

14. SWERTIA Linnaeus, Sp. Pl. 1: 226. 1753.

獐牙菜属 zhang ya cai shu

Agathotes D. Don; *Anagallidium* Grisebach; *Kingdon-wardia* C. Marquand; *Ophelia* D. Don ex G. Don; *Sczukinia* Turczaninow.

Herbs annual or perennial. Roots fibrous or woody; primary roots with few secondary rootlets or rhizomes short and with few fleshy adventitious rootlets. Stems absent, scapiform, or well developed, ascending or erect, terete, striate or angled, simple or branched. Leaves opposite, rarely alternate or whorled, margin entire. Inflorescences cymose, usually grouped into simple or paniculate thyrses, rarely strictly dichotomous, sometimes reduced to single flowers and inflorescences racemelike or flowers solitary and terminal. Flowers 4- or 5-merous. Calyx and corolla rotate, lobed to base, tubes less than 3 mm. Nectaries 1 or 2 per corolla lobe, with fimbriate margin or represented by naked spotlike gland patches. Stamens inserted at base of corolla tube. Ovary 1-celled. Style short to elongate. Capsules 2-valved, few to many seeded. Seeds small.

About 150 species: worldwide, mainly in Asia and Africa, few in North America and Europe; 75 species in China.

Swertia guibeiensis C. Z. Gao has been described from Guangxi (C. Z. Gao, Guihaia 14: 20–22. 1994). However, specimens have not been seen by the authors, and the species is not included in this treatment.

- 1a. Perennials.
 - 2a. Nectaries 1 per corolla lobe.
 - 3a. Flowers 5-merous.
 - 4a. Corolla yellow-green, lobes 8–17 mm 3. *S. erythrosticta*
 - 4b. Corolla white, lobes 3–3.5 mm 47. *S. rosularis*
 - 3b. Flowers 4-merous.
 - 5a. Plant densely tufted; stems 2–12 cm; inflorescences 1–7-flowered, umbel-like or reduced to a solitary terminal flower.
 - 6a. Nectary reduced to a flat gland patch without raised margin or fimbriae.
 - 7a. Plants 2–4 cm tall; petiole 0.8–1.8 cm; leaf blade ovate to suborbicular, 1-veined; corolla 8–10 mm in diam., glabrous 1. *S. handeliana*
 - 7b. Plants 5–7 cm tall; petiole 5–6 cm; leaf blade oblong-spatulate, 3-veined; corolla 12–14 mm in diam., puberulent 29. *S. conaensis*
 - 6b. Nectary with raised fimbriate margin.
 - 8a. Inflorescences racemelike or umbel-like, 1–7-flowered 27. *S. multicaulis*
 - 8b. Inflorescences scapose, 1-flowered 28. *S. scapiformis*
 - 5b. Plant with single robust stem; stems 12–100 cm; inflorescences many flowered, conical thyrsse or verticillasterlike.
 - 9a. Margin of leaves and calyx lobes minutely and somewhat irregularly lacinate; corolla brick red, drying yellow-green; nectaries margin with inflexed fimbriae 30. *S. splendens*
 - 9b. Margin of leaves and calyx lobes smooth; corolla pale yellow-green, pale blue-green, or pale purple; nectaries margin smooth.
 - 10a. Seeds wingless; inflorescences crowded, clusters of flowers ± contiguous 33. *S. virescens*
 - 10b. Seeds winged; inflorescences interrupted, cluster of flowers clearly separated from each other.
 - 11a. Seeds ellipsoid, minutely winged at both ends; nectaries ovate-triangular 31. *S. verticillifolia*
 - 11b. Seeds compressed, discoid winged; nectaries orbicular 32. *S. hookeri*
 - 2b. Nectaries 2 per corolla lobe.
 - 12a. Flowers 4-merous; plants with a taproot (rhizomatous in *S. davidi*).
 - 13a. Inflorescences many flowered; nectaries radially elongated, with a narrow scale.
 - 14a. Plant rhizomatous; leaves basal and cauline; calyx shorter than corolla; corolla pale blue with blue veins 55. *S. davidi*
 - 14b. Plant not rhizomatous; leaves mostly basal; calyx longer than corolla; corolla dark purple 49. *S. pianmaensis*
 - 13b. Inflorescences few flowered; nectaries pocket-shaped, with a triangular scale.
 - 15a. Basal leaf blades narrowly spatulate to oblanceolate; calyx lobes 5–9 mm wide, bract-like 34. *S. patens*
 - 15b. Basal leaf blades linear-oblong; calyx lobes 2–3 mm wide, not bractlike 35. *S. luquanensis*
 - 12b. Flowers 5-merous (also 4-merous in *S. emeiensis*); plant rhizomatous.
 - 16a. Nectary margin entire or each with 1 fimbria at base 2. *S. divaricata*
 - 16b. Nectary margin conspicuously fimbriate.
 - 17a. Seeds ± smooth, discoid winged or minutely winged at both ends; stem leaves always present, usually alternate toward base of stem, rarely all opposite.

- 18a. Flowers 4- (or 5)-merous, 2.5–4 cm in diam.; corolla lobes oblong, apex caudate; nectaries orbicular, margin with few erect fimbriae 4. *S. emeiensis*
- 18b. Flowers 5-merous, 1.5–2(–3) cm in diam.; corolla lobes narrowly elliptic to ovate-oblong, apex not caudate; nectaries cupular, margin with many fimbriae.
- 19a. Calyx lobes as long as to longer than corolla or slightly shorter; seeds subglobose, with irregular narrow wings on edges and at both ends; inflorescences 4–7-flowered, rarely more flowered.
- 20a. Corolla pale yellow; pedicel 3–5.5 cm 5. *S. calycina*
- 20b. Corolla dark blue to blue-purple, pedicel 1.2–3 cm 6. *S. forrestii*
- 19b. Calyx lobes shorter than corolla; seeds compressed, discoid winged; inflorescences many flowered.
- 21a. All stem leaves alternate 7. *S. obtusa*
- 21b. Stem leaves basally alternate but middle to upper leaves opposite.
- 22a. Corolla pale purple to blue-purple, never spotted 8. *S. perennis*
- 22b. Corolla pale yellow to yellow, often spotted.
- 23a. Calyx ca. 2/3 as long as corolla; corolla lobes elliptic-lanceolate, 1.2–1.4 cm 9. *S. veratroides*
- 23b. Calyx 1/2(–2/3) as long as corolla; corolla lobes oblong, 0.8–1.2 cm 10. *S. connata*
- 17b. Seeds longitudinally rugose, usually wingless (*S. tibetica* winged on edges, *S. souliei* winged at both ends); stem leaves absent or, if present, always opposite.
- 24a. Stem leaves few or absent except for those subtending inflorescences (leaves mostly basal).
- 25a. Basal leaves 3 or 4 pairs, usually linear-elliptic or oblanceolate; corolla lobes 2–3 mm wide.
- 26a. Corolla blue or blue-purple; calyx lobes with narrow indistinct membranous margin 11. *S. graciliflora*
- 26b. Corolla yellow; calyx lobes with broad distinct membranous margin 12. *S. marginata*
- 25b. Basal leaves 1 or 2 pairs, elliptic, spatulate, or ovate to oblong; corolla lobes 5–8 mm wide.
- 27a. Corolla dark blue 13. *S. bifolia*
- 27b. Corolla pale yellow to yellow or yellow-green but pale blue on middle of inner surface.
- 28a. Corolla lobes usually 0.9–1.5 cm; calyx lobes narrowly lanceolate, apex acuminate; corolla lobes lanceolate, apex acuminate to acute; ovary horizontally folded 14. *S. przewalskii*
- 28b. Corolla lobes usually 1.5–2 cm; calyx lobes ovate-lanceolate, apex acute; corolla lobes oblong to elliptic, apex obtuse to rounded and erose; ovary smooth 15. *S. wolfgangiana*
- 24b. Stems with 2 to many pairs of leaves.
- 29a. Calyx lobes usually oblong-spatulate to elliptic, base narrowed, apex rounded; nectaries radially elongated 16. *S. cuneata*
- 29b. Calyx lobes linear to ovate-lanceolate, base not narrowed, apex acuminate to acute; nectaries cupular or orbicular.
- 30a. Stem upper leaves bractlike; nectaries orbicular; calyx lobes 6–8 mm.
- 31a. Corolla pale yellow, with purple spots; basal leaves ovate; stem leaves 2–3 cm 19. *S. rotundiglandula*
- 31b. Corolla dark purple; basal leaves spatulate to oblong-spatulate or narrowly lanceolate to linear-elliptic; stem leaves 4–12 cm.
- 32a. Inflorescences a panicle; basal leaf petiole 2–2.5 cm, blade 3.5–6 cm, spatulate to oblong-spatulate 20. *S. asarifolia*
- 32b. Inflorescences a thyrsse, interrupted; basal leaf petiole 5–10 cm, blade 10–16 cm, narrowly lanceolate to linear-elliptic 21. *S. elata*
- 30b. Stem upper leaves not bractlike; nectaries cupular; calyx lobes (7)–9–20 mm.
- 33a. Inflorescences a narrow dense interrupted many-flowered thyrsse; basal leaf blade 17–31 cm 17. *S. kingii*
- 33b. Inflorescences paniculate or racemelike; basal leaf blade 2–14 cm.
- 34a. Bases of stem leaf blades subamplexicaul.
- 35a. Basal leaf petiole 3–7 cm; stem leaves 2 or 3 pairs; leaf blade ovate-lanceolate 26. *S. souliei*

- 35b. Basal leaf petiole 1–2.5 cm; stem leaves more than 3 pairs; leaf blade broadly linear, lanceolate, or linear-elliptic.
- 36a. Calyx lobes 0.7–0.9 cm; corolla blue-purple, lobes 0.9–1.3 cm 22. *S. gyacaensis*
- 36b. Calyx lobes 1.5–2 cm; corolla yellow, with blue in middle of outer surface, lobes 2–2.5 cm 25. *S. younghusbandii*
- 34b. Bases of stem leaf blades not subamplexicaul.
- 37a. Plant 15–20 cm tall; corolla blackish purple 18. *S. endotricha*
- 37b. Plant 30–100 cm tall; corolla blue or yellow.
- 38a. Corolla pale blue to pale blue-gray, lobes (1–)1.3–1.5 cm, ca. 1.9 cm in fruit 23. *S. wardii*
- 38b. Corolla yellow, lobes 2.5–2.8 cm 24. *S. tibetica*
- 1b. Annuals.
- 39a. Stems dichotomously branched from base; flowers in branch forks; each nectary produced into a very short spur on back of corolla lobe 36. *S. dichotoma*
- 39b. Stems well defined, erect or ascending, with or without axillary branches; flowers both terminal and usually axillary; nectaries without an associated spur.
- 40a. Filaments dilated laterally so as to be lanceolate to ovate, bases contiguous or fused into a tube around ovary.
- 41a. Nectaries 2 per corolla lobe, inverted (opening toward base of corolla), pocket-shaped, fimbriate 70. *S. hispidicalyx*
- 41b. Nectaries 1 per corolla lobe, horseshoe-shaped and naked or oblong and with few divisions.
- 42a. Calyx and corolla tubes distinct, 2.5–3.5 mm; nectary oblong, laciniate; style cylindric, 1.5–2 mm 75. *S. racemosa*
- 42b. Calyx and corolla tubes indistinct, 0.5–1.5 mm; nectary horseshoe-shaped, naked; style filiform, 2.5–4 mm.
- 43a. Filaments connate into a short tube surrounding ovary.
- 44a. Corolla blue-purple, reflexed at anthesis 71. *S. ciliata*
- 44b. Corolla pale yellow-green, erect at anthesis 72. *S. cincta*
- 43b. Filaments free.
- 45a. Calyx lobes leaflike, unequal, 2 larger and 3 smaller; corolla white, lobes margin lacerulate 73. *S. pubescens*
- 45b. Calyx lobes not leaflike, only slightly unequal; corolla pale yellow, lobes margin entire 74. *S. paniculata*
- 40b. Filaments not to slightly dilated at base, clearly separated from each other.
- 46a. Plants with 1 to few erect, robust, and narrowly 4-winged main stems that have larger flowers and numerous weak branches with flowers 1/4–1/3 as large as those of main stem; filaments with a small scale at base 69. *S. tetraptera*
- 46b. Plants with stems and flowers uniform, usually not branched from lowermost nodes; filaments without a scale at base.
- 47a. Nectaries reduced to a naked gland patch.
- 48a. Nectaries 1 per corolla lobe.
- 49a. Inflorescences rounded and lax; calyx somewhat campanulate, lobes spreading and ovate-triangular to ovate; corolla lobes narrowly oblong, 1.7–1.9 cm 37. *S. shintensis*
- 49b. Inflorescences usually narrow and dense; calyx rotate, lobes erect and lanceolate to ovate-lanceolate; corolla lobes narrowly elliptic to elliptic-lanceolate, 0.8–1 cm 38. *S. cordata*
- 48b. Nectaries 2 per corolla lobe.
- 50a. Leaf blade broadly elliptic to ovate-lanceolate, 1–4(–5) cm wide; corolla with purple spots 39. *S. bimaculata*
- 50b. Leaf blade linear, linear-lanceolate, or lanceolate, 0.2–0.7 cm wide; corolla unspotted or with yellow spots.
- 51a. Calyx lobes ovate-lanceolate or lanceolate; corolla yellow, without spots, lobes oblong and apex acute; plants to 80 cm tall 40. *S. matsudae*
- 51b. Calyx lobes linear to linear-oblong; corolla white, with yellow-green spots, lobes elliptic-lanceolate and apex acuminate and apiculate; plants to 40 cm tall 41. *S. oculata*
- 47b. Nectaries fimbriate or with laciniate margin.
- 52a. Nectaries pocket-shaped, with an orbicular scale and numerous minutely papillose short fimbriae sometimes hidden by the scale.

- 53a. Nectaries 2 per corolla lobe.
- 54a. Stems ascending, 5–15 cm, cespitose, much branched at base; corolla white or pale purple, with dark blue-purple veins 42. *S. patula*
- 54b. Stems erect, 15–45 cm, pyramidal, branched throughout; corolla pale blue, without dark veins 43. *S. leducii*
- 53b. Nectaries 1 per corolla lobe.
- 55a. Calyx lobes shorter or equal to corolla; corolla white or pale yellow, with brown spots 44. *S. angustifolia*
- 55b. Calyx lobes much longer than corolla; corolla yellow-green, with purple veins.
- 56a. Leaf blade narrowed at base; seed coat spongy 45. *S. nervosa*
- 56b. Leaf blade rounded at base; seed coat rugose 46. *S. arisanensis*
- 52b. Nectaries triangular, radially elongated, or cupular, with a narrow scale and long or sometimes short glabrous fimbriae.
- 57a. Flowers 3–5(–10) mm.
- 58a. Nectaries 1 per corolla lobe 48. *S. tenuis*
- 58b. Nectaries 2 per corolla lobe.
- 59a. Style distinct, slender; flowers 4-merous; nectaries radially elongated 50. *S. membranifolia*
- 59b. Style indistinct, stout; flowers usually 5-merous (occasionally 4-merous in *S. macroisperma*), nectaries cupular.
- 60a. Seeds 3 or 4 per capsule, 1.5–2 mm; nectaries with few fimbriae 51. *S. macroisperma*
- 60b. Seeds many per capsule, less than 1 mm; nectaries with many fimbriae.
- 61a. Calyx lobes elliptic-spatulate to elliptic; corolla lobes ovate, apex acute 52. *S. zayueensis*
- 61b. Calyx lobes linear-lanceolate; corolla lobes ovate-lanceolate, apex acuminate 53. *S. alba*
- 57b. Flowers (7–)10–20 mm.
- 62a. Flowers 4-merous (occasionally 5-merous in *S. kouitchensis*).
- 63a. Nectaries with short compound fimbriae 54. *S. tetrapetala*
- 63b. Nectaries with long simple fimbriae.
- 64a. Calyx as long as or longer than corolla, lobes unequal 56. *S. kouitchensis*
- 64b. Calyx 1/2–2/3 as long as corolla, lobes subequal.
- 65a. Plants regularly branched from near base so whole plant is pyramidal; corolla dark purple or pale yellow green to pale yellow 57. *S. mussotii*
- 65b. Plants with cymes in spreading branched panicles; corolla pale blue 58. *S. tozanensis*
- 62b. Flowers 5-merous.
- 66a. Calyx lobes bractlike, unequal, 3 larger and ovate, 2 smaller and ovate-lanceolate, all with prominent reticulate veins outside 59. *S. delavayi*
- 66b. Calyx lobes not bractlike, subequal, linear to linear-lanceolate, without prominent reticulate veins outside.
- 67a. Inflorescences usually reduced to single terminal flower, sometimes with additional flowers terminating short axillary branches 60. *S. decora*
- 67b. Inflorescences a panicle with at least some (but usually all) flowers in leaf axils.
- 68a. Corolla lobes not apiculate.
- 69a. Calyx more than 2/3 as long as corolla.
- 70a. Corolla 1–1.5 cm in diam.; nectaries with simple fimbriae 61. *S. diluta*
- 70b. Corolla 1.5–2 cm in diam.; nectaries with compound fimbriae 62. *S. pseudochinensis*
- 69b. Calyx 1/2–2/3 as long as corolla.
- 71a. Pedicel filiform; corolla pale blue; calyx lobes linear; nectaries triangular 63. *S. yunnanensis*
- 71b. Pedicel linear; corolla white or rarely pale blue; calyx lobes linear-lanceolate; nectaries

	radially elongated	64. <i>S. hickinii</i>
68b.	Corolla lobes apiculate.	
72a.	Corolla white or yellow.	
73a.	Base of stem leaf blades subamplexicaul, margin ciliolate; corolla 1.5–1.7 cm in diam.	65. <i>S. binchuanensis</i>
73b.	Base of stem leaf blades tapered, margin not ciliolate; corolla 0.8–1.2 cm in diam.	66. <i>S. punicea</i>
72b.	Corolla pale blue or dark purple.	
74a.	Corolla dark purple	66. <i>S. punicea</i>
74b.	Corolla pale blue.	
75a.	Stem leaf bases auriculate, subamplexicaul; inflorescences many-flowered panicles formed by the whole plant; pedicel stout, to 4 cm; corolla lobes 9–15 mm	67. <i>S. franchetiana</i>
75b.	Stem leaf bases cuneate, not subam- plexicaul; inflorescences a narrow panicle with many ± fascicled flowers; pedicel slender, 0.3–0.5 cm; corolla lobes 5–7 mm	68. <i>S. fasciculata</i>

1. ***Swertia handeliana*** Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 106. 1926.

