

APIACEAE (UMBELLIFERAE)

伞形科 san xing ke

She Menglan (余孟兰 Sheh Meng-lan)¹, Pu Fading (溥发鼎 Pu Fa-ting)², Pan Zehui (潘泽惠)¹, Mark F. Watson³, John F. M. Cannon⁴, Ingrid Holmes-Smith³, Eugene V. Kljuykov⁵, Loy R. Phillippe⁶, Michael G. Pimenov⁵

Herbs, annual or perennial, rarely woody at base. Caulescent or acaulescent, stem hollow or solid. Leaves alternate, rarely opposite or basal; petiole usually sheathing at base; stipules absent (except in subfam. Hydrocotyloideae); leaf blade compound or sometimes simple, usually much incised or divided, pinnatifid to pinnatisect, or ternate-pinnately decomposed. Flowers epigynous, small, bisexual or staminate (unisexual male), regular, in simple or compound umbels; umbellules few to many-flowered; rays often subtended by bracts forming a involucre; umbellules (sometimes called umbellets) usually subtended by bracteoles forming an involucre. Pedicels long, short or obsolete (then forming a capitate umbellule). Calyx tube wholly adnate to the ovary; calyx teeth (sometimes called sepals) small or obsolete, forming a ring around the top of the ovary. Ovary inferior, 2-celled, with one anatropous ovule in each locule. Styles 2, usually swollen at the base forming a stylopodium which often secretes nectar. Fruit dry, of two mericarps united by their faces (commissure), and usually attached to a central axis (carpophore), from which the mericarps separate at maturity; mericarps are variously flattened dorsally, laterally or terete; each mericarp has 5 primary ribs, one down the back (dorsal rib), two on the edges near the commissure (lateral ribs), and two between the dorsal and lateral ribs (intermediate ribs), occasionally with four secondary ribs alternating with the primary, the ribs filiform to broadly winged, thin or corky; vittae (oil-tubes) usually present in the furrow (intervals between the ribs sometimes called the valliculae) and on the commissure face, rarely also in the pericarp, sometimes obscure. Each mericarp 1-seeded, splitting apart at maturity. Seed face (commissural albumen) plane, concave to sulcate.

Between 250 and 440(–455) genera and 3300–3700 species: widely distributed in the temperate zone of both hemispheres, mainly in Eurasia and especially in C Asia; 100 genera (ten endemic) and 614 species (340 endemic) in China.

Although many members of this family have distinctive vegetative and floral features, providing a useful key to identify the many genera in China presents several difficulties. First, the classification of genera and generic groupings has been largely based on the morphology and anatomy of the fruit. Thus, to construct a “good” dichotomous key with equal leads, rather than “chipping off” individual genera using unique characteristics, the use of fruit macro- and microscopic characters is unavoidable. This is even more acute when dealing with large numbers of genera. Another major problem is that several of the large genera are heterogeneous, with diffuse generic boundaries and broad patterns of variation. To try and cope with these difficulties two types of identification tool are presented here. The first is a dichotomous key that emphasizes the traditional fruit characters, and the second is a multi-access key that allows easy comparison of ten characteristics across all genera. The multi-access key is particularly useful for incomplete material, but it is worth stressing that specimens without *at least* developing fruit are usually very difficult to identify.

The ten genera endemic to China are *Chaerophyllopsis*, *Changium*, *Chuanminshen*, *Cyclorhiza*, *Dickinsia*, *Harrismithia*, *Melanosciadium*, *Nothomyrrinium*, *Notopterygium*, and *Sinolimprichtia*.

Chinese genera of economic importance include *Angelica*, *Bupleurum*, *Centella*, *Changium*, *Cnidium*, *Ferula*, *Glehnia*, *Heracleum*, *Hydrocotyle*, *Ligusticum*, *Notopterygium*, and *Peucedanum* (medicinal); *Anethum*, *Coriandrum*, *Cuminum*, *Foeniculum*, and *Pimpinella* (flavoring); and *Apium*, *Daucus*, *Oenanthe*, and *Petroselinum* (vegetables).

Chang Ho-tseng, Fu Kun-tsun, Ho Yeh-chi, Hsü Lon-jan, Li Yin, Liou Shou-lu, Pu Fa-ting, Shan Ren-hwa, Sheh Meng-lan, Shen Kuan-mien, Wang Tieh-seng, Yuan Chang-chi. 1979; 1985; 1992. Umbelliferae. In: Shan Ren-hwa & Sheh Meng-lan, eds., Fl. Reipubl. Popularis Sin. 55(1): 1–300; 55(2): 1–268; 55(3): 1–255.

Dichotomous key to genera

The following dichotomous key reflects the traditional classification of the genera of the Apiaceae into subfamilies, tribes, and subtribes. This classification relies heavily on characters of fruit morphology and anatomy, many of which are subject to convergent evolution (e.g., for fruit dispersal strategies). The long-held understanding that this gives rise to artificial, heterogeneous assemblages has been verified by recent molecular studies of DNA sequences. For this reason tribes and subtribes are not formally recognized in the following account; however, they are indicated in the dichotomous key and the traditional order of genera is largely retained. It is worth noting that the generic grouping within the three subfamilies is well supported by molecular evidence, the exception being *Hydrocotyle* and *Centella* which are most likely derived, herbaceous members of the Araliaceae and not Hydrocotyloideae (the residue of this subfamily is restricted to the S hemisphere).

- 1a. Stem creeping or ascending, rarely erect; leaves simple; leaf blade reniform or rounded-cordate; umbels simple; endocarp woody; vittae obscure or distinct, borne in the ribs, not in the furrow (subfam. Hydrocotyloideae).
2a. Fruit flattened dorsally, carpophore shortly bifid at the apex (tribe Mulineae) 3. *Dickinsia*
2b. Fruit flattened laterally, commissure narrow, carpophore absent (tribe Hydrocotyleae).

¹ Institute of Botany, Jiangsu Province and Chinese Academy of Sciences, Nanjing Botanical Garden, Mem. Sun Yat-Sen, Nanjing, P.O. Box 1435, Jiangsu 210014, People's Republic of China.

² Chengdu Institute of Biology, Chinese Academy of Sciences, P.O. Box 416, Chengdu, Sichuan 610041, People's Republic of China.

³ Royal Botanic Garden Edinburgh, 20a Inverleith Row, Edinburgh EH3 5LR, Scotland, United Kingdom.

⁴ c/o Department of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD, England, United Kingdom.

⁵ Moscow State University, Moscow 119899, Russia.

⁶ Illinois Natural History Survey, 607 East Peabody Drive, 172 Natural Resources Building, Champaign, Illinois 61820-6970, U.S.A.

- 3a. Bracts absent; petals valvate; dorsal fruit ribs prominent, lateral ribs obscure, surface smooth 1. *Hydrocotyle*
 3b. Bracts present; petals imbricate; dorsal and lateral fruit ribs prominent, surface wrinkled 2. *Centella*
- 1b. Stem usually erect, sometimes reduced, not creeping; leaves compound or simple; umbels compound, rarely simple or subracemous-branched to capitate; endocarp not woody; vittae distinct to obscure, borne in the primary ribs or furrows.
- 4a. Leaves simple, usually palmately divide to shallowly lobed; umbels simple or compound, occasionally capitate; fruit covered with scales, tubercles or prickles, rarely glabrous; styles elongate (subfam. Saniculoideae).
- 5a. Basal leaves orbicular, rounded-cordate or cordate-pentagonal, usually palmately lobed; flowers polygamous, umbels in racemous, cymous or corymbose inflorescences 4. *Sanicula*
 5b. Basal leaves long-elliptic, lanceolate or oblanceolate, undivided; flowers bisexual, borne in capitate inflorescences 5. *Eryngium*
- 4b. Leaves compound, rarely simple; umbels compound, very rarely simple (acaulescent plants with sessile terminal umbel appearing simple); rays numerous, well developed; fruit glabrous or pubescent, sometimes fine-prickly or spiny; styles short or long (subfam. Apioideae).
- 6a. Fruit with both primary and secondary ribs, secondary ribs prominent or winged.
 7a. Ribs not spinose (tribe Laserpiteae) 99. *Saposhnikovia*
 7b. Ribs spinose (tribe Dauceae) 100. *Daucus*
- 6b. Fruit with primary ribs, secondary ribs absent (except *Aphanopleura* and *Cuminum*).
- 8a. Commissure face of seed plane, rarely slightly concave.
- 9a. Fruit ribs equal, mericarp orbicular or subpentagonal cross section, usually slightly laterally compressed (tribe Ammineae).
- 10a. Primary ribs of fruit filiform, commissure narrow (subtribe Carinae).
- 11a. Leaves simple, undivided 34. *Bupleurum*
 11b. Leaves divided, ternate, pinnate or pinnately decompose.
- 12a. Fruit both with primary and secondary ribs; vittae large, 1 in each furrow.
 13a. Fruit ovoid, secondary ribs clavate-hispid or papillose 35. *Aphanopleura*
 13b. Fruit oblong-ellipsoid, secondary ribs setulose 36. *Cuminum*
- 12b. Fruit with primary ribs only; vittae 1 to several in each furrow, rarely absent.
- 14a. Petals attenuate or thickening at base, or apex caudate to linear.
 15a. Petals thickening at base, often sac-like 46. *Pternopetalum*
 15b. Petals caudate or linear at apex 49. *Acronema*
- 14b. Petals neither thickening at base nor apex caudate.
- 16a. Fruit oblong-ellipsoid or ellipsoid, base rounded.
 17a. Calyx teeth conspicuous, ovate-triangular 55. *Carlesia*
 17b. Calyx teeth minute or obsolete.
- 18a. Fruit vittae obscure; styles long, very reflexed 51. *Aegopodium*
 18b. Fruit vittae conspicuous; styles short or long, less reflexed.
- 19a. Styles long, reflexed.
 20a. Vittae 1 in each furrow, 2 on commissure 43. *Ammi*
 20b. Vittae 3–4 in each furrow, 6–8 on commissure 47. *Chamaesciadium*
- 19b. Styles short, erect or divaricate.
 21a. Leaves ternate-parted, leaflets rhombic-ovate, margin doubly serrate 42. *Cryptotaenia*
 21b. Leaves 2–4-pinnatisect, ultimate segments linear or lanceolate-linear, entire.
 22a. Ultimate leaf segments lanceolate-linear, 20–90 × 1–5 mm 52. *Seselopsis*
 22b. Ultimate leaf segments narrowly linear, 2–10 × 0.2–1 mm.
 23a. Bracts and bracteoles membranous 53. *Hyalolaena*
 23b. Bracts and bracteoles usually absent, rarely few, not membranous 44. *Carum*
- 16b. Fruit ovoid-globose, base often cordate.
 24a. Calyx teeth conspicuous, ovate-triangular; vittae 1 in each furrow 39. *Cicuta*
 24b. Calyx teeth obsolete or minute; vittae 1 to several in each furrow.
 25a. Vittae 2 to numerous (rarely 1) in each furrow, 4–6 on commissure.
 26a. Vittae small, numerous, forming a continuous ring encircling the seed; fruit wall thick, corky 57. *Berula*
 26b. Vittae large, 2–4 in each furrow, not forming a ring encircling the seed; fruit wall not thick, corky.
 27a. Bracts membranous, pale green or absent.
 28a. Bracts absent 40. *Trachyspermum*
 28b. Bract membranous 54. *Nothosmyrnium*
 27b. Bracts lanceolate to linear, green, persistent.

APIACEAE

- 29a. Plants of wet, swampy ground; leaves pinnate to pinnatisect 58. *Sium*
 29b. Plants of dry ground; leaves undivided, 3-parted, ternate-pinnate or ternate-pinnatifid 48. *Pimpinella*
- 25b. Vittae usually 1 in each furrow, 2 on commissure.
 30a. Petals base clawed, unequal, the outer usually radiant 45. *Sinocarum*
 30b. Petals base not clawed, usually equal.
 31a. Fruit surface villous, verrucose or papillose.
 32a. Fruit surface densely villous 41. *Eriocycla*
 32b. Fruit surface verrucose or papillose 50. *Harrysmithia*
 31b. Fruit glabrous or almost so.
 33a. Branches opposite or verticillate; leaves 2–3-pinnate 38. *Petroselinum*
 33b. Branches alternate; leaves pinnate or ternate-pinnate.
 34a. Plants biennial or perennial, often aquatic or amphibious, taproots stout or with creeping rootstocks, rooting at nodes 37. *Apium*
 34b. Plants annual, terrestrial, taproots slender, without creeping rootstock, not rooting at nodes 56. *Cycospermum*
- 10b. Fruit ribs prominent to narrowly winged, commissure moderately broad (subtribe Seselinae).
 35a. Semiaquatic or marshland herbs; outer petals of umbellule usually conspicuously radiant; lateral fruit ribs corky-thickened, subtriangular 61. *Oenanthe*
 35b. Terrestrial herbs; outer petals of umbellule not radiant; lateral fruit ribs not corky (rarely corky-thickened, see *Cortiella*, *Pterygopleurum*).
 36a. Plants strongly aromatic throughout; leaves decompound-pinnatisect, ultimate segments filiform, less than 1 mm wide; petals yellow.
 37a. Fruit oblong, terete; ribs equal; stem gray-green 63. *Foeniculum*
 37b. Fruit ovate-ellipsoid, slightly flattened dorsally; lateral ribs more or less broader than the dorsal; stem green 64. *Anethum*
 36b. Plants not strongly aromatic; leaves 1–3-pinnate or pinnately decompound, ultimate segments broad or narrow, more than 1 mm wide; petals white, purplish, purple, creamy white or greenish white, not strongly yellow (except yellow in *Silaum*).
 38a. Fruit oblong or ellipsoid, slightly to strongly flattened dorsally; mericarps not pentagonal in cross section; ribs unequal, lateral wings much broader than dorsal.
 39a. Bracts leaf-like, 1–2-pinnate.
 40a. Fruit flat-globose, all ribs broadly winged, lateral ribs broadest, wings cork-spongy 75. *Cortiella*
 40b. Fruit ellipsoid, dorsal ribs filiform, narrowly winged, lateral ribs more broadly winged than the dorsal, not cork-spongy.
 41a. Acaulescent or subacaulescent; bracteoles ca. equaling umbellules 76. *Cortia*
 41b. Caulescent, stem usually above 25 cm; bracteoles 2–3 × umbellules 77. *Oreocomopsis*
 39b. Bracts absent or present, usually entire, rarely divided.
 42a. Lateral fruit ribs broadly winged, wings more than 2 × width of dorsal ribs; calyx teeth well developed, often equaling or exceeding the stylopodium 69. *Selinum*
 42b. Lateral fruit ribs winged, wings equaling or slightly broader than the dorsal; calyx teeth usually minute or obsolete 72. *Ligusticum*
- 38b. Fruit ovoid-oblong or ellipsoid, slightly flattened laterally or dorsally, usually terete; mericarp pentagonal in cross section; all ribs equal or subequal.
 43a. Fruit ribs irregularly denticulate, denticles stiffly membranous 70. *Stenocoelium*
 43b. Fruit ribs entire, denticles absent.
 44a. Bracts and bracteoles leaf-like, 1–2-pinnate 62. *Schulzia*
 44b. Bracts entire; bracteoles entire, rarely pinnate.
 45a. Rays much reduced, umbels capitate (appearing simple); petals purplish-brown 74. *Haplosphaera*
 45b. Rays well developed, umbels not capitate; petals white, creamy-white or purplish.
 46a. Calyx teeth well developed, subulate, lanceolate or triangular-ovate.
 47a. Fruit ribs filiform, prominent, obtuse or acute but neither thickened nor corky-dilated at base 59. *Libanotis*
 47b. Fruit ribs winged, wings thickened or corky-dilated at base.
 48a. Leaves 1–2-pinnate or ternate-pinnate, ultimate segments long-lanceolate, entire; fruit ribs corky-dilated at base 66. *Pterygopleurum*
 48b. Leaves 2–3-pinnate, ultimate segments ovate-lanceolate to linear, usually serrate or lobed; wings thickened but not corky dilated at base 73. *Pachypleurum*

APIACEAE

- 46b. Calyx teeth minute or obsolete.
- 49a. Bracteoles fused at base or up to the middle.
- 50a. Stylopodium conic or depressed, margin not lobed; fruit ovoid or ellipsoid 60. *Seseli*
- 50b. Stylopodium flat, margin deeply lobed; fruit oblong 67. *Lithosciadium*
- 49b. Bracteoles separate, not fused at base.
- 51a. Fruit ribs narrowly winged, wings hollow 71. *Cenolophium*
- 51b. Fruit ribs acute or winged, wings not hollow.
- 52a. Petals yellow; fruit vittae numerous, small, obscure at maturity 65. *Silaum*
- 52b. Petals white or pinkish; fruit vittae 1 in each furrow, 2 on commissure, conspicuous at maturity 68. *Cnidium*
- 9b. Lateral ribs of fruit winged, broader than the dorsal and intermediate ribs, mericarp slightly to strongly dorsally compressed (tribe Peucedaneae).
- 53a. Lateral mericarp wings divergent at maturity, lateral wings ca. 2 × broader than dorsal wings (subtribe Angelicineae).
- 54a. Fruit compressed-globose or ellipsoid, ribs all winged, thickened or corky-thickened, ribs equal or lateral ribs slightly broader than dorsal.
- 55a. Vittae numerous, almost encircling and adhering to the seed 79. *Archangelica*
- 55b. Vittae 1–3 in each furrow, 2–6 on commissure, not adhering to the seed.
- 56a. Fruit glabrous 80. *Coelopleurum*
- 56b. Fruit densely hirsute and velutinous on the surface 85. *Glehnia*
- 54b. Fruit ovoid to oblong, ribs all winged, slender, not corky-thickened, usually lateral ribs broader than or rarely just equaling dorsal.
- 57a. Petals yellowish-green to yellow 84. *Levisticum*
- 57b. Petals white, rarely pinkish, purplish or dark purple.
- 58a. Outer petals of umbellules radiant, conspicuously enlarged 81. *Czernaevia*
- 58b. Outer petals of the umbellule not radiant, equal.
- 59a. Calyx teeth conspicuous, triangular or ovate, persistent 83. *Ostericum*
- 59b. Calyx teeth minute or obsolete.
- 60a. Leaf sheaths usually elongate, tube-like; fruit ribs without vascular bundle 78. *Conioselinum*
- 60b. Leaf sheaths usually broadly ovate or sacciform; fruit ribs all with vascular bundles 82. *Angelica*
- 53b. Lateral mericarp wings adnate or closely appressed at maturity, lateral wings less than 2 × broader than the dorsal wings.
- 61a. Lateral mericarp wings membranous (subtribe Ferulineae).
- 62a. Flowers polygamous, bisexual flowers only at the terminal primary-umbel, all the lateral umbels with male flowers; stylopodium base dilated, lobed or undulated-margined.
- 63a. Petals white; bracteoles usually absent 86. *Arcuatopterus*
- 63b. Petals yellow or yellowish-green; bracteoles usually present.
- 64a. Flowers pedicellate, umbellules loose, not capitate 87. *Ferula*
- 64b. Flowers sessile; umbellules capitate.
- 65a. Fruit densely pubescent, dorsal ribs obscure; vittae 3–5 in each furrow, 10–12 on the commissure 88. *Schumannia*
- 65b. Fruit glabrous, dorsal ribs filiform, prominent; vittae 1 in each furrow, 2–4 on the commissure 89. *Soranthus*
- 62b. Flowers often bisexual, male flowers only in the upper lateral umbels; stylopodium base usually undilated, entire.
- 66a. Flowers yellow 93. *Talassia*
- 66b. Flowers white, pinkish or purplish.
- 67a. Fruit ribs corky-thickened, dorsal and intermediate ribs rounded, very prominent, lateral ribs broadly winged 90. *Phlojodicarpus*
- 67b. Fruit ribs not corky-thickened, dorsal ribs filiform, prominent to slightly prominent, lateral ribs narrowly to broadly winged.
- 68a. Calyx teeth obsolete or inconspicuous; bracts present, bracteoles many; lateral ribs of fruit conspicuously winged 91. *Peucedanum*
- 68b. Calyx teeth conspicuous, subulate or triangular-subulate; bracts and bracteoles absent or occasionally bracteoles 1–2, caducous; lateral ribs of fruit thickened, slightly winged ... 92. *Chuanminshen*
- 61b. Lateral mericarp wings thickened, margin rigid (vascular bundle near margin) (subtribe Tordyliinae).
- 69a. Petals yellow, equal, apex obtuse-rounded or truncate with an inflexed lobule; fruit vittae long,

APIACEAE

- filiform, extending to fruit base 94. *Pastinaca*
- 69b. Petals greenish, whitish or purplish, unequal, usually outer petals markedly enlarged, radiant, apex 2-lobed, with a narrowly inflexed lobule; fruit vittae short, clavate, not extending to fruit base, or long, filiform extending to base.
 - 70a. Fruit vittae long, filiform, not clavate, usually extending to base, fruit densely pubescent.
 - 71a. Outer parts of fruit wings inflated and corky, inner mesocarp layer sclerified 95. *Zosima*
 - 71b. Outer parts of fruit wings not inflated, inner mesocarp layer not sclerified 97. *Semenovia*
 - 70b. Fruit vittae short, clavate, usually not extending to base (very rarely filiform and extending to base), fruit glabrous or glabrescent.
 - 72a. Bracts absent or few, caducous, bracteoles linear 96. *Heracleum*
 - 72b. Bracts and bracteoles numerous, large, lanceolate-ovate, persistent in fruit 98. *Tordyliopsis*
- 8b. Commissure face of seed deeply concave or sulcate.
 - 73a. Fruit oblong or slightly elongate, cylindrical, beaked; druse crystals abundant in parenchyma surrounding carpophore (tribe Scandicineae).
 - 74a. Fruit round-ovoid, ovoid to oblong, setulose or bristly, usually in longitudinal rows.
 - 75a. Fertile flowers with radiant petals; primary and secondary fruit ribs prominent 12. *Turgenia*
 - 75b. Fertile flowers without radiant petals; secondary fruit ribs hidden by the dense glochidiate prickles or tubercles 11. *Torilis*
 - 74b. Fruit cylindrical and beaked, glabrous or bristly but not in longitudinal rows.
 - 76a. Fruit ribs acute, narrowly winged; vittae obscure when mature 9. *Osmorhiza*
 - 76b. Fruit ribs rounded, unwinged; vittae conspicuous.
 - 77a. Apex of fruit shortly or long-beaked; vittae small.
 - 78a. Fruit beak shorter than the body 8. *Anthriscus*
 - 78b. Fruit beak much longer than the body 14. *Scandix*
 - 77b. Apex of fruit obtuse or acute, not beaked; vittae large.
 - 79a. Fruit elongate, cylindrical; vittae 1 in each furrow.
 - 80a. Rootstock narrow conic 6. *Chaerophyllum*
 - 80b. Rootstock tuber-like, globose 10. *Krasnovia*
 - 79b. Fruit linear-oblong; vittae 2–4 in each furrow.
 - 81a. Calyx teeth obsolete; petals white, apex notched 7. *Sphallerocarpus*
 - 81b. Calyx teeth conspicuous, persistent; petals purple, apex unnotched 13. *Chaerophyllopsis*
 - 73b. Fruit globose, ovoid to cylindrical, not beaked; druse crystals absent in parenchyma surrounding carpophore.
 - 82a. Fruit globose-ovoid, pericarp hard (tribe Coriandreae).
 - 83a. Plants annual or biennial; cauline leaves heteromorphic; fruit globose 15. *Coriandrum*
 - 83b. Plants perennial; cauline leaves not heteromorphic; fruit biglobose 16. *Schrenkia*
 - 82b. Fruit cylindrical to ovoid, pericarp not hard (tribe Smyrnieae).
 - 84a. Fruit ribs unwinged; mericarp rounded in cross section or near pentagonal.
 - 85a. Umbels sessile, appearing simple; petals plane, apex acute, slightly incurved 17. *Oreomyrrhis*
 - 85b. Umbels pedunculate, obviously compound; petal apex narrowly inflexed.
 - 86a. Primary and secondary fruit ribs conspicuous 22. *Chamaesium*
 - 86b. Primary fruit ribs conspicuous, secondary ribs obscure.
 - 87a. Seed face deeply concave or sulcate.
 - 88a. Fruit ribs faint, furrows obscure; vittae numerous 21. *Changium*
 - 88b. Fruit ribs filiform, prominent, furrow conspicuous; vittae 1–3 in each furrow.
 - 89a. Rootstock tuber-like; ultimate leaf segments narrowly linear 33. *Scaligeria*
 - 89b. Rootstock not tuber-like; ultimate leaf segments oblong to broadly ovate.
 - 90a. Fruit vittae 1 in each furrow, 2 on commissure 26. *Cyclorhiza*
 - 90b. Fruit vittae 3–5 in each furrow, 6 on commissure 25. *Vicatia*
 - 87b. Seed face plane or slightly concave, never sulcate.
 - 91a. Fruit narrowly long-ovate, tapering toward apex, base not cordate 19. *Meeboldia*
 - 91b. Fruit ovoid-globose or long-ellipsoid, apex rounded, base usually cordate.
 - 92a. Fruit surface usually tuberculate 30. *Trachydium*
 - 92b. Fruit glabrous, not tuberculate.
 - 93a. Petal midvein inconspicuous; stylopodium depressed 20. *Tongoloa*
 - 93b. Petal midvein conspicuous; stylopodium conic.
 - 94a. Leaves 2-ternate-pinnate; ultimate segments broadly ovate-rhombic; petals dark purple 29. *Melanosciadium*
 - 94b. Leaves 1–2-pinnate, rarely undivided, ultimate segments oblanceolate, obovate

APIACEAE

- or long-ovate; petals white, yellow or purple 18. *Physospermopsis*
- 84b. Fruit ribs winged (or unwinged and corky-thickened); mericarp pentagonal in cross section or slightly flattened dorsally.
 - 95a. Fruit ribs corky-thickened, winged or unwinged 32. *Prangos*
 - 95b. Fruit ribs thinly winged, not corky.
 - 96a. Bracts and bracteoles few to many, small, undivided.
 - 97a. Fruit ribs sinuate-winged; vittae numerous, encircling seed 31. *Conium*
 - 97b. Fruit ribs plane-winged; vittae 3–4 in each furrow, 4–6 on commissure 27. *Notopterygium*
 - 96b. Bracts and bracteoles well developed, membranous-margined, usually pinnate or apex 3-lobed.
 - 98a. Petals yellow, apex not narrow and inflexed; dorsal ribs filiform, lateral ribs narrow-winged 28. *Sinolimprichtia*
 - 98b. Petals white or pinkish, apex narrow, inflexed; fruit ribs usually undulate, cristate or semi-winged.
 - 99a. Bracteoles herbaceous, often falling in fruit; umbellules not densely crowded (pedicels conspicuous) 23. *Pleurospermum*
 - 99b. Bracteoles stiff, papery, persistent in fruit; umbellules densely crowded (pedicels very short) 24. *Pleurospermopsis*

Multi-access key to genera

A multi-access system of identification allows the user to select from a suite of characters and so provides a means of identification for incomplete or otherwise less than optimal material (e.g., flowering specimens with no fruit). This system has proved to be very effective for Apiaceae in other geographic regions (e.g., Hedge and Lamond, Fl. Turkey 4: 208–288. 1972), and the following key follows the format successfully developed for the Turkish genera. These paper-based systems are the precursors of current interactive electronic identification tools (e.g., “ActKey” datasets on the *Flora of China* web site), but we believe that the simplified, printed version still has its place.

Instructions

Compare the plant material in hand with the following list of characteristics. Record, in order, the code letters for the characters judged applicable to the material, and miss out codes for absent features (e.g., petal color code A or B would be missing when only fruiting material is available). The resultant formula can then be traced in the alphabetically arranged index of formulas. Even if some letters are missing, it is often possible to identify the genus by checking the possible combinations against the index.

List of characteristics

| Code | Characteristics | Guidance notes |
|--------------------------------------|---|---|
| Flowers | | |
| A | Petals white, creamy white, pink, purplish, violet, red, pale blue or green | Some taxa with white petals dry bright yellow (e.g., <i>Daucus</i>) but should still be coded as A |
| B | Petals distinctly yellow | |
| C | Calyx teeth obsolete | Calyx teeth can be observed in flower or fruit (when persistent) |
| D | Calyx teeth small, triangular | |
| E | Calyx teeth large, lanceolate or subulate | |
| Basal or lower cauline leaves | | |
| F | Simple, entire or toothed | Transitions between F and G occur, and in most cases these are coded as G; in doubtful cases both states should be considered |
| G | Lobed, ternate or palmate | |
| H | 1-pinnate or pinnatisect | |
| I | 2-pinnate/2-ternate/2-pinnatisect or more | |
| Fruit | | |
| J | Length more than 3 × width | Length includes the stylopodium, but not the styles; borderline cases are coded as K |
| K | Length less than 3 × width | |
| L | Surface ornamented with hairs or spines, bristles, scales or papillae | |
| M | Surface glabrous, smooth, ribbed or ribs developed into wavy wings | |
| N | Mericarps strongly compressed, thickness (excluding wings) less than 1/3 × width in cross section | Immature fruits of the flat group may appear to be not strongly compressed (e.g., <i>Peucedanum</i>). In doubtful cases both states should be considered |
| O | Mericarps (excluding wings) not strongly compressed, thickness more than 1/3 × width | |
| Bracteoles | | |
| P | Simple, entire | This character is best observed in flowering material as bracteoles may fall after flowering; plants with |
| Q | Pinnately divided or lobed | |

APIACEAE

| | | |
|---------------------------|--|--|
| R | Absent | occasionally divided bracteoles should be coded P |
| Vittae arrangement | | |
| S | 1 in every furrow | Code S should only be used where <i>all</i> furrows have only 1 vitta, otherwise use code T |
| T | More than 1 in at least some furrows | |
| U | Absent or obscure | |
| Stem base | | |
| V | Stem base (caudex) clothed in fibrous remnant leaf sheaths, often densely so | Fibrous collars are not always evident and this character is not consistently recorded for all genera; alternative states should be considered |
| W | Stem base clothed in papery remnant leaf sheaths | |
| X | Stem base naked, remnant sheaths absent | |
| Life history | | |
| Y | Annual | |
| Z | Biennial or perennial | |

Example

An unrecognized genus with white flowers, obsolete calyx teeth, ternate leaves, long, narrow, bristly, terete fruit with obscure vittae, simple bracteoles, and perennial stem base without remnant sheaths will be found to have the formula ACGJLOPUXZ. Tracing this formula in the alphabetic index will show that the plant belongs to the genus *Osmorhiza*. In some cases several genera will share the same formula, and bullet-pointed (●) supplementary features are added which will help differentiate between these genera or, in the case of a morphologically diverse genus, the group of species that has that formula within the genus. For example a plant from Xinjiang with white flowers, small, triangular calyx teeth, 2-pinnate leaves, short, flat, scaly fruit with solitary vittae in the furrows, simple bracteoles, and perennial stem base with fibrous collar would have the formula ADIKLNPSVZ. This formula applies to *Heracleum*, *Saposhnikovia*, *Semenovia*, and *Zosima*. The plant is compared with the supplementary features for these four genera and is seen to have outer parts of the fruit wing inflated and corky, and is therefore identified as *Zosima*. When a character used in the formula is not present on incomplete material, all alternative states for the character should be tried, and in most cases it will still be possible to identify the genus using the key.

Index of formulas

| Formula | Supplementary features | Genus |
|------------|--|----------------------------|
| ACFKLOPTXZ | | 48. <i>Pimpinella</i> |
| ACFKLORTXY | | 48. <i>Pimpinella</i> |
| ACFKMNPUXZ | ● Fruit laterally compressed; bracts absent; fruit lateral ribs obscure | 1. <i>Hydrocotyle</i> |
| | ● Fruit laterally compressed; bracts small, fruit lateral ribs prominent | 2. <i>Centella</i> |
| | ● Fruit dorsally compressed; bracts 2, large, leaf-like | 3. <i>Dickinsia</i> |
| ACFKMOPTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ACFKMOPTXZ | ● Bracteoles enlarged, enveloping flowers; leaves lanceolate | 34. <i>Bupleurum</i> |
| | ● Bracteoles small, linear, shorter than flowers; leaves ovate | 48. <i>Pimpinella</i> |
| ACFKMOQTVZ | ● Young fruit usually emerald green | 18. <i>Physospermopsis</i> |
| | ● Young fruit pale to dark green | 30. <i>Trachydium</i> |
| ACFKMORTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ACFKMORTXY | | 48. <i>Pimpinella</i> |
| ACGJLOPUXZ | Fruit narrow, club-shaped, bristles upwardly pointed | 9. <i>Osmorhiza</i> |
| ACGKLOPTXY | | 48. <i>Pimpinella</i> |
| ACGKLOPTXZ | | 48. <i>Pimpinella</i> |
| ACGKLORTXY | | 48. <i>Pimpinella</i> |
| ACGKLORTXZ | | 48. <i>Pimpinella</i> |
| ACGKMOPTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ACGKMOPTXZ | | 48. <i>Pimpinella</i> |
| ACGKMORSXY | Plants aromatic; peduncles very short, umbels usually leaf-opposed | 37. <i>Apium</i> |
| ACGKMORSXZ | Plants aromatic; peduncles very short, umbels usually leaf-opposed | 37. <i>Apium</i> |
| ACGKMORTXZ | ● Petals acute or obtuse; leaf sheaths broad; rhizome elongate | 45. <i>Sinocarum</i> |
| | ● Petals usually long acuminate; tuber often globose | 49. <i>Acronema</i> |
| ACHJMOPSVZ | | 23. <i>Pleurospermum</i> |
| ACHKLNPSVZ | Vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| ACHKLOPSVZ | Arid land plants; fruit densely white pubescent | 41. <i>Eriocycla</i> |

APIACEAE

| | | |
|------------|---|----------------------------|
| ACHKLOPTXZ | Mesic plants; fruits scabrous | 48. <i>Pimpinella</i> |
| ACHKLORTXY | Mesic plants; fruits scabrous | 48. <i>Pimpinella</i> |
| ACHKMNPSVZ | Vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| ACHKMOPSVZ | Bract and bracteole margins usually white membranous | 23. <i>Pleurospermum</i> |
| ACHKMOPTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ACHKMOPTWZ | High altitude, stemless plants; commissure vittae 8 | 47. <i>Chamaesciadium</i> |
| ACHKMOPTXY | | 48. <i>Pimpinella</i> |
| ACHKMOPTXZ | • Plants slender; petals usually long acuminate, rarely acute | 49. <i>Acronema</i> |
| | • Plants large, robust; petals rounded or obcordate | 72. <i>Ligusticum</i> |
| ACHKMOQTVZ | Young fruit usually emerald green | 18. <i>Physospermopsis</i> |
| ACHKMORSXY | Plant aromatic; peduncles very short, umbels usually leaf-opposed | 37. <i>Apium</i> |
| ACHKMORSXZ | Plant aromatic; peduncles very short, umbels usually leaf-opposed | 37. <i>Apium</i> |
| ACHKMORTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ACHKMORTXY | | 48. <i>Pimpinella</i> |
| ACIJLOPUXZ | • Fruit long-ovoid, warty or short-bristly; leaves finely dissected | 8. <i>Anthriscus</i> |
| | • Fruit narrowly clavate, bristles apically pointed; leaflets broad | 9. <i>Osmorhiza</i> |
| ACIJLOQUXY | Fruit beak long | 14. <i>Scandix</i> |
| ACIJMOPSVZ | Bract and bracteole margins usually white membranous | 23. <i>Pleurospermum</i> |
| ACIJMOPSYX | Bracteoles patent; pedicel apex glabrous; fruit linear-oblong | 6. <i>Chaerophyllum</i> |
| ACIJMOPSXZ | Bracteoles patent; pedicel apex glabrous; fruit linear-oblong | 6. <i>Chaerophyllum</i> |
| ACIJMOPUXZ | Bracteoles deflexed; pedicel apex hairy; fruit long-ovoid | 8. <i>Anthriscus</i> |
| ACIKLNPSXZ | • Vittae linear, long; fruit wings without marginal vascular bundle | 82. <i>Angelica</i> |
| | • Vittae usually clavate, short; fruit wings with marginal vascular bundle | 96. <i>Heracleum</i> |
| ACIKLNPTXZ | • Fruit lateral rib wings broad, divergent at maturity, dorsal ribs thick | 82. <i>Angelica</i> |
| | • Fruit lateral rib wings membranous, less than 2 × width of dorsal, closely appressed at maturity | 91. <i>Peucedanum</i> |
| ACIKLNQTXZ | Fruit lateral rib wings membranous, less than 2 × width of dorsal | 91. <i>Peucedanum</i> |
| ACIKLOPSVZ | Arid land plants; fruit densely white pubescent | 41. <i>Eriocycla</i> |
| ACIKLOPSXY | Fruit and ovary densely covered in clavate-tipped bristles | 35. <i>Aphanopleura</i> |
| ACIKLOPTXY | • Bracts absent | 40. <i>Trachyspermum</i> |
| | • Bracts present | 48. <i>Pimpinella</i> |
| ACIKLOPTXZ | • Flowers, pedicels and rays dark purple; umbels small | 29. <i>Melanosciadium</i> |
| | • Bracts linear or lanceolate, not membranous | 48. <i>Pimpinella</i> |
| | • Bracts conspicuous, broad, membranous, pale green | 54. <i>Nothosmyrnium</i> |
| ACIKLORTXY | Bracts present | 48. <i>Pimpinella</i> |
| ACIKLORTXZ | Bracts absent | 40. <i>Trachyspermum</i> |
| ACIKMNPSXZ | • Fruit lateral rib wings broader than dorsal, ribs without vascular bundles, vittae linear, long; leaf sheaths narrow | 78. <i>Conioselinum</i> |
| | • Fruit ribs all broadly and thickly winged; Jilin | 80. <i>Coelopleurum</i> |
| | • Fruit lateral rib wings broader than dorsal, lateral wings without marginal vascular bundle; vittae linear, long; leaf sheaths broad | 82. <i>Angelica</i> |
| | • Fruit lateral rib wings membranous, less than 2 × width of dorsal, closely appressed at maturity | 91. <i>Peucedanum</i> |
| | • Fruit lateral rib wings broader than dorsal, lateral wings with marginal vascular bundle; vittae usually clavate, short | 96. <i>Heracleum</i> |
| ACIKMNPTXZ | • Fruit lateral rib wings broader than dorsal, ribs without vascular bundles, vittae discrete, not encircling the seed; leaf sheaths narrow | 78. <i>Conioselinum</i> |
| | • Fruit ribs all winged, ribs with vascular bundles, vittae small, many almost encircling and adhering to the seed; leaf sheath broad | 79. <i>Archangelica</i> |
| | • Fruit ribs all winged, vittae discrete, linear, not encircling seed; leaf sheaths broad | 80. <i>Coelopleurum</i> |

APIACEAE

| | | |
|---------------------------|---|----------------------------|
| | <ul style="list-style-type: none"> • Fruit lateral rib wings broader than dorsal; vittae discrete, not encircling the seed; leaf sheaths broad; petals radiant; NE China | 81. <i>Czernaevia</i> |
| ACIKMNPTXZ
(continued) | <ul style="list-style-type: none"> • Fruit lateral rib wings broader than dorsal; vittae discrete, not encircling the seed; leaf sheaths broad; petals equal | 82. <i>Angelica</i> |
| | <ul style="list-style-type: none"> • Fruit lateral rib wings membranous, less than 2 × width of dorsal, closely appressed at maturity | 91. <i>Peucedanum</i> |
| ACIKMNQTVZ | Fruit lateral rib wings membranous, less than 2 × width of dorsal | 91. <i>Peucedanum</i> |
| ACIKMOPSVZ | <ul style="list-style-type: none"> • Bracts and bracteoles margin usually white membranous; fruit ribs all winged, wings often sinuate, cristate or dentate | 23. <i>Pleurospermum</i> |
| | <ul style="list-style-type: none"> • Bracteoles broad, membranous; rays subequal; fruit oblong-ovoid, slightly dorsally compressed, ribs filiform; W Xinjiang | 53. <i>Hyalolaena</i> |
| | <ul style="list-style-type: none"> • Bracteoles fused at base; stylopodium deeply lobed; N Xinjiang | 67. <i>Lithosciadium</i> |
| | <ul style="list-style-type: none"> • Bracteoles linear; fruit ovate, dorsally compressed, lateral ribs usually winged, dorsal ribs usually prominent | 72. <i>Ligusticum</i> |
| ACIKMOPSWZ | Rays and pedicels often very unequal | 44. <i>Carum</i> |
| ACIKMOPSVZ | <ul style="list-style-type: none"> • Leaves shiny, aromatic (parsley), upper leaf segments linear | 38. <i>Petroselinum</i> |
| | <ul style="list-style-type: none"> • Bracts 2-pinnate, filiform, long; fruit ovoid-oblong, ribs acute | 43. <i>Ammi</i> |
| | <ul style="list-style-type: none"> • Bracts linear or absent; fruit ovoid-globose, ribs carinate or narrowly winged; N Sichuan, SE Xizang, N Yunnan | 50. <i>Harrysmithia</i> |
| ACIKMOPSVZ | <ul style="list-style-type: none"> • Bracts linear or absent; fruit ovoid-oblong, ribs acute; plant with a globose tuber; W Xinjiang | 10. <i>Krasnovia</i> |
| | <ul style="list-style-type: none"> • Leaflets filiform; bracts filiform; fruit oblong-ellipsoid, ribs filiform; plant with a globose tuber; W Xinjiang | 33. <i>Scaligeria</i> |
| | <ul style="list-style-type: none"> • Leaves shiny, aromatic (parsley), basal leaves with broader segments, upper leaf segments linear; bracts few, linear or absent | 38. <i>Petroselinum</i> |
| | <ul style="list-style-type: none"> • Bracts 2-pinnate, filiform, long; leaflets filiform; fruit ovoid-oblong | 43. <i>Ammi</i> |
| | <ul style="list-style-type: none"> • Leaflets linear; bracts absent; fruit ribs all narrowly winged, vittae large; W Xinjiang | 52. <i>Seselopsis</i> |
| | <ul style="list-style-type: none"> • Leaflets obovate; bracts linear; fruit oblong-ovoid, slightly dorsally compressed, all ribs narrow, corky | 68. <i>Cnidium</i> |
| ACIKMOPTVZ | <ul style="list-style-type: none"> • Bracteoles linear; fruit ovate, dorsally compressed, lateral ribs usually winged, dorsal ribs usually prominent | 72. <i>Ligusticum</i> |
| | <ul style="list-style-type: none"> • Bracteoles linear; fruit large, oblong to ellipsoid, mesocarp thick, corky, seed face involute, T-shaped; W Xinjiang | 32. <i>Prangos</i> |
| | <ul style="list-style-type: none"> • Bracteoles broad, membranous; fruit oblong-ovoid, slightly dorsally compressed, ribs filiform; W Xinjiang | 53. <i>Hyalolaena</i> |
| | <ul style="list-style-type: none"> • Bracteoles linear, very long, 2–3 × umbellule; S Xizang | 77. <i>Oreocmopsis</i> |
| ACIKMOPTWZ | <ul style="list-style-type: none"> • Plant dying down in summer; fruit ribs obscure, vittae numerous throughout mesocarp, seed face deeply sulcate; E China | 21. <i>Changium</i> |
| | <ul style="list-style-type: none"> • Bracteoles linear; rays often very unequal; fruit oblong-ellipsoid, slightly laterally compressed | 44. <i>Carum</i> |
| ACIKMOPTXZ | <ul style="list-style-type: none"> • Bracteoles linear, deflexed; fruit linear-oblong, ribs prominent, seed face broadly sulcate | 7. <i>Sphallerocarpus</i> |
| | <ul style="list-style-type: none"> • Petals clawed; seed face deeply sulcate; fruit ribs filiform | 25. <i>Vicatia</i> |
| | <ul style="list-style-type: none"> • Stem purple spotted; vittae numerous encircling seed; fruit ribs sinuate ridged | 31. <i>Conium</i> |
| | <ul style="list-style-type: none"> • Petals acute or obtuse; leaf sheaths broad; rhizome elongate | 45. <i>Sinocarum</i> |
| | <ul style="list-style-type: none"> • Fruit ribs filiform, vittae several in ring around seed; seed face plane | 48. <i>Pimpinella</i> |
| | <ul style="list-style-type: none"> • Petals usually long acuminate, rarely acute; seed face plane | 49. <i>Acronema</i> |
| | <ul style="list-style-type: none"> • Bracts large, conspicuous, often reflexed after flowering; ribs filiform | 54. <i>Nothosmyrnum</i> |
| ACIKMOQSVZ | Bracts and bracteole margins usually white membranous; fruit wings often sinuate, cristate or dentate | 23. <i>Pleurospermum</i> |
| ACIKMOQSVZ | Rosette perennial; bracts and bracteoles longer than flowers; Taiwan | 17. <i>Oreomyrrhis</i> |
| ACIKMOQTVZ | <ul style="list-style-type: none"> • Fruit often tuberculate | 30. <i>Trachydium</i> |
| | <ul style="list-style-type: none"> • Young fruit usually emerald green, ribs filiform | 18. <i>Physospermopsis</i> |

APIACEAE

| | | |
|---------------------------|---|-----------------------------|
| | • Bracts and bracteole margins usually white membranous; fruit wings often sinuate, cristate or dentate | 23. <i>Pleurospermum</i> |
| ACIKMOQTVZ
(continued) | • Bracts and bracteoles 2–3-pinnate; fruit ribs narrow, slightly winged | 62. <i>Schulzia</i> |
| ACIKMORSVZ | • Leaflets linear, long; fruit ribs prominent; Xinjiang | 71. <i>Cenolophium</i> |
| | • Leaflets broad; fruit ribs all winged; Jilin | 80. <i>Coelopleurum</i> |
| ACIKMORSXY | Leaves filiform; umbels almost sessile, central flower almost sessile | 56. <i>Cyclospermum</i> |
| ACIKMORSXZ | Rays often very unequal; fruit oblong-ellipsoid, ribs filiform | 44. <i>Carum</i> |
| ACIKMORTXY | Rays subequal; fruit ovoid | 48. <i>Pimpinella</i> |
| ACIKMORTXZ | • Petals obtuse or rounded, clawed; leaf sheaths narrow | 20. <i>Tongoloa</i> |
| | • Petals acute or obtuse; leaf sheaths broad; rhizome elongate | 45. <i>Sinocarum</i> |
| | • Petals usually long acuminate, rarely acute; rhizome globose | 49. <i>Acronema</i> |
| ACIKMORUXZ | Leaflets broad | 51. <i>Aegopodium</i> |
| ADFKMOPTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ADFKMOQTVZ | Young fruit usually emerald green | 18. <i>Physospermopsis</i> |
| ADGJMOPTXZ | Umbels 2–4-flowered, inflorescence branches very unequal | 42. <i>Cryptotaenia</i> |
| ADGKLOPSVZ | | 60. <i>Seseli</i> |
| ADGKMOPSVZ | | 60. <i>Seseli</i> |
| ADGKMOPTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ADGKMOPTXY | Rays very slender; umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| ADGKMORTVZ | Fruit often tuberculate | 30. <i>Trachydium</i> |
| ADGKMORTXZ | Petals usually long acuminate, rarely acute | 49. <i>Acronema</i> |
| ADHJMOPSVZ | Bract and bracteole margin usually white membranous | 23. <i>Pleurospermum</i> |
| ADHKLNPSVZ | • Fruit sparsely to moderately hairy, vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| | • Fruit densely white villous, vittae filiform, long | 97. <i>Semenovia</i> |
| ADHKLOPSVZ | • Arid land plants; fruit densely white villous, ribs rounded or keeled | 41. <i>Eriocycla</i> |
| | • Fruit variously hairy but not densely villous, ribs filiform | 60. <i>Seseli</i> |
| ADHKLOPTVZ | | 60. <i>Seseli</i> |
| ADHKMNPSVZ | • Fruit sparsely to moderately hairy, vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| | • Fruit densely white villous, vittae filiform, long | 97. <i>Semenovia</i> |
| ADHKMOPSVZ | • Bract and bracteole margin usually white membranous; fruit ribs all narrowly winged | 23. <i>Pleurospermum</i> |
| | • Bract and bracteole margin concolorous; fruit ribs rounded or keeled | 60. <i>Seseli</i> |
| ADHKMOPSWZ | • Stylopodium flat, margin expanded (flanged); primary and secondary fruit ribs prominent to narrowly winged; petals greenish | 22. <i>Chamaesium</i> |
| | • Bract and bracteole margin usually white membranous | 23. <i>Pleurospermum</i> |
| ADHKMOPTVZ | • Bract and bracteole margin usually white membranous; fruit slightly dorsally compressed, ribs equal | 23. <i>Pleurospermum</i> |
| | • Bracteoles concolorous, fused at base; fruit slightly to moderately dorsally compressed, ribs equal | 60. <i>Seseli</i> |
| | • Fruit moderately to strongly dorsally compressed, lateral ribs usually winged, dorsal ribs prominent | 72. <i>Ligusticum</i> |
| ADHKMOPTWZ | • Bract and bracteole margin usually white membranous | 23. <i>Pleurospermum</i> |
| | • Bracts and bracteoles stiff, rigid, persistent in fruit | 24. <i>Pleurospermopsis</i> |
| ADHKMOPTXY | Rays very slender; umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| ADHKMOPTXZ | • Rays very slender; umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| | • Wetland and water plants; leaflets sessile | 58. <i>Sium</i> |
| ADHKMOQSVZ | Bract and bracteole margin usually white membranous | 23. <i>Pleurospermum</i> |

APIACEAE

| | | |
|------------|---|----------------------------|
| ADHKMOQSWZ | <ul style="list-style-type: none"> • Stylopodium flat, margin expanded (flanged); primary and secondary fruit ribs prominent to narrowly winged; petals greenish | 22. <i>Chamaesium</i> |
| | <ul style="list-style-type: none"> • Bract and bracteole margin usually white membranous | 23. <i>Pleurospermum</i> |
| ADHKMOQTVZ | <ul style="list-style-type: none"> • Young fruit usually emerald green, ribs filiform | 18. <i>Physospermopsis</i> |
| | <ul style="list-style-type: none"> • Bract and bracteole margin usually white membranous; fruit slightly dorsally compressed, ribs equal, narrowly winged | 23. <i>Pleurospermum</i> |
| | <ul style="list-style-type: none"> • Fruit moderately to strongly dorsally compressed, lateral ribs usually winged, dorsal ribs prominent | 72. <i>Ligusticum</i> |
| ADHKMOQTVZ | Bract and bracteole margin usually white membranous | 23. <i>Pleurospermum</i> |
| ADHKMORSWZ | Stylopodium flat, margin expanded (flanged); primary and secondary fruit ribs prominent to narrowly winged; petals greenish | 22. <i>Chamaesium</i> |
| ADHKMORTVZ | | 60. <i>Seseli</i> |
| ADHKMORTXZ | <ul style="list-style-type: none"> • Petals acute or obtuse; leaf sheaths broad; rhizome elongate | 45. <i>Sinocarum</i> |
| | <ul style="list-style-type: none"> • Petals usually long acuminate, rarely acute; rhizome tuberous | 49. <i>Acronema</i> |
| ADIJMOPSVZ | Bract and bracteole margin usually white membranous | 23. <i>Pleurospermum</i> |
| ADIKLNPSVZ | <ul style="list-style-type: none"> • Fruit densely minute-pubescent, ribs broad, outer parts inflated and corky; SW Xinjiang | 95. <i>Zosima</i> |
| | <ul style="list-style-type: none"> • Fruit pubescent but not densely so, vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| | <ul style="list-style-type: none"> • Fruit densely white pilose or scabrid, vittae long, filiform | 97. <i>Semenovia</i> |
| | <ul style="list-style-type: none"> • Ovaries densely white-tuberculate; fruit secondary ribs prominent, ribs each with 1 large vitta; NE China | 99. <i>Saposhnikovia</i> |
| ADIKLNPSXZ | Vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| ADIKLNPTVZ | Fruit lateral rib wings membranous, less than 2 × width of dorsal | 91. <i>Peucedanum</i> |
| ADIKLOPSVZ | <ul style="list-style-type: none"> • Arid land plants; fruit densely white villous, ribs rounded or keeled | 41. <i>Eriocycla</i> |
| | <ul style="list-style-type: none"> • Fruit variously hairy but not densely villous, ribs filiform | 60. <i>Seseli</i> |
| | <ul style="list-style-type: none"> • Plants dwarf, almost stemless; fruit ribs with stiff membranous denticles and short hairs; high altitudes; Xinjiang | 70. <i>Stenocoelium</i> |
| ADIKLOPSXY | Fruit densely covered with upwardly hooked bristles | 11. <i>Torilis</i> |
| ADIKLOPSXZ | Fruit densely covered with upwardly hooked bristles | 11. <i>Torilis</i> |
| ADIKLOPTVZ | Fruit moderately to slightly dorsally compressed, all ribs prominent | 60. <i>Seseli</i> |
| ADIKLOQSXZ | Fruit with glochidiate prickles, rays incurved after anthesis | 100. <i>Daucus</i> |
| ADIKMNPSVZ | <ul style="list-style-type: none"> • Petals yellowish; ovary sparsely hirsute; fruit glabrescent, vittae filiform; Xinjiang | 89. <i>Soranthus</i> |
| | <ul style="list-style-type: none"> • Fruit pubescent but not densely so, vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| | <ul style="list-style-type: none"> • Fruit densely white pilose or scabrid, vittae filiform, long | 97. <i>Semenovia</i> |
| ADIKMNPSXZ | <ul style="list-style-type: none"> • Fruit ribs equal, filiform | 83. <i>Ostericum</i> |
| | <ul style="list-style-type: none"> • Fruit lateral rib wings membranous, less than 2 × width of dorsal | 91. <i>Peucedanum</i> |
| ADIKMNPTVZ | Vittae usually clavate, to 3/4 length of mericarp | 96. <i>Heracleum</i> |
| ADIKMNPTXZ | <ul style="list-style-type: none"> • Fruit ribs equal, filiform | 83. <i>Ostericum</i> |
| | <ul style="list-style-type: none"> • Fruit lateral rib wings membranous, less than 2 × width of dorsal | 91. <i>Peucedanum</i> |
| ADIKMNQSXZ | Fruit lateral rib wings membranous, less than 2 × width of dorsal | 91. <i>Peucedanum</i> |
| ADIKMNRSWZ | Stylopodium dilated, undulate | 86. <i>Arcuatopterus</i> |
| ADIKMNRTXZ | Stylopodium not dilated | 92. <i>Chuanminshen</i> |
| ADIKMOPSVZ | <ul style="list-style-type: none"> • Medium stature plants, moderate altitudes; fruit slightly to moderately dorsally compressed, ribs equal, prominent | 60. <i>Seseli</i> |
| | <ul style="list-style-type: none"> • Dwarf plants of high altitudes; fruit dorsally compressed, ribs all narrowly winged; W Sichuan, Xinjiang, Xizang | 73. <i>Pachypleurum</i> |
| ADIKMOPSXZ | <ul style="list-style-type: none"> • Marsh plants; rootstock thick with transverse air chambers, sap yellow; fruit ovoid-globose, ribs thick, corky | 39. <i>Cicuta</i> |

APIACEAE

| | | |
|---------------------------|---|----------------------------|
| | • Rays often very unequal; fruit oblong-ellipsoid, slightly laterally compressed, ribs filiform | 44. <i>Carum</i> |
| | • Rays very slender; umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| ADIKMOPTVZ | • Fruit slightly to moderately dorsally compressed, ribs equal, prominent | 60. <i>Seseli</i> |
| ADIKMOPTVZ
(continued) | • Fruit moderately to strongly dorsally compressed, lateral ribs usually winged, dorsal ribs prominent | 72. <i>Ligusticum</i> |
| | • Flowers in tight globose heads, petals dark purple-brown | 74. <i>Haplosphaera</i> |
| ADIKMOPTXZ | • Petals obtuse or rounded, clawed; leaf sheaths narrow | 20. <i>Tongoloa</i> |
| | • Fruit slightly dorsally compressed, ribs all broadly winged | 27. <i>Notopterygium</i> |
| | • Petals acute or obtuse; leaf sheaths broad; rhizome elongate | 45. <i>Sinocarum</i> |
| | • Rays very slender; umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| | • Petals usually long acuminate, rarely acute; rhizome tuberous | 49. <i>Acronema</i> |
| ADIKMOPUVZ | Leaves very finely divided, fruit bi-globose, pericarp hard; Xinjiang | 16. <i>Schrenkia</i> |
| ADIKMOPUXY | Fruit spherical, pericarp hard; plant strongly aromatic (coriander) | 15. <i>Coriandrum</i> |
| ADIKMOQSVZ | Dwarf, high-altitude plants; fruit ribs narrowly winged; Sichuan, Xinjiang, Xizang | 73. <i>Pachypleurum</i> |
| ADIKMOQTVZ | • Young fruit usually emerald green, ribs filiform | 18. <i>Physospermopsis</i> |
| | • Stem very thick; bracteoles 2–3-pinnate; fruit ribs narrowly winged | 28. <i>Sinolimprichtia</i> |
| | • Fruit moderately to strongly dorsally compressed, lateral ribs usually winged, dorsal ribs prominent | 72. <i>Ligusticum</i> |
| ADIKMOQTXZ | Fruit ribs all broadly winged; bracteoles pinnate | 27. <i>Notopterygium</i> |
| ADIKMORTVZ | | 60. <i>Seseli</i> |
| ADIKMORTXZ | • Petals obtuse or rounded, clawed; leaf sheaths narrow | 20. <i>Tongoloa</i> |
| | • Petals acute or obtuse; leaf sheaths broad; rhizome elongate | 45. <i>Sinocarum</i> |
| | • Petals usually long acuminate, rarely acute | 49. <i>Acronema</i> |
| AEFKLOPUXZ | Flowers sessile in heads; leaves spinose | 5. <i>Eryngium</i> |
| AEGKLNPTXZ | Coastal plant; ribs all corky winged | 85. <i>Glehnia</i> |
| AEGKLOPSXZ | Fruit with spines or bristles, fertile flowers few per umbellule | 4. <i>Sanicula</i> |
| AEGKLOPUXZ | Fruit with spines or bristles, fertile flowers few per umbellule | 4. <i>Sanicula</i> |
| AEGKMOPXZ | Rays very slender, umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| AEGKMOPTXZ | Rays very slender, umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| AEGKMOPUXZ | Rays very slender, umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| AEHKLNPTXZ | Coastal plant; ribs all corky winged | 85. <i>Glehnia</i> |
| AEHKLOPSXY | Fruit densely bristly, secondary ribs prominent | 12. <i>Turgenia</i> |
| AEHKMOPXZ | • Rays very slender, umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| | • Water and marsh plants; fruit ribs thick, corky | 61. <i>Oenanthe</i> |
| AEHKMOPTXZ | • Land plants; fruit ribs filiform | 48. <i>Pimpinella</i> |
| | • Rays very slender, umbellules usually 2- or 3-flowered | 46. <i>Pternopetalum</i> |
| | • Water plants; fruit ovoid, 2-globose, exocarp thick, corky, vittae small, forming a continuous band around the seed | 57. <i>Berula</i> |
| AEHKMOQTVZ | • Land plants; fruit moderately to strongly dorsally compressed, lateral ribs usually winged, dorsal ribs prominent | 72. <i>Ligusticum</i> |
| AEIKLNPSVZ | • Fruit ribs thick, corky, lateral ribs broadly winged; NE China | 90. <i>Phlojodicarpus</i> |
| | • Bracts and bracteoles large, conspicuous; S Xizang | 98. <i>Tordyliopsis</i> |
| AEIKLNPTVZ | Fruit ribs thick, corky, lateral ribs broadly winged; NE China | 90. <i>Phlojodicarpus</i> |
| AEIKLNPTXZ | Fruit lateral rib wings membranous, less than 2 × width of dorsal | 91. <i>Peucedanum</i> |
| AEIKLOPSVZ | | 59. <i>Libanotis</i> |
| AEIKLOPSXY | Rays and pedicels very unequal | 36. <i>Cuminum</i> |
| AEIKLOPTVZ | • Fruit long-obovoid or ellipsoid, slightly dorsally compressed, ribs obtuse; Liaoning, Shandong | 55. <i>Carlesia</i> |
| | • Fruit ovoid or oblong, slightly to moderately dorsally compressed, ribs filiform or acute; N China | 59. <i>Libanotis</i> |

| | | |
|------------|--|-----------------------|
| BDIKMNRSVZ | Fruit vittae very small; W Xinjiang | 93. <i>Talassia</i> |
| BDIKMORSWZ | Rootstock a cluster of semi-woody roots with annular scars | 26. <i>Cyclorhiza</i> |
| BEIKLNRTVZ | Fruit densely pubescent; N Xinjiang | 88. <i>Schumannia</i> |
| BEIKMOPUVZ | Wet habitats | 65. <i>Silaum</i> |

1. HYDROCOTYLE Linnaeus, Sp. Pl. 1: 234. 1753.

天胡荽属 tian hu sui shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson, John F. M. Cannon

Herbs perennial. Stem slender, creeping or decumbent, rooting at the nodes. Leaves petiolate; petioles not sheathing; stipules present, entire or parted to base, membranous; blade cordate, orbicular, or reniform. Inflorescence a simple umbel; umbels sometimes densely capitate; peduncles axillary, obsolete to much longer than leaves; bracts present or absent; pedicels very short or extended (best seen in fruiting material). Flowers bisexual. Calyx teeth minute or obsolete. Petals white, greenish or yellow, valvate, ovate, spreading. Stylopodium conic to depressed. Fruit globose or ellipsoid, strongly flattened laterally, base cordate, dorsal surface rounded, glabrous (rarely with white hairs); dorsal and lateral ribs usually conspicuous, slender, acute (rarely obsolete); vittae inconspicuous. Seed face plane to concave; endocarp woody. Carpophore usually absent.

