55a. *Oxytropis densiflora* var. *densiflora*

密叶棘豆(原变种) *mi ye ji dou (yuan bian zhong)*

Legume body oblong-cylindric, 1.5–1.7 cm. Fl. and fr. Aug.

- Slopes, grasslands; 3200–4000 m. Gansu, Xizang.

55b. *Oxytropis densiflora* var. *multiramosa* (P. C. Li) X. Y. Zhu & H. Ohashi, *Cathaya* 11–12: 91. 2000.

多枝密叶棘豆 *duo zhi mi ye ji dou*

Oxytropis multiramosa P. C. Li, *Acta Phytotax. Sin.* 18: 372. 1980.

Legume body broadly oblong, ca. 1 cm.

- Xizang (Qamdo).

56. *Oxytropis latialata* P. C. Li, *Acta Phytotax. Sin.* 18: 370. 1980.

宽翼棘豆 *kuan yi ji dou*

Herbs, 3–4 cm tall, acaulescent, from a multiheaded caudex, subterranean caudex branches sometimes with 1 or 2 apparent internodes below tuft of leaves. Stipules with a triangular distinct part ca. 2 mm, 8–10 mm, submembranous, with appressed white long trichomes when young, adnate to petiole, basal half connate, margin ciliate when mature. Leaves ca. 2 cm, 9- or 11-foliolate; petiole and rachis with appressed to spreading long trichomes; leaflet blades oblong, 2.5–6 × 1.5–2 mm, both surfaces with appressed white long trichomes or abaxially glabrescent, abaxially with trichomes on margin. Racemes compact, 2–5-flowered; peduncle 2–4.5 cm, longer than leaves, subglabrous, with spreading sparse trichomes below raceme; bracts lanceolate, shorter than calyx tube. Calyx campanulate, 5–7 mm, with dense black and white long trichomes; lobes lanceolate, as long as tube. Corolla purple; standard 0.9–1.1 cm, lamina suborbicular, apex emarginate; wings 7–9 mm, lamina obcordate, apex 2-lobed; keel slightly shorter than wings, beak ca. 0.3 mm. Ovary stipitate. Legume unknown. Fl. Jun.

- Mountain slopes; ca. 5100 m. Xizang (Baingoin).

57. *Oxytropis lapponica* (Wahlenberg) Gay, *Flora* 10(2): 30. 1827.

拉普兰棘豆 *la pu lan ji dou*

Phaca lapponica Wahlenberg, *Veg. Clim. Helv.* Sept. 131. 1813; *Oxytropis amoena* Karelin & Kirilov; *O. carinthiaca* Fischer-Ooster; *O. thomasi* Gaudin.

Herbs, 8–30 cm tall, caulescent, from a simple or branched caudex, tufted. Stems with 2 or more internodes apparent, pubescent with appressed pale yellow and black trichomes. Stipules ovate-lanceolate with an ovate-lanceolate distinct part, 4–10 mm, herbaceous, with sparse trichomes, basal half connate, apex acute. Leaves 3–16 cm, 17–37-foliolate; petiole and rachis with appressed white trichomes; leaflet blades lanceolate to elliptic-lanceolate, 10–17 × 1–5 mm, both surfaces with appressed trichomes, base rounded to obtuse, apex acute. Racemes many flowered; peduncle 2–22 cm, as long as or longer than leaves, basally with appressed black and white trichomes, apically with appressed black trichomes; bracts lanceolate-linear to linear, 2–6 mm, with appressed white and black trichomes. Calyx campanulate, 5–7 mm, densely black and white pubescent; lobes lanceolate-subulate, 1.5–3 mm. Corolla pale purple; standard 0.8–1.2 cm, lamina orbicular, apex emarginate; wings 7–10 mm, apex obliquely truncate and broadly emarginate; keel 7–8 mm, beak short and indistinct or to 2.5 mm. Legume stipitate; stipe 2–3 mm; body cylindric, ovoid, or narrowly cylindric, 8–14 × 4–5 mm, pendulous, inflated, thickly membranous, 1-locular, with appressed dense black trichomes, adaxial suture widely grooved, beak short. Fl. Jun–Aug, fr. Jul–Sep. $2n = 16$.

Meadows in alpine areas, gravelly areas, riverbanks; 3300–4600 m. Shaanxi, Xinjiang, Xizang [India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe].

58. *Oxytropis melanocalyx* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 8. 1874.

黑萼棘豆 hei e ji dou

Herbs, usually 5–15(–17) cm tall, caulescent from a simple to much-branched at least slightly subterranean sometimes rhizomatous caudex. Stems with (0 or) 1–4 apparent internodes, basally with persistent stipules. Stipules ovate-triangular, herbaceous, free from petiole, basally connate, apex acute. Leaves mainly (1.8–)4.5–16 cm, 9–25-foliolate; rachis thin, with sparse yellow long trichomes; leaflet blades ovate, ovate-lanceolate, or lanceolate, 5–11 × 2–4 mm, both surfaces with sparse yellow, white, and black long trichomes, base rounded, apex acute. Racemes compact, 3–10(–15)-flowered; peduncle 5.5–14 cm, slightly shorter to longer than leaves, thin, basally with white trichomes, apically with white and black trichomes intermixed; bracts longer than pedicels, membranous. Calyx campanulate, 4–9.2 × 2–3.5 mm, with black short trichomes intermixed with yellow and white trichomes; lobes lanceolate-linear, 2.5–4.7 mm, slightly shorter than tube. Corolla blue; standard (1–)1.1–1.4 cm, lamina broadly ovate, apex rounded to 2-lobed; wings (7.3–)8–11.6 mm, apex rounded to emarginate; keel 6.9–9.5(–11) mm, beak 0.2–1.1 mm. Legume sessile or with a stipe; body broadly oblong, 1.5–2 × 0.7–1.2 cm, pendulous, inflated,

papery, 1-locular, with long trichomes. Fl. Jul–Aug, fr. Aug–Sep.

• Hillsides, among scrub, grasslands, gravelly areas, alpine meadows among dwarf *Salix* on steep slopes, heavily grazed pasture/meadows in alpine areas, *Larix* forests; 2200–5100 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan.

59. *Oxytropis subpodoloba* P. C. Li, Fl. Xizang. 2: 864. 1985.

短序棘豆 duan xu ji dou

Herbs, 15–30 cm tall, caulescent, clump-forming from a multiheaded caudex. Stems erect or prostrate, with 2–4 or more elongate internodes, with lax branches, with spreading white trichomes. Stipules leathery, with sparse white long trichomes, basal half connate. Leaves 6–10 cm, 13–21-foliolate; petiole and rachis with sparse trichomes; leaflet blades oblong, 5–10 × 2–4 mm, both surfaces densely appressed sericeous with long trichomes. Racemes dense to lax, many flowered; peduncle ca. 20 cm, with spreading sparse white long trichomes. Calyx 6–8 mm, with dense white long and black short trichomes; lobes 3–4 mm, slightly shorter than tube. Corolla purple; standard 8–10 mm, lamina narrowly orbicular to suborbicular, apex emarginate; wings as long as standard, apex rounded emarginate; keel slightly shorter than wings, beak ca. 0.5 mm. Legume shortly stipitate; body oblong, ca. 14.5 × 5.3 mm, 2-locular, with an adaxial suture, with dense black and white short trichomes, septum narrow. Fl. and fr. Aug.

• Gravelly riparian sites, S-facing slopes; 3500–4200 m. Xizang.

8. *Oxytropis* sect. *Dolichanthos* Gontscharow in Komarov, Fl. URSS 13: 541. 1948.

长华棘豆组 chang hua ji dou zu

Herbs, acaulescent. Leaves imparipinnate; leaflets not verticillate. Racemes 3- or 4-flowered; peduncle 6–8 cm, shorter than leaves. Lamina of corolla standard oblong, widened in basal half, apex emarginate. Legume unknown for Chinese species.

Two species: C Asia, China; one species (endemic) in China.

60. *Oxytropis guinanensis* Y. H. Wu, Acta Phytotax. Sin. 35: 348. 1997.

贵南棘豆 gui nan ji dou

Herbs, 8–11 cm tall, acaulescent, from a multiheaded caudex clothed with marcescent stipules and petioles. Stipules narrowly triangular, ca. 10 × 3 mm, membranous, adnate to petiole, connate to above middle. Leaves 3–10 cm, 9–15-foliolate; petioles 2–5 cm, densely white pilose; leaflet blades narrowly elliptic, 5–16 × 1–3.5 mm, both surfaces densely appressed pilose, base rounded to cuneate, apex acute to obtuse. Racemes

compact, 3- or 4-flowered; peduncle 6–8 cm, with dense whitish trichomes; bracts oblong to broadly lanceolate, 5–7 × ca. 1.5 mm, with whitish and blackish trichomes. Calyx subcylindric, 12–14 × 4–5 mm, with spreading dense white and black trichomes; lobes subulate, 3–4 × ca. 0.5 mm, ca. 1/3 as long as tube. Corolla purple; standard 2.2–2.4 × 0.5–0.7 cm, lamina obovate, basally tapering and constricted above middle hence becoming 3-lobed, apex truncate and slightly retuse; wings 2–2.2 cm, lamina ca. 7 mm wide, apex rounded; keel 1.6–1.8 cm, beak 3–3.5 mm. Legume unknown. Fl. Jul.

• Deserts; ca. 3200 m. Qinghai (Guinan).

9. *Oxytropis* sect. *Sichuanicae* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 8: 11. 1988 [*“Sichuania”*].

四川棘豆组 si chuan ji dou zu

Leaves imparipinnate; leaflets not verticillate. Racemes 7–9-flowered or more; peduncle longer than leaves. Lamina of corolla standard oblong, widened in basal half, apex emarginate. Legume evidently stipitate; body narrowly ellipsoid.

• One species: China.

61. *Oxytropis sichuanica* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 8: 11. 1988.

四川棘豆 si chuan ji dou

Herbs, 10–17 cm tall, caulescent, from a subterranean multiheaded caudex, with 1 or 2 apparent internodes. Stipules narrowly triangular, ca. 5 × 3 mm, thickly herbaceous, with sparse glands, basally connate. Leaves 3–8 cm, 7–21-foliolate;

petiole 3–4.5 cm; rachis with brownish glands at insertion of leaflets, pilose; leaflet blades ovate, 5–12 × 2–5 mm. Racemes compact and not expanding in fruit, 7–9-flowered or more; peduncle 10–14 cm, densely crisp pubescent below inflorescence; bracts lanceolate, ca. 9 × 3 mm, membranous, blackish villous. Calyx subcylindric, 8–10 × ca. 4 mm, with spreading blackish and lax yellowish trichomes intermixed; lobes subulate, 4–5 × ca. 0.5 mm, as long as tube. Corolla reddish green, bluish vio-

let, blue, yellow, or purple (when dry); standard 1.7–1.9 cm, lamina ovate, ca. 11 × 5 mm, and abruptly dilated below middle, apex emarginate; wings ca. 1.8 × 0.4 cm, apex retuse; keel ca. 1.5 cm, beak ca. 1.5 mm. Legume evidently stipitate; body narrowly ellipsoid, ca. 15 × 4.5 mm, with appressed dense blackish trichomes. Fl. Jun–Aug, fr. Aug.

- Forest margins, grasslands on ridges; 3900–4200 m. Sichuan.

10. *Oxytropis* sect. *Auriculatae* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 7: 197. 1987 [“*Auricula*”].

耳瓣棘豆组 er ban ji dou zu

Leaves imparipinnate; leaflets not verticillate. Racemes 6- or 7-flowered; peduncle subequal to or shorter than leaves. Corolla standard auriculate, tapering into auricles at base, apex rounded. Legume unknown.

- One species: China.

62. *Oxytropis auriculata* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 7: 197. 1987.

耳瓣棘豆 er ban ji dou

Herbs, ca. 17 cm tall, caulescent, procumbent, with 2–4 or more apparent internodes, sparsely white pubescent. Stipules narrowly triangular, ca. 5 × 2 mm, herbaceous, with whitish trichomes, not adnate to petiole, connate to middle. Leaves 5–8 cm, 19–23-foliolate; leaflet blades elliptic to ovate, 6–8 × 3–4 mm, both surfaces appressed pubescent, base rounded, apex acute. Racemes compact to rather lax, 6- or 7-flowered; pedun-

cle 4–7.5 cm, appressed pilose but below raceme crisp pubescent; bracts subulate, ca. 4 × 1 mm, membranous, pubescent. Calyx campanulate, 8–10 mm, with whitish and blackish trichomes; lobes subulate, ca. 4 × 0.5 mm, almost as long as tube. Corolla purple; standard ca. 1.2 cm, lamina ovate-triangular, ca. 7 × 5 mm, and base with 2 ca. 1.5 mm auricles, apex obliquely cuneate; wings ca. 1.1 cm, apex obliquely cuneate; keel ca. 1 cm, beak ca. 0.5 mm. Ovary long stipitate. Legume unknown. Fl. Jun–Jul.

- Grasslands. Sichuan.

11. *Oxytropis* sect. *Brachytripsis* N. Ulziykhutag, Bot. Zhurn. (Moscow & Leningrad) 64: 1235. 1979.

硬毛棘豆组 ying mao ji dou zu

Plants acaulescent, with spreading rigid trichomes. Leaves imparipinnate; leaflets not verticillate; leaflet blades largest of any Chinese species. Racemes spiciform, elongate, thick, many flowered; peduncle as long as or longer than leaves. Legume sessile, ovoid.

Two species: China, Mongolia, Russia; one species in China.

63. *Oxytropis hirta* Bunge, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 2: 91. 1835.

硬毛棘豆 ying mao ji dou

Oxytropis hirta var. *flavida* G. Z. Qian; *O. hirta* var. *wutuensis* C. W. Chang; *O. komarovii* Vassilczenko.

Herbs, 10–50 cm tall or more, acaulescent, from a simple or multiheaded caudex, hirsute with spreading coarse long straight rigid trichomes. Stipules narrowly triangular, 2–3 cm × 3–5 mm, membranous, with whitish rigid trichomes, basally connate. Leaves 10–15 cm or more, 9–21-foliolate; leaflet blades elliptic, lanceolate, or ovate, 1–5 × 0.5–2 cm (largest in *Oxytropis* species for China), base rounded to obtuse, apex acute to rounded. Racemes elongate, 6–14 cm, many flowered; peduncle 10–40 cm, coarse, as long as to longer than leaves;

bracts triangular, 10–13 × 3–4 mm, with rigid trichomes, margin ciliate. Calyx subcylindric, 8–10 × ca. 3.5 mm, usually with spreading dense trichomes, sometimes glabrous but lobes with trichomes; lobes subulate, 4–5 × ca. 0.5 mm, subequal to tube. Corolla bluish purple, purple, blue, red, light yellow, yellowish green, reddish violet, pink, yellow, red, or white; standard 1.5–2 cm, lamina oblong-ovate, apex rounded; wings 1.4–1.8 cm, lamina obliquely obovate, apically entire or emarginate; keel 1.5–1.6 cm, beak 1–2 mm. Legume sessile, ovoid, 12–14 × 4–5 mm, with dense trichomes. Fl. May–Sep, fr. Jul–Sep. $2n = 16, 32$.

Hilltops and hillsides, roadsides, grasslands, sandy tracts, among shrubs, dry slopes, beneath sparse forests; 1000–4100 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Mongolia, Russia].

12. *Oxytropis* sect. *Xerobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 119. 1874.

矮生棘豆组 ai sheng ji dou zu

Herbs, acaulescent, exceptionally caulescent, caespitose. Leaves imparipinnate; leaflets not verticillate. Racemes 1–8-flowered or more; peduncle 1–9 cm, shorter to slightly longer than leaves. Legume sessile or with a stipe to 5 mm; body ovoid or cylindric, 5–27 mm, membranous.

About 27 species: China, Mongolia, Russia; 22 species (12 endemic) in China.

- 1a. Leaves 3-foliolate; leaflet blades of mature leaves 1.7–4.5 cm 64. *O. diversifolia*
- 1b. Leaves 5–35-foliolate; leaflet blades 0.2–1(–1.4) cm.
- 2a. Racemes many flowered (usually 10 or more).
- 3a. Corolla yellow, standard ca. 13 mm 65. *O. maduoensis*
- 3b. Corolla purple, standard 6–8 mm.
- 4a. Plants acaulescent or essentially so; peduncle shorter than leaves; stipules 7–9 mm; beak of corolla keel ca. 0.3 mm 66. *O. linearibracteata*
- 4b. Plants caulescent, with 2 or more internodes apparent; peduncle equaling or shorter than leaves; stipules 4–5 mm; beak of corolla keel ca. 2 mm 67. *O. lanceatifoliola*
- 2b. Racemes (1 or)2–8(–10)-flowered.
- 5a. Corolla standard 0.5–0.9 cm; calyx 3.4–7 mm; racemes 2–5-flowered.
- 6a. Corolla white; racemes 2- or 3-flowered; calyx 6–7 mm; herbage green or greenish, not gray 82. *O. biflora*
- 6b. Corolla purple; racemes 2–5-flowered; calyx 3.4–6 mm; herbage with gray trichomes.
- 7a. Plants 1–2 cm tall; peduncle less than 1 cm, shorter than leaves 80. *O. brevipedunculata*
- 7b. Plants 2–10 cm tall; peduncle 2–7 cm, subequal to leaves or slightly surpassing them.
- 8a. Leaves 7–13-foliolate; leaflet blades lanceolate to linear-lanceolate, 4.5–10 × 0.5–2 mm; lamina of corolla standard oblong 79. *O. pusilla*
- 8b. Leaves 11–21-foliolate; leaflet blades ovate or oblong, 3–5 × 1–2 mm; lamina of corolla standard transversely broadly ovate or ovate.
- 9a. Calyx ca. 3.4 mm; corolla wings ca. 6.2 mm, keel ca. 5 mm; plants of Xinjiang 84. *O. yanchiensis*
- 9b. Calyx 5–6 mm; corolla wings ca. 8 mm, keel ca. 7 mm; plants of Xizang 85. *O. cinerascens*
- 5b. Corolla standard 0.9–2.6 cm; calyx (5–)6–15 mm; racemes (1 or)2–10-flowered.
- 10a. Corolla yellow or pale yellow.
- 11a. Racemes rather lax; calyx 1.2–1.3 cm; corolla pale yellow, standard rounded at apex, wings truncate to rounded apically; leaflets glabrous 68. *O. ciliata*
- 11b. Racemes subcompact; calyx 0.8–1 cm; corolla yellow, standard emarginate at apex, wings rounded apically; leaflets with trichomes 77. *O. pseudohirsuta*
- 10b. Corolla purple, blue, purplish blue, or light purple.
- 12a. Corolla standard 0.9–1.3 cm, wings 1–1.2 cm.
- 13a. Plants 2–8 cm tall; bracts 5–6 mm; calyx lobes 1.5–1.7 mm; apex of corolla standard emarginate; legume body 1–1.5 cm 78. *O. platysema*
- 13b. Plants 7–15 cm tall; bracts 2–4 mm; calyx lobes 2–4 mm; apex of corolla standard 2-lobed; legume body 1.4–3.7 cm 81. *O. yunnanensis*
- 12b. Corolla standard (1–)1.5–2.6(–3) cm, wings (1.2–)1.3–2.1(–2.5).
- 14a. Corolla standard 1–1.5(–2.1) cm; keel beak (1–)1.5–1.6 mm; legume 3–4 mm wide ... 83. *O. pauciflora*
- 14b. Corolla standard (1.5–)1.7–2.6(–3) cm; keel beak 1–3 mm; legume 6–16 mm wide (unknown for *O. wutaiensis*).
- 15a. Beak of corolla keel 1.5–3 mm; calyx (1–)1.2–1.6 cm.
- 16a. Bracts 10–14 mm 75. *O. assiensis*
- 16b. Bracts 3–10 mm.
- 17a. Stipules membranous; leaflet blades broadly elliptic-oblong, oblong, or oblong-linear, 3–7 × 1.5–3 mm, plane; bracts 3–6 mm 69. *O. poncinsii*
- 17b. Stipules scarious; leaflet blades ovate to lanceolate, 5–10 × 2–4 mm, folded; bracts 6–10 mm 70. *O. eriocarpa*
- 15b. Beak of corolla keel 1–1.5(–1.8) mm; calyx 0.8–1.2(–1.3) cm (to 1.5 cm for *O. inschanica*).
- 18a. Leaflet blades apparently linear (involute).
- 19a. Leaves 5–9-foliolate; corolla standard 2–3 cm, lamina subelliptic 71. *O. inschanica*
- 19b. Leaves 9–13-foliolate; corolla standard 1.8–2.3 cm, lamina suborbicular 72. *O. leptophylla*
- 18b. Leaflet blades ovate, oblong-lanceolate, lanceolate, or narrowly lanceolate, plane or only marginally involute.
- 20a. Leaves 13–21-foliolate; leaflet blades lanceolate to narrowly lanceolate; racemes (2 or)3–5-flowered 76. *O. moellendorffii*
- 20b. Leaves 17–35-foliolate; leaflet blades ovate or oblong-lanceolate; racemes 2–8-flowered.
- 21a. Corolla wings rounded at apex; racemes compact, 2–4-flowered; stipules ca. 3 mm 73. *O. wutaiensis*
- 21b. Corolla wings 2-lobed at apex; racemes rather lax, 2–8-flowered; stipules 5–13 mm 74. *O. anertii*

64. *Oxytropis diversifolia* E. Peter, Acta Horti Gothob. 12: 78. 1938.

二型叶棘豆 er xing ye ji dou

Herbs, 3–5 cm tall, acaulescent, from a simple or branching caudex, subglabrous. Branches with a thatch of marcescent leaf bases. Stipules ovate, ca. 4 mm, membranous, persistent, with white trichomes, adnate to petiole, apex acute. Leaves 3–5 cm, 3-foliolate. Eophylls (early leaves): petiole ca. 7 mm; leaflet blades lanceolate-obovate to elliptic, 5–10 × 2–3 mm, abaxially with dense white trichomes, adaxially with dense trichomes, base cuneate, apex acute. Mature leaves: petiole 1.5–4 cm, appressed sericeous; leaflet blades narrowly linear, 1.7–4.5 cm × 2–4 mm. Racemes 1- or 2-flowered; peduncle 2–8 mm, much shorter than leaves, with dense trichomes; bracts linear, ca. 3 mm, membranous, densely sericeous-pubescent. Calyx tubular, 0.9–1.2 cm, with appressed dense white trichomes; lobes lanceolate, 2–3 mm. Corolla pale yellow; standard 1.8–2.2 cm, lamina obovate, apex rounded; wings ca. 1.8 cm, apex rounded; keel ca. 1.6 cm, beak ca. 1 mm. Legume sessile, ovoid, 1–1.5 × ca. 1 cm, inflated, membranous, ± 2-locular, with dense white long trichomes, septum ca. 3 mm wide, adaxial suture grooved, apex beaked. Fl. Apr–May, fr. May–Jun. $2n = 16$.

Dry *Stipa* grasslands, stones in valleys, hillsides; 1000–2200 m. Nei Mongol [Mongolia].

65. *Oxytropis maduensis* Y. H. Wu, Acta Bot. Yunnan. 19: 33. 1997.

玛多棘豆 ma duo ji dou

Herbs, 3–8 cm tall, acaulescent, tufted. Stipules ovate-lanceolate, 6–9 mm, with appressed white long trichomes, basal half connate. Leaves 1.5–6 cm, 15–25-foliolate; petiole and rachis with spreading trichomes; petiole purplish brown, 0.5–2.5 cm; leaflet blades ovate to oblong, 2–7 × 1–3 mm, densely appressed white or yellow pubescent, base rounded, apex acute. Racemes dense, many flowered; peduncle 1–6 cm, pilose; bracts ovate-lanceolate, 5–8 mm, membranous, sparsely pubescent. Calyx tubular-campanulate, 8–10 × 3–4 mm, somewhat inflated, with black short and white long trichomes; lobes subulate, ca. 3 mm. Corolla yellow; standard ca. 1.3 cm, lamina ovate, apex emarginate; wings ca. 1.1 cm, apex obliquely obtuse to rarely emarginate; keel 9–10 mm, beak 0.5–1 mm. Legume unknown. Fl. May–Jul.

• Meadows on hillsides in alpine areas; 4300–4600 m. Qinghai (Madoi).

66. *Oxytropis linearibracteata* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

线苞棘豆 xian bao ji dou

Herbs, 6–11 cm tall, acaulescent, from a much-branched multiheaded caudex. Stipules with a linear-lanceolate free part, 7–9 mm, herbaceous, densely pale yellow sericeous with long trichomes, shortly adnate to petiole. Leaves 5–10 cm, 15–21-foliolate; petiole and rachis with spreading dense pale yellow long trichomes; leaflet blades oblong to ovate-lanceolate, 7–10 × 3–4 mm, both surfaces densely pale yellow sericeous with

long trichomes. Racemes dense to lax, many flowered; peduncle as long as to slightly longer than leaves, with spreading dense trichomes; bracts linear, as long as calyx. Calyx campanulate, 5–7 mm, with appressed dense white and black trichomes; lobes linear-subulate, as long as tube. Corolla purple; standard 6–8 mm, lamina broadly ovate, apex emarginate; wings slightly shorter than standard, apex emarginate; keel slightly shorter than wings, beak ca. 0.3 mm. Ovary shortly stipitate. Legume unknown. Fl. Jun.

• Dry slopes and alluvial fans; ca. 4200 m. Xizang (Sogxian).

67. *Oxytropis lanceatifoliola* H. Ohba, S. Akiyama & S. K. Wu, Bull. Natl. Sci. Mus., Tokyo, B 26(2): 53. 2000.

披针叶棘豆 pi zhen ye ji dou

Herbs, to 15 cm tall, caulescent, from a many-branched evidently subterranean multiheaded caudex, with 2 or more apparent internodes, with spreading dense trichomes. Stipules with a triangular free part, 4–5 mm, with dense white soft trichomes, basal 1/2–2/3 connate, amplexicaul, apical part adnate to petiole, apex acuminate. Leaves 7–10 cm; leaflets 15–19, opposite, sessile; leaflet blades very narrowly lanceolate to linear, 12–14 × 2–4 mm, both surfaces with appressed usually soft trichomes, base rounded, apex acute. Racemes subcompact, 15–20-flowered; peduncle 7.5–12 cm, subequal to leaves, with white and black trichomes; bracts linear to subulate, with dense green trichomes. Calyx campanulate, 5–6 mm, with dense white trichomes; lobes linear to subulate, 2.5–3 mm, nearly as long as tube. Corolla purple; standard spatulate, ca. 8 mm, apex slightly retuse; wings ca. 7.2 mm, lamina narrowly oblong, apex rounded; keel ca. 6.7 mm, beak ca. 2 mm. Legume shortly stipitate; stipe ca. 1 mm; body ovoid, 11–13 × 4.5–5.5 mm, thin, vesicular, 1-locular, with dense trichomes, abaxial and adaxial sutures not grooved, base attenuate, beak ca. 2 mm. Fl. unknown, fr. Aug.