矮獐牙菜 ai zhang ya cai

Perennials 2–4 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems 2–5, erect, cespitose, striate, simple. Leaves mostly basal, crowded in a rosette, slightly shorter than stems; petiole flattened, 0.8–1.8 cm; leaf blade ovate to suborbicular, 4–7 × 3–5.5 mm, base narrowed, apex rounded, midvein distinct. Stem leaves sessile, spatulate to obovate, 4–6 × 2.5–4 mm, both ends obtuse. Flowers terminal, solitary, 4-merous. Pedicel erect, 5–13 mm at anthesis, elongated to 2 cm in fruit. Calyx lobes green, foliaceous, ovate-lanceolate to ovate-elliptic, 3.5–4.5 mm, margin scabrous, apex obtuse, veins 3–5. Corolla pale blue, 8–10 mm in diam., tube ca. 0.5 mm; lobes oblong, 8–10 mm, apex obtuse and mucronate. Nectaries 1 per corolla lobe, reduced to a flat gland patch without raised margin or fimbriae. Filaments ca. 5.5 mm; anthers ovoid, 0.9–1 mm. Style short; stigma lobes capitate. Capsules ovoid-ellipsoid, ca. 1 cm. Seeds light brown, broadly ellipsoid, 0.7–0.8 mm, almost smooth. Fl. and fr. Aug-Nov.

• Grasslands on hillsides, alpine meadows; 3500–4500 m. SE Xizang, NW Yunnan.

2. ***Swertia divaricata*** Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 256. 1965.

叉序獐牙菜 cha xu zhang ya cai

Perennials 50–70 cm tall. Stems erect, robust, striate, simple. Basal leaves absent. Lower stem leaves long petiolate; leaf blade elliptic, 12–14 × 4–5.5 cm, apex obtuse, veins 7; middle to upper leaves sessile or short petiolate; leaf blade elliptic-lanceolate to triangular-lanceolate, 4–8 × 2.5–5 cm, apex obtuse. Inflorescences panicles of cymes, divaricate, many flowered. Flowers 5-merous. Pedicel arcuate, 2–2.5 cm. Calyx lobes lanceolate, ca. 5 mm, thick herbaceous, apex acuminate, veins 3. Corolla blackish purple, with green spots, 1–1.2 cm in diam., tube 1–1.5 mm; lobes elliptic to ovate-

lanceolate, 1–1.2 cm × 4.5–5 mm, apex obtuse. Nectaries 2 per corolla lobe, close together, oblong, with narrowly raised margin and 1 to few fimbriae at base. Filaments ca. 6 mm, base fimbriate-barbate; anthers ellipsoid, ca. 2 mm. Style very short; stigma lobes oblong. Capsules ellipsoid, 1–1.2 cm. Seeds light brown, ellipsoid, 1.2–2 mm, irregularly longitudinally rugose, narrowly winged on edges. Fl. and fr. Sep.

• Woodland margin in valleys; ca. 2400 m. NW Yunnan.

3. ***Swertia erythrosticta*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 503. 1881.

红直獐牙菜 hong zhi zhang ya cai

Perennials 20–50 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, robust, striate, simple. Basal leaves withered at anthesis. Stem leaves with petiole flattened, to 7 cm, shorter toward apex, base connate into a sheath; blade oblong, ovate-elliptic, or ovate, 5–11(–12.5) × 1–3.5 cm, smaller toward apex, base narrowed, apex obtuse, veins 3–5. Inflorescences panicles of cymes, (5–)10–45 cm, narrow, many flowered. Flowers 5-merous. Pedicel somewhat arcuate, 1–2 cm. Calyx lobes lanceolate, 5–10 mm, margin narrowly membranous, apex acuminate. Corolla pale yellow-green, with or without brown spots, 1.2–1.5(–2) cm in diam., tube 1–1.5 mm; lobes oblong to ovate-oblong, 0.8–1.7 cm × (1.5–)3–6 mm, apex obtuse. Nectaries 1 per corolla lobe, deeply cupular to almost tubular, fimbriae 1.5–2 mm. Filaments 5–7 mm, base fimbriate-barbate; anthers ovoid, 2–2.5 mm. Style short, distinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1–1.5 cm. Seeds light brown, ellipsoid, 0.8–1 mm, wings discoid. Fl. and fr. Aug-Oct.

1500–4300 m. Gansu, Hebei, Hubei, Nei Mongol, Qinghai, Shanxi, Sichuan [Korea].

1a. Corolla with brown spots 3a. var. *erythrosticta*
1b. Corolla without brown spots 3b. var. *epunctata*

3a. ***Swertia erythrosticta* var. *erythrosticta***

红直獐牙菜 (原变种) hong zhi zhang ya cai (yuan bia zhong)

Corolla pale yellow-green, with brown spots.

Beside streams, grasslands on dry hillsides, scattered forests, alpine meadows; 1500–4300 m. Gansu, Hebei, Hubei, Nei Mongol, Qinghai, Shanxi, Sichuan [Korea].

3b. *Swertia erythrosticta* var. *epunctata* T. N. Ho & S. W. Liu, Acta Biol. Plateau Sin. 1: 46. 1982.

素色獐牙菜 su se zhang ya cai

Corolla without brown spots.

• Beside streams, meadows on hillsides; 2900–3000 m. E. Qinghai.

4. *Swertia emeiensis* Ma ex T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 75. 1980.

峨眉獐牙菜 e mei zhang ya cai

Perennials 20–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 1.5–5.5 cm; leaf blade folded, narrowly oblong to lanceolate, 4–10 × 0.8–1.5 cm, base narrowed and decurrent into wings of petiole, apex obtuse, veins 3–7. Stem leaves alternate, sessile, ± lanceolate, 1.5–2.5 cm × 6–10 mm, base rounded, subamplexicaul, and decurrent into narrow wings along stem, apex acute, veins 3–5. Inflorescences racemelike cymes, (1–)3–7-flowered. Flowers 4- (or 5)-merous. Calyx lobes linear-lanceolate, 1.7–2.5 cm, apex acuminate, midvein slender. Corolla pale yellow-green, with brown veins, 2.5–4 cm in diam., tube 2–3 mm; lobes oblong, 2.8–3.2 cm, apex acuminate and caudate. Nectaries 2 per corolla lobe, orbicular, with few hispid fimbriae 3–3.5 mm. Filaments 1.2–1.3 cm, base fimbriate-barbate; anthers ellipsoid, 3–3.5 mm. Ovary ellipsoid, 8–9 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug-Sep.

• Forests; ca. 2600 m. Sichuan (Emei Shan).

5. *Swertia calycina* Franchet, Bull. Soc. Bot. France 46: 311. 1899.

叶萼獐牙菜 ye e zhang ya cai

Perennials 8–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened and 4–6 cm; leaf blade usually folded, linear-oblong, 3.5–7 × 0.5–2 cm, base narrowed, apex obtuse, veins 3–7. Stem leaves alternate, sessile, subamplexicaul; lower stem leaf blades similar to basal leaves; middle to upper leaves ovate-oblong to ovate, 2.5–4 × 0.7–1.2 cm, base rounded and decurrent into narrow wings along stem, apex acute, veins 3–5. Inflorescences racemelike, 5- or more flowered. Flowers 5-merous. Pedicel spreading, 3–5.5 cm, stout. Calyx slightly unequal, shorter than to longer than corolla; lobes green, foliose, ovate-lanceolate to ovate, rarely narrowly lanceolate, (0.8–)1–1.6(–2.5) cm, 3–10 mm wide at base, base rounded to cordate, apex acuminate to acute,

veins 1–3. Corolla pale yellow, 1.5–2(–3) cm in diam., tube 1.5–2 mm; lobes ovate-oblong, 1–2.5(–2.9) × 0.5–1.1(–2) cm, margin entire or erose, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 1–1.3 cm, base fimbriate-barbate; anthers blue, ellipsoid, 2–3 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.3–1.5 cm. Seeds light brown, subglobose, 1–1.2 mm in diam., both ends with narrow irregular wings. Fl. and fr. Jul-Sep.

• Hillsides; 2600–4000 m. SW Sichuan, NW Yunnan.

6. *Swertia forrestii* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 258. 1965.

紫萼獐牙菜 zi e zhang ya cai

Perennials 20–25 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 1.5–5.5 cm; leaf blade folded, narrowly oblong to lanceolate, 4–10 × 0.8–1.5 cm, base narrowed and decurrent into wings of petiole, apex obtuse, veins 3–7. Stem leaves alternate, sessile, ± lanceolate, 1.5–2.5 cm × 6–10 mm, base rounded, subamplexicaul, and decurrent into narrow wings along stem, apex acute, veins 3–5. Inflorescences racemelike, 6–20 cm, 4- or more flowered. Flowers 5-merous. Pedicel spreading, 1.2–3 cm, stout. Calyx lobes green, sometimes tinged blue-purple, ovate-lanceolate, 1.1–1.6 cm × 4–7 mm, slightly unequal, foliose, base rounded to cordate, apex acute, veins 1–3. Corolla dark blue to blue-purple, 1.5–2 cm in diam., tube 1.5–2 mm; lobes ovate-lanceolate, 1.3–1.8 cm × 5–6 mm, margin entire, apex acute. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 7–8 mm, base fimbriate-barbate; anthers blue, ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ellipsoid, 8–10 mm. Seeds light brown, subglobose, both ends and edges with irregular narrow wings. Fl. Aug.

• Scrub, alpine meadows; 3400–4200 m. NW Yunnan.

7. *Swertia obtusa* Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 526. 1812.

互叶獐牙菜 hu ye zhang ya cai

Perennials 15–40(–60) cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Leaves alternate. Basal and lower stem leaves with petiole slender and 6–11 cm; leaf blade oblong, 4–9 × 2–4 cm, base narrowed, apex obtuse, veins 1–3. Middle to upper stem leaves sessile, narrowly elliptic to elliptic-lanceolate, 2–4.5 cm × 6–10 mm, base rounded and subamplexicaul, apex obtuse, veins 1–3. Inflorescences slender, many-flowered thyrses 8.5–21 cm. Flowers 5-merous. Pedicel 1.2–3 cm, elongated in fruit. Calyx lobes linear-lanceolate, 8–10 mm, apex acuminate, veins 3. Corolla blue, 1.2–1.6 cm in diam., tube 1.5–2 mm; lobes narrowly elliptic to elliptic, 1.1–1.6 cm, apex obtuse. Nectaries 2 per corolla lobe, cupular, with 2–3

mm pilose fimbriae. Filaments 7–7.5 mm, base fimbriate-barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.3–1.5 cm, as long as persistent corolla. Seeds light brown, broadly ellipsoid to subglobose, 2–2.5 mm in diam., discoid winged. Fl. and fr. Aug-Sep.

Beside streams, forests; 2100–2500 m. Xinjiang (Altay region) [Kazakhstan, Mongolia, Russia].

8. *Swertia perennis* Linnaeus, Sp. Pl. 1: 226. 1753.

北温带獐牙菜 bei wen dai zhang ya cai

Swertia manshurica (Komarov) Kitagawa; *S. perennis* var. *manshurica* Komarov.

Perennials 60–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves alternate; petiole flattened, 8–17 cm; leaf blade oblong to elliptic, 6–13 × 3.5–5.5 cm, base narrowed, apex obtuse, veins 3–5. Middle to upper stem leaves opposite; petiole short, connate, sheathing stem; leaf blade oblong, 5–8 × 2–3 cm, base narrowed, apex obtuse, veins 1–3. Inflorescences dense, many-flowered thyrses. Flowers 5-merous. Pedicel 2–3.5 cm. Calyx lobes narrowly lanceolate, 8–10 mm, apex acuminate, veins 3–5. Corolla pale purple to blue-purple, 1.5–2 cm in diam., tube 1.5–2 mm; lobes narrowly ovate-oblong, 1.3–1.6 cm, apex obtuse. Nectaries 2 per corolla lobe, cupular, long fimbriate. Filaments 6–8 mm, base fimbriate-barbate; anthers blue, ellipsoid, 1.5–2 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid, as long as persistent corolla. Seeds light brown, compressed, suborbicular, 1.5–2 mm in diam., discoid winged. Fl. and fr. Sep.

Shady slopes, meadows; ca. 300 m. Jilin [North America, SW Asia, Europe].

9. *Swertia veratroides* Maximowicz ex Komarov, Fl. Manshur. 3: 276. 1907.

藜芦獐牙菜 li lu zhang ya cai

Perennials 45–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves alternate; petiole winged, 7–14 cm; leaf blade broadly elliptic, 8.5–11.5 × 6.5–8 cm, base truncate and decurrent into wings of petiole, apex obtuse to rounded, veins 5–7. Middle to upper stem leaves opposite; petiole short, connate; leaf blade elliptic, (3.5–)6–9 × 1.2–2.5 cm, both ends obtuse, veins 1–3. Inflorescences many-flowered thyrses 15–25 cm. Flowers 5-merous. Pedicel 1.5–3 cm. Calyx lobes triangular-lanceolate, 6–8 mm, apex acuminate, veins 3. Corolla pale yellow, with blue spots, 1.5–1.8 cm in diam., tube 1.5–2 mm; lobes elliptic-lanceolate, 1.2–1.4 cm × 5–6.5 mm, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 1.5–2 mm. Filaments flattened, 6–8 mm, base glabrous or fimbriate-barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ellipsoid to broadly ellipsoid, as long

as persistent corolla. Seeds brown, compressed, suborbicular, 1–1.2 mm in diam., discoid winged. Fl. and fr. Jul-Sep.

Meadows; 1600–1700 m. Heilongjiang, Jilin, Liaoning [Korea, Russia].

10. *Swertia connata* Schrenk, Nov. Pl. Sp. 1: 37. 1841.

短筒獐牙菜 duan tong zhang ya cai

Swertia obtusa Ledebour var. *quingheensis* T. N. Ho & S. W. Liu.

Perennials to 1 m tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple. Basal and lower stem leaves alternate; petiole flattened, 6–21 cm; leaf blade spatulate-oblong to oblong, 11–15 × 4–8 cm, base narrowed, apex obtuse, veins 5–7. Upper stem leaves opposite, sessile or short petiolate; leaf blade oblong, (3)–6–8 × 0.8–3.5 cm, both ends obtuse, veins 1–3. Inflorescences many-flowered thyrses 15–25 cm. Flowers 5-merous. Pedicel 1.5–2.5 cm. Calyx lobes lanceolate to oblong, 4–8 × 1.5–2 mm, apex acute, midvein distinct. Corolla pale yellow, sometimes with blue spots, 1–1.5 cm in diam., tube 1.5–2 mm; lobes oblong, 8–11 × 3–5 mm, apex acute to obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 1.5–2 mm. Filaments 7–9 mm, base fimbriate-barbate; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ellipsoid, 1–1.3 cm. Seeds brown, compressed, suborbicular, 2.5–3 mm in diam., discoid winged. Fl. and fr. Jul-Aug.