About 75(–100) species: tropical and temperate regions worldwide; 14 species (five endemic) in China.

- 1a. Umbels several fascicled in axils and stem tip; peduncles shorter than the petioles, densely pubescent; flowers and fruit sessile 1. *H. nepalensis*
- 1b. Umbels solitary in axils, sometimes several at stem tip; peduncles shorter than or exceeding the petioles, glabrous or pubescent; flowers and fruit sessile or pedicellate.
- 2a. Leaf blade 0.5–1.5(–2.5) × 0.8–2(–5) cm; umbels sessile or peduncle distinctly shorter than petiole.
- 3a. Axillary umbels sessile, apical umbels often with peduncles to 1 cm; fruit with white hairs or glabrous 2. *H. pseudoconferta*
- 3b. All umbels pedunculate, peduncle 0.5–3.5 cm; fruit glabrous.
- 4a. Petiole glabrous or distally sparsely pubescent.
- 5a. Umbels solitary in axils, 5–18-flowered 3. *H. sibthorpioides*
- 5b. Umbels 2 or 3 in axils, 2–5-flowered 4. *H. calcicola*
- 4b. Petiole densely pubescent or hirsutulous throughout.
- 6a. Petiole 3–15 cm, pubescent; leaf blade 3(–5)-parted, segments 3-lobed (Taiwan) 5. *H. benguetensis*
- 6b. Petiole 0.5–3 cm, densely hirsutulous; leaf blade shallowly 5–7-lobed or nearly entire, lobes inconspicuously crenulate (Taiwan) 6. *H. dichondroides*
- 2b. Leaf blade 1–8 × 2–11 cm; peduncle longer or about equaling the petiole.
- 7a. Umbels not densely capitate in fruit; pedicels elongate, 2.5–8 mm.
- 8a. Leaf blade shallowly to moderately (to near middle) 5–7-lobed.
- 9a. Stems, petioles and peduncles glabrous or moderately hairy with white or brown hairs; leaves angular in outline, with 5 to 7 deep, usually triangular lobes 8. *H. hookeri*
- 9b. Stems, petioles and peduncles densely dark purple-brown hairy; leaves round in outline, with many very shallow, rounded lobes 12. *H. himalaica*
- 8b. Leaf blade 5–7-divided, usually parted to middle or near base.
- 10a. Leaf blade parted to near base; segments cuneate at base 7. *H. dielsiana*
- 10b. Leaf blade parted to 1/2–3/5; lobe base as broad as the middle 9. *H. wilsonii*
- 7b. Umbels densely capitate in fruit; pedicels to 2 mm.
- 11a. Stems, petioles and peduncles moderately to densely hairy with purple-brown hairs; leaves shallowly lobed or cleft to middle, lobes deltoid, apex acute 13. *H. salwinica*
- 11b. Stems, petioles and peduncles essentially glabrous, occasionally hairy at nodes or near distal ends; leaves very shallowly 5–7-lobed, lobes rounded-obtuse.
- 12a. Petioles short, 0.8–2.5 cm; leaf blade small, 0.7–1.3 × 0.8–1.6 cm, adaxially setulose, abaxially pubescent or hispid 14. *H. setulosa*
- 12b. Petioles (1–)15–19 cm; leaf blade larger, 1.5–3.5 × 2–7 cm, glabrous on both surfaces or sparsely hirsute along veins.
- 13a. Leaf blade glabrous on both surfaces or abaxially sparsely hirsute on veins; peduncles equaling or slightly longer than the petioles 10. *H. wilfordii*
- 13b. Leaf blade sparsely hirsute on both surfaces; peduncles 1–2 times longer than the petioles 11. *H. ramiflora*

1. *Hydrocotyle nepalensis* Hooker, Exot. Bot. 1. 1822.

红马蹄草 hong ma ti cao

Hydrocotyle polycephala Wight & Arnott.

Stems robust, decumbent 5–45 cm long. Petioles 4–27 cm, distally densely pubescent; leaf blade orbicular or reniform, 2–5

× 3.5–9 cm, shallowly 5–7-lobed, thin-papery, both surfaces strigose, base cordate, palmately 7–9-nerved, lobes triangular to rounded, crenate. Umbels several to numerous, fascicled in axils and ends of stems; each umbel densely capitate, 20–60-flowered; peduncles 0.5–2 cm, shorter than petioles, puberulous; bracts ovate or obovate, minute, membranous. Pedicels very short, 0.5–1.5(–2) mm in fruit. Petals white or with purplish red stains. Stylopodium depressed; styles incurved when young, spreading in fruit. Fruit pale brown or deep purple with dark stains when mature, broadly oblate-globose, 1–1.2 × 1.5–1.8 mm. Fl. and fr. May–Nov.

Mountain slopes, shady wet grassy places, stream banks; 300–3600 m. Anhui, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, NE India (Assam), Myanmar, E Nepal, Sikkim, Vietnam].

This species has reputed medicinal value. It is part of the highly variable complex of *Hydrocotyle javanica* Thunberg, which extends from Nepal east to Japan and south through Indonesia into Australia. The umbels fascicled at the nodes unite this group and differentiate it from other species of *Hydrocotyle*, but its classification is in need of revision across its whole geographic range.

2. *Hydrocotyle pseudoconferta* Masamune, J. Soc. Trop. Agric. 4: 301. 1932.

密伞天胡荽 mi san tian hu sui

Stem slender and creeping, 6–30 cm long, much-branched. Petioles 2–10(–23) cm; leaf blade round-reniform, 1–2.5 × 1.5–5 cm, shallowly 5–7-lobed, papery, both surfaces puberulous, base cordate, lobes rounded, crenate. Umbels usually solitary at the nodes, sessile; umbels at stem tip often in pairs and pedunculate; each umbel with few to several flowers; pedicels obsolete or almost so. Petals pale green to white, with transparent yellow glands. Styles short, ca. 0.5 mm, erect or spreading. Fruit yellowish green, broadly-globose, 1–1.2 × 1.5–2 mm, usually covered with purplish stains or white hairs. Fl. and fr. Apr–Oct.

Forests, wet valleys, roadsides; 800–1500 m. Taiwan (Jilong), Yunnan (Menghai, Yiwu) [Myanmar].

This species has reputed medicinal value.

3. *Hydrocotyle sibthorpioides* Lamarck, Encycl. 3: 153. 1789.

天胡荽 tian hu sui

Plants strongly aromatic. Stem weak, slender, filiform, creeping, diffusely branched. Petioles 0.7–9 cm, glabrous or distally pubescent; leaf blade reniform-rounded, 0.5–1.5 × 0.8–2.5 cm; membranous, variably hairy, adaxially glabrous and abaxially sparsely strigose along veins, or sometimes both surfaces glabrous or densely puberulous, base cordate, entire or shallowly 5–7-lobed, lobes rounded. Umbel solitary at the nodes, each umbel 5–8-flowered; peduncle filiform, 0.5–3.5 cm, 1–1/3 the length of the petioles; bracts ovate to ovate-lanceolate, 1–1.5 mm, membranous, with bright yellow glands; pedicels obsolete or almost so. Petals greenish white, ca. 1.2 mm, with yellow glands. Styles 0.6–1 mm, spreading. Fruit broadly globose, greenish yellow when young, covered with purplish stains when mature; intermediate ribs very prominent. Fl. and fr. Apr–Sep.

Forests, slopes, wet valleys, grassy places, stream banks; 100–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Nepal, Philippines, Thailand, Vietnam; tropical Africa].

- 1a. Leaf blade shallowly 5–7-lobed or nearly entire 3a. var. *sibthorpioides*
 1b. Leaf blade deeply 3–5-divided, parted nearly to base, divisions obovate 3b. var. *batrachium*

3a. *Hydrocotyle sibthorpioides* var. *sibthorpioides*

天胡荽(原变种) tian hu sui (yuan bian zhong)

Geophila yunnanensis H. Léveillé; *Hydrocotyle formosana* Masamune; *H. keelungensis* T. S. Liu et al.; *H. rotundifolia* Roxburgh ex de Candolle; *H. tenella* Buchanan-Hamilton ex D. Don.

Leaf blade shallowly 5–7-lobed or nearly entire, crenate.

Forests, wet grassy places, stream banks; 400–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Nepal, Thailand, Vietnam; tropical Africa].

This variety is the important medicinal herb “tian hu sui” of traditional Chinese medicine.

3b. *Hydrocotyle sibthorpioides* var. *batrachium* (Hance) Handel-Mazzetti ex R. H. Shan, *Sinensia* 7: 480. 1936.

破铜钱 po tong qian

Hydrocotyle batrachium Hance, *Ann. Sci. Nat., Bot., sér. 4*, 18: 220. 1862; *H. formosana* Masamune; *H. rotundifolia* var. *batrachium* (Hance) Chermeson.

Leaf blade deeply 3–5-divided, parted nearly to base, divisions obovate, crenate.

Slopes, wet valleys, grassy places; 100–2500 m. Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Sichuan, Taiwan [Philippines, Vietnam].

This variety has reputed medicinal value.

4. *Hydrocotyle calcicola* Y. H. Li, *Guihaia* 9: 25. 1989.

石山天胡荽 shi shan tian hu sui

Stem slender, elongate and creeping. Petioles 0.7–3 cm, glabrous; stipules small, subreniform, membranous, irregularly shallowly lobed; leaf blade rounded to reniform, 0.5–1.5 × 0.7–2.5 cm, base cordate, 5–7-lobed, lobes broadly obovate, margins serrate, adaxially sparsely setulose, abaxially glabrous. Umbels 2–3 in terminal cymose inflorescences and axillary, 2–5-flowered; peduncle slender, short, 1–2 cm; bracts lanceolate, ca. 1 mm; pedicels obsolete. Petals white, ca. 0.5 mm. Styles ca. 0.2 mm. Fruit globose 1–1.3 × 0.8–1.2 mm, surface glabrous, usually covered with purplish stains. Fl. and fr. Jul–Aug.

• Shady wet grassy places in limestone areas; ca. 1500 m. S Yunnan (Xishuangbanna).

This species is recorded only from the type collection and may not be distinct from *Hydrocotyle sibthorpioides*.

5. *Hydrocotyle benguetensis* Elmer, *Leafl. Philipp. Bot.* 2: 628. 1909.

吕宋天胡荽 lü song tian hu sui

Hydrocotyle ranunculifolia Ohwi.

Stems slender to somewhat fleshy, long, creeping, pilose. Petioles slender, 2–10(–15) cm, pubescent; leaf blade orbicular to ovate, 1–2.5 × 1–3 cm, 3(–5)-parted; segments 3-lobed, obovate, sparingly pubescent with rough white hairs. Umbels solitary at nodes, 2–13-flowered; peduncles 2–5 cm, densely pubescent; bracts 0.3–0.5 mm; pedicels 0.5–1 mm. Petals white. Styles ca. 0.5 mm. Fruit subglobose, 0.8–1.5 × 1.3–1.7 mm, glabrous. Fl. and fr. Mar–May.

Grasslands, beside slow-moving streams, roadsides; ca. 1800 m. C and N Taiwan [Japan, Korea, Philippines].

This species is recorded only from a few collections. It has reputed medicinal value.

6. *Hydrocotyle dichondroides* Makino, *Bot. Mag. (Tokyo)* 24: 242. 1910.

毛柄天胡荽 mao bing tian hu sui

Hydrocotyle sibthorpioides Lamarck var. *dichondroides* (Makino) M. Hiroe.

Stems slender, filiform, creeping to suberect, pilose. Petioles filiform, 0.5–3 cm, densely hirsutulous with recurved white hairs; leaf blade orbicular-reniform, 0.5–1.5 mm wide, glabrous or shortly puberulent along veins on adaxial surface, thin membranous, very shallowly crenately 5- or 7-lobed, lobes inconspicuously crenulate. Umbels solitary at nodes, 2–8-flowered; peduncles filiform, 1–3 cm, usually longer than leaves; pedicels very short, flowers almost sessile. Petals white. Fruit subglobose, ca. 1 mm wide, glabrous. Fl. and fr. Jun–Sep.

Wet walls and rocks; near sea level. N Taiwan (Taipei) [Japan].

This incompletely known species is recorded only from a few collections. It has reputed medicinal value.

7. *Hydrocotyle dielsiana* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 27: 112. 1929.

裂叶天胡荽 lie ye tian hu sui

Stem slender, decumbent, 15–30 cm, sparingly branched, branches less than 6 cm, proximally sparingly pubescent or glabrous, distally densely white pubescent. Petiole 2.5–7 cm; leaf blade cordate-rounded, 2–4 × 4–8 cm, palmately 5–7-divided, usually parted to near base; segments rhombic, ovate or obovate-lanceolate, sparsely appressed-hispid on both surfaces, dark purple, base cuneate, irregularly dentate or 3-lobed towards apex, apex acute or acuminate. Umbels 20–35-flowered; peduncles filiform, longer than petioles, densely white pubescent; bracts 1–1.2 mm, membranous. Petals white. Styles 0.7–1.1 mm, reflexed. Fruit pale purple when young, deep brown when mature, broadly cordate-globose, ca. 1.3 × 2.1 mm, glabrous. Fl. and fr. Jun–Jul.

• Wet places on mountain slopes, roadsides; ca. 1200 m. W Hubei (Badong), Sichuan.

8. *Hydrocotyle hookeri* (C. B. Clarke) Craib, Bull. Misc. Inform. Kew 1911: 59. 1911.

缅甸天胡荽 mian dian tian hu sui

Stem creeping to 1.5 m, basal parts becoming thickened, distal parts erect or decumbent, laxly branched, glabrous or sparsely pubescent with purple-brown hairs. Petioles stout, 7–19 cm, glabrous or sparsely to moderately pubescent with purple-brown hairs, especially near leaf blade; leaf blade broadly round-pentagonal, rhombic-pentagonal, round-reniform or cordate-orbicular in outline, 3.4–8 × 4–12 cm, membranous or papery, abaxially glabrous or sparsely hispid on veins, base deeply cordate, margin shallowly to deeply 5–7-lobed, parted to near middle, lobes acuminate to acute, finely serrate or irregularly doubly serrate. Umbels 30–55-flowered; peduncles slender, elongate, 6–16 cm, sparsely to moderately pubescent with purple-brown hairs, especially near umbel; bracts numerous, small; pedicels (3–)6–8 mm in fruit, glabrous. Petals white. Fruit brown-spotted, subglobose, 1–1.3 × 1.6–2 mm, base shallowly cordate or truncate. Fl. and fr. Jul–Aug.

Forest margins, woods, mountain slopes, valleys, grassy places, stream banks, wet places, roadsides; 900–2900 m. Guangdong, Hunan, SW Sichuan, SE Xizang, S and W Yunnan [Myanmar].

The name *Hydrocotyle burmanica* Kurz has been widely misapplied (e.g., in FRPS 55(1): 20. 1979) to Chinese plants that are in fact attributable to *H. hookeri*. True *H. burmanica* is a narrow endemic of S Myanmar.

- 1a. Leaf blade broadly round-pentagonal or rhombic-pentagonal in outline, 5-lobed 8a. subsp. *hookeri*
 1b. Leaf blade rounded in outline, 5–7-lobed.
 2a. Leaf blade round-reniform, shallowly 5–7-lobed, lobes apex obtuse 8b. subsp. *chinensis*
 2b. Leaf blade cordate-orbicular, deeply 5–7-lobed, lobes long-ovate or ovate-lanceolate 8c. subsp. *handelii*

8a. *Hydrocotyle hookeri* subsp. *hookeri*

缅甸天胡荽(原亚种) mian dian tian hu sui (yuan ya zhong)

Hydrocotyle javanica Thunberg var. *hookeri* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 668. 1879; *H. forrestii* H. Wolff.

Leaf blade broadly round-pentagonal or rhombic-pentagonal in outline, 5-lobed.

Woods, valleys, stream banks, wet places; 900–2400 m. Guangdong (Luofu Shan), SE Xizang, W Yunnan [Myanmar].

8b. *Hydrocotyle hookeri* subsp. *chinensis* (Dunn ex R. H. Shan & S. L. Liou) M. F. Watson & M. L. Sheh, Acta Phytotax. Sin. 42: 562. 2004.

中华天胡荽 zhong hua tian hu sui

Hydrocotyle javanica var. *chinensis* Dunn ex R. H. Shan & S. L. Liou, Acta Phytotax. Sin. 9: 129. 1964; *H. burmanica* Kurz subsp. *craibii* (H. Eichler) C. Y. Wu & F. T. Pu; *H. craibii* H. Eichler; *H. shanii* Boufford, nom. illeg. superfl.

Leaf blade round-reniform, shallowly 5–7-lobed, lobes apex obtuse; petiole and blade densely or sparsely white or purple pubescent.

• Grassy places, stream banks, shady wet roadsides; 1000–2900 m. Hunan, SW Sichuan, NW and S Yunnan [?Vietnam].

This variety has reputed medicinal value. Records from Vietnam need confirmation.

8c. *Hydrocotyle hookeri* subsp. *handelii* (H. Wolff) M. F. Watson & M. L. Sheh, Acta Phytotax. Sin. 42: 563. 2004.

普渡天胡荽 pu du tian hu sui

Hydrocotyle handelii H. Wolff in Handel-Mazzetti, Symb. Sin. 7: 707. 1933; *H. burmanica* Kurz subsp. *handelii* (H. Wolff) C. Y. Wu & F. T. Pu.

Leaf blade cordate-orbicular, deeply 5–7-lobed to below the middle, lobes long-ovate or ovate-lanceolate, adaxially densely appressed-hispid, abaxially glabrous.

• Forest margins, mountain slopes, grassy places, roadsides; 2300–2500 m. SW Sichuan (Miyi), S Yunnan (Pudu He).

This variety has reputed medicinal value.

9. *Hydrocotyle wilsonii* Diels ex R. H. Shan & S. L. Liou, Acta Phytotax. Sin. 9: 128. 1964.

鄂西天胡荽 e xi tian hu sui

Stem erect or decumbent, thin, yellowish at base, unbranched, densely puberulous, sometimes proximally glabrous. Petiole 4–12 cm, pubescent; leaf blade round-reniform or cordate-reniform, 2–4 × 3.5–7 cm, somewhat leathery, both surfaces appressed-strigose, base deeply cordate, deeply 5–7-divided to middle or below the middle; central segment broadly ovate or obovate, shallowly 3-lobed, irregularly serrate. Umbels many-flowered; peduncles thin, longer than petioles; bracts small, membranous; pedicels 2–4.5 mm, glabrous, spreading. Petals covered with purplish red stains. Styles reflexed when mature. Fruit purplish red when young, becoming dark purple, subglobose, ca. 1.2 × 1.8 mm. Fl. and fr. Jul–Aug.

• Bamboo forests, moist grassy places; 1200–1800 m. W Hubei (Badong, Jianshi), Chongqing (Fengjie).

10. *Hydrocotyle wilfordii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 45. 1886.

肾叶天胡荽 shen ye tian hu sui

Stem to 45 cm, creeping, branched, proximal parts rhizomatous, distal parts erect or decumbent. Petiole 3–10 cm, essentially glabrous but pubescent near leaf blade; leaf blade orbicular or reniform-rounded, 1.5–3.5 × 2–7 cm, both surfaces glabrous or abaxially sparsely hirsute on veins, base deep-cordate, margin very shallowly 7-lobed (some leaves parted to almost middle), lobes 3-crenate. Umbel many-flowered, solitary at nodes, sometimes 2–3 fascicled at tips of branches; peduncle longer than or equaling petiole; bracts small, membranous, with purplish stains. Petals white to pale yellow. Fruit light brown with purplish stains, subglobose, 1.2–1.8 × 1.5–2.1 mm. Fl. and fr. May–Sep.

Shady wet valleys, fields; 300–1400 m. Fujian, Guangdong,

Guangxi, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Vietnam].

11. *Hydrocotyle ramiflora* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 46. 1886.

长梗天胡荽 chang geng tian hu sui

Hydrocotyle maritima Honda; *Hydrocotyle ramiflora* var. *maritima* (Honda) M. Hiroe.

Stem 10–26 cm, creeping, thin and slender, distal parts decumbent. Petiole 1–15 cm; leaf blade orbicular or reniform, shallowly 5–7-lobed, lobes obtuse-orbicular or slightly deltoid, 0.8–2.3 × 1.6–4.5 cm, both surfaces sparsely hirsute or glabrous, base narrowly cordate with basal lobes overlapping. Umbels many-flowered, solitary at nodes; peduncle 1–2-times longer than petiole. Pedicels ca. 2 mm. Petals white with bright yellow glands. Styles incurved when young, strongly spreading when mature. Fruit purplish red when young becoming brown to dark purple, cordate-globose, 1–1.9 × 1.9–2.1 mm. Fl. and fr. Jun–Aug.

Woods, wet grassy places; 500–800 m. Taiwan (Taipei), Zhejiang (Tianmu Shan) [Japan; introduced in NE India, S Russia, and SW Turkey].

12. *Hydrocotyle himalaica* P. K. Mukherjee, Indian Forester 95: 470. 1969.

喜马拉雅天胡荽 xi ma la ya tian hu sui

Hydrocotyle javanica Thunberg var. *podantha* C. B. Clarke in J. D. Hooker Fl. Brit. India 2: 668. 1879, not *H. podantha* Molkenboer (1851).

Plants decumbent, stems, petioles and peduncles moderately to densely pubescent with dark purple-brown hairs. Stem to 50 cm. Petiole 3–18 cm; leaf blades orbicular or reniform, (0.8–)1.5–3.5(–6) × (1.2–)3–6(–8) cm, shallowly 5–7-lobed, lobes deltoid or rounded, both surfaces sparsely hirsute or covered with purplish verruciform hairs, obtusely repand-crenate, apex obtuse-rounded, principal nerves 9. Umbels many-flowered, densely capitate in flower; peduncle 3–8 cm, usually as long as or longer than petioles; pedicels 1–2 mm in flower, 4–7 mm in fruit. Petals white with yellow or purplish red glands. Styles 0.8–1 mm, spreading. Fruit brown to purplish red, cordate-globose, 1.0–1.2 × 1.5–2 mm. Fl. and fr. Jun–Jul.

Mountain valleys, shady moist grassy places; 100–2200 m. Guizhou, Hainan, W Sichuan, E Xizang, S and W Yunnan [Bhutan, N India, Myanmar, Nepal].

The Chinese record in FRPS (55(1): 28. 1979) of *Hydrocotyle podantha* Molkenboer is referable to this species.

13. *Hydrocotyle salwinica* R. H. Shan & S. L. Liou, Acta Phytotax. Sin. 9: 131. 1964.

怒江天胡荽 nu jiang tian hu sui

Hydrocotyle salwinica var. *obtusiloba* S. L. Liou.

Stem 50–70 cm, erect or decumbent, densely hirsute. Petioles 1–7.5 cm, stout, densely covered with dark purple-brown hairs; leaf blade reniform-orbicular, base deeply cordate, 1.5–

3.5 × 2.5–6 cm, shallowly 7–9-lobed, lobes deltoid or obtuse-deltoid, both surfaces densely dark brown hirsute, finely serrate or doubly serrate; the principal nerves 7–9. Umbels many-flowered, densely capitate in flower; peduncle 1.5–8 cm, usually longer than petioles, densely hirsute; pedicels ca. 0.5 mm in flower, 1–2 mm in fruit, forming dense capitate fruiting umbels. Petals ovate, white or pale green, usually with purple spots. Fruit ovoid to globose, ca. 1.5 × 2 mm, deep yellow to dark purple. Fl. and fr. Jun–Aug.

• *Pinus* woods, mountain slopes, valleys, moist grassy places; 1600–3100 m. E Xizang, NW Yunnan.

The Chinese record in FRPS (55(1): 26. 1979) of *Hydrocotyle hookeri* is referable to this species.

14. *Hydrocotyle setulosa* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25: 102. 1908.

刺毛天胡荽 ci mao tian hu sui

Hydrocotyle laxiflora Masamune (1932), not de Candolle (1830); *H. masamunei* M. Hiroe.

Stem creeping, younger branches erect, stems, petioles and peduncles retrorse villous with white or purplish hairs. Petioles 0.8–2.5 cm; leaf blade reniform to cordate, 7–13 × 8–16 mm, shallowly 7-lobed, lobes rounded, adaxially densely to moderately setulose, abaxially pubescent or hispid. Umbels many-flowered, densely capitate, solitary at nodes; peduncles 1.8–4

cm, 1.5–2 times petioles. Pedicels very short, ca. 1 mm. Fruit cordate or globose, 1–1.5 × 1.5–1.8 mm, smooth. Fl. and fr. Apr–Nov.

• Forests, mountain slopes, grassy places, damp mossy rocks; 1500–3000 m. Taiwan.

2. CENTELLA Linnaeus, Sp. Pl., ed. 2, 2. 1393. 1763.

积雪草属 *ji xue cao shu*

She Menglan (余孟兰 *Sheh Meng-lan*); Mark F. Watson

Herbs perennial. Stem slender and creeping, diffuse, nodes rooting. Leaves petiolate, forming rosettes along the creeping stem; petioles sheathing at base; blade simple, entire or shallowly dentate, palmately veined. Inflorescence simple; umbels loose to subcapitate, few-flowered; peduncles axillary, usually very short; bracts 2, membranous; pedicels slender to obsolete. Calyx teeth obsolete. Petals valvate, orbicular with a narrow inflexed apex. Stylopodium obsolete; styles short, equaling filaments. Fruit reniform or globose, base cordate to truncate, strongly laterally compressed; commissure narrow, constricted; primary and secondary ribs prominent, 7–9 per mericarp, filiform, reticulate nerves evident in between; oil-bearing layer beneath the epidermis present, occasionally containing small oil tubes (cf. *vittae*); endocarp woody. Seed narrowly oblong in cross section, face plane. Carpophore present, entire.

Twenty species: predominately in S Africa and tropical and subtropical regions; one species in China.

1. *Centella asiatica* (Linnaeus) Urban in Martius, Fl. Bras. 11(1): 287. 1879.

积雪草 *ji xue cao*

Hydrocotyle asiatica Linnaeus, Sp. Pl. 1: 234. 1753; *H. lurida* Hance.

Petiole 0.5–10(–30) cm; leaf blade orbicular or reniform, 1–4.5 × 1.5–5 cm, palmate veins 5–7, prominent, both surfaces glabrous or abaxially sparsely pubescent on the veins, base broadly cordate, coarsely toothed. Peduncles 2–4, clustered axillary, 0.2–1.5 cm; bracts 2 (rarely 3), ovate, 3–4 × 2.1–3 mm,

persistent in fruit; umbels 3–4-flowered, capitate. Flowers sessile or subsessile. Petals white or rose-tinged. Fruit 2.1–3 × 2.2–3.6 mm. Fl. and fr. Apr–Oct.

Shady, wet, grassy places, river margins; 200–1900 m. Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, S Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [widespread throughout tropical and subtropical countries worldwide, Bhutan, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

This species is similar in appearance to, and is sometimes mistaken for, *Dichondra micrantha* Urban (Convolvulaceae). It is sometimes eaten, and is an important herb (“*ji xue cao*”) of traditional Chinese medicine.

3. DICKINSIA Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 244. 1885.

马蹄芹属 *ma ti qin shu*

She Menglan (余孟兰 *Sheh Meng-lan*); Mark F. Watson

Cotylonia C. Norman.

Herbs annual or biennial, glabrous. Rootstock short and thick, roots fibrous, fasciculate. Stem erect, smooth, unbranched, leafless. Leaves long-petiolate; petiole expanded at base into short sheath; blade orbicular or reniform. Inflorescence terminal; umbels simple; bracts 2, foliaceous. Calyx teeth minute or obsolete. Petals ovate, flat, apex obtuse. Stylopodium conic; styles very short. Fruit rectangular-cubic, flattened dorsally; dorsal rib filiform, prominent, intermediate ribs obscure, lateral ribs winged; *vittae* obscure. Seed face plane. Carpophore shortly bifid at the apex, persistent.

• One species.

1. *Dickinsia hydrocotyloides* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 244. 1885.

马蹄芹 *ma ti qin*

Cotylonia bracteata C. Norman.

Herbs slender, 20–55 cm high. Basal leaves several; petiole 6–30 cm; blade rounded to reniform, 2–8 × 5–12 cm, nerves 7–11 palmate, base deeply cordate, margin irregularly crenate, usually setose-apiculate, apex slightly notched. Peduncles 3–6, 1.5–3.5 cm, terminal, subtended by 2 opposite, foliaceous bracts; bracts rounded or reniform, 2–4 × 5–6.5 cm, sessile;

bracteoles several, linear; umbels 9–40-flowered. Petals white to greenish white, 1.2–1.4 × 1–1.1 mm. Styles short, ca. 0.3 mm, recurved. Fruit 3–3.5 × 2.2–2.8 mm. Fl. and fr. Apr–Oct.

• Shady damp forests, stream banks; 1500–3200 m. Guizhou, Hubei, Hunan, Sichuan, Yunnan.

This species has reputed medicinal value.

4. SANICULA Linnaeus, Sp. Pl. 1: 235. 1753.

变豆菜属 *bian dou cai shu*

She Menglan (佘孟兰 *Sheh Meng-lan*); Loy R. Phillippe

Herbs biennial or perennial. Stem erect, ascending or rarely decumbent, glabrous (Chinese species). Leaves petiolate, sheaths generally membranous, or sessile; blade orbicular, round-cordate or cordate-pentagonal, palmately 3–5-parted and often lobed, margin serrate or doubly setose-serrate. Umbels simple or compound; peduncles racemous, cymous or corymbose-branched; bracts foliaceous, usually serrate; bracteoles small, entire, rarely lobed; umbellules with both sessile or sessile, bisexual flowers and pedicellate, staminate flowers. Calyx teeth prominent, connate and persistent. Petals white, greenish white, pale yellow, purple or pale blue, spatulate or obovate with a narrowly inflexed apex. Stylopodium absent or discoid-flat; styles shorter than or exceeding the calyx teeth, recurved. Fruit long-ellipsoid or subglobose, densely covered with uncinatate or straight bristles, or tubercles; ribs inconspicuous or slightly prominent; vittae distinct or obscure, irregularly arranged on the dorsal and lateral surfaces, usually 3 on commissure. Seed-face concave or sulcate. Carpophore absent.

About 40 species: predominately in temperate regions, some species in subtropical regions; 17 species (11 endemic) in China.

- 1a. Stem and inflorescence unbranched; umbels terminal; staminate flowers 9–20 per umbellule.
 - 2a. Leaf blade usually shallowly 3–5-parted, rarely deeply divided; bracts shorter than the umbel; fruit covered with tubercles and scales, never with spines or bristles 3. *S. hacquetioides*
 - 2b. Leaf blade palmately 3-parted; bracts longer than or equaling the umbel; fruit covered with bristles or tubercles.
 - 3a. Leaf blade sharply serrate, teeth spinulose; central rays 5–15 cm; fruit with bristles 1. *S. rubriflora*
 - 3b. Leaf blade finely serrate, teeth not spinulose; central rays 0.5–3.5 cm; fruit with tubercles or spinules 2. *S. tuberculata*
- 1b. Stem and inflorescence branched; umbels terminal and lateral; staminate flowers 2–8 per umbellule.
 - 4a. Fertile flowers (1–)2–5 per umbellule; fruit densely covered with uncinatate bristles or tubercles.
 - 5a. Inflorescence short, branches few, 1–4, to 1.5 cm.
 - 6a. Staminate flowers 5–7 per umbellule; fertile flowers 1 or 2 5. *S. serrata*
 - 6b. Staminate flowers 2 or 3 per umbellule; fertile flowers 2 or 3 11. *S. rugulosa*
 - 5b. Inflorescence elongate, branches numerous, more than 1.5 cm.
 - 7a. Leaf blade deeply divided to 2/3–4/5, bases of central and lateral segments connected 12. *S. astrantiifolia*
 - 7b. Leaf blade 3–5-parted, bases of central and lateral segments separate or nearly so.
 - 8a. Rays very short, ca. 5 mm 13. *S. elata*
 - 8b. Rays rather long, 5–20 mm.
 - 9a. Calyx teeth linear, ca. 1.2×0.5 mm; styles equaling (rarely exceeding) calyx teeth, slightly recurved 14. *S. chinensis*
 - 9b. Calyx teeth ovate, ca. 0.5×0.3 mm; styles 2–3-times longer than the calyx teeth, recurved 15. *S. giraldii*
 - 4b. Fertile flowers 1 per umbellule (1–3 in *S. caerulescens*); fruit with straight bristles, spines or scales.
 - 10a. Leaf blade 3-parted, segments entire.
 - 11a. Plants 20–50 cm high; stem erect; leaves more than 5 cm wide; peduncles elongate, cymose-branched 16. *S. pengshuiensis*
 - 11b. Plants to 25 cm high; stem decumbent; leaves less than 5 cm wide; peduncles short, subracemose 17. *S. oviformis*
 - 10b. Leaf blade palmately 3–5-parted, segments usually 2–3-lobed.
 - 12a. Inflorescence subracemose; lateral umbels without peduncles, in fascicles 7. *S. caerulescens*
 - 12b. Inflorescence paniculate or subcorymbose; lateral umbels with distinct peduncles.
 - 13a. Leaves small, less than 2×3 cm; fruit furrows smooth, ribs bearing spiny crests 8. *S. petagnioides*
 - 13b. Leaves large, more than 2×3.5 cm; fruit densely covered with spines, scales or tubercles.
 - 14a. Inflorescence branches very slender, elongate; bracts ca. 0.5 mm; calyx teeth ca. 0.3 mm 6. *S. elongata*
 - 14b. Inflorescence branches stout, not elongate; bracts 1.5–3 mm; calyx teeth 0.6–1 mm.
 - 15a. Calyx teeth ovate, ca. 0.6 mm; fruit densely covered with scales and tubercles 4. *S. tienmuensis*
 - 15b. Calyx teeth linear or narrowly linear, 0.5–1 mm; fruit densely covered with spines or erose lamellae.
 - 16a. Lateral segments of leaves oblique-ovate, shallowly 2-lobed or serrate-lobed; styles ca. 1.5 mm 9. *S. lamelligera*

- 16b. Lateral segments of leaves oblique-obovate, deeply divided to base;
 styles 3.5–4 mm 10. *S. orthacantha*

1. *Sanicula rubriflora* F. Schmidt ex Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 123. 1859.

红花变豆菜 hong hua bian dou cai

Plants up to 1 m high. Taproot bearing fibrous or fleshy-fibrous roots. Stem erect, unbranched. Basal leaves numerous; petiole 13–55 cm; blade round-cordate or reniform-orbicular, 3.5–10 × 6.5–12 cm, palmately 3-parted, segments shallowly 2–3-lobed and setose-serrate; central segment obovate, base cuneate; lateral segments broad-obovate, usually parted to the middle or below. Bracts 2, foliaceous, 3-parted; rays 3; bracteoles 3–7, oblanceolate or linear, 7–35 × 3–6 mm, entire or 1–3-serrate; umbellules many-flowered. Staminate flowers 15–20 per umbellule, pedicellate; calyx teeth ovate-lanceolate, 1.2–1.8 × 0.6–1 mm, midrib conspicuous; petals pinkish to purple, base attenuate, apex notched. Fertile flowers 3–5 per umbellule, sessile; calyx teeth and petals as in staminate flowers; styles about 2 times as long as the calyx teeth, recurved. Fruit ovoid or ovoid-globose, ca. 4.5 × 4 mm, densely covered with yellow, uncinat bristles; vittae 5. Fl. and fr. Jun–Sep.

Shady wet places; 200–500 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia (E Siberia)].

This species has reputed medicinal value.

2. *Sanicula tuberculata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 2: 431. 1867.

瘤果变豆菜 liu guo bian dou cai

Plants 12–15 cm high. Taproot bearing numerous dark brown fibrous roots. Stem erect, unbranched. Basal leaves several; petiole 5–15 cm; blade cordate to reniform, 2–3.5 × 4–7 cm, 3-parted, segments distally irregularly serrulate; central segment obovate, base cuneate, midrib elongate to tip, apex acute to subtruncate, usually shallowly 3-lobed; lateral segments broadly obovate or oblique-rounded, parted to middle or below. Bracts 2, opposite, foliaceous, 2–3-parted, lobes obovate, 2.5–3.5 × 1–2 cm, serrulate; rays 3, 0.5–3.5 cm; bracteoles 3–6, narrowly lanceolate or linear, 0.5–1.5 mm, entire or 1–2-serrate; umbellules many-flowered. Staminate flowers ca. 20 per umbellule, pedicels ca. 2 mm; calyx teeth ovate or ovate-lanceolate; petals purplish red. Fertile flowers 3 per umbellule, sessile; calyx teeth narrowly deltoid ca. 2 mm; petals ca. 2 × 1 mm; styles about 2 times as long as calyx teeth, recurved. Fruit ovoid-globose, ca. 4.5 × 4 mm, covered with tubercles and straight or slightly curved spinules; vittae 5. Fl. May.

Wet valleys, swamps, roadsides; 200–600 m. Heilongjiang [S Japan, Korea].

3. *Sanicula hacquetioides* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 110. 1894.

鳞果变豆菜 lin guo bian dou cai

Plants 5–30 cm high. Roots fibrous, sometimes with long creeping rhizomes. Stem slender, unbranched. Basal leaves several; petiole 3–22 cm; blade orbicular or cordate-rounded, (1–

1.5–3(–3.5) × 2–4(–7) cm, palmately deeply 3-parted, serrulate; central segment broadly obovate, base cuneate, apex subtruncate, shallowly 3-lobed; lateral segments rhombic-obovate, 2-lobed. Inflorescence terminal; bracts 2–3, opposite, foliaceous, sessile, 1–1.5 × 0.5–1 cm, 3-parted, segments obovate or lanceolate; rays 3–4, subequal, 0.5–2.5 cm; bracteoles ca. 10, lanceolate or ovate-lanceolate; umbellules 10–15-flowered. Staminate flowers 9–14 per umbellule; pedicels ca. 2 mm; petals white or pinkish, obovate, base tapering, apex deeply notched. Fertile flowers 1–3 per umbellule, sessile; calyx teeth broadly ovate or obovate, ca. 0.5 mm; styles about 1.5 times as long as petals, recurved. Fruit ovoid-globose, 2–2.5 × 2.5–3 mm, covered with scales and tubercles, but never spinulose; vittae obscure. Fl. and fr. May–Sep.

• Forests, mountain slopes, grassy places on stream banks; 2600–3800 m. Guizhou, Sichuan, Xizang, Yunnan.

This species has reputed medicinal value.

4. *Sanicula tienmuensis* R. H. Shan & Constance, Univ. Calif. Publ. Bot. 25: 23. 1951.

天目变豆菜 tian mu bian dou cai

Plants 20–30 cm high. Rootstock short, dark brown, bearing numerous fleshy-fibrous roots. Stems 2–5, branched. Basal leaves several; petioles 7–22 cm; blade round-cordate to orbicular, 3–5.5 × 5–9 cm, palmately 3-parted, primary segments shallowly 2–3-lobed, sharply serrate; central segment obovate, 3–5.5 × 1.5–3 cm; lateral segments broadly obovate, usually parted to middle or near base. Peduncles 1–3-trichotomously branched, central branch usually with a simple umbel, lateral branches longer, with compound umbels; bracts 2, opposite, linear or ovate, 2–3-lobed; rays 3–5, unequal, 3–15 mm; bracteoles 7, ovate, ca. 1 × 0.5 mm; umbellules 3–7-flowered. Staminate flowers 2–6 per umbellule; petals white. Fertile flowers 1 per umbellule, sessile; calyx teeth ovate, ca. 0.6 × 0.5 mm; styles 2–3 mm, recurved. Fruit subglobose, ca. 2.5 × 2 mm, densely covered with scales and tubercles; vittae obscure. Fl. and fr. Apr–May.

• Woods in valleys, forest margins, wet places on stream banks, roadsides; 500–2300 m. W Sichuan, Zhejiang.

- 1a. Staminate flowers 5 or 6 per umbellule 4a. var. *tienmuensis*
 1b. Staminate flowers 2 or 3 per umbellule 4b. var. *pauciflora*

4a. *Sanicula tienmuensis* var. *tienmuensis*

天目变豆菜(原变种) tian mu bian dou cai (yuan bian zhong)

Staminate flowers 5 or 6 per umbellule.

• Forest margins, wet places on stream banks, roadsides; 500–800 m. Zhejiang (W Tianmu Shan, Tiantai Shan).

4b. *Sanicula tienmuensis* var. *pauciflora* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 27: 66. 1989.

疏花变豆菜 shu hua bian dou cai

Staminate flowers 2 or 3 per umbellule.

- Woods in valleys; ca. 2300 m. W Sichuan (Luding).

5. *Sanicula serrata* H. Wolff in Engler, Pflanzenr. 61(IV. 228): 56. 1913.

锯叶变豆菜 ju ye bian dou cai

Plants 8–30 cm high. Rootstock short bearing fibrous roots. Stem slender, erect, unbranched. Basal leaves several; petioles 5–15 cm; blade subrounded, round-cordate or subpentagonal, 1.5–3 × 3–6 cm, palmately 3–5-parted; central segment broadly obovate or cuneate-obovate, 1.5–3 × 1–2.5 cm, base attenuate, apex shallowly 3-lobed, margin irregularly sharply serrate. Cauline leaves sessile or petiolate, palmately 3–5-parted. Bracts 2, opposite, long-ovate or ovate-lanceolate; rays 3–5 mm; bracteoles small, linear; umbellules 6–8-flowered. Staminate flowers 5–7 per umbellule; pedicels 1.5–2.5 mm; petals white or pinkish, broadly obovate, apex notched. Fertile flowers 1 or 2 per umbellule, sessile; calyx teeth ovate, ca. 0.5 × 0.3 mm; styles 2–2.5 mm, recurved. Fruit ovoid or ovoid-globose, ca. 1.2 × 1 mm, proximal part covered with scales, distal part covered with slightly uncinatate bristles, bristles pale yellow or purplish red; vittae obscure. Fl. and fr. Mar–Jun.

- Mixed forests on mountain slopes; 1300–3200 m. W Hubei, E Qinghai, Sichuan, SE Xizang, NW Yunnan.

6. *Sanicula elongata* K. T. Fu in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 297. 1979.

长序变豆菜 chang xu bian dou cai

Plants 35–40 cm high. Fibrous roots brown and numerous. Stems 2 or 3, erect. Basal leaves several; petioles 4–15 cm; leaf blade subrounded, round-cordate or pentagonal, 4–22 cm, palmately 3–5-parted, margin sharply irregular-serrate; central segment cuneate-obovate or ovate, 1.5–7 × 1.2–4.5 cm; lateral segments parted nearly to base, base cuneate. Cauline leaves sessile or short-petiolate; blade palmately 3–5-parted. Peduncles 2–3-trichotomously branched, slender and elongate; bracts small, long-ovate, ca. 0.5 mm; rays 0.8–2 cm; umbellules 4–6-flowered. Staminate flowers 3–5 per umbellule; pedicels ca. 3 mm; petals white, broadly obovate. Fertile flowers 1 per umbellule, sessile; calyx teeth narrow-ovate, ca. 0.3 mm; styles 2–2.5 mm, recurved. Fruit ovoid, ca. 3 × 2.5 mm, densely covered with pale yellow scales; vittae obscure. Fl. May, fr. Jun–Jul.

- Mixed forests in valleys; 1200–1600 m. Gansu (Tianshui), Shaanxi (Meixian).

7. *Sanicula caerulescens* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 109. 1894.

天蓝变豆菜 tian lan bian dou cai

Sanicula dielsiana H. Wolff; *S. erythrophylla* Bobrov; *S. stapfiana* H. Wolff.

Plants to 40 cm high. Taproot slender, bearing fibrous roots. Stems 2–7, erect. Basal leaves many; petioles purplish tinged, 5–17 cm; blade cordate-ovate, 3–7 × 4–10 cm, palmately 3–5-parted or trifoliolate; central segment ovate, 3–7 × 1.5–4.5 cm, base cuneate, apex shallowly 3-lobed; lateral

segments oblique-ovate, usually 2-lobed, abaxially purplish red or tawny, margin crenate with spinulose bristles. Inflorescence subracemose, sometimes several umbels in fascicles; bracts ovate-lanceolate, 1–2 mm; rays 2–7(–12), 0.5–1 cm; bracteoles 5–8, linear ca. 1 × 0.5 mm; umbellules 5–7-flowered. Staminate flowers 4–6 per umbellule, pedicels 2–3 mm; petals white, pale blue to bluish purple. Fertile flowers 1–3 per umbellule, sessile; calyx teeth linear-lanceolate, acute; styles 2.5–3 mm, recurved. Fruit globose or ellipsoid, ca. 2 mm, covered with short and straight spinous-bristles usually fused at the base forming a thin tier; vittae 5, under the ribs; mericarp flattened dorsally, orbicular in cross section. Fl. and fr. Mar–Jul.

- Mixed forests or bamboo forests in wet shady valleys; 800–1600 m. Chongqing (Nanchuan), SC Sichuan (Emei Shan), Yunnan.

This species has reputed medicinal value.

8. *Sanicula petagnoides* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25: 103. 1908.

台湾变豆菜 tai wan bian dou cai

Plants 10–15 cm high. Rootstock short, woody, bearing thinly fibrous roots, sometimes with rhizome or stolons. Stems 1–3, very slender. Basal leaves few; petioles 3–7 cm; blade reniform-orbicular or cordate-pentagonal, 1–2 × 2–3 cm, palmately 3–5-parted or foliolate; central segment broadly obovate or rhombic-obovate, short-petiolate, apex shallowly 3-lobed, sharply serrate, teeth mucronate to spinulose; lateral segments parted to base, trilobulate or entire, base cuneate. Cauline leaves reduced, subsessile, often 3-lobed. Inflorescence terminal, dichotomously branched, umbels 4–8; bracts linear, ca. 1 × 0.5 mm; rays 3–5 mm; umbellules 5–6-flowered. Staminate flowers 4–5 per umbellule, pedicels 1–2 mm; petals white. Fertile flowers 1 per umbellule, sessile; calyx teeth linear-lanceolate, ca. 1 × 0.3 mm; styles ca. 2 mm. Fruit subglobose, 1.5–2 × 1–1.5 mm; ribs bearing spiny crests, furrows smooth; vittae obscure. Fl. and fr. Mar–Oct.

- Forests on mountain slopes; 2500–2700 m. Taiwan.

9. *Sanicula lamelligera* Hance, J. Bot. 16: 11. 1878.

薄片变豆菜 bao pian bian dou cai

Sanicula ichangensis H. Wolff; *S. orthacantha* S. Moore var. *longispina* H. Wolff; *S. satsumana* Maximowicz; *S. yunnanensis* Franchet.

Plants 13–30 cm high. Rootstock short, tuberlike, woody, bearing a fascicle of brown fibrous roots. Stems 2–7, slender, erect. Basal leaves several; petioles 4–18 cm; blade round-cordate, 2–6 × 3–9 cm, palmately 3-parted; central segment cuneate-obovate or rhombic, 2–6 × 1–3 cm, distally 3-lobed, base cuneate; lateral segments oblique-ovate often shallowly 2-lobed; all segments abaxially pale green or purplish red. Upper leaves very small, 3-lobed or undivided, linear-lanceolate. Inflorescence 2–4-dichotomously or trichotomously branched, sometimes subcorymbose; bracts small, linear, 1.5–3 mm; rays 3–7, 2–10 mm; bracteoles 4–5, linear; umbellules 5–6-flowered. Staminate flowers 4–5 per umbellule; petals white, pinkish or pale bluish purple. Fertile flowers 1 per umbellule; calyx teeth linear, ca. 1 mm; styles ca. 1.5 mm, recurved. Fruit long-

ovoid, ca. 2.5×2 mm, covered with erose lamellae, becoming short and straight spines when mature, never uncinatate, fused at the base forming a thin tier; vittae 5. Fl. and fr. Apr–Nov.

Forests, mountain slopes, wet valleys; 500–2000 m. Anhui, Guangdong, Guangxi, Guizhou, Hubei, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [S Japan].

10. *Sanicula orthacantha* S. Moore, J. Bot. 13: 227. 1875.

野鹅脚板 ye e jiao ban

Plants 8–35(–50) cm high. Rootstock short, tuberlike, woody, bearing a fascicle of thinly fibrous roots. Stems 1–6, erect. Basal leaves several; petioles 5–26 cm; blade round-cordate or cordate-pentagonal, $2-7 \times 3.5-7$ cm, palmately 3-parted or foliolate; central segment cuneate-obovate or rhombic-cuneate, $2-7 \times 1-4$ cm; lateral segments oblique-obovate, usually parted to base, base cuneate; all segments abaxially pale green and pale purplish red along veins, distally shallowly 2–3-lobed, serrate, teeth mucronate to spinulose. Cauline leaves small, petiolate, 3-lobed. Inflorescence 2–3-branched; umbels 3–8; bracts 3–5, 1–2.5 mm, unequal; rays 3–8 mm; bracteoles 5, linear to subulate; umbellules 6 or 7-flowered. Staminate flowers 5(or 6) per umbellule, pedicels 2–3.5 mm; petals white, pale blue or purplish red, obovate, $1-1.8 \times 0.8-1.2$ mm. Fertile flowers 1 per umbellule, sessile; calyx teeth narrow-linear, 0.5–1 mm; styles 3.5–4 mm, recurved. Fruit ovoid, $2.5-3 \times 2-2.5$ mm, covered with short, straight spines; vittae obscure. Fl. and fr. Apr–Sep.

Forests, mountain summits, stream banks, roadsides on mountain slopes; 200–3200 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [Cambodia, India, Laos, Vietnam].

- 1a. Rhizome long 10c. var. *stolonifera*
 1b. Rhizome short.
 2a. Flowers 5 per umbellule; fruit ribs and furrows spinulose 10a. var. *orthacantha*
 2b. Flowers 6 or 7 per umbellule; fruit ribs erose-spinulose, furrows tuberculate 10b. var. *brevispina*

10a. *Sanicula orthacantha* var. *orthacantha*

野鹅脚板(原变种) ye e jiao ban (yuan bian zhong)

Sanicula costata H. Wolff; *S. orthacantha* var. *costata* (H. Wolff) K. T. Fu; *S. orthacantha* var. *pumila* H. de Boissieu; *S. henryi* H. Wolff; *S. nanchuanensis* R. H. Shan.

Roots fibrous, without rhizome. Inflorescence rather short; usually 5 flowers per umbellule. Fruit spines straight, covering ribs and furrows.

Forests in valleys, stream banks; 200–3200 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [Cambodia, India, Laos, Vietnam].

This variety is used medicinally in Sichuan and Yunnan.

10b. *Sanicula orthacantha* var. *brevispina* H. de Boissieu, Bull. Soc. Bot. France 53: 421. 1906.

短刺鹅脚板 duan ci e jiao ban

Roots fibrous, without rhizome. Inflorescence elongate, loose and spreading; 6 or 7 flowers per umbellule. Fruit erose-spinose on the ribs, tuberculate in the furrows.

• Forests, roadsides on mountain slopes; 1700–2400 m. Chongqing (Jinfo Shan), SC Sichuan (Emei Shan).

This variety has reputed medicinal value.

10c. *Sanicula orthacantha* var. *stolonifera* R. H. Shan & S. L. Liou in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 297. 1979.

走茎鹅脚板 zou jing e jiao ban

Rhizome long, with distinct nodes.

• Mountain summits; 2300–2500 m. SC Sichuan (Emei Shan).

11. *Sanicula rugulosa* Diels, Bot. Jahrb. Syst. 29: 491. 1901.

皱叶变豆菜 zhou ye bian dou cai

Plants 25–40(–75) cm high. Rootstock short and stout, roots fascicled, fibrous, somewhat fleshy. Stem erect, branched above. Basal leaves several; petioles 6–18 cm, sheaths scarious; blade orbicular, reniform-rounded or broadly cordate, $2-3 \times 3-5.5$ cm, 3-parted; central segment broadly obovate, distally shallowly 3-lobed, base cuneate, apex obtuse-rounded; lateral segments rhombic-rounded or broadly obovate, 2–3-lobed; all segments abaxially pale purplish red, crenate, primary veins 5, prominent on both surfaces. Cauline leaves reniform-rounded, 3-parted, primary veins 3. Inflorescence 2–3-dichotomously branched; bracts 1–2, 3-parted, segments lanceolate, serrate; rays 0.7–2 cm; bracteoles linear; umbellules 5–7-flowered. Staminate flowers 2 or 3 per umbellule, pedicels ca. 2 mm; petals white, obovate, apex inflexed. Fertile flowers 2 or 3 per umbellule, sessile; calyx teeth narrowly lanceolate, ca. 1 mm; styles longer than the petals, recurved. Fruit ellipsoid, ca. 1.5×1 mm, densely covered with uncinatate bristles when mature; vittae obscure. Fl. and fr. Jun.

• Grassy places or rock crevices on mountain slopes; 800–2500 m. Chongqing (Jinfo Shan), Xizang.

12. *Sanicula astantiifolia* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 308. 1930.

川滇变豆菜 chuan dian bian dou cai

Sanicula potaninii Bobrov.

Plants 20–70 cm high. Taproot short and stout, roots numerous, fibrous. Stem erect, 2–4-times-dichotomously branched above. Basal leaves several; petioles 5–16(–30) cm; blade round-reniform or broadly ovate-cordate, $2-8 \times 2.5-14$ cm, palmately deeply 3-parted, primary veins 3–5, prominent on both surfaces, abaxially pale green, serrate or irregularly doubly spinose-serrate; central segment obovate or rhombic; lateral segments oblique-reniform or ovate-lanceolate, often 2-lobed. Upper leaves small, 3-parted, segments ovate-lanceolate. Inflorescence cymose branched; bracts 2, linear-lanceolate, 3–15 mm, 3-parted or entire; rays 0.5–1 cm; bracteoles 7–10, $1-1.5 \times 0.5-1$ mm, midrib distinct; umbellules ca. 10-flowered. Staminate flowers 6–8 per umbellule, pedicels short; petals greenish white or pinkish. Fertile flowers 2 or 3 per umbellule,

sessile; calyx teeth linear-lanceolate, ca. 1×0.5 mm; styles ca. 2 mm, recurved. Fruit obovate or subglobose, proximal end with short bristles, distal end with uncinat bristles, bristles yellow or purple-red; vittae obscure. Fl. and fr. Jul–Oct.

• Stream banks in mixed forests, grassy places on mountain slopes; 1900–3000 m. SW Sichuan, S Xizang (Yadong), Yunnan.

This species is used medicinally in E Yunnan.

13. *Sanicula elata* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 183. 1825.

软雀花 ruan que hua

Sanicula europaea Linnaeus subsp. *elata* (Buchanan-Hamilton ex D. Don) H. de Boissieu; *S. hermaphrodita* Buchanan-Hamilton ex D. Don; *S. montana* Reinwardt ex Blume.

Plants 20–80 cm high. Stem erect, branched above, upper parts purplish brown-tinged. Basal leaves several; petioles 5–25 cm; blade broadly ovate-cordate or subpentagonal, 3–7 \times 4–10 cm, palmately 3(–5)-parted, irregularly serrate, teeth mucronate; central segment obovate or rhombic, shallowly 2–3-parted, base cuneate, apex acuminate; lateral segments oblique-ovate, often 2-parted. Cauline leaves short-petiolate; blade 3(–5)-parted, upper leaves greatly reduced. Inflorescence cymose branched, terminal branch often very short, lateral branches elongate; bracts 2, lanceolate; rays ca. 5 mm, unequal; bracteoles 7–10, linear; umbellules 4–8-flowered. Staminate flowers 1–4 per umbellule, pedicels 1–1.5 mm; petals white, pale yellow or pale blue. Fertile flowers 3(or 4) per umbellule; calyx teeth shorter than bristles, persistent; styles 2-times longer than calyx teeth, recurved. Fruit ovoid-globose, 2.5–3 \times 2–2.5 mm, densely covered with uncinat bristles; vittae 5, small, commissural vittae 2, larger. Fl. and fr. May–Oct.

Forests, stream banks; 800–3200 m. Guangxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Indonesia, Japan, Nepal, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Vietnam; E Africa].

The species has reputed medicinal value. It is a widespread and very variable species, and the leaf dissection tends to intergrade with that of *Sanicula astrantiifolia* in E Himalayan material.

14. *Sanicula chinensis* Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 106. 1835.

变豆菜 bian dou cai

Sanicula europaea Linnaeus subsp. *chinensis* (Bunge) Hultén; *S. europaea* var. *chinensis* (Bunge) Diels.

Plants up to 1 m high. Stem erect, branched above. Basal leaves few; petioles 7–30 cm, sheaths scarious; blade suborbicular or round-reniform, 3–5-parted, abaxially pale green, irregularly doubly serrate, teeth mucronate; central segment obovate, 3–10 \times 4–13 cm, base cuneate; lateral segments divided to near base. Cauline leaves reduced upward, subsessile; blade 3-parted. Inflorescence usually trichotomously branched, terminal branch short, the lateral branches elongate; bracts foliaceous, 3-lobed; bracteoles 8–10, linear, 1.5–2 \times ca. 1 mm; umbellules 6–10-flowered. Staminate flowers 3–7 per umbellule; pedicels 1–1.5 mm; petals white, obovate. Fertile flowers 3 or 4 per umbellule, sessile, slightly longer than the staminate; calyx teeth linear, ca. 1.2 \times 0.5 mm; style nearly equaling calyx teeth. Fruit

ovoid-globose, 4–5 \times 3–4 mm, calyx teeth rostrate, persistent, bristles uncinat above, dilated at base; vittae 5, moderate, commissural vittae 2, larger. Fl. and fr. Apr–Oct.