• Dry alluvial slopes; ca. 4100 m. Xinjiang (Ruoqiang).

68. *Oxytropis ciliata* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 186. 1832.

缘毛棘豆 yuan mao ji dou

Herbs, 5–20 cm tall, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules. Stipules broadly ovate, membranous, with dense white or yellow long trichomes on surface and margin, basally adnate to petiole. Leaves 5–15 cm, 9–17-foliolate; rachis slightly flattened; leaflet blades linear-oblong, oblong, linear-lanceolate, or oblanceolate, 5–10 × 2–6 mm, both surfaces glabrous, base cuneate, margin long ciliate, apex acute to obtuse. Racemes rather lax, 2–8-flowered; peduncle shorter than to as long as leaves, incurved to erect. Calyx cylindrical, 1.2–1.3 cm, with sparse trichomes; lobes lanceolate-attenuate, 2.5–3 mm, ca. 1/3 as long as tube. Corolla pale yellow; standard 2–2.6 cm, lamina elliptic, apex rounded; wings 2–2.8 cm, as long as standard, apex truncate to obtuse; keel ca. 2 cm, shorter than wings, beak 1.5–2 mm. Legume sessile, dark brown to yellowish brown, ovoid, 2–2.5 × 1.2–1.5 cm, inflated, membranous, glabrous, apex beaked. Fl. May–Jun, fr. Jun–Jul.

Roadsides, hilly sunny slopes, valleys, scrub in *Betula* forests; 1800–1900 m. Hebei, Nei Mongol, Ningxia [Mongolia].

69. *Oxytropis poncinsii* Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 343. 1896.

帕米尔棘豆 pa mi er ji dou

Oxytropis introflexa Freyn.

Herbs, 2–5 cm tall, acaulescent, arising from a multi-headed caudex, cushionlike or matlike, densely sericeous with long trichomes. Stipules with a narrowly ovate free part, 0.8–1.5 cm, membranous, adnate to petiole for most of length, margin ciliate. Leaves 2–5 cm, 7–11-foliolate; petiole and rachis with appressed trichomes; leaflet blades broadly elliptic-oblong, oblong, or oblong-linear, 3–7 × 1.5–3 mm, both surfaces with dense white trichomes. Racemes compact, 1–4-flowered; peduncle 2–5 cm, as long as leaves, with appressed trichomes; bracts lanceolate, 3–6 mm, with trichomes. Calyx cylindrical, 1.3–1.5 cm, spreading white and black lanate; lobes lanceolate, shorter than tube. Corolla purple; standard 2–2.5 cm, lamina orbicular, apex emarginate; wings 1.8–2.1 cm; keel slightly shorter than wings, beak 1.5–2 mm. Legume sessile, subspherical-ovoid, 2–2.5 × 1–1.5 cm, vesicularly inflated, membranous, villous with spreading short trichomes, septum narrow. Fl. Jun–Jul, fr. Aug.

Alpine deserts; 2400–4400 m. Gansu, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

70. *Oxytropis eriocarpa* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 122. 1874.

绵果棘豆 mian guo ji dou

Oxytropis komei Saposhnikow.

Herbs, 1–3 cm tall, acaulescent, arising from a prostrate or diffuse many-branched caudex, with persistent stipules and petioles. Stipules with a triangular-lanceolate distinct part, ca. 1 cm, scarious, with appressed sparse trichomes, adnate to petiole, basal half connate. Leaves 2–5 cm, 5–11-foliolate; petiole and rachis with appressed trichomes; leaflet blades ovate to lanceolate, 5–10 × 2–4 mm, conduplicate, both surfaces with appressed trichomes. Racemes compact, 2–4-flowered; peduncle shorter than leaves, with spreading trichomes; bracts lanceolate, 6–10 mm, with cottonlike trichomes. Calyx cylindrical, 1.2–1.5 cm, with spreading white and appressed black trichomes; lobes linear-lanceolate, 4–5 mm. Corolla purple to bluish purple; standard ca. 2.5 cm, lamina ovate, apex emarginate; wings 1.7–2.5 cm, apex slightly emarginate; keel 1.5–1.7 cm, beak 2–3 mm. Legume sessile, ovoid, 1.5–2.2 × ca. 1 cm, thickly leathery, 2-locular, white pannose, septum narrow, adaxial suture grooved, beak 1.5–5 mm. Fl. Jul, fr. Aug. $2n = 16 + 0-3B$.

Hillsides, gravelly alpine areas; ca. 2600 m. Xinjiang [Mongolia, Russia].

71. *Oxytropis inschanica* H. C. Fu & S. H. Cheng, Fl. Intramongol. 3: 289. 1978.

阴山棘豆 yin shan ji dou

Herbs, (3.5–)5–8 cm tall, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules. Stipules lanceolate, with dense long trichomes, basally adnate to

petiole. Leaves (2–)5–8 cm, 5–9-foliolate; leaflet blades linear, (0.6–)1–1.3(–1.4) cm × 0.5–1.5 mm, both surfaces glabrous, base cuneate, margin ciliate, apex attenuate. Racemes 2–5-flowered; peduncle shorter than to as long as leaves, with long trichomes; bracts ovate-elliptic, ca. 10 × 5–7 mm, both surfaces glabrous, margin ciliate, apex acute. Calyx cylindrical, 1–1.5 cm, with dense white and black long trichomes; lobes linear-lanceolate, 2.5–4 mm. Corolla purple to bluish purple; standard 2–3 cm, lamina subelliptic, apex rounded or subtruncate; wings 1.8–2 cm, lamina obliquely obovate, apex rounded; keel ca. 1.8 cm, subequal to wings, beak 1–1.8 mm. Legume sessile, ovoid, 1–1.5 × ca. 0.8 cm, inflated, membranous, with spreading dense long trichomes. Fl. May–Jul, fr. Jul–Aug.

• Dry slopes, gravelly areas in valleys; 1800–2100 m. Nei Mongol.

72. *Oxytropis leptophylla* (Pallas) Candolle, Astragalogia, 77. 1802.

山泡泡 shan pao pao

Herbs, 6–8 cm tall, acaulescent, from a branching superficial caudex, almost glabrous. Stipules triangular, membranous, with dense long trichomes, adnate to petiole, apex retuse. Leaves 1–2 cm or 7–10 cm, 9–13-foliolate; leaflet blades linear, 0.4–1 cm or 1.3–3.5 cm, 1–2 mm wide, adaxially glabrous, base rounded, margin involute, apex acute. Racemes compact to rather lax, 2–5-flowered; peduncle slightly shorter than to as long as leaves, thin, with spreading sparse trichomes; bracts lanceolate to ovate-oblong, with dense long trichomes. Calyx tubular, 8–11 mm, membranous, with dense white long trichomes; lobes subulate, ca. 1/3 as long as tube. Corolla purple; standard 1.8–2.3 cm, lamina suborbicular, apex rounded to emarginate; wings 1.9–2 cm, apex rounded; keel 1.5–1.7 cm, beak ca. 1.5 mm. Legume sessile, ovoid, 1.4–1.8 × 1.2–1.5 cm, inflated, membranous, 1-locular, with white and black short trichomes, septum narrow, adaxially deeply grooved, beak 7–10 mm. Fl. May–Jun, fr. Jun–Jul.

Hillsides, gravelly areas, sand dunes, grasslands; 800–1900 m. Hebei, Jilin, Nei Mongol, Shanxi [Mongolia, Russia].

- 1a. Caudex not abbreviated and densely clothed with a marcescent thatch of leaf bases; leaves 7–10 cm; leaflet blades 1.3–3.5 cm 72a. var. *leptophylla*
- 1b. Caudex abbreviated, densely clothed with a marcescent thatch of leaves; leaves 1–2 cm; leaflet blades 0.4–1 cm 72b. var. *turbinata*

72a. *Oxytropis leptophylla* var. *leptophylla*

山泡泡(原变种) shan pao pao (yuan bian zhong)

Astragalus leptophyllus Pallas, Reise Russ. Reich. 3: 749. 1776; *Oxytropis zhangbeiensis* G. Z. Qian & L. F. Liu.

Caudex not abbreviated and densely clothed with a marcescent thatch of leaf bases. Leaves 7–10 cm; leaflet blades 1.3–3.5 cm. Fl. May–Jun, fr. Jun–Jul. $2n = 16$.

Hillsides, sand dunes, grasslands; 800–1900 m. Hebei, Jilin, Nei Mongol, Shanxi [Mongolia, Russia].

72b. *Oxytropis leptophylla* var. *turbinata* H. C. Fu, Acta Phytotax. Sin. 20: 315. 1982.

陀螺棘豆 tuo luo ji dou

Caudex abbreviated, densely clothed with a marcescent thatch of leaves. Leaves 1–2 cm; leaflet blades 0.4–1 cm. Fl. Jun, fr. unknown.

• Hillsides and gravelly areas. Nei Mongol (Ulanqab Meng, Darhan Muminggan Lianheqi).

73. *Oxytropis wutaiensis* Tatewaki & Hurusawa, J. Jap. Bot. 26: 81. 1951.

五台山棘豆 wu tai shan ji dou

Oxytropis wutaiensis var. *glabrata* Tatewaki & Hurusawa.

Herbs, 4–10 cm tall, acaulescent, from a multiheaded caudex. Stipules with a broadly triangular distinct part, ca. 3 mm, papery, sparsely villous-pilose with white long trichomes, glabrescent, adnate to petiole, connate into a sheath, margin membranous. Leaves 4–5 cm, 21–27-foliolate; petiole and rachis slender, with appressed white long trichomes; leaflet blades oblong-lanceolate, 3–6 × ca. 2 mm, both surfaces with white long trichomes when young and dense short trichomes when old, apex acuminate. Racemes compact, 2–4-flowered; peduncle 3–6 cm, with spreading white short trichomes; bracts lanceolate to ovate-lanceolate, ca. 2/3 as long as calyx tube, ca. 3 mm wide, with black and white long trichomes intermixed, apex acuminate. Calyx subcylindric, ca. 1.3 cm, with pubescence like bracts; lobes lanceolate, ca. 3 mm, apex acute. Corolla purple; standard ca. 1.7 cm, lamina ca. 6 mm wide, apex deeply 2-lobed and reflexed; wings ca. 1.4 cm, lamina ca. 3 mm wide, apex rounded; keel ca. 1.3 cm, beak ca. 1 mm. Ovary reportedly 2-locular. Legume unknown. Fl. May.

• Grasslands. Shanxi (Wutai Shan).

74. *Oxytropis anertii* Nakai in Nakai et al., Rep. Exped. Manchoukuo Sect. IV, Pt. 2, Contr. Cogn. Fl. Manshuricae, 125. 1935.

长白棘豆 chang bai ji dou

Oxytropis anertii f. *albiflora* (Z. J. Zong & X. R. He) X. Y. Zhu & H. Ohashi; *O. anertii* var. *albiflora* Z. J. Zong & X. R. He.

Herbs, 6–8(–10) cm tall, acaulescent, from a well-developed multiheaded caudex, tufted. Branches with a thatch of marcescent leaves, with long trichomes when young. Stipules narrowly triangular, 5–13 × 2–5 mm, connate for more than basal half. Leaves 3.5–8 cm or 16–27 cm, 17–35-foliolate; leaflet blades ovate, 5–10 × 1–3 mm, subglabrous. Racemes rather lax, 2–8-flowered; peduncle 3–6 cm, as long as to slightly longer than leaves, with short trichomes; bracts triangular, 2–3 × ca. 2 mm, pubescent. Calyx campanulate, 8–10.5 × 2–3 mm, with whitish trichomes; lobes subulate, 2–3 × 0.5–1 mm. Corolla blue, bluish purple, or light purple; standard 1.5–2 cm, lamina obovate, apex emarginate; wings 1.6–1.8 cm, lamina obovate, apex 2-lobed; keel ca. 1.3 cm, beak ca. 1 mm. Legume sessile, ovoid to oblong, 1.3–2.4 × 0.6–1 cm, inflated, glabrous or pubescent. Fl. Jun–Aug, fr. Aug–Sep.

Gravelly alpine grasslands, forest margins, damp places, frozen soils in alpine areas; 1800–3000 m. Jilin [Korea].

75. *Oxytropis assiensis* Vassilczenko, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 246. 1960.

阿西棘豆 a xi ji dou

Herbs, (1–)3–8 cm tall, acaulescent, from a multiheaded caudex, cushion- or mat-forming, white. Stipules with an ovate-triangular distinct part, membranous, basal half adnate to petiole, basally connate, margin ciliate. Leaves 2–5 cm, 9–15-foliolate; petiole and rachis with appressed trichomes; petiole persistent; leaflet blades ovate to lanceolate, 5–8 × 2–3 mm, both surfaces with appressed trichomes. Racemes compact, 1- or 2- or 5–7-flowered or more; peduncle shorter than to as long as leaves, thick, with semispreading trichomes intermixed with black trichomes; bracts oblong-ovate, 1–1.4 cm, with white and black trichomes. Calyx usually purple, cylindric, (1–)1.2–1.6 cm, inflated after anthesis, with spreading black and white cottonlike trichomes; lobes linear, 3–4 mm. Corolla purple; standard (1.8–)2.2–2.6 cm, lamina oblong-spatulate, apex emarginate; wings (1.8–)1.9–2.1 cm, apex slightly emarginate; keel 1.7–1.8 cm, beak 1.5–2 mm. Legume sessile, ovoid, 2–2.7 × 1–1.5 cm, membranous, appressed white lanate, septum 2–3 mm wide, adaxial suture grooved, beak 5–7 mm. Fl. Jun–Aug, fr. Jul–Sep.

Dry slopes, grasslands, gravelly alpine areas; 2200–5300 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

76. *Oxytropis moellendorffii* Bunge ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 469. 1880.

窄膜棘豆 zhai mo ji dou

Oxytropis limprichtii Ulbrich; *O. moellendorffii* var. *sylinchanensis* (Franchet) G. Z. Qian; *O. schensiensis* Komarov; *O. sylinchanensis* Franchet.

Herbs, 6–10 cm tall, acaulescent, arising from a shortly branched multiheaded caudex, green. Stipules lanceolate, membranous, with long trichomes, adnate to petiole, basally connate. Leaves 5–10 cm, 13–21-foliolate; leaflet blades lanceolate to narrowly lanceolate, 5–11 × 1–3 mm, sparsely pubescent but glabrescent, base rounded, margin incurved, apex acute to acuminate. Racemes compact, (2 or)3–5-flowered; peduncle 3–8 cm, subequal to or slightly longer than leaves, erect, with spreading white trichomes apically intermixed with black trichomes; bracts lanceolate, ca. 8 mm, with long trichomes, base rounded, apex acuminate. Calyx tubular, 0.9–1.2 cm, with spreading white long trichomes and appressed black trichomes; lobes subulate, ca. 4 mm. Corolla purple; standard 1.7–2.6 cm, lamina broadly ovate, apex emarginate; wings ca. 1.5 cm, lamina oblong, apex 2-lobed; keel ca. 1.3 cm, beak ca. 1 mm. Legume sessile, oblong, ca. 2 × 0.6 cm, membranous, with dense black stout and white long trichomes. Fl. Jun–Jul, fr. Jul–Aug.

• Roadsides on hillsides, gravelly hilltops; 2400–3400 m. Hebei, Shanxi.

77. *Oxytropis pseudohirsuta* Q. Wang & Chang Y. Yang, Acta Phytotax. Sin. 39: 151. 2001.

假长毛棘豆 jia chang mao ji dou

Herbs, 5–12 cm tall, acaulescent, from a multiheaded caudex, with persistent thatch of petioles and stipules. Stipules with a triangular free part, 8–10 mm, membranous, with appressed dense white trichomes, adnate to petiole, basally connate. Leaves 3–8 cm, 7–11-foliolate; petiole and rachis with spreading white trichomes; petiole 1–4 cm; leaflet blades narrowly elliptic to lanceolate, 3–12 × 1–3 mm, both surfaces with appressed long stout trichomes. Racemes subcompact, 3–5-flowered; peduncle 6–11 cm, as long as or slightly shorter than leaves, thin, with spreading white trichomes; bracts lanceolate to linear, 3–4 mm, herbaceous. Calyx cylindric, 8–10 × 3–3.5 mm, with spreading white trichomes; lobes lanceolate-subulate, as long as or slightly shorter than tube. Corolla yellow; standard 1.7–2 × 0.9–1 cm, lamina oblong, apex emarginate; wings 1.6–1.8 × 0.5–0.6 cm, lamina oblique, apex rounded; keel ca. 1.7 × 0.6 cm, beak 2–2.5 mm. Legume sessile, ovoid to oblong, 2–2.5 × 0.6–1 cm, inflated, thickly membranous, beak ca. 5 mm. Fl. May–Jul, fr. Jun–Aug.

- Grasslands on slopes; 700–1700 m. Xinjiang.

78. *Oxytropis platysema* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 254. 1842.

宽瓣棘豆 kuan ban ji dou

Herbs, 2–8 cm tall, acaulescent, from a superficial or subterranean branched caudex, almost glabrous. Stipules membranous, glabrous or only ciliate, free or slightly adnate to petiole, basally connate. Leaves 2–6 cm, (11 or) 13–19 (or 21)-foliolate; leaflet blades ovate-lanceolate, ovate-oblong, or ovate, 3–10(–12) × 1.5–4 mm, both surfaces glabrous or sometimes with dense short trichomes, margin sometimes ciliate when young. Racemes compact, 3–7-flowered; peduncle 2–6.5 cm, as long as to longer than leaves, with white trichomes basally intermixed with black trichomes; bracts oblong, 5–6 mm, with black stout trichomes. Calyx campanulate, 6–9 mm, with dense black and white long trichomes; lobes linear-lanceolate, 1.5–1.7 mm, as long as tube, with black cottonlike trichomes. Corolla purple; standard 0.9–1.3 cm, lamina broadly ovate, apex emarginate; wings 1–1.2 cm, slightly shorter than standard, lamina obliquely obovate-oblong, apex retuse; keel 9–10 mm, slightly longer than wings, beak 1–1.2 mm. Legume sessile or shortly stipitate; body cylindric, 10–15 × 3–4 mm, membranous, with appressed black trichomes, abaxial suture round, adaxial suture deeply grooved, beak incurved. Fl. Jun–Jul, fr. Aug.

Kobresia meadows, damp alpine grasslands, gravelly riparian areas; 2300–5200 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

79. *Oxytropis pusilla* Bunge, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 7, 22(1): 27. 1874.

细小棘豆 xi xiao ji dou

Herbs, 2–10 cm tall, acaulescent, from a multiheaded caudex. Stipules subovate with a lanceolate free part, ca. 6 mm, herbaceous, sparsely white and black strigose, basal half adnate to petiole, distinct, apex acute. Leaves 2–7 cm, laxly 7–13-foliolate; petiole and rachis slender, with white and black short trichomes; leaflet blades lanceolate to linear-lanceolate, 4.5–10 × 0.5–2 mm, subglabrous or abaxially with appressed long trichomes, margin ciliate, apex acute. Racemes 2–5-flowered; pe-

duncle 2.5–5.5 cm, subequal to or slightly longer than leaves, erect, basally glabrous, apically sparsely black strigose; bracts lanceolate, as long as calyx tube, with black bristles. Calyx campanulate, 4–6 mm, with appressed black and white long trichomes; lobes linear, 1.5–1.7 mm, shorter than tube. Corolla purple; standard 5–8 mm, lamina oblong, apex emarginate; wings 6–7.2 mm, slightly shorter than standard, apex retuse; keel 5–6.7 mm, shorter than wings, beak 0.3–0.4 mm. Legume shortly stipitate to subsessile; body oblong-cylindric, 10–12 × ca. 3 mm, with appressed black short trichomes. Fl. Jun–Jul, fr. Jul–Aug.

- Hillsides, grasslands on damp areas along riverbanks and on floodplains; 3700–5000 m. Xinjiang, Xizang.

80. *Oxytropis brevipedunculata* P. C. Li, Acta Phytotax. Sin. 18: 370. 1980.

短梗棘豆 duan geng ji dou

Herbs, 1–2 cm tall, acaulescent, from a few-headed caudex. Stipules herbaceous, adnate to petiole, distinct, margin ciliate. Leaves 1–2 cm, 11–19-foliolate; petiole and rachis with appressed white trichomes; leaflet blades oblong, 3–4 × 1.5–2 mm, abaxially with dense trichomes, adaxially glabrous medially, margin appressed white villous. Racemes compact, 2–5-flowered; peduncle less than 1 cm, shorter than leaves, densely villous. Calyx campanulate, ca. 5 mm, with dense black and white long trichomes; lobes subulate, longer than tube. Corolla purple; standard ca. 7 mm, lamina suborbicular, apex emarginate; wings slightly shorter than standard, apex rounded; keel slightly shorter than wings, beak ca. 0.3 mm. Legume with a stipe as long as calyx tube; body oblong, 5–6 × ca. 2 mm, erect, with appressed dense black and white trichomes. Fl. and fr. Jul–Aug.

- Meadows in alpine areas, along rivers; 5200–5400 m. Xizang.

81. *Oxytropis yunnanensis* Franchet, Pl. Delavay. 163. 1890.

云南棘豆 yun nan ji dou

Oxytropis konlonica H. Ohba.

Herbs, 7–15 cm tall, acaulescent or shortly caulescent, from a multiheaded caudex, with (0 or) 1–5 apparent internodes (as in sect. *Mesogaea*). Stipules oblong, papery, with sparse white and black long trichomes, free from or shortly adnate to petiole, basal 1/3–2/3 connate. Leaves (1–) 2–9 cm, 9–25-foliolate; petiole and rachis with sparse trichomes, petiole persistent; leaflet blades lanceolate, 5–7 × 1.5–3 mm, both surfaces with sparse white short trichomes, base rounded to shortly attenuate, apex acuminate, acute, or obtuse. Racemes 3–10-flowered; peduncle 1–9 cm, subequal to or longer than leaves, with sparse to dense short trichomes; bracts 2–4 mm, membranous, with white and black trichomes intermixed. Calyx subcylindric to campanulate, 5–9 × ca. 3 mm, with black and white long trichomes; lobes subulate, 2–4 mm, slightly shorter than tube. Corolla purple or purplish red; standard 1.2–1.3 cm, lamina broadly ovate to broadly obovate, apex 2-lobed; wings 1–1.2 cm, slightly shorter than standard, apex 2-lobed; keel 1–1.1 cm, shorter than wings, beak 1–1.2 mm. Legume stipitate to subsessile; stipe 2–4 mm; body ellipsoid, cylindric, or ovoid, 1.4–3.7 × 0.8–1 cm,

membranous to papery, with appressed dense black trichomes. Fl. and fr. Jul–Sep. $2n = 24^*$.

• Meadows, limestone scree, open stony pastures, S-facing slopes on hills, grassy slopes, rocky slopes in *Kobresia* meadows, alpine shrub steppes, frozen steppes; 1800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

82. *Oxytropis biflora* P. C. Li, Acta Phytotax. Sin. 18: 370. 1980.

二花棘豆 er hua ji dou

Herbs, 2.5–3 cm tall, acaulescent, from a multiheaded caudex, loosely caespitose. Stipules with a triangular-ovate distinct part, herbaceous, with sparse white and black trichomes, very shortly adnate to petiole, basally connate. Leaves 1.5–5 cm, 7–13-foliolate; petiole and rachis with sparse long trichomes; leaflet blades oblong, 2.5–4 × ca. 1.5 mm, both surfaces with spreading dense long trichomes, base rounded, apex acute. Racemes 2- or 3-flowered; peduncle 2–6 cm, subequal to or longer than leaves, with dense long trichomes; bracts narrowly lanceolate. Calyx subcylindric, 6–7 mm, with black and white long trichomes; lobes as long as tube. Corolla white; standard 7–9 mm, lamina broadly ovate, apex emarginate; wings slightly shorter than standard, apex emarginate; keel slightly shorter than wings, beak ca. 0.5 mm. Legume stipitate; stipe ca. 4 mm; body oblong-cylindric when young, densely white villous. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine meadows, along rivers; ca. 5000 m. Xizang.

83. *Oxytropis pauciflora* Bunge, Arbeiten Naturf. Vereins Riga 1: 227. 1847.

少花棘豆 shao hua ji dou

Oxytropis alpicola Bunge (1874), not Turczaninow (1842); *O. friabilis* H. Ohba, S. Akiyama & S. K. Wu; *O. tschujae* Bunge.

Herbs, 3–10 cm tall, caulescent, from a multiheaded caudex, with short to elongate subterranean branches. Stipules with an oblong-ovate free part, herbaceous, with appressed sparse white trichomes and black short trichomes when young, adnate to petiole, basal 1/2–2/3 connate. Leaves (1.2–)3–8 cm, (7–)11–19-foliolate; petioles 3–6 mm, with appressed sparse white short trichomes shorter than on rachis; leaflet blades oblong-ovate, oblong, or oblong-lanceolate, 3–7 × (1–)1.5–4 mm, both surfaces or only abaxially with appressed sparse white trichomes. Racemes compact, (1 or)3–5-flowered; peduncle 0.5–4 cm, as long as to much longer than leaves, with appressed sparse white trichomes; bracts oblong to lanceolate, with rather dense trichomes. Calyx cylindrical to campanulate, 6–8.5(–13) mm, with appressed dense black short trichomes, sometimes with white short trichomes intermixed; lobes lanceolate, (1.8–)3–4

mm. Corolla bluish purple; standard 1–1.5(–2.1) cm, lamina orbicular, apex 2-lobed; wings 1.2–1.3(–1.9) cm, lamina obovate-oblong, apex emarginate; keel (1–)1.5–1.6 cm, beak (0.7–)1–1.5 mm. Legume sessile, oblong-cylindric, ca. 20 × 3–4 mm, 1-locular, with appressed white short trichomes. Fl. Jun–Jul, fr. unknown.

Alpine gravelly areas, alpine scrub meadows, valley sides; 4500–5600 m. Gansu, Xinjiang, Xizang [Kazakhstan, Russia].

84. *Oxytropis yanchiensis* X. Y. Zhu, H. Ohashi & L. R. Xu, J. Jap. Bot. 74: 133. 1999.

盐池棘豆 yan chi ji dou

Herbs, to ca. 5 cm tall, acaulescent, from a compact multiheaded spreading branched caudex. Stipules triangular, ca. 7 × 3.5 mm, membranous, conspicuously veined, high connate, margin ciliate. Leaves ca. 5 cm, 15–19-foliolate; leaflet blades ovate, 4–4.5 × 1–1.5 mm, both surfaces with appressed pubescence. Racemes compact, 3–5-flowered; peduncle 4–5 cm, shorter to longer than leaves; bracts broadly ovate, 2.1–4.9 × 1.5–1.7 mm, whitish appressed pubescent. Calyx campanulate, ca. 3.4 × 1.3 mm, with whitish and blackish trichomes intermixed; lobes triangular, ca. 3 mm. Corolla purple; standard 6.5–7.5 mm, lamina transversely broadly ovate, apex emarginate; wings ca. 6.2 mm, lamina obovate, apex 2-lobed; keel ca. 5 mm, beak ca. 1 mm. Legume unknown. Fl. Jun.