Hillsides, forest margins; 1600–2600 m. Xinjiang [Kazakhstan, Mongolia, Russia].

11. *Swertia graciliflora* Gontscharow, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 1: 161. 1933.

细花獐牙菜 xi hua zhang ya cai

Perennials 10–20 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple, base sheathed by blackish remains of old petioles. Basal leaves 3 or 4 pairs; petiole flattened, 2–2.5 cm; leaf blade linear-elliptic to oblanceolate, 2.5–6 × 0.6–1.7 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves 1 or 2 pairs, sessile or short petiolate; leaf blade bractlike, ovate-elliptic, 1–2 cm × 4–7 mm, both ends obtuse, veins 1–3. Inflorescences narrow, interrupted, many-flowered thyrses 4–10 cm. Flowers 5-merous. Pedicel suberect, 0.8–2 cm. Calyx lobes lanceolate, 7–8 mm, margin narrowly membranous, apex acuminate, veins indistinct. Corolla blue or blue-purple, tube 1.5–2 mm; lobes narrowly oblong, 8–11 mm, margin erose, apex obtuse to rounded. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 7–9 mm, base fimbriate-barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, as long as persistent corolla. Seeds brown, ellipsoid, 1–1.3 mm, longitudinally rugose. Fl. and fr. Jul-Aug.

Valleys, beside streams, alpine meadows; 2500–4500 m. Xinjiang [Tajikistan].

12. *Swertia marginata* Schrenk, Bull. Sci. Acad. Imp. Sci.

Saint-Pétersbourg 10: 353. 1842.

膜边獐牙菜 mo bian zhang ya cai

Perennials 15–35 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple, base sheathed by blackish remains of old petioles. Basal leaves 3 or 4 pairs; petiole flattened, 3–7.5 cm; leaf blade linear-elliptic to oblanceolate, 3–8 × 0.8–2.5 cm, base narrowed, apex obtuse, veins 3–5. Stem leaves 1 or 2 pairs, sessile or short petiolate; leaf blade bractlike, linear-elliptic to ovate-elliptic, 1.5–3.5 cm × 4–10 mm, both ends obtuse, veins 1–3. Inflorescences narrow, interrupted, many-flowered thyrses 8–15 cm. Flowers 5-merous. Pedicel 0.5–1.5 cm. Calyx lobes lanceolate, 8–10 mm, margin broadly membranous and distinct, apex acuminate, veins 3. Corolla yellow, blue on middle of outer surface, 1.3–1.5 cm in diam., tube 1.5–2 mm; lobes oblong to narrowly so, 1–1.2 cm, margin erose, apex rounded. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3–4 mm. Filaments 7–9 mm, base fimbriate-barbate; anthers blue, ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes oblong to suborbicular. Capsules narrowly ovoid, as long as persistent corolla. Seeds brown, ellipsoid, 1.2–2 mm, longitudinally rugose. Fl. and fr. Aug-Sep.

Grasslands on hillsides; 2500–3000 m. W Gansu, N Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Russia (E Siberia), Tajikistan].

13. *Swertia bifolia* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 378. 1894.

二叶獐牙菜 er ye zhang ya cai

Swertia heterantha Ling.

Perennials 10–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple, base sheathed by blackish remains of old petioles. Basal leaves 1 or 2 pairs; petiole flattened, 2.5–4 cm, base connate; leaf blade oblong to ovate-oblong, 1.5–6 × 0.7–3 cm, base narrowed, apex obtuse to rounded, veins 3–7. Stem leaves 2 or 3 pairs, sessile, bractlike, ovate to ovate-triangular, 0.7–1.8 cm × 4–6 mm, base obtuse, apex acute, veins 1–3. Inflorescences racemelike, 2–8(–13)-flowered. Flowers 5-merous. Pedicel spreading to erect, 0.5–5.5 cm. Calyx lobes lanceolate to ovate, 8–11 mm, apex acuminate, veins 3–5. Corolla dark blue, tube 1.5–2 mm; lobes elliptic-lanceolate to narrowly elliptic, 1.5–2(–3) cm × 5–8 mm, margin entire or sometimes erose, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3.5–4 mm. Filaments 0.9–1.1 cm, base fimbriate-barbate; anthers blue, narrowly ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes ellipsoid to suborbicular. Capsules ovoid-ellipsoid, as long as to slightly longer than persistent corolla. Seeds brown, ellipsoid, 1.2–1.5 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

• Scrub meadows, swamp meadows, alpine meadows, forests; 2800–4300 m. SE Gansu, Qinghai, Shaanxi (Taibei Shan), NW Sichuan, SE Xizang.

14. *Swertia przewalskii* Pissjaukova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 21: 300. 1961.

祁连獐牙菜 qi lian zhang ya cai

Perennials 8–25 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves 1 or 2 pairs; petiole flattened, 1.5–5 cm, base connate; leaf blade spatulate, elliptic, or ovate-elliptic, 1.6–6 × 0.7–2.2 cm, base cuneate to rounded, apex obtuse, veins 3–5. Stem leaves 1 or 2 pairs, sessile, bractlike, ovate-oblong, 1–2 cm × 2–5 mm, base obtuse and subamplexicaul, apex obtuse, veins 1–3. Inflorescences racemelike, 3–8 cm, 3–9-flowered. Flowers 5-merous. Pedicel spreading to erect, 0.5–5 cm. Calyx elongated in fruit; lobes narrowly lanceolate, 8–11 mm, margin distinctly membranous, apex acuminate. Corolla pale yellow-green, blue to brown in middle of outer surface, 1–2 cm in diam., tube 1.5–2 mm; lobes lanceolate (0.6–)0.9–1.5 cm × 5–7 mm, apex acuminate to acute. Nectaries 2 per corolla lobe, cupular, with fimbriae 1–1.5 mm. Filaments flattened, 7–9 mm, base short fimbriate-barbate; anthers blue, narrowly ellipsoid to cylindric, 1.2–3.2 mm. Ovary horizontally grooved. Style indistinct; stigma lobes ellipsoid to suborbicular. Capsules ovoid-ellipsoid, as long as persistent corolla. Seeds dark brown, broadly ellipsoid to subglobose, 0.9–1.1 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

• Moist places, swamp meadows, scrub, alpine meadows; 3000–4200 m. NE Qinghai.

15. *Swertia wolfgangiana* Grüning, Repert. Spec. Nov. Regni Veg. 12: 309. 1913.

华北獐牙菜 hua bei zhang ya cai

Swertia obtusipetala Grüning.

Perennials 8–55 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves 1 or 2 pairs; petiole flattened, 2.5–6 cm, base connate; leaf blade oblong to elliptic, 2–9 × 1–3 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves 1 or 2 pairs, sessile, bractlike, ovate-oblong, 1.5–3 cm × 5–10 mm, base obtuse and subamplexicaul, apex obtuse, veins 1–3. Inflorescences racemelike, (1–)3–9-flowered. Flowers 5-merous. Pedicel spreading to erect, 2–5 cm. Calyx lobes ovate-lanceolate, 0.8–1.3 cm × 3–5 mm, margin membranous, apex acute. Corolla pale yellow-green, blue in middle of outer surface, 1.5–3 cm in diam., tube 1.5–2 mm; lobes oblong to elliptic, 1.5–2 cm, apex obtuse to rounded and erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3–4 mm. Filaments 0.8–1.2 cm, base short fimbriate-barbate; anthers blue, ellipsoid, 3–4 mm. Style indistinct; stigma lobes ellipsoid to suborbicular. Capsules ellipsoid, as long as persistent corolla. Seeds dark brown, ellipsoid, 1–1.2 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

• Moist places, swamp meadows, scrub, alpine meadows; 1500–5300 m. S Gansu, W Hubei, Qinghai, Shanxi, Sichuan, E Xizang.

16. *Swertia cuneata* Wallich ex D. Don, London Edinburgh Philos. Mag. & J. Sci. 8: 77. 1836.

楔叶獐牙菜 xie ye zhang ya cai

Swertia asterocalyx T. N. Ho & S. W. Liu.

Perennials 15–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Leaves mostly basal; petiole winged, 1.2–3 cm; leaf blade spatulate to obovate, 1.5–3.5 × 0.9–1.2 cm, base narrowed and decurrent into wings of petiole, apex rounded, veins 3–7, arcuate. Middle to upper stem leaves 2 or 3 pairs, sessile or short petiolate; leaf blade narrowly elliptic, 2–5.5 cm × 6–11 mm, base narrowed, apex obtuse, veins 3–5. Inflorescences racemelike, 5–7-flowered. Flowers 5-merous. Pedicel spreading, 2.7–7 cm. Calyx lobes usually spreading, oblong-spatulate to elliptic, 6–9 mm, base usually distinctly contracted into a claw, margin dark brown and slightly revolute, apex rounded. Corolla pale blue, 2–3 cm in diam.; tube 1.5–2 mm, base bearing 5 bundles of yellow hairs; lobes ovate-elliptic, 1.5–2 cm, apex obtuse. Nectaries 2 per corolla lobe, linear-oblong, radially elongated, with pilose fimbriae 2.5–3 mm. Filaments 9–10 mm; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.9–1.2 cm. Seeds brown, subglobose, ca. 2 mm; seed coat reticulate. Fl. and fr. Sep-Oct.

Alpine meadows; 3600–4700 m. SW Xizang [W India, Nepal, Sikkim].

17. *Swertia kingii* J. D. Hooker, Hooker's Icon. Pl. 15: 34. 1883.

黄花獐牙菜 huang hua zhang ya cai

Perennials 70–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, robust, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves long petiolate; petiole flattened, 5–13 cm, base connate; blade broadly elliptic, 17–31 × 5–9 cm, base narrowed, apex obtuse, veins 7–9. Middle to upper stem leaves many pairs, sessile or short petiolate; leaf blade ovate-lanceolate to ovate, 3–10 × 0.7–4 cm, base obtuse, apex acute to obtuse, veins 3–7. Inflorescences narrow, dense, interrupted, many-flowered thyrses ca. 25 cm. Flowers 5-merous. Pedicel spreading to erect, to 3 cm, robust. Calyx lobes ovate-lanceolate, 1.1–1.3 cm, margin sparsely serrulate, apex acute. Corolla pale yellow-green, with blue streaks, 2–2.5 cm in diam., tube 1.5–2 mm; lobes oblong to obovate-oblong, 1.5–1.7 cm, apex obtuse to rounded and erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–3 mm. Filaments 8–10 mm; anthers blue, ellipsoid, 3–3.5 mm. Style indistinct; stigma lobes suborbicular. Capsules cylindric to ovoid, 1–1.8 cm. Seeds brown, longitudinally rugose. Fl. Aug-Sep.

Alpine meadows; 3400–3800 m. S Xizang [Nepal].

18. *Swertia endotricha* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 256. 1965.

直毛獐牙菜 zhi mao zhang ya cai

Perennials 15–20 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves

petioles flattened, 3–5 cm, base connate; leaf blade oblong to elliptic, 3–5 × 1.7–2 cm, base narrowed, apex obtuse, veins 3–5. Stem leaves 3 or 4 pairs, sessile, narrowly ovate, 1–2.5 × 0.7–1.2 cm, base obtuse, apex acuminate to obtuse, veins 1–3. Inflorescences racemelike, 6–11-flowered. Flowers 5-merous. Pedicel erect, to 2.5 cm. Calyx lobes narrowly lanceolate, 1–1.2 cm, apex acuminate, veins 3. Corolla blackish purple, 2.5–3 cm in diam., tube 1.5–2 mm; lobes lanceolate, 1.2–1.4 cm, apex acuminate, veins 3. Nectaries 2 per corolla lobe, widely spaced, cupular, pilose, base with erect fimbriae to 5 mm. Filaments ca. 7.5 mm; anthers ellipsoid, ca. 3 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug.

• Hillsides. Yunnan (Jinsha Jiang valley).

19. *Swertia rotundiglandula* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 77. 1980.

圆腺獐牙菜 yuan xian zhang ya cai

Perennials 12–18 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 2–2.5 cm, base connate; leaf blade ovate, 3–3.5 cm, base obtuse and decurrent into wings of petiole, apex acute. Middle stem leaves sessile or short petiolate; leaf blade similar to basal leaves but smaller, 2–3 × 0.6–2.3 cm; upper leaves sessile, bractlike, narrowly oblong to elliptic, 1–1.2 cm × 4–5 mm. Inflorescences racemelike, (1- or) 2–5-flowered. Flowers 5-merous. Pedicel spreading, 2–4 cm. Calyx lobes lanceolate, 6–8 mm, apex acuminate, veins 3. Corolla pale yellow-green, with purple spots, 1.4–1.8 cm in diam., tube 1.5–2 mm; lobes obovate, 1.2–1.5 cm, base contracted into a claw, apex rounded. Nectaries 2 at middle of each corolla lobe, orbicular, close to each other, with inflexed fimbriae 1–2 mm. Filaments 5–6 mm, base few barbate; anthers ellipsoid, 2–2.5 mm. Ovary ellipsoid, 6–7 mm. Style indistinct; stigma lobes suborbicular. Fl. May-Jun.

• Hillsides; ca. 3100 m. Xizang-Yunnan border (Taxui Shan region).

20. *Swertia asarifolia* Franchet, Bull. Soc. Bot. France 46: 311. 1899.

细辛叶獐牙菜 xi xin ye zhang ya cai

Swertia atroviolacea Harry Smith.

Perennials 12–25 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 2–2.5 cm, base connate; leaf blade ± spatulate, 3.5–6 × 1.5–3.3 cm, base narrowed, apex obtuse to rounded, veins 5–7, arcuate. Middle stem leaves sessile, oblong to ovate, 4–8 × 1.5–3.5 cm, base obtuse, apex acute to obtuse, veins 3–5; upper leaves sessile, bractlike, ovate, 1.5–2.5 cm × 4–12 mm, base rounded and subamplexicaul, apex obtuse, veins 1–3. Inflorescences many-flowered panicles. Flowers 5-merous. Pedicel bent near apex, 1.8–5 cm. Calyx lobes narrowly lanceolate, 6–8 mm, apex acuminate; veins 3–5, indistinct. Corolla dark purple, 1.4–1.8 cm in diam., tube 1.5–2 mm; lobes ovate-elliptic, 8–10 mm, base obtuse, apex

obtuse and few dentate. Nectaries 2 per corolla lobe, orbicular, widely spaced to crowded, with inflexed fimbriae 1–2 mm. Filaments ca. 7 mm, base few barbate; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.8–1.2 cm. Seeds brown, longitudinally rugose. Fl. Aug-Sep.

• Grasslands, gravel slopes; 3400–4600 m. NW Yunnan.

21. *Swertia elata* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 106. 1926.

高獐牙菜 gao zhang ya cai

Perennials 40–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 5–10 cm, base connate; leaf blade linear-elliptic to narrowly lanceolate, 10–16 × 2–3 cm, base narrowed and decurrent into wings of petiole, apex obtuse, veins 5–7. Middle stem leaves petiole flattened, 2–4 cm, connate; leaf blade 7–12 × 1.2–2 cm, base narrowed, apex acute, veins 3–5; upper leaves sessile, bractlike, linear to lanceolate, 1–3 × 0.7–1.2 cm, base obtuse and subamplexicaul, apex acuminate, veins 1–3. Inflorescences narrow, interrupted, many-flowered thyrses 21–45 cm. Flowers 5-merous. Pedicel nodding to erect, to 2 cm, terete, striate. Calyx lobes narrowly lanceolate, 6–8 mm, apex acuminate; veins 3–5, indistinct. Corolla dark purple, 1–1.3 cm in diam., tube 1.5–2 mm; lobes ovate-elliptic, 8–10 mm, base obtuse, apex obtuse and few dentate. Nectaries 2 at middle of each corolla lobe, orbicular, widely spaced to crowded, with inflexed fimbriae 1–2 mm. Filaments ca. 7 mm, base few barbate; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.8–1.2 cm. Seeds brown, longitudinally rugose. Fl. and fr. Jun-Sep.

• Grasslands on hillsides, scrub, alpine meadows; 3200–4600 m. SW Sichuan, NW Yunnan.

22. *Swertia gyacaensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 77. 1980.