Mixed forests, stream banks, roadsides on shady slopes; 200–2300 m. Widely distributed in China [N Japan, Korea, Russia (E Siberia)].

This species has reputed medicinal value.

15. *Sanicula giraldii* H. Wolff in Engler, Pflanzenr. 61(IV. 228): 60. 1913.

首阳变豆菜 shou yang bian dou cai

Plants 30–60 cm high. Stems 1–4, erect, branched above. Basal leaves numerous; petioles 5–25 cm; blade reniform-orbicular or round-cordate, 2–6 \times 3–10 cm, palmately 3–5-parted, irregularly doubly serrate, teeth acute or mucronate; central segment obovate or ovate-lanceolate, base cuneate, apex shallowly 3-lobed; lateral segments 2-parted. Cauline leaves palmately 3-parted, reduced above. Inflorescence 2–4-trichotomously branched, all branches elongate; bracts foliaceous, entire or 2–3-lobed; rays 2–4, 0.5–2 cm; bracteoles small, 1–1.2 \times 0.5–0.7 mm; umbellules 6–7-flowered. Staminate flowers 3–5 per umbellule, petals white, broadly obovate. Fertile flowers 1–3 per umbellule; calyx teeth ovate, ca. 0.5 \times 0.3 mm; style 2–3-times longer than calyx teeth, recurved. Fruit ovoid to broad-ovoid, 2–2.5 \times 2.5–3 mm, densely covered with yellow or purplish red uncinat bristles; vittae obscure. Fl. and fr. May–Sep.

• Shady woods, forests and grassy places on mountain slopes, stream banks, roadsides; 1300–3400 m. Chongqing, Gansu, Hebei, Henan, Qinghai, Shaanxi, Shanxi, N and W Sichuan, S Xizang.

- 1a. Fertile flowers usually 3 per umbellule; calyx teeth small, ca. 0.5 \times 0.3 mm 15a. var. *giraldii*
- 1b. Fertile flowers usually few, 1–3 per umbellule; calyx teeth larger, ca. 1 \times 0.7 mm 15b. var. *ovicalycina*

15a. *Sanicula giraldii* var. *giraldii*

首阳变豆菜(原变种) shou yang bian dou cai (yuan bian zhong)

Fertile flowers usually 3 per umbellule. Calyx teeth ovate, ca. 0.5 \times 0.3 mm. Fruit broadly ovoid, 2–2.5 \times 2.5–3 mm.

• Forests on mountain slopes, stream banks, roadsides; 1500–3400 m. Gansu, Hebei, Henan, Qinghai, Shaanxi, Shanxi, N and W Sichuan, S Xizang.

15b. *Sanicula giraldii* var. *ovicalycina* R. H. Shan & S. L. Liou in R. H. Sheh & M. L. Shan, Fl. Reipubl. Popularis Sin. 55(1): 297. 1979.

卵萼变豆菜 luan e bian dou cai

Sanicula subgiraldii R. H. Shan

Fertile flowers 1–3 in each umbellule. Calyx teeth broadly ovate, ca. 1 \times 0.7 mm. Fruit oblong, 2.5–3 \times 3–3.5 mm.

• Shady woods, grassy places on mountain slopes; 1300–1600 m. Chongqing, Shaanxi.

16. *Sanicula pengshuiensis* M. L. Sheh & Z. Y. Liu, Acta Phy-

totax. Sin. 29: 469. 1991.

彭水变豆菜 peng shui bian dou cai

Plant 20–50 cm high. Rootstock short and thin, roots fibrous. Stem erect. Basal leaves numerous; petioles 20–28 cm, purplish tinged, sheaths scarious-margined; blade suborbicular or broadly-ovate, palmately 3-parted, 5–10 × 5–9 cm, shallowly dentate, teeth spinulose; central segment long-elliptic or obovate-elliptic, base cuneate, apex acute, 5–10 × 2.5–3.5 cm; lateral segments oblique-elliptic. Inflorescence cymose branched, peduncles elongate; bracts 5 or 6, small, 1–1.5 × ca. 0.5 mm; rays 5–11, subequal, 2.6–6 mm; bracteoles 5, linear, 0.5–1 mm; umbellules 5–6-flowered. Staminate flowers 4 or 5 per umbellule, pedicels ca. 2 mm. Fertile flower 1 per umbellule, calyx teeth linear, ca. 0.8 mm; styles 3.5–4-times longer than the calyx teeth. Fruit ellipsoid, 2–2.5 × 1–1.7 mm, bristles in regular rows in furrows, ribs glabrous, stout and prominent; vittae 1 under each rib, 2 on commissure. Fl. and fr. Apr–Sep.

- Stream banks, fields; ca. 500 m. Chongqing (Pengshui).

17. *Sanicula oviformis* X. T. Liu & Z. Y. Liu, Acta Phytotax. Sin. 29: 471. 1991.

卵叶变豆菜 luan ye bian dou cai

Plants 12–25 cm high. Rootstock stout, short; roots numerous, thin-fibrous, usually bearing many tubercles. Stems 1–3, slender and decumbent, 20–40 cm. Basal leaves numerous; petioles 6–22 cm, sheaths scarious; blade broadly deltoid ovate, palmately 3-parted, 2–4 × 2.5–5 cm, abaxially deeply purplish red, reticulation conspicuous, margins narrowly rolled inward, 2–3-shallowly-crenate, teeth apiculate; central segment obovate or obovate-rounded, 1.2–2.5 × 1–2 cm, thin-leathery, base cuneate, apex obtuse; lateral segments oblique-ovate, base truncate. Inflorescence racemose branched or terminal, unbranched; bracts 3–5, subulate, unequal, rays 3, ca. 7 mm; bracteoles 5, subulate; umbellules ca. 6-flowered. Staminate flowers 5 per umbellule, pedicels ca. 2.5 mm. Fertile flower 1 per umbellule; calyx teeth linear-lanceolate, ca. 0.5 mm; styles ca. 2.5 mm. Fruit ovoid, ca. 2 × 1 mm, densely short and straight-spinulose; ribs prominent; vittae 1 under each rib, 2 on commissure. Fl. and fr. May–Jul.

- Moist grassy places; 600–700 m. Chongqing (Nanchuan).

5. *ERYNGIUM* Linnaeus, Sp. Pl. 1: 232. 1753.

刺芹属 ci qin shu

She Menglan (佘孟兰 Sheh Meng-lan); Mark F. Watson

Herbs biennial or perennial, caulescent or acaulescent, usually glabrous. Taproot fusiform or stout. Stem solitary, creeping to erect, branched above. Leaves simple; petioles sheathing; blade entire, pinnately or palmately parted or divided, leathery or membranous, venation parallel or reticulate, margin often ciliate to spinose. Umbels simple, capitate forming globose to cylindrical heads; heads solitary or in cymes, sometimes racemes; bracts 1 to several, entire or divided, subtending the head; bracteoles 1 to many, subtending the individual flowers. Flowers small, bisexual, sessile. Calyx teeth prominent, persistent, ovate to lanceolate, acute to obtuse. Petals white or purple, ovate to oblong, with incurved apex. Stylopodium absent; styles shorter than or exceeding the calyx teeth. Fruit globose to obovoid, scarcely flattened laterally, variously covered with scales or tubercles; ribs obsolete; vittae mostly 5, inconspicuous; commissure broad. Seed subterete in cross section, face plane or slightly concave. Carpophore absent.

Between 220 and 250 species: tropics and temperate regions worldwide, especially South America; two species in China.

- 1a. Stem green; flowers white or pale yellow; heads cylindrical 1. *E. foetidum*
 1b. Stem gray-white or pale purple; flower pale blue; heads ovoid to subglobose 2. *E. planum*

1. *Eryngium foetidum* Linnaeus, Sp. Pl. 1: 232. 1753.

刺芹 ci qin

Plants 8–40 cm high from a basal rosette. Taproot fusiform with fibrous roots. Stem green. Basal leaves numerous; petiole short or obsolete, sheath up to 3 cm; blade lanceolate or oblanceolate, entire, 5–25 × 1.2–4 cm, venation pinnately reticulate, base cuneate to decurrent, apex obtuse, callous-margined, crenate to finely spinulose-serrate. Upper leaves sessile, opposite deeply spinulose-serrate to parted. Inflorescence divaricately trifurcate; lateral branches often continuing to form a monochasium, heads numerous, short-pedunculate. Flower heads cylindrical, 5–12 × 3–5 mm; bracts 4–7, foliaceous, lanceolate, 1.5–3.5 × 0.4–1 cm, spreading to reflexed, margin 1–3-spinulose-serrate; bracteoles lanceolate, 1.5–1.8 × ca. 0.6 mm, brightly scarious-margined. Calyx teeth ovate-lanceolate, 0.5–1 mm, acute, equaling petals. Petals white or pale yellow. Styles erect,

ca. 1.1 mm, exceeding calyx teeth. Fruit ovoid-globose, 1.1–1.3 mm, covered with tubercles. Fl. and fr. Apr–Dec.

Forests, stream banks, moist places, roadsides; 100–1500 m. Guangdong, Guangxi, Guizhou, Yunnan [native to Central America; now a widespread weed in tropical and subtropical regions].

The leaves are used as a flavoring (similar to *Coriandrum sativum*), and the species has reputed medicinal value.

2. *Eryngium planum* Linnaeus, Sp. Pl. 1: 233. 1753.

扁叶刺芹 bian ye ci qin

Plants 70–100 cm high. Taproot stout, woody; crown clothed with fibrous residues of leaf sheaths. Stem gray-white to purple. Basal leaves several; petiole 6–13 cm; blade narrowly elliptic-ovate, 5–8.5 × 2.5–5 cm, palmately 7–9-nerved, prominent on both surfaces, base cordate, margin coarsely toothed, teeth mucronate to short spinulose. Upper leaves sessile, shallowly to deeply 3–5-parted, lobes lanceolate, margin 1–4-spinu-

lose-serrate. Inflorescence 1–4-trifurcate, heads terminal on branches. Flower heads round-ovoid, 8–15 × 7–13 mm; bracts 5–6, linear or lanceolate, margin 1–2-spinulose-serrate, apex acute; bracteoles linear or subulate, ca. 5 mm, as long as calyx teeth. Calyx teeth ovate, 2–2.3 × ca. 1.2 mm. Petals pale blue. Styles erect, ca. 2.5 mm. Fruit long-ellipsoid or subglobose, 3–

3.5 × 1.5–1.8 mm, flattened dorsally, clothed with white, narrow long scales. Fl. and fr. Jul–Aug.

Ruderal of disturbed habitats; 500–1500 m. Xinjiang (Altay, Kukesu, Tacheng) [Kashmir, Russia (W Siberia); C and SW Asia, C and S Europe].

6. *CHAEROPHYLLUM* Linnaeus, Sp. Pl. 1: 258. 1753.

细叶芹属 xi ye qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs annual to perennial. Root fusiform or tuberous. Stem erect, branched, retrorsely hispid with white or grayish hairs (Chinese species). Leaves petiolate; petioles sheathing; blade 2-pinnate to pinnately decomposed. Umbels compound, terminal and lateral; bracts usually absent (Chinese species); bracteoles 2–6. Calyx teeth obsolete. Petals white, pale yellow or pale blue-purple, obovate-orbicular, with incurved apex. Styles shorter than stylopodium. Fruit linear-oblong, flattened laterally, commissural surface narrow, glabrous; ribs 5, obtuse, sometimes inconspicuous; mericarps subterete in cross section; vittae 1 in each furrow, 2 on commissure. Seed face concave or with a broad, shallow sulcus. Carpophore entire or bifid at the apex.

About 40 species: Europe, North America; two species in China.

- 1a. Plants annual; root fusiform; ultimate segments of leaves ovate; rays less than 5 1. *C. villosum*
1b. Plants perennial; root tuberous; ultimate segments of leaves linear; rays more than 7 2. *C. prescottii*

1. *Chaerophyllum villosum* de Candolle, Prodr. 4: 225. 1830.

细叶芹 xi ye qin

Anthriscus boissieu H. Léveillé; *Chaerophyllum reflexum* Aitchison.

Plants annual, 70–120 cm high. Root fusiform. Lower leaves long-petiolate; petiole 2.5–7 cm, sheath pubescent; blade broadly ovate in outline, 10–20 × 5–10 cm, 3-ternate-pinnate; primary pinnae 5–6 pairs, broadly deltoid-lanceolate, 2.5–7 × 1.5–4 cm; ultimate segments ovate, small; both surfaces hispid or adaxial surface glabrous, finely serrate. Umbels to 6 cm wide; rays 2–5, 1.5–4 cm; bracteoles 2–6, linear, 1.5–4 × 1–1.5 mm, midrib conspicuous, margins ciliate. Umbellules 9–13-flowered, to 2 cm wide; staminate flowers 4–8 per umbellule, bisexual flowers 3–7 in each umbellule. Pedicels 1–2 mm, extending to 3–6 mm in fruit. Petals white, pale yellow or pale bluish purple, obovate. Style shorter than stylopodium. Fruit 7–9 × 1.5–2.5 mm, apex acuminate and beaked; ribs broad. Fl. and fr. Jul–Aug.

Forests, open grassy places, roadsides; 2100–2800 m. SW Sichuan, S Xizang, NW Yunnan [Afghanistan, Bhutan, N India, Kashmir, Nepal, Pakistan].

7. *SPHALLEROCARPUS* Besser ex de Candolle, Coll. Mém. 5: 60. 1829.

迷果芹属 mi guo qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs perennial. Stem terete, much branched, pubescent (especially around nodes). Leaves 2–3-pinnate, very finely divided. Umbels compound, terminal and lateral; bracts absent; rays numerous; bracteoles several, ovate-lanceolate, margin scarious. Flowers of the terminal umbels almost wholly bisexual, staminate flowers sometimes present in lateral umbels, outer petals of outer umbels often radiant. Calyx teeth minute, subulate or obsolete. Petals obovate. Stylopodium conic or depressed, entire or undulate; styles short, erect or recurved. Fruit ellipsoid-oblong, slightly flattened laterally, constricted at commissure; ribs 5, prominent, undulate; vittae 2–3 in each furrow, 4–6 on commissure. Seed face broadly sulcate. Carpophore bifid, cleft to near base.

One species: China, Japan, Mongolia, Russia (E Siberia).

1. *Sphallerocarpus gracilis* (Besser ex Treviranus) Koso-Poljansky, Bull. Soc. Imp. Naturalistes Moscou, n.s., 29: 202. 1916 [“1915”].

迷果芹 mi guo qin

2. *Chaerophyllum prescottii* de Candolle, Prodr. 4: 225. 1830.

新疆细叶芹 xin jiang xi ye qin

Anthriscus prescottii (de Candolle) Veesenmeyer; *Chaerophyllum bulbosum* Linnaeus subsp. *prescottii* (de Candolle) Nyman.

Plants perennial, 40–100 cm high. Root tuberous, usually solitary, sometimes 2 or more, oblong, 1–3 × 0.5–1 cm. Basal and lower leaves long-petiolate; petiole to 5 cm; blade deltoid in outline, 2–3-ternate-pinnate; ultimate segments linear or narrowly lanceolate, 5–10(–15) × 0.5–2 mm, adaxially glabrous, abaxially sparsely hispid along veins. Upper leaves reduced; petioles wholly sheathing; ultimate segments of blade often glabrous. Umbels 5–9 cm wide; rays 8–12(–18), to 3.5 cm, unequal; umbellules many-flowered, 1–2 cm wide; flowers bisexual. Pedicels equaling the fruit; bracteoles 8–12, ovate, glabrous. Fruit 5–8 × 1–1.5 mm; ribs inconspicuous. Fl. and fr. May–Jul.

Forests, scrub, mountain slopes, valleys, meadows; ca. 2000 m. W Xinjiang (Altay) [Russia (Siberia); C Asia, SW Asia (Caucasus)].

Chaerophyllum gracile Besser ex Treviranus, Nova. Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 13(1): 172. 1826; *Sphallerocarpus cyminum* Besser ex de Candolle.

Plants 50–120 cm high. Root tuberous or conic. Stem somewhat white pubescent towards base, nearly glabrous above. Basal leaves caducous. Cauline leaves petiolate; petioles 1–7 cm, sheaths brown, margin scarious, white pubescent; ultimate segments ovate-lanceolate, 5–10 × 3–5 mm, 3-lobed or toothed. Rays 6–13, 2–4 cm, unequal; bracteoles 5, long-ovate

to broad-lanceolate, 1.5–2.5 × 1–2 mm, pubescent, margin scarious, often reflexed; umbellules 15–25-flowered. Pedicels 2–6 mm, unequal. Petals ca. 1.2 × 1 mm. Fruit 4–7 × 1.5–2 mm. Fl. and fr. Jul–Oct.

Mountain slopes, arable lands, waste places; 500–2800 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shanxi, NW Sichuan, Xinjiang [Japan, Mongolia, Russia (E Siberia)].

This species has reputed medicinal value (in Qinghai).

8. ANTHRISCUS Persoon, Syn. Pl. 1: 320. 1805, nom. cons., not Bernhardi (1800).

峨参属 e shen shu

She Menglan (余孟兰 Sheh Meng-lan); John F. M. Cannon, Mark F. Watson

Cerefolium Fabricius, nom. rej.

Herbs, biennial or perennial. Taproot slender or thickened. Stem erect, branching and fistulose. Leaf blade 2–3-ternate-pinnate or pinnately decompose; ultimate segments dentate or pinnatifid. Umbels loosely compound, terminal and lateral; bracts absent; rays few, spreading; bracteoles several, margin ciliate, reflexed; pedicels spreading. Flowers polygamous. Calyx teeth obsolete. Petals white or yellowish green, oblong or cuneate with a narrow inflexed apex; outer occasionally enlarged (radiant). Stylopodium conic; styles short. Fruit long-ovoid to linear, apex attenuate into a beak, flattened laterally and often constricted at the commissure, smooth or bristly; ribs obsolete; vittae obscure to obsolete. Seed subterete in cross section, face deeply sulcate.

About 15 species: temperate Asia, Europe; one European species introduced in North America; one species in China.

1. *Anthriscus sylvestris* (Linnaeus) Hoffmann, Gen. Pl. Umbell. 40. 1814.

峨参 e shen

Plants 0.6–1.5 m high. Stem stout, glabrous or lower parts finely pubescent. Basal leaves long-petiolate; petioles 10–30 cm, sheaths ca. 4 × 1 cm; blade ovate in outline, 10–30 cm; primary pinnae long-petiolulate, ovate to elliptic-ovate, 4–12 × 2–8 cm; ultimate segments ovate or elliptic-ovate, 1–3 × 0.5–1.5 cm, serrate or toothed, abaxially sparsely pubescent. Upper cauline leaves subsessile. Umbels 2.5–8 cm wide; rays 4–15, unequal; bracteoles 5–8, ovate to lanceolate, acuminate, shorter than pedicels, pedicel apex usually surrounded by white bristles in fruit. Styles ca. 2 × as long as stylopodium. Fruit 5–10 × 1–1.5 mm. Fl. and fr. Apr–May.

Forests, valley sides, grassy places on mountain slopes; near sea level to 4500 m. Anhui, Gansu, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [N India, Japan, Kashmir, Korea, Nepal, Pakistan, Russia; E Europe; introduced in North America].

The roots of both varieties have reputed medicinal value in some provinces.

- 1a. Fruit glabrous or rarely sparsely covered with fine granules 1a. subsp. *sylvestris*
 1b. Fruit densely covered with warty hairs or bristles 1b. subsp. *nemorosa*

1a. *Anthriscus sylvestris* subsp. *sylvestris*

9. OSMORHIZA Rafinesque, Amer. Monthly Mag. & Crit. Rev. 4: 192. 1819, nom. cons.

香根芹属 xiang gen qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Uraspermum Nuttall, nom. rej.

Herbs perennial. Stem erect or decumbent at base, branched, glabrous or pubescent. Petiole sheath narrow, scarious; leaf blade triangular-ovate in outline, 2–3-ternate-pinnate (Chinese species); segments serrate to pinnatifid. Umbels loosely compound; pedun-

峨参(原亚种) e shen (yuan ya zhong)

Chaerophyllum sylvestre Linnaeus, Sp. Pl. 1: 258. 1753; *Chaerofolium sylvestre* (Linnaeus) Schinz & Thellung; *Anthriscus yunnanensis* W.W. Smith; *Myrrhis chaerophylloides* Hance; *Oreochorte yunnanensis* (W. W. Smith) Koso-Poljansky.

Fruit glabrous or rarely sparsely covered with fine granules.

Forests on mountain slopes, valley sides; near sea level to 4500 m. Anhui, Gansu, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Korea, Russia; E Europe; introduced in North America].

1b. *Anthriscus sylvestris* subsp. *nemorosa* (Marschall von Bieberstein) Koso-Poljansky, Trudy Glavn. Bot. Sada 36: 103. 1920.

刺果峨参 ci guo e shen

Chaerophyllum nemorosum Marschall von Bieberstein, Fl. Taur.-Caucas 1: 232. 1808; *Anthriscus nemorosa* (Marschall von Bieberstein) Sprengel; *A. sylvestris* var. *nemorosa* (Marschall von Bieberstein) Trautvetter; *Scandix nemorosa* (Marschall von Bieberstein) Hornemann.

Fruit densely covered with warty hairs or bristles.

Forests, grassy places on mountain slopes; 1600–3800 m. Gansu, Hebei, Jilin, Liaoning, Nei Mongol, Shaanxi, Sichuan, Xinjiang, Xizang [N India, Japan, Kashmir, Nepal, Pakistan, Russia; E Europe].

cles terminal and lateral, usually exceeding the leaves; bracts few or absent; rays few, slender, unequal, lengthening and spreading in fruit; bracteoles several or occasionally absent, reflexed. Calyx teeth obsolete. Petals white, purple or greenish yellow, spatulate to obovate with a narrow inflexed apex. Stylopodium conic; styles slender, sometimes minute. Fruit (Chinese species) narrowly clavate, terete to slightly laterally flattened, apex obtuse, base caudate; ribs filiform, acute, with apically pointed bristles; vittae obscure or absent. Seed subterete in cross section, face concave. Carpophore bifid at apex, cleft up to 1/2 of its length.

About ten species: disjunct between E Asia and North America; one species in China.

1. *Osmorhiza aristata* (Thunberg) Rydberg, Bot. Surv. Nebraska 3: 37. 1894.

香根芹 *xiang gen qin*

Plants 25–70 cm high. Taproot aromatic. Stem green or purplish tinged. Basal leaves petiolate; petiole 5–26 cm; blade to 29 × 25 cm; pinnae 2–4 pairs, ultimate segments ovate to ovate-lanceolate, (0.5–)1–6(–9) × (0.2–)0.5–5(–8) cm, both surfaces hispid or pilose with white hairs, hairs sometimes restricted to veins. Peduncles 4–22 cm; bracts 1–4, subulate to linear, 0.5–1.2 cm, caducous; rays 3–5, 2–5 cm, lengthening in fruit to 10 cm; bracteoles 4–5, lanceolate to ovate-lanceolate, 2–5 × 1–1.5 mm, abaxially pubescent and on margin, usually reflexed. Fertile flowers 1–6 in each umbellule. Petals obovate, ca. 1.2 × 1 mm. Styles slightly longer than the stylopodium. Ovary white pubescent. Fruit 1–2.2 × 0.2–0.25 cm, base caudate; ribs sparsely bristly, densest towards the base. Fl. and fr. May–Jul.

Forests, grassy places in valleys and on stream banks; 200–3500 m. Widely distributed in China [Bhutan, N India, Japan, Kashmir, Korea, Mongolia, Nepal, Pakistan, Russia (Siberia); North America].

A broad range of morphological variation can be seen within this species. Taxonomic treatments vary, with some authors recognizing several distinct taxa, whereas others consider this as continuous variation within one undivided species.

- 1a. Leaf segments ovate-oblong, the basal pair undivided usually deeply dentate 1a. var. *aristata*
 1b. Leaf segments broadly ovate to broadly oblong-ovate, the basal pair 2-lobed or deeply 2–3-parted, usually irregularly coarsely toothed 1b. var. *laxa*

10. *KRASNOVIA* Popov ex Schischkin in Schischkin & Bobrov, Fl. URSS 16: 591. 1950.

块茎芹属 *kuai jing qin shu*

Pan Zehui (潘泽惠); Mark F. Watson

Herbs perennial. Tuber globose. Stem ribbed, simple or branched, softly pilose, tapering below soil level and easily broken from the tuber. Leaves 2–4-ternate-pinnate/pinnatisect. Bracts absent or caducous; rays conspicuously unequal; bracteoles 5. Calyx teeth obsolete. Petals obovate, notched with inflexed apex, outer petals slightly enlarged (radiate). Stylopodium short-conic; styles recurved, 3 times as long as stylopodium, caducous. Fruit ovoid-oblong, slightly flattened laterally, smooth, apex constricted; ribs prominent, protruding; vittae 1 per broad furrow, 2 on commissure. Seed slightly laterally flattened, face deeply sulcate.

One species: China, Kazakhstan.

1. *Krasnovia longiloba* (Karelin & Kirilov) Popov ex Schischkin in Schischkin & Bobrov, Fl. URSS 16: 118. 1950.

块茎芹 *kuai jing qin*

Sphallerocarpus longilobus Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 432. 1841; *Chaerophyllum longilobum* (Karelin & Kirilov) O. Fedtschenko & B. Fedts-

1a. *Osmorhiza aristata* var. *aristata*

香根芹(原变种) *xiang gen qin* (*yuan bian zhong*)

Chaerophyllum aristatum Thunberg in Murray, Syst. Veg., ed. 14, 288. 1784; *Chaerophyllum claytonii* (Michaux) Persoon; *Myrrhis aristata* (Thunberg) Sprengel; *M. claytonii* Michaux; *Osmorhiza amurensis* F. Schmidt ex Maximowicz; *O. aristata* var. *montana* Makino; *O. claytonii* (Michaux) C. B. Clarke; *O. japonica* Siebold & Zuccarini; *Scandix aristata* (Thunberg) Makino; *S. claytonii* (Michaux) Koso-Poljanski; *Uraspremmum aristatum* (Thunberg) Kuntze; *Washingtonia claytonii* (Michaux) Britton.

Leaf segments ovate-oblong, acute or obtuse, the basal pair undivided, usually deep-dentate.

Forests on mountain slopes, grassy places on stream banks; 200–1200 m. Widely distributed from NE to S China; also in S Gansu and S Shaanxi [Japan, Korea, Mongolia, Russia (Siberia); North America].

1b. *Osmorhiza aristata* var. *laxa* (Royle) Constance & R. H. Shan, Univ. Calif. Publ. Bot. 23: 130. 1948.

疏叶香根芹 *shu ye xiang gen qin*

Osmorhiza laxa Royle, Ill. Bot. Himal. Mts. 233. 1839; *Washingtonia laxa* (Royle) Koso-Poljanski ex B. Fedtschenko.

Leaf segments broad-ovate or broadly long-ovate, acuminate, the basal pair bilobed or 2–3-parted, usually irregularly coarsely toothed.

Forests, grassy places in valleys; 1600–3500 m. S Gansu, Guizhou, S Shaanxi, W Sichuan, S Xizang, NW Yunnan [Bhutan, N India, Kashmir, Nepal, Pakistan].

The roots are used medicinally.

chenko; *C. sphallerocarpus* Karelin & Kirilov, nom. illeg. superfl.; *Kozlovkia longiloba* (Karelin & Kirilov) Spalik & S. R. Downie.

Plants 40–100 cm high. Tuber ca. 2 cm wide. Basal and lower leaves long-petiolate with a small, narrow sheath; blade broadly rhombic-ovate in outline, to 8 × 5 cm; primary pinnae 4–5 pairs, long-petiolulate; ultimate segments linear-oblong, 3–

10 × 0.5–2 mm, entire. Middle and upper leaves gradually reduced with petioles wholly sheathing. Umbels 3–4 cm wide; bracts 1 or 2, or absent; rays 5–8; bracteoles 5, lanceolate or ovate-lanceolate, reflexed in fruit. Pedicels numerous, ca. 5 mm. Petals white, up to 5 mm (the outer petals radiating). Fruit

dark brown, ovoid-oblong, 3–5 × 1.5–1.8 mm. Fl. Apr–May, fr. May–Jun.

Shrubby thickets, grassy or gravelly slopes; ca. 2000 m. W Xinjiang [Kazakhstan].

Recent evidence from molecular studies suggests that *Krasnovia longiloba* should be included within the traditionally monotypic genus *Kozlovia* Lipsky.

11. TORILIS Adanson, Fam. Pl. 2: 99, 612. 1763.

窃衣属 qie yi shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs annual or sometimes perennial, bristly, hispid or appressed pubescent throughout. Stem erect, much branched, ridged, leafy throughout. Leaf blade 1–2-pinnate or pinnately decomposed; ultimate segments lanceolate to oblong, densely toothed to deeply lobed, both surfaces strigose with appressed hairs. Umbels loosely compound or capitate, terminal and/or lateral; bracts few or absent; rays 2–12, spreading-ascending, or umbellules sessile; bracteoles 2–8, linear or subulate. Calyx teeth small, triangular to acute-lanceolate. Petals white or purplish red, obovate, with a narrow inflexed apex, appressed-strigose on abaxial surface. Stylopodium thick, conic; styles short. Fruit round-ovoid or oblong, flattened laterally; primary ribs filiform, setulose, lateral ribs displaced onto the commissural surface; secondary ribs hidden by dense, upwardly hooked spines (Chinese taxa) which occupy the entire interval; vittae 1 under the secondary ribs, 2 on commissure. Seed flattened dorsally in cross section, face concave. Carpophore bifid at apex, cleft for 1/3–1/2 of its length.

About 20 species: Africa, Asia, Europe, North and South America, Pacific Islands (New Zealand); two species in China.

"*Torilis taihasenzanensis*" (Masamune, J. Soc. Trop. Agric. 6: 570. 1934) was described from Taiwan, but the apparent assignment to *Torilis* was a typographic error for *Trollius* (Ranunculaceae), as was indicated on an errata slip inserted between pages 4 and 5 of the volume. The correct name is *Trollius taihasenzanensis* Masamune (see Fl. China 6: 141. 2001).

- 1a. Bracts 3–6; rays 4–12; fruit round-ovoid, 1.5–4 × 1.5–2.5 mm 1. *T. japonica*
 1b. Bracts usually absent, rarely 1; rays 2–4(–5); fruit oblong, 4–7 × 2–3 mm 2. *T. scabra*

1. *Torilis japonica* (Houttuyn) de Candolle, Prodr. 4: 219. 1830.

小窃衣 xiao qie yi

Caucalis japonica Houttuyn, Nat. Hist. 2(8): 42. 1777; *Anthriscus vulgaris* Bernhardt; *C. anthriscus* (Linnaeus) Hudson; *C. conifolia* Wallich ex de Candolle; *C. elata* D. Don; *C. praetermissa* (Hance) Franchet; *Tordylium anthriscus* Linnaeus; *Torilis anthriscus* (Linnaeus) C. C. Gmelin (1805), not (Linnaeus) Gaertner (1788); *T. anthriscus* var. *japonica* (Houttuyn) H. de Boissieu; *T. praetermissa* Hance.

Herbs 20–120 cm tall. Basal and lower cauline leaves petioled; petiole 2–7 cm; blade triangular-ovate to ovate-lanceolate in outline, up to 20 × 17 cm; pinnae ovate-lanceolate, 2–6 × 1–2.5 cm. Peduncles 3–25 cm, retrorse hispid; bracts few, linear; rays 4–12, 1–3 cm spreading, bristly; bracteoles 5–8, linear or subulate, 1.5–7 × 0.5–1.5 mm; umbellules 4–12-flowered. Pedicels 1–4 mm, shorter than bracteoles. Calyx teeth small, deltoid-lanceolate. Fruit often blackish purple when mature, globose-ovoid, 1.5–5 × 1–2.5 mm. Fl. and fr. Apr–Oct.

Mixed forests in valleys, grassy places, especially in disturbed areas; 100–3800 m. Throughout China, except Heilongjiang, Nei Mongol, and Xinjiang [widespread as a ruderal in Asia and Europe].

The roots and fruits are used medicinally in some provinces.

2. *Torilis scabra* (Thunberg) de Candolle, Prodr. 4: 219. 1830.

窃衣 qie yi

Chaerophyllum scabrum Thunberg in Murray, Syst. Veg., ed. 14, 289. 1784; *Anthriscus scabra* (Thunberg) Koso-Poljansky; *Caucalis scabra* (Thunberg) Makino; *Torilis henryi* C. Norman.

Herbs to 90 cm tall. Basal and lower cauline leaves petioled; petiole 2–6 cm; blade ovate in outline, up to 15 × 18 cm; pinnae lanceolate to narrowly ovate, 2–15 × 2–8 cm. Peduncles 3–10 cm; bracts usually absent; rays 2–4(–5), 1–5 cm, stout and ridged, densely appressed-strigose; bracteoles 2–6, subulate, equal to or shorter than the pedicels; umbellules 2–6-flowered. Pedicels 3–8 mm, hirsute. Fruit usually dark green, occasionally tinged dark purple, oblong, 4–7 × 2–3 mm. Fl. and fr. Apr–Nov.

Mixed forests on mountain slopes or in valleys, roadsides, especially in disturbed areas; 200–2400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan [Japan, Korea; introduced in North America].

This species has reputed medicinal value.

12. TURGENIA Hoffmann, Gen. Pl. Umbell. xxvi, 59. 1814.

刺果芹属 ci guo qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs annual, all parts densely pubescent, gray-white hirsute. Tap root slender. Stem thinly ribbed, branched. Leaves pinnate (rarely 2-pinnate/pinnatifid); petioles with narrow membranous sheath; pinnae narrowly oblong, coarsely dentate, sessile, the terminal decurrent at base. Umbels terminal and lateral; rays few, lax; bracts and bracteoles present. Flowers polygamous; outer flowers

of umbellules bisexual, inner staminate. Calyx teeth subulate-lanceolate, prominent. Petals purple-red to pinkish white, obovate, the outer enlarged (radiant) obreniform, apex notched, with narrow inflexed lobe. Stylopodium conic; styles short. Fruit ovoid, flattened laterally, densely covered with prickles or bristles; primary and secondary ribs evident, primary ribs bearing 3 rows of bristles, the secondary ribs 1 row of bristles; vittae 1 in each furrow (under each secondary rib) and often 2 under each primary rib, 2 on commissure. Seed face involute with deeply incurved lateral margins. Carpophore bifid at apex.

One species: NW Africa, C and SW Asia, C, S, and W Europe.

1. *Turgenia latifolia* (Linnaeus) Hoffmann, Gen. Pl. Umbell. 59. 1814.

刺果芹 ci guo qin

Tordylium latifolium Linnaeus, Sp. Pl. 1: 240. 1753; *Caucalis latifolia* (Linnaeus) Linnaeus.

Plants 20–40(–50) cm high. Leaf petiole to 5 cm; blade ovate-oblong, 4–10 × 2.5–5 cm; pinnae 1–2.5 × 0.5–1 cm.

Peduncles stout, 6–9 cm; bracts (3–)4–5, lanceolate, 5–12 mm, margin white-scarious; rays 2–5, 3–4 cm; bracteoles ca. 5, ovate, 5–8 mm, margin white-scarious. Umbellules comprise 3–4 bisexual and 3–4 staminate flowers. Fruit ca. 10 × 5 mm. Fl. Jul, fr. Aug.

Ruderal weed of roadsides, waste places, and ditches; ca. 2000 m. W Xinjiang [Afghanistan, Kashmir, Kazakhstan, Pakistan, Russia; NW Africa, C and SW Asia, C, S, and W Europe].

13. **CHAEROPHYLLOPSIS** H. de Boissieu, Bull. Soc. Bot. France 56: 353. 1909.

滇藏细叶芹属 dian zang xi ye qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs annual. Taproot slender. Stem erect, slender, sparingly branched. Leaves long-petiolate; petiole with oblong sheathing base; leaf blade 3–4-pinnate/pinnatifid, thin, papery. Upper stem leaves small, petioles wholly sheathing. Umbels compound, terminal and lateral; bracts absent or rarely 1; rays numerous, subequal, spreading; bracteoles several, narrow, shorter than flowers. Flowers bisexual. Calyx teeth lanceolate, prominent, persistent. Petals oblong-obovate, pinkish white, abaxially pubescent, apex inflexed. Stylopodium widely low-conic; styles very short, deciduous. Fruit small, narrowly oblong, terete, glabrous; ribs equal, filiform, prominent; vittae 1–2 in each furrow, 2 on commissure. Carpophore bifid at apex.

• One species.

1. *Chaerophyllopsis huai* H. de Boissieu, Bull. Soc. Bot. France 56: 353. 1909.

滇藏细叶芹 dian zang xi ye qin

Plants to 50 cm high. Leaf blade ovate-oblong in outline, ca. 10 × 6 cm; pinnae 5–6 pairs; ultimate segments ovate, 4–5.5 × 3–4 mm, adaxially sparsely squamose-pubescent. Peduncles squamose-pubescent; umbels 5–6 cm wide; rays 18–20, 2–4 cm, slender, angled, squamose-pubescent; bracteoles several,

linear-lanceolate; umbellules more than 10-flowered; pedicels densely scaly-villous. Calyx teeth lanceolate, longer than stylopodium. Fruit oblong, terete; mericarps pentagonal in cross section; ribs acute, equal. Fl. Aug–Sep, fr. Sep–Oct.

• Among shrubs and in grassy areas in alpine valleys; 3600–3800 m. SE Xizang (Zayü), Yunnan (Binchuan).

This incompletely known species is recorded only from a few collections.

14. **SCANDIX** Linnaeus, Sp. Pl. 1: 256. 1753.

针果芹属 zhen guo qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Scandicum (K. Koch) Thellung.

Herbs annual. Stem slender, erect, branching above, shortly pubescent. Leaves petiolate; petioles narrowly sheathing for most of their length (especially in upper leaves) blade (1–)2–3-pinnate, ultimate segments narrowly linear (Chinese species). Umbels compound, terminal and lateral; bracts absent (or 1); rays few, sometimes reduced to one; bracteoles several, lobed or dissected. Calyx teeth obsolete. Petals white, oblong, with a narrow incurved apex, sometimes unequal (radiate) in the outer flowers. Stylopodium flattened; styles erect, small. Fruit sub-cylindrical, slightly compressed laterally, erect; beak up to four times as long as the seed-bearing part; ribs slender, prominent; vittae very small. Seed face involute with deeply incurved lateral margins. Carpophore deeply bifid at apex.

About 20 species: Asia, Mediterranean region; one species in China.

1. *Scandix stellata* Banks & Solander in Russell, Nat. Hist. Aleppo ed. 2: 249. 1794.

针果芹 zhen guo qin

Scandix pinnatifida Ventenat; *Scandicum stellatum* (Banks & Solander) Thellung.

Plants 10–30 cm high. Leaf blade ovate, to 6 × 3 cm; ultimate segments 2–11 × ca. 0.5 mm. Rays 1–3, short, 3–8 mm; bracteoles conspicuously pinnate, 4–10 mm. Flowers subsessile, 5–14 per umbellule. Fruit 16–28 mm; beak long, 1.5–3 times as long as the seed-bearing part; seed-bearing part covered with coarse white bristles.

Grassy slopes, waste places, roadsides; ca. 2000 m. Xinjiang (Tian Shan) [widespread in C and SW Asia and the Mediterranean region].

15. CORIANDRUM Linnaeus, Sp. Pl. 1: 256. 1753.

芫荽属 yan sui shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs annual, strongly aromatic, glabrous throughout. Taproot slender. Stem erect, branched above. Leaves petiolate; blade pinnately dissected, membranous; ultimate segments very variable in shape. Umbels compound, lax, terminal or opposite the leaves; bracts absent (rarely 1); rays several, spreading, unequal; bracteoles several, linear. Calyx teeth short, acute, often unequal. Petals white or rose-pink, obovate, apex deeply notched, outer petals enlarged (radiant). Stylopodium conic; styles slender, erect. Fruit globose, not readily separating at maturity; pericarp hard; primary and secondary ribs filiform, evident; vittae absent or solitary, obscure in mature fruits. Seed face concave. Carpophore deeply bifid at apex.

Probably one species: Mediterranean region; cultivated in China.

1. *Coriandrum sativum* Linnaeus Sp. Pl. 1: 256. 1753.

芫荽 yan sui

Selinum coriandrum E. H. L. Krause, nom. illeg. superfl.

Plants to 60 cm high. Basal and lower leaves pinnate to 2-pinnatisect; petiole to 13 cm, shortly sheathing at base; blade ovate, to 14 × 8 cm; pinnae broadly ovate or flabelliform, 1–2 × 1–1.5 cm, variously toothed or incised; ultimate segments broad. Mid and upper cauline leaves ternate-2–3-pinnatisect,

reducing up the stem; ultimate segments linear to filiform, 2–15 × 0.5–1.5 mm, obtuse, entire. Peduncles 2–10 cm; rays 2–8, 1–2.5 cm; bracteoles 2–5, linear, entire; umbellules 3–9-flowered. Pedicels 2–5 mm. Calyx teeth ovate-deltoid or ovate-lanceolate, unequal. Fruit 1.5–5 mm wide. Fl. and fr. Apr–Nov.

Cultivated and sometimes naturalized. Almost throughout China [native to the Mediterranean region; cultivated worldwide].

The stem and leaves are used as a vegetable or culinary herb (coriander, cilantro); the fruit are used as a culinary spice, for oil, and as a dietary herb in traditional Chinese medicine (“hu sui”).

16. SCHRENKIA Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 63. 1841.

双球芹属 shuang qiu qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs perennial. Taproot woody, crown surrounded by fibrous remnant sheaths. Stem ribbed, lower branches alternate, the upper opposite, whorled or cymose. Leaves 2–4-pinnate-pinnatisect; petioles wholly sheathing. Umbels compound, terminal or lateral; bracts small, deciduous; bracteoles several. Flowers polygamous. Calyx teeth conspicuous, subulate-lanceolate, persistent. Petals white, oblong to ovate, base clawlike, apex notched and slightly incurved. Stylopodium low-conic; styles reflexed. Fruit biglobose (didymous), broader than long, glabrous, not separating at maturity; pericarp leathery; ribs inconspicuous (Chinese species); vittae obscure. Seed face concave. Carpophore fused to mericarps.

About seven species: C Asia, Europe; one species in China.

1. *Schrenkia vaginata* (Ledebour) Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 64. 1841.

双球芹 shuang qiu qin

Cachrys vaginata Ledebour, Fl. Altaic. 1: 366. 1829.

Plants 20–50 cm high. Basal leaves short petiolate, petiole 0.5–1.5 cm, upper leaves sessile; blade ultimate segments of blade oblong to linear, 2–15 × 1–2 mm. Umbels 5–10 cm wide;

bracts several, narrowly lanceolate, ca. 5 mm; rays 8–16, 1–5 cm, unequal; bracteoles 8–10, linear-lanceolate, 1–4 mm, margin scarious; umbellules with 6–14 bisexual flowers and several staminate flowers; pedicels unequal, the peripheral ca. 1 cm, the internal almost obsolete. Calyx teeth ca. 0.5 mm. Fruit with many brownish longitudinal stripes, 2–3 × 2.4–4 mm. Fl. May, fr. Jun.

Dry stony slopes; ca. 2000 m. Xinjiang [Kazakhstan].

17. OREOMYRRHIS Endlicher, Gen. Pl. 787. 1839.

山茉莉芹属 shan mo li qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Caldasia Lagasca y Segura, Amen. Nat. Españ. 1(2): 98. 1821, not Willdenow (1806).

Herbs perennial and caespitose. Stem inconspicuous or very short, branching from base. Leaves all basal; petiole with membranous sheath at base; blade oblong to ovate, 1–2-pinnate; ultimate segments linear-lanceolate, minute. Umbels simple, 4–20-flowered; peduncles long, scapellike; bracts 4–10, leaflike, oblanceolate, entire, pinnatifid or pinnate, often longer than umbels. Flowers small, white, bisexual. Calyx teeth obsolete. Petals oblong, apex acute and incurved. Stylopodium shortly conic or conic. Fruit oblong-ovoid or oblong-linear, gradually tapered to apex, slightly flattened laterally, commissure constricted; ribs 5, obtuse ridged; vit-

tae 1 in each furrow, 2 on commissure. Seed face slightly concave. Carpophore bifid at apex.

About 22 species: mainly in S Asia, Australasia, and Central and South America; one species (endemic) in China.

1. *Oreomyrrhis involucrata* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 128. 1911.

山茉莉芹 shan mo li qin

Oreomyrrhis gracilis Masamune; *O. involucrata* var. *pubescens* Masamune; ?*O. nanhuensis* Chih H. Chen & J. C. Wang; *O. taiwaniana* Masamune.

Plants 6–20 cm high. Tap root short. Petioles 2–6 cm; leaf blade 1.5–3.5 × 1–2 cm; pinnae 2–3 pairs, the proximal short-petiolulate; ultimate segments linear, linear-lanceolate or oblanceolate, entire or 2–3-lobed, hirsute to glabrous. Peduncles

5–15 cm, hirsute; bracts 4–8, base slightly united, linear to oblanceolate, 1–2 × 2–10 mm, hirsute to glabrous; pedicels 10–20, much shorter than bracts, hirsute. Petals 1.2–1.5 × ca. 1 mm, glabrous to hirsute. Fruit purple-black, 3–4 × 2–5 mm, glabrous. Fr. Oct–Nov.

• Grassy slopes on mountain ridges; 2000–4000 m. C Taiwan.

A recent revision of *Oreomyrrhis* in Taiwan (Chen & Wang, Bot. Bull. Acad. Sin. 42: 303–312. 2001) reinstated *O. taiwaniana* as a distinct species and described a new species, *O. nanhuensis*. The morphological differences appear slight and further work is needed to confirm this treatment.

18. **PHYSOSPERMOPSIS** H. Wolff, Notizbl. Bot. Gart. Berlin-Dahlem 9: 276. 1925.

滇芎属 dian xiong shu

Pan Zehui (潘泽惠); Mark F. Watson

Haploseseli H. Wolff & Handel-Mazzetti.

Herbs perennial, glabrous. Taproot usually long, conic. Stem ribbed, base covered with fibrous sheath remnants. Leaf blade obovate-lanceolate, broadly triangular to oblong, 1–2-pinnate, rarely entire. Umbels terminal and lateral; bracts many, prominent, leaf-like, base entire, apex 3-lobed or pinnate; bracteoles present, entire or 3-lobed to pinnate. Calyx teeth minute or inconspicuous. Petals obovate, white, yellowish or dark purple, base shortly claw-like, apex obtuse-rounded or with shortly inflexed tips. Stylopodium flattened, margin sinuate; styles about as long as stylopodium. Fruit ovoid to broadly ovoid, base slightly cordate, apex gradually narrowed, slightly flattened laterally, young fruits usually emerald green; ribs 5, filiform, prominent; vittae 2–3 in each furrow, 2–4 on commissure. Seed face plane to concave. Carpophore parted at apex.

About ten species: Sino-Himalayan region; eight species (four endemic) in China.

This is a taxonomically complex genus in which species boundaries are not always clear, and generic limits (e.g., with *Pleurospermum*, *Tongoloo*, and *Trachydium*) are problematic. *Physospermopsis* is one of a group of high-altitude Sino-Himalayan genera in need of a revision treating all taxa across their whole geographic range.

- 1a. Basal leaves simple, undivided 1. *P. alepidioides*
- 1b. Basal leaves 1–2-pinnate or 1–2-ternate/pinnate.
 - 2a. Plants 5–10 cm high; stems reduced, often acaulescent 2. *P. kingdon-wardii*
 - 2b. Plants above 20 cm high; stems not reduced.
 - 3a. Bracts usually absent; bracteoles inconspicuous 3. *P. cuneata*
 - 3b. Bracts and bracteoles present, conspicuous.
 - 4a. Base of leaf segments decurrent, rachis broadly winged 4. *P. delavayi*
 - 4b. Base of leaf segments not decurrent, rachis not broadly winged.
 - 5a. Basal leaves pinnate, nerves partly purple-red 5. *P. rubrinervis*
 - 5b. Basal leaves 2-pinnate, nerves not purple-red.
 - 6a. Bracts entire, 3–5-lobed or nearly-pinnate 6. *P. muliensis*
 - 6b. Bracts 2-pinnate, as the leaves.
 - 7a. Leaf sheaths broad-membranous; bracteoles narrowly obovate, apex incised into 3 teeth or pinnatifid; fruit ribs plane 7. *P. shaniana*
 - 7b. Leaf sheaths small, not broad-membranous; bracteoles broadly obovate, apex incised into 7–9 teeth; fruit ribs sinuate 8. *P. obtusiuscula*

1. *Physospermopsis alepidioides* (H. Wolff & Handel-Mazzetti) R. H. Shan, Sinensia 12: 185. 1941.

全叶滇芎 quan ye dian xiong

Haploseseli alepidioides H. Wolff & Handel-Mazzetti, Symb. Sin. 7: 722. 1933.

Plants 40–70 cm. Stem branched. Basal petioles 4–10 cm, narrowly winged, sheaths narrow; leaf blade obovate or obo-

vate-lanceolate, ca. 8 × 2–3 cm, simple, base cuneate, margin sparsely serrate. Umbel to 12 cm across; peduncles 15–25 cm, scabrous; bracts 4–7, lanceolate or oblong, 5–15 mm, apex 2–3-lobed, margin dark purple; rays 6–13, 2.5–8.5 cm, unequal; bracteoles several, ovate-lanceolate, 2–3.5 × 1–1.5 mm, entire or 2–3-lobed at apex; pedicels 2–4 mm. Calyx teeth minute, ovate-triangular, ca. 0.2 mm. Petals broadly elliptic to obovate, white, 1.5–1.8 mm, apex obtuse. Young fruit ovoid, ca. 2 × 1.8

mm, lateral furrows wider than the dorsal; ribs prominent, somewhat verucose; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. and fr. Jul–Oct.

- Open forests, grasslands; 2200–3300 m. SW Sichuan.

This unusual, poorly known taxon is recorded only from a few collections.

2. *Physospermopsis kingdon-wardii* (H. Wolff) C. Norman, J. Bot. 76: 231. 1938.

小滇芎 xiao dian xiong

Trachydium kingdon-wardii H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 124. 1929; *Physospermopsis bhutanensis* Farille & S. B. Malla; *Pleurospermum kingdon-wardii* (H. Wolff) M. Hiroe.

Plants 5–10 cm. Root long-conic, 2–8 cm. Stem shortened, sometimes to 10 cm, often acaulescent. Basal petioles 2–6 cm, sheaths ovate; blade ovate-oblong in outline, 2–4 × 1.5–2 cm, pinnate; pinnae 2–4 pairs, pinnatifid; ultimate segments lanceolate or oblanceolate, 4–7 × 1–2 mm, entire or 2–3-lobed. Umbels terminal, 3–10 cm across; peduncles (0–)2–4 cm; bracts 1–5, 2–3 cm; rays 5–12(–20), ribbed, 1–10(–13) cm, unequal, often spreading; bracteoles 2–5, lanceolate, nearly as long as flowers; umbellules 8–14 mm across, 10–25-flowered; pedicels unequal. Calyx teeth minute, triangular. Petals white, yellowish or blue-purple, ca. 1 × 0.8 mm. Fruit broadly ovoid; ribs prominent, often sinuate, immature fruit sometimes with sparse minute warts; vittae 2–3 in each furrow, 4–6 on commissure. Seed face slightly concave. Fl. Jul–Sep, fr. Aug–Nov.

Forests, grassy meadows, damp marshes; 2700–4800 m. SE Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

The distinction between this and other dwarf, high-altitude species in the Himalayan region is a continuing problem; see also *Pleurospermum nanum* and *Trachydium*.

3. *Physospermopsis cuneata* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 126. 1929.

楔叶滇芎 xie ye dian xiong

Sinodielsia cuneata (H. Wolff) Pimenov & Kljuykov.

Plants 30–40 cm. Root stout, long-conic. Stem slender, ribbed, a little branched above. Basal petioles 6–15 cm, flattened, sheaths short, narrow; blade broadly rhombic-ovate in outline, ternate/pinnate; pinnae 3-parted; ultimate segments oblong, 8–15 × 2–5 mm, apex 2–5-lobed, base cuneate, slightly decurrent. Umbels terminal, ca. 2–4.5 cm across; peduncles 5–10 cm; bracts often absent, rarely 1, ovate, 1–1.2 cm; rays 5–6, slender, 2–4 cm, unequal; bracteoles 4–6, linear, shorter than pedicels; umbellules 8–15-flowered. Calyx teeth triangular-ovate, to 0.5 mm. Petals white, ca. 1.3 × 1 mm, midvein conspicuous, apex obtuse. Young fruit broadly ovoid, ca. 2 × 2 mm, mature fruit unknown. Fl. and fr. Oct–Dec.

- Open grasslands; 3300–3400 m. Sichuan, Yunnan.

This species is unusual within the genus by the lack of conspicuous bracts and bracteoles. However, it is a poorly known taxon, recorded only from a few collections. The generic assignment is therefore ten-

tative pending further study, as the species may be better placed in *Tongoloo* or, if recognized, *Sinodielsia*.

4. *Physospermopsis delavayi* (Franchet) H. Wolff, Notizbl. Bot. Gart. Berlin-Dahlem 9: 278. 1925.

滇芎 dian xiong

Arracacia delavayi Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 115. 1894; *Pleurospermum delavayi* (Franchet) M. Hiroe.

Plants 55–75 cm. Root stout, long-conic. Stem branched above. Basal petioles 4–7.5 cm, winged, sheaths narrow-oblong; blade triangular or ovate-oblong in outline, 3.5–8 × 2.5–6.5 cm, pinnate/pinnatifid, rachis conspicuously winged; ultimate segments obovate to obovate-orbicular, 2–3 × 1–2.5 cm, base decurrent, margin incised-serrate, often 3-lobed, the central lobe larger than the laterals. Leaves reduced upwards. Umbels 1.5–8 cm across; peduncles 7–20 cm; bracts 4–5, leaf-like, 7–13 mm, apex usually 2–3-lobed, purple-green; rays 5–11, 1–5.5 cm; bracteoles 3–4, ovate-lanceolate or oblanceolate, 4–6 × ca. 2 mm, entire or 3-lobed; umbellules 6–12 mm across, 7–14-flowered; pedicels 3–5 mm. Calyx teeth suborbicular or ovate-triangular, ca. 0.2 mm. Petals white, 2–2.2 mm. Fruit broadly ovoid, 2–3.5 × 2.5–4 mm; ribs filiform, somewhat sinuate; vittae 2 in each dorsal furrow, 3 in each lateral furrow, 4 on commissure. Seed face concave. Fl. May–Aug, fr. Jul–Sep.

- Open grasslands; 2800–3900 m. Sichuan, Yunnan.

5. *Physospermopsis rubrinervis* (Franchet) C. Norman, J. Bot. 76: 231. 1938.

紫脉滇芎 zi mai dian xiong

Trachydium rubrinerve Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 112. 1894; *Physospermopsis muktinathensis* Farille & S. B. Malla; *Pleurospermum rubrinerve* (Franchet) M. Hiroe.

Plants 35–50 cm. Root stout, long-conic. Stem dark purple, little branched above. Basal petioles 5.5–9 cm, sheaths ovate and membranous; blade ovate to broadly ovate in outline, 3.5–5 × 3–4 cm, pinnate; ultimate segments ovate or rhombic, 1.5–2.5 × 1–1.5 cm, base cuneate, margin coarsely incised-toothed or lobed, nerves partly purple-red. Leaves reduced upwards. Umbels 5–15 cm across; peduncles 6–23 cm; bracts 2–5, obovate-lanceolate, leaf-like, apex pinnate; rays 9–14, unequal; bracteoles 3–4, margin purple-red, nearly as long as flowers; umbellules 9–25-flowered, pedicels 2–4 mm. Calyx teeth small, triangular. Petals white, margin purple-red, ca. 0.8 mm. Fruit broadly ovoid, ca. 3 × 3 mm. Seed face concave. Fl. and fr. Aug–Oct.

Open grasslands; 3200–4800 m. SW Sichuan, Yunnan [NE India, Nepal].

6. *Physospermopsis muliensis* R. H. Shan & S. L. Liou in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 297. 1979.

木里滇芎 mu li dian xiong

Plants 20–30 cm. Root long-conic. Stem branched. Basal and lower petioles 5–9 cm, narrowly winged, sheaths narrow; blade ovate-oblong in outline, 3–4 × 2.5–3 cm, 2-pinnate/pinnatifid; pinnae 3–5 pairs, ovate to long-ovate, 1–2 × 0.7–1 cm,

margin pinnatisect. Leaves reduced upwards. Umbels 3–8 cm across; peduncle 10–15 cm; bracts 5–6, 1.5–2 × 0.2–0.7 cm, leaf-like, entire or apex 2–3-toothed to somewhat pinnatifid; rays 10–15, up to 5 cm, unequal; bracteoles 3–4, lanceolate, nearly as long as pedicels, entire, rarely 2–3-toothed; umbellules 9–20-flowered. Calyx teeth minute. Petals white. Fruit broadly ovoid or ovoid, 1.5–2 × 1.8–2 mm, ribs filiform, sparse scattered warts, especially on ribs; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. and Fr. Sep–Oct.

- Open grasslands; 3100–4000 m. SW Sichuan, NW Yunnan.

7. *Physospermopsis shaniana* C. Y. Wu & F. T. Pu in W. T. Wang & S. G. Wu, Vasc. Pl. Hengduan Mts. 1: 1285. 1993.

丽江滇芎 li jiang dian xiong

Trachydium forrestii Diels, Notes Roy. Bot. Gard. Edinburgh 5: 291. 1912; *Physospermopsis dielsii* Pimenov & Kljuykov, nom. illeg. superfl.; *P. forrestii* (Diels) C. Norman (1938), not Fedde ex H. Wolff (1929); *Pleurospermum forrestii* (Diels) M. Hiroe.

Plants 15–30 cm. Taproot long-conic. Stem reduced, branched at base, branches longer than the main stem. Basal petioles 4–9 cm, sheaths broad; blade ovate-oblong in outline, 3–5 × 2–3.5 cm, 2-pinnate/pinnatifid; pinnae subsessile, 3–5 pairs, ovate or broad-ovate, 1.5–2 × 1–1.5 cm, margin pinnatifid; ultimate segments entire or 2–3-toothed. Leaves reduced upwards. Umbels 2–13 cm across; peduncles 7–16 cm; bracts 3–5, leaf-like, 2-pinnate, apex pinnate; rays 9–13, (1–)3–7 cm, ascending-spreading; bracteoles 2–5, ovate oblong to ovate-lanceolate, as long as or exceeding the flowers, often 3-toothed; pedicels 9–13. Calyx teeth minute. Petals white, 1.2–1.5 × 1–

1.2 mm. Fruit broadly ovoid, 2.5–3.5 × 2–2.5 mm, base truncate or slightly cordate. Seed face concave. Fl. and fr. Jul–Aug.

Grassy slopes; 2900–4500 m. Sichuan, Xizang, Yunnan [Myanmar].

