

140. OXYTROPIS Candolle, *Astragalologia*, ed. 4°, 66; ed. 1°, 53. 1802, nom. cons.

棘豆属 *ji dou shu*

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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. neimonggolica*); leaflets alternate, opposite, subopposite, verticillate, or subverticillate; leaflet blades various in shape, base \pm 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 \pm 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 \pm 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. alataicus* 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* Gontscharov, *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. lanuginosa* Komarov, *O. longibracteata* Karelin & Kirilov, *O. macrobotrys* Bunge, *O. martjanovii* Krylov, *O. microsphaera* Bunge, *O. pellita* Bunge, *O. platonychia* Bunge, *O. rhynchophylla* Schrenk, *O. sarkandensis* Vassilczenko, *O. saurica* Saposhnikow, *O. schrenkii* Trautvetter, *O. semenovii* Bunge, *O. sulphurea* (Fischer) Ledebour, *O. thomsonii* Bentham 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. laronovii* 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. parasericeopetala*

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. qamdoensis*

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 multi-headed 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 ± as long as leaves 12. *O.* sect. *Xerobia* (p. 480)
- 13b. Legume scarious; 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 ± 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, Astragalogia, 86. 1802.

Phaca muricata Pallas, Reise Russ. Reich. 3: 746. 1776;
Astragalus muricata (Pallas) Pallas.

糙荚棘豆 cao jia ji dou

Herbs, 5–12 cm tall, acaulescent, from a multiheaded cau-

dex. 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 subsessile; 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 tri-

angular, 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.-Petersbourg 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 squamulosa*, 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. nutans*
- 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* Gontscharow, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 186. 1940.

蓝垂花棘豆 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* Sa-poshnikow.

Herbs, 4–5 cm tall, caulescent, from a multiheaded caudex, mat-forming, grayish white pubescent. Stems prostrate and diffuse, ± 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 × 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 cylindrical, (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 ± 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 × 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 × 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 × 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 × 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 × 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 × 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, ± whitish pubescent. Stipules subulate, 3–3.5 × 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 × 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 × 0.2 mm, with whitish trichomes. Calyx campanulate, 4–4.5 × ca. 2 mm, with whitish trichomes; lobes subulate, 1.2–2 × ca. 0.2 mm. Corolla purple; standard 8–9 mm, lamina broadly ovate and 6–6.5 × 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 × 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 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 sessile; 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. *obesucicorollata* 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. *Brachytopis* 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 cylindrical, 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*

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 maduoensis* 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 cylindrical, 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 cylindrical, 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-cylindrical, 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 subcylindrical 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, cylindrical, 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, $2.5\text{--}4 \times \text{ca. } 1.5$ 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 $1/2\text{--}2/3$ 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, $3\text{--}7 \times (1\text{--})1.5\text{--}4$ 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. $20 \times 3\text{--}4$ 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, $4\text{--}4.5 \times 1\text{--}1.5$ mm, both surfaces with appressed pubescence. Racemes compact, 3–5-flowered; peduncle 4–5 cm, shorter to longer than leaves; bracts broadly ovate, $2.1\text{--}4.9 \times 1.5\text{--}1.7$ 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, $3\text{--}5 \times 1\text{--}2$ 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 cylindrical, 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 cylindric, 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, Astragalogia, 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.

蓝花棘豆组 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, scarios, 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 scarios, 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, cylindric 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 pseudocoeerulea* 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 parasericopetala*). 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 multi-headed 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 cylindrical, 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 cylindrical, 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 cylindrical 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 cylindrical, 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 cylindrical, 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, scarious, 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. *Neimonggolica* 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 × 0.6–0.8 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 cylindrical, 10–15 × ca. 4 mm, with appressed long whitish trichomes and sometimes also with blackish short trichomes; lobes subulate, 2–3 × 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, 1.5–2 × 0.8–1 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 ± ovoid, thickly leathery, ± 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, 2–6 × 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, 5–18 × 1–2 mm, apex acuminate and spinescent. Racemes 1- or 2-flowered; peduncle obsolete or to 5 cm; bracts

subulate, 3–5 × 1–2 mm, scarious, pubescent. Calyx cylindrical, 8–14 × 3–4 mm, slightly inflated after anthesis, pilose with whitish and blackish long trichomes or with only whitish long trichomes; lobes subulate, 2–5 × 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, 1–2.2 × 0.4–0.5 cm, inflated, thickly leathery, ± 2-locular, with appressed whitish trichomes and sometimes with long whitish trichomes. Fl. May–Aug, fr. Jun–Aug. *2n* = 16.

单叶棘豆 *dan ye ji dou*

Herbs, 3–8 cm tall, acaulescent, from a multithreaded 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 cm × 3–8 mm, erect, margin entire, base obtuse, apex acute. Flowers solitary, sessile. Calyx cylindrical, 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].

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.

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, scarios, 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, scarios, 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;

2000–4100 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Kazakhstan, Mongolia].

133. *Oxytropis hystrix* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 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, scarios, 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 scarios, with appressed trichomes, apex acute. Calyx tubular, 0.9–1.1 cm, thinly scarios; 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].