• Hillsides; ca. 2200 m. Xinjiang (Yiwu).

85. *Oxytropis cinerascens* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 26. 1874.

灰叶棘豆 hui ye ji dou

Herbs, 7–10 cm tall, acaulescent, from a short few-branched caudex, grayish green. Stipules oblong, membranous, with trichomes when young but glabrescent, adnate to petiole, distinct. Leaves 2.5–6 cm, 11–21-foliolate; petiole and between leaflets on rachis with glands and with sparse white long trichomes when young; leaflet blades oblong, 3–5 × 1–2 mm, abaxially with appressed trichomes, adaxially and margin with appressed sparse white trichomes, base rounded, apex acute. Racemes 3–5-flowered; peduncle shorter than to as long as leaves, with appressed dense white trichomes; bracts linear-oblong, ca. 3 × 1 mm, membranous, with appressed white trichomes. Calyx subcampanulate, 5–6 mm, with white and black long trichomes; lobes lanceolate-subulate, ca. 1/2 as long as tube. Corolla purple; standard 6–9 mm, lamina ovate, apex 2-lobed; wings ca. 8 mm, lamina obcordate-oblong, apex emarginate; keel ca. 7 mm, beak ca. 0.5 mm. Ovary shortly stipitate, pubescent. Legume unknown. Fl. Jul.

Hilly grassland slopes in alpine areas; 3600–4800 m. Xizang [India].

13. *Oxytropis* sect. *Eumorpha* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 59. 1874.

长荚棘豆组 chang jia ji dou zu

Herbs, acaulescent or subacaulescent with a very short stem. Leaves imparipinnate; leaflets not whorled. Racemes many flowered (rarely only 5–10-flowered); peduncle typically much longer than leaves (shorter in *Oxytropis avisoides*). Legume sessile, subsessile, or with a 1.5–5 mm stipe; body cylindric, ellipsoid, ovoid, or subspherical, scarious or membranous.

About 45 species: China, Himalayas, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; S and SW Asia; 17 species (ten endemic) in China.

- 1a. Plants (including leaves and racemes) not or seldom exceeding 10 cm tall.
- 2a. Leaves 0.5–1 cm; calyx 2.5–3 mm 95. *O. holanshanensis*
- 2b. Leaves 1.5–11 cm; calyx (3.5–)4–6 mm.
- 3a. Plants 5–13(–20) cm tall; leaflet blades 5–15 mm; beak of corolla keel (0.7–)1.5–2 mm; legume body 0.8–0.9 cm 90. *O. pagobia*
- 3b. Plants 1–5 cm tall; leaflet blades 2–5 mm; beak of corolla keel (0.4–)0.5–1 mm; legume body 1–1.3 cm (unknown for *O. baxoiensis*).
- 4a. Racemes 5–10-flowered; beak of corolla keel ca. 0.5 mm; leaves 9- or 11-foliolate 91. *O. baxoiensis*
- 4b. Racemes 2–5-flowered; beak of corolla keel (0.4–)0.8–1 mm; leaves (11 or)13–25(–29)-foliolate.
- 5a. Leaves (11 or)13- or 15-foliolate; calyx 4(–4.8) mm; corolla standard (6.5–)8–10 mm, keel beak (0.4–)0.8 mm; legume body ca. 1.3 cm 98. *O. saposhnikovii*
- 5b. Leaves 17–25(–29)-foliolate; calyx 4–6 mm; corolla standard 9–12 mm; keel beak ca. 1 mm; legume body ca. 1 cm 99. *O. krylovii*
- 1b. Plants (including leaves and racemes) at tallest point mostly exceeding 10 cm tall.
- 6a. Calyx 10–15 mm.
- 7a. Leaves (19 or)21–37-foliolate; corolla standard (1.6–)1.7–2(–2.2) cm, keel beak ca. 1 mm 87. *O. alpina*
- 7b. Leaves 13- or 15-foliolate; corolla standard ca. 1.5 cm, keel beak 2–2.5 mm 88. *O. pseudofrigida*
- 6b. Calyx 2.5–7 mm.
- 8a. Peduncle 2–3 cm 92. *O. avisoides*
- 8b. Peduncle 5–40 cm.
- 9a. Calyx 5.3–7 mm.
- 10a. Leaves 19–35-foliolate; leaflet blades 1.9–2.8 cm; pedicel 17–40 cm; calyx lobes 2.3–3.5 mm; corolla standard ca. 1.6 cm 86. *O. qitaiensis*
- 10b. Leaves 11–19-foliolate; leaflet blades 0.4–1 cm; pedicel 10–15 cm; calyx lobes 1.5–2 mm; corolla standard 1.2–1.5 cm 93. *O. ladyginii*
- 9b. Calyx 3–5 mm.
- 11a. Beak of corolla keel 2–3 mm.
- 12a. Plants 6–15 cm tall; racemes dense and globose; legume with a 1.5–2 mm stipe 89. *O. globiflora*
- 12b. Plants to 30 cm tall; racemes lax; legume sessile 101. *O. caerulea*
- 11b. Beak of corolla keel 0.5–2 mm.
- 13a. Calyx lobes 1.5–2.5 mm 100. *O. imbricata*
- 13b. Calyx lobes 0.4–1.3 mm.
- 14a. Peduncle 15–25 cm; racemes to 20 cm; calyx lobes ca. 1.3 mm 96. *O. merkensis*
- 14b. Peduncle 5–15 cm; racemes to 15 cm; calyx lobes 0.4–1.2(–1.3) mm.
- 15a. Leaves at least some of them more than 25-foliolate 94. *O. filiformis*
- 15b. Leaves 25-foliolate or fewer.
- 16a. Calyx 3–3.5 mm, lobes ca. 1 mm; bracts 1.5–4 mm; legume ca. 2 mm in diam. 97. *O. tashkurensis*
- 16b. Calyx ca. 4 mm, lobes ca. 1.2 mm; bracts 0.7–1.5 mm; legume 2.5–4.5 mm in diam. 102. *O. fragiliphylla*

86. *Oxytropis qitaiensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 66. 1999.

奇台棘豆 *qi tai ji dou*

Herbs, 17–40 cm tall, acaulescent, from a short, multi-headed caudex. Stipules narrowly triangular, 8–10 × 2–3 mm, thickly leathery, with appressed dense trichomes, basally connate. Leaves 9–25 cm, 19–35-foliolate; petiole and rachis subglabrous or with appressed sparse trichomes; leaflet blades narrowly ovate to ovate, 1.9–2.8 × 0.4–1 cm, abaxially sometimes with dense glandular trichomes, adaxially subglabrous, apex cuspidate. Racemes capitate but becoming lax, many flowered; peduncle 17–40 cm, much longer than leaves; bracts narrowly triangular, 2.5–4 × ca. 0.6 mm, pubescent. Calyx campanulate, 5.3–6.5 mm, with whitish or blackish trichomes and sometimes with glandular trichomes; lobes linear-triangular, 2.3–3.5 mm, subequal, as long as tube. Corolla violet (when dry); standard

ca. 1.6 cm, lamina orbicular, 8–10 × 6–8 mm, apex rounded and slightly retuse; wings 1.5–1.6 cm, apex emarginate; keel 1.5–1.6 cm, beak 1.5–2 mm. Legume stipitate; stipe 2–4 mm; body cylindric, ca. 1.8 × 0.4 cm, appressed short pubescent, apically attenuate to a long beak. Fl. Jun–Aug, fr. Jun–Aug.

• Meadows, hillsides; 1900–2400 m. Xinjiang.

87. *Oxytropis alpina* Bunge, Delect. Sem. Horti Bot. Dorpat. 1840: 8. 1840.

高山棘豆 *gao shan ji dou*

Oxytropis alpicola Turczaninow; *O. frigida* Karelin & Kirilov; *O. uralensis* (Linnaeus) Candolle var. *pumila* Ledebour.

Herbs, (6–)10–21 cm tall, caulescent, from a multiheaded caudex with many branches, tufted, clothed with persistent peti-

oles and stipules. Stipules ovate to lanceolate, membranous, with appressed white trichomes, adnate to petiole. Leaves (2–)5–17(–19) cm, (19 or)21–37-foliolate; petiole and rachis with appressed sparse white trichomes; leaflet blades lanceolate-ovate to lanceolate, (4–)7–18 × (1–)2–4 mm, white sericeous when young but sparsely so later. Racemes 5- to many flowered; peduncle 4–15(–21) cm, as long as to longer than leaves, thick, erect, sulcate, with spreading trichomes; bracts lanceolate to subulate, 1.2–1.5 cm, with white long trichomes. Calyx broadly cylindrical, 1–1.2 cm, with spreading white and appressed black trichomes; lobes linear-lanceolate, 3–5 mm. Corolla pale purple; standard (1.6–)1.7–2(–2.2) cm, lamina broadly ovate, apex 2-lobed; wings 1.5–1.7 cm, apex emarginate; keel 1.2–1.3 cm, beak ca. 1 mm. Legume sessile, oblong-ovoid, 1.5–3 × 0.5–0.7 cm, thinly leathery, 2-locular, with sparse white and appressed black trichomes, septum wide, apex beaked. Fl. and fr. Jul–Aug.

Hillsides, gravelly areas, alpine areas; ca. 2500 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan].

88. *Oxytropis pseudofrigida* Saposhnikow, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 136. 1923.

阿拉套棘豆 a la tao ji dou

Herbs, 10–18 cm tall, acaulescent, from a multiheaded caudex, sericeous with white long trichomes. Stipules with a broadly triangular free part, scarious, adnate to petiole. Leaves 5–12 cm, 13- or 15-foliolate; petiole and rachis with appressed trichomes; leaflet blades ovate to oblong-lanceolate, 8–10 × 3–4 mm, both surfaces appressed sericeous with long trichomes. Racemes many flowered; peduncle longer than leaves, erect, with white and black trichomes; bracts lanceolate, 1–1.2 cm, sericeous with long trichomes. Calyx tubular-campanulate, 1–1.5 cm, with spreading black and white cottonlike trichomes; lobes lanceolate, ca. 1/2 as long to as long as tube. Corolla purple; standard ca. 1.5 cm, lamina ovate, apex emarginate; wings 1.2–1.3 cm, apex retuse to rounded; keel as long as wings, beak 2–2.5 mm. Legume ovoid, 2.5–3 × 1–1.2 cm, inflated, thinly leathery, 2-locular, with spreading white and black trichomes, septum wide, adaxial suture grooved, beak 1–1.2 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine meadows among shrubs; ca. 1400 m. Xinjiang.

89. *Oxytropis globiflora* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 43. 1869.

球花棘豆 qiu hua ji dou

Herbs, 6–15 cm tall, acaulescent, from a multiheaded caudex, matlike or cushionlike, sericeous. Stipules linear-subulate, sericeous, adnate to petiole, distinct. Leaves 5–12 cm, 11–21-foliolate; petiole and rachis with appressed trichomes; leaflet blades lanceolate, oblong, or oblong-lanceolate, 5–17 × 1.5–4 mm, both surfaces appressed sericeous, apex acute. Racemes globose, dense, many flowered; peduncle longer than leaves, with appressed trichomes; bracts linear, as long as calyx tube, membranous, with dense white long trichomes and stout trichomes, apex acute. Calyx campanulate, ca. 5 mm, with appressed black and white trichomes; lobes linear-subulate, shorter than tube. Corolla bluish purple; standard 8–9 mm, lamina broadly ovate, apex rounded; wings slightly shorter than

standard; keel as long as wings, beak ca. 2.5 mm. Legume stipitate; stipe 1.5–2 mm; body cylindrical-ovoid to narrowly ovoid, 10–12 × 2.5–3 mm, pendulous, membranous, with appressed dense short trichomes, apex beaked. Fl. Jun–Jul, fr. Jul–Aug.

Pastures, alpine gravelly slopes, valleys, grasslands; 3600–4300 m. Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

90. *Oxytropis pagobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 27. 1874.

冰河棘豆 bing he ji dou

Herbs, 5–13(–20) cm tall, acaulescent, from a simple to shortly branched caudex, matlike or cushionlike. Stipules with a lanceolate free part, 5–10 mm, white sericeous, basal half adnate to petiole. Leaves 3–11 cm, rather long petiolate, 13–21-foliolate; leaflet blades lanceolate to oblong-lanceolate, 5–15 × 1–2.5 mm, both surfaces with appressed trichomes, apex acuminate. Racemes initially subglobose but becoming lax in late anthesis and fruit, many flowered; peduncle declined, slightly to much longer than leaves, with appressed trichomes; bracts subulate, as long as tube. Calyx campanulate, (3.5–)4–5 mm; lobes subulate, 1–2 mm, 1/3–1/2 as long as tube. Corolla violet fading to dark purple or yellowish white; standard 7–8.5 mm, lamina suborbicular; wings 7–8 mm, as long as standard, apex rounded; keel 6.5–8 mm, beak (0.7–)1.5–2 mm. Legume stipitate; stipe (0.7–)1.5–2 mm; body cylindrical, 8–9 × ca. 3 mm, declined by flexion of pedicels, membranous, covered with appressed black and white trichomes. Fl. and fr. Jul–Aug. $2n = 16^*$.

• Hillsides, roadsides, shrublands, *Artemisia* steppes, grasslands, subalpine steppes, flooded or wet plains and valleys, dry places between forest margins; 2100–3800 m. Xinjiang.

91. *Oxytropis baxoiensis* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

八宿棘豆 ba su ji dou

Herbs, 3–5 cm tall, acaulescent, from a multiheaded caudex, with densely imbricate thatch of marcescent petioles and stipules. Stipules herbaceous, densely sericeous, adnate below middle to petiole, otherwise distinct. Leaves 1.5–2.5 cm, 9- or 11-foliolate; petiole and rachis densely sericeous; leaflet blades oblong to ovate, 3–4 × 1.5–2 mm, both surfaces densely sericeous. Racemes compact, 5–10-flowered; peduncle ca. 2 × as long as leaves, densely white sericeous. Calyx 4–6 mm, with appressed white and black trichomes; lobes lanceolate, 2–3 mm. Corolla largely purple; standard 8–10 mm, lamina purple with a white center and orbicular, apex rounded to slightly emarginate; wings 7–9 mm, lamina obovate-oblong, apex rounded to emarginate; keel shorter than wings, beak ca. 0.5 mm. Legume shortly stipitate; body oblong-cylindrical when young, with appressed dense black short trichomes. Fl. Jun, fr. Jul–Aug.

• About 3900 m. Xizang.

92. *Oxytropis avisoides* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

鸟状棘豆 niao zhuang ji dou

Herbs, 10–20 cm tall, acaulescent, from a shortly branched

multiheaded caudex. Stipules with a linear-lanceolate free part, ca. 1 cm, herbaceous, with spreading white long trichomes, shortly adnate to petiole. Leaves 3–7 cm, 13–21-foliolate; petiole and rachis densely clothed with spreading white long trichomes; leaflet blades oblong to oblong-lanceolate, ca. 35 × 6.5 mm, both surfaces with spreading white long trichomes, base rounded, apex acute. Racemes lax, 6–10-flowered; peduncle 2–3 cm, with appressed to spreading dense trichomes. Calyx 5–7 mm, with appressed white and black trichomes; lobes as long as tube. Corolla purple; standard 7–9 mm, lamina suborbicular, apex emarginate; wings shorter than standard, lamina obovate-oblong, apex emarginate; keel shorter than wings, beak ca. 0.5 mm. Ovary long stipitate. Legume unknown. Fl. Jul.

• Hillsides; 4600–4700 m. Xizang (Baxoi).

93. *Oxytropis ladyginii* Krylov, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 5. 1903 [*“ladygini”*].

拉德京棘豆 la de jing ji dou

Herbs, 5–30 cm tall, acaulescent, from a multiheaded caudex. Stipules with a lanceolate free part, membranous, with appressed white trichomes, adnate to petiole, margin ciliate. Leaves 4–12 cm, 11–19-foliolate; petiole and rachis white sericeous; leaflet blades lanceolate, lanceolate-oblong, or elliptic, 4–10 × 1.5–4 mm, both surfaces with appressed white trichomes, base obtuse to rounded, apex acute. Racemes many flowered, elongating after anthesis; peduncle 10–15 cm, ca. 2 × as long as leaves, with appressed sparse white trichomes apically intermixed with black trichomes; bracts linear-lanceolate, longer than pedicels, with appressed sparse white trichomes. Calyx broadly cylindrical, 6–7 mm, with appressed sparse white and black trichomes; lobes lanceolate, 1.5–2 mm. Corolla pale yellow or sometimes pale purple; standard 1.2–1.5 cm, lamina broadly ovate, apex rounded; wings slightly shorter than standard, apex rounded; keel 1–1.2 cm, apically spotted, beak ca. 1 mm. Legume sessile, oblong-ovoid, 1.4–1.7 × 0.4–0.6 cm, erect-ascending, 1-locular, with appressed white and black trichomes. Fl. and fr. Jul–Aug.

Stony hillsides, valley bottoms; 1500–2700 m. Xinjiang [Mongolia, Russia].

94. *Oxytropis filiformis* Candolle, Astragalologia, 80. 1802.

线棘豆 xian ji dou

Oxytropis coerulea Turczaninow (1842), not *O. caerulea* (Pallas) Candolle (1802).

Herbs, 10–20 cm tall, acaulescent, from a multiheaded caudex, tufted. Stipules narrowly ovate, membranous, densely appressed sericeous, adnate to petiole, basally connate to almost distinct. Leaves 1.5–12 cm, (5–)17–31(–45)-foliolate; petiole and rachis with appressed white trichomes; petiole long and thin, persistent; leaflet blades lanceolate, linear-lanceolate, or ovate-lanceolate, 2–6 × 0.5–2 mm, with appressed trichomes, base rounded, margin involute, apex acuminate. Racemes lax, 2.5–5 cm, 10–15-flowered; peduncle 6–11 cm, 1–2 × as long as leaves, thin, usually incurved, with appressed white and black trichomes; bracts linear, longer than pedicels. Calyx broadly campanulate, 2.5–3(–4.9) mm; lobes triangular, 0.4–0.6(–1.3)

mm, with dense white and black short trichomes. Corolla bluish purple; standard 5.5–7 mm, lamina suborbicular, apex emarginate; wings 5–6 mm, as long as standard, slightly longer than keel, lamina oblong; keel 4.5–6 mm, beak ca. 1.5 mm. Legume subsessile; body broadly ellipsoid to ovoid, 5–10 × 3–5 mm, thickly membranous, 1-locular, with appressed sparse white and black short trichomes, apex beaked. Fl. Jul–Aug, fr. Aug. $2n = 16, 32$.

Roadsides on gravelly or stony mountain slopes, meadows; 600–700 m. Nei Mongol [Mongolia, Russia].

95. *Oxytropis holanshanensis* H. C. Fu, Acta Phytotax. Sin. 20: 313. 1982.

贺兰山棘豆 he lan shan ji dou

Herbs, 5–10 cm tall, acaulescent, from a much-branched multiheaded caudex, clothed with marcescent stipules and leaf bases. Stipules ovate, membranous, adnate to petiole, basally connate. Leaves 5–10 mm, 7–19-foliolate; leaflet blades ovate to elliptic-ovate, 2–3 × ca. 1 mm, both surfaces densely appressed white pilose, base rounded, apex acute. Racemes rather compact, 10–15-flowered; peduncle 2–8 cm, much longer than leaves, slender; bracts linear-lanceolate. Calyx campanulate, 2.5–3 mm, densely appressed white and black pilose; lobes linear, ca. 1 mm. Corolla yellow; standard ca. 7 mm, lamina obovate, apex emarginate; wings ca. 5 mm; keel slightly shorter than wings, beak ca. 1 mm. Ovary pilose. Legume unknown. Fl. Jul–Aug.

• Valleys, stony hillsides; 2000–2400 m. SW Nei Mongol (Helan Shan), Ningxia.

96. *Oxytropis merkensis* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 65. 1866.

米尔克棘豆 mi er ke ji dou

Astragalus loczyi Kanitz var. *scaposa* Kanitz; ?*Oxytropis avis* Saposchnikow; *O. kanitzii* N. D. Simpson.

Herbs, to 30 cm tall or more, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules, grayish pubescent. Stipules with a lanceolate-subulate free part, sparsely to densely appressed pubescent, adnate to petiole, base triangular, margin ciliate. Leaves 5–15 cm, 13–25-foliolate; leaflet blades oblong, broadly elliptic-lanceolate, or lanceolate, 5–20 × 2–5 mm, both surfaces sparsely pubescent, margin slightly involute, apex acute. Racemes lax, many flowered, elongating to 10–20 cm after anthesis; peduncle 15–25 cm, 1–2(–3) × as long as leaves, with appressed sparse white trichomes; bracts subulate, with sparse trichomes. Calyx campanulate, 3.6–5 mm, with appressed black trichomes; lobes subulate, ca. 1.3 mm, shorter than tube. Corolla purple to almost white; standard 7–10 mm, lamina suborbicular, apex emarginate; wings as long as or slightly shorter than standard; keel ca. 8.8 mm, as long as or longer than wings, tip spotted, beak 0.5–1.8 mm. Legume stipitate; stipe 4–5 mm; body broadly ellipsoid-oblong, 10–16 × 5–6 mm, pendulous, papery, with appressed white trichomes, apex acuminate. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16, 32$.

Grasslands on hillsides, river terraces and floodplains, gravelly areas, roadsides, fields, dry slopes, flooded lands, subalpine meadows;

1700–4600 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

According to the description of *Oxytropis avis* in Fl. URSS (13: 26. 1948), the keel beak is 0.5–0.75 mm, the leaflets are 4–6-paired, the peduncle is to 15 cm and several × longer than the leaves, and the racemes are loose and few flowered. Whether it is really conspecific with *O. merkensis* requires additional investigation.

97. *Oxytropis tashkurensis* S. H. Cheng ex X. Y. Zhu, Y. F. Du & H. Ohashi, J. Jap. Bot. 75: 289. 2000.

塔什库儿干棘豆 ta shi ku er gan ji dou

Herbs, 9–24 cm tall, acaulescent, from a multiheaded caudex, herbage with whitish trichomes. Stipules triangular, 3–4 × ca. 2 mm, leathery, with whitish trichomes, basal part adnate to petiole. Leaves 5–8 cm; leaflets 15–19(–23), opposite or seldom alternate; leaflet blades narrowly ovate to ovate, 2.5–14 × 1–4 mm, both surfaces with appressed whitish trichomes. Racemes lax to compact, 10–15 cm, many flowered; peduncle 5–15 cm, much longer than leaves; bracts triangular, 1.5–4 × ca. 0.5 mm, with whitish trichomes. Calyx campanulate, 3–3.5 × ca. 2 mm, with blackish and whitish trichomes; tube 2–2.5 mm; lobes subulate, ca. 1 × 0.2 mm. Corolla purple but drying to yellowish white; standard 6–9.5 × 3–7 mm, lamina broadly obovate and basally narrowed, apex rounded; wings 5–9.5 mm; keel 6–7 mm, beak 1.5–2 mm. Legume narrowly ellipsoid, 8–10 × ca. 2 mm, with blackish and whitish trichomes. Fl. May–Sep, fr. Jun–Sep.

• Grasslands, S-facing slopes, alpine meadows; 1800–3600 m. Xinjiang.

98. *Oxytropis saposhnikovii* Krylov, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 4. 1903 [*“saposhnikovi”*].

萨氏棘豆 sa shi ji dou

Herbs, acaulescent, from a prostrate or diffuse multiheaded caudex with many 1–3 cm branches. Stipules with a triangular distinct part, membranous, glabrous, adnate to petiole, basally connate, margin ciliate. Leaves (1.5–)3–5 cm, (11 or)13- or 15-foliolate; leaflet blades ovate-lanceolate to lanceolate, 3–6 × 1.5–2.5 mm, abaxially with appressed sparse short trichomes, adaxially subglabrous, margin reflexed, apex acute. Racemes 2–4-flowered; peduncle 1.5–5 cm, mostly longer than leaves, thin, with appressed short trichomes; bracts lanceolate, ca. 2 mm, with appressed sparse trichomes. Calyx tubular-campanulate, 4(–4.8) mm, with appressed black and sparse white trichomes; lobes subulate, 1(–2.3) mm. Corolla purple; standard (6.5–)8–10 mm, lamina orbicular-ovate, apex emarginate; wings (6–)7–8 mm; keel (5.7–)6–7 mm, beak (0.4–)0.8 mm. Legume oblong-ovoid, ca. 13 × 5 mm, with appressed black short trichomes, beak falcate. Fl. and fr. Jul–Aug.

• Gravelly alpine slopes, on frozen lands. Xinjiang.

99. *Oxytropis krylovii* Schipczinski, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 1(7): 1. 1920 [*“krylovi”*].

克氏棘豆 ke shi ji dou

Herbs, 1–4 cm tall, acaulescent, from a multiheaded caudex, matlike or cushionlike, appressed white pubescent. Stip-

ules lanceolate to subulate, adnate to petiole, basal half connate, margin ciliate. Leaves 2–5 cm, 17–25(–29)-foliolate; petiole and rachis sulcate, with appressed trichomes; leaflet blades linear-lanceolate to narrowly ovate, 2–5 × 0.5–2 mm, both surfaces glabrous or adaxially with sparse trichomes, margin involute and abaxially with appressed trichomes. Racemes lax, to ca. 5-flowered; peduncle 2–5 cm, somewhat to much longer than leaves, slender, with appressed trichomes, apically with appressed black trichomes intermixed with white long trichomes; bracts linear to subulate, 2.5–3 mm, with appressed black and white long trichomes. Calyx broadly cylindrical, 4–6 mm, with appressed black trichomes; lobes subulate, ca. 1.5 mm, 1/3–1/2 as long as tube. Corolla purple; standard 0.9–1.2 cm, lamina obovate, apex emarginate; wings 8–11 mm, apex broadly emarginate; keel as long as wings, beak ca. 1 mm. Legume stipitate; stipe 2–3 mm; body cylindrical-ovoid, ca. 10 × 4 mm, 1-locular, with appressed black and sparse white trichomes, apex acuminate. Fl. and fr. Jun–Jul.

Gravelly alpine areas, valleys; 3000–4700 m. Xinjiang [Kazakhstan, Russia (W Siberia)].

100. *Oxytropis imbricata* Komarov, Repert. Spec. Nov. Regni Veg. 13: 232. 1914.