8. *Physospermopsis obtusiuscula* (Wallich ex de Candolle) C. Norman, J. Bot. 76: 231. 1938.

波棱滇芎 bo leng dian xiong

Hymenolaena obtusiuscula Wallich ex de Candolle, Prodr. 4: 246. 1830; *Physospermopsis farillei* P. K. Mukherjee & Constance; *P. hirsutula* (C. B. Clarke) Farille; *Pleurospermum obtusiusculum* (Wallich ex de Candolle) M. Hiroe; *Trachydium hirsutulum* C. B. Clarke; *T. obtusiusculum* (Wallich ex de Candolle) C. B. Clarke; *T. obtusiusculum* var. *strictum* C. B. Clarke.

Plants 15–45 cm, sometimes flushed red. Root short, thickened. Stem dark purple-green, simple, occasionally branched at base. Leaves petiolate; petioles 3–4 cm, sheaths small; blade ovate in outline, 4–5 cm, 2-pinnate; pinnae ovate, ca. 1.5 cm, margin pinnatifid; ultimate segments narrowly elliptic, 2–3 × 1–2 mm. Primary umbels 5–18 cm across; peduncles 9–18 cm; bracts 4–6, leaf-like, 2-pinnate; rays purple, 14–17, 2.5–14 cm, unequal, becoming erect in fruit; bracteoles 3–4, broadly ovate, slightly longer than flowers, 6–9-toothed at apex; umbellules 7–12-flowered. Calyx teeth minute. Fruit ovoid to broadly ovoid, 2.5–3.2 × 1.5–1.8 mm; ribs narrowly winged, sinuate; vittae 2 in each furrow, 4 on commissure. Seed face plane. Fl. and fr. Aug–Sep.

Forests, grasslands; 3900–4300 m. Sichuan, Xizang, Yunnan [Bhutan, NE India, Nepal, Sikkim].

This is a widespread species with complex morphological variation. Distinction between this species and *Physospermopsis shaniana* is not always straightforward.

19. MEEBOLDIA H. Wolff, Repert. Spec. Nov. Regni Veg. 19: 313. 1924.

滇芹属 dian qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Sinodielsia H. Wolff.

Herbs perennial, essentially glabrous (scabrescent around nodes and at ends of peduncles and rays). Stem erect, branched above, striate. Leaves petiolate, sheathing; blade broadly deltoid, 3-pinnate/pinnatifid; pinnae 4–9 pairs, leaflets deeply pinnate-lobed, serrate. Umbels compound, terminal and lateral, large; terminal peduncle long and thick; bracts 1–3 or 0; rays many, unequal, quadrangular, scabrid at the angles; bracteoles many, narrow; umbellules many-flowered. Flowers polygamous. Calyx teeth large, conspicuous, lanceolate-subulate. Petals obovate, white, medial rib yellow, apex narrow inflexed, base clawed. Stylopodium conic, about equaling the calyx teeth; styles recurved. Fruit narrowly ovoid, tapering toward the apex, slightly flattened laterally, glabrous; ribs filiform; vittae 2–3 in each furrow, 4 on commissure. Seed face concave. Carpophore 2-parted.

Three species: Sino-Himalayan region; two species (one endemic) in China.

The classification of *Meeboldia*, *Tongoloa*, and *Vicatia* is problematic; see *Tongoloa* for a discussion of the issues.

- 1a. Ultimate segments of leaves 4–15 × 3–12 mm, widely spaced; rays 5–8; calyx teeth 0.3–0.6 mm 1. *M. yunnanensis*
 1b. Ultimate segments of leaves 2–5 × 1–3 mm, closely spaced; rays 8–15; calyx teeth 0.7–1.2 mm; 2. *M. achilleifolia*

1. *Meeboldia yunnanensis* (H. Wolff) Constance & F. T. Pu, Novon 8: 70. 1998.

滇芹 dian qin

Sinodielsia yunnanensis H. Wolff, Notizbl. Bot. Gart. Berlin-Dahlem 9: 278. 1925; *Physospermopsis cruciata* H. Wolff; *P. forrestii* Fedde ex H. Wolff (1929), not (Diels) C.

Norman (1938); *Pleurospermum cruciatum* (H. Wolff) M. Hiroe; *Sinodielsia microloba* Kljuykov.

Plants 40–70 cm. Taproot fusiform, annular scars several, prominent. Basal petioles 2–13 cm, sheaths short, broad, membranous; blade 2–3-pinnate, 8–14 × 5–10 cm; pinnae 4–6 pairs, lower pinnae long-petiolulate; ultimate segments obovate-linear, 5–15 × 3–12 mm, widely spaced, deeply lobed or irregularly serrate. Leaves reduced upwards, uppermost small, short petiolate or sessile. Umbels 4–7 cm across; peduncles 8–15 cm; bracts 1–3, linear, 3–5 mm; rays 5–8, 2–6 cm, spreading; bracteoles 7–9, linear, ca. 5 mm; pedicels unequal. Calyx teeth lanceolate-acute, 0.3–0.6 mm. Petals ca. 1.2 × 1 mm. Fruit ca. 3 × 2 mm. Fl. Jul–Sep, fr. Sep–Oct.

• Sparse forests on mountain slopes, grassy places, rock crevices; 2000–3500 m. SE Xizang, Yunnan.

The plants are used in Yunnan as a regional substitute for the medicine “gao ben” (*Ligusticum sinense* and *L. jeholense*).

20. TONGOLOA H. Wolff, Notizbl. Bot. Gart. Berlin-Dahlem. 9: 279. 1925.

东俄芹属 *dong e qin shu*

Pan Zehui (潘泽惠); Mark F. Watson

Herbs perennial, essentially glabrous, often scabrous at nodes and base of umbel. Taproot long-conic. Stem slender, thinly ribbed or striate, usually branched, petiole remnants not persistent. Leaves petiolate; petioles sheaths inflated, membranous; blade triangular to broadly lanceolate, 3-ternate/pinnate or 2–3-pinnate; ultimate segments narrow. Umbels terminal or lateral; bracts and bracteoles often absent, sometimes several. Calyx teeth minute. Petals obovate to elliptic-ovate, white, pink or dark purple (often variable within a species), base claw-like, apex obtuse or notched with incurved tips. Stylopodium short-conic or depressed. Fruit broadly ovoid, base cordate or obtuse, apex slightly constricted, slightly laterally compressed, glabrous; ribs 5, filiform; vittae (2–)3 in each furrow, (2–)4 on commissure. Seed face concave. Carpophore divided half its length or more.

About 15 species: high-altitude Sino-Himalayan region, mainly in SW China, extending west to C Nepal; 15 species (13 endemic) in China.

This is a poorly defined genus in need of revision based on new, comprehensive material. Many of the Chinese species are incompletely known with no specimens bearing mature fruit. Specific boundaries are often unclear, and this treatment should be considered provisional. Generic delimitation between *Meeboldia*, *Sinodielsia*, *Tongoloo*, and *Vicatia* continues to be problematic and controversial. Some authors accept the genus *Sinodielsia* to contain five species (*S. bipinnata*, *S. digitata*, *S. microloba*, *S. tibetica*, and *S. yunnanensis*), whereas others include *S. bipinnata* and *S. tibetica* in *Vicatia* and the remainder in *Meeboldia*. The latter classification is adopted for the *Flora of China* pending detailed revision including all Chinese taxa in these genera.

Tongoloo souliei (H. de Boissieu) H. Wolff (Pflanzenr. 90(IV. 228): 319. 1927; *Pimpinella souliei* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 2:810. 1902) was described from W Sichuan (“Tongolo,” *J. A. Soulié s.n.*, holotype, P). It is not treated in this account as it is imperfectly known.

1a. Bracts and bracteoles usually both present, (2–)3–6, linear.

2a. Basal leaves 1–2-ternate or 2–3-ternate/pinnate; ultimate segments ovate to lanceolate-ovate, margin irregularly pinnate or coarsely serrate.

3a. Leaves 1–2-ternate, nerves purplish-red 1. *T. rubronervis*

3b. Leaves 2–3-ternate/pinnate, nerves not purplish-red 2. *T. stewardii*

2b. Basal leaves 2–3-pinnate or 3–4-ternate/pinnate; ultimate segments linear, entire or 1–3-toothed.

4a. Basal leaves 2–3-pinnate; bracts absent.

5a. Rays up to 4 cm, equal; bracteoles entire 3. *T. pauciradiata*

5b. Rays up to 6 cm, unequal; bracteoles apex pinnate 4. *T. napifera*

4b. Basal leaves 3–4-ternate/pinnate; bracts usually present.

6a. Plants ca. 40 cm; rays ca. 8 5. *T. zhongdianensis*

6b. Plants 50–110 cm; rays 8–19 6. *T. loloensis*

1b. Bracts and bracteoles both absent (bracts of *T. gracilis*, *T. silaifolia*, and *T. smithii* sometimes developed).

7a. Plants less than 30 cm.

8a. Ultimate segments of leaves 4–6 × 2–3 mm; rays 3–5 cm 7. *T. taeniophylla*

8b. Ultimate segments of leaves 1–4 × 0.5–1.5 mm; rays 1.5–3 cm.

2. *Meeboldia achilleifolia* (de Candolle) P. K. Mukherjee & Constance, Edinburgh J. Bot. 48: 44. 1991.

薯叶滇芹 *shi ye dian qin*

Ptychotis achilleifolia de Candolle, Prodr. 4: 109. 1830; *Pimpinella achilleifolia* (de Candolle) C. B. Clarke; *Tongoloo achilleifolia* (de Candolle) Pimenov & Kljuykov; *Vicatia achilleifolia* (de Candolle) P. K. Mukherjee.

Plants 30–100(–150) cm. Basal petioles ca. 20 cm, sheaths oblong; blade triangular-ovate, 8–15 × 4–8 cm, 3–4-ternate/pinnate, held in one plane; ultimate segments linear-lanceolate, 2–5 × 1–3 mm, closely spaced, acute. Terminal umbels 5–8 cm across; bracts 1 to several, linear, 5–15 mm; rays 8–15, 3–5 cm, somewhat unequal; bracteoles 4–6, linear, 2–5 mm; umbellules 10–15-flowered; pedicels 2–12 mm, unequal. Calyx teeth lanceolate, 0.7–1.2 mm. Petals ca. 1.5 × 1 mm. Fruit ca. 2 × 1.5 mm. Fl. Jul–Sep, Fr. Aug–Oct.

Forests, grassy slopes; ca. 3500 m. NW Yunnan [?Bhutan, Nepal, ?Sikkim].

- 9a. Plants to 15 cm; ultimate segments of leaves 3–4 × 0.5–1.5 mm 8. *T. rockii*
 9b. Plants 15–30 cm; ultimate segments of leaves 1–2 × 1–1.2 mm 9. *T. filicaudicis*
- 7b. Plants more than 30 cm.
 10a. Ultimate segments of leaves less than 5 mm.
 11a. Rays thick, 4–9 cm 10. *T. tenuifolia*
 11b. Rays slender, ca. 4 cm 11. *T. smithii*
- 10b. Ultimate segments of leaves mainly more than 7 mm.
 12a. Leaves 3–4-ternate/pinnate or 3–4-pinnate; ultimate segments 0.5–1 mm wide 12. *T. elata*
 12b. Leaves 2–3-pinnate; ultimate segments (0.8–)1–3 mm wide.
 13a. Ultimate segments of leaves 2–4.5 cm 13. *T. dunnii*
 13b. Ultimate segments of leaves 0.3–1.5 cm.
 14a. Ultimate segments of leaves 5–18 × 1–2 mm; rays 8–22; petals usually purple 14. *T. silaifolia*
 14b. Ultimate segments of leaves 3–10 × ca. 1 mm; rays 5–11; petals usually white 15. *T. gracilis*

1. *Tongoloo rubronervis* S. L. Liou, Acta Phytotax. Sin. 27: 69. 1989.

红脉东俄芹 hong mai dong e qin

Plants 30–55 cm. Stem branched above. Basal petioles 8–14 cm, slender, sheaths broadly inflated; blade broadly triangular in outline, 3–5.5 × 4–6 cm, 1–2-ternate; lower pinnae short-petiolate, subtriangular or broadly ovate, 3-lobed; ultimate segments lanceolate-ovate, margin irregularly pinnate or coarse-serrate, nerves purplish-red. Umbels ca. 7 cm across; peduncles 14–32 cm; bracts absent or 1–2, linear, 4–10 mm, purplish-red; rays 12–18, 1.5–4 cm, unequal; bracteoles 3–5, linear; umbellules 13–21-flowered; pedicels unequal. Calyx teeth minute, triangular-ovate. Petals obovate, white. Young fruit ovoid (mature fruit not known). Fl. Oct.

- Coniferous forests; ca. 3700 m. SW Sichuan (Muli).

This poorly known species is recorded only from the type gathering.

2. *Tongoloo stewardii* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 185. 1929.

牯岭东俄芹 gu ling dong e qin

Physospermopsis wolffiana Fedde ex H. Wolff; *Pimpinella stewardii* (H. Wolff) M. Hiroe; *Pleurospermum cavaleri* M. Hiroe.

Plants 30–100 cm. Stem hollow, branched. Basal leaves petiolate; petioles 10–38 cm, sheaths narrow-oblong; blade broadly triangular, 2–3-ternate/pinnate; basal pinnae long-petiolate, 4–5 pairs; ultimate segments ovate to ovate-lanceolate, 1.5–2 × 0.5–1 cm, margin pinnatisect, nerves prominent on both sides. Leaves reduced upwards, Umbels 3–10 cm across; peduncles 5–15 cm; bracts 1–3, linear; rays 11–15, 3–7 cm; bracteoles 3–6, linear, shorter than pedicels; umbellules 9–20-flowered; pedicels unequal. Calyx teeth small, rounded or ovate, 0.2–0.5 mm. Petals orbicular or obovate, white, 1.5–2 × 1–1.8 mm, apex obtuse-rounded. Anthers dark purple. Fruit ovoid-globose, base cordate, 2.5–3 × 2–3 mm. Fl. and fr. Jun–Nov. *n* = 11*.

- Damp grasslands in valleys; 800–3000 m. Jiangxi, NW Yunnan.

3. *Tongoloo pauciradiata* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 128. 1929.

少辐东俄芹 shao fu dong e qin

Plants 10–20 cm. Stem simple or branched above. Lower leaves few; petioles slender, nearly as long as blades; blades narrowly triangular, 2-pinnate; pinnae 5–6 pairs, petiolulate, terminal pinnae sessile; ultimate segments cuneate-obovate or rounded, 3–8 × 2–5 mm, apex 3-lobed. Umbels ca. 6 cm across, terminal with long peduncles; bracts absent; rays 3–8, to 4 cm, equal, spreading; bracteoles numerous, linear, longer than pedicels; umbellules 20–25-flowered. Young fruit oblong-ovate, truncate at base (mature fruit not known). Fl. Aug.

- Lakeshores with open sandy soils; 3200–4000 m. Qinghai, Xizang.

This incompletely known species is recorded only from a few collections.

4. *Tongoloo napifera* (H. Wolff) C. Norman, J. Bot. 76: 232. 1938.

裂苞东俄芹 lie bao dong e qin

Trachydium napiferum H. Wolff, Acta Horti Gothob. 2: 300. 1926.

Plants 20–30 cm. Root short-napiform. Stem stout, ribbed and branched. Basal leaves few; petioles slender, sheaths small; blades broad-triangular, ca. 15 × 8–10 cm, 3-pinnate; pinnae 7-paired, basal pinnae short-petiolate, broad-obovate, 0.5–1 cm, base cuneate, margin pinnate; ultimate segments 2–4 × ca. 1.5 mm. Primary umbels ca. 12 cm across; peduncles ca. 5 cm; bracts absent; rays unequal, up to 6 cm; bracteoles 3–5, linear, apex pinnate, similar to leaves; umbellules 15–20-flowered; pedicels unequal, plane-winged, up to 5 mm. Calyx teeth conspicuous, ovate-triangular. Petals broad-obovate, apex obtuse. Young fruit cordate, ca. 1.5 × 2 mm (mature fruit not known). Fl. Aug.

- About 4000 m. NW Sichuan.

This incompletely known species is recorded only from the type gathering.

5. *Tongoloo zhongdianensis* S. L. Liou, Acta Phytotax. Sin. 27: 68. 1989.

中甸东俄芹 zhong dian dong e qin

Plants ca. 40 cm. Stem purplish. Basal petioles 7–9 cm, sheaths narrow-ovate; blade triangular in outline, 7–7.5 × 8–9 cm, 3–4-pinnate; ultimate segments linear, 2–4 × 1–1.5 mm. Umbels ca. 7–8.5 cm across, peduncles 4.5–12 cm; bracteoles

4–5, linear-lanceolate, 4–5 mm, scarious-margined, purplish-red; rays ca. 8, 2.5–4.5 cm, unequal; bracteoles 4–5, linear-lanceolate; umbellules many-flowered, pedicels short. Calyx teeth minute, triangular. Petals white or purplish-white, obovate, base narrow, apex with incurved tips. Young fruit ovate, ca. 1.7 × 2.2 mm; ribs filiform (mature fruit unknown). Fl. Sep.

- Coniferous forests; ca. 2800 m. NW Yunnan (Zhongdian).

This incompletely known species is recorded only from the type gathering. It is possibly conspecific with *Tongoloa loloensis*.

6. *Tongoloa loloensis* (Franchet) H. Wolff in Engler, Pflanzener. 90(IV. 228): 318. 1927.

云南东俄芹 yun nan dong e qin

Carum loloense Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 125. 1894; *Pimpinella loloensis* de Boissieu; *Trachydium loloense* (Franchet) M. Hiroe.

Plants 30–90(–110) cm. Taproot short, woody. Stem sparingly branched above. Basal and lower petioles 12–22 cm, sheaths small; blade triangular, 3–4-ternate/pinnate, proximal pinnae petiolulate; ultimate segments linear, 2–7 × 0.5–1 mm, entire or 1–3-toothed. Leaves reduced upwards, sheath prominent, larger than blade in uppermost leaves. Umbels 3–6 cm across; peduncles 4–11 cm; bracts absent or 1–2, linear; rays 8–19, 2–5 cm; bracteoles 3–10, linear, as long as pedicels; umbellules 12–21-flowered; pedicels unequal. Calyx teeth minute, ovate, ca. 0.4 mm. Petals ovate to obovate, white, sometimes flushed purple, 1.2–1.5 × 1–1.3 mm, apex obtuse-rounded. Stylopodium dark purple, margin wavy. Fruit ovoid to broadly ovoid, ca. 2.4 × 1.8 mm, ribs filiform to inconspicuous, base caudate, often asymmetric. Fl. Jul–Sep, fr. Aug–Oct.

Grassy slopes; 2500–3600 m. W Sichuan, Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

7. *Tongoloa taeniophylla* (H. de Boissieu) H. Wolff, Notizbl. Bot. Gart. Berlin-Dahlem. 9: 280. 1925.

条叶东俄芹 tiao ye dong e qin

Pimpinella taeniophylla H. de Boissieu, Bull. Soc. Bot. France 53: 429. 1906.

Plants 18–25 cm. Taproot short. Stem dark purple, little-branched. Basal petioles 4–5 cm, slender, sheaths oblong; blade triangular, 2.5–4 × 2–3.5 cm, 2–3-ternate/pinnate; pinnae 5–7 pairs; ultimate segments long-ovate to obovate-lanceolate, 4–6 × 2–3 mm, base cuneate, irregularly serrate distally. Umbels 5–8 cm across; peduncles 3–7 cm; bracts and bracteoles usually absent; rays 6–10, 3–5 cm, unequal, slender; pedicels unequal. Calyx teeth minute, ovate. Petals purple-red, rarely white, long-obovate, 1.2–1.5 × ca. 1 mm. Anthers dark purple. Young fruit broadly ovoid, ca. 2 × 1.5 mm (mature fruit not known). Fl. Aug–Sep, fr. Oct.

- Grassy slopes; 3200–4200 m. Qinghai, Sichuan, Yunnan.

This poorly known species is recorded only from a few collections.

8. *Tongoloa rockii* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 127. 1929.

滇西东俄芹 dian xi dong e qin

Plants slender, 8–15 cm. Root brown, thick. Stem usually solitary, or 1–2-branched. Basal petioles slender, sheaths broad, 5–6 mm across; blade broadly triangular in outline, 2.5–6 × 2.5–5 cm, 4-pinnate/pinnatifid; pinnae (3–)5–7 pairs, petiolulate; ultimate segments lanceolate, 3–4 × 0.5–1.5 mm. Stem leaves reduced upwards. Umbels 2–4 cm across; bracts and bracteoles absent; rays 6–8, 1.5–3 cm, subequal; umbellules 10–15-flowered; pedicels slender, up to 5 mm, subequal. Calyx teeth minute, broad-ovate. Petals long-obovate, white or tinged purplish-red, ca. 2.5 mm, base claw-like, apex obtuse. Anthers purplish-red. Ovary broad-ovate. Stylopodium depressed. Fruit oblong-ellipsoid, ca. 2 × 1.5 mm; ribs filiform. Fl. Jul–Aug, fr. Aug–Oct.

- Riversides; 3800–4700 m. NW Yunnan (Zhongdian).

This poorly known species is recorded only from a few collections.

9. *Tongoloa filicaudicis* K. T. Fu, Fl. Tsinling. 1(3): 456. 1981.

细颈东俄芹 xi jing dong e qin

Plants 15–30 cm. Root brown, fusiform or napiform, 1–2 × 0.4–0.5 cm. Stem branched above. Lower petioles long; blades triangular, 3–4.5 cm, 3-ternate/pinnate; pinnae short petiolulate; ultimate segments obovate or oblanceolate, 1–2 × 1–1.2 mm, sometimes 2–3-lobed, apex acute. Umbels ca. 5 cm across; peduncles 5–7 cm; bracts and bracteoles absent; rays 7–9, 1.8–2.7 cm; umbellules 9–10-flowered, ca. 1 cm across; pedicels 2–5 mm. Calyx teeth obsolete. Petals obovate, white, base clawed, apex rounded, slightly radiant, up to 1.5 mm. Mature fruit not known. Fl. Jul–Aug.

- Open slopes; 2800–3800 m. S Gansu (Qin Ling).

This poorly known species is recorded only from a few collections.

10. *Tongoloa tenuifolia* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 128. 1929.

细叶东俄芹 xi ye dong e qin

Plants ca. 50 cm. Stem little-branched. Basal leaves few; petiole sheaths oblong; blade broadly triangular or rhombic-triangular, 3–4-pinnate; primary and secondary pinnae petiolulate; ultimate segments linear, 3–5 × 0.5–1 mm. Umbels to 15 cm across; peduncles 8–25 cm; bracts and bracteoles absent; rays thick, 6–11, 4–9 cm, spreading-ascending; umbellules many-flowered, ca. 1.5 cm across; pedicels slender. Calyx teeth minute, ovate. Petals obovate, white, rarely pinkish, apex obtuse-acute. Anthers yellow or tinged with purplish. Young fruit broad-ovoid, 2–2.5 × ca. 2 mm (mature fruit unknown). Fl. Aug.

- Damp slopes, marshy areas; 3500–4300 m. Sichuan, Xizang, Yunnan.

This incompletely known species is recorded only from a few collections.

11. *Tongoloa smithii* H. Wolff, Acta Horti Gothob. 2: 290. 1926.

短鞘东俄芹 duan qiao dong e qin

Plants 50–60 cm, purplish green. Stem flexuose-erect, branched from base. Basal petioles slender with short sheaths; blades broadly triangular, 4-ternate/pinnate; pinnae 5–7 pairs, remote, up to 2 cm, petiolule short; ultimate segments oblong-linear or linear, 4–7 × ca. 1 mm, ternately lobed, margin incrasate and mucronulate. Terminal umbels up to 6 cm across, peduncles long; bracts absent; rays 10, up to 4 cm, subequal; bracteoles absent or few, linear, almost as long as pedicels; umbellules ca. 20-flowered; pedicels ca. 5 mm, subequal. Petals broad-ovate, base long-clawed. Young fruit ovate, ca. 1.5 mm, base truncate (mature fruit unknown). Fl. Jul–Aug.

- Moorlands; ca. 4000 m. NW Sichuan.

This poorly known species is recorded only from the type gathering (*H. Smith 4270*, GB).

12. *Tongoloa elata* H. Wolff, *Acta Horti Gothob.* 2: 291. 1926.

大东俄芹 da dong e qin

Pimpinella elata (H. Wolff) M. Hiroe; *Tongoloa cnidifolia* K. T. Fu.

Plants 20–75 cm. Root conic. Stem purplish, little-branched. Lower petioles 5–12 cm, sheaths ovate, inflated; blade broadly triangular, 4–10 × 3–8 cm, 3–4-ternate/pinnate; primary and secondary pinnae petiolulate; ultimate segments linear (3–) 5–15 × 0.5–1 mm. Umbels 4–9 cm across; peduncles 5–12 cm; bracts and bracteoles absent; rays 6–16, unequal, 2–4(–5) cm; umbellule many-flowered; pedicels 3–5 mm. Calyx teeth minute, triangular. Petals obovate to long-obovate, white, sometimes pink, 1.8–2 × 1.2–1.8 mm, apex obtuse-rounded. Fruit broadly ovoid, 2–4 × 1.5–2 mm, base cordate; ribs slender. Fl. Jul–Sep, fr. Sep–Oct. *n* = 11*.

- Grasslands, riversides, ditches; 2300–4300 m. Gansu, Qinghai, Sichuan.

13. *Tongoloa dunnii* (H. de Boissieu) H. Wolff in Engler, *Pflanzenr.* 90(IV. 228): 317. 1927.

宜昌东俄芹 yi chang dong e qin

Pimpinella dunnii H. de Boissieu, *Bull. Herb. Boissier*, sér. 2, 3: 841. 1903 [“*dunni*”]; *Peucedanum giraldii* Diels.

Plants 50–70 cm. Taproot brown, short. Stem several-branched. Lower petioles 7–18 cm, sheaths oblong, 1.3–3 cm, membranous and clasping; blade broadly triangular, 2–3-pinnate; pinnae 4–5 pairs, short-petiolulate; ultimate segments elongate-linear, 2–4.5 cm × 1.5–3 mm, entire. Umbels 5–10 cm across; bracts and bracteoles absent; rays 7–17, 3–6 cm; umbellules 10–25-flowered. Calyx teeth minute, ovate or triangular-ovate. Petals long-elliptic to obovate, white or greenish, 1.2–2 × ca. 1 mm, apex obtuse-acute. Young fruit broad-ovoid to cordate, ca. 1.5 mm (mature fruit unknown). Fl. Jun.

21. *CHANGIUM* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 19: 314. 1924.

明党参属 ming dang shen shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial, glabrous, withering during summer, sprouting in winter to early spring. Taproot stout, fusiform or irregularly thickened. Stem erect, branched above, rigid, glaucous, base with papery remnant sheaths. Leaves petiolate; blade broadly ovate, ternate-2–3-pinnatisect. Umbels compound, loose; peduncles terminal and lateral; bracts absent or few; rays spreading; bracteoles few.

- Forests; 2000–4000 m. Hubei, Sichuan, SE Xizang.

This distinctive but poorly known species is recorded only from a few collections. It has reputed medicinal value (in Xizang).

14. *Tongoloa silaifolia* (H. de Boissieu) H. Wolff, *Notizbl. Bot. Gart. Berlin-Dahlem.* 9: 280. 1925.

城口东俄芹 cheng kou dong e qin

Pimpinella silaifolia H. de Boissieu, *Bull. Herb. Boissier*, sér. 2, 2: 809. 1902; *Pimpinella fortunatii* H. de Boissieu; *P. peucedanifolia* H. de Boissieu; *Tongoloa fortunatii* (H. de Boissieu) Pimenov & Kljuykov; *T. peucedanifolia* (H. de Boissieu) H. Wolff.

Plants 28–60 cm. Root brown, conic. Stem purplish, branched. Basal and lower petioles 6–12 cm, sheaths oblong-inflated; blade broadly ovate, (3–)5–8 × (2–)4–6 cm, 2–3-ternate/pinnate; pinnae short petiolulate; ultimate segments linear, 5–18 × 1–2 mm, apex acute. Primary umbels 3–12 cm across; bracts absent; rays 8–22, 3–6 cm, subequal; bracteoles usually absent or 1–5, linear, shorter to longer than the flowers; umbellules 10–25-flowered, ca. 1 cm across; pedicels unequal. Calyx teeth minute, ovate or semi-orbicular. Petals long-obovate, purplish-red sometimes white, 1–1.2 × ca. 0.8 mm. Anthers purplish-red, sometimes white. Stylopodium dark purple, short-conic. Fruit broadly ovoid, ca. 1.8–2.2 × 1.2–1.5 mm; ribs filiform. Fl. Jul–Sep, Fr. Sep–Oct. *n* = 8*.

- Damp grasslands; 2200–4000 m. Chongqing, Qinghai, Shaanxi, Sichuan, Yunnan.

Some authors consider this taxon to be conspecific with *Tongoloa stewardii*. It has reputed medicinal value (in Shaanxi).

15. *Tongoloa gracilis* H. Wolff, *Notizbl. Bot. Gart. Berlin-Dahlem* 9: 179. 1925.

纤细东俄芹 xian xi dong e qin

Pimpinella tilia M. Hiroe.

Plants 25–75 cm. Taproot slender. Stem purplish, branched. Lower leaves long-petiolate, petioles slender, sheaths narrow-oblong; blade broadly ovate, 3–10 × 2–6 cm, 3-pinnate; lower pinnae short petiolulate; ultimate segments linear-lanceolate, 3–8(–10) × ca. 1 mm, pinnatifid. Umbels 3.5–10 cm across; peduncles 3–12 cm; bracts and bracteoles absent; rays 5–11, 2.5–6 cm; umbellules many-flowered. Calyx teeth minute, ovate-triangular or semi-orbicular. Petals obovate, white or pinkish, notched with incurved tips. Fruit oblong-ellipsoid, ca. 2 × 1.3 mm; ribs filiform. Fl. Aug–Sep, fr. Sep–Oct.

- Forest margins, meadows; 2300–4500 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [?Bhutan, NE India].

Calyx teeth inconspicuous, minute. Petals white, oblong or ovate-lanceolate, apex acute and inflexed. Stylopodium low-conic; styles reflexed. Fruit ovoid-globose to ovoid-oblong, slightly flattened laterally, commissure constricted, 10–12 striped, smooth; ribs inconspicuous; vittae numerous (ca. 20), scattered throughout the mesocarp. Seed face deeply sulcate. Carpophore 2-parted.

- One species.

Changium angustilobum P. K. Mukherjee & Kljuykov (Byull. Moskovsk. Obšč. Isp. Prir., Otd. Biol. 96(5): 71. 1991) was described from Xinjiang. It apparently differs from *C. smyrnioides* in having narrow, linear leaf lobes. No specimens of this species have been seen, and further study is needed to discern if this plant should be included in this otherwise endemic genus of E China.

1. *Changium smyrnioides* H. Wolff, Repert. Spec. Nov. Regni Veg. 19: 315. 1924.

明党参 ming dang shen

Conopodium smyrnioides (H. Wolff) M. Hiroe.

Plants 50–100 cm. Taproot surface tawny to pale yellow, inner parts white, starchy. Branches remote and spreading, often alternate, branchlets alternate or opposite. Petiole 3–15 cm; blade 4–10 × 2–5 cm; pinnae broadly ovate, pinnatifid; ultimate segments oblong-lanceolate, 2–4 × 1–2 mm. Leaves reduced up

wards, the uppermost reduced to linear or bladeless sheaths. Umbels 3–8 cm across; bracts absent or 1–3, small, ca. 1 cm; rays 4–10, 2.5–10 cm, spreading; bracteoles few, linear, 4–6 mm; umbellules 8–20-flowered. Petals pale purplish when young becoming white. Fruit ovoid-globose, 2–3 × 1.8–2.5 mm. Fl. and fr. Apr–Jun.

- Mountain slopes in fertile areas, rock crevices; 100–300 m. Anhui, E Hubei, Jiangsu, NE Jiangxi, Zhejiang.

The root is used in E China as the traditional medicine “ming dang shen.”

22. CHAMAESIUM H. Wolff, Notizbl. Bot. Gart. Berlin-Dahlem 9: 275. 1925.

矮泽芹属 ai ze qin shu

Pan Zehui (潘泽惠); Mark F. Watson, Eugene V. Kljuykov

Herbs, perennial, small, glabrous. Stem solitary, ribbed, base usually covered by papery dark purple-brown remnant sheaths. Leaf blade oblong, pinnate; pinnae opposite, sessile, ovate to orbicular, entire or 3–6-lobed to serrate. Umbels compound, terminal and lateral. Bracts absent or few; rays unequal; bracteoles absent or few; pedicels many, short. Calyx teeth minute, semi-orbicular or ovate-triangular. Petals white, yellowish or greenish, obovate or suborbicular, base narrow, apex nearly plane, usually not inflexed. Stylopodium depressed, margins conspicuously extended into a broad undulate flange. Fruit ellipsoid-oblong, base slightly cordate, smooth; ribs 9, 5 primary and 4 secondary ribs all prominent to narrowly winged, wings undulate; vittae 1 in each furrow, 2 on commissure. Seed face concave. Carpophore parted to base, rather thick.

Eight species: mainly at high altitudes from E Himalayas to SW China; seven species (four endemic) in China.

- 1a. Ultimate segments of leaves linear, 1–2 mm wide 1. *C. wolffianum*
- 1b. Ultimate segments of leaves suborbicular, broadly ovate to ovate-lanceolate, 2–17 mm wide.
 - 2a. Bracts and bracteoles absent 2. *C. delavayi*
 - 2b. Bracts or bracteoles present.
 - 3a. Bracteoles absent, rarely 1–2, abortive; pinnae 2–4 pairs 3. *C. viridiflorum*
 - 3b. Bracteoles well developed; pinnae (2–)4–6 pairs.
 - 4a. Ultimate segments of leaves ovate to ovate-lanceolate; bracteoles linear, entire, often shorter than flowers 4. *C. paradoxum*
 - 4b. Ultimate segments of leaves long-ovate, broadly ovate to suborbicular; bracteoles linear to long-obovate, entire, lobed to pinnatifid, equal to or much longer than flowers.
 - 5a. Ribs of fruit extended into undulate wings (Xizang) 7. *C. malleaeum*
 - 5b. Ribs of fruit prominent, not undulate-winged.
 - 6a. Plants usually stemless, less than 15 cm tall, unbranched; bracteoles linear to long-obovate, entire to pinnatifid 5. *C. novemjugum*
 - 6b. Plants usually with long stems more than 15 cm tall, branched above; bracteoles linear, entire to 3-toothed 6. *C. thalictrifolium*

1. *Chamaesium wolffianum* Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 305. 1930.

细叶矮泽芹 xi ye ai ze qin

Trachydium yunnanense M. Hiroe.

Plants 40–70 cm. Root short thick. Lower petioles nearly as long as blades; sheaths narrow, membranous; blades oblong-ovate in outline, 10–20 × 2–8 cm; ultimate segments linear, 1.5–4 × 0.1–0.2 cm, acute. Uppermost leaves sessile; sheaths

slightly inflated, white-margined. Umbels 2–3 cm across; peduncles 3–6 cm; bracts and bracteoles absent or aborted (squamuliform); rays 5–8, slender, 8–50 mm, very unequal. Calyx teeth small, triangular-ovate, ca. 0.3 mm, partly hidden by stylopodium. Petals broadly obovate, greenish, ca. 1 × 0.8 mm, base long-clawed, apex obtuse or acute. Stylopodium depressed, margin conspicuously spreading, crenulate, dark green to deep purple; ovary glabrous, ribbed. Fruit ovoid, ca. 2.5 × 1.3 mm; ribs prominent. Fl. Aug, fr. Sep.

• Open stony grasslands, damp open woodlands; 3300–3600 m. NW Yunnan.

This poorly known taxon is recorded only from a few collections.

2. *Chamaesium delavayi* (Franchet) R. H. Shan & S. L. Liou in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 130. 1979.

鹤庆矮泽芹 he qing ai ze qin

Trachydium delavayi Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 110. 1894; *Chamaesium novemjugum* (C. B. Clarke) C. Norman var. *delavayi* (Franchet) C. Norman.

Plants 10–20(–33) cm. Root branched. Basal petioles 2.5–5 cm; sheaths broad, long-ovate; blade oblong in outline, 3–6 × 1.5–2.5 cm; pinnae 4–6 pairs, overlapping; ultimate segments broadly ovate or suborbicular, 8–15 × 6–13 mm, base truncate, apex obtuse, 2–3-crenulate. Umbels 4–5 cm across; bracts and bracteoles absent; rays 5–6, 1–3 cm, unequal; pedicels 8–17, 2–4 mm. Calyx teeth suborbicular, small, obscured by stylopodium. Petals obovate or orbicular, white or yellowish, ca. 1.8 × 1.2 mm. Fruit oblong-ellipsoid, 2–2.5 × ca. 2 mm; ribs prominent. Fl. and fr. Aug–Oct.

• Grassy slopes; 3500–4000 m. Sichuan, Yunnan.

3. *Chamaesium viridiflorum* (Franchet) H. Wolff ex R. H. Shan, Sinensia 8: 87. 1937.

绿花矮泽芹 lü hua ai ze qin

Trachydium viridiflorum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 111. 1894; *Chamaesium markgrafianum* (Fedde ex H. Wolff) C. Norman; *Trachydium affine* W. Smith; *T. markgrafianum* Fedde ex H. Wolff.

Plants (3–)8–20(–32) cm. Rhizome slender, torulose. Basal and lower petioles 1.5–6 cm, sheaths narrowly oblong; blade oblong, 1.5–3.5 × 0.8–2.5 cm; pinnae 2–4 pairs, remote; ultimate segments ovate, broadly ovate or ovate-oblong, 4–12 × 2–6 mm, apex 3-toothed, rarely entire; terminal pinnae broadly obovate to fan-shaped, 3–5-lobed. Leaves reduced upwards, uppermost with linear-elliptic ultimate segments. Umbels 1–5 cm across; peduncles slender, 1.5–8 cm; bracts 2–5, linear, entire or pinnatifid, leaf-like; rays 6–11, slender, 0.5–3.5 cm, unequal, spreading; bracteoles absent or 1–2, abortive (squamulate or occasionally linear). Calyx teeth minute, orbicular, ca. 0.3 mm, obscured by spreading stylopodium. Petals obovate, ca. 1 × 0.8 mm, greenish, apex obtuse. Fruit oblong-ellipsoid, 1.3–1.8 × 1–1.3 mm; ribs prominent. Fl. Jul–Aug, fr. Aug–Sep.

Forests, scrubland slopes, damp moorland; 3200–4300 m. Sichuan, Xizang, NW Yunnan [Sikkim].

4. *Chamaesium paradoxum* H. Wolff, Notizbl. Bot. Gart. Berlin-Dahlem. 9: 275. 1925.

矮泽芹 ai ze qin

Trachydium paradoxum (H. Wolff) M. Hiroe.

Plants 5–35 cm, biennial. Root long-conic, 3–9 cm. Basal and lower petioles 4–7 cm, sheaths long and broad; blade oblong, 3–5 × 1.5–3 cm; pinnae 4–6 pairs, remote; ultimate segments ovate to ovate-lanceolate, 7–15 × 5–8 mm, entire or shal-

lowly 2–3-toothed, base rounded-truncate or slightly cordate. Leaves reduced upwards, ultimate segments becoming narrow. Umbels 3–5 cm across; bracts 3–5, linear, entire or pinnate and leaf-like; rays 6–12(–17), 0.5–10 cm, very unequal; bracteoles 3–5, linear, 2–4 mm, entire, usually shorter than flowers; pedicels numerous, 2–5 mm. Calyx teeth minute, triangular-ovate, often hidden under the spreading stylopodium. Petals obovate, white or greenish-yellow, ca. 1.5 × 1 mm. Fruit oblong-ellipsoid, 1.8–2.9 × 1–1.5 mm; ribs prominent, sometimes obscure. Fl. Jul–Aug, fr. Aug–Sep.

• Damp grassy slopes; 3200–4800 m. Qinghai, Sichuan, Xizang, NW Yunnan.

This species has reputed medicinal value.

5. *Chamaesium novemjugum* (C. B. Clarke) C. Norman, J. Bot. 76: 231. 1938.

粗棱矮泽芹 cu leng ai ze qin

Trachydium novemjugum C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 672. 1879; *Chamaesium spatuliferum* (W. W. Smith) C. Norman; *C. spatuliferum* var. *minus* R. H. Shan & S. L. Liou; *Trachydium novemjugum* var. *tongolense* H. de Boisseu; *T. spatuliferum* W. W. Smith.

Plants 5–12 cm. Taproot stout, 5–23 cm. Stem shortened, plants usually acaulous. Basal petioles 1.5–5 cm, sheaths long, broad; blade oblong, 2–4 × 1–2 cm, pinnate; pinnae sessile, (3–)4–6 pairs, remote; ultimate segments long-ovate to suborbicular, 5–10 × 3–8 mm, base subtruncate or rounded, entire or apex shallowly 1–3-toothed, sometimes 3–4-crenate; terminal pinnae obovate or orbicular, base cuneate, apex more deeply 3-lobed. Umbels usually sessile, 5–17 cm across; bracts 4–5, pinnate, leaf-like; rays 9–18, 2–8 cm, unequal, ribbed; bracteoles 3–7, linear, oblanceolate or long-obovate, entire, 3–5-lobed to pinnatifid, nearly equal to much longer than flowers. Calyx teeth minute, hidden under the spreading stylopodium. Petals obovate or orbicular, ca. 1.5 × 1 mm, white or greenish, apex obtuse. Fruit oblong-ellipsoid ca. 3.5 × 2 mm, ribs prominent. Fl. Jun–Aug, fr. Aug–Sep.

Grassy slopes, riversides; 3400–4700 m. Sichuan, Xizang, Yunnan [Bhutan, Nepal, Sikkim].

This species has reputed medicinal value.

6. *Chamaesium thalictrifolium* H. Wolff, Acta Horti Gothob. 2: 302. 1926.

松潘矮泽芹 song pan ai ze qin

Trachydium thalictrifolium (H. Wolff) M. Hiroe.

Plants 15–40 cm. Root slender, brown. Stem branched above. Basal and lower petioles 4–15 cm; sheaths long, membranous; blade oblong, 2.5–8 × 1.5–3.5 cm, pinnate; pinnae 2–6 pairs, remote; ultimate segments ovate or broad-ovate, 0.8–2 × 0.7–1.7 cm, base truncate to broad-cuneate, apex 3–5-toothed or irregularly serrate; terminal pinnae broadly obovate or suborbicular, base cuneate, apex often 3-lobed. Umbels ca. 5 cm across; bracts 2–4, linear to linear-lanceolate, pinnate; rays 6–13, unequal, spreading, ribbed; bracteoles 2–5, linear, entire or 3-toothed, longer than flowers; pedicels many, 2.5–3 mm. Calyx teeth minute, hidden by stylopodium. Petals white or green-

ish, obovate or suborbicular, apex slightly incurved. Fruit oblong-ellipsoid, ca. 2.5 × 2 mm; ribs all prominent. Fl. and fr. Jul–Aug. *n* = 6*.

- Grassy slopes; 3200–4000 m. Gansu, Sichuan, Xizang, Yunnan.

This species has reputed medicinal value.

7. *Chamaesium mallaeanum* Farille & S. B. Malla, *Candollea* 40: 537. 1985.

聂拉木矮泽芹 *nie la mu ai ze qin*

Plants 30–50 cm. Stem stout, unbranched. Lower petioles 6–8 cm; sheaths small; blade oblong to oval, 3–5 cm; pinnae 2–5 pairs; ultimate segments broadly ovate, 1–1.5 × 1–1.2 cm,

base cuneate, margin irregularly dentate or serrate lobed, apex acute. Terminal umbels ca. 5 cm across, much larger than the lateral; peduncles stout, ca. 10 cm; bracts several, 2–3.5 cm, leaf-like; rays 8–14, 2.5–7 cm, unequal; bracteoles 4–6, 4–8 mm, 3–5-serrate lobed; umbellules 15–20-flowered; pedicels unequal, 2–10 mm. Calyx teeth ovate, mostly hidden by stylopodium. Petals obovate, indistinctly clawed. Stylopodium low-conic. Fruit narrow-ovoid, 3–4 × 1.5–2 mm; ribs all extended into undulate wings. Fl. & fr. Aug–Sep.

Dwarf *Rhododendron* scrub, grasslands; 4200–4400 m. S Xizang (Nyalam) [C Nepal].

This poorly known species is recorded only from a few collections.

23. PLEUROSPERMUM Hoffmann, Gen. Pl. Umbell. viii. 1814.

棱子芹属 *leng zi qin shu*

Pan Zehui (潘泽惠); Mark F. Watson

Aulacospermum Ledebour; *Hymenidium* de Candolle; *Hymenolaena* de Candolle; *Pterocyclus* Klotzsch.

Herbs perennial, rarely biennial. Root crown often surrounded with fibrous remnant sheaths. Stems erect, sometimes shortened. Leaves 1–4-pinnate or ternate-pinnate; ultimate segments serrate to incised or pinnate. Umbels terminal and lateral; bracts several, entire or pinnate, margin usually white scarious; rays often extending in fruit; bracteoles numerous, scarious, sometimes white margined. Calyx teeth conspicuous or obsolete. Petals oblong to broad-ovate, white or purple-red, base clawed, apex narrow, inflexed. Stylopodium conic or short-conic. Fruit oblong to broad-ovoid, slightly flattened laterally, glabrous, often with numerous, shining tubercles; ribs prominent and acute, sometimes undulate, cristate or narrowly winged; vittae 1(–3) in each furrow, 2(or 4 or 6) on commissure. Seed face concave. Carpophore 2-parted.

About 50 species: N Asia, E Europe, and especially diverse in the Himalayan region and W China; 39 species (22 endemic) in China.

This is a widespread, heterogeneous genus of complex and controversial taxonomy. Russian authors delimit *Pleurospermum sensu stricto* by only two species (the type, *P. austriacum* Linnaeus, and *P. uralense*), referring the other species to *Aulacospermum*, *Hymenidium*, *Hymenolaena*, *Physospermopsis*, and *Pterocyclus*. Other morphologically similar genera, where generic boundaries become indistinct, include *Trachydium* and *Pseudotrachydium* (Kljuykov et al.) Pimenov & Kljuykov. A full discussion of the Russian classification of *Pleurospermum* is presented by Pimenov and Kljuykov (Feddes Repert. 111: 499–515, 517–534, 535–552. 2000). As yet, this rather radical classification has not gained widespread acceptance, and the proponents admit that this is a taxonomic hypothesis, and (particularly for some groups) a more natural classification will only be possible following critical revision in the field and herbarium. A traditional treatment is adopted for the following account, with due influence from the work of the Russian taxonomists.

- 1a. Plants of high altitudes, (3500–)4000–5000 m, short and squat 5–20(–40) cm; stems usually much reduced, often thickened, unbranched.
- 2a. Bracteole apex acute, acuminate or obtuse.
 - 3a. Fruit wings narrow, crisped; calyx teeth lanceolate; rays thickened, particularly at the distal ends; pedicels flattened and winged 1. *P. nubigenum*
 - 3b. Fruit wings narrow or broad, plane; calyx teeth triangular or obsolete; rays uniform thickness, pedicels terete.
 - 4a. Petals white; fruit thinly winged; calyx teeth triangular; vittae 3 per furrow 2. *P. pulszkyi*
 - 4b. Petals purple-red; fruit broadly winged; calyx teeth obsolete; vittae 2 per furrow 3. *P. lindleyanum*
- 2b. Bracteole apex 1–2-pinnate/pinnatifid.
 - 5a. Bracteole apex 2-pinnate/pinnatifid; ultimate leaf segments linear, 0.3–0.5 mm broad; pedicels flattened 4. *P. heterosciadium*
 - 5b. Bracteole apex 1-pinnate/pinnatifid; ultimate leaf segments lanceolate, 0.5–5 mm broad; pedicels terete.
 - 6a. Compact rosette, stemless; inflorescence densely capitate, sessile; rays reduced, crowded; fruit wings broad and sinuate, not dentate 5. *P. hedinii*
 - 6b. Stems usually distinct; inflorescences not densely capitate, usually distinctly pedunculate; rays not reduced, lax; fruit ribs prominent or irregularly dentate or sinuate winged.
 - 7a. Umbels usually sessile; rays very unequal; fruit tuberculate, wings irregularly dentate 8. *P. astrantioideum*
 - 7b. Umbels distinctly pedunculate; rays subequal; if fruit winged then not tuberculate.
 - 8a. Plants with strong unpleasant odor; rays 14–30; fruit wings irregularly dentate 9. *P. foetens*
 - 8b. Plant without unpleasant odor; rays 5–15(–20); fruit ribs prominent to narrowly winged, wing margin entire.
 - 9a. Leaves 1–2-pinnate, ultimate segments ovate or orbicular; fruit ribs all broadly winged 6. *P. stellatum*

- 9b. Leaves 2–3-pinnate, ultimate segments linear-lanceolate; fruit ribs prominent or narrowly sinuate-winged 7. *P. nanum*
- 1b. Plants from varying altitudes and habitats, usually much larger (0.3–2 m), smaller specimens slender-stemmed.
- 10a. Large, often robust plants, (0.5–)0.8–2 m, rarely shorter.
- 11a. Leaflets of lower leaves broadly ovate, regularly serrate, base truncate or cordate.
- 12a. Umbels 8–10 cm across; rays 15–20, 4–7 cm; fruit 8–10 × 4–6 mm 10. *P. rivulorum*
- 12b. Umbels 2–4 cm across; rays 6–8(–15), 0.6–2 cm; fruit 7–8 × 3–4 mm 11. *P. rotundatum*
- 11b. Leaflets of lower leaves variously lobed and dissected, often pinnatifid, not broadly ovate, bases usually cuneate to decurrent.
- 13a. Plants usually very robust, thick-stemmed (except *P. stylosum*); umbels (7–)12–28 cm across; rays (15–)25–40.
- 14a. Rays 15–35; fruit 4–6 mm; ribs sinuate-winged (Xinjiang) 12. *P. stylosum*
- 14b. Rays 20–40(–60); fruit 6–10 mm; ribs cristate- or plane-winged.
- 15a. Ultimate leaf segments pinnatifid, lobes linear; calyx teeth conspicuous, triangular-ovate; fruit wings thick, cristate (NW China) 13. *P. uralense*
- 15b. Ultimate leaf segments coarsely dentate, lobes ovate; calyx teeth obsolete; fruit wings thin, broad and plane (SW China) 14. *P. aromaticum*
- 13b. Plants less robust, slender-stemmed; umbels 3–15 cm across; rays 7–28.
- 16a. Petioles of upper leaves expanded into auriculate sheaths; fruit oblong, 8–15 mm.
- 17a. Leaves irregularly serrate; bracteoles ca. 5 mm broad; seed face deeply concave 15. *P. angelicoides*
- 17b. Leaves regularly crenate; bracteoles ca. 1 mm broad; seed face slightly concave 16. *P. longicarpum*
- 16b. Petioles of upper leaves expanded or not, but not auriculate; fruit ovate to oblong-ovate, 3.5–8(–10) mm.
- 18a. Leaves 2–4-ternate/pinnate.
- 19a. Leaves with narrow ultimate segments 2–5 mm broad, hirtellous along the margins, lobes round, obtuse; primary umbel overtopped by laterals; bracteoles oblong to obovate, entire to 3-lobed at apex, lobes obtuse; petals white; fruit 4–5 mm 19. *P. franchetianum*
- 19b. Leaves with ultimate segments 0.3–1 mm broad, margin glabrous, lobes lacerate, acute; primary umbel not overtopped by laterals; bracteoles oblanceolate, 3-lobed to pinnate/pinnatifid at apex, apex acute; petals white to pink; fruit 6–10 mm 20. *P. benthamii*
- 18b. Leaves 1–2-ternate/pinnate (3–5-partite to 2-ternate).
- 20a. Leaves 3–5-partite (sometimes to 2-ternate).
- 21a. Leaves 3–5-partite (sometimes to 2-ternate); leaf bases and veins with coarse white hairs reminiscent of those of *Heracleum*; rays 2–4 cm; petals white 17. *P. heracleifolium*
- 21b. Leaves always 3-partite, without white hairs; rays 5–6 cm; petals pink 18. *P. macrochlaenum*
- 20b. Leaves 2-ternate/pinnate.
- 22a. Rays 10–18, 2–7 cm; bracteoles lanceolate, acute or 3-lobed; fruit smooth, wings sinuate but not irregularly dentate 21. *P. decurrens*
- 22b. Rays 7–13. 1–2.5 cm; bracteoles linear-lanceolate, entire; fruits tuberculate with irregularly dentate wings 22. *P. cristatum*
- 10b. Small, slender plants, 20–40(–50) cm rarely taller.
- 23a. Petiole wings greatly expanded, white with purple veining, upper leaves and bracts enveloping the inflorescence 23. *P. amabile*
- 23b. Petiole wings not greatly expanded, not purple veined.
- 24a. Leaves 1-pinnate to 2-pinnatifid; rays 2–4; bracteoles broadly ovate, entire 24. *P. bicolor*
- 24b. Leaves 2–4-ternate/pinnate; rays (4–)6–25; bracteoles entire or more usually pinnatifid at apex.
- 25a. Stems, petioles and leaf rachis conspicuously white pubescent 26. *P. pilosum*
- 25b. Plants essentially glabrous, bases of umbels and/or petioles sometimes puberulent.
- 26a. Calyx teeth conspicuous, triangular to lanceolate.
- 27a. Ultimate leaf segments 5–20 mm broad, irregularly serrate or incised 25. *P. yunnanense*
- 27b. Ultimate leaf segments finely dissected, 1–8(–10) mm broad.
- 28a. Calyx teeth linear-lanceolate; sheaths of upper leaves and bracts broadly auriculate; bracteoles silvery white with a narrow green midrib, apex acuminate to 3-lobed 27. *P. album*
- 28b. Calyx teeth triangular or rounded; leaf sheaths somewhat expanded but not auriculate; bracteoles usually white margined, but not conspicuously silvery white, apex usually pinnatifid.
- 29a. Rays 4–7, very unequal; bracteoles entire, apex acuminate 29. *P. rupestre*
- 29b. Rays (6–)8–20(–30), subequal (but see *P. szechenyii*); bracteole apex pinnatifid (rarely acuminate).
- 30a. Rays (15–)20–30.
- 31a. Plant without unpleasant odor when crushed; rays very unequal; fruit wings broad, sinuate but not dentate 30. *P. szechenyii*

- 31b. Plant with a strong unpleasant odor when crushed; rays subequal; fruit wings broad, irregularly dentate 9. *P. foetens*
- 30b. Rays 6–12(–15).
- 32a. Leaf blades oblong-lanceolate in outline, approaching 2–3-ternate/pinnate; fruit wings broad, sinuate 31. *P. wilsonii*
- 32b. Leaf blades broadly ovate in outline, 3–4-ternate/pinnate; fruit ribs prominent to winged, but not sinuate.
- 33a. Ultimate leaf segments ca. 2 mm; calyx teeth ca. 1 mm, green 32. *P. hookeri*
- 33b. Ultimate leaf segments 3–5 mm; calyx teeth ca. 0.3 mm, dark purple 33. *P. tsekuense*
- 26b. Calyx teeth obsolete or minute.
- 34a. Rays 5–9(–11); bracts and bracteoles entire, acuminate.
- 35a. Stems and leaf sheaths purple-red, rays subequal; bracteoles broad, longer than the flowers 35. *P. apiolens*
- 35b. Stems and leaf sheaths green, rays very unequal; bracteoles linear-lanceolate, shorter than the pedicels 28. *P. simplex*
- 34b. Rays (9–)11–25; bracts and bracteoles pinnate/pinnatifid at apex, rarely acuminate.
- 36a. Larger plants, 30–60 cm; rays 10–25; fruit wings broad, sinuate or irregularly cristate/dentate.
- 37a. Rays subequal; fruit wings sinuate 37. *P. linearilobum*
- 37b. Rays very unequal; fruit wings irregularly cristate/dentate 39. *P. wrightianum*
- 36b. Small slender plants, 20–35(–45) cm; rays 9–15; fruit ribs prominent to narrowly winged, but not sinuate or dentate.
- 38a. Rays 1.5–2.5 cm 34. *P. giraldii*
- 38b. Rays 4–12 cm.
- 39a. Stem branches often opposite or whorled; leaf rachis glabrous; ovary smooth 36. *P. handellii*
- 39b. Stem branches usually alternate; leaf rachis tuberculate on abaxial surface; ovary tuberculate 38. *P. calcareum*

1. *Pleurospermum nubigenum* H. Wolff, Repert. Spec. Nov. Regni Veg. Beih. 12: 448. 1922 [*"nubigena"*].

皱果棱子芹 *zhou guo leng zi qin*

Hymenidium nubigenum (H. Wolff) Pimenov & Kljuykov.

Plants dwarf, to 15 cm, near rosette. Root stout, 0.5–1 cm across. Stem greatly reduced, rarely branched. Petioles 2–4 cm, sheaths oblong, membranous; blades oblong, 4–6 cm, 2-ternate-pinnate; pinnae 4–5 pairs, only the basal petiolulate, ca. 1 cm; ultimate segments linear or linear-lanceolate, ca. 5 × 1–2 mm. Primary umbels 10–15 cm across; peduncle very short; bracts several, small, leaf-like; rays 6–15, 5–10 cm, stout, somewhat unequal, ribbed, thickening especially at distal parts; umbellules borne above leaves; bracteoles 10–15, obovate to oblong, 5–10 × 3–4 mm, margin broad, white, membranous, apex acute; pedicels numerous, 3–5 mm, flattened and winged. Calyx teeth triangular-lanceolate, ca. 0.5 mm. Petals white, spatulate, ca. 1.5 mm, apex obtuse. Fruit ellipsoid, dark gray-green, 3–4 mm; ribs crisped-winged; vittae 3 in each furrow, 5–6 on commissure. Fl. and fr. Jul–Aug.

• Alpine grasslands; ca. 4900 m. W Sichuan, E Xizang, NW Yunnan.

This rather poorly known taxon is recorded only from a few collections.

2. *Pleurospermum pulszkyi* Kanitz in Szechenyi, Wiss. Erg. Reise Griechenl. 2: 701. 1898.

青藏棱子芹 *qing zang leng zi qin*

Hymenidium pulszkyi (Kanitz) Pimenov & Kljuykov;
Pleurospermum kansuense H. Wolff.

Plants 8–40 cm, usually tinged purplish-red. Root stout,

dark brown, branched. Stem stout, often reduced. Basal and lower stem leaves long-petiolate, sheaths ovate; blades oblong or ovate, 3–10 × 1–3 cm, 1–2-pinnate; ultimate segments oblong or linear, 3–10 × 1–3 mm. Umbels 15–20 cm across; bracts 5–8, ovate or lanceolate, 2–5 × 0.3–1 cm, margin white or purplish-red, apex acute or pinnate; rays 5–10, 5–12 cm, slightly unequal; bracteoles 10–15, ovate or lanceolate, 1–2 cm, acuminate, longer than flowers; pedicels numerous, 5–8 mm. Calyx teeth conspicuous, triangular-ovate, ca. 0.8 × 0.5 mm. Petals obovate, white. Anthers dark purple. Fruit oblong-ovoid, 5–6 × 2–3.5 mm; ribs narrowly sinuate winged; vittae 3 in each furrow, 6 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

• Alpine meadows, stony slopes; 3600–4600 m. Gansu, Qinghai, Xizang, NW Yunnan.