加查獐牙菜 jia cha zhang ya cai

Perennials 5–15 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves with petiole flattened, 1–1.7 cm, base connate; leaf blade linear-elliptic to lanceolate, 2–4 cm × 5–11 mm, base narrowed, apex obtuse, midvein distinct. Middle to upper stem leaves sessile, 1.2–3.5 cm × 3–8 mm, base obtuse and subamplexicaul, apex obtuse, midvein distinct. Inflorescences racemelike, 3–7 cm, (1–)3–7-flowered. Flowers 5- merous. Pedicel spreading to erect, blue-purple to purple, 1–2.2 cm. Calyx lobes linear to linear-lanceolate, 7–9 mm, margin pale blue, narrow, and membranous, apex acuminate; veins 3, indistinct. Corolla blue-purple, 1.5–2 cm in diam., tube 1.5–2 mm; lobes oblong, 0.9–1.3 cm, margin smooth or erose, apex acuminate. Nectaries 2 per corolla lobe, widely spaced to crowded, cupular, with pilose fimbriae 2.5–3 mm. Filaments

7–8 mm, base few barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, 6–7 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug-Sep.

• Alpine meadows; ca. 4300 m. Xizang (Gyaca Xian).

23. *Swertia wardii* C. Marquand, J. Linn. Soc., Bot. 48: 208. 1929.

苇叶獐牙菜 wei ye zhang ya cai

Perennials 30–80 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 4–15 cm, base connate; leaf blade lanceolate to narrowly elliptic, 3.5–14 × 2–3 cm, base narrowed, apex acute to obtuse, veins 5–7. Stem leaves sessile or with connate short petioles; leaf blade lanceolate to narrowly elliptic, 1.5–10 × 0.5–1.8 cm, base obtuse to rounded, apex obtuse, midvein distinct. Inflorescences paniculate or racemelike. Flowers 5-merous. Calyx lobes lanceolate to ovate-lanceolate, 7–10 mm, margin narrow, white or pale blue, and membranous, apex acute, veins 3–5 outside. Corolla pale blue to pale blue gray, 1.4–1.6 cm in diam., tube 1.5–2 mm; lobes lanceolate to elliptic-lanceolate, (1–)1.3–1.5 cm, to 1.9 cm in fruit, margin erose, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 8–9 mm, base few barbate; anthers blue, narrowly ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.2–1.5 cm. Seeds dark brown, broadly ellipsoid, 1.3–1.6 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

3800–5200 m. Xizang [Bhutan, Sikkim].

- | | |
|--|-------------------------|
| 1a. Inflorescences paniculate; pedicel to
7.5 cm in fruit | 23a. var. <i>wardii</i> |
| 1b. Inflorescences racemelike; pedicel to
10 cm in fruit | 23b. var. <i>rigida</i> |

23a. *Swertia wardii* var. *wardii*

苇叶獐牙菜 (原变种) wei ye zhang ya cai (yuan bian zhong)
Swertia phragmitiphylla T. N. Ho & S. W. Liu.

Inflorescences paniculate, many flowered, usually 20–40 cm. Pedicel spreading to somewhat arcuate, not rigid, 1.2–3 cm, elongated to 7.5 cm in fruit.

Swamps, scrub, forests, alpine meadows; 3800–5200 m. SE Xizang [Bhutan, Sikkim].

23b. *Swertia wardii* var. *rigida* (T. N. Ho & S. W. Liu) T. N. Ho, Novon 4: 372. 1994.

硬杆獐牙菜 ying gan zhang ya cai

Swertia phragmitiphylla T. N. Ho & S. W. Liu var. *rigida* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 79. 1980.

Inflorescences racemelike. Pedicel erect, rigid, to 10 cm in fruit.

• Scrub slopes. Xizang (Yadong Xian).

24. *Swertia tibetica* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 175. 1895.

大药獐牙菜 da yao zhang ya cai

Perennials 30–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, robust, striate, simple, base sheathed by blackish remains of old petioles. Leaves mostly basal; petiole flattened, 2–7 cm, base connate; leaf blade narrowly oblong to elliptic-spatulate, 4.5–13.5 × 1–3.5 cm, base narrowed, apex acute to obtuse, veins 5–7(–9). Stem leaves 4–6 pairs, sessile or short petiolate with base connate; leaf blade elliptic-spatulate to ovate, 4–9 × 1–3 cm, base narrowed, apex acute, veins 3–5. Inflorescences racemelike, 5–7-flowered. Flowers 5-merous. Pedicel erect, 7–8.5 cm. Calyx lobes lanceolate, 1.7–2 cm, margin narrowly membranous, apex acuminate, veins 1–3. Corolla yellow, 2.5–3.5 cm in diam., tube 1.5–2 mm; lobes oblong to ovate-oblong, 2.5–2.8 cm, apex obtuse and erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 1–1.2 cm, base few barbate; anthers narrowly ellipsoid, 2–3 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ellipsoid, 2–2.5 cm. Seeds brown, broadly ellipsoid, longitudinally rugose, winged on edges. Fl. and fr. Jul-Nov.

• Streamsides, grasslands on hillsides, gravel slopes, forests, forest margins; 3200–4800 m. W Sichuan, NW Yunnan.

25. *Swertia younghusbandii* Burkhill, J. Proc. Asiatic Soc. Bengal 2: 325. 1906.

少花獐牙菜 shao hua zhang ya cai

Perennials 5–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 1–2.5 cm, base connate; leaf blade linear-elliptic, 2.5–4.5 cm × 6–8 mm, base narrowed, apex obtuse, veins 1–3. Stem leaves sessile, 2.5–6 cm × 3–7 mm, base obtuse to rounded and subamplexicaul, apex obtuse, midvein distinct. Flower solitary and terminal, rarely 2 or 3(–6) in apparent raceme, 5-merous. Pedicel purple, erect, 3.5–10.5 cm. Calyx lobes linear to linear-lanceolate, 1.1–2 cm, apex acuminate, veins 1–3. Corolla yellow, blue in middle of outer surface, 2.5–3.2 cm in diam., tube 1.5–2 mm; lobes elliptic to ovate-elliptic, 2–2.5 cm, apex obtuse to rounded. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 4.5–5 mm. Filaments 1–1.2 cm, base few barbate; anthers blue, ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.8–1.2 cm. Fl. Sep.

Scrub meadows, alpine meadows; 4300–5400 m. S and SE Xizang [Sikkim].

26. *Swertia souliei* Burkhill, J. Proc. Asiatic Soc. Bengal 2: 326. 1906.

康定獐牙菜 kang ding zhang ya cai

Swertia pauciflora Harry Smith; *S. subspeciosa* Burkhill.

Perennials 8–35 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Leaves mostly

basal; petiole flattened, 3–7 cm, base connate; leaf blade linear-elliptic to narrowly elliptic, 3–10 cm × 5–13 mm, base narrowed, apex obtuse, veins 3–5. Stem leaves 2 or 3 pairs, sessile, ovate-lanceolate, 1.4–4.5 cm × 4–8 mm, base obtuse and subamplexicaul, apex acute to obtuse, veins 1–3. Inflorescences racemelike, 5–11(–15)-flowered. Flowers 5-merous. Pedicel erect, 1–4.5 cm. Calyx lobes lanceolate, 0.9–1.4 cm, apex acuminate, veins 3–5. Corolla yellow, 2–2.6 cm in diam., tube 1.5–2 mm; lobes lanceolate, 1.6–2 cm, base obtuse, apex caudate and sometimes erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3–4 mm. Filaments 8–11 mm, base few barbate; anthers blue, narrowly ellipsoid, 2–3 mm. Style indistinct; stigma lobes broadly ellipsoid. Capsules ellipsoid, as long as persistent corolla. Seeds light brown, broadly ellipsoid to subglobose, 1.2–1.5 mm, longitudinally rugose, both ends winged. Fl. and fr. Aug.

• Alpine meadows; 3700–4400 m. W Sichuan.

27. *Swertia multicaulis* D. Don, Prodr. Fl. Nepal. 128. 1825.

多茎獐牙菜 duo jing zhang ya cai

Perennials 8–12 cm tall. Taproot 5–10 mm in diam. Stems ascending, many, cespitose, striate, simple; caudex sheathed by blackish remains of old petioles. Leaves mostly basal, in a rosette; petiole flattened, 5–10 mm, base connate; leaf blade spatulate to oblong-spatulate, 1.5–3.5 cm × 5–12 mm, base narrowed, margin scabrous, apex obtuse to rounded, veins 3–7 distinct and arcuate. Stem leaves 1 or 2 pairs, sessile, bractlike, elliptic, 7–10 × 3–5 mm, both ends obtuse, midvein distinct. Inflorescences racemelike or umbel-like. Flowers 4-merous. Calyx lobes lanceolate to oblong, 5–7 mm, margin scabrous, apex acute to obtuse, midvein distinct. Corolla pale blue to purple, 1.5–2.2 cm in diam., tube 1.5–2 mm; lobes oblong, (0.8)–1–1.2 cm, apex obtuse. Nectaries 1 per corolla lobe, oblong to rhomboid, margin raised with erect stiff fimbriae 2–2.5 mm. Filaments 5–7 mm; anthers dark blue, ovoid, 1.5–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.2–1.5 cm. Seeds brown, subglobose, almost smooth. Fl. and fr. Jun-Sep.

3600–4700 m. Xizang [Bhutan, Nepal, Sikkim].

1a. Pedicel 2–4.5 cm 27a. var. *multicaulis*
1b. Pedicel to 6.5 cm 27b. var. *umbellifera*

27a. *Swertia multicaulis* var. *multicaulis*

多茎獐牙菜 (原变种) duo jing zhang ya cai
(yuan bian zhong)

Inflorescences racemelike, 1–3- (or 4)-flowered. Pedicel spreading, 2–4.5 cm.

Alpine meadows; 3600–4400 m. S Xizang [Bhutan, Nepal, Sikkim].

27b. *Swertia multicaulis* var. *umbellifera* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 79. 1980.

伞花獐牙菜 san hua zhang ya cai

Inflorescences umbel-like, 5–7-flowered. Pedicel to 6.5 cm.

• Alpine meadows; 4300–4700 m. SW Xizang.

28. *Swertia scapiformis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 80. 1980.

花亭獐牙菜 hua ting zhang ya cai

Perennials 5–7 cm tall. Taproot 7–10 mm in diam. Stems ascending, many, scapiform, cespitose, striate, simple, naked, papillate along striae; caudex sheathed by blackish remains of old petioles. All leaves basal, in a rosette, short petiolate; leaf blade oblong-spatulate, 1.5–3 cm × 3–5 mm, base narrowed, margin ciliolate, apex obtuse, veins 1–3. Flowers solitary on naked scape, 4-merous. Calyx lobes elliptic-spatulate, 8–10 mm, margin ciliolate, apex obtuse and with a recurved tip, midvein distinct. Corolla dark blue to blue-purple, 1.5–2.2 cm in diam., tube 1.5–2 mm; lobes oblong, 1–1.2 cm, apex obtuse and emarginate. Nectaries 1 per corolla lobe, rhomboid, margin raised and with inflexed stiff fimbriae 1–1.5 mm. Filaments ca. 8 mm; anthers yellow, ellipsoid, ca. 2 mm. Ovary ovoid-ellipsoid to ellipsoid, ca. 8 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug.

• Hilltops; 4500–4600 m. Xizang (Cona Xian).

29. *Swertia conaensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 81. 1980.

错那獐牙菜 cuo na zhang ya cai

Perennials 5–7 cm tall. Taproot 7–10 mm in diam. Stems ascending, many, scapiform, cespitose, striate, simple, naked, puberulent along striae; caudex sheathed by blackish remains of old petioles. All leaves basal, in a rosette; petiole 5–6 cm; leaf blade oblong-spatulate, puberulent, base narrowed, margin ciliolate, apex obtuse to rounded, veins 3. Flowers solitary on naked scape, 4-merous. Calyx lobes narrowly oblong, 8–10 mm, puberulent, apex obtuse; veins 3, indistinct. Corolla dark blue, 1.2–1.4 cm in diam., tube 1.5–2 mm; lobes lanceolate, 8–10 mm, puberulent, apex obtuse and erose. Nectaries blue, 1 per corolla lobe, orbicular, reduced to a gland patch without raised margin or fimbriae. Filaments blue, 5–6 mm; anthers yellow, ellipsoid, ca. 1.5 mm. Ovary ovoid-ellipsoid to ellipsoid, ca. 6 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug.

• Hilltops; ca. 4600 m. Xizang (Cona Xian).

30. *Swertia splendens* Harry Smith, Bull. Brit. Mus. (Nat. Hist.), Bot. 4: 250. 1970.

光亮獐牙菜 guang liang zhang ya cai

Perennials ca. 40 cm tall. Taproot 7–10 mm in diam. Stems single, erect, robust, angular, sparsely puberulent along striae. Basal leaves petioles flattened, 8–12 cm, base connate; leaf blade spatulate to obovate, 8–12 × 4.5–5.5 cm, base narrowed, margin irregularly laciniate, apex obtuse to rounded, veins 7. Stem leaves in whorls of 3–6, sessile, bractlike, oblong to ovate, 2–4 × 1–1.5 cm, both ends obtuse, veins 3–5. Inflorescences a conical thyrs or verticillasterlike, many flowered, 3-whorled. Flowers 4-merous. Pedicel spreading, 1–2 cm, somewhat 4-angled. Calyx lobes broadly ovate to triangular-cordate, 1.3–1.6 cm × 8–10 mm, margin

irregularly laciniate, apex acute, veins 1–3. Corolla brick red drying yellow-green, campanulate, tube 2–3 mm; lobes broadly obovate, 2.3–2.5 × ca. 2 cm, margin lacerate, apex rounded. Nectaries 1 per corolla lobe, orbicular, with ca. 1 mm inflexed fimbriae. Filaments 0.9–1.1 cm; anthers ellipsoid, 2.5–3.5 mm. Ovary ovoid-ellipsoid, 1–1.2 cm. Style indistinct; stigma lobes suborbicular. Fl. Jul.

• Gravel slopes; ca. 4000 m. Xizang (Moindawang).

31. *Swertia verticillifolia* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 81. 1980.

轮叶獐牙菜 lun ye zhang ya cai

Perennials 80–100 cm tall. Taproot stout. Stems single, erect, robust, 1.2–2.5 cm in diam., angular. Leaves mostly basal, in a rosette; petiole flattened, 4–6 cm, base connate; leaf blade spatulate, 4–7 × 2.5–3.5 cm, base narrowed, apex rounded, veins 5–7, arcuate. Stem leaves in whorls of 4–6, sessile or short petiolate; leaf blade elliptic to ovate-elliptic, to ca. 12 × 3.5 cm, base narrowed to obtuse, apex acuminate, veins 5–7, arcuate. Inflorescences verticillasterlike, many flowered. Flowers 4-merous, nodding. Pedicel to 6 cm, striate. Calyx lobes broadly elliptic to broadly ovate, 1–1.5 × 0.9–1.7 cm, base obtuse to subcordate and overlapping, apex rounded; veins 9–11, arcuate. Corolla pale yellow-green, with dark purple veins, campanulate, 3–3.5 cm in diam., tube 2–3 mm; lobes broadly obovate, 2–2.5 cm, margin irregularly crenulate, apex rounded to truncate. Nectaries 1 per corolla lobe, ovate-triangular, naked. Filaments 1.2–1.4 cm; anthers yellow, ellipsoid, 4–5 mm. Ovary ovoid-ellipsoid, 1–1.2 cm. Style indistinct; stigma lobes suborbicular. Capsules ovoid, 2.2–2.7 cm. Seeds dark brown, ellipsoid, ca. 2 mm, both ends winged. Fl. and fr. Jul-Sep.

• Scrub; 3800–4200 m. SE Xizang.

32. *Swertia hookeri* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 127. 1883.

粗壮獐牙菜 cu zhuang zhang ya cai

Perennials 25–80 cm tall. Taproot stout. Stems single, erect, robust, 6–13 mm in diam., angular. Leaves mostly basal, in a rosette; petiole flattened, 1–2 cm, base connate; leaf blade elliptic-spatulate to oblong, 6–20 × 2–5 cm, base narrowed, apex rounded; veins 3–5, arcuate. Stem leaves in whorls of 3–6; sessile or short petiolate, base free or slightly connate; leaf blade ovate-spatulate, ovate-oblong, or ovate, 7.5–12 × 2–3 cm, apex acuminate to obtuse; veins 5–7, arcuate. Inflorescences verticillasterlike, many flowered. Flowers 4-merous, sometimes nodding. Pedicel erect, 3–5 cm, striate. Calyx lobes ovate-elliptic to ovate, 0.8–1.5 cm × 5–7 mm, base obtuse, apex acute, veins 1–3. Corolla pale blue-green to pale purple, with blue veins, campanulate, 2–2.5 cm in diam., tube 2–3 mm; lobes oblong to oblong-spatulate, 1.2–1.7 × 0.8–1.1 cm, apex rounded to truncate. Nectaries 1 per corolla lobe, orbicular, naked. Filaments 6–7 mm; anthers blue, ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid, 1.2–1.8 cm. Seeds dark brown, compressed, ca. 3.2 mm in diam., discoid winged. Fl. and fr. Jul-Aug.