密花棘豆 mi hua ji dou

Herbs, 10–15 cm tall, acaulescent, from a many-branched caudex, tuft-forming. Stipules linear-lanceolate, with dense long trichomes, adnate to petiole. Leaves 3–10 cm, 15–29-foliolate; petiole with appressed trichomes, adaxially sulcate; leaflet blades narrowly elliptic to ovate-lanceolate, (3–)5–11 × (1.2–)3–5 mm, both surfaces gray or white and with appressed trichomes, base rounded, apex acute to retuse. Racemes dense to lax and becoming more lax in fruit, many flowered; peduncle 10–18 cm, longer than leaves, thin, with appressed trichomes; bracts lanceolate, shorter than calyx. Calyx campanulate, 3–5 mm, with black and white trichomes; lobes lanceolate-linear, as long as or somewhat shorter than tube. Corolla purple; standard ca. 8 mm, lamina oblong, apex rounded; wings as long as standard, apex retuse; keel as long as wings, beak 1.7–2 mm. Legume shortly stipitate; body broadly ovoid to subspherical, 5–6 mm, papery, with appressed short trichomes, beak hook-shaped and 5–9 mm. Fl. May–Jul, fr. Jul–Aug.

• Grasslands on hillsides; 1800–3500 m. Gansu, Xinjiang, Xizang.

101. *Oxytropis caerulea* (Pallas) Candolle, Astragalologia, 68. 1802.

蓝花棘豆 lan hua ji dou

Astragalus caeruleus Pallas, Reise Russ. Reich. 3: 293. 1776; *A. baicalensis* Pallas; *Oxytropis baicalensis* (Pallas) Pallas ex Besser; *O. caerulea* f. *albiflora* (H. C. Fu) X. Y. Zhu & H. Ohashi; *O. caerulea* subsp. *subfalcata* (Hance) S. H. Cheng ex H. C. Fu; *O. chinensis* Bunge; *O. curviflora* Turczaninow ex Besser; *O. mandshurica* Bunge; *O. mandshurica* f. *albiflora* H. C. Fu; *O. subfalcata* Hance; *O. subfalcata* var. *albiflora* C. W. Chang.

Herbs, to 30 cm tall or more, acaulescent, from a multiheaded caudex, clothed with marcescent leaf bases and stipules.

Stipules narrowly triangular, ca. 4 × 3 mm, membranous, with long stout trichomes, basally connate. Leaves 10–20 cm, 15–41-foliolate; leaflet blades ovate to lanceolate-elliptic, 6–19 × 1.5–8 mm, persistent, subglabrous. Racemes lax, 10–20-flowered, elongating 10–20 cm in fruit; peduncle 10–22 cm, much longer than leaves; bracts triangular, 3–5 × ca. 2 mm, pubescent. Calyx campanulate, 3–5 × 1–1.5 mm, with whitish and blackish trichomes; lobes subulate, 2–2.5 × 0.5–1 mm, shorter than to equaling tube. Corolla purple, violet, blue, red, or white; standard (0.8–)0.9–1.3 cm, lamina orbicular, apex rounded; wings (0.7–)0.9–1.1 cm, lamina obliquely oblanceolate, apex obtuse; keel 7–9 mm, beak 2–3 mm. Legume sessile; body ovoid to lanceolate-ovoid, 10–16 × 4–5 mm, inflated, leathery, with whitish and blackish trichomes. Fl. Jun–Sep, fr. Aug–Sep. $2n = 16$.

Rocky areas, hillsides, forests, meadows, roadsides, prairies; 1000–3000 m. Gansu, Hebei, Nei Mongol, Shanxi [Mongolia, Russia].

102. *Oxytropis fragiliphylla* Q. Wang, Chang Y. Yang, X. Y. Zhu & H. Ohashi, J. Jap. Bot. 76: 219. 2001.

14. *Oxytropis* sect. *Janthina* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 20. 1874.

藍花棘豆組 lan hua ji dou zu

Herbs, acaulescent or very shortly caulescent, matlike, moundlike, or cushionlike, with yellowish gray or glandular trichomes. Leaves imparipinnate; leaflets not verticillate; leaflet blades yellowish gray. Racemes 5- to many flowered; peduncle 1.5–9 cm. Corolla purple, bluish purple, blue, red, or yellow. Legume sessile, subsessile, or with a 3–4 mm stipe; body cylindrical to ellipsoid, membranous.

About 40 species: Afghanistan, China, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia; seven species (four endemic) in China.

- 1a. Corolla red 103. *O. tukemansuensis*
 1b. Corolla yellow, purple, blue, or bluish purple.
 2a. Corolla yellow 104. *O. stracheyana*
 2b. Corolla purple, blue, or bluish purple.
 3a. Corolla standard ca. 1.3 cm, keel beak ca. 1 mm 106. *O. vermicularis*
 3b. Corolla standard 0.5–1.3 cm, keel beak ca. 0.5 mm or ca. 2 mm.
 4a. Beak of corolla keel ca. 2 mm 105. *O. longialata*
 4b. Beak of corolla keel ca. 0.5 mm.
 5a. Petiole 1.5–4 cm; leaves 17–25-foliolate; peduncle 5–9 cm 109. *O. valerii*
 5b. Petiole less than 1.5 cm; leaves (9 or)11–19(or 21)-foliolate; peduncle (1.5–)2–5(–8) cm.
 6a. Corolla standard 5–8 mm, apex emarginate 107. *O. densa*
 6b. Corolla standard 8–13 mm, apex subrounded 108. *O. humifusa*

103. *Oxytropis tukemansuensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 66. 1999.

土克曼棘豆 tu ke man ji dou

Herbs, 3.5–4.5 cm tall, acaulescent, from a multiheaded caudex, pulvinate-caespitose, yellowish brown pubescent. Stipules ovate, ca. 5 × 2 mm, scarious, basally connate. Leaves 1–2 cm, 11–17-foliolate; leaflet blades linear to ovate, 3–4 × 1–1.5 mm, with yellowish brown or glandular trichomes. Racemes compact, 5–7-flowered; peduncle 3–4 cm, much longer than leaves; bracts triangular, with yellowish brown trichomes. Calyx campanulate, ca. 3 × 2 mm; tube ca. 1.4 mm; lobes narrowly triangular, ca. 1.6 × 0.4 mm. Corolla red; standard 7–8 × ca. 3.6 mm, lamina obovate, apex rounded; wings ca. 7 mm, lamina obovate, ca. 4 × 1.2 mm, and auriculate; keel ca. 5.7

脱叶棘豆 tuo ye ji dou

Herbs, 8–15 cm tall, acaulescent, from a branching multiheaded ligneous caudex, tuft-forming, green. Stipules obtusely triangular, membranous, covered with dense whitish trichomes, adnate to petiole. Leaves 4–10 cm, fragile, deciduous, 17–25-foliolate; petiole erect, often withered; petiolules extremely short; leaflet blades elliptic to ovate, 2–5 × 1–2 mm, caducous, both surfaces with sparse whitish trichomes. Racemes dense and 2–5 cm but becoming lax and elongating in fruit, 7–13-flowered or more; peduncle 6–12 cm, longer than leaves, with sparse trichomes; bracts linear to narrowly subulate, 0.7–1.5 mm, almost as long as pedicels. Calyx campanulate, ca. 4 mm, with blackish and whitish trichomes; lobes subulate, ca. 1.2 × 0.4 mm. Corolla purple; standard 6–10 mm, apex rounded; wings 7.5–8.5 mm, lamina obovate, apex rounded; keel 7.5–8 mm, beak ca. 1.5 mm. Legume stipitate; stipe 2–2.5 mm; body narrowly ovoid, 8–12 × 2.5–4.5 mm, appressed whitish pubescent. Fl. Jun–Jul, fr. Jul.

- Subalpine meadows; 1800–2800 m. Xinjiang.

mm, beak ca. 1 mm. Legume sessile, fusiform, 9–10 × 2.5–3 mm, with whitish trichomes. Fl. and fr. Jun–Jul.

- About 4200 m. Xinjiang (Taxkorgan).

104. *Oxytropis stracheyana* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 62. 1874.

胀果棘豆 zhang guo ji dou

Herbs, 2–3 cm tall, acaulescent, from a multiheaded caudex, with many marcescent petioles and stipules. Stipules narrowly triangular, ca. 5 × 3 mm, thinly membranous to scarious, glabrous, basally connate. Leaves 1.5–4 cm, 13–19-foliolate; leaflet blades oblong-elliptic, 3–7 × 1–2 mm, densely pubescent. Racemes compact, 3–6-flowered; peduncle 1.5–4 cm, subequal to or slightly longer than leaves; bracts triangular, ca.

2 × 1 mm, with dense trichomes. Calyx cylindric, 10–14 × 2–3 mm, with whitish trichomes; lobes triangular, 2–3 × ca. 2 mm, much shorter than tube. Corolla yellow; standard 2.2–2.5 cm, lamina orbicular, apex emarginate; wings 1.6–1.8 cm, lamina obovate; keel 1.6–1.8 cm, beak ca. 2 mm. Legume sessile, ovoid, ca. 1.2 cm, inflated, densely villous. Fl. Jun–Jul, fr. Jul–Aug. 2n = 48.

Hillsides, meadows, *Stipa* grasslands, floodplains, roadsides; 2200–5000 m. Gansu, Qinghai, Xinjiang, Xizang [India, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

105. *Oxytropis longialata* P. C. Li, Acta Phytotax. Sin. 18: 371. 1980.

长翼棘豆 chang yi ji dou

Herbs, 6–8 cm tall, acaulescent, from a shortly branched multiheaded caudex. Stipules linear-lanceolate, ca. 1 cm, herbaceous, with appressed white trichomes, adnate on basal ca. 1/3 to petiole, otherwise distinct. Leaves 4–8 cm, 15–21-foliolate; petiole and rachis with spreading white long trichomes; leaflet blades ovate-lanceolate, 3.5–7 × 1–2.5 mm, both surfaces densely spreading white pilose, apex acute. Racemes many flowered; peduncle 2–7 cm, shorter than leaves, with spreading sparse white trichomes. Calyx subcylindric, 6–8 mm, with appressed sparse black trichomes; lobes linear-subulate, as long as tube. Corolla purple; standard 0.9–1.1 cm, lamina broadly ovate, apex emarginate; wings 1–1.2 cm, lamina ovate-oblong, apex emarginate; keel 8–10 mm, beak ca. 2 mm. Ovary stipitate. Legume unknown. Fl. May–Jun.

• Sandy and gravelly areas in valleys; 4000–4100 m. Xizang (Lhari).

Grubov (Fl. Central Asia 8b: 21. 1999) treated *Oxytropis longialata* as a synonym of *O. globiflora*, but the former differs by its standard apically 2-lobed, not rounded as in *O. globiflora*.

106. *Oxytropis vermicularis* Freyn, Bull. Herb. Boissier, sér. 2, 5: 1025. 1905.

维米苦拉棘豆 wei mi ku la ji dou

Herbs, 4–5 cm tall, acaulescent, from a multiheaded branched and sometimes elongated and flexuous caudex, low tufted. Stipules covered with appressed white trichomes, 1-veined, adnate to petiole. Leaves 0.5–1.5 cm, 13–19-foliolate; leaflet blades oblong-elliptic, ca. 2.5 × 1.3–1.4 mm, pubescent. Racemes umbelliform, 2–5-flowered; peduncle 2–5 cm, ca. 2 × as long as leaves, with trichomes; bracts linear, 3–4 mm, densely covered with black and white trichomes. Calyx broadly cylindric, 6–7 mm, black and white pubescent; lobes 3–4 mm, ca. 1/2 as long as tube. Corolla blue; standard ca. 1.3 cm, lamina orbicular, apex emarginate; wings as long as standard; keel as long as wings, beak ca. 1 mm. Ovary substipitate, glabrous or almost so. Legume unknown. Fl. Jun–Jul.

• Hilltops, grasslands, gravelly areas; 3500–4000 m. SW Xinjiang.

107. *Oxytropis densa* Bentham ex Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg. Sér. 7, 22(1): 24. 1874.

密丛棘豆 mi cong ji dou

Oxytropis stipulosa Komarov.

Herbs, 2–7 cm tall, acaulescent, from a multiheaded caudex, cushionlike, with long trichomes. Stipules with a lanceolate free part, 5–7 mm, herbaceous, with spreading dense white long trichomes when young but glabrescent, basal half adnate to petiole. Leaves 1–3 cm, densely (9 or) 11–19-foliolate; petiole and rachis with spreading dense or sparse white long trichomes; leaflet blades ovate, oblong, or oblong-lanceolate, 1.5–4 × 1–2 mm, densely to sparsely sericeous with white long trichomes, base rounded, apex retuse, rounded, or acute. Racemes 2–10-flowered; peduncle (1.5–)2–7 cm, slightly shorter to longer than leaves, with dense or sparse white long trichomes; bracts oblong-lanceolate, 3–4 mm. Calyx campanulate, 4–6 mm, with dense white and black short trichomes; lobes linear, 1–2.1 mm. Corolla purple to bluish purple; standard 5–8 mm, claw very short, lamina suborbicular, apex emarginate; wings as long as or shorter than standard, apex rounded to emarginate; keel 5–6 mm, beak ca. 0.5 mm. Legume shortly stipitate; body oblong-cylindric, 9–12 × 2–3 mm, inflated, 1-locular, with spreading dense white trichomes, septum less than ca. 1 mm wide, adaxial suture deeply grooved, apex acute. Fl. Jun–Jul, fr. Jul–Aug.

Alpine gravelly areas, floodplains, hillsides, grasslands, gravelly terraces, *Carex moorcroftii-Stipa* grasslands, stony slopes; 3500–5200 m. Gansu, Qinghai, Xinjiang, Xizang [Kashmir, Pakistan].

108. *Oxytropis humifusa* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 535. 1842.

铺地棘豆 pu di ji dou

Oxytropis albana Steven; *O. humifusa* var. *grandiflora* Bunge; *O. lapponica* (Wahlenberg) Gay var. *humifusa* (Karelin & Kirilov) Baker; *O. lapponica* var. *jacquemontiana* Bentham ex Baker; *O. melanotricha* Bunge.

Herbs, 2–5(–8) cm tall, acaulescent, from a multiheaded shortly branched caudex, low tuft-forming. Stipules lanceolate with a lanceolate-subulate free part ca. 5 mm, 1–1.2 cm, membranous to leathery, persistent, sericeous with dense long trichomes or glabrous, adnate to petiole. Leaves 2–7 cm, 13–17(–21)-foliolate; petiole and rachis with appressed trichomes; leaflet blades ovate-lanceolate to lanceolate, 3–8 × 2–3 mm, appressed sericeous with long trichomes, apex acute. Racemes rather compact, 6–10-flowered; peduncle 2–5(–8) cm, to 2 × as long as leaves, thin, erect to diffuse, with sparse white short trichomes; bracts linear-subulate, 4–5 mm, with white and black trichomes. Calyx campanulate, 5–6 mm, with dense black short and white long trichomes; lobes linear-subulate, ca. 2 mm. Corolla purple; standard 0.8–1.3 cm, lamina obcordate, apex emarginate; wings 7–10 mm, apex 2-lobed; keel as long as wings, beak ca. 0.5 mm. Legume stipitate; stipe 3–4 mm; body cylindric-ovoid, 1.3–2.5 × 0.4–0.6 cm, pendulous, membranous, 1-locular, with appressed white and black trichomes. Fl. Jul–Aug, fr. Aug–Sep.

Sunny S-facing slopes, floodplains, gravelly areas in valleys; 4000–4400 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

109. *Oxytropis valerii* Vassilczenko, Novosti Sist. Vyssh. Rast. 24: 133. 1987.

维力棘豆 wei li ji dou

Herbs, 5–10 cm tall or taller, acaulescent, from a multi-headed caudex. Stipules adnate to petiole. Leaves 5–8 cm, 17–25-foliolate; petiole 1.5–4 cm, with trichomes; leaflets densely arranged; leaflet blades lanceolate-ovate to ovate, both surfaces villous, base rounded, apex obtuse. Racemes compact, many flowered; peduncle 5–9 cm, longer to somewhat shorter than

leaves. Calyx campanulate, ca. 4 mm, lanate; lobes longer than tube. Corolla purple; standard ca. 7.5 mm, apex subrounded; wings almost as long as standard; keel beak ca. 0.5 mm. Ovary with appressed dense trichomes. Legume unknown. Fl. Jun.

- Hilltops, gravelly areas; 3500–4000 m. Xinjiang.

15. *Oxytropis* sect. *Oxytropis*

棘豆组 ji dou zu

Oxytropis sect. *Protoxytropis* Bunge.

Plants acaulescent (but shortly caulescent in *Oxytropis mollis*), from a simple or branching caudex, with yellowish gray trichomes. Leaves imparipinnate; leaflet blades yellowish gray. Racemes 5–13-flowered or more; peduncle 2–38 cm, somewhat shorter to much longer than leaves. Flowers 0.6–3.5 cm. Legume sessile, subsessile, or with a 2–3 mm stipe; body cylindrical to obovoid, 0.8–3 cm.

About 28 species: China, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe; nine species (seven endemic) in China.

- 1a. Corolla standard 0.6–0.8 cm; calyx 5–6 mm 113. *O. qilianshanica*
 1b. Corolla standard (0.9–)1–3 cm; calyx 6.3–14 mm.
 2a. Corolla standard (1.4–)2–3 cm.
 3a. Peduncle stiffly erect, arising from castaneous to dark brown caudex 112. *O. grandiflora*
 3b. Peduncle typically curved-ascending, arising from a pale brown caudex.
 4a. Leaves (13 or)15–23-foliolate; corolla standard 2.1–2.9 cm and apex rounded, keel beak 1–1.5 mm 110. *O. latibracteata*
 4b. Leaves 19–35-foliolate; corolla standard 1.4–2 cm and apex emarginate, keel beak 1–2.5 mm 111. *O. barkolensis*
 2b. Corolla standard (0.9–)1–2.1 cm.
 5a. Calyx 6–7 mm; corolla standard ca. 1 cm, keel beak 0.5–1 mm 118. *O. qingnanensis*
 5b. Calyx (6–)8–12 mm; corolla standard (0.9–)1–2.1 cm, keel beak (0.8–)1–4 mm.
 6a. Beak of corolla keel 3–4 mm 114. *O. pseudocoerulea*
 6b. Beak of corolla keel 0.8–1.5 mm.
 7a. Leaves 3–4 cm, 9- or 11-foliolate 117. *O. reniformis*
 7b. Leaves 10–35 cm, 21–41-foliolate.
 8a. Leaflet blades oblong-ovate to lanceolate; peduncle erect; legume erect-ascending; corolla standard apex emarginate 115. *O. songarica*
 8b. Leaflet blades oblong, lanceolate, elliptic, obovate, or oblong-lanceolate; peduncle erect-ascending; legume declining; corolla standard apex rounded 116. *O. mollis*

110. *Oxytropis latibracteata* Jurtzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 19: 269. 1959.

宽苞棘豆 kuan bao ji dou

Herbs, 10–25 cm tall, acaulescent, from a simple or branched caudex, clothed with marcescent leaf bases and stipules. Stipules ovate to broadly lanceolate, ca. 1.1 cm, membranous, with spreading long trichomes, apex acute. Leaves (3–)10–25 cm; leaflets (13 or)15–23, opposite or sometimes alternate; leaflet blades elliptic, narrowly ovate, or lanceolate, 6–29 × 3–5 mm, sericeous. Racemes rather dense, 5–13-flowered or more, with dense black short trichomes; peduncle (4–)6–25 cm, as long as to longer than leaves, sulcate, with dense short trichomes; bracts elliptic, 8–18 × 2–6 mm, papery, sericeous with appressed black short trichomes intermixed, base rounded, apex acuminate. Calyx cylindrical, (9–)11–13 × ca. 3 mm, with dense black and white short trichomes; lobes subulate to triangular, 1.3–3.5 mm. Corolla bluish purple to pale purple; standard 2.1–2.7 cm, lamina narrowly elliptic, apex rounded; wings 1.7–1.9 cm, lamina obliquely obtriangular, apex rounded or obliquely emarginate; keel 1.6–1.7 cm, beak 1–1.5

mm. Legume sessile, ovoid-ellipsoid, ca. 1.5 × 0.6 cm, leathery, pubescent. Fl. and fr. Jul–Aug.

- Sunny slopes, *Betula* forests, hillsides, alpine steppes, grasslands, floodplains, among shrubs; 1700–3800 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang.

- 1a. Leaflet blades 0.6–1.7 cm; bracts 8–11 × ca. 2 mm, shorter than calyx; corolla standard ca. 2.1 cm 110a. var. *latibracteata*
 1b. Leaflet blades to 2.9 cm; bracts 14–18 × ca. 6 mm, longer than calyx; corolla standard to 2.7 cm 110b. var. *longibracteata*

110a. *Oxytropis latibracteata* var. *latibracteata*

宽苞棘豆(原变种) kuan bao ji dou (yuan bian zhong)

Leaflet blades 0.6–1.7 cm. Bracts 8–11 × ca. 2 mm, shorter than calyx. Corolla standard ca. 2.1 cm. Fl. Jul–Aug, fr. Jul–Aug. $2n = 16^*$.

- Sunny slopes, *Betula* forests, hillsides, alpine steppes, grass-

lands, floodplains; 1700–3800 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang.

110b. *Oxytropis latibracteata* var. *longibracteata* Y. H. Wu, Acta Phytotax. Sin. 35: 352. 1997.

长宽苞棘豆 chang kuan bao ji dou

Leaflet blades to 2.9 cm. Bracts 14–18 × ca. 6 mm, longer than calyx. Calyx lobes to ca. 5 mm. Corolla standard to 2.7 cm. Fl. Aug, fr. Aug.

- Among shrubs; 3500–3700 m. Qinghai (Gonghe).

111. *Oxytropis barkolensis* X. Y. Zhu, H. Ohashi & Y. B. Deng, J. Jap. Bot. 74: 65. 1999.

八里坤棘豆 ba li kun ji dou

Oxytropis flavovirens H. Ohba, S. Akiyama & S. K. Wu.

Herbs, to 35 cm tall, caulescent or essentially acaulescent, from a shortly branched multiheaded caudex, tufted, perennial. Stipules narrowly triangular with a subulate free part, 1.8–2.5 cm × ca. 3 mm, villous, basally connate. Leaves subglabrous, 10–30 cm, 19–35-foliolate; leaflet blades narrowly ovate to lanceolate, 5–12 × 3–5 mm, both surfaces white villous, abaxially more densely villous than adaxially. Racemes 1.5–7 cm but elongating in fruit, compact to lax, 5–12-flowered; peduncle (5.6–)8.5–26(–35) cm, much longer than leaves; bracts triangular, 6–7 × ca. 3 mm, shorter than calyx tube, pubescent. Calyx campanulate, 8–10 × ca. 4 mm, with whitish and blackish trichomes; lobes subulate, 4–5 × ca. 0.5 mm, as long as tube. Corolla purple (when dry) or rarely white; standard 1.4–2 cm, lamina ovate, apex emarginate; wings 1.3–1.7 cm, apex emarginate; keel 1.2–1.3 cm, beak 1–2.5 mm. Legume sessile, subcylindric, to 2.5 cm including a slender beak to 5 mm. Fl. Jun–Jul, fr. Jul.

- Alpine meadows, hillsides, *Juniperus centrasiatica* forest margins, exposed grasslands, dry slopes, riversides; 2000–3400 m. Xinjiang.

112. *Oxytropis grandiflora* Candolle, Astragalogia, 71. 1802.

大花棘豆 da hua ji dou

Astragalus grandiflorus Pallas, Sp. Astragal. 57. 1800, not Linnaeus (1753); *Oxytropis collina* Turczaninow.

Herbs, 20–40 cm tall, acaulescent, from a branching caudex, clothed with marcescent leaf bases and stipules, with appressed white but fading yellow trichomes. Stipules broadly ovate, with dense white trichomes. Leaves 5–25 cm, 15–29-foliolate; leaflet blades oblong-lanceolate to rarely orbicular-ovate, 1–2.5 × 0.5–0.7 cm, both surfaces white sericeous, base rounded, apex acute. Racemes compact, many flowered; peduncle 10–30 cm, longer than leaves; bracts lanceolate to oblong-obovate, 0.7–1.3 cm, with appressed trichomes, apex acuminate. Calyx slightly purple, tubular, 1–1.4 cm; lobes triangular-lanceolate, 1–3 mm. Corolla purple to bluish purple; standard 2.3–3 cm, lamina broadly ovate, apex rounded; wings ca. 2 cm, lamina obliquely obtriangular, apex rounded or emarginate; keel ca. 1.7 cm, beak 2–3 mm. Legume sessile, cylindrical to lanceolate-cylindric, 2–3 × 0.4–0.8 cm, leathery, 2-locular, with appressed white trichomes intermixed with black trichomes,

septum wide, adaxial suture deeply grooved, beak long. Fl. Jun–Jul, fr. Jul–Aug. $2n = 32$.

Prairies on S-facing hillsides, hillsides, gravelly areas, forest margins, grasslands; 800–1700 m. Hebei, Jilin, Nei Mongol, Ningxia [Mongolia, Russia (Siberia)].

113. *Oxytropis qilianshanica* C. W. Chang & C. L. Zhang ex X. Y. Zhu & H. Ohashi, Cathaya 11–12: 154. 2000.

祁连山棘豆 qi lian shan ji dou

Herbs, (4.5–)9–22 cm tall, acaulescent, from a simple or multiheaded caudex. Stipules triangular, 5–13 mm, membranous to herbaceous, basal ca. 1/3 adnate to petiole, distinct, apex acuminate, with spreading sparse white long trichomes. Leaves (4–)6–15 cm, 19–29-foliolate; leaflet blades narrowly ovate, 5–10 × 3–5 mm, with appressed dense pale yellow and white trichomes, base rounded, margin ciliate, apex acute. Racemes compact, 5–14-flowered, elongating after anthesis; peduncle (2.5–)11–19(–30) cm, mainly longer than leaves, erect, sulcate, with white long trichomes apically intermixed with black ones; bracts narrowly lanceolate, ca. 4 × 1 mm, herbaceous, pubescent, apex acuminate. Calyx campanulate, 5–6 × ca. 2 mm, with white and black long trichomes intermixed; lobes subulate, 3–4 mm. Corolla blue; standard 6–8 mm, apex emarginate; wings 6–8 mm, lamina elliptic; keel 5–6 mm, beak 0.3–0.5 mm. Legume shortly stipitate; stipe ca. 1 mm; body brown, cylindric, ca. 13 × 4 mm, pendulous, leathery, 1-locular. Fl. Jun–Jul, fr. Jul–Aug.

- Forests, riverbanks, dry hillsides and grasslands, along roadsides; 2300–5100 m. Gansu, Qinghai, Xizang.

114. *Oxytropis pseudocerulea* P. C. Li, Acta Bot. Yunnan. 11: 300. 1989.