3. *Pleurospermum lindleyanum* (Klotzsch) B. Fedtschenko, Rastit. Turkest. 604. 1915.

天山棱子芹 *tian shan leng zi qin*

Hymenolaena lindleyana Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar, 150. 1862; *Hymenidium nanum* (Ruprecht) Pimenov & Kljuykov; *Hymenolaena nana* Ruprecht; *Pleurospermum stellatum* (D. Don) C. B. Clarke var. *lindleyanum* (Klotzsch) C. B. Clarke.

Plants dwarf, near rosette, 5–30 cm. Root long-conic, 3–5 mm across. Stem inconspicuous, elongating in fruit, tinged purple-red, papery remnant sheaths at base. Petioles 3–6 cm, sheaths oblong; blades oblong-elliptic, 3–8 × 0.8–3 cm, 2–3-ternate-pinnate; pinnae short-petiolulate; ultimate segments oblong to linear, 2–10 × 1–2.5 mm, entire, apex obtuse. Umbels 3–5 cm across; bracts 2–4, oblong-ovate, 2–3 cm, shorter than rays, margin purple-red, 1–2-pinnate at apex; rays 4–7, 1–4 cm, unequal; bracteoles 8–12, oblong-ovate or obovate, 5–11 × 4–7

mm, slightly longer than flowers, mid band purple-red, margin broad, white, apex entire or 3-lobed, membranous; pedicels numerous, 4–5 mm, winged. Calyx teeth obsolete. Petals broad-obovate, purplish-red, ca. 1.2 mm. Anthers dark purple. Fruit broad-ovoid, purple-red, 4–5 mm; ribs all broadly sinuolate-winged; vittae 2 in each furrow, 4 on commissure. Fl. and fr. Aug.

Alpine grasslands; ca. 4000 m. W Xinjiang, Xizang [NW India, Kashmir, Pakistan].

4. *Pleurospermum heterosciadium* H. Wolff, Repert. Spec. Nov. Regni Veg. 21: 243. 1925.

异伞棱子芹 *yi san leng zi qin*

Hymenidium heterosciadium (H. Wolff) Pimenov & Kljuykov; *Physospermopsis fuscopurpurea* (Handel-Mazzetti) Pimenov & Kljuykov; *Trachydium fuscopurpureum* Handel-Mazzetti.

Plants dwarf, near rosette, 10–25 cm. Root stout, 5–8 mm across, branched. Stem greatly reduced, ribbed, sparingly branched, base clothed with dense, brown fibrous remnant sheaths. Basal petiole sheaths oblong, membranous; blades oblong to narrowly ovate, 1.8–6 cm, 3-pinnate; pinnae 5–7 pairs, nearly sessile; ultimate segments linear to oblanceolate, 2–4 × ca. 0.5 mm. Peduncle greatly reduced; bracts several, small, leaf-like; rays 8–15, 10–20 cm, unequal; bracteoles 10–15, broadly obovate in outline, 4–10 mm, pale green, margin white in lower half, apex 2-pinnate; pedicels numerous, flattened, 3–5 mm. Calyx teeth triangular, obtuse, minute, ca. 0.3 mm. Petals broad-ovate to broad-oblong, white, apex purple-red with incurved tip. Anthers dark purple-red. Ovary black-gray. Young fruit slightly crisped-winged (mature fruit not known). Fl. Aug.

• Alpine grasslands; 3500–4500 m. W Sichuan, SE Xizang.

This incompletely known taxon is recorded from very few collections.

5. *Pleurospermum hedinii* Diels in Hedin, S. Tibet 6(3): 52. 1922.

垫状棱子芹 *dian zhuang leng zi qin*

Cortiella hedinii (Diels) C. Norman; *Hymenidium hedinii* (Diels) Pimenov & Kljuykov.

Plants dwarf, rosette, 4–8 cm. Stem very short, 1–1.5 cm thick, fleshy. Basal petioles 3–5 cm, flattened, winged, sheaths narrow, oblong; blades oblong, 3–5 × 1–1.5 cm, 2-pinnate; pinnae 5–7 pairs, sessile; ultimate segments obovate, 1.5–3 × 0.5–1.7 mm, apex small-toothed. Umbel densely capitate, terminal, 5–12 cm across; peduncles greatly reduced; bracts numerous, leaf-like, 2.5–3 cm; rays 40–50, thick, fleshy, outer rays up to 2–3 cm, central rays shorter; bracteoles 8–12, obovate or oblanceolate, 4–10 mm, pale green margin broad, white, apex 3-lobed; pedicels numerous, thick, fleshy, 1–2 mm. Calyx teeth triangular, ca. 0.5 mm. Petals rounded, white to purplish-red. Anthers black-purple. Stylopodium short-conic. Fruit broad-ovoid, 4–5 × 3–3.5 mm; ribs broadly sinuolate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine grasslands; 4200–5000 m. S and W Qinghai, E Xizang, NW Yunnan.

This species is considered closely related to, and is sometimes treated as conspecific with, *Pleurospermum stellatum*.

6. *Pleurospermum stellatum* (D. Don) C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 705. 1879.

尖头棱子芹 *jian tou leng zi qin*

Selinum stellatum D. Don, Prodr. Fl. Nepal. 185. 1825; *Hymenolaena govianiana* de Candolle; *H. stellata* (D. Don) Lindley; *Pleurospermum govianianum* (de Candolle) Bentham ex C. B. Clarke.

Plants dwarf, 3–20(–40) cm, essentially glabrous, sometimes apex of peduncles and rays scaberulous. Root stout, branched. Stem shortened or elongated, simple or 1-branched above; base with papery remnant sheaths. Basal petioles slender, 1–8 cm, sheaths oblong; blades oblong to oval, 2–10 × 1–3 cm, 1–2-pinnate; ultimate segments sessile, ovate to orbicular, 3–20 mm, incised-pinnatifid, mucronulate. Umbels 2.5–4 cm across; peduncle stout, up to 10 cm; bracts 2–8, oblong to orbicular, 1–6 cm, pinnatifid, margin broad, white-scarious; rays 2–10(–20), spreading-ascending, 2–20 cm; bracteoles 8–12, oblong to obovate, ca. 1 cm, longer than flowers, entire, 3-lobed to pinnatifid, margin broad white-scarious; umbellules 15–40-flowered, pedicels unequal. Calyx teeth ovate, minute. Petals obovate, white, apex inflexed. Stylopodium short-conical. Fruit oblong-ovoid, 4–6 × 2.5–3 mm, papillate; ribs all broadly winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jun–Aug.

Open grassy slopes; ca. 3500 m. SW Xizang [NW India, Kashmir, C and W Nepal, Pakistan].

7. *Pleurospermum nanum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 140. 1894.

矮棱子芹 *ai leng zi qin*

Physospermopsis nana (Franchet) Pimenov & Kljuykov; *Physospermopsis purpurascens* (Franchet) Pimenov & Kljuykov; *Trachydium purpurascens* Franchet.

Small plants, 5–15 cm, glabrous. Stem reduced, slender, ribbed. Basal leaves petiolate; petioles 2–5 cm; sheaths broadly oblong-lanceolate, membranous-margined; blades ovate-oblong, 3–5 cm, 2–3-pinnate; pinnae 4–5 pairs, only the basal pinnules petiolulate; ultimate segments linear-lanceolate, 1–3 × 0.5–1 mm, entire or 3-toothed at apex. Stem leaves gradually reduced upwards, petioles short or wholly sheathing. Umbels 5–7 cm across; peduncles very short; bracts 5–7, leaf-like, 2–3 cm; rays 5–15, slightly unequal, 3–6 cm; bracteoles 6–10, oblong-ovate to broadly obovate, 1–2-pinnate, 6–10 × 4–8 mm, about equal to flowers, pale green, margin whitish in lower half; pedicels 15–20, 3–5 mm. Calyx teeth small, triangular-ovate, 0.15–0.3 mm. Petals white or purplish-red, obovate, ca. 1.2 mm. Anthers dark purple. Stylopodium short-conic. Fruit broad-ovoid, ca. 2.5 × 1.5 mm, sparsely pimples; ribs prominent, narrowly sinuolate-winged, dark purple-black; vittae large, 1 per furrow, 2 on commissure. Fl. Jul–Sep, fr. Oct–Nov.

• Dwarf *Rhododendron* scrub, marshy meadows; (2600–)3500–4600 m. SE Xizang, NW Yunnan.

This is an enigmatic species, rarely collected in fruit, and is here retained within *Pleurospermum* (on account of the white scarious mar-

gins of the bracts and bracteoles), but is possibly better placed in *Physospermopsis*. Some authors treat *Physospermopsis purpurascens* as a separate species, distinguished by the short or sometimes obsolete calyx teeth.

8. *Pleurospermum astraintioideum* (H. de Boissieu) K. T. Fu & Y. C. Ho in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 178. 1979.

雅江棱子芹 ya jiang leng zi qin

Trachydium astraintioideum H. de Boissieu, Bull. Soc. Bot. France 53: 422. 1906; *Hymenidium astraintioideum* (H. de Boissieu) Pimenov & Kljuykov.

Plants dwarf, 8–20 cm, often tinged purple-red. Root gray-brown, conic, 1–1.5 cm thick. Stem strongly reduced, 3–5 cm. Petioles short, flattened, winged, 3–5 cm, sheaths oblong; blades ovate-lanceolate, 4–6 × 1.5–2.5 cm, 3–4-pinnate; pinnae 5 pairs, petiolulate; ultimate segments linear-lanceolate, 1–2.5 × 0.5–1.5 mm, midrib channelled. Umbels usually almost sessile (sometimes pedunculate in mesic conditions), 15–18 cm across; bracts few, leaf-like; rays stout, 15–25, 3–15 cm, very unequal, ribbed; bracteoles 12–14, obovate, 5–12 mm, just longer than flowers, apex pinnate, pedicels numerous, 0.5–1 cm, narrowly winged/ribbed. Calyx teeth minute, ca. 0.2 mm, ovate. Petals oblanceolate, white or greenish-white. Stylopodium short-conic, dark purple. Fruit broadly ovoid, 3.5–6 × 3–5 mm, pale brown, tuberculate; ribs all broadly triangular-dentate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

• Alpine grasslands; 4000–4600 m. SW Sichuan.

9. *Pleurospermum foetens* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 140. 1894.

丽江棱子芹 li jiang leng zi qin

Hymenidium foetens (Franchet) Pimenov & Kljuykov; *Pleurospermum dielsianum* Fedde ex H. Wolff, p.p.

Plants dwarf, 8–40 cm high, with characteristic strong unpleasant odor. Rootstock stout, vertical. Stem reduced, ribbed, scabrous, to 1.5 cm thick at base. Basal and lower petioles 3–6 cm, flattened, winged, sheaths narrow to broad, oblong; blades oblong, 3–6 × 1–3 cm, 3–4-ternate-pinnate; pinnae 4–6 pairs, subsessile; ultimate segments linear or lanceolate, 1–3 × 0.5–1.5 mm, hirtellous along veins and margins, apex entire, rarely 2–3-lobed. Primary umbels 10–15 cm across; peduncle 3–5 cm, scabrous; bracts 6–8, obovate, 3–6 cm, apex pinnate; rays 14–30, 3–9 cm, unequal, hispidulous; bracteoles ca. 10, obovate, 1–2 × 0.5–1 cm, apex pinnate-pinnatifid, pale green, margin broad, white, membranous; pedicels numerous, 0.4–1 cm, flattened, winged. Calyx teeth minute, triangular. Petals obovate, white or pinkish, ca. 2 mm, acute, clawed at base. Anthers purple-black, filaments white. Stylopodium short-conic. Fruit ovoid, purple-black, dark red-brown, 7–9 × 3–4 mm; ribs all broadly-sinuate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Sep, fr. Jul–Sep.

• Open alpine meadows, rocky slopes, loose screes; 3600–4500 m. Gansu, Sichuan, SE Xizang, NW Yunnan.

10. *Pleurospermum rivulorum* (Diels) M. Hiroe, Umbell. World, 747. 1979.

心叶棱子芹 xin ye leng zi qin

Angelica rivulorum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 288. 1912; *Pterocyclus rivulorum* (Diels) H. Wolff.

Plants 50–100(–150) cm. Root stout, dark brown, 1–2 cm across, aroma strong, like that of *Angelica* or *Apium*. Stem to 1 cm thick at base, thinly ribbed, branching. Basal petioles 7–16 cm; sheaths oblong; blades 1–2-ternate/pinnate; ultimate segments broadly ovate, 5–11 × 4–8 cm, setose along nerves, regular-serrate, apex acute to acuminate, base cordate. Stem leaves gradually reduced upwards; uppermost with inflated, often bladeless sheaths. Umbels 8–10 cm across; peduncle 15–25 cm; bracts 3–4, linear-lanceolate, 2–4 × 0.2–0.4 cm; rays 15–20, 4–7 cm, scabrous; bracteoles 6–8, linear-lanceolate, 1–2.5 cm, greenish-white with dark green median stripe.; pedicels 14–20, 8–10 mm. Calyx teeth inconspicuous. Petals greenish-white, obcordate, ca. 3 mm. Stylopodium conic. Fruit dark brown, ovoid-oblong, 8–10 × 4–6 mm; ribs all narrowly winged; vittae 1 in each furrow, 2 on commissure. Fl. Aug, fr. Aug–Sep. $2n = 22^*$.

• Damp grasslands, gravelly stream banks, frequently collected; 3100–4000 m. NW Yunnan.

This species is used in Yunnan as a regional substitute for the medicine “qiang huo” (*Notopterygium franchetii* and *N. incisum*).

11. *Pleurospermum rotundatum* (de Candolle) C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 703. 1879.

圆叶棱子芹 yuan ye leng zi qin

Hymenolaena rotundata de Candolle, Prodr. 4: 245. 1830; *Pterocyclus rotundatus* (de Candolle) Pimenov & Kljuykov.

Plants (30–)50–60(–80) cm. Root brown, long-cylindric, ca. 1.5 cm thick, unbranched. Stem purple-green, thinly ribbed, base covered by remnant fibrous sheaths. Basal petioles 5–15 cm; sheaths broadly ovate; blades broadly ovate, 12–20 × 10–15 cm, 1–2-ternate; ultimate segments petiolulate, broadly ovate to orbicular, 3–8 × 2.5–8.5 cm, simple or 3-lobed, margin cuspidate crenate-dentate. Stem leaves few, tripartite. Umbels 2–4 cm across; peduncles 15–29 cm, thinly ribbed; bracts absent or 1–2, long-lanceolate, scarious, 0.5–2 cm, apex long-cuspidate; rays 6–8(–15), 0.6–2 cm, about as long as bracts; bracteoles 5–8, lanceolate, about as long as flowers; umbellules 8–12-flowered; pedicels unequal, 5–10 mm. Calyx teeth ovate, minute, apex obtuse. Petals yellowish-green or purplish, obovate, clawed. Stylopodium conic. Fruit oblong, 7–8 × 3–4 mm; ribs narrowly winged; vittae 1–2 in each furrow, ca. 4 on commissure. Fl. & fr. Aug–Sep.

Forest margins, roadsides; 3300–3800 m. S Xizang (Nyalam) [Nepal].

12. *Pleurospermum stylosum* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 704. 1879.

新疆棱子芹 xin jiang leng zi qin

Aulacospermum pulchrum (Aitchison & Hemsley) K. H. Rechinger & Riedl; *A. stylosum* (C. B. Clarke) K. H. Rechinger & Riedl; *Pleurospermum pulchrum* Aitchison & Hemsley.

Plants (20–)60–150 cm, robust. Taproot thick. Stem branched, scaberulous or puberulent base with fibrous remnant

sheaths. Basal petioles slender, 3–8 cm, sheaths very narrow; blades oblong-ovate or triangular-ovate, 3–8 × 2–6 cm, 2-pinnate or ternate-pinnate; ultimate segments lanceolate, ovate or obovate, 5–20 × 2–5 mm, base winged, margin serrate to pinnatifid, usually scaberulous. Leaves gradually reduced upwards. Umbels terminal and lateral, 8–15 cm across; peduncles 4–18 cm; bracts 5–8, lanceolate or oblong, 1–3 cm, like upper leaves, becoming reflexed; rays 15–35, 3–10 cm, about equal, thick, scaberulous; bracteoles 6–10, lanceolate or ovate-lanceolate, 5–12 mm, longer than flowers, reflexed, margin broad, white, scarious; umbellules 20–30-flowered; pedicels 7–12 mm, angled, scaberulous. Calyx teeth ovate, minute. Petals obovate, white or flushed pink, apex inflexed. Fruit oblong ovoid or ellipsoid, 4–6 × 2–4 mm; ribs all narrowly sinuate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Aug, fr. Aug–Oct.

Open stony ground, streamsides; ca. 3800 m. NW Xinjiang [Afghanistan, NW India, Kashmir, Pakistan].

13. *Pleurospermum uralense* Hoffmann, Gen. Pl. Umbell. ix. 1814

棱子芹 *leng zi qin*

Pleurospermum camtschaticum Hoffmann.

Plants 1–2 m, robust. Root dark brown, 2–3 cm across, branched, strongly aromatic. Stem hollow, ribbed, scabrous to glabrous. Basal and lower petioles 15–30 cm, sheaths ovate, broad; blades broadly triangular-ovate, 15–30 cm, 2–3-ternate-pinnate; ultimate segments narrowly ovate or lanceolate, 2–6 × 0.5–2.5 cm, irregular-pinnatifid, veins and margin hirtellous. Leaves reduced upwards. Umbels large, 10–20 cm across; bracts numerous, linear or lanceolate, 2–8 cm, apex entire or pinnate, reflexed; rays 20–40(–60), unequal, hirtellous; bracteoles 6–9, linear-lanceolate, 5–10 × 1–3 mm, apex entire or pinnate; pedicels 10–12 mm, scabrous. Calyx teeth triangular-ovate. Petals broad-obovate, white, 2–2.5 mm. Stylopodium short-conic. Fruit broad-ovoid, 6–10 × 3–6 mm; ribs all thickly cristate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Jul–Aug. *n* = 11.

Stream banks in forests or mountain ravines. Hebei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi [Japan, Mongolia, SE Russia].

This species has reputed medicinal value. Chinese material previously recorded as *Pleurospermum austriacum* Linnaeus is referable to *P. uralense*.

14. *Pleurospermum aromaticum* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 341. 1915.

芳香棱子芹 *fang xiang leng zi qin*

Oreocmopsis aromatica (W. W. Smith) Pimenov & Kljuykov.

Plants 40–100 cm high, robust, strongly aromatic. Root brownish, cylindrical, branched, crown stout, 1–2 cm across, annular ringed. Stem purple-tinged at base. Basal and lower petioles 10–30 cm, sheath oblong; blades broad-ovate, 15–30 cm, 3–4-pinnate; pinnae 3–5 pairs, long-petiolulate; ultimate segments ovate or obovate, 1–3 × 0.7–2.3 cm, irregularly coarse-dentate, scabrous on rachis, nerves and margins. Leaves re-

duced upwards. Umbels large, 10–28 cm across; peduncle up to 20 cm; bracts 6–8, very variable, similar to uppermost leaves, 4–10 cm, margin densely scabrid with flattened hairs, apex entire, 3-lobed or pinnate; rays 20–40, 4–12 cm; bracteoles ca. 10, linear-lanceolate, 1.5–3 cm, densely scabrid with flattened hairs, margin narrow, white; pedicels numerous, ca. 1 cm. Calyx teeth obsolete. Petals obovate, white. Stylopodium short-conic. Fruit oblong, 0.7–1 × 0.5–0.6 mm; ribs all broadly thick-winged; vittae 2–3 in each furrow, 6–7 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

• Near ditches in forests, open dwarf scrub, alpine meadows; 3800–4100 m. SW Sichuan, Xizang, NW Yunnan.

This species has reputed medicinal value.

15. *Pleurospermum angelicoides* (Wallich ex de Candolle) C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 703. 1879.

归叶棱子芹 *gui ye leng zi qin*

Angelica forrestii Diels; *Hymenolaena angelicoides* Wallich ex de Candolle, Prodr. 4: 245. 1830; *Pterocyclus angelicoides* (Wallich ex de Candolle) Klotzsch; *Pterocyclus forrestii* (Diels) Pimenov & Kljuykov.

Plants 80–120 cm or more, robust. Root dark brown, long-conic, 3–4 cm across. Stem thinly ribbed, glabrous. Basal leaves with long petioles, 20–40 cm, sheath narrow-oblong, 4–5 cm; blades oblong, 3–4-ternate-pinnate; ultimate segments oblong or ovate-oblong, 4–10 × 2.5–4 cm, scabrous along nerves abaxially, cuneate, irregularly serrate or 3-lobed, apex acute. Stem leaves reduced upwards, sheaths strongly inflated and auriculate, membranous. Umbels 8–10 cm across, peduncle ca. 30 cm; bracts 5–8, linear-lanceolate, 2–3 × ca. 0.8 cm, apex caudate, deciduous; rays 15–25, 5–8 cm in flower, to 15 cm in fruit; bracteoles 5–8, narrow-lanceolate, 1–2 × 0.3–0.5 cm, membranous, green, margin sometimes pale; pedicels ca. 25, 1–1.5 cm. Calyx teeth obsolete. Petals ovate, white or tinged purplish-red, 2–2.75 × ca. 1.75 mm. Anthers dark purple. Fruit oblong, dark brown, 8–14 × 3–4 mm; dorsal ribs prominent, lateral ribs narrowly winged; vittae 1–2 in each furrow, 2–3 on commissure. Seed face concave. Fl. Jun–Aug, fr. Aug–Sep. *2n* = 22*.

Stream banks in forests, alpine meadows; 3000–4000 m. SW Sichuan, SE Xizang, NW Yunnan [Bhutan, Kashmir, Myanmar, Nepal, Sikkim].

16. *Pleurospermum longicarpum* R. H. Shan & Z. H. Pan in C. Y. Wu, Fl. Xizang. 3: 426. 1986.

长果棱子芹 *chang guo leng zi qin*

Pterocyclus wolffianus Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 321. 1930, not *Pleurospermum wolffianum* Fedde ex H. Wolff (1929).

Plants 80–100 cm. Stem ribbed, branched. Basal and lower petioles 10–30 cm; sheaths very broad, auriculate; blades broad-ovate in outline, 30–40 × 15–25 cm, 3–4-ternate-pinnate, pinnae long-petiolulate, ultimate segments oblong-ovate to broad-ovate, 5–15 × 2.5–7 cm, oblique-cuneate, regular-crenate, apiculate, sparse-setose along nerves abaxially. Leaves reduced upwards; sheaths inflated, conspicuous. Umbel 8–10

cm across; peduncle 10–15 cm; bracts 3–8, linear, 2–3.5 × 1–3 mm; rays 20–25, subequal, 5–8 cm in fruit, scabrous; bracteoles ca. 8, linear, 10–15 × ca. 1 mm, uniform green; pedicels numerous, 7–10 mm, flattened, slightly scabrous. Calyx teeth obsolete. Petals broad-obovate, white. Stylopodium short-conic. Fruit narrow-oblong, dark brown, 10–15 × ca. 4 mm; ribs all narrowly winged; vittae 1 in each furrow, 2 on commissure. Seed face slightly concave. Fl. and fr. Jul–Sep.

• Near ditches in coniferous forests, shrubby thickets; ca. 3100 m. SE Xizang, NW Yunnan.

This incompletely known taxon is recorded only from a few collections. It is superficially similar to *Angelica*, and is closely related to *P. angelicoides*, from which it differs by its regularly crenate leaves, narrower bracts and bracteoles (less than 4 mm), and slightly concave seed face.

17. *Pleurospermum heracleifolium* Franchet ex H. de Bois-sieu, Bull. Soc. Bot. France 53: 433. 1906.

芷叶棱子芹 zhi ye leng zi qin

Hymenidium heracleifolium (Franchet ex H. de Boissieu) Pimenov & Kljuykov.

Plants 40–80 cm. Root dark brown, long-conic. Stem ribbed. Basal and lower petioles to 20 cm, flattened, membranous-winged, sheaths narrow-oblong; blades broadly triangular-ovate, 8–12 × 8–12 cm, 3–5-lobed or 2-ternatifid; ultimate segments ovate or narrow-ovate, 2–5 × 1–2.5 cm, irregular-serrulate, acute, white-hispid abaxially and on adaxial veins, abaxial surface gray-green. Leaves reduced upwards. Umbels 10–15 cm across; peduncle 5–10 cm; bracts 7–9, oblanceolate to obovate, 3–6 × 0.5–2 cm, white-hispidulous along nerves on both sides, apex entire or 3–5-lobed, margin coarse-dentate; rays 10–15, 2–4 cm, densely hispidulous; bracteoles 5–9, lanceolate, 1–2 cm, similar to bracts; pedicels 10–15, 8–15 mm, hispidulous, elongating in fruit to 20 mm. Calyx teeth obsolete. Petals elliptic, white, ca. 1.5 mm. Stylopodium conic. Fruit oblong-ovoid, 7–10 × 1.8–2.5 mm; ribs all narrow-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Sep, fr. Aug–Oct.

• Open dwarf scrub, grasslands; 3000–3900 m. Xizang, NW Yunnan.

This species is closely related to, and not always easy to distinguish from, *P. benthamii*. The presence of coarse, white hairs (reminiscent of those seen in *Heracleum*) on the leaf sheath and main veins is usually diagnostic, as is the gray-green underside of the leaves and the densely hispidulous rays and pedicels.

18. *Pleurospermum macrochlaenum* K. T. Fu & Y. C. Ho in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 298. 1979.

大苞棱子芹 da bao leng zi qin

Hymenidium macrochlaenum (K. T. Fu & Y. C. Ho) Pimenov & Kljuykov.

Plants 40–60 cm. Root stout conic. Stem ribbed and branched. Basal and lower petioles 4–6 cm, flattened, membranous-winged, sheaths broad, oblong, membranous; blades broadly triangular-ovate, tripartite; median lobes ovate, 1.5–3 × ca. 1.5 cm, larger than narrowly ovate lateral lobes, serrate. Leaves

reduced upwards, with petioles becoming wholly sheathing. Umbels ca. 10 cm across; bracts 7–10, oblanceolate, 3–5 × ca. 1 cm, pilose along veins, apex 3–5-lobed; rays 10–25, 5–6 cm; bracteoles 6–8, elliptic-obovate, 1–1.5 × 0.3–0.5 cm, apex 3–5-lobed, median stripe green, margins white; pedicels numerous, ca. 8 mm. Calyx teeth obsolete. Petals broad-ovate or rounded, pinkish. Stylopodium short-conic. Immature fruit ellipsoid; ribs all broadly sinuate-winged; vittae 1 in each furrow, 2 on commissure (mature fruit not known). Fl. Jun–Jul.

• Grassy slopes in mountains; ca. 3500 m. SW Xizang.

This incompletely known taxon is recorded only from the type gatherings. It is closely allied to *P. benthamii*.

19. *Pleurospermum franchetianum* Hemsley, J. Linn. Soc., Bot. 29: 307. 1892.

松潘棱子芹 song pan leng zi qin

Pleurospermum longipetiolatum H. Wolff; *P. pilgerianum* Fedde ex H. Wolff; *P. rockii* Fedde ex H. Wolff.

Plants 40–70 cm. Root conic, branched. Stem hollow, ribbed, base 5–12 mm thick. Basal and lower leaves long-petiole, sheaths narrow-oblong; blades ovate, 7–18 × 5–15 cm, 3-ternate-pinnate; pinnae 5–7 pairs, proximal pinnae petiolulate; ultimate segments oblong-lanceolate, 10–25 × 2–5 mm, hirtellous along nerves and margins otherwise glabrous, irregularly incised. Leaves gradually reduced upwards. Terminal umbels fertile, 8–17 cm across, peduncle 2–4 cm, overtopped by the sterile lateral umbels (when present), peduncles to 14 cm; bracts 8–12, oblong-ovate to spatulate, 1.5–3 cm, broadly white-margined to the first lobes, apex 3–5-lobed; rays 12–28, 3.5–7 cm, unequal, smooth; bracteoles 8–10, oblong-elliptic to spatulate, 10–15 mm, apex entire or shortly 3-lobed; pedicels numerous, 6–10 mm. Calyx teeth obsolete. Petals obovate, white, ca. 1 mm. Anthers dark purple. Stylopodium short-conic. Fruit oblong-ovoid, 4–6 × ca. 3 mm; dorsal ribs sinuate-winged, lateral ribs plane-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Sep.

• Alpine grasslands, river banks; 2500–4300 m. Gansu, Hubei, Ningxia, Qinghai, Shaanxi, Sichuan.

This species is similar to, and sometimes treated as conspecific with, *Pleurospermum davidii* (here a synonym of *P. benthamii*). It is here distinguished by the more finely divided leaves (ultimate segments to 5 mm wide), hirtellous along the margin, the smaller fruits (less than 6 mm), and the terminal umbel overtopped by the staminate lateral umbels. It has reputed medicinal value (in Sichuan).

20. *Pleurospermum benthamii* (Wallich ex de Candolle) C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 703. 1879.

宝兴棱子芹 bao xing leng zi qin

Hymenolaena benthamii Wallich ex de Candolle, Prodr. 4: 246. 1830; *Hymenidium benthamii* (Wallich ex de Candolle) Pimenov & Kljuykov; *H. davidii* (Franchet) Pimenov & Kljuykov; *Pleurospermum davidii* Franchet.

Plants (25–)45–150 cm. Root cylindrical, ca. 2.2 cm thick, annular ringed at apex. Stem hollow, thinly ribbed, base ca. 2 cm thick, often tinged purple. Basal and lower petioles 10–18 cm, sheaths narrow-oblong; blades broadly triangular-ovate, 8–15 cm, 2–3-ternate-pinnate, glabrous; pinnae 3–4 pairs, short-

petiolulate; ultimate segments narrow-ovate or lanceolate, 1–2.5 × 0.3–1 cm, base decurrent, serrate-pinnatifid. Umbels (5–)10–15 cm across; peduncle 4–12 cm; bracts 5–9, oblanceolate, 3–9 × 1–2 cm, margin white-scarious, apex pinnate; rays 10–25, 5–10 cm (in fruit), scabrous-ribbed; bracteoles 6–9, oblanceolate, 8–20 × 3–5 mm, margin white-scarious, apex 3-lobed, pedicels 15–20, 5–15 mm (to 35 mm in fruit), flattened, scabrous. Calyx teeth obsolete. Petals obovate, white, rarely pink, 2–3 mm, acute. Stylopodium conic. Fruit ovoid-ellipsoid, 6–10 × 2.5–4.5 mm; ribs all sinuolate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

Open scrub, alpine pastures, riversides; 2200–4300 m. W Sichuan, SE Xizang, NW Yunnan [Bhutan, N Myanmar, E Nepal, Sikkim].

This species has reputed medicinal value (in Yunnan).

21. *Pleurospermum decurrens* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 138. 1894.

异叶棱子芹 *yi ye leng zi qin*

Hymenidium decurrens (Franchet) Pimenov & Kljuykov.

Plants 40–100 cm high. Root dark brown, 7–10 cm across. Stem slender, 4–7 mm thick at base, ribbed. Basal and lower petioles 10–30 cm; sheaths oblong, membranous; blades broad-ovate, 5–12 cm, 2-ternate/pinnate, hirtellous along the main veins on both surfaces, otherwise glabrous; ultimate segments oblong-ovate, 1–3 × 0.8–2 cm, base cuneate-decurrent, pinnately incised distally. Stem leaves gradually reduced upwards. Umbels 6–10(–18) cm across; peduncles 5–13 cm; bracts 6–10, pale green, oblong-lanceolate, 1.2–2.2 × 0.4–1.2 cm, less than half length of rays, margin white membranous, apex acute or 3-lobed; rays 10–15(–20), 2–4.5 cm, scabrous; bracteoles 6–8, 7–15 mm, equal to flowers, linear-lanceolate, entire or occasionally 3-lobed; pedicels numerous. Calyx teeth obsolete. Petals ovate-lanceolate, white, ca. 2 mm. Anthers violet, filaments white. Stylopodium conic, cream. Fruit ovoid, 4–8 × 2.5–3.3 mm; ribs narrowly sinuolate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

• Shady areas in *Pinus* and mixed forests, alpine grasslands; 3000–4000 m. NW Yunnan.

22. *Pleurospermum cristatum* H. de Boissieu, Bull. Soc. Bot. France 53: 434. 1906.

鸡冠棱子芹 *ji guan leng zi qin*

Hymenidium cristatum (H. de Boissieu) Pimenov & Kljuykov.

Plants 60–120 cm, glabrous. Root gray-brown, conic. Stem slender, hollow, simple or branched. Basal and lower leaves long-petiolate, sheaths ovate; blades broadly triangular-ovate, 15–28 × 10–14 cm, 2-ternate-pinnate; ultimate segments rhomboid-ovate, 1.5–6 × 0.8–2.8 cm, cuneate, irregular-incised or pinnate, acuminate. Leaves reduced upwards. Umbels 3–5 cm across; bracts 3–7, obovate-oblong, 1–2.5 cm, apex entire; rays 7–13, 1–2.5 cm, subequal; bracteoles 4–6, linear-lanceolate, 1–2.3 cm, almost as long as rays; pedicels 15–25, 3–5 mm. Calyx teeth obsolete. Petals ovate, white, ca. 1 mm. Stylopodium conic. Fruit ovoid, brownish, 3.5–5 × 3–4.5 mm, tuberculate; ribs all broadly cristate-keeled/narrowly winged; vittae

1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

• Forest margins, grasslands near ditches; 1000–2600 m. Anhui, Gansu, Henan, Hubei, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

23. *Pleurospermum amabile* Craib & W. W. Smith, Trans. Bot. Soc. Edinburgh 26: 154. 1913.

美丽棱子芹 *mei li leng zi qin*

Hymenidium amabile (Craib & W. W. Smith) Pimenov & Kljuykov.

Plants 15–50 cm high. Root stout, dark brown, 1–1.5 cm across. Stem solitary, stout 1–2 cm broad, violet-green, unbranched. Basal petioles 3–6 cm, sheaths broad-ovate, 2–3 cm across; blades triangular-ovate, 6–15 cm, 3–4-ternate-pinnate; ultimate segments linear, 1–2 mm. Stem leaves gradually reduced upwards, sheaths greatly expanded, 3–5 cm broad, very pale almost white, nerves tinged purple, membranous, margins erose. Umbel 5–12 cm across, usually solitary; peduncles 2.5–4 cm; bracts 3–8, 3–5 cm, similar to upper leaves; rays 20–30, 2–4 cm, subequal; bracteoles ca. 12, oblong or oblanceolate, 6–10 × 4–8 mm, membranous, silvery white, main veins dark purple; pedicels 20–25, ca. 5 mm. Calyx teeth obsolete. Petals obcordate, white to dark purple, 1–1.5 mm. Anthers dark purple. Stylopodium depressed, purple-black; style yellow-green. Fruit ovoid-oblong, 3–5 × ca. 1.5 mm; ribs very narrowly sinuolate-winged; vittae 3 in each furrow, 4–6 on commissure. Fl. Jul–Sep, fr. Sep–Oct.

Open scrub, high-altitude alpine turf, semi-stable screes; (3000–) 4000–5100 m. SE Xizang, NW Yunnan [Bhutan, Sikkim].

The plants are used in traditional medicine in Xizang.

24. *Pleurospermum bicolor* (Franchet) C. Norman ex Z. H. Pan & M. F. Watson, Acta Phytotax. Sin. 42: 564. 2004.

二色棱子芹 *er se leng zi qin*

Pleurospermum govanianum (de Candolle) Bentham ex C. B. Clarke var. *bicolor* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 137. 1894, not *P. govanianum* var. *bicolor* H. Wolff (1929); *Hymenidium bicolor* (Franchet) Pimenov & Kljuykov.

Plants 10–40 cm. Root long-conic, simple. Stem purple-green, often simple, ribbed. Basal and lower petioles 2–8 cm, sheaths narrowly oblong, membranous; blades oblong, 4–10 × 2–6 cm, 1-pinnate to 2-pinnatifid; pinnae 4–5 pairs, only basal pinnae shortly petiolulate; ultimate segments oblong, 1.2–2.5 cm, serrate to pinnatifid. Stem leaves gradually reduced upwards. Umbels terminal, 5–9 cm across; bracts 3–8, narrowly oblanceolate, 1.5–2.5 cm; rays 2–4, 1.5–3.5 cm, unequal; bracteoles 6–8, broadly ovate, 7–12 × 6–8 mm, median stripe broad, purple-green, margin broad white-membranous, apex 1–3-lobed, slightly exceeding flowers; pedicels ca. 2 mm. Calyx teeth narrowly triangular, ca. 1 mm. Petals white, purple-red distally, apex rounded. Anthers dark purple. Stylopodium dark purple. Fruit narrowly obovoid, 2.5–3 × 1.8–2 mm; ribs sinuolate winged; vittae 2 in each furrow, 4 on commissure. Fl. Aug–Sep, fr. Sep–Oct.

• Open mixed woodlands, dwarf *Rhododendron* scrub, alpine pastures; 3500–4300 m. SW Sichuan, SE Xizang, NW Yunnan.

This species is similar to, and sometimes confused with, the Himalayan unispecific genus *Pleurospermopsis*.

25. *Pleurospermum yunnanense* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 137. 1894.

云南棱子芹 yun nan leng zi qin

Hymenidium yunnanense (Franchet) Pimenov & Kljuykov; *Pleurospermum pseudoyunnanense* H. Wolff.

Plants 30–60(–100) cm. Taproot stout, dark brown. Stem hollow, distally ribbed and branched. Basal and lower petioles up to 20 cm; sheaths broad oblong, extended to first pinnae in mid and upper leaves, puberulous along veins; blades broadly triangular-ovate, 10–20 cm, 2–3-ternate/pinnate, glabrous; ultimate segments ovate or oblong, 1–2.8 × 0.5–2 cm, acutely serrate to lacerate. Umbels 7–10(–15) cm across; peduncles 7–12 cm; bracts 6–8, oblong to broadly lanceolate, 2–4 × 1–2 cm, divided at apex; rays 12–25, 3–5 cm, brown-hirtellous along ribs; bracteoles 6–10, oblong-obovate, 10–15 mm, membranous except midribs, cuneate, 3–5-lobed to pinnatifid at apex; pedicels numerous, 6–8 mm in fruit. Calyx teeth conspicuous, lanceolate-triangular, ca. 0.5 mm. Petals obovate, greenish-white, occasionally flushed pink. Anthers dark purple-black. Fruit broad-ovoid, 3–4 × 2.5–3.2 mm; ribs narrowly winged; vittae 2 in each furrow, 4 on commissure. Fl. Jun–Sep, fr. Aug–Oct.

Woodland margins, dwarf *Rhododendron* scrub, valley sides, rocky slopes; 3600–4100 m. W Sichuan, NW Yunnan [NE Myanmar].

26. *Pleurospermum pilosum* C. B. Clarke ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 117. 1929.

疏毛棱子芹 shu mao leng zi qin

Hymenidium pilosum (C. B. Clarke ex H. Wolff) Pimenov & Kljuykov.

Plants 20–40 cm, white-setose throughout. Root stout and branched. Stem ribbed, lower parts purple-red. Stem leaves petiolate, petioles ca. 10 cm; sheaths broadly ovate, 2.5–4 cm, purple-red adaxially, densely white-setose abaxially; blades triangular-oblong, 10–15 × 5–7 cm, 3-pinnate; pinnae 5–7 pairs, only basal pinnae short-petiolate; ultimate segments obovate or oblanceolate, 3–5 × 2–3 mm, setose along nerves abaxially, entire or 2–3 toothed, cuspidate at apex. Umbels 3–15(–20) cm across (in fruit); bracts 1–3, 1–3 cm, white-setose abaxially, apex acute or pinnate; rays 6–17, 8–10 cm; bracteoles 8–10, broadly cuneate-obovate, 6–15 mm, mottled purple-green, pubescent along nerves, abruptly acuminate to a short point; umbellules many-flowered. Calyx teeth obsolete. Petals obovate, white, often purplish on reverse, ca. 2 × 1.2 mm. Fruit oblong, 3–6 × 1.5–2 mm; ribs narrowly winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Oct, fr. Sep–Nov.

Damp meadows, streamsides; ca. 4100 m. S Xizang (Yadong) [Bhutan, Sikkim].

This species has reputed medicinal use.

27. *Pleurospermum album* C. B. Clarke ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 113. 1929.

白苞棱子芹 bai bao leng zi qin

Hymenidium album (C. B. Clarke ex H. Wolff) Pimenov & Kljuykov.

Plants 16–40(–70) cm, essentially glabrous. Stem solitary, 5–8 mm across at base, little branched. Lower petioles flattened; sheaths ovate, white-margined; blades broadly rhomboid, 3–4-ternate/pinnate; pinnae 6–8 pairs remote, proximal pinnae long-petiolate; leaflets broadly ovate, 8–10 mm, pinnatifid; ultimate segments 2–3-toothed. Stem leaves reduced upwards, sheaths greatly inflated, broadly white-margined. Umbels 3.5–13 cm across; bracts 5–6, broadly obovate, 2–3.5 × 0.8–1.5 cm, scabrous along nerves, apex slightly pinnate; rays 8–10, unequal, ca. 1.5 cm in flower, extending to 7 cm in fruit; bracteoles numerous, broadly cuneate, ca. 10 × 6 mm, unequal, exceeding umbellules, margin broad silver-white, apex acuminate or trifid, margin irregularly serrulate; umbellules 12–20 mm across. Calyx teeth linear-lanceolate, 0.5–0.75 mm. Petals white, yellowish or greenish, oblanceolate to obovate, unequal. Anthers dark purple-black. Style dark violet. Mature fruit not known. Fl. and fr. Jul–Sep.

Open wet grasslands, streamsides; 3900–4900 m. S Xizang (Yadong) [Bhutan, Nepal, Sikkim].

28. *Pleurospermum simplex* (Ruprecht) Benth. & J. D. Hooker ex Drude in Engler & Prantl, Nat. Pflanzenfam. 3(8): 172. 1898.

单茎棱子芹 dan jing leng zi qin

Aulacospermum simplex Ruprecht in Osten-Sacken & Ruprecht, Sert. Tianschan. 49. 1869; *Albertia commutata* Regel & Schmalhaus. *Trachydium commutatum* (Regel & Schmalhaus.) M. Hiroe.

Plants 20–40 cm, glabrous. Stem solitary, ribbed, branched. Basal and lower petioles 8–15 cm, flattened, sheaths narrow-oblong, 3–5 cm broad; blades ovate or oblong-ovate, 4–7 × 1.5–3.5 cm, 2–3-ternate-pinnate; pinnae 4–6 pairs, sessile; ultimate segments linear-lanceolate, 4–18 × 1–4 mm, acute. Leaves gradually reduced upwards. Umbels 5–7 cm across; bracts 4–7, lanceolate, 1–1.5 cm; rays 5–11, 1–5 cm, very unequal; bracteoles 5, 5–8 mm, lanceolate, pale green, apex entire acute, pedicels 7–16, 2–5 mm. Calyx teeth conspicuous, broad-triangular. Petals broad-ovate, purplish, margin white. Anthers yellow-green. Stylopodium green, short-conic. Fruit broad-ovoid or subglobose, 3–4 × 2.5–3.5 mm; ribs all broadly sinuate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul, fr. Aug.

Grasslands in mountains; ca. 2500 m. NW Xinjiang [Turkmenistan].

29. *Pleurospermum rupestre* (Popov) K. T. Fu & Y. C. Ho in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 163. 1979.

岩生棱子芹 yan sheng leng zi qin

Aulacospermum rupestre Popov, Byull. Moskovsk. Obšč. Isp. Prir., Otd. Biol. 44: 129. 1935.

Plants 20–50 cm, glabrous. Root conic. Stem simple or little-branched. Basal and lower petioles 8–18 cm, flattened, sheaths narrow-oblong; blades ovate, 3–5 × 1.5–3 cm, 2–3-

pinnate; pinnae 3–5 pairs, sessile; ultimate segments linear-lanceolate, 2–5 × 1–2.5 mm, acute. Leaves reduced upwards. Umbels 5–10 cm across; bracts 4–7, linear-lanceolate, 1–2 cm; rays 4–7, 2–5 cm, unequal; bracteoles 4–6, lanceolate, 5–10 mm, pale green, apex entire, acute; pedicels 10–20, 3–5 mm. Calyx teeth small, triangular. Petals ovate-obovate, white, ca. 1 mm. Stylopodium yellow-brown, short-conic. Fruit broad-ovoid, 3–5 × mm; ribs all broadly sinuate-winged; vittae 3 in each furrow, 6 on commissure. Fl. Jul, fr. Aug.

Rocky mountain slopes; 2500–3500 m. NW Xinjiang [Turkmenistan].

This rather poorly known taxon is possibly conspecific with *Pleurospermum simplex*.

30. *Pleurospermum szechenyi* Kanitz in Szechenyi, Wiss. Erg. Reise Griechenl. 2: 701. 1898.

青海棱子芹 qing hai leng zi qin

Hymenidium szechenyi (Kanitz) Pimenov & Kljuykov; *Pleurospermum dielsianum* Fedde ex H. Wolff, p.p.

Plants 15–40 cm. Root dark brown, conic. Stem stout, simple or branched, base with papery remnant sheaths. Basal and lower leaves long-petiolate, petioles flattened, sheaths narrow-oblong; blades ovate or ovate-lanceolate, 5–8 × 2–4 cm, 2–3-ternate-pinnate; pinnae 6–9 pairs, sessile; ultimate segments lanceolate, 2–3 × ca. 1 mm, acute. Leaves gradually reduced upwards. Umbels 10–15 cm across; bracts 7–11, oblanceolate, 3–4 cm, apex 1–2-pinnate, base narrowly scarious margined; rays 15–25, 5–8 cm, unequal; bracteoles 9–13, obovate or oblanceolate, 6–8 mm, apex pinnate; pedicels 6–8 mm, flattened, membranous-winged. Calyx teeth small, triangular. Petals obovate, reddish, ca. 2.5 mm. Anthers dark purple. Stylopodium short-conic. Fruit oblong-ovoid, 5–6 × 3–4 mm; ribs all sinuate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul, fr. Aug.

• High-altitude grasslands; 3700–4200 m. N Gansu, E Qinghai, E Xizang.

31. *Pleurospermum wilsonii* H. de Boissieu, Bull. Soc. Bot. France 53: 433. 1906.

粗茎棱子芹 cu jing leng zi qin

Hymenidium wilsonii (H. de Boissieu) Pimenov & Kljuykov; *Physospermopsis lalabhduriana* Farille & S. B. Malla; *Pleurospermum cnidiifolium* H. Wolff; *P. crassicaule* H. Wolff; *P. lecomteanum* H. Wolff; *P. tanacetifolium* H. Wolff; *P. thalictrifolium* H. Wolff

Plants 10–40 cm. Root brown, long-conic. Stem purplish-tinged, ribbed, fibrous remnant sheaths at base. Basal and lower petioles 3–5 cm, flattened, winged, sheaths narrow-oblong; blades oblong-lanceolate, 3–15 cm, 2–3-ternate-pinnate; pinnae 5–9 pairs, basal pinnae petiolulate; ultimate segments narrow-ovate or lanceolate, 3–5 × 1.5–2 mm, entire or 2–3-lobed. Leaves reduced upwards, petioles becoming wholly sheathing. Umbels 4–6 cm across; peduncle 3–4 cm; bracts 5–8, leaf-like, 1.5–4 cm, apex 2-pinnate, margin broadly white-membranous; rays 7–15, 2–5 cm, subequal; bracteoles 5–8, broad-ovate, 7–11 mm, similar to bracts; pedicels numerous, 2–4 mm. Calyx teeth small, triangular-ovate, ca. 0.3 mm. Petals white, yellowish-

green or purplish, ca. 1.5 mm. Anthers purple-red. Fruit oblong-ovoid, ca. 3 × 2 mm, dark purple; ribs all broadly crisped-winged; vittae 1–2 in each furrow, 2 on commissure. Fl. and fr. Aug–Oct.

High-altitude open grasslands; 3000–4500 m. S Gansu, SE Qinghai, W Sichuan, E Xizang, NW Yunnan [Nepal].

32. *Pleurospermum hookeri* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 705. 1879.

喜马拉雅棱子芹 xi ma la ya leng zi qin

Plants 10–40 cm, glabrous. Root dark brown, 4–6 mm across. Stem ribbed. Basal and lower petioles 3–8 cm, sheaths narrowly oblong, membranous margined; blades triangular-ovate, 5–13 cm, 3–4-ternate-pinnate; pinnae 7–9 pairs, ovate-lanceolate, 3–5 × 1.5–2.5 cm; ultimate segments linear, ca. 2 mm. Leaves gradually reduced upwards, petioles becoming wholly sheathing. Umbels 5–7 cm across; peduncles 6–12 cm; bracts 5–7, obovate-lanceolate or linear-lanceolate, 1.5–2.5 cm, margin membranous, white or tinged brown, apex long-caudate or occasionally pinnatifid; rays 6–12, 2–4 cm, subequal, ribbed; bracteoles 6–10, ca. 5 mm, similar to bracts, pedicels numerous, ca. 5 mm, flattened. Calyx teeth narrowly triangular, ca. 1 mm. Petals rounded, 1–1.2 mm, white. Anthers dark purple. Fruit ovoid, 3–4 mm; ribs narrowly winged; vittae 3 in each furrow, 6 on commissure. Fl. and fr. Aug–Oct.

Open pastures by streams, grassy slopes; 2700–5400 m. Gansu, Qinghai, Sichuan, SE Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

This highly variable and complex taxon is wide-ranging in distribution and leaf form across the Himalayan region and SW China. Two varieties are currently recorded from China, but further revision of the taxon, together with *P. giraldii* and *P. tsekuense*, is needed.

- 1a. Bracteoles obovate-lanceolate, margin broad, white, apex long-caudate 32a. var. *hookeri*
- 1b. Bracteoles linear-lanceolate, margin narrow, tinged brown, apex pinnatifid 32b. var. *thomsonii*

32a. *Pleurospermum hookeri* var. *hookeri*

喜马拉雅棱子芹(原变种) xi ma la ya leng zi qin (yuan bian zhong)

Aulacospermum hookeri (C. B. Clarke) Farille & S. B. Malla; *Hymenidium hookeri* (C. B. Clarke) Pimenov & Kljuykov; *Pleurospermum wolffianum* Fedde ex H. Wolff.

Bracteoles obovate-lanceolate, margin broad, white, apex long-caudate.

Open pastures by streams; 4100–5400 m. SE Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

32b. *Pleurospermum hookeri* var. *thomsonii* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 705. 1879.

西藏棱子芹 xi zang leng zi qin

Hymenidium chloroleucum (Diels) Pimenov & Kljuylov; *Pleurospermum affine* H. Wolff; *P. likiangense* H. Wolff (1930), not H. Wolff (1929); *P. markgrafianum* H. Wolff; *P. pseudoinvolucratum* H. Wolff; *P. tibeticum* H. Wolff; *Trachydium chloroleucum* Diels.

Bracteoles linear-lanceolate, margin narrow, tinged brown, apex usually pinnatifid.

• Grassy slopes; 2700–4500 m. Gansu, Qinghai, Sichuan, SE Xizang, NW Yunnan.

This variety has reputed medicinal value (in Xizang). Some authors consider *Hymenidium* (*Trachydium*) *chloroleucum* (including *Pleurospermum likiangense*) to be a separate taxon, differentiated by the less dissected leaflets and bracteoles with a pinnate apex. Further work is needed on this complex group.

33. *Pleurospermum tsekuense* R. H. Shan, Fl. Reipubl. Popularis Sin. 55(1): 298. 1979.

泽库棱子芹 ze ku leng zi qin

Hymenidium tsekuense (R. H. Shan) Pimenov & Kljuykov.

Plants 30–50 cm, glabrous. Root stout, ribbed and branching. Basal and lower petioles 5–8 cm, sheaths ovate; blades broadly triangular, 6–10 × ca. 8 cm, 3–4-ternate-pinnate; petioles of proximal pinnae 1.5–2 cm; ultimate segments linear-lanceolate, 3–5 × ca. 1 mm. Leaves gradually reduced upwards with short or wholly sheathing petioles. Umbels 4–6 cm across; bracts 3–5, lanceolate, 1.5–2.5 cm, apex pinnate; rays 7–10, 2.5–4 cm, subequal; bracteoles 8–10, narrow-lanceolate, 0.6–1 cm, apex pinnate/pinnatifid; pedicels ca. 5 mm, flattened. Calyx teeth conspicuous, ovate, dark purple, ca. 0.3 mm. Petals broad-ovate or rounded, purplish to white, ca. 1 mm. Anthers black-purple. Stylopodium black-purple, low-conic. Immature fruit ovoid, narrow-winged (mature fruit unknown). Fl. Aug.

• Grassy slopes; 3400–3500 m. Qinghai.

This incompletely known taxon is recorded only from a few collections and is part of the *Pleurospermum hookeri* complex.

34. *Pleurospermum giraldii* Diels, Bot. Jahrb. Syst. 29: 492. 1900.

太白棱子芹 tai bai leng zi qin

Hymenidium giraldii (Diels) Pimenov & Kljuykov; *Pleurospermum limprichtii* H. Wolff; *P. meoides* Diels.

Plants 20–35 cm, glabrous. Root dark brown, 0.5–1 cm across, branched. Stem tinged purple, ribbed, simple or little branched. Basal and lower leaves long-petiolate, sheaths membranous; blades triangular-ovate, 5–8 cm, 3–4-ternate-pinnate; ultimate segments linear, 1.5–3 × 0.3–0.5 mm. Leaves gradually reduced upwards, petioles becoming almost wholly sheathing. Umbel often 1, rarely 2–3, 3.5–4.5 cm across; bracts 5–7, ovate-elliptic or obovate, 15–20 × 5–8 mm, white or tinged purple, membranous; rays 9–15, 1.5–2.5 cm; bracteoles 5–7, obovate, longer than flowers, margin white membranous to first lobes, apex pinnatisect; pedicels 18–30, 2.5–3.5 mm. Calyx teeth minute, triangular. Petals obcordate, white, ca. 1 mm. Stamens longer than petals, anthers purple-black. Fruit oblong, 3.5–4 mm; ribs winged; vittae 3 in each furrow, 6 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

• Grassy mountain slopes; 3000–3600 m. Gansu, Hubei, Shaanxi, Sichuan.

This taxonomic boundaries between this species and *Pleurospermum hookeri* var. *thomsonii* are unclear as the character of obsolete

calyx teeth is not reliable and the degree of dissection of the bracteoles is somewhat variable. All parts of the plant are used medicinally to cure stomach ache (in Shaanxi).

35. *Pleurospermum apiolens* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 705. 1879.

紫色棱子芹 zi se leng zi qin

Hymenidium apiolens (C. B. Clarke) Pimenov & Kljuykov; *Pleurospermum apiolens* var. *nipaulense* Farille & S. B. Malla; *P. atropurpureum* K. T. Fu & Y. C. Ho.

Plants 30–40 cm. Stem ribbed, branched, lower parts dark purple-red. Basal and lower petioles 10–12 cm, sheaths narrow-oblong; blades oblong-ovate, 10–15 cm, 2-ternate-pinnate; pinnae 5–6 pairs, petiolulate; ultimate segments ovate to obovate, 1–2 × 0.5–1 cm, cuneate, incised-dentate. Leaves gradually reduced upwards. Umbels ca. 7 cm across; bracts 3–6, oblong-ovate, 1–2 × ca. 0.5 cm, margin purple-red, serrate, apex cuspidate; rays 5–7, ca. 3 cm, subequal, scabrous-ribbed; bracteoles 6–10, ovate to broad-ovate, ca. 10 × 4–6 mm, longer than flowers, similar to bracts; pedicels numerous, ca. 4 mm. Calyx teeth obsolete. Petals broad-ovate, white. Stylopodium short-conic. Fruit oblong, 3.5–5 × 2–3 mm; ribs all broadly sinuate-winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

High-altitude grassy slopes; 3800–4700 m. SW Xizang [Bhutan, Nepal, Sikkim].

36. *Pleurospermum handelii* H. Wolff in Handel-Mazzetti, Symb. Sin. 7: 710. 1933.

高山棱子芹 gao shan leng zi qin

Physospermopsis handelii (H. Wolff) Pimenov & Kljuykov.

Plants 30–45 cm, slender, glabrous. Taproot stout. Stem branched, branches often opposite or cyclic. Basal petioles ca. 15 cm; sheaths narrow, 1–2 cm; blades triangular-lanceolate, 6–8 × ca. 2.5 cm, 3-pinnate; pinnae 5–6 pairs, broadly triangular, petiolules ca. 3 mm; ultimate segments shortly petiolulate or sessile, pinnatifid, colored-mucronate. Stem leaves gradually reduced upwards. Terminal umbel, peduncle 10–15 cm, often exceeding by the lateral umbels; bracts 5–10, obovate-lanceolate, 2–4.5 cm, leaf-like; rays slender, 6–12 cm, unequal; bracteoles rhomboid, about equaling the flowers, apex pinnate; pedicels 15–30, up to 10 mm, unequal. Calyx teeth minute. Petals white, rounded, ca. 1 mm. Anthers dark purple. Young fruit broad-ovoid, sparsely tuberculate; ribs narrowly sinuate-winged (mature fruit not known). Fl. Aug, fr. Sep.

Alpine meadows; 2900–4100 m. NW Yunnan [NE Myanmar].

This incompletely known and problematic species is recorded only from a few collections (none bearing mature fruit). It is possibly better placed in *Physospermopsis* on account of the fibrous stem base, long slender rays, and green young fruit, but is here retained in *Pleurospermum* pending further research.

37. *Pleurospermum linearilobum* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 342. 1915.

线裂棱子芹 xian lie leng zi qin

Hymenidium linearilobum (W. W. Smith) Pimenov & Kljuykov.

Plants 30–60 cm. Root dark brown, conic, ca. 2.5 cm thick. Stem thinly ribbed, glabrous. Basal and lower petioles 8–12 cm, sheaths small, narrow; blades oblong-ovate, 6–13 × 4–8 cm, 3–4-pinnate; ultimate segments linear, 3–6 × 0.5–1 mm, acute. Leaves reduced upwards, petiole becoming entirely sheathing. Umbels 10–18 cm across; peduncle 8–15 cm; bracts 7–10, 3–4 cm, like upper leaves; rays 20–25, 5–9 cm, unequal, hispidulous; bracteoles 6–8, lanceolate to oblanceolate, 5–10 mm, green with narrow white margin, apex entire or pinnate; pedicels 10–20, 8–10 mm, hispidulous. Calyx teeth obsolete. Petals obovate, white. Anthers dark purple. Stylopodium short-conic. Fruit ovoid, 4–5 × 3.5–4.5 mm; ribs all broadly sinuate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Jul–Aug.

• Mixed woodland margins, open low scrub, rocky slopes, screes; 2400–3000 m. W Sichuan, NW Yunnan.

38. *Pleurospermum calcareum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 114. 1929.