Meadows; 4000–4200 m. Xizang [Bhutan, Nepal, Sikkim].

33. Swertia virescens Harry Smith, Bull. Brit. Mus. (Nat. Hist.), Bot. 4: 244. 1970.

绿花獐牙菜 lu hua zhang ya cai

Perennials 15–20 cm tall. Taproot stout. Stems single, erect, robust, angular. Leaves mostly basal, in a rosette; petiole flattened, to 1.5 cm, base connate; leaf blade oblong to spatulate, 5–10 × 1–4 cm, base narrowed, apex rounded, veins 5–7. Stem leaves in whorls of 3–6, sessile, ovate-oblong to ovate, 3–5 × 1–2 cm, apex obtuse, veins 3–5. Inflorescences verticillasterlike, many flowered. Flowers 4-merous. Pedicel nodding, striate, to 2 cm. Calyx lobes ovate, 5–10 × 4–8 mm, apex acute, veins 1–3. Corolla pale yellow-green, with purple veins, campanulate, 1.6–2 cm in diam., tube 2–3 mm; lobes cuneate-ovate, 1.5–2 cm × 5–10 mm, apex rounded and erose. Nectaries 1 per corolla lobe, orbicular, naked. Filaments 7–8 mm; anthers ovoid, 0.5–1 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ovoid, 1.2–1.6 cm. Seeds ovoid, wingless. Fl. Jun.

Alpine meadows; 4300–4600 m. Xizang (Zayü Xian) [Bhutan].

34. Swertia patens Burkill, J. Proc. Asiatic Soc. Bengal 7: 82. 1911.

斜茎獐牙菜 xie jing zhang ya cai

Pleurogyne mairei H. Léveillé; *P. mairei* var. *rubropunctata* H. Léveillé; *P. vaniotii* H. Léveillé.

Perennials 10–15 cm tall. Roots 3–4 mm in diam., fibrous. Stems ascending, 5–7-cespitos, subquadangular, narrowly winged and papillate on angles, simple. Leaves mostly basal, crowded in a rosette, short petiolate; leaf blade narrowly spatulate to oblanceolate, 1.5–6.5 cm × 4–5 mm including petiole, base narrowed, apex obtuse, midvein distinct. Stem leaves sessile or short petiolate; leaf blade narrowly linear, narrowly elliptic, or spatulate, 1.5–3.8 cm × 2–4 mm, base narrowed, apex acuminate to obtuse, midvein distinct. Cymes terminal and axillary, few flowered. Flowers 4-merous. Pedicel erect, 1–2.2 cm, thick. Calyx lobes green, bractlike, base rounded to cordate, apex acuminate, unequal; 2 lobes ovate-lanceolate, 2–2.8 cm × 5–9 mm; other 2 lobes lanceolate, 1–2 cm × to 5 mm; veins 3–7, indistinct. Corolla white, with purple veins, 2.5–3 cm in diam., tube 1–2 mm; lobes ovate-oblong, 1.3–1.5 cm × to 6 mm, apex obtuse and mucronate. Nectaries 2 per corolla lobe, pocket-shaped, with a triangular scale and many short fimbriae. Filaments ca. 7 mm; anthers blue, ellipsoid, ca. 2.5 mm. Ovary ovoid-ellipsoid, 8–10 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid. Seeds yellow, ellipsoid; seed coat smooth. Fl. Jul-Aug.

• Grassland slopes; 1100–2600 m. S Sichuan, NE Yunnan.

35. Swertia luquanensis S. W. Liu in T. N. Ho, Novon 4: 372. 1994.

碌劝獐牙菜 lu quan zhang ya cai

Perennials 5–6(–18) cm tall. Roots 3–4 mm in diam., fibrous. Stems prostrate to ascending, 5–7-cespitos, subquadangular, narrowly winged and papillate on angles, simple. Leaves mostly basal, crowded in a rosette; petiole short; leaf blade linear-oblong, 2–6 cm × 2–3 mm including

petiole, base narrowed, apex acute, midvein distinct. Stem leaves sessile, linear, to 3 cm × 2 mm, base narrowed, apex acuminate, midvein distinct. Inflorescences racemelike, few flowered. Flowers 4-merous. Pedicel erect, 7–12 mm, slender. Calyx lobes not bractlike, lanceolate, 8–11 × 2–3 mm, unequal, both ends obtuse, margin scabrous and slightly revolute; veins 3, indistinct. Corolla pale yellow, ca. 1.5 cm in diam., tube 1–2 mm; lobes ovate, 8–9 × ca. 4 mm, apex acute. Nectaries 2 per corolla lobe, pocket-shaped, with a triangular scale and many short fimbriae. Filaments ca. 5 mm; anthers blue, ellipsoid, ca. 1.5 mm. Ovary ovoid-ellipsoid, 8–10 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, ca. 8 mm. Seeds brown, subglobose; seed coat smooth.

• Grassland slopes; ca. 2500 m. NE Yunnan.

36. Swertia dichotoma Linnaeus, Sp. Pl. 1: 227. 1753.

歧伞獐牙菜 qi san zhang ya cai

Annuals 5–12 cm tall. Roots stout, fibrous. Stems ascending to erect, subquadangular, narrowly winged on angles, dichotomously branched from base. Basal leaves with petiole 0.8–2 cm; leaf blade spatulate, 0.7–1.5 cm × 5–9 mm, base obtuse, apex rounded, veins 3–5. Stem leaves sessile or short petiolate; leaf blade ovate-lanceolate, 0.6–2.2 cm × 3–12 mm, base rounded to truncate, apex acute, veins 1–3. Flowers in forks of stems, 4-merous. Pedicel slender, somewhat nodding, 0.7–3 cm, 4-angled, narrowly winged on angles. Calyx lobes broadly ovate, 3–4 mm, margin scabrous, apex acute; veins 1–3, indistinct. Corolla white, sometimes with or without purple spots, tube ca. 0.5 mm; lobes ovate, 5–8 mm, apex obtuse. Nectaries 2 per corolla lobe, brown, orbicular, squamose, produced into a very short spur on back of corolla lobe. Filaments ca. 2 mm, base short fimbriate; anthers blue, ellipsoid, ca. 0.5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid. Seeds yellow, ellipsoid; seed coat smooth. Fl. and fr. May-Jul.

1000–3100 m. Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Kazakhstan, Mongolia, Russia (Siberia)].

- 1a. Corolla without purple spots 36a. var. *dichotoma*
1b. Corolla with purple spots 36b. var. *punctata*

36a. Swertia dichotoma var. *dichotoma*

歧伞獐牙菜 (原变种) qi san zhang ya cai (yuan bian zhong)

Anagallidium dichotomum (Linnaeus) Grisebach, Gen. Sp. Gent. 312. 1839.

Corolla white, without spots.

Stream banks, slopes, forest margins; 1000–3100 m. Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Kazakhstan, Mongolia, Russia (Siberia)].

36b. Swertia dichotoma var. *punctata* T. N. Ho & S. W. Liu in J. X. Yang, Fl. Tsinling. 1(4): 397. 1983.

紫斑歧伞獐牙菜 zi ban qi san zhang ya cai

Corolla white, with purple spots.

• Hillsides. S Shaanxi.

37. *Swertia shintenensis* Hayata, Icon. Pl. Formosan. 6: 31. 1916.

新店獐牙菜 xin dian zhang ya cai

Annuals 45–70 cm tall. Roots stout, fibrous. Stems erect, simple. Basal leaves with petiole flattened, 3–3.5 cm; leaf blade elliptic, 15–19 × 8–10 cm, base cuneate and decurrent into wings of petiole, apex acute; veins distinct, pinnate. Lower stem leaves with petiole to 2 cm; leaf blade elliptic, to 11 × 4 cm; middle to upper leaves sessile, ovate, to 7 × 3 cm, base cordate and subamplexicaul, apex acute, veins distinct. Inflorescences many-flowered thyrses, rounded, lax, spreading, to 45 cm. Flowers 4- or 5-merous, nodding. Pedicel 1.6–3 cm, slightly thickened at apex. Calyx tube 2–2.5 mm; lobes spreading, ovate to ovate-triangular, 3–3.5 mm, margin narrowly membranous, apex acute. Corolla pale yellow, with dark spots, 1.5–1.7 cm in diam., tube 3–3.5 mm; lobes narrowly oblong, 1.7–1.9 cm, apex acute. Nectaries 1 per corolla lobe, suborbicular, reduced to a naked gland patch. Filaments slightly flattened, 6–7 mm; anthers yellow, narrowly ellipsoid, ca. 5 mm. Style distinct, ca. 2 mm; stigma lobes capitate. Capsules ellipsoid, 1.7–1.9 cm. Seeds pale yellow, ellipsoid, ca. 0.5 mm; seed coat warty. Fl. and fr. Oct-Dec.

Forest margins; ca. 900 m. N Taiwan [Japan].

38. *Swertia cordata* (Wallich ex G. Don) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 123. 1883.

心叶獐牙菜 xin ye zhang ya cai

Ophelia cordata Wallich ex G. Don, Gen. Hist. 4: 178. 1837.

Annuals 30–60 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, with wings on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile, ovate to ovate-cordate, 0.8–2.3 × 0.5–1.2 cm, base cordate and subamplexicaul, margin scabrous, apex acute, veins 3–5. Inflorescences narrow, dense, many-flowered thyrses 13–40 cm. Flowers 5-merous. Pedicel 3–10 mm, striate. Calyx tube 1–2 mm; lobes lanceolate to ovate-lanceolate, 5.5–7 mm, margin scabrous and usually slightly revolute, apex acute, veins 3. Corolla pale purple, with dark purple veins, 1–1.5 cm in diam., tube 1–2 mm; lobes narrowly elliptic to elliptic-lanceolate, 8–10 mm, apex acute. Nectaries 1 per corolla lobe, rhomboid to orbicular, reduced to a naked gland patch. Filaments ca. 5 mm; anthers ellipsoid, ca. 5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 6–8 mm. Seed coat cristate. Fl. Sep-Oct.

Grassland slopes; 1700–4000 m. Xizang, Yunnan [Bhutan, E India, Kashmir, Myanmar, Nepal, Sikkim].

39. *Swertia bimaculata* (Siebold & Zuccarini) J. D. Hooker & Thomson ex C. B. Clarke, J. Linn. Soc., Bot. 14: 449. 1875.

獐牙菜 zhang ya cai

Ophelia bimaculata Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 159. 1846; *Silene esquirolii* H. Léveillé; *Swertia bimaculata* var. *macrocarpa* Nakai; *S. platyphylla* Merrill.

Annuals 30–140(–200) cm tall. Roots yellow, fibrous. Stems erect, 2–6 mm in diam., branched. Basal leaves withered at anthesis. Stem leaves sessile or short petiolate; leaf blade broadly elliptic to ovate-lanceolate, 3.5–9 × 1–4(–5) cm, base narrowly tapered to obtuse, apex acuminate; veins 3–5, arcuate. Inflorescences panicles of cymes, lax, spreading branched, many flowered, to 50 cm. Flowers 5-merous. Pedicel spreading to erect, 0.6–4 cm, stout, terete. Calyx tube 1–2 mm; lobes narrowly oblanceolate to narrowly elliptic, 3–6 mm, base narrowed, margin slightly revolute and membranous, apex acuminate; veins 3–5, indistinct. Corolla yellow or white, with purple spots, to 2.5 cm in diam., tube 1–2 mm; lobes oblong to elliptic, 1–1.5 cm, base narrowed, apex acuminate to acute. Nectaries 2 per corolla lobe, yellow-green, orbicular, reduced to a naked gland patch without raised margin. Filaments 5–6.5 mm; anthers ellipsoid, ca. 2.5 mm. Style indistinct; stigma lobes capitate. Capsules narrowly ovoid, to 2.3 cm. Seeds brown, globose; seed coat warty. Fl. and fr. Jun-Nov.

Beside streams, swamp, meadows, scrub, forests; 200–3000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Malaysia, Myanmar, Nepal, Sikkim, Vietnam].

40. *Swertia matsudae* Hayata ex Satake, J. Jap. Bot. 17: 722. 1941.

细叶獐牙菜 xi ye zhang ya cai

Annuals to 80 cm tall. Roots yellow, fibrous. Stems erect, ca. 2.5 mm in diam., striate, branched. Leaves sessile or short petiolate; leaf blade linear-lanceolate to lanceolate, 3–6 cm × 4–7 mm including petiole, base obtuse, apex acuminate, veins 3. Inflorescences panicles of cymes, lax, spreading branched, many flowered. Flowers 5-merous. Pedicel spreading to erect, 1.5–2 cm, terete. Calyx tube 1–2 mm; lobes lanceolate to ovate-lanceolate, 4–5 mm, apex acuminate, veins 3 outside. Corolla yellow, tube 1–2 mm; lobes oblong, 7–8.5 mm, slightly crenate, apex acute. Nectaries 2 per corolla lobe, orbicular, reduced to a naked gland patch. Filaments ca. 3 mm; anthers ellipsoid, 1.5–2 mm. Style short, distinct; stigma lobes capitate. Capsules narrowly ovoid, ca. 1.3 cm. Seeds ellipsoid; seed coat smooth.

• Grassland slopes, forests; 2300–3000 m. Taiwan.

41. *Swertia oculata* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 140. 1890.

鄂西獐牙菜 e xi zhang ya cai

Annuals 30–40 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, branched. Leaves sessile, linear to linear-lanceolate, 1.5–6 cm × 2–5 mm, base narrowed, margin slightly revolute, apex acuminate, midvein distinct. Inflorescences panicles of cymes, lax, spreading branched, many flowered, to 30 cm. Flowers 5-merous. Pedicel erect, to

3 cm, slender, subquadangular. Calyx tube 1–2 mm; lobes linear to linear-oblong, 2–5 mm, unequal, apex obtuse, midvein slender. Corolla white, with yellow-green spots, 3–8 mm in diam., tube 1–2 mm; lobes elliptic-lanceolate, 5.5–6.5 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, yellow-green, orbicular, reduced to a naked gland patch. Filaments ca. 3.5 mm; anthers ellipsoid, ca. 1 mm. Style short, distinct; stigma lobes capitate. Capsules narrowly ovoid, ca. 8 mm. Seeds brown, ellipsoid to globose, 1–1.5 mm in diam.; seed coat warty. Fl. and fr. Aug-Sep.

• Slopes, scrub; ca. 1500 m. Guizhou, W Hubei, E Sichuan.

42. *Swertia patula* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 986. 1936.

开展獐牙菜 kai zhan zhang ya cai

Annuals 5–15 cm tall. Roots yellow, fibrous. Stems ascending, striate, branched from base so whole plant is somewhat cespitose. Basal leaves withered at anthesis; petiole short; leaf blade oblanceolate to spatulate, 1–2.5 cm × 2–5 mm, base narrowed, apex obtuse, veins 1–3. Stem leaf blades linear to linear-lanceolate, 0.7–1.8 cm × 1.5–3 mm, base narrowed, apex acuminate, midvein distinct. Inflorescences usually reduced to a single flower, sometimes racemelike. Flowers 4-merous. Pedicel erect, 1.5–2 cm, terete, base with a pair of bractlets. Calyx tube 1–2 mm; lobes narrowly linear-lanceolate, 1–1.8 cm, apex acute and apiculate, midvein distinct. Corolla white, rarely pale purple, with purple veins, to 2.5 cm in diam., tube 1–2 mm; lobes spatulate-oblong to elliptic, 1.2–1.7 cm, base narrowed, apex rounded and mucronate. Nectaries 2 per corolla lobe, yellow-green, pocket-shaped with an orbicular scale, glabrous or with many tomentose short fimbriae. Filaments 6–8 mm; anthers blue, ellipsoid, ca. 2 mm. Ovary ovoid-ellipsoid, 6–7 mm. Style short, distinct; stigma lobes capitate. Fl. Jul-Sep.