假蓝花棘豆 jia lan hua ji dou

Herbs, acaulescent, 15–25 cm tall, from a multiheaded caudex, laxly caespitose. Caudex branches covered with marcescent stipules. Stipules lanceolate, ca. 1 cm, herbaceous, densely appressed whitish villous, basal part adnate to petiole. Leaves 10–14 cm; leaflets 17–29, alternate or opposite; leaflet blades oblong-lanceolate to lanceolate, 8–12 × 4–5 mm, abaxially densely white villous, adaxially laxly white villous, base rounded, apex acuminate. Racemes oblong, many flowered; peduncle much longer than leaves, densely villous; bracts lanceolate-elliptic, 4–5 mm, densely pilose. Calyx tubular-campanulate, 9–10 mm, densely pilose; lobes linear-subulate, shorter than to rarely as long as tube. Corolla bluish purple; standard 1.3–1.4 × 0.7–0.8 cm, lamina broadly oblong, apex rounded; wings 1.2–1.3 × 0.4–0.5 cm, apex emarginate; keel ca. 1 cm, beak 3–4 mm. Ovary 2.5–3 mm, glabrous. Legume shortly stipitate; body oblong, 1.5–1.8 × ca. 0.5 cm, subleathery, 1-locular, densely pubescent, apex contracted into a long beak. Fl. and fr. May–Jul.

- Grasslands, shrubby slopes; 2000–3800 m. Sichuan, Xinjiang, Xizang.

115. *Oxytropis songarica* (Pallas) Candolle, Astragalogia, 73. 1802.

准噶尔棘豆 zhun ga er ji dou

Astragalus songaricus Pallas, Sp. Astragal. 63. 1800.

Herbs, 20–40 cm tall, acaulescent, from a thickened short branching multiheaded caudex, tuft-forming, sericeous-villous. Stipules broadly ovate, 1–1.2 cm, scarious, coarsely white pilose, 1- or 2-veined, basally adnate to petiole, connate and amplexicaul. Leaves 10–35 cm, 21–39(or 41)-foliolate; petiole and rachis with appressed trichomes; leaflet blades oblong-ovate to lanceolate, 1–2 × 0.3–0.8 cm, both surfaces white sericeous with appressed dense trichomes. Racemes rather lax, several to many flowered, elongating 8–10 cm in fruit; peduncle 7–38 cm, longer than leaves, erect, round, without grooves, covered with white soft trichomes; bracts lanceolate, 7–9 mm, with white trichomes, apex obtuse. Calyx cylindrical, 0.9–1.2 cm, covered with spreading white and black long trichomes; lobes lanceolate, 1–2.2 mm. Corolla purple; standard 1.7–2.1 cm, lamina ovate, apex slightly emarginate; wings 1.5–2 cm, apically broadening; keel 1.8–2 cm, beak ca. 1 mm. Legume sessile or substipitate; stipe to 0.5 mm; body ovoid to lanceolate-ovoid, 1.2–2 × 0.6–0.8 cm, erect-ascending, inflated, pilosulose, beaked. Fl. and fr. Jul–Aug.

• Grasslands and gravelly dry slopes, alpine and subalpine meadows; 1300–2800 m. Xinjiang.

116. *Oxytropis mollis* Royle ex Benth in Royle, Ill. Bot. Himal. Mts. 198. 1835.

软毛棘豆 ruan mao ji dou

Oxytropis iridum Dickoré & Kriechbaum.

Herbs, 15–30 cm tall, shortly caulescent, from a simple or multiheaded caudex, with 1–2 or more apparent internodes, tuft-forming. Stipules lanceolate, 1.4–1.7 cm, papery, with spreading dense trichomes, basally adnate to petiole. Leaves 10–22 cm, 23–31-foliolate; petiole and rachis with spreading dense white long and black short trichomes; leaflet blades oblong, lanceolate, elliptic, obovate, or oblong-lanceolate, 0.7–2.5 × 0.2–0.8 cm, both surfaces with spreading dense white long trichomes, apex acute to subtruncate. Racemes many flowered; peduncle 7–27 cm, shorter to longer than leaves, erect-ascending, with dense white and black trichomes; bracts linear, 4–6 mm. Calyx 6.3–10 mm, with dense black and white long trichomes; lobes 1.5–4 mm. Corolla purple, rarely white or fading to cream; standard 0.9–1.7 cm, lamina suborbicular to broadly ovate, apex rounded; wings 0.8–1.5 cm, apex rounded; keel 0.7–1.4 cm, beak 0.8–1.5 mm. Legume stipitate; stipe ca. 3 mm; body cylindrical, ca. 1.5 × 0.5 cm, declining, 1-locular, with dense black short trichomes, septum ca. 0.5 mm wide, adaxial suture grooved, beak ca. 3 mm. Fl. and fr. May–Sep.

Floodplains near fields; 2700–3400 m. Xizang [India, Kashmir, Nepal, Pakistan].

117. *Oxytropis reniformis* P. C. Li, Acta Phytotax. Sin. 18: 370. 1980.

肾瓣棘豆 shen ban ji dou

16. *Oxytropis* sect. *Sericopetalae* C. W. Chang, Acta Bot. Boreal.-Occid. Sin. 9: 40. 1989 [*“Sericopetala”*].

毛瓣棘豆组 mao ban ji dou zu

Herbs, acaulescent (but shortly caulescent in *Oxytropis parasericeopetala*). Leaves imparipinnate; petioles and rachises densely

Herbs, 3–7 cm tall, acaulescent, from a multiheaded caudex. Caudex branches clothed with marcescent stipules and leaf bases, with sparse white long trichomes. Stipules with an ovate-lanceolate distinct part, free from petiole, connate to middle. Leaves 3–4 cm, 9- or 11-foliolate; petiole and rachis with spreading white long trichomes; leaflet blades oblong to lanceolate-oblong, 4–7 × 1.5–2 mm, abaxially almost glabrous but midvein and margin with sparse long trichomes, adaxially densely appressed pubescent, apex acute. Racemes 5–7-flowered; peduncle as long as leaves, with spreading dense white long trichomes and basally with dense black and white long trichomes. Calyx cylindrical, 8–10 mm, with appressed white and black long trichomes; lobes subulate, shorter than tube. Corolla blue; standard 1.1–1.3 cm, lamina orbicular-reniform, apex emarginate; wings 0.9–1.1 cm, lamina obovate-oblong, apex emarginate; keel slightly shorter than wings, beak subulate and ca. 1.5 mm. Legume stipitate; stipe ca. 2 mm; body cylindrical, 10–12 × ca. 4 mm, with sparse white and black short trichomes. Fl. and fr. Jun–Aug.

• Grasslands on mountain slopes; 4300–4600 m. Xizang.

118. *Oxytropis qingnanensis* Y. H. Wu, Acta Bot. Yunnan. 19: 36. 1997 [*“qinghaiensis”* and *“qingnanensis”*].

囊谦棘豆 nang qian ji dou

Oxytropis nangqianensis X. Y. Zhu, nom. illeg. superfl.

Herbs, 10–16 cm tall, acaulescent. Stipules with a triangular-lanceolate distinct part, 0.6–1.3 cm, adnate to petiole in basal ca. 1/3, connate. Leaves 3–10 cm, 15–23-foliolate; petiole and rachis with appressed to spreading sparse white trichomes; petiole 1–5 cm; leaflet blades ovate, oblong, or ovate-lanceolate, 3–13 × 2.5–5 mm, both surfaces with appressed white trichomes, base rounded, apex acute. Racemes dense, many flowered; peduncle 10–14 cm, slightly longer than or subequal to leaves, with spreading long trichomes basally intermixed with dense short trichomes; bracts linear, 4–6 mm, white pilose. Calyx subcylindrical, 6–7 mm, with intermixed dense black short and white long trichomes; lobes subulate, shorter than to almost as long as tube. Corolla bluish purple; standard ca. 1 cm, lamina ovate and 7–8 mm wide, apex emarginate; wings ca. 1 cm, lamina obliquely narrowly obovate and 3–4 mm wide, apex emarginate; keel ca. 8 mm, beak 0.5–1 mm. Legume sessile, pale brown, cylindrical, 8–10 × 3–4 mm, leathery, sparsely pubescent, beak ca. 1.5 mm. Fl. and fr. Jun–Sep.

• Near alpine forests; 3900–4100 m. Qinghai.

The specific epithet was spelled both *“qinghaiensis”* and *“qingnanensis”* in the protologue (heading and figure caption on p. 36, Feb 1997). Later, in the same volume, this was corrected to *Oxytropis qingnanensis* (p. 223, Jun 1997). The name *O. nangqianensis* X. Y. Zhu (Cathaya 11–12: 154. 2000) was published as a nomen novum in the mistaken belief that its replaced synonym was an illegitimate later homonym of *O. qinghaiensis* Y. H. Wu (1996); see the comments under that species (p. 475). In fact, the name *O. nangqianensis* was nomenclaturally superfluous when published and is therefore illegitimate.

white sericeous-villous; leaflets not verticillate; leaflet blades whitish gray villous. Racemes subcapitate, many flowered. Corolla purple, blue, or white; standard and keel sericeous on outside surfaces. Legume narrowly ellipsoid, ellipsoid-ovoid, or ovoid, 1-locular, densely sericeous-villous.

- Three species: China.

- 1a. Corolla white; leaflet blades narrowly elliptic; calyx lobes 3–4 mm 119. *O. lhasaensis*
 1b. Corolla purple, bluish purple, violet, blue, or rarely white; leaflet blades oblong, elliptic, or ovate-lanceolate; calyx lobes 4.5–9 mm.
 2a. Plants 10–35 cm tall; calyx lobes 4.5–5 × ca. 1.2 mm 120. *O. sericopetala*
 2b. Plants 7–9 cm tall; calyx lobes 7–9 × ca. 3 mm 121. *O. parasericeopetala*

119. *Oxytropis lhasaensis* X. Y. Zhu, Ann. Bot. Fenn. 41: 495. 2004.

拉萨棘豆 *la sa ji dou*

Herbs, 10–11 cm tall, acaulescent, from a multiheaded caudex. Stipules triangular, 7.5–10 × 3.5–4.5 mm, herbaceous, with appressed white long trichomes, basally adnate to petiole, apical ca. 2/3 free. Leaves 4–7 cm, 9–17-foliolate; leaflet blades appressed silvery or buff-colored tomentose; young leaflet blades sessile, narrowly elliptic to linear, 7–15.5 × 1–2 mm, usually conduplicate; mature leaflet blades with a 2–3 mm petiolule, narrowly elliptic, 11.5–21 × 1.7–2.5 mm, sometimes with glands. Racemes elongate, lax, many flowered; peduncle 7–12 cm; bracts subulate, 3–4 × ca. 0.2 mm, with appressed white trichomes. Calyx campanulate, 6–8 × ca. 3 mm, with white trichomes; tube 3–4 mm; lobes subulate, 3–4 × 0.2–0.3 mm. Corolla white; standard 10–11 × 6–7 mm, lamina suborbicular, 6–7 × 6–7 mm, and outside densely sericeous, apex slightly emarginate; wings 9–10 mm, lamina obovate, apex rounded; keel 6.5–7.5 mm, sericeous outside near tip, beak 0.2–0.5 mm. Legume unknown. Fl. Aug.

- Sandy riverbanks; ca. 3700 m. Xizang (Lhasa).

120. *Oxytropis sericopetala* Prain ex C. E. C. Fischer, Bull. Misc. Inform. Kew 1937: 95. 1937.

毛瓣棘豆 *mao ban ji dou*

Herbs, 10–35 cm tall, acaulescent, from a branching caudex, tufted, sometimes with persistent petioles and peduncles of previous seasons, ± grayish. Stipules narrowly elliptic, 8–15 × 2.5–3 mm, silvery or buff-colored villous, apex acuminate. Leaves 7–20 cm, 13–31-foliolate; leaflets sessile or subsessile; leaflet blades elliptic to ovate-lanceolate, 0.6–2.5 × 0.2–0.7 cm, both surfaces silvery or buff-colored tomentose, apex acute. Racemes many flowered; peduncle 18–25 cm, usually longer

than leaves, silvery or buff-colored villous-tomentose; bracts linear, 2.5–3 × 1–1.5 mm, villous, apex acuminate. Calyx cylindrical, 8–10 × 2–4 mm, silvery villous; tube ca. 3.5 × 1–2 mm; lobes linear, 4.5–5 × ca. 1.2 mm. Corolla purple, bluish purple, violet, blue, or rarely white; standard 0.9–1.2 cm, lamina obcordate, 8–10 × 6–7 mm, and outside sericeous-villous; wings 1–1.2 cm, apex rounded; keel 8–10 mm, beak ca. 0.3 mm. Legume shortly stipitate; body ellipsoid-ovoid, 6–7 × 4–5 mm, slightly inflated, densely whitish villous. Fl. Jun–Sep, fr. Aug–Sep. $2n = 16^*$.

- Sandy sites and sand dunes, hills, grasslands, gravelly flooded places; 2600–4600 m. Xizang.

121. *Oxytropis parasericeopetala* P. C. Li, Acta Phytotax. Sin. 18: 369. 1980.

长萼棘豆 *chang e ji dou*

Herbs, 7–9 cm tall, shortly caulescent, from a multiheaded caudex. Stipules membranous, densely white tomentose, free from petiole, basal half connate, apex acute. Leaves 3–5 cm, 7–15-foliolate; petiole and rachis densely white tomentose; leaflet blades oblong to ovate-lanceolate, 8–12 × 4–6 mm, both surfaces densely white tomentose. Racemes subcompact, many flowered; peduncle shorter than to as long as leaves, densely white tomentose; bracts linear, almost as long as calyx. Calyx 1–1.2 cm, with dense white and black long trichomes; lobes linear, 7–9 × ca. 3 mm, ca. 2 × as long as tube. Corolla purple; standard 1.8–2 cm, lamina subelliptic and outside white or pale yellow sericeous; wings slightly shorter than keel, outside sericeous or glabrous; keel outside densely sericeous. Legume stipitate; body ovoid, 7–9 × 4–6 mm, with dense white and black short trichomes. Fl. and fr. Aug–Sep.

- Valley grasslands; 4500–5000 m. Xizang (Lhasa).

17. *Oxytropis* sect. *Orobia* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 73. 1874.

大花棘豆组 *da hua ji dou zu*

Herbs, 3–25 cm tall, acaulescent. Leaves imparipinnate; leaflets not verticillate; leaflet blades pubescent on both surfaces but often adaxially sparingly so. Racemes 2–11-flowered or more; peduncle 2–15(–18) cm. Corolla of various colors, 0.5–2 cm. Legume subsessile or with a stipe to 5 mm; body cylindrical, ovoid, or oblong-ovoid, 0.5–4 cm, erect, exerted from calyx, 1-locular to nearly 2-locular, with developed abaxial and adaxial (or only adaxial) septa.

- About 70 species: Asia, Europe, North America; seven species (two endemic) in China.

- 1a. Corolla white or yellow, sometimes purplish violet, standard 1.7–2 cm; leaves 19–25 cm 122. *O. argentata*
 1b. Corolla purple, pale pink, blue, bluish purple, violet, or white, standard 0.5–1.3(–2) cm; leaves 1.5–12 cm.
 2a. Calyx ca. 3 mm; peduncle shorter than leaves; legume sessile 123. *O. malloryana*
 2b. Calyx 3–12 mm; peduncle longer than leaves; legume with a stipe ca. 5 mm or less.

- 3a. Corolla standard 1.5–2 cm; legume stipe ca. 5 mm 127. *O. rupifraga*
 3b. Corolla standard 0.5–1.3 cm; legume stipe 3 mm or less.
 4a. Corolla standard 0.9–1.3 cm, wings apically rounded 128. *O. immersa*
 4b. Corolla standard (0.5–)0.6–1 cm, wings apically emarginate.
 5a. Peduncle 4–15 cm, 3–4 × as long as leaves; legume 10–15 mm; corolla standard with apex rounded 124. *O. lehmannii*
 5b. Peduncle 1.8–15 cm, not more than 2 × as long as leaves; legume 5–8 mm; corolla standard with apex emarginate or emarginate to rounded.
 6a. Peduncle 1.8–3.5 cm, less than 2 × as long as leaves; leaves 0.5–3 cm 125. *O. savellanica*
 6b. Peduncle 4–15 cm, to 2 × as long as leaves; leaves 2–12 cm 126. *O. proboscidea*

122. *Oxytropis argentata* (Pallas) Persoon, Syn. Pl. 2: 331. 1807.

斋桑棘豆 zhai sang ji dou

Astragalus argentatus Pallas, Sp. Astragal. 60. 1800; *Oxytropis argyraea* Candolle; *O. argyrophylla* Ledebour; *O. recognita* Bunge.

Herbs, 10–15(–20) cm tall, acaulescent, from a multiheaded long-branched caudex. Caudex clothed with persistent petioles and sericeous trichomes. Stipules ovate, membranous, with sparse white trichomes, basal half adnate to petiole and connate. Leaves 3–12(–15) cm, (9–)19–25(–31)-foliolate; petiole and rachis with appressed trichomes; leaflet blades oblong to ovate-lanceolate, 5–10(–15) × 2–5 mm, with appressed white trichomes. Racemes lax, many flowered; peduncle as long as to longer than leaves, erect, with appressed to spreading white trichomes; bracts lanceolate, almost as long as calyx tube, with white and black trichomes. Calyx broadly cylindric, 8–10(–12) mm, with appressed black and spreading white trichomes; lobes lanceolate to subulate, 1/3–1/2 as long as tube. Corolla white or yellow, sometimes purplish violet; standard 1.7–2 cm, lamina obovate, apex emarginate; wings 1.3–1.6 cm; keel shorter than wings, beak 1–1.5 mm. Legume sessile, ovoid-oblong, 1.7–2.5 × 0.4–0.7 cm, adaxial suture deeply grooved, beak 5–7 mm. Fl. May–Jul, fr. May–Aug.

Shrublands, gravelly slopes. Xinjiang [Russia (Siberia)].

123. *Oxytropis malloryana* Dunn, Bull. Misc. Inform. Kew 1927: 250. 1927.

马老亚纳棘豆 ma lao ya na ji dou

Herbs, 3–5 cm tall, acaulescent, with sparse white trichomes. Stipules ovate to lanceolate, ca. 5 mm, adnate to petiole base, margin membranous and ciliate, apex obtuse. Leaves 3–5 cm, 21–25-foliolate; petiole 1–2 cm; leaflet blade oblong-ovate, ca. 3 mm, margin slightly involute, apex obtuse. Racemes compact, 4- or 5-flowered; peduncle shorter than leaves; bracts lanceolate, shorter than calyx. Calyx campanulate, ca. 3 mm; tube ca. 2 mm; lobes lanceolate, ca. 1 mm. Corolla purple to violet; standard ca. 6 mm, lamina ovate; wings as long as standard; keel shorter than wings, apex acutely rostrate. Legume sessile, linear, 1–4 cm, 1-locular, adaxial suture intruded. Fl. and fr. Apr–Jun.

• Stony S-facing slopes; 3800–4600 m. Xizang.

124. *Oxytropis lehmannii* Bunge, Arbeiten Naturf. Vereins Riga 1: 225. 1847.

等瓣棘豆 deng ban ji dou

Oxytropis aequipetala Bunge.

Herbs, 5–20 cm tall, acaulescent, from a multiheaded caudex, pubescence short. Stipules with a lanceolate-subulate distinct part, 5–6 mm, subleathery, densely sericeous and sometimes also with sparse black trichomes, adnate to petiole, basal half connate. Leaves 2–6 cm, 9–31-foliolate; petiole and rachis densely sericeous; leaflets closely arranged; leaflet blades lanceolate, oblong, or elliptic, 1.5–12 × 0.3–4 mm, both surfaces appressed sericeous, apex acute. Racemes 8–11-flowered; peduncle 4–15 cm, 3–4 × as long as leaves, erect to diffuse, with appressed sparse white and black trichomes. Calyx broadly cylindric, 3.5–6(–8) mm, with appressed white and black short trichomes; lobes subulate, 0.8–1.2 mm, ca. 1/2 as long to as long as tube. Corolla purple and pale pink; standard 6–11 mm, lamina orbicular, apex rounded; wings as long as standard, lamina oblong, apex emarginate; keel as long as wings, beak ca. 1 mm. Legume stipitate; stipe ca. 3 mm; body cylindric to ovoid, 10–15 × 3–3.5 mm, slightly flattened, 1-locular, with appressed dense white short trichomes, sometimes with black trichomes intermixed, septum absent, abaxial suture round, adaxial suture concave, beak ca. 1 mm. Fl. Jun–Jul, fr. Jul–Sep. $2n = 16$.

Gravelly alpine meadows, grasslands on hillsides; 2000–4800 m. Xizang [Tajikistan, Uzbekistan].

125. *Oxytropis savellanica* Bunge ex Boissier, Fl. Orient. 2: 503. 1872.

伊朗棘豆 yi lang ji dou

Oxytropis carduchorum Hedge.

Herbs, 3–5 cm tall, acaulescent, from a multiheaded caudex, matlike or cushionlike, with appressed white trichomes. Stipules triangular-ovate, 3–4 mm, herbaceous, glabrous, subglabrous, or with sparse trichomes, adnate to petiole, basally connate, margin ciliate. Leaves 0.5–3 cm, (7–)11–23-foliolate; leaflet blades oblong to elliptic, 1.5–5 × 0.3–2 mm, both surfaces with appressed white trichomes, apex retuse to acute. Racemes capitate, (1 or)2–8-flowered; peduncle 0.8–3.5 cm, mostly longer than leaves, with appressed black and white trichomes; bracts linear to narrowly lanceolate, 1–1.5 mm, with sparse trichomes. Calyx broadly cylindric, 3–5 mm, with appressed white and black trichomes; lobes subulate, 0.8–1.8 mm. Corolla purple; standard 6–10 mm, lamina suborbicular, apex emarginate; wings 5.5–6.3 mm, oblong, slightly shorter than standard, apex emarginate; keel 5.2–6 mm, beak 0.5–1 mm. Legume shortly stipitate; body broadly cylindric, 7–8 × 2–3 mm, slightly inflated, with appressed trichomes, beak ca. 1 mm. Fl. Jul–Aug, fr. Aug–Sep. $2n = 16$.

Rocky N slopes, in *Carex moorcroftii* grasslands, gravelly areas; 3500–5100 m. Qinghai, Xizang [Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

126. *Oxytropis proboscidea* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 17. 1874.

冰川棘豆 bing chuan ji dou

Oxytropis glacialis Bentham ex Bunge; *O. nivalis* Franchet.

Herbs, 3–17 cm tall, acaulescent, from a multiheaded caudex, densely cinereous pubescent. Stipules ovate, membranous, densely sericeous with long trichomes, free from petiole, basally connate. Leaves 2–12 cm, 9–19-foliolate; rachis with small glands; leaflet blades oblong to oblong-lanceolate, 3–10 × 1.5–3 mm, sericeous with spreading long trichomes. Racemes compact, 6–10-flowered; peduncle 4–15 cm, equaling to much longer than leaves, with dense white and black incurved trichomes; bracts linear, slightly shorter than calyx tube, with sparse white and black trichomes. Calyx 4–6 mm, with dense black or white trichomes intermixed with black long trichomes; lobes lanceolate, shorter than tube. Corolla purple, bluish purple, or seldom white; standard 5–9 × ca. 5 mm, lamina orbicular, apex emarginate to rounded; wings ca. 7 mm, lamina obovate to oblong, apex emarginate; keel ca. 6 mm, beak subtriangular, very short. Legume shortly stipitate; body ovoid to oblong-ovoid, 5–7 × 4–6 mm, inflated, membranous, 1-locular, with spreading dense white long and black short trichomes, septum absent, adaxial suture emarginate, beak erect. Fl. and fr. Jun–Sep.

• Desert grasslands, gravelly areas, lakeshores, sunny dry slopes, floodplains, cold meadows, sand dunes; 4100–5300 m. Gansu, Xinjiang, Xizang, Yunnan.

127. *Oxytropis rupifraga* Bunge, Bull. Soc. Imp. Naturalistes Moscou 39(2): 24. 1866.

悬岩棘豆 xuan yan ji dou

Herbs, 4–9 cm tall, acaulescent, from a branching multi-headed caudex, appressed white villous-sericeous. Stipules ovate-oblong, membranous, villous-sericeous, adnate to petiole, basally connate. Leaves 2–6 cm, 15–21-foliolate; petiole and rachis densely villous-sericeous; leaflets densely arranged; leaf-

let blades ovate to oblong, 2–5 × 1–2 mm, both surfaces densely white villous-sericeous. Racemes dense, 5–7-flowered; peduncle 4–6 cm, as long as to longer than leaves, with white and black trichomes intermixed; bracts lanceolate, 3–8 mm, with black and white trichomes intermixed on apical part. Calyx broadly cylindrical, 0.8–1.2 cm, with trichomes like those on bracts; lobes lanceolate, 4–5 mm. Corolla blue to bluish purple; standard 1.5–2 cm, lamina almost orbicular, apex emarginate to 2-lobed; wings 1.1–1.6 cm, lamina apex emarginate; keel 1–1.3 cm, beak ca. 1 mm. Legume stipitate; stipe ca. 5 mm; body oblong, oblong-ovoid, or ovoid, 1.5–3 × 0.5–0.7 cm, 1-locular, with appressed white trichomes, beak erect. Fl. Jun–Jul, fr. Jul–Aug.

Gravelly hilltops; ca. 1700 m. Xinjiang [Kyrgyzstan].

128. *Oxytropis immersa* (Baker ex Aitchison) Bunge ex B. Fedtschenko, Beih. Bot. Centralbl. 21: 212. 1907.

和硕棘豆 he shuo ji dou

Astragalus immersus Baker ex Aitchison, J. Linn. Soc., Bot. 18: 45. 1880; *Oxytropis incanescens* Freyn; *O. pamirica* Danguy.

Herbs, 4–11 cm tall, acaulescent, from a multiheaded caudex, cushion- or mat-forming, with whitish trichomes. Stipules narrowly triangular, 5–6 × ca. 3 mm, membranous, basally connate. Leaves (0.8–)2–8 cm, 15–21-foliolate; leaflet blades ovate, 1–5 × 1–2 mm, both surfaces with appressed trichomes. Racemes compact, few to ca. 10-flowered; peduncle 4–10 cm, as long as or somewhat longer than leaves, with appressed trichomes; bracts triangular, 2–3 × ca. 1 mm, scariosus, pubescent. Calyx broadly cylindrical, 3–7 × ca. 1 mm, with whitish and blackish trichomes; lobes subulate, 1–3 × ca. 0.5 mm, ca. 1/2 as long as tube. Corolla violet to purple; standard 0.9–1.3 cm, lamina orbicular, apex emarginate; wings ca. 9.5 mm, lamina obovate, apex rounded; keel as long as wings, beak ca. 1 mm. Legume stipitate; stipe 2–3 mm; body cylindrical, 10–18 × 4–7 mm, with appressed blackish and whitish trichomes, beak 1–2 mm. Fl. and fr. Aug.

Sunny gravelly hill slopes, alpine meadows; 3600–4200 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

18. *Oxytropis* sect. *Neimonggolicae* X. Y. Zhu & H. Ohashi, Cathaya 11–12: 161. 2000 [*“Neimonggolica”*].