疣叶棱子芹 you ye leng zi qin

Plants 20–30 cm. Taproot brown, conic. Stem stout, purplish-tinged, glabrous or tuberculate at nodes. Lower petioles 4–9 cm, flattened, tuberculate; sheaths oblong; blades triangular-ovate, 6–9 cm, 3–4-ternate/pinnate, rachis tuberculate; pinnae 5–6-paired, shortly petiolulate; ultimate segments ovate, 3–5 × 2.5–4 mm, 3–5-lobed, tuberculate along nerves abaxially. Stem leaves reduced upwards; peduncles ca. 4 cm; bracts 5–6, leaf-like, 4–6 cm, 1–2 pinnate at apex; rays 10–15, 4–7 cm, unequal, slightly scabrous; bracteoles ca. 10, broadly lanceolate,

ca. 1 cm, entire or apex pinnate, green with narrow white margin; pedicels numerous, 5–6 mm. Calyx teeth obsolete. Petals pinkish-white, oblong-obovate. Ovary tuberculate along ribs; stylopodium conic. Fruit unknown. Fl. Jun–Jul.

• Alpine grasslands; 3200–4200 m. NW Yunnan (Lijiang).

This incompletely known taxon is recorded only from the type gathering. It is possibly conspecific with *Pleurospermum linearilobum*.

39. *Pleurospermum wrightianum* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 847. 1903.

瘤果棱子芹 liu guo leng zi qin

Hymenidium wrightianum (H. de Boissieu) Pimenov & Kljuykov; *Pleurospermum prattii* H. Wolff.

Plants (15–)30–60 cm, tuberculate. Root brown, 1–2 cm thick. Stem tinged purple-red, ribbed and branched. Basal and proximal petioles 5–8 cm, flattened, winged, sheaths narrow, oblong; blades narrowly oblong-ovate, 4–9 × 2.5–5 cm, 2–3-ternate-pinnate; pinnae 5–7 pairs, proximal pinnae petiolulate; ultimate segments linear-lanceolate, 3–5 × 0.5–1 mm, acute. Umbels 15–20 cm across; peduncle 2–3 cm; bracts 7–9, linear-lanceolate, 2–3 cm, apex pinnatifid, deciduous; rays 10–20, 3–10 cm (10–13 cm in fruit), very unequal; bracteoles ca. 10, oblanceolate, 7–15 × 3–7 mm, apex pinnate; pedicels 10–15, 5–12 mm. Calyx teeth minute, triangular. Petals obovate, white or purplish-reddish. Stylopodium short-conic. Fruit narrowly elliptic-ovoid, 5–6 × 2.5–3.2 mm, usually tuberculate; ribs all broadly cristate-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

• Alpine grasslands; 3600–4600 m. SE Qinghai, SW Sichuan, SE Xizang, NW Yunnan.

The following species have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

Hymenidium pachycaule Pimenov & Kljuykov (Edinburgh J. Bot. 53: 275. 1996), described from NW Gansu (“Lienhuo Shan,” *J. F. C. Rock 12703*, holotype, E; isotype, NAS). It is possibly referable to *Pleurospermum*, but further research is required.

Pleurospermum albimarginatum H. Wolff (Repert. Spec. Nov. Regni Veg. 21: 243. 1925), described from W Sichuan (“Tongolo,” *J. A. Soulié 2618*, holotype, P).

Pleurospermum grandifolium H. Wolff (Repert. Spec. Nov. Regni Veg. 21: 244. 1925), described from W Sichuan (“Tatsienlu” [Kangding], *J. A. Soulié 2182*, holotype, P). It has possible affinities with *P. benthamii*.

Pleurospermum microphyllum H. Wolff (Repert. Spec. Nov. Regni Veg. 21: 242. 1925), described from W Sichuan (“Tongolo,” *J. A. Soulié 2605*, holotype, P).

Pleurospermum microsciadium H. Wolff (Repert. Spec. Nov. Regni Veg. 21: 241. 1925), described from W Sichuan (“Tongolo,” *J. A. Soulié 2614*, holotype, P).

Pleurospermum souliei H. Wolff (Repert. Spec. Nov. Regni Veg. 19: 309. 1924), described from W Sichuan (Kangding, *J. A. Soulié 2196*, holotype, P).

24. PLEUROSPERMOPSIS C. Norman, J. Bot. 76: 200. 1938.

簇苞芹属 cu bao qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs biennial or perennial, aromatic when crushed. Taproot stout. Stems stout, erect, solitary, sparingly branched above, bases clothed with papery remnant sheaths. Leaves mostly basal, petiolate; petiole abruptly and broadly sheathing at base; blade pinnate, stiffly subcoriaceous; pinnae ovate or suborbicular, margin coarse-serrate, sessile. Umbels compound, terminal and lateral; bracts several, obovate, lobed, stiffly papery, apex coarsely toothed; rays few, short; umbellules crowded; bracteoles prominent, similar to bracts, rigid, longer than and fringing the flowers, persistent and remaining spreading after fruiting. Calyx teeth small, triangular-acute, persistent in fruit. Petals broadly oblong-obovate, deep red-purple or purple-black, apex shortly incurved. Stylopodium flat-domed; styles slightly longer than stylopodium. Fruit narrowly oblong, slightly compressed laterally, glabrous; ribs prominent, narrowly winged; vittae 1–2 in each furrow, 4 on commissure. Seed face concave. Carpophore 2-parted.

One species: high-altitudes in Bhutan, China, E Nepal, and Sikkim.

1. *Pleurospermopsis sikkimensis* (C. B. Clarke) C. Norman, J. Bot. 76: 200. 1938.

簇苞芹 cu bao qin

Pleurospermum sikkimense C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 702. 1879.

Plants 10–50 cm, essentially glabrous (sometimes scabrescent at base of umbels, rays and around nodes). Stem base ca. 1 cm thick. Petioles slender, 2.5–15 cm, sheath often purple spotted; blade oblong in outline, 5–20 × 2–5 cm; pinnae 3–7 pairs, 9–18 × 7–20 mm, base rounded or truncate, apex acute,

green adaxially, often tinged purple abaxially. Umbels 4–15 (–25) cm across; bracts 4–6, 2–3.5 cm, green; rays 4–7, (1.5–) 4–13 cm, stout, to 3 mm thick; umbellules 2–4 cm across; bracteoles numerous, 1–16 × 4–8 mm, 3-lobed, lobes toothed, acute; pedicels 1–3 mm. Calyx teeth purple-black, ca. 0.5 mm. Fruit 3–4.5 × 1.5–2 mm green, apex blackened. Fl. and fr. Jan–Sep(–Oct).

Alpine turf, among rocks and dwarf shrubs, semi-stable screes; ca. 4000 m. S Xizang (Yadong) [Bhutan, E Nepal, Sikkim].

This species is morphologically similar to *Pleurospermum bicolor* and is possibly closely related.

25. *VICATIA* de Candolle, Prodr. 4: 243. 1830.

凹乳芹属 ao ru qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs perennial. Taproot stout, short, sometimes branched. Stem single or 2–3, erect, branched above. Leaves petiolate, sheathing; blade triangular, ternate-2–3-pinnate, or 1–2-pinnate. Umbels compound, terminal on stem and branches; bracts few or absent; rays unequal; bracteoles several, entire; umbellules 8–20-flowered. Calyx teeth obsolete. Petals ovate or obovate, white or flushed purple, apex narrow inflexed, base clawed or cuneate. Stylopodium low conic or depressed; styles short, recurved. Fruit ovoid or oblong-ovoid, slightly laterally compressed, smooth; ribs filiform; vittae (1–)3–4(–5) in each furrow, (1–)4–6(–8) on commissure. Seed face deeply concave or sulcate. Carpophore 2-parted, sometimes to base.

About five species: Sino-Himalayan region, from Afghanistan to SW China; three species (one endemic) in China.

This is a taxonomically problematic genus; see comments under *Carum* and *Tongoloa*.

- 1a. Leaves ternate-2-pinnate, leaflets serrate; ultimate segments ovate, 2–3 cm broad; rachis minutely scabrous 1. *V. bipinnata*
 1b. Leaves ternate-2–3-pinnate, leaflets finely dissected; ultimate segments oblong-ovate or linear to lanceolate, less than 1 cm broad; rachis glabrous.
 2a. Leaves abaxially minutely scabrous on main veins; bracteoles subulate, shorter than the pedicels; short male umbellules absent at base of fruiting umbel 2. *V. tibetica*
 2b. Leaves glabrous on both surfaces; bracteoles linear, longer than the pedicels; rays of male umbellules not elongating after flowering, clustered at base of fruiting umbel 3. *V. conifolia*

1. *Vicatia bipinnata* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 24: 313. 1986.

少裂凹乳芹 shao lie ao ru qin

Sinodielsia bipinnata (R. H. Shan & F. T. Pu) Pimenov & Kljuykov.

Plants to 1.5 m. Stems minutely pubescent to glabrous. Basal leaves petiolate, 10–20 cm, sheaths narrow; blade ternate-2-pinnate; primary pinnae 3–4 pairs, leaflets serrate; ultimate segments ovate, broad, 2–3 × 1–1.5 cm, serrate. Leaves reduced upwards, uppermost small, petiole sheathing for most of its length, blade 3-lobed. Umbels 5–15 cm across; bracts absent; rays 5–20, 1.5–8 cm, somewhat unequal, finely pubescent; umbellules ca. 1.5 cm across; bracteoles absent, or occasionally 2–5, linear, 4–8 mm. Petal base cuneate. Fruit oblong-ovoid, 4–5 × ca. 3 mm; ribs prominent, ridged; vittae 3–5 in each furrow, 8 on commissure. Seed face deeply concave. Fl. May–Jun, fr. Jul–Aug.

• Forest margins, grasslands, shady slopes; ca. 2700 m. NW Sichuan, SE and W Yunnan.

2. *Vicatia tibetica* H. de Boissieu, Bull. Soc. Bot. France 53: 423. 1906.

西藏凹乳芹 xi zang ao ru qin

Sinodielsia tibetica (H. de Boissieu) Kljuykov & P. K. Mukherjee.

Plants 20–80 cm, essentially glabrous (except base of umbels sparsely strigose). Leaves ternate-2–3-pinnate; primary pinnae 5–6 pairs, finely dissected, abaxially minutely scabrous on main veins; ultimate segments oblong-ovate, 5–15 × 2–8 mm, pinnatisect. Umbels 4–11 cm across; bracts 1, linear, or caducous; rays 8–10, 2–7 cm, unequal; umbellules 6–10 mm across; bracteoles 3–5, subulate, 3–5 mm, shorter than the pedicels; pedicels 1–4 mm, elongating to 8 mm in fruit. Petals white, occasionally flushed purplish-red, ca. 1.8 × 1 mm, base shortly clawed. Fruit ovoid-oblong, 2.5–4 × 1.5–2 mm, ribs filiform; vittae 3–4 in each furrow, 6 on commissure. Seed face deeply concave. Fl. Jun–Aug, fr. Aug–Sep.

Forests, among shrubs, riparian grasslands, rock crevices; 2000–4400(–5000) m. Qinghai, W Sichuan, E and S Xizang, Yunnan [Nepal].

3. *Vicatia conifolia* Wallich ex de Candolle, Prodr. 4: 243. 1830.

凹乳芹 ao ru qin

Chaerophyllum gracillum Klotzsch; *C. millefolium* Klotzsch; *Sphallerocarpus conifolius* (Wallich ex de Candolle) Koso-Poljansky; *S. millefolius* (Klotzsch) Koso-Poljansky;

Vicatia millefolia (Klotzsch) C. B. Clarke; *V. stewartii* C. B. Clarke.

Plants 5–30 cm, essentially glabrous (except base of umbels sparsely strigose). Stem solitary, erect. Leaves ternate–2–3-pinnate; primary pinnae 5–6 pairs, very finely divided, both surfaces glabrous; ultimate segments linear or lanceolate, 1.5–3 × 0.8–3 mm, pinnatifid. Leaves reduced upwards. Umbels 2–4 cm across; bracts usually absent or 1–2, leaf-like; rays 6–12, un-

equal, 4–15 mm in flower, elongating to 3 cm in fruiting umbellules (remains of short male umbellules conspicuous at base of umbel); bracteoles 3–6, linear, 3–5 mm; as long or longer than the umbellules. Petals white or purplish-red, ca. 1.5 × 1 mm, base shortly clawed. Fruit oblong-ovoid, 3.3–4 × 1–1.4 mm; ribs filiform; vittae (1–)2–4(–5) in each furrow, 2–4(–6) on commissure. Seed face deeply sulcate. Fl. May–Aug, fr. Jul–Sep.

Sparse alpine scrub, alpine meadows, grassy slopes, grassy stream banks; 3000–4700 m. Qinghai, W Sichuan, S Xizang, NW Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan, Sikkim].

26. CYCLORHIZA M. L. Sheh & R. H. Shan, Acta Phytotax. Sin. 18: 45. 1980.

环根芹属 huan gen qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs perennial, glabrous. Taproots stout, branched near stem into a cluster of several long, woody, carrot-like roots with prominent annular scars when old. Stem fistulose, erect, branched above, base clothed in purplish-brown remnant sheaths. Basal leaves petiolate, 4-pinnatisect; petiole narrowly sheathing at base; ultimate segments linear or linear-elliptic. Umbels loose, compound; peduncles terminal and lateral, stout, branching, mostly longer than leaves; bracts and bracteoles absent (bracts occasionally present, few); rays few to numerous. Calyx teeth minute, triangular. Petals yellow or greenish-yellow, irregular square, obovate suborbicular, median line dark, apex narrowly inflexed. Stylopodium broadly low-conic, disk crenulate; styles short, reflexed. Fruit ovoid or ellipsoid, slightly laterally compressed; mericarps subpentagonal in cross section; ribs 5, filiform, prominent, acute-ridged, almost narrowly winged; vittae 1 in each furrow, 2 on commissure. Seed face deeply sulcate or concave. Carpophore 2-cleft to base.

• Two species.

- 1a. Stem smooth; ultimate leaf segments 4–20 × 2–6 mm; seed face deeply sulcate 1. *C. waltonii*
1b. Stem striate; ultimate leaf segments 20–60 × 3–10 mm; seed face deeply concave 2. *C. peucedanifolia*

1. *Cyclorhiza waltonii* (H. Wolff) M. L. Sheh & R. H. Shan, Acta Phytotax. Sin. 18: 46. 1980.

环根芹 huan gen qin

Ligusticum waltonii H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 317. 1930.

Plants 16–100 cm. Roots 8–18 × 0.8–2 cm. Stem smooth, lower parts deep purple. Leaves triangular-ovate in outline, 8–25 × 6–20 cm; petioles 10–23 cm; ultimate segments linear, 4–20 × 2–6 mm, glaucescent, petioles and margins occasionally squamose-pubescent. Umbels 3–16 cm across; peduncles stout; bracts absent; rays 4–14, 1–4 cm, unequal; umbellules 8–12-flowered; pedicels 4–8 mm, subequal. Fruit ellipsoid, ca. 4 × 2.5 mm, dark brown; ribs gray-yellow. Seed face deeply sulcate. Fl. Jul–Aug, fr. Sep–Oct.

• Open broad-leaved forests, scrub, alpine meadows; 2500–4600 m. W Sichuan, SE Xizang, NW Yunnan.

This species has reputed medicinal value.

2. *Cyclorhiza peucedanifolia* (Franchet) Constance, Edinburgh J. Bot. 54: 101. 1997.

南竹叶环根芹 nan zhu ye huan gen qin

Arracacia peucedanifolia Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 114. 1894; *Acronema edosmioides* (H. de Boissieu) Pimenov & Kljuykov; *Cenolophium chinense* M. Hiroe; *Cyclorhiza edosmioides* (H. de Boissieu) M. L. Sheh; *C. major* (M. L. Sheh & R. H. Shan) M. L. Sheh; *C. waltonii* (H. Wolff) M. L. Sheh & R. H. Shan var. *major* M. L. Sheh & R. H. Shan; *Pimpinella edosmioides* H. de Boissieu.

Plants 80–150 cm. Roots 5–15 × 0.6–1.5 cm. Stem striate, lower parts purple-brown. Leaves broadly ovate-triangular in outline, 15–25 × 12–20 cm; petiole 6–20 cm, stout; pinnae 5–6 pairs, remote; ultimate segments ovate-oblong to linear-lanceolate, 20–60 × 3–10 mm. Umbels 3–14 cm across; peduncles 5–18 cm, stout; bracts usually absent, occasionally 1–2, 2–5 mm, membranous; rays 5–15, 2–9 cm, unequal; umbellules 14–20-flowered; pedicels 5–14 mm, unequal. Petals ca. 1.5 × 1 mm. Fruit ovoid, 4–7 × 2–3.5 mm, chocolate-brown; ribs pale brown. Seed face deeply concave. Fl. Jul–Aug, fr. Sep–Oct.

• Alpine open mixed forests, bamboo thickets, scrub; 1800–3600 m. SW Sichuan (Muli), SE Xizang, NW Yunnan.

This species has reputed medicinal value.

27. NOTOPTERYGIUM H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 838. 1903.

羌活属 qiang huo shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs perennial. Root woody; caudex usually stout-tuberous, aromatic. Stem hollow, terete, erect, often purplish, especially at base. Leaves 2–3-ternate-pinnate or pinnatisect; petiolate, sheaths membranous, clasping; ultimate segments oblong or oblong-ovate.

Umbels loose compound, terminal and lateral; bracts few, deciduous; bracteoles few to many, linear or pinnatifid. Calyx teeth minute, ovate-triangular, deciduous in fruit. Petals pale yellow to whitish, ovate or ovate-orbicular. Stylopodium conic or low-conic; styles short, reflexed. Fruit oblong-ellipsoid or subglobose, slightly flattened dorsally; ribs 5, all broadly winged, sometimes somewhat unequally; commissure constricted; vittae 3–4 in each furrow, 4–6 on commissure. Seed face concave. Carpophore 2-cleft.

- Six species.

- 1a. Caudex developed, elongate or tuberous, with clusters of rootlets, strongly aromatic; rays (7–)12–25(–40), (2–)5–12 cm.
- 2a. Bracteoles pinnatifid 6. *N. pinnatiinvocellum*
- 2b. Bracteoles linear or linear-lanceolate, entire.
- 3a. Ultimate leaf segments oblong, margin pinnatifid or variously lacinate-dentate 1. *N. incisum*
- 3b. Ultimate leaf segments ovate to oblong-ovate, margin entire or coarsely toothed 2. *N. franchetii*
- 1b. Caudex not thickened, taproot unbranched or with slender branches, slightly aromatic; rays 5–12, 1–5 cm.
- 4a. Leaves 3–4-pinnate/pinnatifid 5. *N. tenuifolium*
- 4b. Leaves 2-ternate/ternatifid.
- 5a. Ultimate leaf segments ovate-lanceolate, 2.5–8 cm; bracteoles linear, shorter than flowers 3. *N. forrestii*
- 5b. Ultimate leaf segments ovate, 1.5–3.5 cm; bracteoles filiform, longer than flowers 4. *N. oviforme*

1. *Notopterygium incisum* C. C. Ting ex H. T. Chang, Acta Phytotax. Sin. 13(3): 86. 1975.

羌活 qiang huo

Plants 60–120 cm. Root deep brown, with clusters of rootlets; caudex elongate, often node-scarred, strongly aromatic. Leaves ternate-3-pinnate; petiole 5–12 cm; ultimate segments oblong or oblong-ovate, 2–5 × 0.5–2 cm, margins pinnatifid or lacinate-dentate, puberulous on veins and margins. Leaves reduced upwards, petioles becoming wholly sheathing. Umbels 3–13 cm across, lateral umbels frequently sterile; bracts 3–6, linear, 1.5–3 cm, deciduous; rays 7–20(–40), 2–10 cm; bracteoles 6–10, linear, 3–13 × ca. 0.5 mm, shorter or longer than flowers; umbellules many-flowered, crowded; pedicels 5–10 mm. Calyx teeth ovate-triangular, 0.3–5 mm. Petals white or greenish-white, ovate to oblong-ovate, ca. 1.5 × 1 mm, apex obtuse, inflexed. Fruit oblong-ellipsoid, 5–6 × 2.5–3.5 mm, all ribs winged, wings equal or unequal; vittae 3 in each furrow, 6 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

- Forest margins, scrub; 1600–5000 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang.

The rootstock and root are used in the important traditional medicine “qiang huo” (see also *Notopterygium franchetii*).

2. *Notopterygium franchetii* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 839. 1903.

宽叶羌活 kuan ye qiang huo

Angelica rubrivaginata H. Wolff; *Drymoscias forbesii* (H. de Boissieu) Koso-Poljansky; *D. franchetii* (H. de Boissieu) Koso-Poljansky; *Notopterygium forbesii* H. de Boissieu.

Plants 80–180 cm. Root stout, with clusters of rootlets; caudex tuberous, strongly aromatic. Leaves ternate-2–3-pinnate; petiole 3–8 cm; blade to 25 × 35 cm; pinnae 2–3 pairs, proximal pinnae long-petiolulate; ultimate segments oblong-ovate, 3–8 × 1–3 cm, base obtuse or cuneate, puberulous on veins and margins. Leaves reduced upwards to 3 leaflets, sheaths broadly ovate. Umbels 5–14 cm across; peduncles 5–25 cm; bracts 1–3, linear-lanceolate, 0.5–1.5 cm; rays 10–17(–23),

3–12 cm; bracteoles 4–5, linear, 3–4 mm, very short; umbellules many-flowered; pedicels 0.5–1 cm. Calyx teeth ovate-triangular, ca. 0.5 mm. Petals pale yellow or yellowish-green, obovate, apex inflexed. Fruit oblong-ellipsoid, ca. 5 × 4 mm; vittae 3–4 in each furrow, 4 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

- Forest margins, scrub; 1700–4800 m. Gansu, Hubei, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan.

The rootstock and root are used in some districts instead of *Notopterygium incisum* for the important traditional medicine “qiang huo.”

3. *Notopterygium forrestii* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 325. 1930.

澜沧羌活 lan cang qiang huo

Plants 50–100 cm. Taproot slightly aromatic. Stem little-branched above. Lower leaves 2-ternately dissected; petioles 4–6 cm; blade broadly triangular, 8–15 × 8–15 cm; ultimate segments ovate-lanceolate to oblong-lanceolate, 2.5–8 × 1–3 cm, puberulous along veins, margins glabrous, abaxially glaucous, base cuneate or truncate, sometimes oblique, margins irregular or sharply serrate. Leaves reduced upwards becoming 2–3-lobed; segments linear. Umbels 4–10 cm across; bracts absent, or 1, linear, 0.5–1.5 cm; rays 5–9, 1–3.5 cm, unequal, spreading; bracteoles 2–4, linear, shorter than flowers; umbellules 9–14-flowered, open; pedicels 4–8 mm, unequal. Calyx teeth ovate-lanceolate, 0.3–0.6 mm. Fruit subglobose, ca. 3–3.5 × 2.5–3 mm; all ribs broadly winged; vittae 2(–3) in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

- Forest margins, mountain slopes, gravelly river banks; 2000–3000 m. SW Sichuan (Muli), NW Yunnan.

4. *Notopterygium oviforme* R. H. Shan, Sinensia 14: 112. 1943.

卵叶羌活 luan ye qiang huo

Notopterygium forbesii H. de Boissieu var. *oviforme* (R. H. Shan) H. T. Chang.

Plants to 40–60 cm. Rootstock slightly aromatic. Basal leaves few, petioles ca. equal to blades; blade broadly ovate, 2-ternately dissected, 5–9 × 3–5 cm; ultimate segments ovate or

elliptic, 1.5–3.5 × 0.6–3 cm, central segments obovate, base cuneate, lateral segments ovate or elliptic, base truncate, margins serrulate, apex obtuse. Stem leaves usually single, petiole wholly sheathing; blade divisions linear. Umbels 3–5 cm across; bracts 2–3, linear, 2–5 mm, or absent; rays 5–9, 1–4.5 cm, very unequal; bracteoles 2–4, ca. 3 × 0.2 mm, filiform, longer than or equaling flowers, 5–8 × ca. 0.5 mm in fruit; umbellules 6–12-flowered; pedicels short, 2–3 mm, unequal. Fruit globose, 4–5 × 2–3 mm; all ribs broadly winged, wings subequal; vittae 2–3 in each furrow, 4–6 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

• Forest margins, mountain slopes; 1800–2700 m. Chongqing (Nanchuan), S Shaanxi (Shanyang, Taibai Shan, Zhenba), SC Sichuan (Emei Shan).

This poorly known taxon is recorded only from a few collections.

5. *Notopterygium tenuifolium* M. L. Sheh & F. T. Pu, Acta Phytotax. Sin. 38: 435. 2000.

细叶羌活 xi ye qiang huo

Plants 40–70 cm, glabrous throughout. Root long-conic, chocolate-brown, slightly aromatic; caudex ca. 1 cm, clothed with few remnant sheaths. Basal leaves several, petioles 16–19 cm, sheaths narrowly lanceolate; blade broad-ovate, 13–16 × 8–12 cm, 3–4-pinnate/pinnatifid; pinnae 6–8 pairs, pinnules 4–5 pairs; ultimate segments obovate to linear, 2–5 × 1.5–4 mm, 2–3-parted or entire, margin narrowly reflexed, apex apiculate, usually gray-green, thick, papery. Stem leaves 1–2, reduced and less divided, petioles wholly sheathing, sheaths oval-lanceolate.

Umbels 5–6 cm across; bracts 1–4, linear-lanceolate, 3–7 × 0.5–1 mm, unequal, apex caudate; rays 8–12, 2–5 cm, unequal; bracteoles 6–8, linear-lanceolate, ca. 3 × 1 mm, apex caudate; umbellules 6–15-flowered; pedicels 0.5–1 mm, ca. 2 mm in fruit. Fruit ellipsoid-oblong, ca. 4 × 2.5 mm; ribs all broadly winged; vittae 2 in each furrow, 5–6 on commissure. Fl. Jul–Aug, fr. Sep.

• High-altitude alpine meadows in valleys; ca. 4300 m. W Sichuan (Litang, Yajiang).

6. *Notopterygium pinnatiinvolutellum* F. T. Pu & Y. P. Wang, J. Sichuan Univ., Nat. Sci. Ed. 31: 386. 1994.

羽苞羌活 yu bao qiang huo

Plants 1–1.5 m high. Rootstock stout, elongate, strongly aromatic. Stem finely striped, glabrous, little-branched above. Basal leaves petiolate, petioles 1–2 cm, sheaths oblong, large, 2–5 cm across; blade ternate-3-pinnate/pinnatifid; ultimate segments lanceolate, 3–7 × 0.5–1 cm, margins incised dentate or pinnatisect. Leaves reduced upwards, less divided, petioles becoming wholly sheathing. Umbels 6–9 cm across, lateral umbels usually sterile; bracts few, linear, caducous; rays 14–24, 7–10 cm; bracteoles 7–12, oblanceolate, 15–25 cm, much longer than the umbellules in fruit, pinnate, rarely entire; pedicels ca. 0.3 mm. Fruit oblong-ovoid, 4–5 × 3–4 mm; ribs broadly winged, sometimes wings unequal; vittae 1–3 in each furrow, 2–4 on commissure. Fl. & Fr. Jul–Nov.

• Among shrubs in grassland at coniferous forest margins; ca. 3400 m. W Sichuan (Xiaojin).

28. *SINOLIMPRICHTIA* H. Wolff, Repert. Spec. Nov. Regni Veg. Beih. 12: 448. 1922.

舟瓣芹属 zhou ban qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, perennial, all parts glabrous. Taproot thick, long-conic, branched. Stem stout, usually solitary, unbranched, hollow, ribbed, purplish, base densely clothed with fibrous remnant sheaths. Leaves mostly basal, petiolate, sheath broad and clasping at base, base often below ground level; blade (2–)3–4-ternate-pinnate, very finely divided, rather small; ultimate segments narrow. Umbels compound, mainly one large terminal and a few smaller lateral umbels; bracts absent; rays many, subequal, thick, congested; bracteoles many, 2–3-pinnate or entire, margin scarious; umbellules many-flowered, congested. Calyx teeth small, ovate to ovate-triangular. Petals ovate or obovate, yellowish or white, sometimes flushed purple, midvein darker, base clawed, apex inflexed. Stylopodium low-conic, dark purple; styles long, reflexed. Fruit ellipsoid, slightly laterally compressed; ribs 5, dorsal ribs filiform; lateral ribs very narrowly winged; vittae large, 2–3 in each furrow, 2 on commissure. Seed face concave. Carpophore very slender, 2-parted to base.

• One species.

1. *Sinolimprichtia alpina* H. Wolff, Repert. Spec. Nov. Regni Veg. Beih. 12: 449. 1922.

舟瓣芹 zhou ban qin

Plants (8–)15–30 cm. Stem (0.5–)1–2.5(–3) cm thick. Petioles 2–10 cm, slender, sheaths narrow-oblong, 3–6 × 1–1.5 cm; blade ovate-oblong or oblong, 4–7 × 2.5–7 cm; pinnae 5–6 pairs, proximal pinnae short-petiolate; ultimate segments linear, 1–4 × 0.5–2 mm, apex rounded, entire or 2–3-toothed. Primary umbels (3–)6–16 cm across; bracts 1–4 cm, about half as long as rays; rays 15–35(–50), 2–9 cm, subequal, suberect-

ascending, hollow and ribbed; pedicels 2–7 mm, membranous-winged. Calyx teeth 0.4–0.8 mm, persistent in fruit. Petals 2–2.5 × 1.2–1.5 mm. Anthers dark purple. Styles 1.5–2 mm. Fruit ca. 4 × 1.5 mm. Fl. May–Sep, fr. Jul–Oct.

• Alpine grassy slopes, alpine sandy areas, screes, rock crevices; 3300–5000 m. Qinghai, SW Sichuan, SE Xizang, NW Yunnan.

- 1a. Bracteoles entire, almost as long as umbellule 1a. var. *alpina*
 1b. Bracteoles 2–3-pinnate, exceeding umbellule 1b. var. *dissecta*

1a. *Sinolimprichtia alpina* var. *alpina*

舟瓣芹(原变种) zhou ban qin (yuan bian zhong)

Bracteoles linear or linear-lanceolate, 8–17 × 0.4–0.7 mm, almost as long as umbellule, apex entire, obtuse.

• Alpine sandy areas, screes, rock crevices; 3300–5000 m. Qinghai, SW Sichuan, SE Xizang, NW Yunnan.

This variety has reputed medicinal value.

1b. *Sinolimprichtia alpina* var. *dissecta* R. H. Shan & S. L. Liou in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 299. 1979.

裂苞舟瓣芹 lie bao zhou ban qin

Bracteoles broadly obovate in outline, 10–20 × 6–15 mm, exceeding umbellule, 2–3-pinnate.

• Alpine grassy slopes, screes, rock crevices; 3500–4800 m. SW Sichuan, SE Xizang, NW Yunnan.

This high-altitude, short, stout plant, with characteristic, highly dissected bracteoles, is more commonly collected than the typical variety. This plant is superficially very similar to *Ligusticum capillaceum* and has often been confused with it. *Ligusticum capillaceum* is generally hirsute, especially along the leaf rachis, rays, pedicels, bracts, and bracteoles, has lacerate bracteoles with acute lobes, and greatly dorsally compressed fruit. *Sinolimprichtia alpina* var. *dissecta* is completely glabrous, has smooth-margined bracteoles with rounded lobes, and slightly laterally compressed fruit.

29. MELANOSCIADIUM H. de Boissieu, Bull. Herb. Boissier, sér. 2, 2: 803. 1902.

紫伞芹属 zi san qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs perennial, stout. Taproot elongate. Stem erect, much branched, purplish. Leaves long petiolate, sheaths membranous, purplish; blade 2-ternate, glabrous except veins and rachis densely pilose. Leaves reduced upwards, blade becoming 3-lobed. Inflorescence branching, umbels compound, terminal and lateral, rather small; bracts several, caducous; bracteoles several, persistent; rays and pedicels densely hispidulous with purplish hairs. Calyx teeth obsolete or minute, triangular. Petals dark purple, suborbicular, apex notched, with a narrow incurved tip. Ovary granular-puberulent. Stylopodium low-conic, dark purple, margin undulate; styles purple, reflexed. Fruit subglobose, compressed laterally, surface roughened, appearing granular; ribs 5, prominent; vittae 2–4 in each furrow, 6 on commissure. Seed face nearly plane. Carpophore 2-cleft to base.

• One species.

1. *Melanosciadium pimpinelloideum* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 2: 804. 1902.

紫伞芹 zi san qin

Angelica involucellata Diels; *Pimpinella pimpinelloidea* (H. de Boissieu) M. Hiroe (1979 ["*pimpinelloideum*"]), not *P. pimpinelloides* (Hochstetter) H. Wolff (1927).

Plants 0.5–2 m. Taproot 15–20 × 1.5–2 cm. Lower petioles 10–20 cm; leaf blade broadly ovate-triangular, 15–25 × 10–20 cm; ultimate segments ovate, 3–10 × 2–6 cm, base cu-

neate, margins serrate, apex acuminate, adaxially green, abaxially slightly glaucous. Umbels 1.8–5.5 cm across; peduncles 1.5–4 cm, densely puberulent; rays 5–14, 0.2–2 cm, very unequal; bracteoles 5–10, linear-filiform, 1–6 mm, dark purple or greenish, as long as flowers, pilose; umbellules 10–20-flowered; pedicels 0.5–7 mm, dark purple. Fruit 2–2.8 × 1.7–1 mm. Fl. and fr. Jul–Sep.

• Forest margins, bamboo thickets, grasslands; 1400–2900 m. W Guizhou (Bijie), W Hubei (Xingshan), E Sichuan.

30. TRACHYDIUM Lindley in Royle, Ill. Bot. Himal. Mts. 1: 232. 1835.

瘤果芹属 liu guo qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs perennial, small. Taproot long-conic, rarely fusiform. Stem simple, usually very short and appearing acaulescent. Basal leaves petiolate, petioles sheathing. Leaves reduced upwards. Inflorescence branching, umbels compound, terminal on stem and branches; bracts entire, 2–3-lobed to pinnate or absent; rays 5–20, those of primary terminal umbel stout, spreading-ascending or diffuse; bracteoles similar to bracts or absent; umbellules 10–30-flowered. Calyx teeth usually minute or obsolete. Petals ovate or obovate, white or purplish-red, base cuneate or shortly clawed, apex incurved and notched. Stylopodium low-conic; styles spreading to reflexed. Fruit broadly ovoid, rarely oblong-ovoid, slightly laterally compressed, glabrous, sometimes with small tubercles between ribs; ribs filiform, conspicuous; vittae 1–4 in each furrow, 4–8 on commissure. Seed face slightly to deeply concave. Carpophore various.

About six species (see following note): widespread across C Asia to the Himalayan region and SW China; six species (four endemic) in China.

This genus has received very mixed treatments since its establishment by Lindley in 1835. Norman (J. Bot. 76: 229–233. 1938) studied the genus critically, resolving some of the confusion, and commented that probably all plants assigned to *Trachydium* since Lindley's day really belong to other genera. However, the high-altitude, dwarf plants exhibit complex variation and the taxonomy continues to be controversial, particularly when delimiting boundaries with other genera containing similar species of reduced stature (e.g., *Aulacospermum*, *Chamaescidium*, *Chamaesium*, *Ligusticum*, *Physospermopsis*, *Pleurospermum*, *Schulzia*, and *Sinocarum*). Some authors follow Norman and limit *Trachydium* to a unispecific genus including *T. roylei*, while others extend the circumscription to include anything up to 14 additional species. It is acknowledged that the following species form a heterogeneous group, but a conservative treatment has been adopted here as new, comprehensive material is needed to determine proper speci-

fic and generic limits.

- 1a. Leaves simple, 3-lobed to middle; blade orbicular or broadly ovate 1. *T. simplicifolium*
 1b. Leaves compound; blade triangular or oblong-lanceolate in outline.
 2a. Leaves trifoliolate; bracts and bracteoles absent (Yunnan) 2. *T. trifoliatum*
 2b. Leaves ternate-pinnate or 2–3-pinnate; bracts and bracteoles present or not.
 3a. Leaves ternate-1–3-pinnate; bracts linear, entire or apex 3-lobed; bracteoles similar to bracts; calyx teeth minute or obsolete.
 4a. Ultimate segments of leaves ovate, pinnate-lobed or incised; petal base cuneate; fruit densely tuberculate between ribs; seed face deeply concave 3. *T. subnudum*
 4b. Ultimate segments of leaves linear-oblong-lanceolate, entire or 3-lobed at apex; petal base shortly clawed; fruit with scattered tubercles between ribs; seed face slightly concave 4. *T. tibeticum*
 3b. Leaves 2–3-pinnate; bracts and bracteoles 2–3-lobed or 1–2-pinnate, rarely entire; calyx teeth obsolete.
 5a. Bracts and bracteoles 2–3-lobed or 1 pinnate, rarely entire; vittae numerous in each furrow 5. *T. involucellatum*
 5b. Bracts and bracteoles 1–2-pinnate; vittae solitary in each furrow 6. *T. roylei*

1. *Trachydium simplicifolium* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 346. 1915.

单叶瘤果芹 dan ye liu guo qin

Ligusticum simplicifolium (W. W. Smith) M. Hiroe.

Plants 7–20(–30) cm. Stem erect, purplish, sparsely pubescent. Lower leaves 2–7; petioles 2–18 cm, sheaths 1–3 cm, inflated, flushed purple, densely pubescent; blade orbicular or broadly ovate, 3-lobed divided to middle, 2–12 × 1.8–10 cm, glabrous except veins scabrous, adaxially green, abaxially dark purple, base cordate, margin crenate. Leaves reduced upwards with large sheaths. Umbels 1.5–4 cm across; bracts absent or 1–2, lanceolate, entire or apex 2–3-lobed; rays 6–12, purplish, (1.5–)2–4(–5) cm, subequal, sparsely pubescent; bracteoles ca. 10, narrowly oblanceolate, purple, to 12 mm, just longer than flowers, entire. Calyx teeth minute. Petals white or purplish, shortly clawed at the base. Fruit oblong-ovoid, ca. 2 × 1 mm, smooth or scattered-tuberculate; ribs filiform to thickened; vittae 1–2 in each furrow, 4 on commissure. Seed face slightly concave. Carpophore parted to base. Fl. and fr. Aug–Nov.

- Alpine meadows, stony slopes; 2700–4000 m. NW Yunnan.

This distinctive species is often collected in flower, but the fruit is poorly known.

2. *Trachydium trifoliatum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 125. 1929.

三叶瘤果芹 san ye liu guo qin

Plants slender, 4–10 cm, purplish. Stem erect. Leaves 3-foliolate; leaflets broadly ovate or rotund, 8–12 × 8–10 mm, 3-lobed, margin sparsely crenate. Leaves reduced upwards to a broad sheath and 3-lobed blade. Umbels 1.5–4 cm across; bracts and bracteoles absent; rays 8–12, 1–2.5(–4) cm, unequal. Calyx teeth minute, narrowly triangular, ca. 0.3 mm. Petals white. Mature fruit unknown, young fruit broadly ovoid, tuberculate. Fl. and fr. Sep–Oct.

- Stony alpine meadows; ca. 4000 m. W Yunnan (Ruili).

This poorly known taxon is recorded only from the type gathering.

3. *Trachydium subnudum* C. B. Clarke ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 125. 1929.

密瘤瘤果芹 mi liu liu guo qin

Chamaescidium subnudum (C. B. Clarke ex H. Wolff) C. Norman; *Trachydium verrucosum* R. H. Shan & F. T. Pu.

Plants 10–20(–30) cm. Stem often reduced, branched or not, plants almost rosette. Basal leaves petiolate; blade oblong-lanceolate, ternate-2-pinnate, to 7 × 2 cm; primary pinnae 4–5 pairs, remote; ultimate segments ovate or lanceolate, 3–5 × 1–4 mm, margins incised, both surfaces moderately hispid. Stem leaves reduced upwards, pinnate. Umbels 9–25 cm across, lax; bracts absent, or occasionally 1, linear; rays 5–7, purplish, long and spreading, 4–16 cm, unequal; umbellules 12–17 mm across; bracteoles 2–7(–15), linear, just shorter than flowers. Calyx teeth obsolete. Petals white, base cuneate. Fruit broadly ovoid, ca. 3 × 2 mm, ribs filiform, densely tuberculate especially on ribs; vittae 3 in each furrow, 6 on commissure. Seed face deeply concave. Fl. and fr. Jul–Sep.

Alpine meadows; 3000–4500(–5000) m. SW Sichuan, S Xizang [NE India].

4. *Trachydium tibeticum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 122. 1929.

西藏瘤果芹 xi zang liu guo qin

Plants 8–13 cm. Stems very short, plants almost rosette. Petioles slender, sheaths broad, clasping; blade triangular in outline, ternate-2–3-pinnate; primary pinnae 3–4 pairs; ultimate segments linear-oblong-lanceolate, 4–5 × 1–2 mm, entire or apex 3-lobed. Umbels 8–18 cm across, lax; bracts absent; rays 10–20, 4–8(–14) cm, unequal; bracteoles absent, or occasionally 1, linear, shorter than flowers. Calyx teeth obsolete. Petals white or purplish, base shortly clawed. Fruit broadly ovoid, 1–1.5 × ca. 1 mm, scattered-tuberculate; vittae 3 in each furrow, 6 on commissure. Seed face slightly concave. Fl. and fr. Aug–Nov.

- Alpine meadows, moist rock crevices; 3000–4000 m. NW Sichuan (Dêgê), SE Xizang (Zayü), NW Yunnan.

Possible affinities between this species and *Sinocarum* need further study.

5. *Trachydium involucellatum* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 24: 313. 1986.

裂苞瘤果芹 lie bao liu guo qin

Plants 8–16 cm. Stem erect, dull purplish, branching, sparsely pubescent to almost glabrous. Basal leaves petiolate; blade triangular or triangular-ovate, 2–3-pinnate; primary pin-

nae 2–3 pairs; ultimate segments linear-lanceolate, 4–7 × 0.5–1 mm. Stem leaves reduced upwards. Umbels 3.5–4 cm across; peduncles stout, apex pubescent; bracts usually absent, or 1–3, 2–3-lobed or pinnate, rarely entire; rays 5–7, 1–2.5 cm, unequal; bracteoles 3–6, similar to bracts, unequal, margin pubescent. Calyx teeth obsolete. Petals purplish-red, base shortly clawed. Styles short. Fruit oblong-ovoid, tuberculate; vittae 3 or 4 in each furrow, 6–8 on commissure. Seed face slightly concave or plane. Fl. and fr. Aug–Oct.

• Scrub, alpine meadows, streamsides; 4000–4500 m. SE Xizang (Zayü).

This rather poorly known taxon is recorded only from a few specimens. It resembles *Trachydium roylei* and *T. tibeticum*, but differs in having 2–3-lobed or pinnate bracteoles (rarely entire) and vittae 3 or 4 in each furrow and 6–8 on the commissure.

6. *Trachydium roylei* Lindley in Royle, Ill. Bot. Himal. Mts. 1: 232. 1835.

瘤果芹 liu guo qin

Plants, 4–10 cm, usually acaulescent. Taproots stout, to 10 cm. Leaves petiolate; blade oblong-lanceolate in outline, 2–3-pinnate; primary pinnae 4–6 pairs, pinnatifid; ultimate segments linear-lanceolate, 1–3 × 0.5–1 mm. Umbels 4–8 cm across; bracts 3–5, oblanceolate to obovate, 1–2-pinnate, to 2 cm; rays 5–10, 2–7 cm, unequal; bracteoles 6–10, similar to bracts, longer than flowers. Calyx teeth obsolete. Petals white, base shortly clawed. Styles about equaling stylopodium, spreading-ascending. Fruit broadly ovoid, ca. 2.5 × 2 mm, scattered-tuberculate; vittae solitary in each furrow, 2 on commissure. Seed face slightly concave. Carpophore undivided. Fl. and fr. Jul–Oct.

Alpine grasslands, stony slopes; 3000–5600 m. W Sichuan, E and SW Xizang [NW India, Kashmir, Pakistan].

This species has reputed medicinal value (in Xizang).

The following species have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

Trachydium szechuanense H. Wolff (Acta Horti Gothob. 2: 299. 1926), described from N Sichuan (ca. 4000 m, *K. A. H. Smith 3428*, holotype, GB).

Trachydium variabile H. Wolff (Acta Horti Gothob. 2: 298. 1926), described from N Sichuan (4000–4500 m, *K. A. H. Smith 2988, 3205, 3232, 3723, 3888 & 4181*, syntypes, GB).

31. **CONIUM** Linnaeus, Sp. Pl. 1: 243. 1753.

毒参属 du shen shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, biennial or shortly perennial, slender. Root stout, long-conic. Stem hollow, erect, much-branched above, conspicuously purple-spotted. Leaves petiolate, narrowly sheathing at base; blade 2–3-pinnate, finely dissected. Umbels numerous, terminal and lateral on dichotomous branches; bracts and bracteoles several, often reflexed; rays numerous, ascending; rays numerous, spreading widely. Calyx teeth obsolete. Petals white or yellowish white, obovate or obcordate, apex incurved. Stylopodium low-conic, styles short, reflexed. Fruit ovoid or broad-ovoid, slightly flattened laterally; ribs 5, prominent, all ridged to very narrowly sinuate-winged; vittae small, numerous, completely encircling the seed, usually broken down in mature fruit. Seed face deeply concave or sulcate. Carpophore 2-cleft, at least to middle.

About six species: native to the Mediterranean region, widely naturalized in the N temperate zone; one species (introduced) in China.

1. *Conium maculatum* Linnaeus, Sp. Pl. 1: 243. 1753.

毒参 du shen

Plants 80–200(–300) cm, essentially glabrous. Basal leaves on long-petioles, petioles 7–25 cm, sheaths small, narrow; blades 2–3-pinnate, 10–30 × 6–28 cm, finely divided; pinnae petiolulate; ultimate segments oblong or ovate-lanceolate, 1–3 × 0.5–1 cm, short-petiolulate, incised or pinnatifid. Leaves gradually reduced upwards. Umbels 4–7 cm across, lateral umbels overtopping the terminal; peduncles 2–7 cm; bracts 4–6,

ovate-lanceolate, acuminate, 2–5 mm, reflexed; rays 10–20, 1.5–4 cm, unequal; bracteoles 5–6, ovate, 1.5–3 mm, fused at base; pedicels 10–20, 1–5 mm, unequal. Petals ca. 1.5 × 1 mm. Fruit 2–4 × 1.5–2.5 mm. Fl. and fr. May–Aug. *n* = 11.

Forest margins, cultivated field margins. Xinjiang [native to the Mediterranean region, widely naturalized in the N temperate zone].

This notorious plant (hemlock) was famously used to kill Socrates. All part of the plants are poisonous (containing toxic alkaloids, C₈H₁₇N), but can be used medicinally to relieve pain and reputedly as a cancer cure.

32. **PRANGOS** Lindley, Quart. J. Sc. Lit. Arts. 19: 7. 1825.

栓翅芹属 shuan chi qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, perennial. Root long-conic, woody. Stem erect, branched, base clothed in stiff or fibrous remnant sheaths. Basal leaves caespitose, petiolate, sheathing at base; blade 3–4-pinnate; ultimate segments linear, entire. Leaves reduced upwards. Umbels compound, terminal or lateral; bracts several, linear or lanceolate; bracteoles similar to bracts. Calyx teeth obsolete. Petals white or yellow, ovate or elliptic, apex incurved. Stylopodium depressed, almost hidden in the apex of mature fruit; styles short, spreading. Fruit

oblong to ellipsoid, somewhat dorsally compressed; ribs 5, dorsal ribs filiform, lateral ribs winged, or all ribs inconspicuous; mesocarp thick, corky; vittae numerous, small, encircling seed. Seed face inflexed into a deep T-shaped groove. Carpophore 2-parted.

About 30 species: C and SW Asia, Mediterranean region; four species in China.

Several conflicting taxonomies exist for *Prangos* and the related genera *Cachrys* Linnaeus, *Cryptodiscus* Schrenk, *Hippomaranthum* Link, and *Neocryptodiscus* Hedge & Lamond. The genus is treated here in the broad sense.

1a. Petals white; fruit subspherical, 4–9 mm.

2a. Leaf blades oblong, 10–30 × 3–5 cm; rays hispid; ovary densely hispid 1. *P. cachroides*

2b. Leaf blades broad-ovate, 10–15 × 5–10 cm; rays glabrous; ovary glabrous 2. *P. didyma*

1b. Petals yellow; fruit oblong- or obovoid-ellipsoid, 9–18 mm.

3a. Ultimate leaf segments densely hairy; fruit oblong-ellipsoid; ribs inconspicuous 3. *P. herderi*

3b. Ultimate leaf segments glabrous; fruit obovoid-ellipsoid; primary and secondary ribs conspicuous 4. *P. ledebourii*

1. *Prangos cachroides* (Schrenk) Pimenov & V. N. Tikhomirov in Czerepanov, Sosud. Rast. SSSR, 28. 1981.

毛栓翅芹 mao shuan chi qin

Cryptodiscus cachroides Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 65. 1841; *Neocryptodiscus cachroides* (Schrenk) V. M. Vinogradova.

Plants 30–60 cm. Taproot ca. 1 cm thick. Stem sparsely hispid, especially lower parts. Basal leaf blades oblong, 10–30 × 3–5 cm, 3–4-pinnate; pinnae 6–7 pairs, oblong-ovate; ultimate segments linear, 6–13 × 0.5–1 mm, hispid, entire. Umbels 3–6 cm across; peduncles 3–8 cm; bracts 5–7, linear, 3–10 mm, unequal, hispid; rays 4–6, 1.5–3 cm, subequal; bracteoles 5–7, linear, 2–6 mm, unequal, hispid; pedicels 10–20, 3–5 mm, elongating to 10 mm in fruit. Petals white, glabrous. Ovary densely white hispid. Fruit subspherical, 4–7 × 6–10 mm, hispid when young, becoming smooth; ribs all inconspicuous. Fl. May, fr. Jun.

Desert grasslands, semi-stable sands and gravels; 400–900 m. W Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan].

2. *Prangos didyma* (Regel) Pimenov & V. N. Tikhomirov in Czerepanov, Sosud. Rast. SSSR, 28. 1981.

双生栓翅芹 shuang sheng shuan chi qin

Cachrys didyma Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 601. 1878; *Cryptodiscus didymus* (Regel) Korovin; *Neocryptodiscus didymus* (Regel) Hedge & Lamond.

Plants 40–60 cm. Root ca. 1 cm thick. Stem hispid, especially below, branches opposite or cyclic. Basal petioles 5–7 cm; blades broad-ovate, 10–15 × 5–10 cm, 3–4-pinnate; pinnae 6–7 pairs, triangular-ovate; ultimate segments linear-lanceolate, 3–8 × 0.5–1.2 mm, entire, hispid. Umbels 2–5 cm across; peduncles 3–9 cm; bracts 1–3, linear-lanceolate, 3–9 mm, hispid, deciduous; rays 4–6, 1.5–5 cm, equal, glabrous; bracteoles 5, linear-lanceolate, 1.5–4 mm, hispid; pedicels 6–10, 3–7 mm, elongating to 15 mm in fruit. Petals white, ca. 1.5 mm, hispid abaxially. Ovary smooth. Fruit subspherical, 5–9 × 6–10 mm; ribs all inconspicuous. Fl. Apr–May, fr. Jun. *n* = 11.

Desert grasslands, dry slopes, gravels; 400–1300 m. W Xinjiang [Kyrgyzstan, Tajikistan].

3. *Prangos herderi* (Regel) Herrstadt & Heyn subsp. **xin-**

jiangensis X. Y. Chen & Q. X. Liu, Bull. Bot. Res., Harbin 9(3): 99. 1989.

新疆栓翅芹 xin jiang shuan chi qin

Plants 40–70 cm. Stem hispid, lower branches opposite, upper branches opposite or cyclic. Basal petioles hispid; blades triangular-ovate, ca. 21 × 23 cm, 3–4-pinnate; ultimate segments linear, 5–15 × 0.8–1 mm, margin densely hispid. Umbels ca. 5–6.5 cm across; peduncles short, ca. 2.4 cm, lateral peduncles long, 8.5–10 cm, hispid; bracts 2–5(–7), linear, 5–15 mm, hispid; rays 6–11, 2–6 cm, subequal; bracteoles 3–5, narrow-lanceolate, 0.6–1.2 cm; pedicels 6–10, 5–7 mm. Petals yellow, lanceolate, glabrous. Ovary smooth. Fruit oblong-ellipsoid, 9–12 × ca. 6 mm; ribs inconspicuous. Fl. and fr. May–Jul.

• Grassy slopes; ca. 1100 m. W Xinjiang.

This incompletely known taxon is recorded only from a few collections. *Prangos herderi* subsp. *herderi* is distributed in Kazakhstan.

4. *Prangos ledebourii* Herrstadt & Heyn, Boissiera 26: 68. 1977.

大果栓翅芹 da guo shuan chi qin

Cachrys macrocarpa Ledebour, Fl. Altaic. 1: 364. 1829, not *Prangos macrocarpa* Boissier (1844).

Plants 50–60 cm. Stem shortly pubescent, upper branches opposite or cyclic, base without remnant sheaths. Basal petioles short, pubescent; blades broad-ovate, 25–30 × 25–35 cm, 3–4-ternate-pinnate; primary and secondary pinnae long-petiolulate, petiolules 4–10 cm; ultimate segments linear, 5–20 × 0.5–1.5 mm, margin ciliate. Umbels 8–15 cm across, cymosely arranged; peduncles 4–7 cm; bracts 5, linear, 8–12 mm, unequal; rays 5–10(–18), 2–5 cm, glabrous or sparsely scabrous; bracteoles 5–6, ovate-lanceolate, 2–4 mm, unequal, shorter than flowers, scarious; pedicels 7–12, 2–5 mm, elongating to 9 mm in fruit. Petals yellow, oblong-acuminate, glabrous. Ovary glabrous. Fruit obovoid-ellipsoid, 10–18 × 5–10 mm; primary ribs prominent, winged, secondary ribs thinly filiform. Fl. May, fr. Jun. *n* = 11.

Grassy or gravelly slopes; 500–1100 m. W Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Uzbekistan].

33. SCALIGERIA de Candolle, Coll. Mém. 5: 70. 1829, nom. cons., not *Scaligera* Adanson (1763).

丝叶芹属 *si ye qin shu*

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, perennial. Rootstock tuberous. Leaves 3–4-pinnate; ultimate segments linear. Umbels compound, terminal and lateral; bracts and bracteoles present, filiform. Calyx teeth obsolete. Petals white, obovate, median vein dark, apex notched, incurved. Stylopodium conic; styles short, reflexed. Fruit oblong-ellipsoid, slightly dorsally compressed, smooth; ribs 5, dorsal ribs slightly prominent, lateral ribs obsolete; vittae 1, transverse-slit, in each furrow, 2 on commissure. Seed face deeply concave to plane. Carpophore 2-cleft at apex.

About 22 species: C and SW Asia, E Mediterranean region, mainly in Russia; one species in China.

1. *Scaligeria setacea* (Schrenk) Korovin, Byull. Sredne-Aziatsk. Gosud. Univ. 14: Suppl. 19. 1926.

丝叶芹 *si ye qin*

Carum setaceum Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 61. 1841; *Bunium setaceum* (Schrenk) H. Wolff; *Conopodium setaceum* (Schrenk) Korovin.

Plants 50–80(–120) cm. Tuber globose, ca. 1.5 cm across. Stem thinly ribbed, branched. Basal and lower leaves long-petiolate, withering at flowering, petiole 2–6 cm, sheath narrow, clasping; blades broad-ovate, ca. 13 × 8 cm, 3–4-pinnate, finely divided; pinnae all petiolulate; ultimate segments linear-fili-

form, ca. 10 × 1–2 mm, entire. Cauline leaves sessile, ultimate segments longer and narrower, 10–20 × 0.2–0.5 mm. Umbels 2.5–6 cm across; peduncles 2.5–7 cm; bracts 2–6, 1.5–6 × ca. 0.15 mm, unequal; rays 6–20, 0.4–3 cm, very unequal; bracteoles 2–6, 1–3 mm, unequal, shorter than flowers; pedicels 10–25, 1–5 mm, unequal. Petals ca. 1 mm. Fruit 2–4 × 0.4–1.8 mm, brown. Fl. May–Jun, fr. Jul–Aug.

Shrubby thickets, grassy slopes. W Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan].

This species is often included within *Bunium* Linnaeus on account of the globose tuber.

34. BUPLEURUM Linnaeus, Sp. Pl. 1: 236. 1753.

柴胡属 *chai hu shu*

She Menglan (佘孟兰 *Sheh Meng-lan*); Mark F. Watson

Herbs perennial, rarely annual, glabrous. Rootstock usually short, woody. Stem alternate or dichotomously branched, green or glaucous, base with or without fibrous remnant sheaths. Leaves entire, petioles sheathing; blade membranous, herbaceous or coriaceous, usually with parallel venation, base usually tapering into petiole. Cauline leaves often sessile, clasping, auriculate or perfoliate. Inflorescence loose, umbels compound, terminal and lateral; bracts several, conspicuous, often similar to uppermost leaves; rays few to many; bracteoles several, conspicuous. Calyx teeth obsolete. Petals yellow, greenish-yellow, tinged purple or purple, oblong to orbicular, apex narrowly inflexed. Stylopodium conic, low-conic or discoid; styles short, often reflexed. Fruit oblong to ovoid-oblong or ellipsoid, slightly laterally compressed, mericarps subpentagonal (rarely rounded) in cross section; ribs 5, filiform, prominent or obscure; vittae 1–3(–6) in each furrow, 2–6(–8) on commissure, sometimes obscure. Seed face plane. Carpophore 2-cleft to base.

About 180 species: widespread in the N temperate zone, one species (*B. mundtii* Chamisso & Schlechtendal) in S Africa; introduced in Australasia; 42 species (22 endemic) in China.

This distinctive genus is easily recognized by the simple leaves and conspicuous bracts and bracteoles. Species within *Bupleurum* are, however, notoriously difficult to identify on account of wide morphological variation within a species, often spread across wide geographic distributions. Many *Bupleurum* species are difficult to characterize, as is evident by complex classifications where all possible taxonomic ranks have been used. Several taxa are recorded only from a few collections, and it is likely that future work will reduce the number of species. The roots of several species of *Bupleurum* are famous for their use as the traditional Chinese medicine “chai hu” for treatment of coughs, fevers, and influenza. Almost all of the species are recorded in the literature as regional substitutes for “chai hu” or for other local medicinal purposes. However, caution should be applied as a very few species are toxic (e.g., *B. longiradiatum*) and can result in “toxic strike” if misused as such substitutes.

1a. Bracteoles large and conspicuous, mostly exceeding the umbellule.

2a. Cauline leaves broadly ovate, 10–20 × 3–5.5 cm, base dilated, rounded, perfoliate (Xinjiang) 3. *B. aureum*

2b. Cauline leaves linear, lanceolate or narrowly ovate, 1–15 × 0.1–1 cm, base dilated or not, but never perfoliate.

3a. Plants small, 7–20(–25 cm).

4a. Bracteoles yellow or tinged purple.

5a. Plants erect; bracteoles 5–8, yellow-green; stylopodium dark yellow (NW China) 4. *B. triradiatum*

5b. Plants decumbent; bracteoles 6–10, tinged purple; stylopodium dark purple (NW and SW China) ... 9. *B. dalhousieanum*

4b. Bracteoles green.