• Gravel slopes, scrub, forest margins, forests; 1400–3400 m. SW Sichuan, NW Yunnan.

43. *Swertia leducii* Franchet, Bull. Soc. Bot. France 46: 316. 1899.

蒙自獐牙菜 meng zi zhang ya cai

Swertia mileensis T. N. Ho & W. L. Shi.

Annuals 15–45 cm tall. Roots yellow, fibrous. Stems basally erect, subquadangular, branched throughout so whole plant is pyramidal. Leaves sessile, linear, narrowly oblong, or lanceolate, 0.4–4 cm × 2–4 mm, base narrowed, apex acute, veins 3. Flowers solitary, terminal, 4-merous. Pedicel erect, 0.4–3 cm, terete, base with a pair of bractlets. Calyx tube 1–2 mm; lobes linear-lanceolate, 6–10 mm, apex acute, primary veins 1–3. Corolla pale blue, ca. 1 cm in diam., tube 1–2 mm; lobes oblong to ovate-lanceolate, 7–12 mm, apex acute and apiculate. Nectaries 2 per corolla lobe, yellow-green, pocket-shaped with an orbicular scale and many minutely papillose short fimbriae. Filaments 4.5–6 mm; anthers blue, ellipsoid, 2–2.5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid to ellipsoid, to 1 cm. Seeds dark brown, ovoid, ca. 0.6 mm in diam. Fl. and fr. Sep-Nov.

• Grasslands on hillsides; 1300–1700 m. S Yunnan.

44. *Swertia angustifolia* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 127. 1825.

狭叶獐牙菜 xia ye zhang ya cai

Annuals 20–80 cm tall. Roots yellow, fibrous. Stems erect, subquadangular, narrowly winged on angles, branched. Leaves sessile, lanceolate to elliptic-lanceolate, 2–6 cm × 3–12 mm, both ends attenuate, veins 1–3. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 3–7 mm. Calyx tube 1–2 mm; lobes linear-lanceolate, 6–8 mm, apex acute, midvein 1–3. Corolla white or pale yellow, with brown spots, 8–9 mm in diam., tube 1–2 mm; lobes 4–6.5 mm, apex obtuse and apiculate. Nectaries 1 per corolla lobe, pocket-shaped, with an orbicular scale and many minutely hairy short fimbriae at apex of pocket. Filaments 3.5–4 mm; anthers ellipsoid, ca. 1 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, 5–7 mm. Seeds brown, ellipsoid, ca. 0.6 mm. Fl. and fr. Aug-Nov.

100–3300 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Sikkim, Vietnam].

- | | |
|---|-------------------------------------|
| 1a. Calyx longer than corolla at anthesis | 44a. var. <i>angustifolia</i> |
| 1b. Calyx ca. 2/3 as long as corolla at | |
| anthesis | 44b. var. <i>pulchella</i> |

44a. *Swertia angustifolia* var. *angustifolia*

狭叶獐牙菜(原变种) xia ye zhang ya cai (yuan bian zhong)

Swertia angustifolia var. *hamiltoniana* Burkhill.

Calyx longer than corolla at anthesis. Corolla lobes elliptic to ovate. Fl. and fr. Aug-Sep.

Edge of cultivated land, wastelands, grasslands; 100–3300 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Yunnan [Bhutan, Kashmir, Myanmar, Nepal, Sikkim, Vietnam].

44b. *Swertia angustifolia* var. *pulchella* (D. Don) Burkhill, J. Proc. Asiatic Soc. Bengal 2: 375. 1906.

美丽獐牙菜 mei li zhang ya cai

Ophelia pulchella D. Don, London Edinburgh Philos. Mag. & J. Sci. 8: 77. 1836; *Swertia affinis* C. B. Clarke; *S. esquirolii* H. Léveillé; *S. vacillans* Maximowicz.

Calyx ca. 2/3 as long as corolla at anthesis. Corolla lobes ovate-oblong. Fl. and fr. Aug-Nov.

Edge of cultivated land, wastelands, grasslands; 100–3300 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Yunnan [Bhutan, India, Kashmir, Nepal, Sikkim].

45. *Swertia nervosa* (Wallich ex G. Don) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 125. 1883.

叶脉獐牙菜 ye mai zhang ya cai

Agathotes nervosa Wallich ex G. Don, Gen. Hist. 4: 177. 1837; *Swertia cavaleriei* H. Léveillé.

Annuals 30–100 cm tall. Roots yellow-brown, fibrous. Stems erect, 2–5 mm in diam., subquadrangular, narrowly winged on angles, branched. Leaves sessile or subsessile, lanceolate, narrowly elliptic, or elliptic, 1.6–7.5 × 0.4–2.3 cm, both ends attenuate, veins 1–3. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 0.5–2 cm. Calyx tube 1–2 mm; lobes free, foliose, linear-lanceolate, 0.8–1.7 cm, apex acuminate, veins 3 and prominent. Corolla pale yellow-green, with purple veins, 1.5–1.8 cm in diam., tube 1–2 mm; lobes linear-lanceolate, 6–8 mm, apex obtuse and apiculate. Nectaries 1 per corolla lobe, pocket-shaped, with an orbicular scale, and many papillose, short fimbriae at apex of pocket. Filaments 4.5–6 mm; anthers yellow, ellipsoid, ca. 2 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, 6–8 mm. Seeds dark brown, ellipsoid, ca. 0.6 mm; seed coat spongy. Fl. and fr. Sep-Dec.

Beside streams, hillsides, scrub, scattered forests; 400–2600 m. SE Gansu, Guangxi, Guizhou, SW Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

46. *Swertia arisanensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 203. 1911.

阿里山獐牙菜 a li shan zhang ya cai

Swertia alata Hayata (1908), not (Royle ex D. Don) C. B. Clarke (1883).

Annuals to 90 cm tall. Roots yellow-brown, fibrous. Stems erect, to 8 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile or subsessile, lanceolate to oblong, 4–8 × to 3 cm, thin herbaceous, base rounded, apex acute to obtuse, veins 3; uppermost leaves much smaller; leaf blade lanceolate, apex acuminate. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 0.5–1.5 cm, thickened apically, with narrow wings. Calyx tube 1–2 mm; lobes lanceolate, 5–10 mm, apex acuminate; veins 3, prominent. Corolla pale yellow-green, veins purple, tube 1–2 mm; lobes lanceolate, 6–8 mm, apex acuminate. Nectaries 1 per corolla lobe, pocket-shaped, with an orbicular scale and many, minutely hairy, short fimbriae at apex of pocket. Filaments ca. 3 mm; anthers ellipsoid, ca. 1 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid, ca. 1 cm. Seeds brown, ovoid, ca. 0.6 mm; seed coat rugose. Fl. and fr. Oct-Nov.

• Forests; 2000–3000 m. C and E Taiwan.

47. *Swertia rosularis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 83. 1980.

莲座獐牙菜 lian zuo zhang ya cai

Perennials 5–15 cm tall. Caudex blackish, with slender pale yellow and fibrous rootlets. Stems ascending to erect, slender, subquadrangular, simple. Leaves mostly basal, in a rosette, spatulate to obovate, 0.9–2.1 cm × 2–4 mm including long petiole, base narrowed, apex obtuse to rounded, midvein distinct. Stem leaves 2 or 3 pairs; petiole short; leaf blade spatulate to spatulate-elliptic, to 1.7 cm × 3 mm, base narrowed, apex obtuse to rounded, midvein distinct. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5-merous. Pedicel erect, to 5 mm, slender.

Calyx tube ca. 0.5 mm; lobes linear-subulate, ca. 2 mm, margin narrowly membranous, apex acuminate, midvein indistinct. Corolla white, 2–3 mm in diam., tube ca. 0.5 mm; lobes lanceolate to ovate-lanceolate, 3–3.5 mm, apex acute. Nectaries 1 per corolla lobe, cupular, with a narrow scale, and few, long fimbriae. Filaments ca. 2 mm; anthers ovoid, ca. 0.5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, ca. 5 mm. Seeds dark brown, subglobose, ca. 0.3 mm; seed coat warty. Fl. and fr. Aug-Nov.

• Hillsides; 1200–1300 m. Sichuan (Emei Shan).

48. *Swertia tenuis* T. N. Ho & S. W. Liu, Fl. Reipubl. Popularis Sin. 62: 396. 1988.

细瘦獐牙菜 xi shou zhang ya cai

Swertia gracilis Franchet (1899), not Kunth (1818).

Annuals 8–30 cm tall. Roots yellow, slender, fibrous. Stems erect, slender, branched from middle. Basal leaves withered at anthesis. Stem leaves sessile; lower leaves oblong to elliptic, 0.9–1.5 cm × 1.5–2.5 mm, base narrowed, apex obtuse, midvein distinct; middle to upper leaves linear to linear-lanceolate, 5–12 × 1–2 mm, base narrowed, apex obtuse, midvein distinct. Inflorescences panicles of cymes, many flowered. Flowers 5-merous. Pedicel erect, filiform, 4–12 mm. Calyx tube ca. 0.5 mm; lobes linear, 2.5–4 mm, apex acuminate, midvein indistinct. Corolla pale blue, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate-oblong to ovate-lanceolate, 4–6 mm, apex acute. Nectaries 1 per corolla lobe, cupular, with a narrow scale, and few long fimbriae. Filaments ca. 3.5 mm; anthers ellipsoid, ca. 0.3 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, ca. 5 mm. Seeds light brown, subglobose, ca. 0.3 mm. Fl. and fr. Aug-Nov.

• Grassland slopes, forests; 1200–3500 m. S Sichuan, NW Yunnan.

49. *Swertia pianmaensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 82. 1980.

片马獐牙菜 pian ma zhang ya cai

Perennials 20–40 cm tall. Caudex blackish, stout, with few slender fibrous rootlets. Stems ascending to erect, slender, striate, branched from base. Leaves mostly basal; petiole short; leaf blade oblong, broadly obovate, or suborbicular, 1.5–6.5 × 1–3.5 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves sessile, ovate, 1.3–2 × 0.6–1.3 cm, base rounded, apex acute, veins 1–3. Inflorescences panicles of cymes, many flowered, narrow. Flowers 4-merous. Pedicel erect, to 2.5 cm, slender. Calyx tube ca. 0.5 mm; lobes narrowly elliptic, 6–8 mm, apex acute; veins 1–3, indistinct. Corolla dark purple, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate, 6–8 mm, apex acute and caudate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many long fimbriae. Filaments 4–4.5 mm; anthers yellow, ellipsoid, ca. 1.2 mm. Style distinct, linear, ca. 2 mm; stigma lobes capitate. Capsules ovoid, ca. 5 mm. Seeds light brown, subglobose, ca. 0.3 mm. Fl. Jul.

• Forests. Yunnan (Lushui Xian).

50. *Swertia membranifolia* Franchet, Bull. Soc. Bot. France 46: 319. 1899.

膜叶獐牙菜 mo ye zhang ya cai

Annuals to 60 cm tall. Roots yellow, ca. 5 mm in diam. Stems erect, subquadrangular, narrowly winged on angles, branched from base. Basal leaves withered at anthesis; petiole flattened, ca. 3 cm; leaf blade oblanceolate to elliptic, 2–3.5 × 1–1.5 cm, thin herbaceous, base narrowed, apex acute to obtuse, veins 5 and prominent. Stem leaves sessile, narrowly elliptic to ovate-lanceolate, 1.5–8 × to 2 cm, thin herbaceous, base obtuse and subamplexicaul, apex acuminate, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading, to 27 cm. Flowers 4-merous. Pedicel erect, 3–15 mm, to 2.5 cm for terminal flowers, slender. Calyx elongated in fruit, tube ca. 0.5 mm; lobes lanceolate to ovate-lanceolate, 2–3 mm, apex acute, veins 1–3 and indistinct. Corolla pale yellow-green, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate, 3–5 mm, apex acute and caudate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments ca. 2 mm; anthers ovoid, ca. 1 mm. Style distinct, linear, ca. 2 mm; stigma lobes capitate. Capsules ovoid, 7–9 mm. Seeds light brown, subglobose, ca. 0.7 mm; seed coat smooth. Fl. and fr. Aug.

• Hillsides, wet and shady valleys; 2500–2700 m. NW Yunnan.

51. *Swertia macrosperma* (C. B. Clarke) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 123. 1883.

大籽獐牙菜 da zi zhang ya cai

Ophelia macrosperma C. B. Clarke, J. Linn. Soc., Bot. 14: 448. 1875; *Swertia randaiensis* Hayata; *S. scandens* H. Léveillé.

Annuals 30–100 cm tall. Roots yellow, ca. 5 mm in diam. Stems erect, subquadrangular, narrowly winged on angles, branched from middle. Basal and lower stem leaves withered at anthesis, petiolate; leaf blade spatulate, 2–6.5 × to 1.5 cm, base narrowed, margin entire or denticulate, apex obtuse, veins 1–3. Middle stem leaves sessile, lanceolate, oblong, ovate, or rarely obovate, 0.4–4.5 × 0.3–1.5(–2) cm, base obtuse, apex acute, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5- or rarely 4-merous. Pedicel erect, 4–15 mm, slender. Calyx tube ca. 0.5 mm; lobes ovate-elliptic, 2.5–4 mm, apex acute, midvein distinct. Corolla white or pale blue, 3–5 mm in diam., tube ca. 0.5 mm; lobes elliptic, 4–8 mm, apex obtuse. Nectaries 2 per corolla lobe, cupular, with a narrow scale and few long fimbriae. Filaments 4–5 mm; anthers ellipsoid, ca. 1.5 mm. Style indistinct; stigma lobes capitate. Capsules ovoid, 5–6 mm. Seeds 3–4 per capsule, brown, ellipsoid to subglobose, 1.5–2 mm; seed coat smooth. Fl. and fr. Jul-Nov.

Beside streams, grasslands on hillsides, scrub, mixed forests, bamboo thickets; 1400–4000 m. Guangxi, Guizhou, Hubei, Sichuan, Taiwan, Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

52. *Swertia zayueensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 84. 1980.

察隅獐牙菜 cha yu zhang ya cai

Annuals 15–25 cm tall. Roots yellow, slender. Stems erect, 2–4 mm in diam., striate, branched. Basal leaves petioles flattened, 3.5–4.5 cm; leaf blade spatulate, 1.5–2 × to 1.3 cm, base narrowed, apex obtuse, veins 1–3. Stem leaves sessile, elliptic to ovate-elliptic, ca. 3 × 1.5 cm, base obtuse to cuneate, apex obtuse to rounded, veins 1–3. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5-merous. Pedicel erect, to 6 mm, slender. Calyx tube ca. 0.5 mm; lobes elliptic to elliptic-spatulate, 2.5–4 mm, base narrowed, apex acute, veins indistinct. Corolla pale yellow-green, tinged pale purple, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate, 4–6 mm, apex acute and apiculate. Nectaries 2 per corolla lobe, cupular, with a narrow scale and many long fimbriae. Filaments ca. 3 mm; anthers blue, ovoid, ca. 1 mm. Ovary ovoid-ellipsoid, ca. 5 mm, with many ovules. Style indistinct; stigma lobes capitate. Fl. Jul.

• Shady slopes; 2400 m. Xizang (Zayü Xian).

53. *Swertia alba* T. N. Ho & S. W. Liu, Acta Biol. Plateau Sin. 1: 46. 1982.

白花獐牙菜 bai hua zhang ya cai

Annuals 15–40 cm tall. Roots yellow, ca. 5 mm in diam. Stems erect, 1–2 mm in diam., subquadrangular, branched. Basal leaves withered at anthesis. Stem leaves sessile, oblong, 1.5–3 × 0.6–1 cm, base obtuse and subamplexicaul, margin ciliolate, apex acute to rounded, veins 3. Inflorescences panicles of cymes, many flowered, narrow. Flowers 5-merous. Pedicel erect, 2–15 mm, slender. Calyx tube ca. 0.5 mm; lobes linear-lanceolate, 2–5 mm, margin ciliolate, apex acuminate, midvein distinct. Corolla white or pale yellow, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate-lanceolate, 4–6(–7) mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, cupular, with a narrow scale and many ca. 1 mm fimbriae. Filaments flattened, 2–2.5 mm; anthers ellipsoid, ca. 1.5 mm. Ovary ovoid-ellipsoid, 4–5 mm, with many ovules. Style indistinct; stigma lobes capitate. Fl. Aug.

• Hillsides; ca. 2500 m. Sichuan (Muli Zangzu Zishixian), Yunnan (Zhongdian Xian).

54. *Swertia tetrapetala* Pallas, Fl. Ross. 1(2): 99. 1789.