内蒙古棘豆组 nei meng gu ji dou zu

Herbs, acaulescent, from a simple or branched caudex, compactly caespitose. Leaves 1-foliolate; leaflet borne on a short to elongate petiole. Racemes 1- or 2-flowered; peduncle obsolete or present and shorter than leaves. Legume sessile, spherical-ovoid (unknown in *Oxytropis monophylla*).

Two species: China, Mongolia; two species (one endemic) in China.

1a. Petiole 2–5 cm; corolla light yellow, yellow, yellowish green, red, whitish green, or white; ovary

pubescent 129. *O. neimonggolica*

1b. Petiole 0.5–1 cm; corolla purple; ovary glabrous 130. *O. monophylla*

129. *Oxytropis neimonggolica* C. W. Chang & Y. Z. Zhao, Acta Phytotax. Sin. 19: 523. 1981.

内蒙古棘豆 nei meng gu ji dou

Herbs, 3–9 cm tall, acaulescent, from a simple or multi-headed caudex, with a thatch of marcescent leaf bases. Stipules narrowly triangular, ca. 4 × 2–3 mm, membranous, whitish villous, basally connate. Leaves 3–6.5 cm, 1-foliolate; petiole 2–5

cm; leaflet blade lanceolate to elliptic, ca. $3.2 \times 0.6\text{--}0.8$ cm, densely whitish sericeous. Racemes 1- or 2-flowered; peduncle 1–2 cm, shorter than leaves, whitish villous with long trichomes; bracts triangular, ca. 3×1 mm, whitish villous with long trichomes. Calyx cylindric, $10\text{--}15 \times$ ca. 4 mm, with appressed long whitish trichomes and sometimes also with blackish short trichomes; lobes subulate, $2\text{--}3 \times$ ca. 0.5 mm. Corolla light yellow, yellow, yellowish green, red, whitish green, or white; standard 1.9–2.1 cm, lamina spatulate and ca. 1.4×0.7 cm, apex entire or 2-lobed; wings ca. 1.6 cm, lamina obovate; keel ca. 1.4 cm, beak ca. 0.5 mm. Ovary pubescent. Legume sessile, spherical-ovoid, $1.5\text{--}2 \times 0.8\text{--}1$ cm, inflated, densely whitish villous, apex abruptly beaked. Fl. May–Jun, fr. Jul–Aug.

• Sunny slopes, grasslands, N-facing slopes, *Stipa* community on dry desertic prairie; 1000–2200 m. Nei Mongol.

3. *Oxytropis* subg. *Traganthoxytropis* Vassilczenko in Komarov, Fl. URSS 13: 221. 1948.

猫刺棘豆亚属 *mao ci ji dou ya shu*

Shrublets, usually pulvinate, strongly branching, spiny, tragacanthoid. Racemes 1–5-flowered. Corolla purple or pink. Legume ovoid to subspherical, inflated.

Seven species in two sections: China, Kazakhstan, Mongolia, Russia; three species in two sections in China.

- 1a. Leaves lacking terminal leaflet, rachis apex spinescent; legume nut-form in shape, thickly leathery 19. *O.* sect. *Lycotriche*
 1b. Leaves with a terminal leaflet, rachis ultimately persistent as a thorn; legume vesicular, membranous 20. *O.* sect. *Hystrix*

19. *Oxytropis* sect. *Lycotriche* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 134. 1874.

猫头刺组 *mao tou ci zu*

Shrublets, strongly branched, non-glandular, with appressed silky trichomes often forming pulvinate tufts. Stipules adnate to petiole, connate. Leaves appearing paripinnate by apical leaflet reduced to a spine; petioles and rachis hardened after falling of leaflets and becoming slender spines. Racemes axillary, few flowered; peduncle short. Calyx inflating in fruit, not ruptured by legume. Legume \pm ovoid, thickly leathery, \pm 2-locular.

One species: China, Mongolia, Russia.

131. *Oxytropis aciphylla* Ledebour, Fl. Altaic. 3: 279. 1831.

猫头刺 *mao tou ci*

Oxytropis aciphylla f. *albiflora* Zhao Y. Chang, Z. H. Wu & L. R. Xu; *O. aciphylla* var. *gracilis* Krylov; *O. aciphylla* var. *utriculata* H. C. Fu; *O. kossinskyi* B. Fedtschenko & Basilevskaja; *O. lycotriche* Bunge.

Shrublets, 4–20 cm tall, from a woody base, forming hemispherical cushions. Branchlets bearing persistent leaves modified as thorns. Stipules narrowly triangular, $2\text{--}6 \times$ ca. 3 mm, scarious, connate nearly to apex, margin ciliate. Leaves 2–6 cm, with 4–12 opposite leaflets not including apical spine; pedicel and rachis persistent; leaflet blades linear to narrowly elliptic, $5\text{--}18 \times 1\text{--}2$ mm, apex acuminate and spinescent. Racemes 1- or 2-flowered; peduncle obsolete or to 5 cm; bracts

130. *Oxytropis monophylla* Grubov, Bot. Zhurn. (Moscow & Leningrad) 63: 364. 1978.

单叶棘豆 *dan ye ji dou*

Herbs, 3–8 cm tall, acaulescent, from a multihedged caudex, cushion- or tuft-forming. Stipules obovate, ca. 5 mm, membranous, with white long trichomes, free, basally connate, apex obtuse. Leaves 1-foliolate; petiole 5–10 mm; leaflet blade lanceolate-elliptic, ca. $3.5 \text{ cm} \times 3\text{--}8$ mm, erect, margin entire, base obtuse, apex acute. Flowers solitary, sessile. Calyx cylindric, 0.9–1.4 cm, densely appressed white villous and with white and black trichomes on apical part; lobes triangular-subulate, 2–3 mm. Corolla purple; standard 1.8–2 cm, lamina oblong-obovate; wings ca. 1.5 cm, lamina oblong; keel ca. 1.4 cm, beak short. Ovary glabrous. Legume unknown. Fl. May–Oct.

Deserts; ca. 3700 m. Nei Mongol, Ningxia [Mongolia].

subulate, $3\text{--}5 \times 1\text{--}2$ mm, scarious, pubescent. Calyx cylindric, $8\text{--}14 \times 3\text{--}4$ mm, slightly inflated after anthesis, pilose with whitish and blackish long trichomes or with only whitish long trichomes; lobes subulate, $2\text{--}5 \times$ ca. 0.5 mm. Corolla pink, purple, red, or white; standard 2–2.2 cm, lamina ovate to elliptic, apex rounded; wings 1.8–1.9 cm, lamina obliquely lanceolate, apex rounded; keel 1.4–1.6 cm, beak 1–1.5 mm. Legume ellipsoid, $1\text{--}2.2 \times 0.4\text{--}0.5$ cm, inflated, thickly leathery, \pm 2-locular, with appressed whitish trichomes and sometimes with long whitish trichomes. Fl. May–Aug, fr. Jun–Aug. $2n = 16$.

Sandy areas, stony slopes on hills, gravelly areas on high plains, rocky deserts, N-facing sandy lakeshores, dry hillsides in desert steppes, floodplains in valleys, gravelly and stony areas with *Caragana*; 500–3200 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia, Russia].

20. *Oxytropis* sect. *Hystrix* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 22(1): 131. 1874.

猬刺棘豆组 *wei ci ji dou zu*

Shrublets, often forming pulvinate tufts, non-glandular, with appressed to spreading trichomes. Leaves imparipinnate; petioles

and rachis hardened after falling of leaflets and becoming slender spines. Racemes axillary, (1 or)2–5-flowered; peduncle shorter to longer than leaves. Calyx not inflating in fruit, ruptured by legume. Legume ovoid to subspherical, membranous.

Five species: China, Kazakhstan, Mongolia; two species in China.

- 1a. Leaves 7–11(or 13)-foliolate; racemes 2–5-flowered; calyx 1–1.4 cm, lobes 2–4 mm 132. *O. tragacanthoides*
 1b. Leaves 19–31-foliolate; racemes 1- or 2-flowered; calyx 0.9–1.1 cm, lobes 1.2–2 mm 133. *O. hystrix*

132. *Oxytropis tragacanthoides* Fischer ex Candolle, Prodr. 2: 280. 1825.

2000–4100 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Kazakhstan, Mongolia].

胶黄耆状棘豆 jiao huang qi zhuang ji dou

Oxytropis paratragacanthoides Vassilczenko.

Shrublets, 25–30 cm in diam., forming hemispherical cushions, branching from a ligneous caudex. Branches 6–10 cm, stout. Stipules narrowly triangular, 3–5 × ca. 3 mm, scarious, basally connate, margin ciliate. Leaves 1–7 cm, 7–11(or 13)-foliolate; rachis persistent, with whitish trichomes, apically spine-bearing; leaflets opposite; leaflet blades ovate, linear, or oblong, 2–15 × 1–2 mm, appressed sericeous, apex acuminate and spinescent. Racemes 2–5-flowered; peduncle 2–5 cm, with dense white trichomes; bracts subulate, 3–5 × ca. 3 mm, scarious, with whitish and blackish trichomes. Calyx cylindric, 10–14 × 3–4 mm, pilose with whitish or sometimes whitish and blackish intermixed long trichomes; lobes subulate, 2–4 × ca. 0.5 mm. Corolla purple, blue, violet-blue, reddish purple, or white; standard 1.8–2.4 cm, lamina obovate to elliptic, apex rounded; wings 1.7–2.3 cm, lamina obliquely obovate, apex rounded; keel 1.9–2.2 cm, beak 1–2 mm. Legume sessile, ovoid to subspherical, 1.7–2.5 × 1–1.2 cm, inflated, ± 2-locular, dense blackish and whitish pilose, septum 1.5–2 mm. Fl. Apr–Aug, fr. Jul–Aug. $2n = 16, 32$.

Floodplains, gravelly hillsides, dry rocky places, dry meadows;

133. *Oxytropis hystrix* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 254. 1842.

猬刺棘豆 wei ci ji dou

Oxytropis spinifer Vassilczenko.

Shrublets, 10–16 cm tall, from a thickened multiheaded caudex, forming a hemispherical cushion. Branches thick and tough. Stipules oblong, scarious, adnate to petiole, basally connate, margin ciliate, apex obtuse. Leaves 2–4 cm, 19–31-foliolate; petiole and rachis persistent, spinescent, with whitish trichomes; leaflets opposite; leaflet blades linear to oblong, 7–8 × 1–1.5 mm, caducous, both surfaces with appressed white trichomes, apex acuminate. Racemes 1- or 2-flowered; peduncle shorter than leaves, with dense whitish trichomes; bracts lanceolate, thinly scarious, with appressed trichomes, apex acute. Calyx tubular, 0.9–1.1 cm, thinly scarious; lobes subulate, 1.2–2 × ca. 0.5 mm. Corolla purple; standard 1.7–2 cm, lamina ovate to elliptic, apex rounded; wings 1.5–1.8 cm, lamina obovate; keel 1.8–1.9 cm, beak 1–2 mm. Legume sessile, ovoid, ca. 2 × 1–1.2 cm, subglabrous with sparse trichomes on abaxial and adaxial sutures, septum ca. 2.5 mm wide, apex acuminate. Fl. Jun–Jul, fr. Aug.

S-facing gravelly slopes in valleys; 2000–4300 m. Xinjiang [Kazakhstan].

141. CHESNEYA Lindley ex Endlicher, Gen. Pl. 1275. 1840.

雀儿豆属 que er dou shu

Zhu Xiangyun (朱相云); Kai Larsen

Spongiocarpella Yakovlev & N. Ulziykhutag.

Plants perennial. Root stout, woody. Stem lignified, short. Leaves imparipinnate, rarely 3-foliolate; stipules herbaceous, adnate to petiole; leaflets entire. Flowers solitary, axillary, rarely 1–4 in a raceme; peduncle with nodes bearing 1 bract. Calyx with 2 bracts at base; tube tubular, gibbous on one side at base, 5-lobed; 2 upper lobes connate, 3 lower lobes free, with brown glands at apex. Corolla yellow or purple; standard suborbicular or oblong, abaxially with dense short appressed hairs, ± longer than wings or keel. Stamens diadelphous; anthers uniform. Ovary sessile; stigma capitate, papillary. Legume oblong to linear, 1-loculed. Seeds reniform. Basic chromosome number $x = 8$.

About 21 species: C and SW Asia, Mediterranean region; seven species (two endemic) in China.

Chesneya dshungarica Goloskokov (Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 117. 1957) was recorded from Xinjiang by Chang Y. Yang (Claves Pl. Xinjiang. 3: 72. 1985). However, the present authors found no relevant specimens and therefore could not substantiate the occurrence of this species in China.

- 1a. Stipules deciduous; plants not cushionlike, with dense whitish appressed hairs; leaflets obovate or obovate-elliptic, apex rounded, emarginate, or truncate; legume 4–6 cm.
 2a. Racemes 1–4-flowered; mature legume glabrous 1. *C. cuneata*
 2b. Flowers solitary; mature legume with dense appressed hairs.
 3a. Leaflets 5–7 × 3–5 mm; pedicels ca. as long as or slightly longer than leaves; legume 35–50 × 4–5 mm 2. *C. crassipes*
 3b. Leaflets 7–15 × 4–10 mm; pedicels ca. as long as or shorter than leaves; legume 50–60 × 9–10 mm 3. *C. acaulis*

- 1b. Stipules persistent; plants cushionlike, with spreading whitish appressed hairs or glabrous; leaflets obovate, elliptic, or suborbicular, apex acute or subrounded; legume shorter than 3 cm.
- 4a. Persistent stipules not becoming spines, darkened when dry, incurved or straight, leaflets without hard spine at apex.
- 5a. Leaflets 19–41, glabrous, base conspicuously oblique 4. *C. polystichoides*
- 5b. Leaflets 15–21, both surfaces with dense spreading appressed hairs, base rounded or slightly so 5. *C. nubigena*
- 4b. Persistent stipules becoming spines; leaflets with hard spine at apex.
- 6a. Corolla purple; bracteoles linear, ca. 8 mm; leaflets 3 or 4 pairs, both surfaces with whitish silky appressed hairs 6. *C. macrantha*
- 6b. Corolla yellow; bracteoles subulate, shorter than 1 mm; leaflets 4–6 pairs, with whitish spreading short appressed hairs 7. *C. spinosa*

1. *Chesneya cuneata* (Benth) Ali, Scientist (Karachi) 3: 3. 1959.

截叶雀儿豆 jie ye que er dou

Gueldenstaedtia cuneata Benth in Royle, Ill. Bot. Himal. Mts. 200. 1835; *Calophaca cuneata* (Benth) Komarov; *Caragana cuneata* (Benth) Baker (1876), not Moench (1794).

Stems 10–15 cm tall, with many branches. Leaves 2–10 cm, 5–17-foliolate; stipules ovate-lanceolate, 5–6 mm, adnate to petiole for ca. 1/2 its length; axis and petiole with dense spreading long hairs or short appressed hairs; leaflet blades obovate or obovate-oblong, 4–16 × 2–4 mm, both surfaces with dense spreading long or short appressed hairs, base rounded, apex rounded, cuneate, or emarginate. Racemes umbellate, 1–4-flowered; peduncles 3–10 mm, with dense white appressed hairs; pedicels 2–4 mm. Calyx tubular, 15–17 mm, gibbous at base, inflated on one side; teeth lanceolate, shorter than tube, with black glands at apex. Corolla purple; standard 20–30 mm, with short appressed hairs abaxially; wings 18–28 mm; keel slightly shorter than wings. Legume linear, 4–6 cm × 8–10 mm, glabrous when mature. Fl. Jul, fr. Aug.

Dry slopes on hills, gravelly areas, between stones; 3300–4300 m. Xinjiang, Xizang [India, Kashmir, Pakistan].

2. *Chesneya crassipes* Borissova, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 207. 1936.

长梗雀儿豆 chang geng que er dou

Plants cushionlike. Stems woody at base, with branches. Leaves 3–8 cm, 11- or 13-foliolate; stipules lanceolate, 6–7 mm, adnate to petiole for ca. 1/2 its length, persistent; axis and petiole slender, with dense long hairs; leaflet blades dense, obovate-oblong, 5–7 × 3–5 mm, both surfaces with dense spreading long hairs, base rounded, apex emarginate or cuneate. Flowers solitary; pedicels 10–60 mm, with dense spreading white short hairs; bracts subulate; bracteoles almost same as bracts. Calyx tubular, 12–13 mm, with dense white short hairs, gibbous at base, inflated on one side; teeth lanceolate, slightly shorter than tube, with red-brown glands at apex. Corolla purple or orange-yellow with purple; standard 13–18 mm, lamina elliptic. Ovary sessile, glabrous. Legume linear, 3.5–4 cm × 4–5 mm, with dense appressed hairs. Fl. Jul, fr. Aug.

Gravelly areas; ca. 3800 m. Xizang [Pakistan, Tajikistan].

3. *Chesneya acaulis* (Baker) Popov, Byull. Sredne-Aziatsk. Gosud. Univ. 15(2, Suppl.): 10. 1927.

无茎雀儿豆 wu jing que er dou

Caragana acaulis Baker, J. Linn. Soc., Bot. 18: 44. 1880; *Calophaca acaulis* (Baker) Komarov.

Plants cushionlike. Stems woody at base, 3–8 cm tall. Leaves 4–8 cm, 13–17-foliolate; stipules ovate-lanceolate, 5–6 mm, adnate to petiole for ca. 1/2 its length; axis and petiole with dense white appressed hairs; leaflet blades obovate or obovate-oblong, 7–15 × 4–10 mm, both surfaces with dense white appressed hairs, base subrounded, apex emarginate, rarely cuneate. Flowers solitary; pedicels 3–4 cm, slightly shorter or ca. as long as leaves, with white short appressed hairs; bracts subulate; bracteoles ca. as long as bracts. Calyx tubular, 12–13 mm, with dense white short hairs, gibbous at base, inflated on one side; teeth lanceolate, slightly shorter than tube, with red-brown glands at apex. Corolla purple or orange-yellow; standard 13–18 mm, lamina elliptical, with dense white short hairs abaxially. Ovary sessile, glabrous. Legume linear, 5–6 cm × 9–10 mm, with dense appressed hairs. Fl. Jul, fr. Aug.

Gravelly areas; 2900–3000 m. Xizang [Afghanistan, Pakistan].

4. *Chesneya polystichoides* (Handel-Mazzetti) Ali, Scientist (Karachi) 3: 10. 1959.

川滇雀儿豆 chuan dian que er dou

Calophaca polystichoides Handel-Mazzetti, Symb. Sin. 7: 552. 1933; *Spongiocarpella polystichoides* (Handel-Mazzetti) Yakovlev.

Plants cushionlike. Stems woody at base, prostrate, ca. 25 mm in diam., branched, bark red-brown, with dense persistent petioles and stipules. Leaves 3–14 cm, 19–41-foliolate; stipules linear, ca. 15 mm, adnate to petiole for ca. 1/2 its length, rarely with short white hairs; axis and petiole rarely with long hairs, incurved after drying, persistent; leaflets sessile; leaflet blades dense, abaxially gray-white, adaxially dark green, oblong, ovate, or nearly orbicular, 3–11 × 2–6 mm, both surfaces hairy, base conspicuously oblique, apex rounded, seldom truncate or emarginate. Flowers solitary; pedicels 10–20 mm, with spreading white long hairs; bracts linear; bracteoles slightly shorter than bracts. Calyx tubular, 12–15 × 5–7 mm, rarely with long hairs, gibbous at base, inflated on one side; teeth triangular-lanceolate, ca. 1/2 as long as tube. Corolla yellow; standard 20–22 mm, lamina oblong, with dense white short hairs abaxially; keel 15–17 mm, auriculate, ca. as long as wings. Ovary sessile, glabrous. Legume narrowly elliptical, 2.5–3.5 cm × ca. 8 mm, leathery, slightly applanate, glabrous. Fl. Jul, fr. Aug.

• Slopes, on rocks, meadows; 3400–4400 m. Sichuan, Xizang, Yunnan.

5. *Chesneya nubigena* (D. Don) Ali, Scientist (Karachi) 3: 4. 1959.

云雾雀儿豆 yun wu que er dou

Plants cushionlike. Stems woody at base, branched, with persistent petioles and stipules. Leaves 3–15 cm, 15–21-foliolate; stipules linear, ca. 10 mm, adnate to petiole for ca. 1/2 its length, upper part rounded or 2- or 3-lobed, with dense long hairs; axis and petiole with dense spreading long hairs, incurved or erect after drying, persistent; leaflet blades dense, oblong, 3–8 × 1–4 mm, both surfaces with dense spreading long hairs, base rounded or slightly oblique, apex acute. Flowers solitary; pedicels 10–40 mm, with dense spreading white long hairs; bracts linear, ca. 10 mm; bracteoles slightly shorter than bracts. Calyx tubular, 10–15 mm, rarely with long hairs, gibbous at base, inflated on one side; teeth lanceolate, ca. 1/2 as long as tube. Corolla yellow or purple; standard 20–30 mm, lamina broadly ovate or suborbicular, with dense white short hairs abaxially, apex emarginate; wings 18–28 mm; keel ca. as long as wings, without auricles. Ovary sessile, with dense white long hairs. Legume narrowly elliptical, 2–3 cm × 7–8 mm, rarely with long white appressed hairs, slightly applanate, leathery. Fl. Jul–Aug, fr. Aug–Sep.

Rocky alpine slopes, within shrubs, slopes, meadows, gravelly areas; 3600–5300 m. Xizang, Yunnan [Bhutan, India, Nepal].

- 1a. Flowers yellow; plants 11–16 cm; leaflets 4–8 × 2–4 mm, with a few persistent petioles 5a. subsp. *nubigena*
 1b. Flowers purple; plants 3.5–6 cm; leaflets 3–5 × 1–2 mm, with many persistent petioles 5b. subsp. *purpurea*

5a. *Chesneya nubigena* subsp. *nubigena*

云雾雀儿豆(原亚种) yun wu que er dou (yuan ya zhong)

Astragalus nubigenus D. Don, Prodr. Fl. Nepal. 245. 1825; *Calophaca crassicaulis* (Benth. ex Baker) Komarov; *Caragana crassicaulis* Benth. ex Baker; *Chesneya intermedia* (Yakovlev) Z. G. Qian; *C. paucifoliolata* (Yakovlev) Z. G. Qian; *C. yunnanensis* (Yakovlev) Z. G. Qian; *Spongiocarpella intermedia* Yakovlev; *S. nubigena* (D. Don) Yakovlev; *S. nubigena* subsp. *kumaoensis* Yakovlev; *S. paucifoliolata* Yakovlev; *S. yunnanensis* Yakovlev.

Plants tall, 11–16 cm. Leaflet blades 4–8 × 2–4 mm, with a few persistent petioles. Flowers yellow. Fl. Jul–Aug, fr. Aug–Sep.

Rocky alpine slopes, within shrubs, slopes, meadows; 3600–5300 m. Xizang, Yunnan [India, Nepal].

5b. *Chesneya nubigena* subsp. *purpurea* (P. C. Li) X. Y. Zhu, Acta Phytotax. Sin. 34: 561. 1996.

紫花雀儿豆 zi hua que er dou

Chesneya purpurea P. C. Li, Acta Phytotax. Sin. 19: 236. 1981; *Spongiocarpella purpurea* (P. C. Li) Yakovlev.

Plants small, 3.5–6 cm. Leaflet blades 3–5 × 1–2 mm, with many persistent petioles. Flowers purple. Fl. Jul, fr. Aug.

Within shrubs, hilly slopes, meadows, gravelly areas; 4700–5200 m. Xizang [Bhutan].

6. *Chesneya macrantha* S. H. Cheng ex H. C. Fu, Fl. Intra-mongol. 3: 291. 1978.

大花雀儿豆 da hua que er dou

Chesneya potaninii (Yakovlev) Govaerts; *Oxytropis grubovii* N. Ulziykhutag (1971), not *Chesneya grubovii* Yakovlev (1979); *Spongiocarpella grubovii* (N. Ulziykhutag) Yakovlev; *S. potaninii* Yakovlev.

Plants cushionlike. Stems shortened, 5–10 cm tall. Leaves 2–4 cm, 7- or 9-foliolate; stipules ovate, ca. 4 mm, submembranous, adnate to petiole for ca. 1/2 its length, persistent, with dense white long appressed hairs; axis and petiole rarely with spreading white long hairs, persistent and forming spines at apex; leaflet blades elliptic or obovate, 5–6 × ca. 3 mm, both surfaces with white silky short appressed hairs, base cuneate, apex acute or spinelike. Flowers solitary; pedicels 4–5 mm; bracts linear, ca. 8 mm; bracteoles similar to bracts. Calyx tubular, ca. 15 mm, with dense long hairs and dark brown glands, gibbous at base, inflated on one side; teeth linear, almost as long as tube, with glands at apex. Corolla purple; standard ca. 25 mm, lamina oblong, with dense short hairs abaxially; wings ca. 20 mm; keel shorter than wings. Ovary sessile, with dense hairs. Legume unknown. Fl. Jun, fr. Jul.

Dry slopes. Nei Mongol, Xinjiang [Mongolia].

7. *Chesneya spinosa* P. C. Li, Acta Phytotax. Sin. 19: 236. 1981.

刺柄雀儿豆 ci bing que er dou

Spongiocarpella spinosa (P. C. Li) Yakovlev.

Plants cushionlike. Stems short, 4–6 cm tall, woody at base, branched, with dense persistent spinelike petioles and stipules. Leaves 2–2.5 cm, 9–13-foliolate; stipules ovate, 2–3 mm, papery, adnate to petiole for ca. 1/2 its length, glabrous, rarely with short white hairs; axis and petiole rarely with long hairs, persistent and forming spines; leaflet blades narrowly oblong, 3–5 × ca. 1.5 mm, both surfaces with dense white short hairs when young, becoming glabrous, base rounded or slightly oblique, apex acute, rounded, or truncate, with short spines. Flowers solitary; pedicels shorter than leaves; bracts lanceolate, ca. 1.5 mm; bracteoles subulate, shorter than 1 mm. Calyx tubular, 14–16 mm, rarely with white short hairs and brown glands, gibbous at base, inflated on one side; teeth lanceolate, with glands and hard acute at apex. Corolla yellow; standard 24–26 mm, lamina suborbicular, with dense white short hairs abaxially; wings 23–25 mm, claw slightly longer than lamina; keel 19–21 mm. Ovary sessile, with dense white short hairs. Legume oblong, 2–2.5 cm × 4–5 mm, rarely with long white hairs. Fl. Jul, fr. Aug.

• On gravelly slopes of hills; 3900–4200 m. Xizang.

142. CHESNIELLA Borissova, *Novosti Sist. Vyssh. Rast.* 1964: 182. 1964.旱雀豆属 *han que dou shu*

Zhu Xiangyun (朱相云); Kai Larsen

Chesneya sect. *Microcarpon* Borissova, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R.* 21: 252. 1961.

Plants perennial. Root stout, woody. Stem prostrate, slender, base woody. Leaves imparipinnate, 5–11-foliolate, entire; stipules membranous, separate from petiole. Flowers solitary, axillary. Corolla pale yellow, pink, or purple; standard orbicular, abaxially with dense short appressed hairs, \pm equal to wings or keel. Stamens diadelphous. Ovary sessile; stigma capitate, papillary. Legume ovoid or oblong. Seeds cylindrical-reniform. Basic chromosome number $x = 8$.