6a. Leaves and bracteoles abaxially glaucous, 3–5-nerved; umbellules 10–20-flowered (Qinghai,

Xinjiang) 5. *B. densiflorum*

- 6b. Leaves and bracteoles abaxially not glaucous, 9–15-nerved; umbellules 8–14-flowered (Sichuan, Xizang, Yunnan) 10. *B. yunnanense*
- 3b. Plants tall, 25–125 cm.
- 7a. Middle and upper leaves base dilated, cordate and clasping.
- 8a. Root dark brown; bracteoles usually 6–9; petals yellow-green (NC and NW China) 8. *B. smithii*
- 8b. Root gray-brown; bracteoles usually 10–12; petals usually dark purple (C, NW, and SW China) 16. *B. longicaule*
- 7b. Middle and upper leaves base not dilated nor cordate.
- 9a. Inflorescence many-branched, forming a panicle (Yunnan) 11. *B. luxiense*
- 9b. Inflorescence little-branched, not forming a panicle.
- 10a. Petals purple or dark purple (at least abaxially).
- 11a. Bracteoles 5(–7), green, broadly ovate, apex rounded or acute, apiculate (Jilin) 7. *B. euphorbioides*
- 11b. Bracteoles 7–9, bluish-purple, elliptic, apex acuminate, long-apiculate (NW and SW China) 13. *B. commelynoideum*
- 10b. Petals yellow.
- 12a. Lateral umbel present at base of terminal umbel and overtopping it (Guizhou) 17. *B. kweichowense*
- 12b. Terminal umbel without a lateral umbel at base.
- 13a. Bracts 1–2, linear-lanceolate, usually deciduous (NC and NE China) 6. *B. sibiricum*
- 13b. Bracts 1–5, elliptic or ovate, persistent.
- 14a. Bracts elliptic, apex acuminate; rays 8–11 (NW and SW China) 15. *B. petiolulatum*
- 14b. Bracts ovate or suborbicular, apex rounded or obtuse; rays 4–12.
- 15a. Leaves thin-papery, abaxially grayish-white-green, margin not thickened, green; rays 4–8 (Sichuan, Xizang, Yunnan) 12. *B. candollei*
- 15b. Leaves thick-papery, often tinged reddish-brown, abaxially green, margins thickened and reddish; rays 7–12 (Sichuan, Yunnan) 14. *B. rockii*
- 1b. Bracteoles small, narrow, usually shorter than, equaling or slightly exceeding the umbellules.
- 16a. Leaves 8–25 × 2.5–10 cm, base dilated, cordate and clasping.
- 17a. Petals and stylopodium usually yellow; fruit dark brown (NE and NW China) 1. *B. longiradiatum*
- 17b. Petals and stylopodium purple; fruit dark purplish-brown (Gansu, Henan, Hubei, Shaanxi, Sichuan) 2. *B. boissieuianum*
- 16b. Leaves 2–16(–20) × 0.1–1(–3) cm, base not dilated nor cordate and clasping.
- 18a. Plants small, 2–20(–30) cm (sometimes more in *B. gracillimum*).
- 19a. Stem base densely clothed with fibrous remnant sheaths.
- 20a. Plants 15–30 cm; fruit 2.5–3 mm, ribs prominent; altitude 650–1550 m (NC and NE China) 18. *B. bicaule*
- 20b. Plants 2–10 cm; fruit 3.5–4 mm, ribs conspicuous or narrowly winged; altitude 2300–3500 m (Nei Mongol, Ningxia, Qinghai, Xinjiang) 19. *B. pusillum*
- 19b. Stem base without fibrous remnant sheaths (Qinghai, Sichuan, Xizang).
- 21a. Plants gray-green; fruit ribs broadly winged (Xizang) 20. *B. alatum*
- 21b. Plants tinged red; fruit ribs rounded or slightly prominent.
- 22a. Basal leaves very numerous, rosette-caespitose; rays 4–7, 3–6 cm; petals usually yellow or yellow-green (Qinghai) 21. *B. condensatum*
- 22b. Basal leaves few, not rosette-caespitose; rays ca. 3, 0.5–1.7 cm; petals yellow or dark purple (Sichuan) 23. *B. gracillimum*
- 18b. Plants tall, (25–)30–125 cm (or less in *B. angustissimum* and *B. hamiltonii*).
- 23a. Root surface reddish-brown.
- 24a. Stem base without fibrous remnant sheaths (Gansu, Nei Mongol, Ningxia, Shaanxi) 29. *B. yinchowense*
- 24b. Stem base clothed in fibrous remnant sheaths.
- 25a. Leaves linear, 6–16 × 2–7 mm (E, NC, NW, and SC China) 27. *B. scorzoniferifolium*
- 25b. Leaves narrow-linear, 6–18 × 0.8–1 mm (NC and NW China) 28. *B. angustissimum*
- 23b. Root surface usually gray-yellow or brown, not reddish-brown.
- 26a. Fruit vittae 1 in each furrow, 2 on commissure (C, SC, and SW China) 34. *B. hamiltonii*
- 26b. Fruit vittae 1–3 in each furrow, 2–4 on commissure.
- 27a. Leaves lanceolate or oblong-elliptic, (0.5–)0.8–3 cm wide.
- 28a. Rootstock short, tuberous, with many fibrous fascicled roots (Heilongjiang, Jilin) 24. *B. komarovianum*
- 28b. Taproot little-branched or unbranched.
- 29a. Leaf margin white cartilaginous (C, NW, and SW China) 35. *B. marginatum*
- 29b. Leaf margin not white cartilaginous.
- 30a. Fruit vittae 1 (rarely 2–3) in each furrow, 2 on commissure (Xinjiang) 25. *B. krylovianum*
- 30b. Fruit vittae 3–4 in each furrow, 4 on commissure.
- 31a. Stem and branches usually slender and flexuose; bracts narrowly linear, 1–5 × 0.5–1 mm (C, E, NC, NE, and NW China) 38. *B. chinense*

- 31b. Stem and branches rigid, not flexuous; bracts lanceolate, ovate, elliptic or obovate, 3–10 × 1–5 mm.
- 32a. Bracts 3–5, ovate, elliptic or obovate; fruit brown, glaucous (Chongqing) 37. *B. gracilipes*
- 32b. Bracts 2–3, lanceolate; fruit brown but not glaucous (Taiwan) 42. *B. kaoi*
- 27b. Leaves linear, 0.2–0.5(–7) cm wide (to 1 cm in *B. microcephalum*).
- 33a. Stem solitary.
- 34a. Rays 1–3, filiform, very unequal, remote (NW Sichuan) 33. *B. wenchuanense*
- 34b. Rays (3–)4–10, not slender, moderately equal.
- 35a. Fruit oblong; ribs prominent.
- 36a. Stem little-branched (W Xinjiang) 26. *B. thianschanicum*
- 36b. Stem many-branched (Yunnan) 39. *B. polyclonum*
- 35b. Stem little-branched; fruit ovoid or ellipsoid; ribs inconspicuous.
- 37a. Pedicels 1–1.5 mm; fruit ovoid; mericarp pentagonal in cross section (Gansu, Sichuan, Xizang) 31. *B. microcephalum*
- 37b. Pedicels 5–10 mm; fruit ellipsoid; mericarp near round in cross section (Shaanxi) 32. *B. dielsianum*
- 33b. Stems numerous, often caespitose from a thickened woody caudex.
- 38a. Leaves margin white cartilaginous (Sichuan) 36. *B. chaishou*
- 38b. Leaves margin not white cartilaginous.
- 39a. Fruit vittae 1 in each furrow, 2 on commissure (Xinjiang) 22. *B. exaltatum*
- 39b. Fruit vittae 3 in each furrow, 4 on commissure.
- 40a. Bracts 1–3, small, linear or squamose; bracteoles shorter than or equaling umbellules (Gansu, Qinghai, Sichuan, Xizang) 30. *B. malconense*
- 40b. Bracts 3–8, oblong or narrowly elliptic; bracteoles longer than the umbellules.
- 41a. Bracts 5–8, narrowly elliptic; rays 4–11, somewhat unequal, 1–2.5 cm (Yunnan) 40. *B. kunmingense*
- 41b. Bracts 3–4, oblong; rays 6–13, very unequal, 0.4–3.3 cm (Qinghai) 41. *B. qinghaiense*

1. *Bupleurum longiradiatum* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 719. 1844.

大叶柴胡 da ye chai hu

Plants (50–)80–150 cm, perennial. Rhizome thick, little-branched. Stem usually solitary, much-branched above, base without fibrous remnant sheaths. Leaves several, basal leaves petiolate, 8–12 cm, tinged purple; blade broadly ovate-elliptic or lanceolate, 8–17 × 2.5–5(–8) cm, 9–11-nerved. Middle leaves sessile; blade ovate or narrowly ovate. Upper leaves sessile; blade broadly lanceolate, base cordate, clasping, apex acuminate. Inflorescence much-branched, remote, umbels 3–10 cm across; bracts 1–5, lanceolate, 2–10 × 1–2 mm, unequal, yellowish-green; rays 3–9, 3–35 mm, unequal, very slender; bracteoles 5–6, ovate-lanceolate, 1.5–5 × 0.5–1.2 mm, unequal; umbellules 10–15 mm across, 5–16-flowered; pedicels long, 4–8 mm, unequal, 7–15 mm in fruit. Petals yellow or purple, short-orbicular, apex notched. Stylopodium conic, dark yellow. Fruit oblong-ellipsoid, 4–7 × 2–2.5 mm, glaucous; mericarp subrounded in cross section; ribs obscure; vittae 3–4 in each furrow, 4–6 on commissure. Fl. and fr. Aug–Oct. $n = 6^*$.

Forests, woods, mountain slopes, shady river banks; 200–900 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, SE Russia].

This is one of a few toxic species in the genus that should not be used for medicinal purposes as a substitute for “chai hu.”

- 1a. Plants 80–150 cm; rays long, usually 25–40 mm; fruit not reddish-brown 1a. var. *longiradiatum*
- 1b. Plants 50–80 cm; rays short, 10–20 mm; fruit reddish-brown 1b. var. *breviradiatum*

1a. *Bupleurum longiradiatum* var. *longiradiatum*

大叶柴胡(原变种) da ye chai hu (yuan bian zhong)

Bupleurum leveillei H. de Boissieu; *B. longiradiatum* f. *leveillei* (H. de Boissieu) Kitagawa.

Plants 80–150 cm. Upper leaves long-ovate or broadly lanceolate, base cordate and clasping. Fruit dark brown, glaucous.

Forests, mountain slopes; 200–900 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, SE Russia].

The endemic *Bupleurum longiradiatum* f. *australe* R. H. Shan & Yin Li (Acta Phytotax. Sin. 12: 269. 1974) is recorded from wet valleys in shady woods or grasslands at 500–1400 m in Anhui, Jiangxi, Hubei, Hunan, and Zhejiang. This form is distinguished by having taller stature, upper leaves lanceolate or narrowly obovate, with base tapering and cuneate, and chromosome number $n = 6^*$.

1b. *Bupleurum longiradiatum* var. *breviradiatum* F. Schmidt ex Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 125. 1859.

短伞大叶柴胡 duan san da ye chai hu

Bupleurum sachalinense F. Schmidt.

Plants short, 50–80 cm. Upper leaves short, thick. Peduncles and rays short, rays 10–20 mm. Fruit small, reddish brown.

Woods, shady river banks; 200–800 m. Heilongjiang, Liaoning [Japan, Korea, SE Russia].

2. *Bupleurum boissieuanum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 186. 1929.

紫花阔叶柴胡 zi hua kuo ye chai hu

Bupleurum longiradiatum Turczaninow var. *porphyranthum* R. H. Shan & Yin Li.

Plants 80–120 cm, perennial. Stem rigid, erect, solid, much-branched from base, with profuse elongate and slender branches, base without fibrous remnant sheaths. Lower leaves many; blade lanceolate, slightly falcate, base tapering into petiole. Cauline leaves many; blade broadly ovate elliptic or broadly lanceolate, 8–25 × ca. 10 cm, base narrow, clasping, margins slightly incrassate. Apical leaves small and narrow, lanceolate, sessile. Inflorescence much-branched, branches remote and slender; umbels 2–9 cm across; bracts 5, narrowly lanceolate, ca. 2 × 1 mm; rays 5–8, 2–7 cm, unequal, filiform; bracteoles 5–6, lanceolate, ca. 2 × 1 mm, equal, apex acute; umbellules 5–15 mm across, 10–15-flowered; pedicels 8–10 mm in flower, 14–18 mm in fruit, very slender. Petals dark purple. Stylopodium low-conic, dark purple. Fruit oblong, dark purplish-brown, 4.5–6 × 2.8–3.3 mm; vittae 3 in each furrow, 6 on commissure. Fl. and fr. Aug–Oct.

• Woods, shady slopes, wet places; 800–1500 m. Gansu, Henan, Hubei, Shaanxi, Sichuan.

This rather poorly known taxon is recorded only from a few collections. It is similar to, and perhaps conspecific with, *Bupleurum longiradiatum*. It also has reputed medicinal value.

3. *Bupleurum aureum* Fischer ex Hoffmann, Gen. Pl. Umbell. 115. 1814.

金黄柴胡 jin huang chai hu

Plants 50–120 cm, perennial. Rhizomes thin, dark brown, creeping, little-branched. Stems 1–2(–3), little-branched, lustrous, often tinged purple, base without fibrous remnant sheaths. Lowest leaves many, petiolate; blade broadly ovate or obovate, 4–6.5 × 3–5 cm, 9–11-nerved, base tapering into petiole, apex rounded or acute. Middle leaves sessile; blade lyrate, base auriculate, clasping, apex obtuse-acute. Upper leaf blades perfoliate, 12–20 × 3–5.5 cm. Uppermost leaf ovate, small, base cordate, clasping. Terminal umbel 6–10 cm across, lateral umbels 3–5 cm; bracts 3–5, ovate to ovate-orbulate, 6–28 × 3–16 mm, unequal; rays 6–10, 1.5–6 cm, unequal; bracteoles aureate, 5–6 (–7), broadly ovate or elliptic, 4–9 × 3–8 mm, equal; umbellules 6–10 mm across, 15–20-flowered; pedicels 2–4 mm. Petals yellow, obovate, midvein dark yellow. Stylopodium low-conic or discoid, pale yellow. Fruit oblong, dark brown, 4–6 × 2.5–3 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

Open forests, forest margins, among shrubs, mountain slopes, river banks; 1300–1900 m. W Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Mongolia, Russia].

Two varieties occur in China. Both have reputed medicinal value.

- 1a. Bracteoles broad-ovate or elliptic, 5–12 × 7–9 mm, exceeding flowers, base obtuse 3a. var. *aureum*
 1b. Bracteoles narrowly ovate or linear-lanceolate, 2–3 × 0.7–2 mm, equaling or shorter than flowers, base tapering 3b. var. *breviinvolucratum*

3a. *Bupleurum aureum* var. *aureum*

金黄柴胡(原变种) jin huang chai hu (yuan bian zhong)

Bupleurum longifolium Linnaeus var. *aureum* (Fischer ex Hoffmann) H. Wolff.

Bracteoles broadly ovate or elliptic, 5–12 × 7–9 mm, usually exceeding flowers, base obtuse, 5–9-nerved.

Forest margins, among shrubs, mountain slopes, river banks; 1300–1900 m. W Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Mongolia, Russia].

3b. *Bupleurum aureum* var. *breviinvolucratum* (Trautvetter ex H. Wolff) R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 271. 1974.

短苞金黄柴胡 duan bao jin huang chai hu

Bupleurum longifolium subvar. *breviinvolucratum* Trautvetter ex H. Wolff in Engler, Pflanzenr. 43(IV. 228): 53. 1910.

Bracteoles narrowly ovate or linear-lanceolate, 2–3 × 0.7–2 mm, shorter than flowers, base tapering, 3-nerved.

• Open forests, among shrubs, mountain slopes; 1400–1600 m. W Xinjiang (Tian Shan).

This is a variant with narrow bracteoles at the southernmost limit of this C Asian species.

4. *Bupleurum triradiatum* Adams ex Hoffmann, Gen. Pl. Umbell. 115. 1814.

三辐柴胡 san fu chai hu

Bupleurum ranunculoides Linnaeus var. *triradiatum* (Adams ex Hoffmann) Regel; *Diaphyllum triradiatum* (Adams ex Hoffmann) Hoffmann.

Plants 7–20(–25) cm, perennial. Rhizome dark brown, creeping, little-branched. Stem erect, tinged purple at base, base without fibrous remnant sheaths. Basal leaves several, linear or lanceolate, 2.5–10 × 0.3–1 cm, 3–5-nerved, base tapering, apex obtuse-acute. Cauline leaves few, 1–4, sessile; blade narrow-ovate, 1.5–6 × 0.3–0.7 cm, base obtuse, clasping. Umbels 1–3, 2–5 cm across; bracts 1–3, ovate or broad-ovate, 5–15 × 4–14 mm, unequal, shorter than rays, 7–19-nerved; rays 2–3, erect, 1–2.5 cm; bracteoles 5–8, 3–7 × 2–6 mm, yellowish, reddish-tinged or purplish-tinged, distinctly longer than flowers, base subrounded, apex obtuse or acute; umbellules 8–15 mm across; flowers 18–26, crowded; pedicels 2–3 mm. Petals yellow or abaxially purplish, apex obtuse, inflexed. Stylopodium low-conic or discoid, dark yellow. Fruit ellipsoid, brownish-red, 2.5–3 × 1.5–2 mm; ribs prominent; vittae 1–3 in each furrow, 2–4 on commissure. Fl. and fr. Jul–Sep.

Forest margins, alpine meadows, sunny slopes, rock crevices; 2300–4900 m. Qinghai, W Sichuan, Xinjiang, Xizang, NW Yunnan [?N Japan, Russia].

This species has reputed medicinal value.

5. *Bupleurum densiflorum* Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 47. 1867.

密花柴胡 mi hua chai hu

Plants 10–30 cm, perennial. Rhizome short, horizontal. Stems few or several, slender, base without fibrous remnant sheaths. Basal leaves many; blade narrow-lanceolate or linear, 6–13 × 0.3–0.7 cm, thin, abaxially glaucous, 3–5-nerved, base

tapering into a long petiole. Cauline leaves 1–3, lanceolate, sessile, base clasping, apex obtuse-acute, 5–7-nerved. Umbels terminal, ca. 3 cm across; bracts 1–3, ovate-lanceolate, 5–15 × 3–5 mm, unequal, base embracing; rays 2–3(–4), slender, 1.5–5 cm, unequal; bracteoles 5–6, ovate to broadly ovate, 5–7 × 3–7 mm, exceeding flowers, 7–9-nerved; umbellules ca. 10 mm across, 10–20-flowered; pedicels ca. 2 mm. Petals yellow, mid-vein purplish, prominent. Stylopodium low-conic, discoid, dark purple. Fruit oblong, dark brown, 3–4 × 2–2.5 mm; ribs acute; vittae large, 2 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Alpine meadows, gravelly slopes; 2500–3100 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

This species has reputed medicinal value (in Xinjiang). It is considered to be closely related to *Bupleurum triradiatum*, and in C Asia the two taxa intergrade.

6. *Bupleurum sibiricum* Vest ex Sprengel in Roemer & Schultes, Syst. Veg. 6: 368. 1820.

兴安柴胡 xing an chai hu

Plants 30–70 cm, perennial. Stems few or many, base often purplish-red, with or without fibrous remnant sheaths. Basal leaves many; blade narrowly lanceolate, 12–25 × 0.7–1.6 cm, 7–9 nerved, apex short-acuminate, apiculate, base tapering into petioles; petioles 5–10 cm. Upper leaves sessile; blades lanceolate, 2.5–6 × 0.8–1.1 cm, base rounded-cuneate, embracing, apex acuminate. Umbels 4–6 cm across; bracts 1–2, lanceolate, 5–10 × 1–3 mm, similar to upper leaves, deciduous; rays 5–14, 1.5–3(–5) cm, unequal, stout, slightly incurved; bracteoles (5–) 7–12, elliptic-lanceolate, 5–7 × 2–3 mm, 5–7-nerved, exceeding flowers and fruit, base cuneate; umbellules 8–15 mm across, 10–20-flowered; pedicels 0.5–1.5 mm. Petals yellow. Stylopodium low-conic, discoid, yellow. Fruit broad-ellipsoid, dark brown, 3–4 × 2.5–3 mm, slightly glaucous; ribs prominent, narrowly winged; vittae 3 in each furrow, 4–6 on commissure. Fl. and fr. Jul–Sep. $n = 32^*$.

Mountain slopes; 300–2000 m. Hebei, Heilongjiang, Liaoning, Nei Mongol [Mongolia, SE Russia].

Two varieties occur in China. Both have reputed medicinal value.

- 1a. Leaf blade narrowly lanceolate; bracteoles 7–12 6a. var. *sibiricum*
 1b. Leaf blade broad, ovate-lanceolate; bracteoles 5 6b. var. *jeholense*

6a. *Bupleurum sibiricum* var. *sibiricum*

兴安柴胡(原变种) xing an chai hu (yuan bian zhong)

Bupleurum dahuricum Fischer & C. A. Meyer ex Turczaninow.

Leaf blade narrowly lanceolate; bracteoles 7–12, pale yellow, usually 5-nerved.

Mountain slopes; 300–800 m. Heilongjiang, Liaoning, Nei Mongol [Mongolia, SE Russia].

6b. *Bupleurum sibiricum* var. *jeholense* (Nakai) Y. C. Chu ex R. H. Shan & Y. Li, Acta Phytotax. Sin. 12: 272. 1974.

雾灵柴胡 wu ling chai hu

Bupleurum jeholense Nakai, J. Jap. Bot. 13: 482. 1937; *B. jeholense* var. *latifolium* Nakai.

Leaf blade ovate-lanceolate; bracteoles 5, yellowish-green, usually 7-nerved.

- Mountain slopes; 1500–2000 m. Hebei (Wuling Shan)

This rather poorly known taxon is recorded only from a few collections.

7. *Bupleurum euphorbioides* Nakai, Bot. Mag. (Tokyo) 27: 313. 1914.

大苞柴胡 da bao chai hu

Bupleurum tatudinense I. V. Baranov.

Plants (8–)12–60 cm, annual or biennial. Taproot slender. Stem often tinged purple, 1–2-branched above, base without fibrous remnant sheaths. Basal leaf blades linear 7–15 × 0.1–0.3 cm, base tapering into petiole, 5–7-nerved. Cauline leaves narrowly lanceolate, clasping, apical leaf ovate. Umbels 2–11 cm across; bracts 2–5, ovate, 3–30 × 2–12 mm, very unequal; rays 4–11, 0.5–10 cm, very unequal, slender; bracteoles 5(–7), broadly elliptic or obovate, green, 4–9 × 1.5–5 mm, apex acute, apiculate, exceeding flowers and fruit; umbellules 6–15 mm across, 16–24-flowered; pedicels 2–3 mm. Petals yellow, abaxially purplish. Stylopodium low-conic, discoid, purple. Fruit ovoid-oblong, purplish-brown, ca. 3 × 2 mm; ribs prominent; mericarp pentagonal in cross section; vittae 3–4(–5) in each furrow, 4 on commissure. Fl. and fr. Jul–Sep. $2n = 16^*$.

Forest margins, grassy places, mountain slopes; 1200–2500 m. S Jilin (Antu, Changbai Shan, Fusong) [Korea].

8. *Bupleurum smithii* H. Wolff, Acta Horti Gothob. 2: 304. 1926.

黑柴胡 hei chai hu

Plant 25–60 cm, perennial. Rhizome dark brown, usually branched, often thick. Stems several, tufted, stout, base without fibrous remnant sheaths. Basal leaves many; petioles often purplish-red, clasping; blade narrow-oblong or oblanceolate, 10–20 × 1–2 cm, thick-papery, 7–9-nerved, base tapering, margins white scarious, apex obtuse or acute, apiculate. Cauline leaves sessile. Apical leaf long-ovate, 1.5–7.5 × 1–1.7 cm, base rounded, sometimes auriculate, clasping, apex acuminate. Bracts 0 or 1–2, broadly ovate, 7–18 × 4–11 mm, unequal; rays 4–9, 0.5–4 cm, unequal, angled; bracteoles 6–9, ovate or broad-ovate, 4.5–6 × 3–5 mm, equal, acute, apiculate, exceeding (to × 1.5) flowers; umbellules 1–2 cm across; pedicels 1.5–2.5 mm. Petals yellow, occasionally abaxially purplish-red. Stylopodium low-conic, discoid, dark yellow or purple-brown. Fruit ovoid, brown, 3.5–4 × 2–2.5 mm; ribs acute, prominent; vittae 3 in each furrow, 3–4 on commissure. Fl. and fr. Jul–Sep.

- Mountain slopes, grassy places, sunny riverside shingle; 1400–3700 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi.

- 1a. Leaf blade 2–2.6 cm broad, upper leaf bases deep-cordate or deep-auriculate 8b. var. *auriculatum*

- 1b. Leaf blade 0.3–2 cm broad, upper leaf bases not deep-cordate or deep-auriculate.
 2a. Leaf blade 10–20 × 1–2 cm 8a. var. *smithii*
 2b. Leaf blade 6–11 × 0.3–0.7 cm 8c. var. *parvifolium*

8a. *Bupleurum smithii* var. *smithii*

黑柴胡(原变种) *hei chai hu* (yuan bian zhong)

Bupleurum borealisinense Nakai.

Leaf blade broadly lanceolate or oblong, 10–20 × 1–2 cm, thinly papery, base shallowly caudate, semi-embracing.

• Mountain slopes in valleys, grassy places; 1400–3400 m. Gansu, Hebei, Henan, Nei Mongol, Shaanxi, Shanxi.

8b. *Bupleurum smithii* var. *auriculatum* R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 273. 1974.

耳叶黑柴胡 *er ye hei chai hu*

Leaf blade broadly lanceolate or oblong, 10–20 × 2–2.6 cm, thinly papery, base deep-cordate or deep-auriculate, embracing.

• Mountain slopes, sunny riverside shingle; 2100–2400 m. N Shanxi (Ningwu).

8c. *Bupleurum smithii* var. *parvifolium* R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 273. 1974.

小叶黑柴胡 *xiao ye hei chai hu*

Basal leaves narrowly lanceolate, 6–11 × 0.3–0.7 cm, thickly papery, base tapered into petiole, not embracing.

• Grassy places on mountain slopes; 2700–3700 m. Gansu, Nei Mongol, Ningxia, Qinghai.

This variety is widely used in Gansu and Qinghai as a substitute for the Chinese medicine “chai hu” (see *B. chinense* and *B. scorzonifolium*).

9. *Bupleurum dalhousieanum* (C. B. Clarke) Koso-Poljansky, Trudy Imp. Bot. Sada Petra Velikago 30(2): 165. 1913 [“*dalhousianum*”].

匍枝柴胡 *pu zhi chai hu*

Bupleurum longicaule de Candolle var. *dalhousieanum* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 677. 1879 [“*dalhousieana*”].

Plants (5–)10–20 cm, perennial. Rootstock long, woody, branched. Stems purplish-red, numerous, usually decumbent, base without fibrous remnant sheaths. Basal leaves few; blade linear, 3–8 × 0.2–0.4 cm, 5–7-nerved, tapering into petiole. Upper leaves sessile; blade lanceolate or ovate, 1.5–5 × 0.3–0.8 cm, base rounded, clasping, apex acuminate, sometimes caudate. Umbels few, 1.5–2.5 cm across, terminal; bracts 1–3, ovate, 5–18 × 4–8 mm, unequal; rays 2–4, 1–2 cm, unequal; bracteoles (4–)6–10, broadly ovate or obovate, tinged purple, 4–8 × 3.5–5.5 mm, slightly exceeding flowers, apex apiculate; umbellules 11–13 mm across, 16–24-flowered; pedicels 1–2 mm. Petals purplish. Stylopodium low-conic, dark purple. Fruit oblong-ovoid, brown, ca. 4 × 2 mm; ribs narrowly winged; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jun–Sep.

Alpine regions, mountain summits, rock crevices; 3700–4800 m. W Sichuan, S and W Xizang, NW Yunnan [Bhutan, NE India, N Myanmar, Sikkim].

This species has reputed medicinal value.

10. *Bupleurum yunnanense* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 117. 1894.

云南柴胡 *yun nan chai hu*

Plants 12–35 cm, perennial. Taproot fusiform, vertical, thickened, often branched. Stems several, slender, erect, base without fibrous remnant sheaths. Lower leaves sessile; blade linear, 4–8 × 0.15–0.4 cm, base clasping. Middle leaves sessile; blade lanceolate, 5–10 × 0.3–0.7 cm, 9–15-nerved, base rounded, embracing, apex caudate. Upper leaves small, ovate-lanceolate. Umbels few, 1.5–2.7 cm across; bracts 2–4, ovate-lanceolate, 0.2–2.5 mm, unequal; rays (2–)3–5(–7), 3–25 mm, unequal; bracteoles 5, elliptic, 3–5 × 1–2 mm, equal, apex acuminate, about 1.5–2 times as long as flowers; umbellules ca. 10 mm across, 8–14-flowered; pedicels ca. 2 mm. Petals yellow or purplish. Stylopodium low-conic, discoid, yellow or purplish. Fruit oblong, gray-brown, ca. 2.5 × 1.1 mm; ribs prominent, narrowly winged; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

• Mountain slopes; 2500–5000 m. Sichuan, SE Xizang (Dinggyê), Yunnan.

This species has reputed medicinal value (in Yunnan). It is very similar to the C Asian *Bupleurum falcatum* Linnaeus.

11. *Bupleurum luxiense* Yin Li & S. L. Pan, Acta Phytotax. Sin. 24: 150. 1986.

泸西柴胡 *lu xi chai hu*

Plants 55–125 cm, stout, perennial. Taproot dark brown, thick, woody, little-branched, densely marked with annular leaf scars. Stem usually tinged purple at base, base without fibrous remnant sheaths. Basal leaves caespitose, lanceolate, 10–20 × 1.6–3 cm, abaxially glaucous, 5–7-nerved, base tapering into long petiole, margins usually reddish-brown. Cauline leaves narrow-lanceolate, 8–18 × 1.2–2.5 cm, petiolate, clasping, 7–9-nerved. Apical leaves sessile, obovate, clasping, 9–11-nerved. Inflorescence profusely dichotomously branched forming a large panicle, branches spreading and rigid; umbels 2.5–4 cm across; bracts 5, obovate, 4–7 × 3–4 mm, unequal; rays 2–9, 1–4 cm; bracteoles 5, elliptic or obovate, ca. 3 × 2.5 mm, green, exceeding flowers; umbellules ca. 10 mm across, 8–17-flowered; pedicels 0.5–1 mm. Petals yellow. Stylopodium low-conic, discoid, yellow. Fruit oblong, brown, 2–3.5 × 1–2 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jul–Oct.

• Mountain slopes; ca. 1800 m. SE Yunnan (Jianshui, Luxi).

The roots are used in traditional Chinese medicine. This rather poorly known taxon is recorded only from a few collections.

12. *Bupleurum candollei* Wallich ex de Candolle, Prodr. 4: 131. 1830 [“*candollii*”].

川滇柴胡 *chuan dian chai hu*

Plants 40–100 cm, perennial. Taproot stout, woody, branch-

ed. Stem erect, much-branched above, branches spreading-ascending, base without fibrous remnant sheaths. Lower leaves linear-lanceolate or long-elliptic, 12–15 × 0.5–0.8 cm, 11–15-nerved, abaxially glaucous, apex rounded-obtuse, apiculate. Upper leaves long-obovate, base cuneate. Umbels 2.5–4 cm across; bracts 3–5, ovate, 3–20 × 2–10 mm, unequal; rays 4–8, 1–3 cm, unequal, slender; bracteoles 5, broadly elliptic or sub-orbicular, 3–6 × 1.8–4 mm, apex rounded, apiculate, greatly exceeding flowers; umbellules 8–12 mm across, 10–15-flowered; pedicels 0.5–1.5 mm. Petals pale yellow or dark purple. Stylopodium low-conic, discoid, dark yellow or dark purple. Fruit oblong, brown, 2.7–3.5 × 1.7–1.9 mm; ribs prominent, narrowly winged; vittae 3 in each furrow, 4 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

Mixed forests on shady slopes, open forests, mountain slopes, grassy places; 1800–3200 m. W Sichuan, S Xizang, Yunnan [Bhutan, N India, Kashmir, N Myanmar, Nepal, Pakistan, Sikkim].

This widespread species exhibits wide variation across its geographic range. Several infraspecific taxa have been described, but these are not always distinct. This, and the following four species are morphologically very similar and further work is needed to define the taxa clearly. At least var. *candollei* has reputed medicinal value.

- 1a. Stem, bracts and bracteoles purplish-red; leaf blade abaxially not glaucous 12b. var. *atropurpureum*
 1b. Stem, bracts and bracteoles green; leaf blade abaxially glaucous.
 2a. Stem moderately branched; basal leaves not spatulate, petioles short 12a. var. *candollei*
 2b. Stem copiously branched, branches slender; basal leaves spatulate or oblanceolate, tapering into a long petiole 12c. var. *virgatissimum*

12a. *Bupleurum candollei* var. *candollei*

川滇柴胡(原变种) *chuan dian chai hu* (*yuan bian zhong*)

Stem, bracts and bracteoles green. Basal leaves linear-lanceolate or long-elliptic, leaf blade abaxially glaucous, thinly papery. Petals yellow. Stylopodium dark yellow.

Open forests, mountain slopes, grassy places; 1800–3200 m. W Sichuan, S Xizang, NW Yunnan [Bhutan, N India, Kashmir, N Myanmar, Nepal, Pakistan, Sikkim].

12b. *Bupleurum candollei* var. *atropurpureum* C. Y. Wu, *Acta Phytotax. Sin.* 12: 275. 1974.

紫红川滇柴胡 *zi hong chuan dian chai hu*

Bupleurum atropurpureum (C. Y. Wu) C. Y. Wu.

Stem, bracts and bracteoles purplish-red, thickly papery. Leaves green on both surfaces. Petals dark purple. Stylopodium dark purple.

- Grassy slopes; ca. 2900 m. W Yunnan (Zhenkang).

This poorly known taxon is recorded only from a few collections.

12c. *Bupleurum candollei* var. *virgatissimum* C. Y. Wu, *Acta Phytotax. Sin.* 12: 275. 1974.

多枝川滇柴胡 *duo zhi chuan dian chai hu*

Stem copiously branched, branches, peduncles and rays slender. Basal leaves spatulate or oblanceolate, tapering toward the base, forming a long petiole, 7-nerved. Petals yellow. Stylopodium dark yellow.

- Mixed forests on shady slopes; 2500–3000 m. SW Sichuan (Huidong, Miyi), Yunnan (Kunming).

13. *Bupleurum commelynoideum* H. de Boissieu, *Bull. Herb. Boissier, sér. 2, 2: 805. 1902.*

紫花鸭跖柴胡 *zi hua ya zhi chai hu*

Plants 15–50 cm, perennial. Rhizome slender, woody, much-branched. Stems several, base without fibrous remnant sheaths. Basal leaves sessile; blade linear-lanceolate, 8–18 × 0.3–0.5 cm, abaxially tinged purple, 5-nerved, base rounded, clasping. Middle leaves ovate-lanceolate, apex long-acuminate or caudate, 8–11 × 0.5–1 cm, margin white scarious. Apical leaf short, narrow-ovate, apex caudate. Umbels 2–6 cm across; bracts 1 or 2, or absent, ovate-lanceolate, 4–35 × 2–9 mm, unequal, deciduous; rays 3–7, 1.5–5 cm; bracteoles 7–9, broadly ovate, 7–9 × 3–5 mm, exceeding flowers; umbellules 8–18 mm across, 16–30-flowered; pedicels 1–3 mm. Petals adaxially purple or yellowish-tinged, abaxially purple. Stylopodium low-conic, discoid, dark purple. Fruit oblong, reddish-brown, 2–2.5 × ca. 1.5 mm; ribs pale brown, prominent or narrowly winged; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Aug–Oct.

- Alpine meadows; 2700–4300 m. S Gansu, SE Qinghai, W Sichuan, Xizang, NW Yunnan.

At least var. *commelynoideum* has reputed medicinal value. See the taxonomic note under *Bupleurum candollei*.

- 1a. Bracteoles tinged purple; umbellules 12–18 mm across 13a. var. *commelynoideum*
 1b. Bracteoles yellow; umbellules 8–12 mm across 13b. var. *flaviflorum*

13a. *Bupleurum commelynoideum* var. *commelynoideum*

紫花鸭跖柴胡(原变种) *zi hua ya zhi chai hu* (*yuan bian zhong*)

Umbellules 12–18 mm across; bracteoles purplish-blue, ovate or lanceolate, 7–9 × 3–5 mm, greatly exceeding the flowers.

- Alpine meadows; 3000–4300 m. W Sichuan, Xizang, NW Yunnan.

13b. *Bupleurum commelynoideum* var. *flaviflorum* R. H. Shan & Yin Li, *Acta Phytotax. Sin.* 12: 276. 1974.

黄花鸭跖柴胡 *huang hua ya zhi chai hu*

Umbellules 8–12 mm across; bracteoles yellow, 5–7 × 2–3 mm, slightly exceeding the flowers.

- Alpine meadows; 2700–4000 m. S Gansu, SE Qinghai, W Sichuan, E and S Xizang.

14. *Bupleurum rockii* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 27: 186. 1929.

丽江柴胡 *li jiang chai hu*

Bupleurum handelii H. Wolff.

Plants 60–100 cm, perennial. Taproot branching, dark brown, woody. Stem erect, sometimes purplish-red, few-branched above, base without fibrous remnant sheaths. Basal leaves many, linear-oblong, 10–15 × 0.8–1 cm, thick-papery, often reddish brown-tinged, 11-nerved, base tapering into a long petiole, margins reddish and thickened. Cauline leaves often few, sessile; blade ovate-lanceolate, 2.5–7 × 8–12 mm, base rounded, clasping, margins purple, apex obtuse-acute. Terminal umbel 6–8 cm across; peduncles elongate and rigid; bracts 1–3, ovate-lanceolate, 7–20 × 0.5–1 cm, unequal, green or tinged red, apex obtuse-rounded; rays (3–)7–12, 1–4 cm, unequal; bracteoles 5, elliptic-obovate, 3–4 × 1.8–2.5 mm, often reddish, equaling or slightly exceeding flowers, shorter than umbellules in fruit; umbellules ca. 8 mm across, 10–12-flowered; pedicels 0.5–1.5 mm. Petals yellow. Stylopodium shape low-conic, color dark yellow. Fruit ovoid, reddish-brown when mature, 4–5 × 2.2–2.6 mm; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jul–Oct.

• Open forests, grassy places on mountain slopes; 1900–4200 m. Sichuan, NW Yunnan.

This species has reputed medicinal value. See the taxonomic note under *Bupleurum candollei*.

15. *Bupleurum petiolulatum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6; 117. 1894.

有柄柴胡 you bing chai hu

Plants 50–70 cm, perennial. Taproot long-fusiform, dark brown. Stem usually solitary, erect, usually little-branched above, base without fibrous remnant sheaths. Basal leaves several, narrowly long-lanceolate or long-elliptic, 9–14 × 1–1.3 cm, thinly papery, 7–9-nerved, margin tinged red, base tapering into long petioles, clasping. Upper leaves short-petiolate; blade elliptic or lanceolate, 7–12 × 1–2 cm, apex obtuse-acute, apiculate. Apical leaf small, sessile. Umbels few, 4–8 cm across; bracts 1–3, elliptic, 4–9 × 2–4 mm, apiculate; rays 8–11, 0.5–4 cm, unequal, slender; bracteoles 5–7, ovate-lanceolate, 5–11 × 1.5–3 mm, unequal, membranous, apex acute, apiculate, equaling or slightly exceeding the flowers; umbellules 4–6 mm across, 8–16-flowered; pedicels 1.2–2.2 mm. Petals yellow. Stylopodium low-conic, yellow. Fruit ellipsoid, dark brown, 3.5–5 × 1.6–2.1 mm; ribs pale brown, slightly prominent; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

• Mixed forests on mountain slopes, among shrubs, alpine grasslands; 2300–3900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

At least var. *petiolulatum* has reputed medicinal value. See the taxonomic note under *Bupleurum candollei*.

- 1a. Stem stout, branching above; bracteoles 2.8–5 × 1.2–1.5 mm, shorter than the flowers 15a. var. *petiolulatum*
 1b. Stem slender, branching from base; bracteoles 4–6 × 1.6–3.2 mm, usually exceeding the flowers 15b. var. *tenerum*

15a. *Bupleurum petiolulatum* var. *petiolulatum*

有柄柴胡(原变种) you bing chai hu (yuan bian zhong)

Bupleurum longicaule de Candolle var. *tibeticum* H. Wolff.

Stem usually solitary, stout, branched above; bracteoles ovate-lanceolate or lanceolate, 2.8–5 × 1.2–1.5 mm, base cuneate, membranous, 3-nerved, usually shorter than the flowers.

• Among shrubs, alpine grasslands; 2300–3400 m. Gansu, Sichuan, Xizang, Yunnan.

15b. *Bupleurum petiolulatum* var. *tenerum* R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 277. 1974.

细茎有柄柴胡 xi jing you bing chai hu

Stems few, slender, branching from base; bracteoles broadly ovate, 4–6 × 1.6–3.2 mm, base broad-cuneate, 5-nerved, usually exceeding the flowers.

• Mixed forests on mountain slopes; 2800–3900 m. Qinghai, Sichuan, Xizang.

16. *Bupleurum longicaule* de Candolle, Prodr. 4: 131. 1830.

长茎柴胡 chang jing chai hu

Plants 50–70 cm, perennial. Rhizome horizontal, little-branched, gray-brown. Stems solitary or several, erect, little-branched above, branches short or elongate, base without fibrous remnant sheaths. Basal leaves narrow-linear, lanceolate or oblanceolate, 10–12 × 0.5–2 cm, 5–11-nerved, base tapering into a conspicuous petiole, apex acute or acuminate. Cauline leaves sessile; blade linear-lanceolate to ovate-lanceolate, smaller, base broad-cordate and clasping, apex long-acuminate or acute. Umbels 3–8 cm across; bracts 0 or 2–3, lanceolate or ovate, 4–15 × 3–8 mm, unequal, 9–15-nerved; rays 3–12, 2.5–6 cm, unequal, somewhat stout, ribbed; bracteoles (5–)10–12, narrow-lanceolate or suborbicular, ca. 7 × 5 mm, longer than the flowers; umbellules ca. 8 mm across, ca. 20-flowered; pedicels 1.5–2 mm. Petals dark purple or yellow. Stylopodium low-conic, discoid, dark purple. Fruit ovoid or ellipsoid-ovoid, gray-brown, 3.5–5 × 1–1.5 mm; ribs prominent, acute; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

Forests, grassy places on mountain slopes; 1000–4000 m. S Gansu, W Hubei, Ningxia, Qinghai, Shaanxi, Shanxi, NE and W Sichuan, E Xizang, NW Yunnan [India, Kashmir, Nepal, Pakistan].

All four varieties have reputed medicinal value. See the taxonomic note under *Bupleurum candollei*.

- 1a. Stem solitary; petals usually dark purple 16a. var. *longicaule*
 1b. Stems several, rarely solitary; petals yellow.
 2a. Bracteoles 5–7; rays 4–6 16d. var. *giraldii*
 2b. Bracteoles 5; rays 7–12.
 3a. Middle leaves lanceolate-ovate, base cordate 16b. var. *amplexicaule*
 3b. Middle leaves lanceolate, base narrow, not cordate 16c. var. *franchetii*

16a. *Bupleurum longicaule* var. *longicaule*

长茎柴胡(原变种) chang jing chai hu (yuan bian zhong)

Bupleurum longicaule var. *strictum* C. B. Clarke; *B. rupestre* Edgeworth.

Stem solitary. Lower leaves lanceolate, 2–12 × 0.5–1.5 cm, sessile, base broad, clasping. Petals dark purple.

Grassy places on mountain slopes; 2500–3600 m. W Hubei, SE Qinghai, SW Sichuan, E Xizang, NW Yunnan [India, Kashmir, Nepal, Pakistan].

16b. *Bupleurum longicaule* var. *amplexicaule* C. Y. Wu ex R. H. Shan & Yin Li, *Acta Phytotax. Sin.* 12: 277. 1974.

抱茎柴胡 *bao jing chai hu*

Stems several, unbranched or few-branched above. Lower leaves linear, 9–18 × 0.6–1.2 cm, sessile, clasping. Middle leaves long-lanceolate, sessile, base rounded or cordate. Upper leaves narrow-ovate, base deep cordate. Rays (4)–7–9. Petals yellow.

- Forests on mountain slopes; 2500–2700 m. NW Yunnan.

16c. *Bupleurum longicaule* var. *franchetii* H. de Boissieu, *Bull. Soc. Bot. France* 53: 425. 1906.

空心柴胡 *kong xin chai hu*

Bupleurum candollei Franchet (1894), not Wallich ex de Candolle (1830).

Stems usually several, rarely solitary, younger parts often purplish-tinged. Basal leaves narrowly oblong-lanceolate, 10–19 × 0.7–1.5 cm. Middle leaves lanceolate, base slightly narrow and clasping. Bracts 1–2, deciduous, umbellules 8–15-flowered. Petals yellow.

- Forests, grassy places on mountain slopes; 1000–4000 m. S Gansu, W Hubei, Ningxia, S Shaanxi, NE and W Sichuan, NW Yunnan.

16d. *Bupleurum longicaule* var. *giraldii* H. Wolff in Engler, *Pflanzenr.* 43(IV. 228): 123. 1910.

秦岭柴胡 *qin ling chai hu*

Bupleurum giraldii (H. Wolff) Koso-Poljansky.

Stems tufted, sometimes solitary, few-branched. Basal leaves oblanceolate, 6–10 × 1–1.7 cm, 5–7-nerved, base tapering into petioles. Cauline leaves sessile, ovate-orbicular to broad-ovate, base subcordate, clasping. Rays 4–6; bracts 2–3, bracteoles 5–7, broad-ovate, slightly exceeding the flowers. Petals yellow.

- Grassy places on mountain slopes; 2600–3300 m. Ningxia, Qinghai, Shaanxi, Shanxi.

17. *Bupleurum kweichowense* R. H. Shan, *Sinensia* 11: 172. 1940.

贵州柴胡 *gui zhou chai hu*

Plants 20–40 cm, perennial. Rhizome slender. Stem solitary, erect, tinged purple, especially upper parts and around nodes, base without fibrous remnant sheaths. Basal leaves numerous; blades narrowly spatulate to lanceolate, base tapering into a long petiole. Middle leaves usually in two rows, sessile; blades obovate-lanceolate, 7–12 × 1–1.5 cm, nerves 7–9, base narrow and clasping, apex obtuse-acute, often tinged purple. Upper leaves long-elliptic, 1–4 × 0.5–1 cm. Umbels 2.5–4 cm

across, terminal and axillary, base of terminal umbel often bearing a lateral umbel which overtops the terminal; bracts 1, broad-obovate, 5–12 × 2–6 mm, deciduous; rays 5–6, 1.5–2.5 cm, unequal; bracteoles 5, broad-obovate, 4–5 × 2.2–3 mm, apex rounded, mucronate, tinged purple, equaling or slightly shorter than umbellules in fruit; umbellules ca. 8 mm across, 10–14-flowered; pedicels ca. 2 mm. Fruit ovoid or ellipsoid, brown, 3.5–4.5 × 2.5–2.7 mm; ribs thick, pale brown; vittae (3)–4–5 in each furrow, 4–6 on commissure. Fl. and fr. Aug–Oct.

- Gravelly slopes in sunny places; ca. 2100 m. NE Guizhou (Fanjing Shan).

This poorly known taxon is recorded only from a few collections.

18. *Bupleurum bicaule* Helm, *Mém. Soc. Imp. Naturalistes Moscou* 2: 108. 1809.

锥叶柴胡 *zhui ye chai hu*

Plants 15–30 cm, perennial. Rootstock, branched, thickened and woody at apex. Stems many, slender, few-branched above, base densely clothed with remnant fibrous sheaths. Leaves all linear, 7–16 × 0.1–0.3 cm, 3–5-nerved, base slightly tapering into a short petiole, apex mucronate. Cauline leaves sessile, slightly clasping. Umbels 1–2 cm across; bracts 1–3, or absent, 1–3 × ca. 1 mm; rays 4–7, 4–15 mm; bracteoles 5, lanceolate, 1–3 × 0.5–0.7 mm, shorter than flowers; umbellules 3–6 mm across, 7–13-flowered; pedicels 0.7–1.3 mm. Petals bright yellow, tip shallowly 2-lobed. Stylopodium low-conic, dark yellow. Fruit broadly ovoid, bluish-brown, 2.5–3 × ca. 2 mm; ribs prominent; vittae 3 in each furrow, 2–4 on commissure, very small, obscure when mature. Fl. and fr. Jul–Sep.

Forest margins, gravelly or sunny mountain slopes, dry stony grasslands; 600–1600 m. Hebei, N Heilongjiang, Nei Mongol, N Shaanxi, N Shanxi [Afghanistan, Japan, Korea, Mongolia, Russia].

The roots of at least var. *bicaule* are used in traditional Chinese medicine.

- 1a. Stems several to many, leaves linear, 0.1–0.3 cm broad 18a. var. *bicaule*
- 1b. Stems very numerous, usually ca. 20, caespitose, leaves linear-lanceolate, ca. 4 mm broad 18b. var. *latifolium*

18a. *Bupleurum bicaule* var. *bicaule*

锥叶柴胡(原变种) *zhui ye chai hu* (yuan bian zhong)

Bupleurum falcatum Linnaeus var. *bicaule* (Helm) H. Wolff.

Stems several to many. Leaves all linear, 0.1–0.3 cm broad.

Sunny mountain slopes, dry stony grasslands; 600–1600 m. Hebei, Nei Mongol, N Shaanxi, N Shanxi [Afghanistan, Japan, Korea, Mongolia, Russia].

18b. *Bupleurum bicaule* var. *latifolium* Y. C. Chu, *Fl. Pl. Herb. Chin. Bor.-Orient.* 6: 293. 1977.

呼玛柴胡 *hu ma chai hu*

Bupleurum bicaule f. *latifolium* (Y. C. Chu) Y. C. Chu.

Stems very numerous, usually ca. 20 cm, caespitose. Leaves linear-lanceolate, ca. 4 mm broad.

- Forest margins, gravelly mountain slopes; ca. 600 m. N Heilongjiang (Da Hinggan Ling).

This poorly known taxon is recorded only from a few collections.

19. *Bupleurum pusillum* Krylov, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 18. 1903.

短茎柴胡 duan jing chai hu

Plants 2–10 cm, bluish gray-green, perennial. Root thickened at apex into woody caudex. Stem decumbent or ascending, branches flexuose, base densely clothed with remnant sheaths. Basal leaves numerous; petiole tinged purple; blade linear or narrowly oblanceolate, 2–5 × 0.1–0.4 cm, 3–5-nerved, thickly papery, apex acute. Cauline leaves sessile, clasping; blades shorter, slightly broader. Umbels 1–2.5 cm across; bracts 1–4, ovate-lanceolate, 4–9 × 1–2.5 mm, unequal; rays 3–6, 1.5–4 mm, unequal; bracteoles 5(–7), ovate, 4.5–5 × 1.2–2 mm, equaling or slightly exceeding umbellules, 3-nerved, apex apiculate, abaxially glaucous; umbellules 4–6 mm across, 10–15-flowered; pedicels ca. 1 mm. Petals yellow. Stylopodium low-conic, dark yellow. Fruit ovoid-ellipsoid, brown, 3.5–4 × 1.8–2.5 mm; ribs prominent; vittae 3(–4) in each furrow, 4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

Scrub or grassland on sunny mountain slopes; 2300–3500 m. Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia, Russia].

20. *Bupleurum alatum* R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 300. 1979.

翅果柴胡 chi guo chai hu

Plants ca. 20 cm, perennial. Root slender, pale brown, little-branched. Stems several, slender, erect, base without fibrous remnant sheath. Lower leaves sessile, clasping; blade oblong-lanceolate, ca. 20 × 2.5 mm, nerves 11–13, apex acuminate. Middle leaves elliptic-lanceolate, apex obtuse-acute. Umbels 2–5 cm across, lax; bracts 2–3, elliptic, 7–10 × 1.8–3 mm, 5–7-nerved, apex acute or acuminate; rays of terminal umbel 3, 2–5 cm, unequal, rays of lateral and lower umbels 1–2, ca. 2 cm; bracteoles 3–5, linear-lanceolate, 4–5 × 1.2–1.5 mm, shorter than umbellules in fruit; umbellules 3–8 mm across, (4–)8–10-flowered; pedicels 1–2.5 mm. Petals yellow. Stylopodium low-conic, dark yellow. Fruit oblong, ca. 5 × 2 mm; ribs all broadly winged, equal; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Sep.

- Mountain slopes; ca. 3900 m. S Xizang (Nyalam).

This rather poorly known species is recorded only from a few localities. It is similar to *Bupleurum stewartianum* Nasir, from Pakistan, but differs in having fewer and longer rays, and fruit with broader wings.

21. *Bupleurum condensatum* R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 279. 1974.

簇生柴胡 cu sheng chai hu

Plants 8–20 cm, perennial, tinged pink throughout. Taproot stout, fusiform, apex woody, forming a thick caudex. Stems very numerous, slender, base without fibrous remnant sheaths. Basal leaves numerous, rosette-caespitose, sessile and

clasping; blade narrowly lanceolate, 2–5.5 × 0.2–0.5 cm, 5–11-nerved, acuminate. Cauline leaves reduced upwards. Terminal umbels 4–6 cm across, lax; bracts 5–6, linear, 1.2–3 × 0.5–2 mm; rays 4–7, 3–6 cm, very unequal, slender; bracteoles (5–)6–8, lanceolate or ovate-elliptic, 3–5 × 1–1.7 mm, apiculate; umbellules 4–7 mm across, 14–20-flowered; pedicels 1.2–1.8 mm. Petals yellow, yellow-green, or tinged purple, obovate-elliptic, midvein dark. Stylopodium low-conic, yellow or purplish. Fruit ovoid-oblong, reddish-brown, 1.8–3.2 × 1.8–2 mm; ribs slightly prominent; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

- Sunny mountain slopes, open gravels, sandy soils, riversides; 3000–3700 m. E Qinghai (Gonghe, Xinghai).

22. *Bupleurum exaltatum* Marschall von Bieberstein, Tabl. Prov. Mer. Casp. 113. 1798.

新疆柴胡 xin jiang chai hu

Bupleurum falcatum Linnaeus var. *euexaltatum* H. Wolff; *B. falcatum* var. *linearifolium* H. Wolff, p.p.

Plants 40–90 cm, perennial. Taproot stout, woody, thickened into a several-branched caudex. Stems numerous, branching above, base without fibrous remnant sheaths. Basal leaves many, caespitose, sessile; blade linear to linear-lanceolate, 8–12 × 0.2–0.4 cm, 3-nerved, base slightly narrow, clasping. Middle leaves linear-subulate. Upper leaves subulate, ca. 5 × 1 mm, 1–3-nerved. Inflorescence copiously branched, umbels 1.5–3 cm across; bracts 2–3, linear or lanceolate, 0.5–2 mm; rays 3–5 (–7), 5–22 mm, unequal; bracteoles 5, elliptic or lanceolate, 1–1.5 × ca. 0.5 mm, thick, shorter than or equaling pedicels; umbellules 4–7 mm across, 5–10-flowered; pedicels 2–3 mm, exceeding the bracteoles in fruit. Petals yellow. Stylopodium low-conic, dark yellow. Fruit oblong, 3.5–4.5 × 1.5–2 mm; ribs narrowly winged; vittae large, 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

Mountain slopes; ca. 1500 m. Xinjiang (Urumqi) [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan].

This species has reputed medicinal value (in Xinjiang).

23. *Bupleurum gracillimum* Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar, 148. 1862.

纤细柴胡 xian xi chai hu

Bupleurum falcatum Linnaeus var. *gracillimum* (Klotzsch) H. Wolff.

Plants 6–30(–40) cm, perennial. Taproot slender. Stems numerous, caespitose, decumbent, slender, branching at base, yellow or tinged pink, base without fibrous remnant sheaths. Leaves sessile; blades linear, 1–6 × 0.2–0.6 cm, 7–11-nerved, gray-green, base slightly dilated, almost clasping, apex acuminate. Middle leaves shorter and broader, lanceolate, thinly 15–19-nerved. Umbels 1–3 cm across; bracts 3–4, ovate or elliptic, 4–9 × 2–4 mm, unequal; rays 3, 0.5–2 cm, rather thick, unequal; bracteoles (1–)3–5, ovate or lanceolate, 1.5–5 × 0.7–2.5 mm, very unequal; umbellules ca. 5 mm across, 3–6(–9)-flowered, only 2–3 flowers develop into fruit; pedicels ca. 1 mm. Petals yellow or dark purple. Stylopodium low-conic, dark yellow or purplish. Fruit ellipsoid or long-ovoid, brown, 3.5–

4.5 × 2–2.3 mm, apex slightly narrow; ribs pale yellow, rounded; vittae 4–5 in each furrow, 4 on commissure. Fl. and Fr. Jul–Sep.

Alpine meadows, streamsides; 3200–4500 m. Sichuan [Bhutan, Kashmir, N Myanmar, Nepal, Pakistan].

24. *Bupleurum komarovianum* O. A. Linczevski in Schischkin & Bobrov, Fl. URSS 16: 319. 1950.

长白柴胡 chang bai chai hu

Bupleurum chinense de Candolle var. *komarovianum* (O. A. Linczevski) S. L. Liou & Y. Huei Huang; *B. falcatum* Linnaeus subsp. *komarovianum* (O. A. Linczevski) Voro-schilov.

Plants 70–100 cm, perennial. Rootstock short, woody, tuberous, dark brown, with many fibrous fascicled roots. Stems several, erect, branching from base, upper parts flexuose and branched, base without fibrous remnant sheaths. Basal and lower leaves lanceolate or narrowly elliptic, 15–20 × 1.6–2.5 cm, nerves 7–9, base tapering into flat, broad petioles, clasping, prominent abaxially, apex acuminate, rigidly apiculate. Middle leaves oblong-elliptic, 8–14 × 1.5–3.5 cm. Apical leaves small, elliptic. Umbels numerous, terminal umbels 1.5–5 cm across; bracts 1–3, or absent, linear, 1–7 mm; rays 4–13, 0.6–4 cm, unequal; bracteoles 5, linear, 2–3(–5) × 0.5–1 mm, slightly shorter than or equaling umbellules; umbellules 5–10 mm across, 6–14-flowered; pedicels ca. 2 mm. Petals bright yellow. Stylopodium low-conic, pale yellow. Fruit ellipsoid, brown, 2.8–3.2 × 2–2.2 mm, apex rounded; vittae (4–)5 in each furrow, 6–8 on commissure, distinct when young, obscure when mature. Fl. and fr. Jul–Sep. $2n = 8^*$.

Forest margins, among shrubs, mountain slopes, stony sandy areas; 200–300 m. Heilongjiang, Jilin [Japan, Korea, SE Russia].

This species has reputed medicinal value.

25. *Bupleurum krylovianum* Schischkin ex Krylov, Fl. Sibir. Occid. 8: 2010. 1935.