卵叶獐牙菜 luan ye zhang ya cai

Ophelia tetrapetala (Pallas) Grossheim; *Swertia wilfordii* A. Kerner.

Annuals 20–30 cm tall. Roots yellow, stout. Stems erect, 1–2 mm in diam., subquadrangular, branched. Basal leaves withered at anthesis. Stem leaves sessile, ovate-triangular, 1–2.7 × 0.4–1.5 cm, base cordate and subamplexicaul, apex acute, veins 3. Inflorescences panicles of cymes, many flowered, narrow. Flowers 4-merous. Pedicel erect, to 2 cm, slender. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 5–7 mm, apex acute, midvein distinct. Corolla purple, 1.2–1.5 cm in diam., tube 1–1.5 mm; lobes elliptic, 6–8 mm, apex acute. Nectaries 2 per corolla lobe, radially elongated, margin raised with many compound fimbriae. Filaments 5–7 mm; anthers ellipsoid, ca. 1 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 6–9 mm. Seeds subglobose; seed coat warty. Fl. Aug-Sep.

Meadows; ca. 700 m. Jilin (Changbai Shan) [Japan, Korea, E Russia].

55. *Swertia davidii* Franchet, Nouv. Arch Mus. Hist. Nat., sér. 2, 10: 72. 1887–88.

川东獐牙菜 chuan dong zhang ya cai

Swertia longipes Franchet.

Perennials (5–)15–60 cm tall. Rhizomes slender, with few rootlets. Stems ascending to erect, subquadrangular, narrowly winged on angles, branched. Basal and lower stem leaves petiolate; leaf blade linear-elliptic, 1.3–7 cm × 2–5 mm including petiole, base narrowed, apex obtuse, veins 1–3. Middle to upper stem leaves sessile or short petiolate; leaf blade linear, linear-lanceolate, or linear-elliptic, 1.5–3 cm × 1–3 mm, base obtuse, apex acuminate to obtuse, midvein distinct. Inflorescences panicles of cymes, many flowered, to 36 cm. Flowers 4-merous. Pedicel erect, 0.5–3.5 cm, slender. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 5–7 mm, apex acuminate, veins 1–3. Corolla pale blue, with blue veins, 1.2–1.5 cm in diam., tube 1–1.5 mm; lobes ovate-lanceolate to ovate, 7–11 mm, apex acuminate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 5–7 mm; anthers ellipsoid, ca. 1 mm. Style indistinct; stigma lobes capitate. Capsules ellipsoid, 0.8–1.2 cm. Seeds subglobose; seed coat warty. Fl. Sep-Nov.

• Beside streams, wet places, meadows, mixed forests; 900–1200 m. W Hubei, W Hunan, E Sichuan, Yunnan (Jingdong Xian).

56. *Swertia kouitchensis* Franchet, Bull. Soc. Bot. France 46: 320. 1899.

贵州獐牙菜 gui zhou zhang ya cai

Swertia elongata T. N. Ho & S. W. Liu.

Annuals 30–60 cm tall. Roots yellow, stout. Stems erect, subquadrangular, narrowly winged on angles, branched. Leaves sessile or subsessile, lanceolate, ca. 5 × 1.5 cm, both ends attenuate, veins 1–3. Inflorescences panicles of cymes, many flowered, spreading. Flowers 4- (or 5)-merous. Pedicel erect, 4–15 mm, elongated to 6.5 cm in fruit. Calyx tube 1–1.5 mm; lobes unequal, narrowly elliptic, 0.7–2 cm, apex acute and apiculate, midvein distinct. Corolla pale yellow to pale yellow-green, 1–1.2 cm in diam., tube 1–1.5 mm; lobes elliptic to ovate-elliptic, 6–12 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 6–8 mm; anthers ellipsoid, ca. 0.8 mm. Style indistinct; stigma lobes capitate. Capsules ovoid, 1–1.3 cm. Seeds light brown, subglobose, 0.7–0.9 mm; seed coat smooth. Fl. and fr. Aug-Nov.

• Beside streams, grassland slopes, forests; 700–2000 m. S Gansu, Guizhou, Hubei, S Shaanxi, E Sichuan, NE Yunnan.

57. *Swertia mussotii* Franchet, Bull. Soc. Bot. France 46: 316. 1899.

川西獐牙菜 chuan xi zhang ya cai

Annuals 15–60 cm tall. Roots yellow, stout. Stems erect, 2–5 mm in diam., subquadrangular, narrowly winged on angles, branched from base so whole plant is pyramidal. Leaves sessile, narrowly lanceolate to ovate-lanceolate, 0.8–3.5 cm × 3–10 mm, base cordate and subamplexicaul, apex obtuse, midvein distinct. Inflorescences many-flowered panicles formed by whole plant. Flowers 4-merous. Pedicel erect, to 5 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes linear-lanceolate to lanceolate, 4–7 mm, apex acute, veins 3. Corolla 0.8–1.3 cm in diam., tube 1–1.5 mm; lobes lanceolate, 7–9 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 6–8 mm; anthers ellipsoid, ca. 0.8 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 0.8–1.4 cm. Seeds dark brown, ellipsoid to subglobose, 0.8–1 mm; seed coat reticulate. Fl. and fr. Jul-Oct.

• 1900–3800 m. SW Qinghai, NW Sichuan, E Xizang, Yunnan (Dêqên Xian).

- 1a. Corolla dark purple 57a. var. *mussotii*
1b. Corolla pale yellow-green to pale yellow 57b. var. *flavescens*

57a. *Swertia mussotii* var. *mussotii*

川西獐牙菜 (原变种) chuan xi zhang ya cai (yuan bian zhong)

Corolla dark purple.

• Beside streams, hillsides, scrub, forests; 1900–3800 m. SW Qinghai, NW Sichuan, E Xizang, Yunnan (Dêqên Xian).

57b. *Swertia mussotii* var. *flavescens* T. N. Ho & S. W. Liu, Acta Biol. Plateau Sin. 1: 47. 1982.

黄花川西獐牙菜 huang hua chuan xi zhang ya cai

Corolla pale yellow-green to pale yellow.

• Beside streams, hillsides, scrub; 3500–3700 m. SW Qinghai, NW Sichuan.

58. *Swertia tozanensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 204. 1911.

塔山獐牙菜 ta shan zhang ya cai

Annuals 15–25 cm tall. Roots yellow, stout. Stems erect, slender, subquadrangular, branched. Leaves subsessile to short petiolate; leaf blade oblong-lanceolate to lanceolate, 1.5–3 cm × 5–7 mm, base narrowed, apex obtuse, veins pinnate. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 1–2 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes slightly recurved, linear to linear-lanceolate, 3–5 mm, apex obtuse to acute, midvein distinct. Corolla white, pale blue, or pale blue-green, tube 1–1.5 mm; lobes oblong, 5–6 mm, apex obtuse to acute. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with few fimbriae. Filaments 3–4 mm; anthers ovoid, ca. 0.8 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 8–11 mm. Seeds brown, subglobose, 0.5–0.7 mm in diam.; seed

coat warty. Fl. and fr. Aug-Nov.

• Forests; 2300–3500 m. Taiwan (Jiayi Xian).

59. *Swertia delavayi* Franchet, Bull. Soc. Bot. France 46: 323. 1899.

丽江獐牙菜 li jiang zhang ya cai

Annuals 10–40 cm tall. Roots yellow, stout. Stems erect, slender, subquadangular, narrowly winged on angles, branched. Basal leaves withered at anthesis, short petiolate; leaf blade spatulate to oblong-spatulate, 1.5–3 cm × 6–7 mm including petiole, base narrowed, apex obtuse, midvein distinct. Stem leaves subsessile, linear to narrowly elliptic, 1.3–3.5 cm × 2–7 mm, base narrowed, apex acute, veins 1–3. Inflorescences usually reduced to a single flower. Flower 5-merous. Pedicel erect, 1.5–4 cm, stout. Calyx tube 2–3 mm; lobes bractlike, unequal, 3 ovate and 0.9–2.5 cm × 6–12 mm, 2 ovate-lanceolate and 0.7–1.6 cm × 3–4 mm, base cordate, apex obtuse, reticulate veins purple. Corolla blue-purple, 2.5–3 cm in diam., tube 2–3 mm; lobes ovate-oblong to ovate, 0.9–1.6 cm × 3–5 mm, apex obtuse. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many compound fimbriae. Filaments ca. 6 mm; anthers ellipsoid, ca. 2 mm. Ovary ellipsoid, 5–7 mm. Style ca. 2 mm; stigma lobes capitate. Fl. Aug-Oct.

• Gravel slopes, forests; 1900–4000 m. S Sichuan, NW Yunnan.

60. *Swertia decora* Franchet, Bull. Soc. Bot. France 46: 317. 1899.

观赏獐牙菜 guan shang zhang ya cai

Annuals 2–15 cm tall. Roots yellow, stout. Stems erect, slender, subquadangular, narrowly winged on angles, branched. Basal and lower stem leaves short petiolate; leaf blade spatulate to elliptic, 0.7–1.3 cm × 2.5–5 mm including petiole, base narrowed, apex obtuse, midvein prominent. Upper stem leaves sessile, linear to linear-lanceolate, 0.6–1.8 cm × 1–3.5 mm, base narrowed, margin slightly revolute, apex acute, midvein prominent. Inflorescences usually reduced to a single flower. Flowers 5-merous. Pedicel erect, 1.2–6 cm, stout. Calyx tube 2–3 mm; lobes linear-lanceolate, 0.8–1.6 cm, equal, base obtuse, slightly revolute, apex acute, midvein prominent. Corolla rose, 2.5–3 cm in diam., tube 2–3 mm; lobes ovate-oblong to elliptic, 1.1–1.7 cm, apex rounded and mucronate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many compound fimbriae. Filaments 6–8 mm; anthers ellipsoid, ca. 2 mm. Ovary elliptic, 5–7 mm. Style ca. 2 mm; stigma lobes capitate. Fl. Aug-Nov.

• Grassland slopes; 1800–2900 m. S Sichuan, Yunnan.

61. *Swertia diluta* (Turczaninow) Bentham & J. D. Hooker, Gen. Pl. 2: 817. 1876.

北方獐牙菜 bei fang zhang ya cai

Annuals 20–70 cm tall. Roots yellow, stout. Stems erect, 2–4 mm in diam., subquadangular, narrowly winged on

angles, branched. Leaves sessile, linear to linear-lanceolate, 1–4.5 cm × 2–9 mm, both ends attenuate, midvein prominent. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5-merous. Pedicel erect, to 1.5 cm, 4-angled. Calyx tube 1–1.5 mm; lobes linear, 6–12 mm, apex acuminate, midvein distinct. Corolla white, pale blue, or pale lilac, 1–1.5 cm in diam.; tube 1–1.5 mm; lobes elliptic-lanceolate, 6–11 mm, apex acute. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many simple fimbriae. Filaments 6–8 mm; anthers ellipsoid, 1.5–2 mm. Style indistinct; stigma lobes capitate. Capsules ovoid, 1–1.2 cm. Seeds dark brown, ellipsoid, 0.6–0.8 mm; seed coat warty. Fl. Aug-Oct.

100–3100 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Korea, Mongolia, Russia (Siberia)].

- 1a. Corolla pale blue 61a. var. *diluta*
1b. Corolla pale yellow 61b. var. *tosaensis*

61a. *Swertia diluta* var. *diluta*

北方獐牙菜 (原变种) bei fang zhang ya cai (yuan bian zhong)

Sczukinia diluta Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 13: 166. 1840; *Ophelia chinensis* Bunge ex Grisebach.

Corolla pale blue. $2n = 18, 20$, or 24.

Edges of cultivated land, wet and shady slopes, valleys; 100–2600 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Korea, Mongolia, Russia].

61b. *Swertia diluta* var. *tosaensis* (Makino) H. Hara, J. Jap. Bot. 25: 89. 1950.

日本獐牙菜 ri ben zhang ya cai

Swertia tosaensis Makino, Bot. Mag. (Tokyo) 17: 54. 1903.

Corolla pale yellow. $2n = 20$.

Hillsides; 800–3100 m. Hebei, Nei Mongol, Ningxia, NE Qinghai, Shaanxi, Shandong, Shanxi [Japan, Korea].

62. *Swertia pseudochinensis* H. Hara, J. Jap. Bot. 25: 89. 1950.

瘤毛獐牙菜 liu mao zhang ya cai

Annuals 10–15 cm tall. Roots yellow, stout. Stems erect, 2–3 mm in diam., subquadangular, narrowly winged on angles, branched. Leaves sessile, linear to linear-lanceolate, ca. 3.5 cm × 6 mm, both ends attenuate, midvein prominent. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 2 cm, 4-angled. Calyx tube 1–1.5 mm; lobes linear, to 1.5 cm, apex acuminate, midvein distinct. Corolla blue-purple, with dark blue veins, 1.5–2 cm in diam., tube 1–1.5 mm; lobes lanceolate, 0.9–1.6 cm, apex acuminate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many

long compound fimbriae. Filaments 6–8 mm; anthers narrowly ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes capitate. Fl. Aug-Sep.

Beside streams, hillsides, scrub, forests; 500–1600 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Japan, Korea].

63. *Swertia yunnanensis* Burkill, J. Proc. Asiat. Soc. Bengal 2: 320. 1906.

云南獐牙菜 yun nan zhang ya cai

Annuals 5–40 cm tall. Roots yellow, stout. Stems erect, subquadrangular, narrowly winged on angles, branched. Basal and lower stem leaves subsessile, lanceolate, rarely oblanceolate, 7–12 × 2–3.5 mm, base narrowed, apex obtuse, midvein distinct. Middle to upper stem leaves sessile, linear to linear-lanceolate, 0.3–1.7 cm × 0.5–3 mm, both ends attenuate, midvein distinct. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, 6–13 mm, filiform. Calyx tube 1–1.5 mm; lobes linear, 4–7 mm, apex acuminate, midvein distinct. Corolla pale blue, 1–1.2 cm in diam., tube 1–1.5 mm; lobes elliptic, 7–12 mm, apex acuminate. Nectaries 2 per corolla lobe, triangular-lamellate, laciniate. Filaments 5–6 mm; anthers oblong, 1.5–2 mm. Ovary narrowly ellipsoid. Style indistinct; stigma lobes capitate. Fl. Sep-Oct.

• Grassland slopes, scrub, forests; 1100–3800 m. W Guizhou, Sichuan, Yunnan.

64. *Swertia hickinii* Burkill, J. Proc. Asiat. Soc. Bengal 2: 320. 1906.

浙江獐牙菜 zhe jiang zhang ya cai

Annuals 15–35 cm tall. Roots yellow, stout. Stems erect, subquadrangular, narrowly winged on angles, branched. Leaves subsessile, lanceolate, linear-elliptic, or spatulate, 0.7–2.6 cm × 1–7 mm, base narrowed, apex acute, midvein distinct. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, 7–11 mm, slender. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 3–6 mm, apex acuminate, midvein distinct. Corolla white, rarely pale blue, 1–1.2 cm in diam., tube 1–1.5 mm; ovate-lanceolate to ovate, 5–9 mm, apex obtuse. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many 3–5 mm fimbriae. Filaments 4–5 mm; anthers ellipsoid, 1–1.5 mm. Ovary ovoid, 4.5–5.5 mm. Style indistinct; stigma lobes capitate. Fl. Oct-Nov.

• Edges of cultivated land, grasslands, forests, valleys; 100–1600 m. Anhui, Fujian, Guangxi, Hunan, Jiangsu, Jiangxi, Zhejiang.

65. *Swertia binchuanensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 84. 1980.

宾川獐牙菜 bin chuan zhang ya cai

Annuals 20–45 cm tall. Roots yellow, stout. Stems erect, 2–3 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile, lanceolate to ovate-lanceolate, 2–3.2 cm × 6–10 mm, base obtuse and subamplexicaul, margin ciliolate and

slightly revolute, acute, veins 3. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, 0.5–2.5 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes lanceolate, 6–11 mm, margin ciliolate and slightly revolute, apex acuminate and apiculate, veins 3. Corolla yellow, 1.5–1.7 cm in diam., tube 2–3 mm; lobes ovate-lanceolate, 1–1.3 cm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 4–5 mm; anthers ellipsoid, 1.5–2 mm. Ovary ovoid-ellipsoid, 5–8 mm. Style indistinct; stigma lobes capitate. Fl. Sep-Nov.

• Hillsides. Yunnan (Binchuan Xian).

66. *Swertia punicea* Hemsl. in F. B. Forbes & Hemsl., J. Linn. Soc., Bot. 26: 140. 1890.