Six species: C Asia to NW China; two species (one endemic) in China.

1a. Leaflets 5 or 7, obovate, adaxially rarely with hairs, abaxially with dense white long appressed hairs;

corolla purple 1. *C. mongolica*1b. Leaflets 7–11, obovate-lanceolate, both surfaces with dense spreading white short hairs; corolla pink 2. *C. ferganensis***1. *Chesniella mongolica*** (Maximowicz) Borissova, *Novosti Sist. Vyssh. Rast.* 1964: 184. 1964.蒙古旱雀豆 *meng gu han que dou**Chesneya mongolica* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 27: 462. 1881.

Stems caespitose, prostrate, 15–25 cm, slender, with dense white long appressed hairs. Leaves 15–20 mm, 5- or 7-foliolate; stipules separate from petiole, subulate, ca. 2 mm, with dense white long hairs, with dense white glands at apex; axis and petiole with dense white long appressed hairs; leaflet blades obovate, 6–8 \times 5–6 mm, abaxially with dense white long appressed hairs, adaxially with dense blue glands and rarely with hairs, base cuneate, apex blunt. Flowers solitary; pedicel 5–7 mm, with dense white hairs; bracts ca. 0.5 mm; bracteoles same shape as bracts, with glands at apex. Calyx tubular, ca. 7 mm, with dense white hairs, gibbous at base, inflated on one side; teeth lanceolate, slightly shorter than tube, upper 2 lobes almost connate, with brown glands at apex. Corolla purple; standard ca. 13 mm, lamina broadly orbicular, with dense white short hairs abaxially; wings and keel ca. as long as standard. Ovary sessile, with dense white long hairs. Legume oblong, ca. 13 \times 2 mm, slightly inflated, with dense white short hairs. Fl. Aug, fr. Aug.

• Gravelly areas. Nei Mongol.

2. *Chesniella ferganensis* (Korshinsky) Borissova, *Novosti Sist. Vyssh. Rast.* 1964: 183, 184. 1964.甘肃旱雀豆 *gan su han que dou**Chesneya ferganensis* Korshinsky, *Zap. Imp. Akad. Nauk Fiz.-Mat. Otd.* 4: 90. 1896; *C. gansuensis* Y. X. Liou; *C. grubovii* Yakovlev; *Chesniella gansuensis* (Y. X. Liou) P. C. Li.

Stems prostrate, 10–20 cm, with many branches, with dense spreading short hairs. Leaves 10–30 mm, 7–11-foliolate; stipules separate from petioles, ovate, ca. 2 mm, with dense short hairs, with dark brown glands at apex; axis and petiole slender, with dense spreading short hairs; leaflets obovate-lanceolate, 7–9 \times 3–4 mm, with dense spreading white short hairs, base rounded, apex rounded, emarginate, or truncate. Flowers solitary; pedicel 8–10 mm, slender, with dense spreading short hairs; bracts ca. 1 mm; bracteoles same shape as bracts. Calyx campanulate, ca. 7 mm, rarely with short hairs; teeth linear, longer than tube, with dark brown glands at apex, upper 2 lobes almost connate. Corolla pink; standard 9–10 mm, lamina orbicular, with dense short hairs abaxially, apex emarginate, claw ca. 1 mm; wings 10–11 mm, claw ca. as long as lamina, ca. 1 mm; keel slightly shorter than wings, shortly clawed, without auricles. Ovary sessile, with dense short hairs. Legume narrowly oblong, 18–20 \times ca. 5 mm, slightly inflated, with dense spreading long hairs. Fl. Jul, fr. Aug.

Dry slopes; ca. 1800 m. Gansu [Mongolia].

143. COLUTEA Linnaeus, *Sp. Pl.* 2: 723. 1753.鱼鳔槐属 *yu biao huai shu*

Sun Hang (孙航); Kai Larsen

Shrubs or small shrubs. Leaves imparipinnate, rarely 3-foliolate; stipules small; leaflets entire, opposite, estipellate. Racemes axillary, long pedunculate; bract and bracteoles very small or absent. Calyx campanulate; teeth 5, subequal or upper 2 smaller, outside pubescent. Corolla yellow or brownish red; standard suborbicular, upper part of stalk bicallose; wings narrowly falcate-oblong, with short stalk; keel broad, mostly inrolled, blunt at apex, with long connate stalk. Stamens diadelphous, upper 1 free, other 9 connate to tube; anthers homomorphic. Ovary stipitate; ovules numerous; style incurved, barbate along upper ventral suture; stigma inrolled or hook-curved. Legume inflated, bladderlike, acute or tapering at apex, indehiscent or tip 2-valvate, with long stalk at base, segments membranous. Seeds numerous, reniform, without strophiole; funicle filiform.

About 28 species: E and NE Africa, C and SW Asia, S Europe; four species (one endemic, two introduced) in China.

1a. Leaflets 19–25; racemes 8–14(–31)-flowered 4. *C. delavayi*

1b. Leaflets 7–13; racemes 3–8-flowered.

- 2a. Annual branches (excluding young tips) glabrous to subglabrate, bark of branchlets thinly papery, longitudinally split; flowers to 2.4 cm; ovary densely white pubescent 1. *C. nepalensis*
- 2b. Annual branches villosulous, bark of branchlets not split; flowers shorter than 1.8 cm; ovary sparsely pubescent.
- 3a. Corolla yellow, wings with lower part wide, upper part gradually narrowed, without teeth, keel triangular-suborbicular auriculate, auricle intersecting stalk at an acute angle 2. *C. arborescens*
- 3b. Corolla orange-yellow to reddish brown, wings with upper and lower parts subequal, lower part with 1 or 2 teeth, keel oblong auriculate, auricle parallel to stalk 3. *C. ×media*

1. *Colutea nepalensis* Sims, Bot. Mag. 53: t. 2622. 1826.

尼泊尔鱼鳔槐 ni bo er yu biao huai

Colutea arborescens Linnaeus var. *nepalensis* (Sims) Baker.

Shrubs, deciduous, 1–3 m tall. Old branches reddish brown to brunescent, glabrous, glossy; annual branches white to white-green. Leaves pinnate, 7–13-foliolate, often clustered at new branch bases, 4–10 cm; rachis sparsely pubescent; stipules triangular; leaflets often opposite; petiolules ca. 1 mm; leaflet blades elliptic to obovate, 6–16 × 7–11 mm, both surfaces sparsely pubescent or adaxially glabrous, lateral veins inconspicuous, base rounded to nearly truncate, apex with inconspicuous mucro. Racemes subequal to leaves, 3–10-flowered; peduncle 8–10 cm, pubescent; bract ovate-lanceolate, both bracteoles and bract pubescent. Flowers to 2.4 cm. Calyx outside with hairs; upper 2 teeth broadly triangular, lower 3 linear, slightly curved. Corolla yellow; standard deflexed, 20–22 × ca. 19 mm, stalk 5–6 mm, calluses oblong, rounded but margin free at apex; wings ca. 15 mm, stalk ca. 6 mm, upper stalk auriculate, ca. 3 × 1.5 mm, irregular at apex; keel connate, suborbicular, 10–11 × 7–8 mm, apex beaked, stalk 9–10 mm. Ovary complanate, oblong-lanceolate, densely pubescent; stipe ca. 3.5 mm; style ca. 10 mm, curved, hook-curved at apex, ventrally with longitudinal cirrus; stigma terminal, small. Legume oblong, 4–5.5 × 2–2.5 cm, with groove along ventral suture, pubescent, with curved fruit stalk at base, acute to rounded at apex; segments thinly leathery. Seed smooth. Fl. and fr. Jun–Jul.

Mountain slopes, riverside gravel, among shrubs. W Qinghai (Haixi Diqu), W Xizang (Ngari Diqu) [Afghanistan, India, Pakistan].

2. *Colutea arborescens* Linnaeus, Sp. Pl. 2: 723. 1753.

鱼鳔槐 yu biao huai

Shrubs, deciduous, 1–4 m tall. Young branches with fine white hairs. Leaves pinnate, 7–13-foliolate, 6–15 cm, with groove on rachis; stipules triangular or lanceolate-triangular to lanceolate-falcate, 2–3 mm; leaflets abaxially gray-green, adaxially green, oblong to obovate, 1–3 cm × 6–15 mm, thinly leathery, abaxially sparsely shortly hairy, adaxially glabrous, venation clear and free, apex retuse or obtuse, mucronate. Racemes 5–6 cm, 6–8-flowered; bract ovate-lanceolate, ca. 2 mm, blackish brown or intermixed white scattered shortly sericeous, apex obtuse. Pedicel ca. 1 cm. Calyx ca. 5 mm; tube inside upper part densely pallid to brown hairy; teeth triangular, 1/4–1/3 as long as calyx tube, outside sparsely blackish brown and white sericeous, apex argute. Corolla yellow; standard slightly wider than long, 15–17 mm, base rounded, apex retuse, stalk 2–4 mm, calluses crescent-shaped, slightly convex; wings 11–14 mm, widest near base, to 4 mm wide, upper part often attenu-

ate, curved auriculate at one lateral base, equal to stalk, ca. 4 mm, apex obtuse; keel suborbicular to triangular-suborbicular, ± concave, ca. 5 mm wide and triangular-suborbicular auriculate at base, to 11 mm wide at apex, auricle intersecting stalk at an acute angle, stalk 8–9 mm. Ovary densely pubescent; style curved, at slight right angle with ovary, inrolled at apex, adaxially longitudinally white barbate. Legume greenish or slightly red at base, narrowly ovate, 6–8 × 2–3 cm, glabrous to subglabrate, both ends acute. Seeds complanate, blackish to green-brown. Fl. May–Jul, fr. Jul–Oct.

Cultivated for ornament. Beijing, Jiangsu (Nanjing), Liaoning (Dalian), Shaanxi (Wugong), Shandong (Qingdao) [native to C and S Europe].

3. *Colutea ×media* Willdenow, Enum. Pl. 2: 771. 1809.

杂种鱼鳔槐 za zhong yu biao huai

Shrubs, deciduous, ca. 1.8 m tall. Old branches gray, glabrous; young ones gray-yellow, with white hairs. Leaves pinnate, 9–13-foliolate, 7–10 cm; stipules on lower branches often triangular, ca. 1 mm, on upper branches lanceolate, ca. 3 mm, sparsely pubescent to glabrous; leaflets opposite or subopposite; petiolules 0.5–1 mm, densely pubescent; leaflet blades adaxially bluish green, obovate, 1.3–1.9(–2.5) × 0.9–1.2 cm, abaxially appressed white pubescent, adaxially glabrous, base rounded, apex truncate to retuse, shortly mucronate. Racemes 6–6.5 cm, 3–5-flowered; peduncle to 3–4 cm, pubescent; bract lanceolate, ca. 1.5 mm, hairy. Pedicel 7–10 mm; bracteoles fine, pubescent. Calyx ca. 5 × 5 mm, outside with hairs, longitudinal ribs 5; teeth triangular, subequal, ca. 1 mm, inside densely manicate, glabrous below. Corolla orange-yellow to reddish brown; standard reflexed, ca. 15 × 19–20 mm, base rounded, sinus at apex, stalk ca. 2 mm, calluses lunate; wings conspicuous, smaller than standard and keel, upper and lower parts subequal, ca. 1 cm, rounded at apex, auriculate at one lateral upper base, often conduplicate and curved at apex, intersecting stalk to form a ring, lower part with 1 or 2 teeth, stalk ca. 4 mm; keel connate, triangular-suborbicular, ca. 1.2 × 1.2 cm, oblong auriculate and ca. 4 mm wide at base, auricle parallel to stalk, stalk ca. 9 mm. Ovary flattened, linear-lanceolate, ca. 6 mm, pubescent; stipe ca. 4 mm; style curved to nearly right angle, inrolled at apex, glabrous except barbate adaxially. Legume ca. 7.5 cm. Fl. and fr. May–Oct.

Cultivated for ornament. Shandong [of hybrid origin in SW Asia (Caucasus); widely cultivated].

Colutea ×media is a hybrid between *C. arborescens* and *C. orientalis* Miller; the latter is often cultivated in the Mediterranean region.

4. *Colutea delavayi* Franchet, Pl. Delavay. 158. 1889.

膀胱豆 pang guang dou

Shrubs, deciduous, 1–4 m tall, to 4 cm in diam. Stems with gray-green bark and many fibers, throughout with dense to sparse, pallid and brownish appressed hairs. Leaves pinnate, 19–25-foliolate, ca. 15 cm; stipules linear-lanceolate, 3–4 mm, both surfaces densely pubescent, tapering at apex; leaflets adaxially bottle-green, elliptic, ovate-elliptic, or narrowly obovate, 10–20 × 6–10 mm, abaxially sparsely hairy, adaxially with scattered appressed hairs or subglabrous, base rounded to broadly cuneate, apex rounded or retuse, mucronate. Racemes longer than or equal to leaves, 15–17 cm, 8–14(–31)-flowered. Pedicel 3–5 mm. Calyx tube ca. 3 mm; teeth triangular, 1–1.5 mm, outer and inner margin densely pubescent. Corolla yellowish; standard reflexed, 1–1.3 cm wide, base cordate, apex retuse,

stalk 2–3 mm, calluses suborbicular, ca. 1 mm wide; wings ca. 8 mm, auriculate and stipitate at base; keel suborbicular, 6.5–8 mm, broadly triangular auriculate, stalk ca. 7 mm. Ovary flattened, 4–5 mm, outside densely puberulent; stipe ca. 3 mm; style at right angle with ovary, inrolled at apex, adaxially longitudinally barbate; stigma fine. Legume ovoid-fusiform, 3.5–4 × 1.8–2 cm, argute at apex, attenuate at base, stalk 12–18 mm; segments greenish white to yellow-green, outside sparsely appressed blackish brown hairy to glabrous. Seeds brown, not glossy, ca. 4.5 × 3.5 mm; funicle ca. 2 mm. Fl. Aug–Oct, fr. Oct–Dec.

• Mountain slopes, riversides, among shrubs; 1800–3000 m. SW Sichuan (Jiulong, Muli), NW Yunnan.

144. SPHAEROPHYSA Candolle, Prodr. 2: 270. 1825.

苦马豆属 *ku ma dou shu*

Sun Hang (孙航); Kai Larsen

Shrubs, small, or perennial herbs, glabrous or with pallid appressed hairs. Leaves imparipinnate; stipules small; leaflets 3 to numerous, entire, estipellate. Racemes axillary. Calyx teeth subequal or upper 2 connivent. Corolla red; standard orbicular, reflexed at margins; wings falcate-oblong; keel inrolled and blunt at apex. Stamens diadelphous; anthers homomorphic. Ovary long stipitate; ovules numerous; style incurved, adaxially longitudinally barbate; stigma terminal, capitate or oblique. Legume inflated, subglabrous, nearly indehiscent, with long stalk at base, ventral suture slightly sunken, segments membranous or leathery. Seeds numerous, reniform; funicle filiform. $x = 8$.

Two species: mainly in C, E, and SW Asia and Siberia; one species in China.

1. *Sphaerophysa salsula* (Pallas) Candolle, Prodr. 2: 271. 1825.

苦马豆 *ku ma dou*

Phaca salsula Pallas, Reise Russ. Reich. 3: 747. 1776;
Swainsona salsula (Pallas) Taubert.

Subshrubs or perennial herbs. Stems erect or lower part stoloniferous, 0.3–0.6 m tall, rarely to 1.3 m. Branches with longitudinal rib, with sparse to dense pallid appressed hairs. Leaves 11–21-foliolate; stipules linear-lanceolate or triangular to subulate; rachis 5–8.5 cm, adaxially grooved; petiolule short, puberulent; leaflets obovate to obovate-oblong, 5–15(–25) × 3–6(–10) mm, abaxially with appressed white fine hairs, adaxially with scattered hairs or glabrous, lateral veins inconspicuous, base rounded to broadly cuneate, apex retuse to rounded, mucronate. Racemes often longer than leaves, 6.5–13(–17) cm, 6–16-flowered; bract ovate-lanceolate. Pedicel 4–5 mm, densely white pilose, bracteoles linear to subulate. Calyx campanulate;

teeth triangular, upper 2 shorter and wider, others longer and narrower, outside white pilose. Corolla red, becoming purple; standard suborbicular, reflexed outward, 12–13 × 12–16 mm, base shortly stipitate, apex retuse; wings shorter than keel, ca. 12 mm (including stalk), apex rounded, base with slightly curved stalk ca. 3 mm and auriculate lobes ca. 2 mm, lobes rounded at apex; keel ca. 13 × 4–5 mm, blunt at apex, stalk ca. 4.5 mm. Ovary ± linear, densely white pilose; style curved, only inner surface sparsely longitudinally barbate; stigma spheroidal. Legume ellipsoid or broadly ellipsoid, turgid, 1.7–3.5 × 1.7–1.8 cm, apex rounded, stalk ca. 10 mm, segments membranous, outside sparsely white pilose, densely so on suture. Seeds brown, reniform to nearly semicircular, ca. 2.5 mm; funicle 1–3 mm; hilum rounded and sunken. Fl. May–Aug, fr. Jun–Sep.

Mountain slopes, plains, wastelands, sand, oases, ditch sides, around salt ponds; 1000–3200 m. Gansu, Hebei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Mongolia, Russia].

145. EREMOSPARTON Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 75. 1841.

无叶豆属 *wu ye dou shu*

Sun Hang (孙航); Kai Larsen

Shrubs, short. Leaves squamiform. Flowers numerous; racemes slender, sparsely flowered. Calyx campanulate; teeth 5, ca. 1/2 as long as keel, upper 2 wider than lower 3. Standard orbicular or orbicular-reniform, base shortly clawed, apex with a sinus; keel shorter than wings. Stamens diadelphous; anthers homomorphic. Ovary sessile; style inrolled, upper dorsal surface longitudinally barbate; stigma terminal. Legume orbicular or oval, flattened and slightly turgid, 2-valvate, indehiscent. Seeds 1 or 2(or 3), reniform, without strophiole, segments membranous.

About three species: C Asia; one species in China.

1. Eremosparton songoricum (Litvinov) Vassilczenko in Komarov, Fl. URSS 11: 311. 1945.

准噶尔无叶豆 zhun ga er wu ye dou

Eremosparton aphyllum (Pallas) Fischer & C. A. Meyer var. *songoricum* Litvinov, Trudy Bot. Muz. Imp. Akad. Nauk 11: 74. 1913.

Shrubs, 50–80 cm tall. Stems much branched at base; old branches fulvous, with peeling bark; young branches green, sparsely pubescent, slender, slightly angulate. Leaves squami-

form, lanceolate, 1–2.5 mm. Flowers solitary, axillary, forming long racemes (10–15 cm) on branches; pedicel 1–1.5 mm. Calyx tube ca. 2 mm; teeth triangular, appressed pubescent. Corolla purple; standard broadly reniform, ca. 4 × 7 mm; wings oblong, claw ca. 1/2 as long as limb; keel shorter than wings, argute at apex, claw slightly shorter than limb. Legume slightly turgid, ovate or oval, 6–13 × 5–8 mm, appressed pubescent, with acute beak, segments membranous. Seed 1(–3), reniform. Fl. May–Jun, fr. Jun–Jul.

Migratory or subfixed dunes. Xinjiang (Junggar Pendi) [Kazakhstan].

146. GUELLENSTAEDTIA Fischer, Mém. Soc. Imp. Naturalistes Moscou 6: 171. 1823.

米口袋属 mi kou dai shu

Bao Bojian (包伯坚); Anthony R. Brach

Amblytropis Kitagawa (1936), nom. illeg. superfl., not (Mitten) Brotherus (1907).

Herbs, perennial. Taproot thick. Stem very short or nearly absent, with a rosette of leaves at soil surface. Leaves imparipinnate, rarely 1-foliolate; stipules adnate to petiole or free; stipels absent; petiolule short or leaflets nearly sessile; leaflets ovate, lanceolate, elliptic, oblong, or linear, rarely orbicular. Flowers purple, pink, or yellow, 3–8(–12) per umbel on axillary peduncles. Calyx campanulate, densely appressed villous, rarely glabrous, 5-toothed; upper 2 teeth broader. Standard ovate or orbicular, narrowing to claw at base, retuse at apex; wings free, obovate-oblong, slightly shorter than standard; keel ovate, very short. Stamens diadelphous. Ovary sessile, many ovuled; style short, rolled inward at apex; stigma broad. Legume cylindrical or linear, not septate, with many seeds. Seeds triangular-reniform.

About 12 species: from Russia (Siberia) to the Sino-Himalayan region; three species (two endemic) in China.

- 1a. Leaflets orbicular to ovate or elliptic 3. *G. taihangensis*
 1b. Leaflets obovate to linear.
 2a. Stems short, less than 5 cm, not woody; standard obtuse at apex 2. *G. verna*
 2b. Stems long, ca. 5 cm, woody; standard acuminate at apex 1. *G. henryi*

1. Gueldenstaedtia henryi Ulbrich, Bot. Jahrb. Syst. 36(Beibl. 82): 59. 1905.

川鄂米口袋 chuan e mi kou dai

Amblytropis henryi (Ulbrich) C. Y. Wu ex H. P. Tsui.

Stems to 5 cm, woody, branched, with basal rosette of leaves. Leaves imparipinnate, 2–9 cm, pilose or glabrescent; stipules narrowly triangular; petiolules very short or leaflets nearly sessile; leaflets oblong or obovate, 3–10 × 2–5 mm, abaxially pubescent, adaxially glabrous, apex rounded, obviously mucronate. Umbels 4- or 5-flowered; rachis ca. 10 cm, sparsely pilose or glabrous; bracts narrowly lanceolate, ca. 3.5 mm. Corolla purple; standard broadly ovate, ca. 14 × 8 mm, apex acuminate, retuse; wings elliptic, ca. 11.5 × 3.5 mm, claw short, ca. 1.8 mm; keel ca. 5.5 × 2.5 mm, claw ca. 2 mm. Ovary oblong, villous. Legume ca. 1.5 cm, pilose. Seeds reniform.

• Grasslands; ca. 100 m. Hubei, Sichuan.

2. Gueldenstaedtia verna (Georgi) Borissova, Spisok Rast. Gerb. Fl. S.S.S.R. Bot. Inst. Vsesojuzn. Akad. Nauk 12: 122. 1953.

少花米口袋 shao hua mi kou dai

Astragalus vernus Georgi, Bemerk. Reise Russ. Reich. 1: 226. 1775; *Amblytropis delavayi* (Franchet) C. Y. Wu ex H. P.

Tsui; *A. maritima* (Maximowicz) Kitagawa; *A. pauciflora* (Pallas) Kitagawa; *A. stenophylla* Bunge; *A. verna* (Georgi) Kitagawa; *Astragalus biflorus* Pallas (1776), not Linnaeus (1771); *A. brevicarinatus* Candolle; *A. cavaleriei* H. Léveillé; *A. pauciflorus* Pallas; *Gueldenstaedtia brachyptera* Pampanini; *G. brachyptera* var. *elongata* (Pavolini) Pampanini; *G. delavayi* Franchet; *G. delavayi* f. *alba* H. P. Tsui; *G. gansuensis* H. P. Tsui; *G. giraldii* Harms; *G. giraldii* var. *alba* Jacot Guillarmod; *G. giraldii* f. *elongata* Pavolini; *G. giraldii* subsp. *glabra* Jacot Guillarmod; *G. gracilis* H. P. Tsui; *G. guillonii* Franchet; *G. harmsii* Ulbrich; *G. maritima* Maximowicz; *G. multiflora* Bunge; *G. multiflora* f. *alba* F. Z. Li; *G. multiflora* var. *maritima* (Maximowicz) Jacot Guillarmod; *G. pauciflora* (Pallas) Fischer; *G. stenophylla* Bunge; *G. verna* f. *alba* (H. P. Tsui) P. C. Li; *G. verna* f. *multiflora* (Bunge) H. P. Tsui; *G. verna* subsp. *multiflora* (Bunge) H. P. Tsui.

Taproot straight. Stems short. Leaves imparipinnate, (1.5–) 2–20 cm, (5 or) 7–19-foliolate; stipules persistent, triangular or ovate, joined at base; petiole white pilose; leaflets elliptic, oblong, narrowly obovate, or ovate (in spring) to lanceolate or linear (in autumn), (2–) 5–25(–35) × (1–) 1.5–7(–9) mm, both surfaces pilose or villous, adaxially rarely glabrous, apex variably obtuse, rounded, truncate, retuse, or acute, and with mucro. Umbels 2–4(–8)-flowered; rachis variable in length, ca. 1/2 as long to as long as leaves or longer; bracts narrowly triangular,

lanceolate, or linear, sometimes subulate, 2–3 mm; pedicel 0.5–1(–3) mm; bracteoles linear, shorter than calyx. Calyx (4–)5–7 mm, white pilose; teeth lanceolate, upper 2 longer. Corolla purplish red, purple, pink, rose, or white; standard ovate, elliptic, or obovate to orbicular, (0.6–)1.3(–1.4) cm, apex retuse or acuminate; wings obovate, (0.6–)1.1 cm, auriculate or cuneate, claw (0.8–)3 mm; keel obovate or ovate, (4–)5.5(–7) mm, claw (1.8–)2.5 mm. Ovary elliptic or cylindrical, densely pilose or villous; style glabrous, rolled inward. Legume cylindrical or narrowly ovoid, (1–)1.5–2 cm × 3–4 mm, villous, pilose, or glabrescent, dehiscent. Seeds reniform, ca. 1.5 mm in diam. Fl. (Mar–)May, fr. (May–)Jun–Jul(–Nov).

Roadsides, grasslands, hillsides, valleys, meadows, terraced fields, margins of farms, riverbanks, sandy soil, sea bluffs; sea level to 2600 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Tianjin, Yunnan, Zhejiang [India, Laos, Mongolia, Myanmar, Pakistan, Russia].

A white-flowered form, *Gueldenstaedtia verna* f. *alba* (H. P. Tsui) P. C. Li (Vasc. Pl. Hengduan Mts. 1: 940. 1993), occurs in Beijing and Shandong.

3. *Gueldenstaedtia taihangensis* H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 40. 1979.

太行米口袋 tai hang mi kou dai

Gueldenstaedtia guangxiensis W. L. Sha & X. X. Chen.

Taproot straight. Stems many from root crown, with basal rosettes of leaves and rachis. Leaves (3–)3.5–7.5(–13) cm, 5–13-foliolate; petiole slender, pilose; petiolules very short; leaflets orbicular to ovate or elliptic, (5–)6–9(–10) × (3–)5–7(–8) mm, both surfaces pilose or abaxially villous and adaxially glabrous, base rounded, apex truncate or notched, or obtuse or acute and with mucro. Umbel 2- or 3(–12)-flowered; rachis equal to leaves or longer, slender; bracts narrowly triangular or linear; pedicel very short; bracteoles adnate to base of calyx. Calyx (5–)7 mm, densely appressed villous, 5-toothed; upper 2 teeth larger. Corolla purple; standard oblong or obovate, ca. 11 × (6–)7 mm; wings obovate, (7–)9 × ca. 3 mm, claw (1.5–)2 mm; keel ovate, (3–)5 mm. Ovary oblong or cylindrical, villous; style glabrous, rolled inward. Legume conical or cylindrical, (1–)1.5(–1.7) cm, ca. 3 mm in diam., pilose, valves twisted after dehiscence. Seeds reniform. Fl. (Jan–Feb or)May, fr. (Apr–May or)Aug.

• Meadows and bushes on slopes of hills; 1100–1600 m. Guangxi, Hebei, Shanxi.

147. **TIBETIA** (Ali) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 48. 1979.

高山豆属 gao shan dou shu

Bao Bojian (包伯坚); Anthony R. Brach

Gueldenstaedtia subg. *Tibetia* Ali, Candollea 18: 140. 1962.

Herbs, perennial. Taproot conical, strong. Stems many from collar, slender, branched, sometimes with adventitious roots. Leaves imparipinnate; stipules brown, ovate or elliptic, membranous, amplexicaul and opposite to leaves; leaflets elliptic, orbicular, or cordate, apex rounded to retuse, rarely bifid. Umbel 1–4-flowered, on axillary peduncles. Calyx brown, upper 2 teeth larger and joined. Corolla usually dark purple, rarely yellow; standard broadly obovate or obcordate, clawed; wings broadly obovate, equal in length to standard; keel oblong or obovate, small. Stamens diadelphous. Ovary cylindrical, pilose or glabrous; style rolled inward. Legume cylindrical, with many seeds. Seeds reniform, smooth.

About five species: Bhutan, China, India, Nepal, Pakistan; five species (four endemic) in China.

1a. Plants with dense appressed glandular hairs.

2a. Leaflets villous; stipules acute at apex 2. *T. himalaica*

2b. Leaflets pilose; stipules rounded or sometimes acuminate at apex 3. *T. yadongensis*

1b. Plants subglabrous or with sparse appressed glandular hairs.

3a. Corolla purple, purplish blue, or red; stipules acute at apex 4. *T. yunnanensis*

3b. Corolla yellow; stipules rounded or sometimes acuminate at apex.

4a. Stipules with brown-purple marks; ovary glabrous 1. *T. tongolensis*

4b. Stipules without brown-purple marks; ovary with white appressed hairs 5. *T. forrestii*

1. *Tibetia tongolensis* (Ulbrich) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 50. 1979.

黄花高山豆 huang hua gao shan dou

Gueldenstaedtia tongolensis Ulbrich, Bot. Jahrb. Syst. 50 (Beibl. 110): 11. 1913; *Amblytropis flava* (Adamson) C. Y. Wu ex H. P. Tsui; *G. flava* Adamson; *G. flava* var. *tongolensis* (Ulbrich) Ali.

Stems slender. Leaves ca. 10 cm, 5–9-foliolate; stipules free, with brown-purple spots, broadly ovate, 5–6 mm, mem-

branous; leaflets obovate, broadly elliptic, or broadly ovate, ca. 12 × 9 mm, abaxially pilose, adaxially glabrous, apex truncate or retuse. Umbel 2- or 3-flowered; rachis usually ca. as long as leaves or slightly longer; bract narrowly triangular; pedicel ca. 5 mm, with rigid hairs; bracteole narrowly ovate, glandular on margin. Calyx campanulate or broadly campanulate, ca. 5 × 2.5 mm, densely brown rigidly hairy; upper 2 teeth joined at base. Corolla yellow; standard broadly ovate, ca. 9.5 mm, base narrowed to claw, apex retuse; wings broadly obliquely ovate, ca. 9 × 5 mm, claw linear; keel obovate, ca. 4 × 1.5 mm. Ovary cylindrical, glabrous. Legume glabrous. Fl. Apr–Jul, fr. Aug–Sep.

- Hills; above 3000 m. Sichuan, Yunnan.

2. *Tibetia himalaica* (Baker) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 51. 1979.

高山豆 gao shan dou

Gueldenstaedtia himalaica Baker in J. D. Hooker, Fl. Brit. India 2: 117. 1876; *Amblytropis uniflora* (Strachey ex Jacot Guillarmod) Kuang & H. P. Tsui; *G. diversifolia* Maximowicz; *G. santapau* Thothathri; *G. uniflora* Strachey ex Jacot Guillarmod; *Tibetia himalaica* f. *alba* X. Y. Zhu.

Taproot straight. Stems obvious. Leaves 2–7 cm, 9–13-foliolate; stipules ovate, large, to 7 mm, densely villous, apex acute; petiole sparsely villous; leaflets orbicular, elliptic, broadly obovate, or ovate, 1–9 × 1–8 mm, appressed villous, apex retuse. Umbel 1–3-flowered, rarely 4-flowered; rachis usually ca. as long as leaves or slightly longer, sparsely villous; bract narrowly triangular. Calyx campanulate, 3.5–5 mm, villous; upper 2 teeth 1.5–2 mm, joined from base to middle. Corolla bluish purple, purple, blue, mauve, violet, or red; standard ovate-orbicular, 6.5–8 × 4.5–7.5 mm, base with claw ca. 2 mm, apex retuse; wings broadly cuneate, 6–7 × 2–3 mm; keel subrectangular, 3–4 × 1–2 mm. Ovary villous. Legume pilose or glabrescent. Fl. May–Jun, fr. Jul–Aug.

Hilly areas, alpine meadows, rocky slopes, forests; 3000–5000 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Pakistan].

The type was originally collected in India (Sikkim).

3. *Tibetia yadongensis* H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 52. 1979.

亚东高山豆 ya dong gao shan dou

Taproot straight. Stems long, branched. Leaves 3–5.5 cm, 7–15-foliolate; stipules broadly ovate, membranous, abaxially hairy, adaxially glabrous, apex rounded or acuminate; petiole pilose; leaflets elliptic to obovate, 7–10 × 6–8 mm, both surfaces pilose, apex parted to bifid. Umbel 1- or 2-flowered; rachis pilose, usually ca. as long as leaves; bract linear, ca. 1 mm; pedicel ca. 2 mm; bracteole lanceolate, slightly shorter than bract. Calyx brown, narrowly campanulate, ca. 5 mm. Corolla purple; standard orbicular, ca. 10 × 8 mm, base narrowed to claw, apex retuse; wings obliquely obovate, ca. 9 × 4 mm, claw curved, auriculate; keel nearly triangular, ca. 4 × 1.5 mm. Ovary cylindrical, densely villous. Legume ca. 2 cm, pilose. Fl. May–Jun, fr. Jul–Sep.

- Grasslands on hills, thickets; 3000–4100 m. Xizang.

4. *Tibetia yunnanensis* (Franchet) H. P. Tsui, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1979(5): 54. 1979.

云南高山豆 yun nan gao shan dou

Stems very developed, slender. Leaves 3–7(or 9)-foliolate; stipules amplexicaul, joined at base and opposite to leaf, obovate or broadly elliptic, margin glandular toothed, apex acuminate; leaflets obovate, broadly elliptic, or broadly ovate to obovate, appressed pilose, apex truncate to retuse. Umbel 1- or 2(or 3)-flowered; rachis 5–10 cm, pilose; bract lanceolate or

narrowly triangular, 2(–2.5) mm; bracteole lanceolate or narrowly ovate, ca. 1.5 mm. Calyx campanulate, 4–5 mm; teeth lanceolate, upper 2 teeth joined for up to 2/3 length, villous. Corolla purple, purplish blue, or red; standard obovate or ovate-orbicular, 10.5–11 × ca. 9 mm, base narrowed to claw, apex retuse; wings subcuneate or subelliptic, 9–10 × 3.5–4 mm; keel obovate, 4–4.5 × ca. 1.5 mm. Ovary villous with long appressed hairs or glabrous. Legume ca. 1.2 cm, pilose. Fl. Jun–Jul, fr. Sep.

- Hilly areas, grassy or rocky places at streamsides, disturbed forests, thickets, N-facing ravines; above 2500 m. Sichuan, SE Xizang, Yunnan.

1a. Ovary with long appressed hairs 4a. var. *yunnanensis*

1b. Ovary glabrous 4b. var. *coelestis*

4a. *Tibetia yunnanensis* var. *yunnanensis*

云南高山豆(原变种) yun nan gao shan dou (yuan bian zhong)

Gueldenstaedtia yunnanensis Franchet, Pl. Delavay. 164. 1890; *Amblytropis yunnanensis* (Franchet) C. Y. Wu ex H. P. Tsui.

Ovary with long appressed hairs.

- Hilly areas, grassy places at streamsides, disturbed forests, thickets, N-facing ravines; above 2500 m. Sichuan, Yunnan.

4b. *Tibetia yunnanensis* var. *coelestis* (Diels) X. Y. Zhu, Bot. J. Linn. Soc. 148: 479. 2005.

蓝花高山豆 lan hua gao shan dou

Astragalus coelestis Diels, Notes Roy. Bot. Gard. Edinburgh 5: 244. 1912; *Amblytropis coelestis* (Diels) C. Y. Wu ex H. P. Tsui; *Gueldenstaedtia coelestis* (Diels) N. D. Simpson; *Tibetia coelestis* (Diels) H. P. Tsui; *T. tongolensis* (Ulbrich) H. P. Tsui f. *coelestis* (Diels) P. C. Li; *T. tongolensis* var. *coelestis* (Diels) H. P. Tsui.

Ovary glabrous.

- Grasslands on hills; above 3000 m. Sichuan, SE Xizang, Yunnan.

5. *Tibetia forrestii* (Ali) P. C. Li, Acta Bot. Yunnan. 11: 287. 1989.

中甸高山豆 zhong dian gao shan dou

Gueldenstaedtia forrestii Ali, Candollea 18: 153. 1962; *Tibetia liangshanensis* P. C. Li.

Stems prostrate, elongated. Leaves 7- or 9-foliolate; stipules connate at base, obovate or oblong, abaxially with appressed pale yellow hairs, adaxially glabrous, apex obtuse or subtruncate; petiole 3.5–9 cm; petiolules ca. 1 mm; leaflets obovate or orbicular, 11–19 × 9–15 mm, apex retuse, rarely subtruncate or obtuse. Peduncle 13–14 cm; bracts lanceolate, ca. 4 mm; pedicels 3–4 mm. Calyx ca. 8 mm, with appressed yellow hairs, 2-lobed; upper lobe ca. 3 mm, apex retuse, lower lobe equal, linear, 2–3 mm. Corolla pale yellow; standard ca. 1.6 × 1.2 cm, retuse at apex; wings ca. 1.4 cm, claw 2–3 mm; keel ca. 6 × 2 mm, claw ca. 2 mm, auricle shorter than 1 mm. Ovary

with densely appressed white hairs; style shorter than 1 mm. Fl. and fr. Jun–Sep. chuan, Yunnan.

- Understories of *Pinus* and *Quercus* forests; above 3000 m. Si-

The placement of *Tibetia liangshanensis* here is uncertain, and further study is needed.

148. GLYCYRRHIZA Linnaeus, Sp. Pl. 2: 741. 1753.

甘草属 gan cao shu

Bao Bojian (包伯坚); Kai Larsen

Liquiritia Medikus.

Subshrubs or perennial herbs. Roots and rhizomes very developed. Stem erect, much branched. Leaves imparipinnate, (3 or) 5–17-foliolate; stipules 2, free, caducous or persistent; leaflets entire or serrulate. Racemes axillary; bracts caducous. Calyx campanulate or cylindrical, 5-toothed, slightly bilabiate. Corolla white, yellow, purple, or purple-red; standard shortly clawed; wings shorter than standard, obliquely oblong; keels joined. Stamens diadelphous or monadelphous. Ovary sessile, 2–10-ovuled. Legume ovoid, oblong, or linear, rarely moniliform, straight or curved, flat or inflated, prickly or rarely smooth, indehiscent or dehiscent. Seeds reniform or orbicular.

About 20 species: mainly in Asia and Europe, extending to Australia, and in North and South America; eight species (two endemic) in China.

- 1a. Legume orbicular, reniform, or ovoid, yellow spiny or tuberculate, with 2 seeds; leaflets lanceolate to oblong, margin spiny-serrulate.
 - 2a. Legume tuberculate; racemes not globose; leaflets retuse or obtuse at apex 8. *G. squamulosa*
 - 2b. Legume rigidly spiny; racemes globose or oblong; leaflets acuminate at apex.
 - 3a. Racemes oblong or globose; legume abruptly acuminate at apex, sparsely rigidly spiny 6. *G. pallidiflora*
 - 3b. Racemes globose or subglobose; legume cuspidate at apex, densely rigidly spiny 7. *G. yunnanensis*
- 1b. Legume linear, oblong, or orbicular, scaly glandular punctate, glandular hairy, or smooth, rarely tuberculate, with 2–8 seeds; leaflets elliptic, oblong, or ovate, rarely lanceolate.
 - 4a. Legume moniliform, smooth 5. *G. aspera*
 - 4b. Legume not moniliform, scaly glandular punctate, glandular hairy, or tuberculate.
 - 5a. Legume zigzag 3. *G. eglanulosa*
 - 5b. Legume not zigzag.
 - 6a. Legume linear, falcate or curved into a ring 1. *G. uralensis*
 - 6b. Legume oblong, straight or slightly curved.
 - 7a. Leaflets 3–7(–9); calyx with upper 2 teeth joined to 1/2 from base 2. *G. inflata*
 - 7b. Leaflets 11–17; calyx with upper 2 teeth mostly joined 4. *G. glabra*

1. *Glycyrrhiza uralensis* Fischer ex Candolle, Prodr. 2: 248. 1825.

甘草 gan cao

Glycyrrhiza asperrima Linnaeus f. var. *desertorum* Regel; *G. asperrima* var. *uralensis* (Fischer ex Candolle) Regel; *G. shiheziensis* X. Y. Li.

Herbs, perennial. Roots and rhizomes strong. Stem 30–120 cm tall, densely scaly glandular punctate and white or brown tomentose. Leaves 5–20 cm, 5–17-foliolate; stipules triangular-lanceolate, ca. 5 × 2 mm, densely white pubescent; petiole densely brown glandular punctate and pubescent; leaflets ovate, narrowly ovate, or orbicular, 1.5–5 × 0.8–3 cm, densely glandular punctate and pubescent, base rounded, margin entire or repand, apex obtuse and mucronate. Racemes much flowered; rachis shorter than leaf, densely brown glandular punctate and pubescent; bracts brown, oblong-lanceolate, 3–4 mm, membranous, yellow glandular and pubescent. Calyx campanulate, 7–14 mm, densely yellow glandular punctate and pubescent, inflated to saccate at base, 5-toothed; upper 2 teeth mostly joined. Corolla purple, white, or yellow, 1–2.4 cm; standard oblong, base shortly clawed, apex retuse; wings shorter than standard;

keel shorter than wings. Ovary densely glandular. Legume falcate to curved into a ring, densely tuberculate and glandular hairy. Seeds 3–11, dark green, orbicular or reniform, ca. 3 mm. Fl. Jun–Aug, fr. Jul–Oct. $2n = 16^*$.

Sandy lands, dry riverbanks, grasslands on hills; 400–2700 m. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan].

2. *Glycyrrhiza inflata* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 484. 1891.

胀果甘草 zhang guo gan cao

Glycyrrhiza eurycarpa P. C. Li; *G. hediniana* Harms; *G. paucifoliolata* Hance.

Herbs, perennial. Roots and rhizomes strong. Stem 50–150 cm tall, woody at base. Leaves 4–20 cm, 3–7(or 9)-foliolate; stipules caducous, brown, triangular-lanceolate, small, ca. 1 mm; petiole densely brown glandular punctate, densely pubescent when young; leaflets ovate, elliptic, or oblong, 2–6 × 0.8–3 cm, brown glandular punctate, sparsely pubescent on veins, base rounded, margin somewhat undulate, apex acute or obtuse. Racemes with rachis shorter than or ca. as long as leaves,

densely glandular punctate, densely hairy when young; bracts oblong-lanceolate, ca. 3 mm, densely glandular punctate and pubescent. Calyx campanulate, 5–7 mm, densely glandular punctate and pubescent, 5-toothed; upper 2 teeth joined to 1/2 from base. Corolla purple or light purple; standard narrowly elliptic, 6–9(–12) × 4–7 mm, base shortly clawed, apex rounded; wings ca. as long as standard, obviously auriculate and clawed; keel shorter, auriculate and clawed. Legume straight or slightly curved, elliptic or oblong, 8–30 × 5–10 mm, inflated or somewhat constricted between seeds, brown glandular punctate and glandular hairy, sparsely villous. Seeds 1–4, green, orbicular, 2–3 mm in diam. Fl. May–Jul, fr. Jun–Oct. $2n = 16^*$.

Riverbanks, dry stream banks, margins of farms, wastelands; ca. 1100 m. Gansu, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan].

3. *Glycyrrhiza eglandulosa* X. Y. Li, Bull. Bot. Res., Harbin 13: 29. 1993.

无腺毛甘草 wu xian mao gan cao

Herbs, perennial. Roots and rhizomes strong. Stem 50–90 cm tall, sparsely brown glandular punctate, prickly, white hairy. Leaves 15–22 cm, 11–15-foliolate; petiole sparsely glandular, prickly, white hairy; leaflets ovate or elliptic, 2.3–4.5 × 0.6–1.4 cm, adaxially sparsely puberulent, densely brown glandular, base rounded or slightly cordate, margin undulate, apex obtuse. Racemes 11–19 cm, ca. as long as or longer than leaves, sparsely glandular, prickly, hairy; bracts lanceolate, white hairy. Calyx campanulate, 9–10 mm, densely brown glandular punctate and pilose; upper 2 teeth nearly joined completely. Corolla 1.2–1.6 cm; standard narrowly elliptic, 13–15 × 3–5.5 mm, base shortly clawed; wings oblong, ca. 6.5 × 1.9–2.5 mm, claw linear, auriculate. Ovary straight, densely puberulent. Legume zigzag, oblong, flat, 12–30 × 5–7 mm, pilose. Seeds 1–9. Fl. Jun–Aug, fr. Jul–Oct. $2n = 16^*$.

- Sandy areas, grasslands on hills; 300–2000 m. Xinjiang.

4. *Glycyrrhiza glabra* Linnaeus, Sp. Pl. 2: 742. 1753.

洋甘草 yang gan cao

Glycyrrhiza alalensis X. Y. Li; *G. brachycarpa* Boissier; *G. glabra* var. *caduca* X. Y. Li; *G. glabra* subsp. *glandulifera* (Waldstein & Kitaibel) Ponert; *G. glabra* var. *glandulifera* (Waldstein & Kitaibel) Regel & Herder; *G. glabra* var. *glandulosa* X. Y. Li; *G. glabra* var. *laxifoliolata* X. Y. Li; *G. glabra* var. *violacea* (Boissier & Noë) Boissier; *G. glandulifera* Waldstein & Kitaibel; *G. pallida* Boissier; *G. violacea* Boissier & Noë; *Liquiritia officinarum* Medikus, nom. illeg. superfl.

Herbs, perennial. Stem 50–150 cm tall, woody at base, densely scaly glandular punctate, white hairy. Leaves 5–14 cm, 11–17-foliolate; stipules caducous, linear, 1–2 mm; petiole densely yellow-brown glandular hairy and villous; leaflets ovate-oblong, oblong-lanceolate, or elliptic, 1.7–4 × 0.8–2 cm, abaxially densely yellow scaly glandular punctate and pubescent on veins, adaxially glabrescent or pilose, base rounded, apex rounded or retuse and with mucro. Racemes much and densely flowered; rachis densely brown scaly glandular punctate, white villous and tomentose; bracts lanceolate, ca. 2 mm,

membranous. Calyx campanulate, 5–7 mm, sparsely yellow glandular punctate and pubescent, 5-toothed; upper 2 teeth mostly joined. Corolla purple or light purple, 9–12 mm; standard ovate or oblong, 1–1.1 cm, base clawed, apex retuse; wings 8–9 mm; keel straight, 7–8 mm. Ovary glabrous. Legume oblong, flat, 17–35 × 4.5–7 mm, rarely constricted between seeds, glabrous or sparsely hairy, rarely glandular hairy. Seeds 2–8, dark green, ca. 2 mm in diam., smooth. Fl. May–Jun, fr. Jul–Sep. $2n = 16^*$.

Margins of farms, roadsides, saline areas; 500–1300 m. Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, E and S Europe, Indian Ocean islands (Maldives); introduced in Australia, C Europe, and North America].

5. *Glycyrrhiza aspera* Pallas, Reise Russ. Reich. 1: 499. 1771.

粗毛甘草 cu mao gan cao

Glycyrrhiza asperrima Linnaeus f.; *G. laxiflora* X. Y. Li & D. C. Feng; *G. laxissima* Vassilczenko; *G. macrophylla* X. Y. Li; *G. nutantiflora* X. Y. Li; *G. prostata* X. Y. Li & D. C. Feng; *G. purpureiflora* X. Y. Li.

Herbs, perennial. Roots and rhizomes slender. Stem erect or diffuse, 10–30 cm tall, sparsely pubescent and glandular hairy. Leaves 2.5–10 cm, (5 or) 7- or 9-foliolate; stipules ovate-triangular, 4–6 × 2–4 mm; petiole sparsely pubescent and glandular hairy; leaflets gray-green, ovate, broadly ovate, obovate, or elliptic, 10–30 × 3–18 mm, abaxially sparsely pubescent and glandular hairy, adaxially glabrous, base cuneate, margin small spiny-hairy. Racemes much flowered; rachis longer than leaves, pilose, glandular hairy; bracts linear-lanceolate, 3–6 mm, membranous. Calyx cylindric, 7–12 mm, sparsely pubescent, 5-toothed; upper 2 teeth slightly joined. Corolla light purple or purple; standard oblong, 13–15 × 5–6.5 mm, base narrowed to claw, apex rounded; wings 1.2–1.4 cm; keel 1–1.1 cm. Ovary glabrescent. Legume usually falcate to curved into a ring, brown, moniliform, 1.5–2.5 cm, glabrous. Seeds 2–10, black-brown, orbicular. Fl. May–Jun, fr. Jul–Aug. $2n = 16^*$.

Margins of farms, riverbanks, steppes; 100–800 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; C and SW Asia, Europe (native only in Russia)].

6. *Glycyrrhiza pallidiflora* Maximowicz, Prim. Fl. Amur. 79. 1859.

刺果甘草 ci guo gan cao

Herbs, perennial. Stem 1–1.5 m tall, striped, densely yellow-brown scaly glandular punctate, nearly glabrous. Leaves 6–20 cm, 9–15-foliolate; stipules lanceolate, ca. 5 mm; petiole glabrous, densely glandular punctate; leaflets lanceolate or ovate-lanceolate, 2–6 × 1.5–2 cm, glabrous, densely scaly glandular punctate, base cuneate, margin serrulate, apex acuminate with mucro. Racemes much flowered, oblong or globose; rachis shorter than leaves, densely brown glandular punctate and pubescent; bracts ovate-lanceolate, 6–8 mm, membranous, glandular punctate. Calyx campanulate, 4–5 mm, densely glandular punctate and sparsely pubescent at base, lanceolately 5-toothed. Corolla light purple, purple, or purple-red; standard ovate, 6–8 mm, base shortly clawed, apex rounded; wings 5–6 mm; keel

shorter than wings. Legume ovoid, $10-17 \times 6-8$ mm, rigidly spiny, apex abruptly acuminate. Seeds 2, black, ca. 2 mm. Fl. Jun–Jul, fr. Jul–Sep. $2n = 16^*$.

Riverbanks, open valleys by streams, open slopes, margins of farms, roadsides; 2600–3100 m. Hebei, Heilongjiang, Henan, N and NE Jiangsu, Liaoning, Nei Mongol, Shaanxi, Shandong, Yunnan [Mongolia, Russia].

7. *Glycyrrhiza yunnanensis* S. H. Cheng & L. K. Dai ex P. C. Li, Acta Bot. Boreal.-Occid. Sin. 4: 117. 1984.

云南甘草 yun nan gan cao

Herbs, perennial. Stem 60–100(–120) cm tall, densely scaly glandular punctate, sparsely pubescent. Leaves 8–10 cm, 7–15-foliolate; stipules lanceolate, $5-7 \times 2-3$ mm, glandular punctate, glabrous; petiole densely scaly glandular punctate, densely villous; leaflets lanceolate or ovate-lanceolate, $2-5 \times 0.7-1.5$ cm, densely scaly glandular punctate, sparsely pubescent, base cuneate, apex acuminate. Racemes much flowered, globose or subglobose; rachis shorter than leaf, densely scaly glandular punctate, villous when young; bracts lanceolate, 6–7 mm, densely glandular punctate. Calyx campanulate, ca. 5 mm, sparsely scaly glandular punctate and pubescent, 5-toothed; upper 2 teeth partly joined. Corolla purple; standard narrowly ovate or elliptic, 6–9 mm, very shortly clawed; wings 5–6 mm; keel slightly shorter than wings, clawed, auriculate. Legume dense, narrowly ovoid, $12-18 \times 4-6$ mm, densely spiny, apex cuspidate. Seeds brown, ca. 4 mm. Fl. May–Jun, fr. Jul–Sep. $2n = 16^*$.

• Near forests, open grassy slopes, farms, roadsides; ca. 2700 m. Yunnan.

8. *Glycyrrhiza squamulosa* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 5: 245; Pl. David. 1: 93. 1883.

圆果甘草 yuan guo gan cao

Astragalus glanduliferus Debeaux.

Herbs, perennial. Roots and rhizomes slender. Stem 30–60 cm tall, densely yellow scaly glandular punctate, glabrous or sparsely pubescent. Leaves 5–15 cm, 9–13-foliolate; stipules lanceolate, 2–3 mm, sparsely white pubescent, glandular punctate; petiole densely scaly glandular punctate, sparsely pubescent; leaflets narrowly elliptic to oblong-obovate, densely scaly glandular punctate, base cuneate, margin serrulate, apex usually retuse. Racemes much flowered; rachis longer than leaves, densely scaly glandular punctate, sparsely pubescent; bracts lanceolate, membranous, glandular punctate, pubescent. Calyx campanulate, 2.5–3.5 mm, densely scaly glandular punctate, sparsely pubescent, 5-toothed; upper 2 teeth slightly joined. Corolla white, abaxially densely yellow glandular punctate; standard ovate-oblong, $5-7 \times 2.5-3.5$ mm; wings 4–5 mm; keel straight, slightly shorter than wings. Legume brown, orbicular or broadly reniform, $5-10 \times 4-7$ mm, tuberculate, apex mucronate. Seeds 2, green, ca. 2 mm. Fl. May–Jul, fr. Jun–Sep.

Roadsides, wastelands; 100–1100 m. Hebei, Henan, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang [Mongolia].