紫红獐牙菜 zi hong zhang ya cai

Annuals 15–80 cm tall. Roots yellow, stout. Stems erect, 2–7 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile, linear-lanceolate, lanceolate, or narrowly elliptic, to 6 × 1.8 cm, base narrowed, apex acuminate to acute, veins 1–3 and prominent. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 3.2 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes linear-lanceolate to lanceolate, 4–7 mm, apex acuminate to acute, midvein distinct. Corolla yellow or dark purple, 0.8–1.2 cm in diam., tube 1–1.5 mm; lobes lanceolate, 6–10 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 4–6 mm; anthers ellipsoid, 1.5–2 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–1.5 cm. Seeds pale yellow, ellipsoid, 0.5–0.6 mm; seed coat warty. Fl. and fr. Aug-Nov.

• 400–3800 m. Guizhou, W Hubei, Hunan, Sichuan, Yunnan.

- 1a. Corolla dark purple 66a. var. *punicea*
1b. Corolla yellow 66b. var. *lutescens*

66a. *Swertia punicea* var. *punicea*

资红獐牙菜 (原变种) zi hong zhang ya cai
(yuan bian zhong)

Swertia duclouxii Burkill.

Corolla dark purple.

• Beside streams, grassland slopes, scrub, forests; 400–3800 m. Guizhou, W Hubei, Hunan, Sichuan, Yunnan.

66b. *Swertia punicea* var. *lutescens* Franchet ex T. N. Ho, Acta Biol. Plateau Sin. 1: 47. 1982.

淡黄獐牙菜 dan huang zhang ya cai

Corolla yellow.

• Beside streams, hillsides; 1900–3000 m. C and NW Yunnan.

67. *Swertia franchetiana* Harry Smith, Bull. Brit. Mus. (Nat. Hist.), Bot. 4: 251. 1970.

抱茎獐牙菜 bao jing zhang ya cai

Swertia stricta Franchet (1900), not Collett & Hemsley (1890).

Annuals 15–40 cm tall. Roots yellow, stout, fibrous. Stems erect, 2–7 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis, long petiolate; leaf blade spatulate, 1–1.5 cm, base narrowed, apex obtuse, midvein distinct. Stem leaves sessile, lanceolate to ovate-lanceolate, 1.5–3.7 cm × 2–8 mm, base auriculate and subamplexicaul as well as decurrent into narrow wings on stem, apex acuminate; veins 1–3, prominent. Inflorescences many-flowered panicles formed by whole plant. Flowers 5-merous. Pedicel erect, to 4 cm, stout, subquadrangular. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 7–12 mm, apex acuminate, midvein distinct. Corolla pale blue, 1–1.2 cm in diam., gray, tube 1–1.5 mm; lobes lanceolate to ovate-lanceolate, 1–1.5 cm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many long fimbriae. Filaments 5–7 mm; anthers dark blue, linear, 2–2.5 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–1.6 cm. Seeds pale yellow, subglobose, ca. 0.5 mm in diam.; seed coat reticulate. Fl. and Aug-Nov.

• Beside streams, hillsides, scrub, forest margins; 2200–3600 m. S Gansu, Qinghai, Sichuan, Xizang.

68. *Swertia fasciculata* T. N. Ho & S. W. Liu, Fl. Reipubl. Popularis Sin. 62: 403. 1988.

簇花獐牙菜 cu hua zhang ya cai

Swertia hypericoides Diels (1912), not Kunth (1818).

Annuals 15–40 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, branched. Basal leaves withered at anthesis. Stem leaves sessile, oblanceolate to oblong, 1–2.5 × 3–6 cm, base narrowed, margin slightly revolute, apex acute; veins 3, abaxially prominent. Inflorescences a narrow panicle, with many ± fascicled flowers. Flowers 5-merous. Pedicel erect, 3–5 mm, slender, subquadrangular. Calyx tube 1–1.5 mm; lobes lanceolate to narrowly oblong, 4–5 mm, margin ciliolate and slightly revolute, apex acute and apiculate, midvein distinct. Corolla pale blue, tube 1–1.5 mm; lobes lanceolate, 5–7 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 3–5 mm; anthers ellipsoid, 1–1.5 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 7–10 mm. Seeds pale yellow, subglobose, 0.5–0.7 mm in diam., almost smooth. Fl. and fr. Jul-Nov.

• Hillsides, forest margins; 2500–3500 m. NW Yunnan.

69. *Swertia tetraptera* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 503. 1881.

四数獐牙菜 si shu zhang ya cai

Swertia dimorpha Batalin; *S. pusilla* Diels.

Annuals 5–30 cm tall. Roots yellow, fibrous. Stems 1 to few, robust, erect, 2–3.5 mm in diam., subquadrangular, with

larger flowers, and numerous weak branches from base, with flowers 1/4–1/3 as large as those of robust stems. Basal and lower stem leaves withered at anthesis; petiole 1–5 cm; leaf blade oblong to elliptic, 0.9–3 × (0.8–)1–1.8 cm, thin herbaceous, base narrowed, apex obtuse, veins 3 and abaxially prominent. Middle to upper stem leaves sessile, ovate-lanceolate, 1.5–4 × 1–1.5 cm, base rounded and subamplexicaul, apex acute; veins 3–5, abaxially prominent. Inflorescences panicles of cymes, many flowered, spreading. Flowers 4-merous. Pedicel 0.5–6 cm, slender. Calyx lobes basally narrowed, apex acute, veins 3. Corolla pale yellow-green, sometimes tinged purple; lobes apically obtuse and erose. Nectaries 2 per corolla lobe, oblong, double door-shaped, each with a very narrow scale and few irregular divisions. Anthers yellow, ellipsoid. Style indistinct; stigma lobes capitate. Seeds pale yellow, subglobose, almost smooth. Flowers on robust stems: calyx tube 0.5–1 mm; lobes lanceolate to ovate-lanceolate, 6–8 mm. Corolla tube 0.5–1 mm; lobes ovate, 0.9–1.2 cm. Filaments 2–3.5 mm; anthers 0.5–1.5 mm. Capsules ovoid-ellipsoid, 1–1.4 cm. Seeds 1–1.2 mm. Flowers on weak branches: calyx tube 0.3–0.5 mm; lobes broadly ovate, 1.5–4 mm. Corolla tube 0.3–0.5 mm; lobes ovate, 2.5–5 mm. Filaments 2–3.5 mm; anthers 0.5–1.5 mm. Capsules broadly ovoid to subglobose, 4–5 mm. Seeds less than 0.1 mm. Fl. and fr. Jul-Sep.

• Beside streams, wet slopes, scrub, scattered forests; 2000–4000 m. Gansu, Qinghai, Sichuan, Xizang.

70. *Swertia hispidicalyx* Burkill, J. Proc. Asiat. Soc. Bengal 2: 321. 1906.

毛萼獐牙菜 mao e zhang ya cai

Annuals 5–25 cm tall. Roots yellow, fibrous. Stems procumbent to ascending, branched. Basal leaves withered at anthesis. Stem leaves sessile, lanceolate to narrowly elliptic, 0.9–1.5 cm × 2–5 mm, base obtuse and subamplexicaul, margin slightly revolute, apex obtuse, veins 1–3. Inflorescences many-flowered panicles formed by the whole plant. Flowers 5-merous. Pedicel erect, to 3.5 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes ovate-lanceolate to ovate, 7–9 mm, apex acute, veins 3. Corolla pale purple, 1–1.2 cm in diam., tube 1–1.5 mm; lobes ovate, 7–11 mm, apex acute to obtuse. Nectaries 2 per corolla lobe, pocket-shaped and opening toward base of corolla, with a suborbicular scale and many short fimbriae. Filaments 5–7 mm, basally much enlarged, free; anthers ellipsoid, 1–1.5 mm. Style 3–4 mm, slender; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–1.6 cm. Seeds dark brown, ellipsoid, 0.8–1 mm; seed coat smooth. Fl. and fr. Aug-Oct.

3400–5200 m. Xizang [Nepal].

- 1a. Margin of leaf blades and calyx
lobes ciliate 70a. var. *hispidicalyx*
- 1b. Margin of leaf blades and calyx
lobes glabrous 70b. var. *minima*

70a. *Swertia hispidicalyx* var. *hispidicalyx*

毛萼獐牙菜 (原变种) mao e zhang ya cai (yuan bian zhong)

Margin of leaf blades and calyx lobes ciliate.

Beside streams, wet meadows, hillsides, alpine meadows; 3400–5200 m. Xizang [Nepal].

70b. *Swertia hispidicalyx* var. *minima* Burkill, J. Proc. Asiat. Soc. Bengal 2: 321. 1906.

小毛萼獐牙菜 xiao mao e zhang ya cai

Margin of leaf blades and calyx lobes glabrous.

• Beside streams, meadows, scrub; 3700–4800 m. SE and W Xizang.

71. *Swertia ciliata* (D. Don ex G. Don) B. L. Burtt, Notes Roy. Bot. Gard. Edinburgh 26: 272. 1965.

普兰獐牙菜 pu lan zhang ya cai

Ophelia ciliata D. Don ex G. Don, Gen. Hist. 4: 178. 1837; *O. purpurascens* Wallich ex D. Don.

Annuals 30–50 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, branched. Leaves sessile or short petiolate; leaf blade lanceolate to ovate-lanceolate, 0.8–4.5 × 0.3–2 cm, thin herbaceous, base obtuse, margin slightly revolute, apex acute, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 2.5 cm, filiform. Calyx tube 1–1.5 mm; lobes reflexed at anthesis, lanceolate, 5–7 × 1.5–2 mm, slightly unequal, margin and midvein dark purple, apex acuminate. Corolla dirty purple, with 2 purple spots above each nectary, 1–1.2 cm in diam., tube 1–1.5 mm; lobes spreading at anthesis, ovate-lanceolate, 6–7 mm, apex acuminate. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments dark purple, 4–5 mm, basally much enlarged and connate; anthers blue-purple, ellipsoid, 1–1.5 mm. Style 3–4 mm, slender; stigma lobes capitate. Capsules ovoid, 7–10 mm. Seeds pale yellow, subglobose, 0.3–0.5 mm in diam.; seed coat smooth to warty. Fl. and fr. Jul-Sep. 2n = 20.

Beside streams, hillsides; 3600–3700 m. SW Xizang [Afghanistan, India, Kashmir, Nepal, Sikkim].

72. *Swertia cineta* Burkill, J. Proc. Asiat. Soc. Bengal 2: 319. 1906.

西南獐牙菜 xi nan zhang ya cai

Swertia alboviolacea H. Léveillé; *S. purpurascens* (Wallich ex D. Don) C. B. Clarke var. *violaceocincta* Franchet.

Annuals 30–100(–150) cm tall. Roots yellow, fibrous. Stems erect, 3–5 mm in diam., branched. Basal leaves withered at anthesis. Stem leaves petioles short, puberulent; leaf blade lanceolate to elliptic-lanceolate, 2.5–7.5 × 0.5–2 cm, puberulent, both ends attenuate, margin ciliate, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading, to 60 cm. Pedicel erect, 0.3–1.8 cm, terete, with puberulent striae; flower nodding, 5-merous. Calyx tube 1–1.5 mm; lobes ovate-lanceolate, 0.9–1.5 cm × 3–6 mm, slightly unequal, margin ciliate, apex acuminate and caudate, veins 1–3. Corolla pale yellow-green, with 2 blackish purple spots above each nectary, these sometimes joined into a ± continuous ring;

tube 1–1.5 mm; lobes ovate-lanceolate, 0.7–1.4 cm, margin ciliolate, apex acuminate and caudate. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments 5–7 mm, basally much enlarged and connate; anthers narrowly ellipsoid, 2–2.5 mm. Style 3–4 mm, slender; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–2.3 cm. Seeds pale yellow, ellipsoid, 0.9–1.1 mm; seed coat reticulate. Fl. and fr. Aug-Nov.

• Wet slopes, scrub, forests; 1400–3800 m. Guizhou, Sichuan, Yunnan.

73. *Swertia pubescens* Franchet, Bull. Soc. Bot. France 46: 313. 1899.

毛獐牙菜 mao zhang ya cai

Annuals 30–90 cm tall, whole plant puberulent. Roots yellow, fibrous. Stems erect, 2–3 mm in diam., striate, branched. Leaves sessile, ovate-lanceolate, 2–6 × 0.4–1.5 cm, base cordate and subamplexicaul, apex acute, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading. Pedicel 0.5–2 cm, terete, with puberulent striae. Flowers nodding, 5-merous, 1.5–2 cm in diam. Calyx tube 1–1.5 mm; lobes bractlike, apically acute, 3–7-veined, unequal; 2 larger lobes ovate-lanceolate, 1–2 × to 1.5 cm; 3 smaller lobes linear-lanceolate to lanceolate, 8–10 × ca. 5 mm. Corolla white, with 2 blackish purple spots above each nectary, these sometimes joined into a ± continuous ring; tube 1–1.5 mm; lobes ovate-oblong, 1–1.5 cm, lacerulate, apex obtuse. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments 7–9 mm, basally much enlarged but free, puberulent; anthers dark purple, narrowly ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, 8–9 mm. Style 3–4 mm, slender; stigma lobes capitate. Fl. Aug-Nov.

• Beside streams, hillsides, scrub; 2800–4100 m. NW Yunnan.

74. *Swertia paniculata* Wallich, Pl. Asiat. Rar. 3: t. 205. 1832.

宽丝獐牙菜 kuan si zhang ya cai

Swertia dilatata C. B. Clarke.

Annuals 80–120 cm tall. Roots yellow, fibrous. Stems erect, 1.5–4 mm in diam., striate, branched. Basal leaves withered at anthesis. Stem leaves subsessile, lanceolate, 2–5.5 cm × 4–14 mm, abaxially puberulent, adaxially sometimes glabrous, base obtuse, margin ciliolate, apex acuminate; veins 1–3, prominent. Inflorescences panicles of cymes, many flowered, spreading, to 70 cm. Pedicel erect, 0.6–1.5 cm, terete, striate. Flower 5-merous. Calyx tube 1–1.5 mm; lobes ovate-lanceolate, 6–10 × 2–5 mm, slightly unequal, papillate, margin ciliolate, apex acuminate; veins 1–3, indistinct. Corolla pale yellow-green, with 2 blackish purple spots above each nectary, tube 1–1.5 mm; lobes ovate, 6–8 mm, apex acute. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments 4–5 mm, basally much enlarged but free; anthers purple, ellipsoid, 1–1.5 mm. Style 2.5–3.5 mm, slender; stigma lobes capitate. Capsules ovoid, 8–10 mm. Seeds pale yellow, ellipsoid; seed coat smooth. Fl. and fr. Aug-Sep.

Scrub slopes, forests; 2800–3300 m. S and SW Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Sikkim].

75. *Swertia racemosa* (Wallich ex Grisebach) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 124. 1883.

藏獐牙菜 zang zhang ya cai

Ophelia racemosa Wallich ex Grisebach, Gen. Sp. Gent. 319. 1839; *Kingdon-wardia codonopsisoides* C. Marquand; *K. racemosa* (Wallich ex Grisebach) T. N. Ho.

Annuals 8–40 cm tall. Roots yellow, fibrous. Stems dark purple, erect, striate, sometimes with ascending branches from lower and middle nodes. Leaves sessile, linear-lanceolate to lanceolate, 1.5–5 × 0.4–1.6 cm, base auriculate and subamplexicaul, margin ciliate, veins 1–3, strigose when young but becoming glabrous. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 1 cm, terete, with puberulent striae. Calyx tube campanulate, 2.5–3.5 mm, densely strigose outside; lobes triangular-lanceolate, margin ciliolate, apex acuminate to acute, unequal, 3 larger and 7–11 mm, 2 smaller and 5–7 mm, midvein slender. Corolla pale blue to pale blue-purple, densely strigose outside; tube campanulate, 2.5–3.5 mm; lobes ovate-elliptic, 6–7.5 mm, margin ciliolate, apex acute. Nectaries 1 per corolla lobe, oblong and opening toward base of corolla, with a narrow scale and few divisions. Filaments basally white, apically blue, flattened subulate, 4.5–5.5 mm, basally much enlarged and connate; anthers blue, ellipsoid, 1–1.2 mm. Style 1.5–2 mm, slender; stigma lobes capitate. Capsules ovoid-ellipsoid, 5–6 mm. Seeds pale yellow, ellipsoid, 1–1.2 mm; seed coat smooth. Fl. and fr. Aug-Sep.

Meadows, scrub; 3200–4400 m. SE Xizang [Bhutan, N India, Nepal, Sikkim].