阿尔泰柴胡 a er tai chai hu

Plants 40–80 cm, perennial. Rootstock woody, tawny, thickened and branched at apex forming caudex. Stems numerous, branched above, base without fibrous remnant sheaths. Basal leaves lanceolate, 10–20 × 1–2 cm including petioles, 5–7-nerved, thinly coriaceous, adaxially yellow-green, abaxially greenish-white, base tapering into long petioles, apex acute to rounded, rigidly apiculate. Middle leaves short-petiolate or sessile; blade lanceolate, sometimes slightly falcate, 4–17 × 0.7–1.5 cm. Apical leaves small, elliptic, rigid. Umbels 3–7 cm across; bracts 4–6(–8), 4–11 × 0.5–3 mm, unequal; rays of terminal umbels 10–20, lateral umbels 6–8-rayed, 5–35 mm, unequal; bracteoles 5, ovate-lanceolate, 4–7 × 1–2 mm, equaling or slightly shorter than umbellules, yellowish-green, rigid, often reflexed; umbellules 3–5 mm across, 18–22-flowered; pedicels 1–2.5 mm. Petals yellow, tips 2-lobed. Stylopodium low-conic, dark yellow. Fruit terete-oblong, dark brown, 3–4 × 1.5–2 mm; ribs prominent; vittae 1(rarely 2–3) in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Under shrubs, dry stony mountain slopes; 1200–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia].

This species has reputed medicinal value.

26. *Bupleurum thianschanicum* Freyn, Mém. Herb. Boissier 13: 23. 1900.

天山柴胡 tian shan chai hu

Plants 50–80 cm, perennial. Root fibrous or somewhat fleshy. Stems several, sometimes tinged purple, short-branched above, base without remnant sheaths. Basal leaves linear to narrowly lanceolate, 9–18 × 0.2–0.4 cm, 5–7-nerved, thick-papery, margin narrowly membranous, base tapering into petiole and clasping, apex acuminate. Cauline leaves linear-lanceolate, 6–10 × 0.4–0.6 cm, almost clasping. Apical leaves small. Umbels 2–4 cm across; bracts 2–3, lanceolate, 5–15 × 3–4 mm, unequal, deciduous; rays (3–)5–7(–15), 2–4 cm, unequal; bracteoles 7–9, ovate-lanceolate, 4–7 × 1.5–2 mm, equal, slightly exceeding umbellules in flower, equaling or slightly shorter than umbellules in fruit; umbellules 8–13 mm across, 15–30-flowered, capitate in fruit; pedicels 1.5–2.5 mm. Petals yellow or brownish-yellow. Stylopodium low-conic, brownish-yellow. Fruit oblong, dark brown, 3–4 × ca. 2 mm; ribs pale brown, prominent; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Grassy slopes, stony places; 1700–2000 m. W Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

This species has reputed medicinal value (in Xinjiang).

27. *Bupleurum scorzoniferolium* Willdenow, Enum. Pl. Suppl. 30. 1814 [“*scorzoneraefolium*”].

红柴胡 hong chai hu

Bupleurum falcatum Linnaeus subsp. *scorzoniferolium* (Willdenow) Koso-Poljansky; *B. falcatum* var. *scorzoniferolium* (Willdenow) Ledebour; *B. sinensium* Gandoger.

Plants 30–60 cm, perennial. Taproot stout, dark reddish-brown, branched. Stems 1–3, flexuose, greatly dichotomously branched, base clothed with fibrous remnant sheaths. Basal leaves linear, 6–16 × 0.2–0.7 cm, thick-papery, rigid, nerves 3–5, prominent abaxially, margin white cartilaginous, base slightly narrowed and clasping. Upper leaves small. Umbels numerous, 1.2–4 cm across; bracts 1–3, subulate, 0.5–4 × 0.2–0.6 mm, unequal, deciduous; rays (3–)4–6(–8), 1–2 cm, very slender, spreading; bracteoles 5, lanceolate, 2.5–4 × 0.5–1 mm, equaling or slightly exceeding umbellules; umbellules 2–5 mm across, (6–)9–11(–15)-flowered; pedicels 0.2–1 mm. Petals yellow. Stylopodium low-conic, dark yellow. Fruit ellipsoid, dark brown, 2.5–3 × 1.5–2 mm; ribs pale, prominent; vittae 5–6 in each furrow, 4–6 on commissure. Fl. and fr. Jul–Sep. $n = 6^*$.

Shrub forest margins, sunny mountain slopes, dry grasslands; 100–2300 m. Anhui, Gansu, Guangxi, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Japan, Korea, Mongolia, Russia].

This *Bupleurum* is one of two primary species the roots of which are used for the major traditional Chinese medicine “chai hu” (see also *B. chinense*).

Two forms are endemic in China: *f. longiradiatum* R. H. Shan & Yin Li (Acta Phytotax. Sin. 12: 282. 1974), distinguished by having rays longer, 11–35 mm, and bracts larger, 4–7 mm (Hebei, Liaoning, Qinghai); and *f. pauciflorum* R. H. Shan & Yin Li (loc. cit.), distinguished

by having rays usually fewer, 2–3(–5), and shorter, 3–12 mm, and umbellules only 4–6(–8)-flowered (Jiangsu, $n = 6^*$).

28. *Bupleurum angustissimum* (Franchet) Kitagawa, J. Jap. Bot. 21: 97. 1947.

线叶柴胡 xian ye chai hu

Bupleurum falcatum Linnaeus var. *angustissimum* Franchet, Pl. David. 1: 138. 1883; *B. falcatum* f. *angustissimum* (Franchet) C. Pei & R. H. Shan; *B. falcatum* subf. *angustissimum* (Franchet) H. Wolff; *B. scorzonifolium* Willdenow subsp. *angustissimum* (Franchet) Kitagawa; *B. scorzonifolium* var. *angustissimum* (Franchet) Y. Huei Huang.

Plants 15–80 cm, perennial. Taproot long, slender, woody, reddish-brown. Stem slender, dichotomous-branched throughout, base clothed with fibrous remnant sheaths. Lower leaves sessile, linear, 6–18 × 0.8–1 cm, thick, rigid, 3–5-nerved, margins narrowly reflexed, apex and base tapering. Apical leaves short. Umbels numerous, 1.5–2 cm across, bracts 1 or absent, subulate, 0.5–2 × 0.2–0.5 mm, unequal; rays 5–7, 1.5–3 cm, unequal; bracteoles 5, linear-lanceolate, 1.2–2.5 × 0.5–0.7 mm, longer than pedicels in fruit; umbellules ca. 5 mm across, 12–16-flowered; pedicels ca. 0.8 mm. Petals yellow, midvein dark. Stylopodium low-conic, dark yellow. Fruit ellipsoid, ca. 2 × 1 mm; ribs prominent; vittae not recorded. Fl. Jun–Jul, fr. Aug–Sep.

Dry grasslands; 1600–2000 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Mongolia].

This species is widely used as a substitute for the Chinese medicine “chai hu.”

29. *Bupleurum yinchowense* R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 283. 1974.

银州柴胡 yin zhou chai hu

Plants 25–50 cm, perennial. Taproot long, stout, woody, pale reddish-brown, digitate-branched, thickened at apex. Stems numerous, slender, tinged purple at base, branching above, base without fibrous remnant sheaths. Basal leaves oblanceolate, 5–8 × 0.2–0.5 cm, 3–5-nerved, deciduous, base tapering into long petioles, apex acute, apiculate. Middle leaves short-petiolate. Umbels numerous, 10–18 mm across; bracts 1 or 2, or absent, subulate, ca. 2 mm; rays (3)–4–6(–9), slender, 4–11 mm; bracteoles 5, linear, 1–2 × ca. 0.2 mm, shorter than pedicels in fruit; umbellules 2.5–4 mm across, 6–9-flowered; pedicels ca. 2 mm. Petals yellow, midvein brown. Stylopodium low-conic, pale yellow. Fruit broadly ovoid, dark brown, 2.8–3.2 × 2–2.2 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. Aug, fr. Sep.

• Dry mountain slopes; 500–1900 m. Gansu, Nei Mongol, Ningxia, Shaanxi.

This species is widely used as a substitute for the Chinese medicine “chai hu.” It resembles both *Bupleurum angustissimum* and *B. bicaule* but differs in the following characters: root horizontal, smooth; leaves oblanceolate, thinly papery; cauline leaves tapering at base, petioles conspicuous; bracteoles shorter than pedicels in fruit.

30. *Bupleurum malconense* R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 284. 1974.

马尔康柴胡 ma er kang chai hu

Bupleurum sichuanense S. L. Pan & P. S. Hsu.

Plants 30–65 cm, perennial. Taproot stout, woody, purplish-brown, digitate-branched. Stems numerous, usually erect, base purplish, without fibrous remnant sheaths. Basal leaves numerous, linear, 10–15 × 0.25–0.5 cm, thick and rigid, 5–7-nerved, base clasping. Middle and upper leaves linear-lanceolate, 3–5-nerved. Umbels numerous, small, 1–2 cm across; peduncles usually purplish-tinged; bracts 2–3, linear or squamose, 1–5 × 0.5–1 mm, unequal; rays 3–5, 1–2 cm; bracteoles 5, lanceolate, 2–2.5 × 0.6–0.8 mm, slightly shorter than or equaling umbellules; umbellules very small, 4–6 mm across, 7–11-flowered; pedicels 0.5–1 mm. Petals yellow. Stylopodium low-conic, yellow. Fruit ellipsoid, brown, 2.5–3 × 1.5–1.8 mm; vittae 3 in each furrow, 4 on commissure. Fl. Jul–Sep, fr. Sep–Oct. $n = 6^*$.

• Shrub forest margins, mountain slopes, riversides, ruderal areas; 2000–3700 m. S Gansu, SE Qinghai, W Sichuan, SE Xizang.

This species is used as a regional substitute for the Chinese medicine “chai hu.”

31. *Bupleurum microcephalum* Diels, Bot. Jahrb. Syst. 29: 494. 1900.

马尾柴胡 ma wei chai hu

Plants 50–100 cm, biennial. Taproot yellowish-brown, elongate-terete, unbranched. Stem solitary, several-branched above, slender, base purplish-tinged, without fibrous remnant sheaths. Basal leaves numerous, narrowly linear, 16–30 × 0.25–1 cm, thin-papery, abaxially slightly glaucous, 5-nerved, base tapering into petiole, margin white scariosus. Cauline leaves shorter, sessile, somewhat clasping. Umbels numerous, 1.2–3 cm across; peduncles and rays very slender; bracts 3–5, very small, 0.2–2 × 0.1–0.4 mm, lanceolate or squamose; rays (3)–4–6(–9), 7–50 mm, unequal; bracteoles 5, elliptic or spatulate, 1.5–2.5 × 0.5–1 mm, mostly shorter than umbellules in fruit; umbellules 2.5–5 mm across, 6–12-flowered; pedicels 1–1.5 mm. Petals yellow, midvein dark. Stylopodium low-conic, yellow. Fruit ovoid, brown, 2.6–3 × 2–2.2 mm, glaucous, base rounded; ribs inconspicuous; mericarps pentagonal in cross section; vittae 3 in each furrow, 4 on commissure. Fl. Jul–Aug, fr. Aug–Oct.

• Among shrubs, open slopes, roadsides; 1400–3200 m. S Gansu, W Sichuan, SE Xizang.

This species is used as a regional substitute for the Chinese medicine “chai hu.” It is similar to *Bupleurum malconense* but differs in the unbranched rootstock and the narrow, longer leaf blades.

32. *Bupleurum dielsianum* H. Wolff in Engler, Pflanzenr. 43 (IV. 228): 147. 1910.

太白柴胡 tai bai chai hu

Plant 50–75 cm, perennial. Taproot long-terete, unbranched. Stem solitary, erect, slender, branched above, base tinged purple, without fibrous remnant sheaths. Basal leaves linear, 5–7 × 0.3–0.5 cm including petioles, 5–7-nerved, thinly papery, abaxially greenish-white. Cauline leaves similar to basal, shortly petiolate. Apical leaves small, sessile. Umbels 3–4 cm across; bracts 1–2, lanceolate, 1–4 × 0.5–1.5 mm, unequal; rays (4)–6–10, 1–3 cm, unequal, very slender, spreading; bracteoles 5–6,

elliptic, 1–2 × 0.5–1 mm, membranous; umbellules 4–5 mm across, 10–14-flowered; pedicels very slender, 5–7 mm in flower, up to 10 mm in fruit, greatly exceeding the bracteoles. Petals yellow. Stylopodium low-conic, discoid, yellow. Fruit ellipsoid, brown, ca. 4 × 2 mm, slightly glaucous; ribs inconspicuous; mericarps near round in cross section; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Aug–Sep.

- Mountain slopes; ca. 2000 m. SW Shaanxi (Taibai Shan).

This species is used as a regional substitute for the Chinese medicine “chai hu.” It is a rather poorly known taxon, recorded only from a few collections.

33. *Bupleurum wenchuanense* R. H. Shan & Yin Li, *Acta Phytotax. Sin.* 12: 288. 1974.

汶川柴胡 wen chuan chai hu

Plant 40–90 cm, perennial. Taproot long, thickened, yellowish-brown, fusiform, little-branched. Stem solitary, much-branched throughout, branches long, slender, remote, base clothed with fibrous remnant sheaths. Basal leaves numerous, rosette-caespitose; blades oblanceolate, 5–12 × 0.2–0.4 cm, 3–5-nerved, tapering into petiole, base dilated, clasping. Lower leaves linear. Middle and upper leaves 1–8, subulate to squamose, 0.5–1 mm. Umbels numerous, remote, very small, ca. 4 mm across; bracts 2–3, subulate or squamose, 0.3–1.5 × 0.1–0.3 mm, unequal, rigid; rays (1–)2–3, 2–35 mm, filiform, very unequal; bracteoles 5–6(–7), obovate or elliptic, 0.6–1 × 0.3–0.5 mm, thick, shorter than flowers; umbellules 2–3 mm across, 1–4-flowered; pedicels 3–6 mm in flower, elongating in fruit. Petals yellow, midvein dark yellow. Stylopodium low-conic, yellow. Fruit ovoid, brown, ca. 2 × 1.5 mm; ribs prominent; vittae 2–3 in each furrow, 3–4 on commissure. Fl. and fr. Aug–Oct.

- Mountain slopes, grasslands; 1400–1800 m. NW Sichuan (upward from Min Jiang drainage basin).

This species is used as a regional substitute for the Chinese medicine “chai hu.”

34. *Bupleurum hamiltonii* N. P. Balakrishnan, *J. Bombay Nat. Hist. Soc.* 63: 328. 1967.

小柴胡 xiao chai hu

Herbs 10–100 cm, annual, or short-lived perennial. Root grayish-yellow, thin, woody, branched. Stem tinged purple, much branched throughout, branches slender, ascending, base without fibrous remnant sheaths. Leaves sessile, oblong-lanceolate or linear, 3–8 × 0.4–0.8 cm, 7–9-nerved, base slightly narrow, sometimes punctate with oil glands along veins and margin. Inflorescence profusely branched, umbels numerous, small, 1–2 cm across, lax; bracts 2–4, lanceolate or elliptic, 3–6 × 1–2 mm, unequal, 5–7-nerved; rays 2–5(–7), 0.5–2 cm, unequal, very slender; bracteoles 5, lanceolate or elliptic, 3–4 × 1–1.5 mm, equal, 3-nerved, apex apiculate, equaling or slightly longer than flowers; umbellules 1–1.3 mm across, 5–11-flowered; pedicels 0.5–1.5 mm. Petals yellow-green, suborbicular, midvein dark. Stylopodium low-conic, dark yellow. Fruit broad-ovoid or ellipsoid, brown, 2–2.5 × ca. 1.5 mm; ribs pale yellow, prominent; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Sep–Oct.

Forest margins, mountain slopes, grasslands, sunny slopes, shady wet places, dry stony areas; 600–2900 m. Hubei, Guangxi, Guizhou, Sichuan, S Xizang, NW Yunnan [Bhutan, N India, Kashmir, Malaysia, Myanmar, Nepal, Pakistan, Sikkim, Thailand, Vietnam].

All three varieties have reputed medicinal value.

- 1a. Plants annual, 10–25 cm, usually reddish throughout 34b. var. *humile*
- 1b. Plants biennial or perennial, usually 50–100 cm high, green.
 - 2a. Plants ca. 100 cm; bracts 2–3, equal; bracteoles usually 3, exceeding the flowers 34c. var. *paucifulcrans*
 - 2b. Plants 50–80 cm; bracts usually 4; bracteoles 5, equaling or slightly exceeding the flowers 34a. var. *hamiltonii*

34a. *Bupleurum hamiltonii* var. *hamiltonii*

小柴胡(原变种) xiao chai hu (yuan bian zhong)

Bupleurum tenue Buchanan-Hamilton ex D. Don, *Prodr. Fl. Nepal.* 182. 1825, not Salisbury (1796).

Plants 50–80 cm, biennial; bracts usually 4; bracteoles 5, equaling or slightly exceeding the flowers.

Grasslands, sunny slopes, dry stony areas; 600–2900 m. Hubei, Guangxi, Guizhou, Sichuan, S Xizang, NW Yunnan [Bhutan, N India, Kashmir, Malaysia, Myanmar, Nepal, Pakistan, Sikkim, Thailand, Vietnam].

34b. *Bupleurum hamiltonii* var. *humile* (Franchet) R. H. Shan & M. L. Sheh, *Vasc. Pl. Hengduan Mts.* 1: 1306. 1993.

矮小柴胡 ai xiao chai hu

Bupleurum tenue Buchanan-Hamilton ex D. Don var. *humile* Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 118. 1894.

Plants 10–25 cm, annual, usually reddish throughout. Branches numerous, short. Leaves small, thick-papery, 1–3 × 0.15–0.3 cm.

- Forest margins, mountain slopes, grasslands; 1100–2300 m. SW Sichuan, NW Yunnan [?Vietnam].

Records of this variety from Vietnam require confirmation.

34c. *Bupleurum hamiltonii* var. *paucifulcrans* C. Y. Wu ex R. H. Shan & Yin Li, *Acta Phytotax. Sin.* 12: 291. 1974.

三苞柴胡 san bao chai hu

Plants ca. 1 m, perennial. Stem stout. Leaves large, 6–8 × ca. 0.8 cm. Bracts 2–3; bracteoles usually 3, unequal, exceeding the flowers.

- Mountain slopes, shady wet places; ca. 1300 m. W Guizhou (Bijie).

35. *Bupleurum marginatum* Wallich ex de Candolle, *Prodr.* 4: 132. 1830.

竹叶柴胡 zhu ye chai hu

Plants 25–120 cm high, perennial. Taproot stout, woody, branched. Stem rigid, base woody, usually tinged purple, without fibrous remnant sheaths. Leaves long-lanceolate to linear,

10–16 × 0.6–1.4 cm, thinly coriaceous, nerves 9–13, base tapering and clasping, margin conspicuously white-cartilaginous, apex acute or acuminate, apiculate. Upper leaves small. Inflorescence much-branched, umbels numerous, 1.5–4 cm across, lateral umbels often overtopping the terminal; bracts 2–5, lanceolate or squamose, 1–4 × 0.2–1 mm, unequal; rays 3–4(–7), 1–3 cm, unequal; bracteoles 5, lanceolate, 1.5–2.5 × 0.5–1 mm, shorter than pedicels, apex apiculate, margin white-scarious; umbellules 4–9 mm across, (6–)8–10(–12)-flowered. Petals pale yellow. Stylopodium low-conic, dark yellow. Fruit oblong, brown, 3.5–4.5 × 1.8–2.2 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. Jun–Sep, fr. Sep–Nov. $n = 12^*$.

Forests, alpine forests, mountain slopes, grasslands, river banks, roadsides; 700–4000 m. S Gansu, Guizhou, Hubei, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, NE India, Kashmir, Myanmar, Nepal, Pakistan, Sikkim].

The root is widely used as a substitute for the Chinese medicine “chai hu.”

- 1a. Plants 50–120 cm; leaves broad, 10–16 × 0.6–1.4 cm, cartilaginous margin broad 35a. var. *marginatum*
 1b. Plants 25–60 cm; leaves narrow, 3–10 × 0.3–0.6 cm, cartilaginous margin narrow 35b. var. *stenophyllum*

35a. *Bupleurum marginatum* var. *marginatum*

竹叶柴胡(原变种) zhu ye chai hu (yuan bian zhong)

Bupleurum falcatum Linnaeus subsp. *marginatum* (Wallich ex de Candolle) H. Wolff; *B. falcatum* var. *marginatum* (Wallich ex de Candolle) C. B. Clarke.

Plants 50–120 cm. Leaves broad, 10–16 × 0.6–1.4 cm, cartilaginous margin broad. Bracteoles shorter than pedicels. Fl. Jun–Sep, fr. Sep–Nov. $n = 12^*$.

Forests, mountain slopes, grasslands; 700–3100 m. S Gansu, Guizhou, Hubei, Sichuan, E and S Xizang, Yunnan [Bhutan, NE India, Kashmir, Myanmar, Nepal, Pakistan, Sikkim].

35b. *Bupleurum marginatum* var. *stenophyllum* (H. Wolff) R. H. Shan & Yin Li, Acta Phytotax. Sin. 12: 292. 1974.

窄竹叶柴胡 zhai zhu ye chai hu

Bupleurum falcatum var. *stenophyllum* H. Wolff in Handel-Mazzetti, Symb. Sin. 7: 713. 1933; *B. falcatum* f. *stenophyllum* (H. Wolff) P. K. Mukherjee & B. D. Naithani; *B. marginatum* f. *stenophyllum* (H. Wolff) H. J. Chowdhery & Wadhwa.

Plants 25–60 cm. Leaves narrow, 3–10 × 0.3–0.6 cm, cartilaginous margin narrow. Bracteoles longer than the pedicels. Fl. Aug–Sep, fr. Sep–Oct. $n = 7^*$.

• Alpine forests, river banks, roadsides; 2300–4000 m. Qinghai, Sichuan, Xizang, Yunnan [?Bhutan, ?E Nepal].

The taxonomic status of var. *stenophyllum* requires further study. Some authors treat it as conspecific with *Bupleurum marginatum* without any infraspecific designation, but the difference in chromosome numbers favors treating it as a separate taxon, perhaps as a separate species.

36. *Bupleurum chaishou* R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(1): 299. 1979.

柴首 chai shou

Plants 0.5–1 m, perennial. Taproot gray-brown, stout, digitate-branched, capitate, woody when old forming a thickened caudex. Stems many, tufted, base without fibrous remnant sheaths. Basal leaves numerous, subsessile or shortly petiolate; blade oblanceolate, 4–6 × ca. 0.5 cm, dark gray-green, glabrous, nerves 7, margin white cartilaginous, apex obtuse. Cauline leaves lanceolate to elliptic, very unequal at the same node, 1.2–9 × 0.3–1.2 cm, 5-nerved, usually reflexed. Umbels numerous, small, terminal umbels 1–2(–4) cm across, lateral umbels less than 1 cm; bracts 2–4, linear, 0.6–7 × 0.3–1 mm, unequal; rays 3–5, 0.2–3 cm, slender when young, thickening with age; bracteoles 5, obovate or obovate-elliptic, 1.2–2.8 × 0.5–0.8 mm, equaling or exceeding the umbellules, nerves 3; umbellules ca. 5 mm across, 4–10-flowered; pedicels ca. 1 mm. Petals yellow. Stylopodium low-conic, yellow. Fruit ovoid-ellipsoid, brown, 3–3.5 × ca. 2 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Aug–Oct.

• Among shrubs, sunny slopes; 2100–2700 m. NW Sichuan.

The multi-branched and thickened rootstock is used as the traditional Chinese medicine “chai shou” (柴首). The crude drug looks like a large head, hence the name “shou” (head).

37. *Bupleurum gracilipes* Diels, Bot. Jahrb. Syst. 29: 493. 1900.

细柄柴胡 xi bing chai hu

Plants 50–90 cm, perennial. Root long, thickened, branched. Stem usually solitary, erect, branched at base, base without fibrous remnant sheaths. Basal leaves oblanceolate, 8–18 × 1–1.4 cm including petioles, base narrow, clasping, apex acute. Cauline leaves subsessile, oblanceolate or narrowly long-elliptic, 5–9 × 0.7–1 cm, abaxially grayish-green, 5–7-nerved, apex obtuse, apiculate. Upper leaves sessile, small, lanceolate. Umbels 1.5–4 cm across; bracts 3–5, elliptic or ovate, 3–7 × 1–3 mm, unequal; rays 2–3(–5), thin and rigid, 1–3 cm, unequal; bracteoles 4–5, green, 3–4 × 2–2.5 mm, margin membranous, exceeding umbellules in flower, but shorter in fruit; umbellules ca. 5 mm across, 5–10-flowered; pedicels ca. 1 mm. Petals pale yellow, midvein dark. Stylopodium low-conic, yellow. Fruit oblong-ellipsoid, brown, ca. 4 × 1.5 mm, glaucous; ribs prominent; vittae 3 in each furrow, 2–4 on commissure. Fl. and fr. Jun–Aug.

• Forests, shady valleys; 1400–1700 m. Chongqing (Nanchuan).

This poorly known taxon is recorded only from a few collections.

38. *Bupleurum chinense* de Candolle, Prodr. 4: 128. 1830.

北柴胡 bei chai hu

Bupleurum chinense Franchet (1883), not de Candolle (1830); *B. chinense* de Candolle f. *vanheurckii* (Müller Argovienensis) R. H. Shan & Yin Li; *B. falcatum* Linnaeus f. *ensifolium* H. Wolff; *B. togasii* Kitagawa; *B. vanheurckii* Müller Argovienensis.

Plants 50–85 cm, perennial. Root stout, elongate, brown, woody, usually branched. Stem solitary or several, dichotomously much-branched above, base without fibrous remnant

sheaths. Basal leaves oblanceolate or narrow-elliptic, 4–7 × 0.6–0.8 cm, base tapering into petioles, apex acuminate. Middle leaves broadly linear-lanceolate, 4–12 × 0.6–1.8(–3) cm, 7–9-nerved, abaxially glaucous, apex apiculate. Apical leaves small. Umbels numerous, 2–6 cm across; peduncles slender, greatly spreading forming a large loose panicle; bracts 0 or 2–3, linear, 1–5 × 0.5–1 mm, 3-nerved; rays 3–8, very slender, 1–3 cm, unequal; bracteoles 5, lanceolate, 3–3.5 × 0.6–1 mm, shorter than flowers; umbellules 4–6 mm across, 5–10-flowered. Petal bright yellow. Stylopodium low-conic, discoid, dark yellow. Fruit oblong, brown, ca. 3 × 2 mm; ribs prominent, narrowly winged, wings pale brown; vittae 3(–4) in each furrow, 4 on commissure. Fl. and fr. Sep–Oct. $n = 6^*$.

• Grasslands, stream banks, sunny slopes, roadsides; 100–2700 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Zhejiang.

This *Bupleurum* is one of two primary species the roots of which are used for the major traditional Chinese medicine “chai hu” (see also *B. scorzonerifolium*). It is a very widespread species, within which three forms are currently recognized: f. *pekinense* (Franchet ex Hemsley) R. H. Shan & Yin Li (Acta Phytotax. Sin. 12: 293. 1974; *B. pekinense* Franchet ex Hemsley, J. Linn. Soc., Bot. 23: 327. 1887), distinguished by having leaves rigid, papery, both surfaces gray-green; f. *chiliosciadium* (H. Wolff) R. H. Shan & Yin Li (loc. cit.; *B. falcatum* Linnaeus var. *chiliosciadium* H. Wolff, Acta Horti Gothob. 2: 303. 1926), distinguished by having peduncles much-branched and umbellules numerous, small; and f. *ocoradiatum* (Bunge) R. H. Shan & M. L. Sheh (Fl. Reipubl. Popularis Sin. 55(1): 293. 1979; *B. ocoradiatum* Bunge, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 2: 106. 1835), distinguished by having branches non-flexuous, bracteoles elliptic-lanceolate, usually exceeding umbellules in flower and longer than pedicels in fruit, and chromosome number $n = 6 + 1 - 2B^*$.

39. *Bupleurum polyclonum* Yin Li & S. L. Pan, Acta Phytotax. Sin. 22: 131. 1984.

多枝柴胡 duo zhi chai hu

Plants 15–40 cm, perennial. Taproot slender, woody, annular leaf scars dense. Stem much branched throughout, base without fibrous remnant sheaths. Basal leaves caespitose, linear, 10–20 × 0.2–0.3 cm. Cauline leaves remote, linear, 13–15 × 0.15–0.3 cm. Apical leaves subulate, 3–5-nerved. Inflorescence much dichotomously branched, forming a large panicle; umbels numerous, 1.5–3 cm across; bracts 4–5, elliptic or obovate, 2–8 × 1–3 mm, unequal, 5–7-nerved; rays 3–6, 1–3 cm, unequal, very slender; bracteoles ca. 5, obovate, 3–4 × 2–3 mm, exceeding the flowers; umbellules 1.5–4 mm across, 7–15-flowered; pedicels ca. 1.5 mm. Petals yellow. Stylopodium low-conic, yellow. Fruit oblong, brown, 2–3 × 1.2–1.5 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

• Mountain slopes; ca. 2200 m. NE Yunnan (Huize).

The roots are used in traditional Chinese medicine. This poorly known taxon is recorded only from a few collections.

40. *Bupleurum kunmingense* Yin Li & S. L. Pan, Acta Phytotax. Sin. 22: 131. 1984.

韭叶柴胡 jiu ye chai hu

Plant 60–100 cm, perennial. Taproot slender, woody, rarely branched. Stem green, erect, base densely marked with annular leaf scars, without fibrous remnant sheaths. Basal leaves numerous, linear, 10–15 × 0.3–0.5 cm, abaxially glaucous, 3–7-nerved, thinly papery, base tapering, apex acuminate. Cauline leaves remote; blade narrowly lanceolate. Apical leaves small, 8–10 × 1.5–5 mm, 3–5-nerved, clasping. Umbels 1.5–4.5 cm across; bracts 5–8, narrow-elliptic, 1.5–5 × 1–2 mm, unequal; rays 4–11, 1–2.5 cm, unequal, slender; bracteoles 5, obovate or broad-elliptic, 2.5–3.5 × 1–2 mm, 3–5-nerved, greenish, exceeding the flowers; umbellules 4–6 mm across, 8–14-flowered; pedicels 1–1.5 mm, slender. Petals yellow. Stylopodium low-conic, yellow. Fruit oblong, brown, 2–3 × 1–2 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. Jul–Sep, fr. Aug–Oct.

• Upland slopes; ca. 2000 m. E Yunnan (Kunming, Luxi).

The roots are used in traditional Chinese medicine. This rather poorly known taxon is recorded only from a few collections.

41. *Bupleurum qinghaiense* Yin Li & J. X. Guo, J. Chin. Pharm. Sci. 2: 39. 1993.

青海柴胡 qing hai chai hu

Plants 30–80 cm, perennial. Root yellowish-brown, woody, slender. Stem erect, green, base without fibrous remnant sheaths. Basal leaves linear, 10–14 × 0.3–0.5 cm, 5-nerved, papery, base tapering into petiole. Cauline leaves linear, 8–10 × 0.4–0.5 cm, 5-nerved, petiolate, clasping. Apical leaves short-linear. Umbels 2–3.5 cm across; bracts 3–4, oblong, 2–7 × 1–2 mm, 5-nerved; rays 6–13, 4–33 mm, unequal; bracteoles 5–7, obovate, 3–4 × 1–2 mm, green, 3-nerved, thickly papery, exceeding the flowers; umbellules 5–8 mm across, 5–26-flowered; pedicels 1–2 mm, very slender. Petals yellow. Stylopodium low-conic, yellow. Fruit oblong, brown, 2–3 × ca. 1.5 mm; ribs prominent; vittae 3 in each furrow, 4 on commissure. Fl. and fr. Jun–Aug.

• Sunny slopes, grassy places; 3200–3700 m. Qinghai (Wanglin).

This rather poorly known taxon is recorded only from a few collections.

42. *Bupleurum kaioi* T. S. Liu et al., Quart. J. Taiwan Mus. 14: 22. 1961.

台湾柴胡 tai wan chai hu

Plants 30–70 cm, perennial. Rootstock slender, branched. Stems several, erect, much-branched from base, base without fibrous remnant sheaths. Basal and lower leaves petiolate; blade oblong-lanceolate or spatulate, 5–10 × 0.5–1 cm, apex acute. Upper leaves numerous, sessile, oblanceolate to oblong-spatulate, 1–3 × 0.3–0.7 cm, almost embracing, 5–7-nerved. Umbels 3–5 cm across; bracts 2–3, lanceolate, 5–10 × 3–5 mm; rays 5–6, 1–3 cm, unequal; bracteoles 4–5, linear-lanceolate, 1–5 mm; umbellules ca. 1 cm across, ca. 5-flowered; pedicels 1–3 mm. Petals yellow. Stylopodium low-conic, yellow. Fruit oblong, brown, 2–3 × 1–1.5 mm; vittae large, usually 2–3 in each furrow, 4 on commissure. Fl. and fr. Jun–Aug. $n = 12^*$.

• Mountain slopes; ca. 100 m. C and N Taiwan.

This species has reputed medicinal value. It is the only species of *Bupleurum* reported from Taiwan, but is rather poorly known and is recorded only from a few collections.

35. APHANOPLEURA Boissier, Fl. Orient. 2: 855. 1872.隐棱芹属 *yin leng qin shu*She Menglan (余孟兰 *Sheh Meng-lan*); Mark F. Watson

Herbs annual, small, slender. Root thin. Stem erect, base without remnant sheaths. Leaves 2–3-pinnate or entire, petiole sheath very narrow, margin scarious. Leaves reduced upwards, becoming 3-lobed. Umbels compound, terminal on stem and branches; bracts and bracteoles usually present. Calyx teeth obsolete. Petals white or pinkish, obovate, midvein yellow-brown, prominent, apex narrow, inflexed, abaxially pubescent along midvein. Stylopodium low-conic; styles divergent, ca. twice as long as the stylopodium. Fruit ovoid or subglobose, slightly flattened laterally, mericarp pentagonal in cross section, densely pubescent with clavate-tipped bristles; ribs 5, all rounded or obscure; vittae large, 1 in each furrow, 2 on commissure. Seed face plane. Carpophore shortly bifid at apex.

Three or four species: C Asia; two species in China.

- 1a. Plant glabrous; bracts absent or inconspicuous; basal leaves 2-pinnate or 2-ternate 1. *A. capillifolia*
 1b. Plant pubescent; bracts conspicuous; basal leaves simple, entire, 3-lobed or 3-toothed, 2. *A. leptoclada*

1. *Aphanopleura capillifolia* (Regel & Schmalhausén) Lipsky, *Izv. Imp. Akad. Nauk* 4: 379. 1896. 细枝隐棱芹 *xi zhi yin leng qin*

细叶隐棱芹 *xi ye yin leng qin*

Pimpinella capillifolia Regel & Schmalhausén, *Izv. Imp. Obsch. Lyubit. Estestv. Moskovsk. Univ.* 34: 29. 1881.

Plant 7–12(–30) cm, glabrous. Stem sometimes purplish-red in lower parts. Lower leaves shortly petiolate, petioles 3–12 mm; blade 2–3 × 1–2 cm, 2-pinnate or 2-ternate; ultimate segments filiform, linear or narrow-lanceolate, 5–10(–25) × 0.5–1(–2) mm, apex acute. Umbels 1.5–2.5 cm across; bracts absent or rarely 1, lanceolate, ca. 1.2 mm, membranous; rays 3–8, 9–16 mm, slender, divergent; bracteoles 4–6(–7), lanceolate or linear-lanceolate, 1–1.5 mm, shorter than flowers, margins broadly scarious, sometimes ciliate; umbellules 4–8 mm across; pedicels 7–12, 1.5–5 mm, longer in fruit. Petals ca. 1 × 0.7 mm. Fruit broadly ovoid, 1.2–1.5 × 0.8–1.1 mm; bristles 0.2–0.3 mm. Fl. Apr–Jun, fr. May–Jun.

Mountain slopes, sandy deserts; 1400–2500 m. W Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

2. *Aphanopleura leptoclada* (Aitchison & Hemsley) Lipsky, *Izv. Imp. Akad. Nauk* 4: 377. 1896.

Carum leptocladum Aitchison & Hemsley, *Trans. Linn. Soc. London, Bot.* 2: 66. 1888–1889.

Plants 10–40 cm, sparsely pubescent throughout, sometimes glabrescent. Lower leaves petiolate, petiole 1–2 cm; blade lanceolate, oblong-lanceolate or obtusely in outline, 2–5 × 0.5–2 cm, 3-lobed, 3-toothed, or entire; ultimate segments almost linear, 0.6–4.0 × 0.6–2.8 mm, base tapering into the long petiole, apex acute. Leaves reduced upwards, ultimate segments becoming narrower. Umbels numerous, usually opposite leaves, 2.5–6 cm across, open; peduncles long, 1.8–5 cm; bracts 2–5, lanceolate-acute, 2–3.5 mm, white membranous, central stripe yellow, abaxially puberulous, margins ciliate; rays 5–10, 1.5–5 cm, very slender, divergent; bracteoles 5–6, ovate-lanceolate, 1–2.5 mm, much shorter than flowers, similar to bracts; umbellules ca. 10-flowered, 6–10 mm across, pedicels 2.5–12 mm, longer in fruit. Petals ca. 1 × 0.5 mm. Fruit ovoid, 2–3 × 1.2–1.8 mm; bristles 0.2–0.4 mm. Fl. Apr–May, fr. Jun.

Grasslands, stable sandy places, cultivated land; ca. 1500 m. W Xinjiang [Afghanistan, Tajikistan, Turkmenistan, Uzbekistan].

36. CUMINUM Linnaeus, Sp. Pl. 1: 254. 1753.孜然芹属 *zi ran qin shu*Pu Fading (溥发鼎 *Pu Fa-ting*); Mark F. Watson

Herbs, annual, glaucescent throughout, glabrous except the setulose fruit. Taproot slender. Stem erect, slender, profusely branched. Basal leaves petiolate, base with narrow membranous wing; blade 2-ternate; ultimate segments filiform. Leaves reduced upwards, becoming sessile. Umbels lax, terminal and lateral; bracts and bracteoles several, similar to leaves but more cartilaginous, apex subulate, persistent; rays and pedicels very unequal. Calyx teeth subulate, conspicuous, unequal, persistent in fruit. Petals white or pinkish, obovate or oblong, base cuneate, with a small inflexed lobule. Stylopodium conic, attenuate into styles; styles short, reflexed. Fruit oblong-ellipsoid, slightly laterally compressed; primary and secondary ribs prominent, setulose; vittae 1 in each furrow under secondary ribs, 2 on commissure. Seed face slightly concave. Carpophore 2-parted

Four species: N Africa, C and SW Asia, Mediterranean region, North America; one species (introduced) in China.

1. *Cuminum cyminum* Linnaeus, Sp. Pl. 1: 254. 1753.

孜然芹 *zi ran qin*

Plants 10–30(–50) cm. Basal petioles 1–2 cm, sheaths lanceolate, margins white and membranous; blade 3–8 × 2–7 cm;

ultimate divisions long-filiform, 15–60 × 0.4–0.7 mm. Umbels many, 2–3 cm across; peduncles 3–10 cm; bracts 2–6(–8), linear or linear-lanceolate, 10–50 × 0.5–1.2 mm, unequal, entire or apex 2–3-fid, usually longer than the rays, margins membranous; rays (1–)3–6, 3–20 mm, rather stout, very unequal; brac-

teoles 3–5, similar to bracts, 4–10 × 0.3–0.6 mm, very unequal, sometimes reflexed; umbellules 3–8-flowered; pedicels 3–6 mm, stout, very unequal. Calyx teeth 0.5–2 mm, longer than the styles. Petals ca. 1.4 × 1 mm. Fruit 5–7 × 1.6–2.8 mm; primary ribs short setulose, secondary ribs densely stellate setulose. Fl. and fr. Feb–Jun(–Sep).

Cultivated. Xinjiang [possibly native to SW Asia and the Mediterranean region].

The aromatic fruits (cumin) are used as a flavoring, to aid digestion, and are of reputed medicinal value. This species is widely cultivated in favorable climates outside its presumed native range. It readily escapes and becomes more or less naturalized locally in many areas.

37. *APIUM* Linnaeus, Sp. Pl. 1: 264. 1753.

芹属 qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, annual or biennial, glabrous. Stem erect, ridged and shallowly fluted. Leaves petiolate, with membranous sheaths; leaf blade pinnate to ternate-pinnately compound. Umbels compound, loose to subcompact; peduncles usually short or abortive; bracts and bracteoles absent; rays few, spreading-ascending or spreading; umbellules few-flowered. Petals white or greenish-yellow, ovate to suborbicular, apex narrow, inflexed. Calyx teeth obsolete. Stylopodium low-conic to depressed; styles short, erect to reflexed. Fruit globose to ellipsoid, rounded at both ends, slightly compressed laterally, mericarp nearly rounded in cross section, commissural face constricted, glabrous; ribs 5, prominent, acute; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore stout, entire or bifid at the apex.

About 20 species: widespread in the temperate zones of both hemispheres; one species (introduced) in China.

1. *Apium graveolens* Linnaeus, Sp. Pl. 1: 264. 1753.

旱芹 han qin

Apium integrilobum Hayata.

Plants 15–150 cm, strongly fragrant. Basal leaves oblong to obovate, 7–18 × 3.5–8 cm, 3-lobed to 3-parted; ultimate segments subrhombic, 1.2–2.5 × 0.8–2.5 cm, crenate or serrate. Upper leaves short-petiolate; blade broad-triangular, usually 3-parted, ultimate segments obovate. Umbels 1.5–4 cm across, usually leaf-opposed; peduncles usually short, 4–15 mm, stout, rarely obsolete; rays 3–8(–16), 0.5–2.5 cm, slender; umbellules

7–25-flowered, 6–9 mm across; pedicels 1–1.5 mm. Fruit 1.3–1.5 × 1–2 mm. Fl. and fr. Apr–Jul.

Widely cultivated and adventive throughout China [?native to Asia and Europe; cultivated and adventive worldwide].

This cosmopolitan species is cultivated as a vegetable (celery and celeriac) and is adventive in temperate regions worldwide. It has been cultivated since ancient times and features in the herbal medicinal traditions of many civilizations. All parts of the plant are used in traditional Chinese medicine as the dietary herb “qin” (also known as “han qin” and “qin cai”). There are several cultivated varieties; the cultivated Chinese celery is thought to be close or identical to var. *secalinum* Alefeld.

38. *PETROSELINUM* Hill, Brit. Herb. 424. 1756.

欧芹属 ou qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs biennial, rarely annual, glabrous. Root narrowly conic. Stem erect, branching above, base without remnant sheaths. Leaf blades triangular, 2–3-pinnate; ultimate segments ovate to linear, toothed or lobed. Umbels loose compound, terminal and axillary; bracts few or absent; bracteoles several. Calyx teeth obsolete. Petals yellow or yellowish-green, obovate, apex emarginate, narrow, inflexed. Stylopodium low-conic; styles short, spreading. Fruit ovoid-oblong, slightly flattened laterally, mericarps subrounded in cross section, commissure constricted, glabrous, shiny; ribs 5, filiform, prominent; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base or to middle.

About two species: native in S and W Europe; cultivated worldwide; one species (introduced) in China.

1. *Petroselinum crispum* (Miller) Nyman ex A. W. Hill, Hand-List Herb. Pl. Kew., ed. 3, 122. 1925.

欧芹 ou qin

Apium crispum Miller, Gard. Dict., ed. 8, *Apium* no. 2. 1768; *Petroselinum hortense* Hoffmann var. *crispum* (Miller) L. H. Bailey.

Plant 30–100 cm. Basal leaves long-petiolate, petioles 3–7 cm, narrowly sheathing at base; blade 5–8 × 4–7 cm; ultimate segments narrowly elliptic or ovate, 4–12 × 1.5–9 mm, 3-parted or deeply toothed, teeth obtuse, white-mucronate, adaxially

shiny. Leaves reduced upwards, becoming 3-lobed, segments narrower, lanceolate-linear, entire or 3-lobed. Umbels 3–6(–8) cm across; bracts 1–2 or absent, linear, 2–5 mm, apex acute, thinly coriaceous; rays 10–25(–30), 1–2.5(–5) cm, subequal; bracteoles 6–8, linear or subulate, 1.5–2.5 mm, shorter than flowers; umbellules ca. 20-flowered; pedicels 1.5–4.5 mm. Fruit 2–4 × 1.5–3 mm, gray-brown. Fl. and fr. Jun–Jul.

Cultivated in some cities in China [possibly native to the W Mediterranean region].

This species is cultivated in many temperate countries worldwide as a culinary herb (parsley) and is often adventive. It has reputed medicinal value.

39. *CICUTA* Linnaeus, Sp. Pl. 1: 255. 1753.

毒芹属 *du qin shu*She Menglan (余孟兰 *Sheh Meng-lan*); Mark F. Watson

Herbs, perennial, stout, glabrous. Rootstock swollen, with transverse air chambers, roots fascicled. Stems tall, erect, hollow, branched above, striate. Leaves petiolate, sheath narrow, clasping, membranous; leaf blade (1–)2–3-pinnate; ultimate segments narrow, linear-lanceolate or lanceolate, serrate or dentate. Umbels compound, lax, terminal or lateral; bracts absent or few, inconspicuous; rays numerous, long, slender, ascending-spreading; bracteoles numerous, narrow, longer or shorter than the flowers. Calyx teeth conspicuous, ovate-triangular. Petals white or greenish-white, obovate or suborbicular, apex narrow, inflexed. Stylopodium depressed; styles slender, reflexed when mature. Fruit ovoid-globose, rounded at both ends or base cordate, flattened laterally, glabrous; ribs 5, thick, corky; vittae 1 in each furrow, 2 on commissure. Seed face plane or slightly concave. Carpophore 2-fid.

About three species: N temperate zone; one species in China.

1. *Cicuta virosa* Linnaeus, Sp. Pl. 1: 255. 1753.毒芹 *du qin*

Plants 70–120 cm. Rootstock 2–4 cm thick, surface tawny, yellow within, exudes yellow sap when cut. Stem solitary, sometimes purplish-tinged. Basal leaves petiolate, petioles 15–30 cm; blade triangular or ovate-triangular, 12–30 × 10–25 cm; pinnae 3-lobed or pinnatifid; ultimate segments linear-lanceolate or lanceolate, 1.5–6 × 0.3–1 cm, serrate to sharply serrate. Upper leaves 1–2-pinnate; ultimate segments narrowly lanceolate, 1–2.5 × 0.2–0.5 cm. Umbels 5–15 cm across; peduncles 2.5–20 cm; bracts absent or 1, linear, ca. 8 mm; rays 6–25, 2–6 cm, subequal, slender; bracteoles numerous, linear-lanceolate, 3–5 × 0.5–0.9 mm, almost as long as flowers, rarely longer; umbellules 15–35-flowered; pedicels 4–8 mm. Calyx teeth 0.3–0.5 mm, unequal. Petals ca. 1.2 × 1 mm. Fruit 2–3.5 × 1.8–3 mm. Fl. and fr. Jul–Sep.

Forest margins, marshy areas, bogs, streamsides, often emergent in shallow water; 300–3300 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Kashmir, Korea, Mongolia, Russia; Europe].

- 1a. Ultimate leaf segments linear-lanceolate or narrowly lanceolate, 1.5–6 × 0.3–1 cm 1a. var. *virosa*
 1b. Ultimate leaf segments long-elliptic or ovate, 5–10 × 2–4 cm 1b. var. *latisecta*

40. TRACHYSPERMUM Link, Enum. Hort. Berol. Alt. 1: 267. 1821, nom. cons.糙果芹属 *cao guo qin shu*She Menglan (余孟兰 *Sheh Meng-lan*); Mark F. Watson*Ammios* Moench, nom. rej.

Herbs, perennial or annual. Taproot narrow. Stem erect, terete, much-branched, usually puberulous, rarely glabrous. Basal leaves 2–3-pinnate-ternate/pinnatisect; ultimate segments ovate, narrowly lanceolate to filiform, sessile or short-petiolate, base usually broad-cuneate or truncate, margin sparingly irregularly serrate, dentate or entire, glabrous on both surfaces. Umbels compound, loose, terminal and lateral; peduncles slender; bracts and bracteoles absent, rarely present, linear; rays few, slender. Calyx teeth obsolete. Petals white, obovate, apex narrow, inflexed, abaxially sparsely scaberulous. Stylopodium conic; styles short, divaricate. Fruit ovoid-globose or broadly ellipsoid, base rounded or cordate, slightly flattened laterally, nearly round in cross section, white strigose or papillose; ribs 5, filiform, prominent to scarcely so; vittae (1–)2–3 in each furrow, 2–6 on commissure. Seed face plane. Carpophore 2-cleft to base.

About 12 species: Africa to Asia; four species (two endemic, two introduced) in China.

This rather heterogeneous genus has uncertain generic boundaries with *Pimpinella*.

- 1a. Plants biennial or perennial; bracts and bracteoles absent.
 2a. Upper leaves pinnate; fruit surface scabrous 1. *T. scaberulum*
 2b. Upper leaves usually 3-lobed or undivided, linear; fruit surface densely strigose 2. *T. triradiatum*
 1b. Plants annual; bracts and bracteoles present, linear-subulate, 3–5 mm.
 3a. Plants hirtellous, at least in inflorescence, leaf segments narrowly oblong, 2–3 mm broad; fruit densely

1a. *Cicuta virosa* var. ***virosa***毒芹(原变种) *du qin (yuan bian zhong)**Cicuta virosa* f. *longiinvolutellata* Y. C. Chu.

Ultimate segments of leaves linear-lanceolate or narrowly lanceolate. Seed face slightly concave.

Forest margins, marshy areas, bogs, streamsides, often emergent in shallow water; 400–3300 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Sichuan, Xinjiang, Yunnan [Japan, Kashmir, Korea, Mongolia, Russia; Europe].

All parts are highly toxic, especially the rootstock; nevertheless, the plant has reputed medicinal value.

1b. *Cicuta virosa* var. ***latisecta*** Čelakovský, Prodr. Fl. Böhmen 3: 563. 1875.宽叶毒芹 *kuan ye du qin**Cicuta nipponica* Franchet.

Ultimate segments of leaves long-elliptic or elliptic-ovate, 5–10 × 2–4 cm, base cuneate, irregularly serrulate, apex acuminate. Seed face plane.

Marshy places; 300–500 m. Jilin, Shanxi [Japan, SE Russia].

- hirtellous to glabrescent 3. *T. roxburghianum*
 3b. Plants essentially glabrous; leaf segments linear-filiform, 0.2–0.3 mm broad; fruit minutely papillose 4. *T. ammi*

1. *Trachyspermum scaberulum* (Franchet) H. Wolff in Handel-Mazzetti, Symb. Sin. 7: 713. 1933.

糙果芹 *cao guo qin*

Plants perennial, 70–160 cm. Stem hollow, much branched above, scabrous. Basal and lower leaves petiolate, petioles 2–5 cm, slender, scabrous; blade ovate-triangular, 3–10 × 2.5–7 cm, deeply 1–2-pinnatifid; ultimate segments broad-ovate, ovate-lanceolate or nearly ovate-triangular, 1–3.5 × 0.5–2.5 cm, base cuneate, truncate or cordate, irregularly serrate or dentate, strigose on both surfaces, apex acuminate. Leaves reduced upwards, ultimate segments becoming narrow. Umbels many, 2.5–4 cm across, lax; peduncles 1–4 cm, slender; bracts and bracteoles absent; rays 3–8, 1–2 cm, very slender, spreading widely; umbellules 3–8-flowered, 3–5 mm across; pedicels very thin, 0.5–2 mm, unequal. Petals white, ca. 0.8 × 0.7 mm. Fruit ovoid-globose, 0.9–1.1 × 1.1–1.3 mm across, base cordate, surface scabrous with short appressed hairs. Fl. and fr. Jul–Sep.

• Open forests or scrub on mountain slopes, grassy places on mountain slopes or roadsides; 600–3000 m. Guangxi, Guizhou, Sichuan, Yunnan.

- 1a. Plants sparsely scabrous; ultimate leaf segments irregularly serrate or dentate 1a. var. *scaberulum*
 1b. Plants densely pubescent throughout; ultimate leaf segments deeply dentate to pinnate 1b. var. *ambrosiifolium*

1a. *Trachyspermum scaberulum* var. *scaberulum*

糙果芹(原变种) *cao guo qin* (yuan bian zhong)

Carum scaberulum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 125. 1894; *Pimpinella scaberula* (Franchet) H. de Boissieu.

Plants sparsely scabrous. Ultimate leaf segments irregularly serrate or dentate.

• Open forests or scrub on mountain slopes, grassy places on roadsides; 600–2600 m. Guangxi, Guizhou, Sichuan, Yunnan.

1b. *Trachyspermum scaberulum* var. *ambrosiifolium* (Franchet) R. H. Shan, Sinensia 11: 166. 1940.

豚草叶糙果芹 *tun cao ye cao guo qin*

Carum scaberulum var. *ambrosiifolium* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 125. 1894; *Pimpinella scaberula* var. *ambrosiifolia* (Franchet) H. Wolff.

Plants densely pubescent throughout. Ultimate leaf segments deeply dentate to pinnate.

• Grassy places on mountain slopes; ca. 3000 m. Sichuan, Yunnan.

2. *Trachyspermum triradiatum* H. Wolff, Acta Horti Gothob. 2: 305. 1926.

马尔康糙果芹 *ma er kang cao guo qin*

Plants 60–90 cm, perennial, scabrous or shortly hirtellous throughout. Basal leaves petiolate, petioles 1–2.5 cm, sheaths short; blade 2–2.5 cm, pinnate; pinnae 3–5, ovate or obovate, 5–15 × 2–12 mm, 3-parted or apex 3-lobed, base cuneate, margin entire or sparingly dentate. Leaves reduced upwards, becoming 3-parted, segments linear, entire or 1–2-serrate. Umbels 1.5–2 cm, numerous, leaf-opposed; peduncles 1–5 cm; bracts and bracteoles absent; rays 2–4, 5–13 mm; umbellule 3–7-flowered; pedicels 1–2 mm, very slender, elongating in fruit. Petals obovate, ca. 1 × 1 mm. Fruit broadly ovoid-acuminate, ca. 1.8 × 1.5 mm, densely white strigose. Fl. and fr. Aug–Sep.

• Mountain slopes, roadsides; 2600–3200 m. Sichuan (Drogochi).

This incompletely known taxon is recorded only from a few collections

3. *Trachyspermum roxburghianum* (de Candolle) H. Wolff in Engler, Pflanzenr. 90(IV. 228): 129. 1927.

滇南糙果芹 *dian nan cao guo qin*

Ptychotis roxburghiana de Candolle, Prodr. 4: 109. 1830; *Apium involucratum* Roxburgh; *Carum roxburghianum* (de Candolle) Kurz; *C. stictocarpum* C. B. Clarke; *Pimpinella involucrata* (Roxburgh) Wight & Arnott; *Ptychotis involucrata* (Roxburgh) Lindley; *Trachyspermum involucratum* (Roxburgh) H. Wolff; *T. roxburghianum* (de Candolle) H. Wolff; *T. stictocarpum* (C. B. Clarke) H. Wolff.

Plants annual, 20–100 cm. Leaves petiolate, petioles slender, 1–2 cm; blade ovate in outline, 3–8 × 2–12 cm, 2-pinnate or ternate-pinnate; ultimate segments narrowly oblong, 5–20 × 2–3 mm, base cuneate. Leaves reduced upwards, ultimate segments becoming linear-lanceolate. Umbels 2–4 cm across; peduncles 5–9 cm; bracts and bracteoles few, linear-subulate or ciliate, 3–5 mm; rays 4–12, 1–3 cm, filiform, unequal, hirsutulous or glabrescent; umbellules 12–20-flowered; pedicels 1–5 mm, unequal, hirsutulous. Fruit ovoid, 1.5–3 × 1.5–2 mm, apex contracted forming a very short neck, densely hirsutulous or glabrescent. Fl. and fr. Feb–Jul.

Cultivated, adventive on forest margins and in ruderal areas. S Yunnan (Xishuangbanna) [apparently native to S India].

This species cultivated as a spice throughout the Indian subcontinent, SE Asia, and Indonesia.

4. *Trachyspermum ammi* (Linnaeus) Sprague, Bull. Misc. Inform. Kew 1929: 228. 1929.

细叶糙果芹 *xi ye cao guo qin*

Sison ammi Linnaeus, Sp. Pl. 1: 252. 1753; *Ammi copticum* Linnaeus; *Bunium copticum* (Linnaeus) Sprengel; *Carum copticum* (Linnaeus) C. B. Clarke; *Daucus coptica* (Linnaeus) Persoon; *Ptychotis coptica* (Linnaeus) de Candolle; *Trachyspermum copticum* (Linnaeus) Link.

Plants annual, 20–50(–90) cm, essentially glabrous. Leaves petiolate, petiole 1–5 cm; blade triangular-ovate in outline, 2–8 × 2–6 cm, 2–3-pinnate/pinnatisect; ultimate segments

linear-filiform to $15 \times 0.2-0.5$ mm. Umbels 2.5–5 cm across; bracts 3–8, linear-subulate, 5–7 mm; rays 6–20, 1–3 cm; bracteoles 5–10, linear, 2–3 mm; umbellules ca. 1 cm across, ca. 20-flowered; pedicels 0.5–4 mm, unequal. Calyx teeth conspicuous, minute, ovate or obsolete. Petals ca. 1.3×1.3 mm. Fruit

$1.2-2 \times 1.2-1.8$ mm, densely covered in whitish minute papillae. Fl. & fr. May–Aug.

Cultivated, adventive in dry open ruderal areas. W Xinjiang [apparently native to India].

The fruits are used as a spice for flavoring and for perfume; they have reputed medicinal value (in Xinjiang). The species is extensively cultivated throughout C, S, and SW Asia.

41. *ERIOCYCLA* Lindley in Royle, Ill. Bot. Himal. Mts. 1: 232. 1835.

绒果芹属 rong guo qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson, Michael G. Pimenov, Eugene V. Kljuykov

Herbs perennial, usually pubescent throughout. Taproot stout, long-cylindrical, woody. Stem sparingly branched from base, erect or caespitose, base often woody, densely clothed in fibrous or tough remnant sheaths. Leaves mostly basal, petiolate, petioles slender, base sheathing; blade 1–2-pinnate; ultimate segments entire or pinnatifid. Leaves rapidly reduced upwards, stem upper parts almost leafless. Inflorescence branching, umbels compound, lax, terminal; bracts few, linear, inconspicuous, or absent; rays few, (2–)3–6(–10), unequal, widely divergent; bracteoles 4–10, linear. Calyx teeth minute, triangular, often obscured by dense hairs. Petals white or yellowish-white, rarely purple, ovate or obovate, base cuneate, apex incurved, notched; usually abaxially pubescent. Ovary densely pubescent. Stylopodium low-conic, margin undulate; styles long, reflexed. Fruit oblong-ovoid, slightly laterally compressed, constricted at commissure, rounded at base, densely white-pubescent; ribs 5, filiform, often obscured by the hairs; vittae large, 1 in each furrow, 2 on commissure. Seed face plane or slightly concave. Carpophore 2-parted.

Six to eight species: N Iran, W Himalayan region to N and W China; three species (two endemic) in China.

The generic boundaries between *Eriocyclus* and *Seseli* (and the Mediterranean genera *Deverra* de Candolle and *Pituranthos* Viviani) are problematic and need further research. Recent work by Russian authors suggests that *Eriocyclus* should be included within *Seseli* (see *Seseli* for comments and a synopsis of an alternative classification).

- 1a. Leaves basal and cauline, pinnate, ultimate segments coarsely dentate; bracts 1 or absent; petals white 1. *E. albescens*
 1b. Leaves mostly basal, caespitose, 1–2-pinnate, ultimate segments crenate; bracts 2–5; petals pale yellow or purple.
 2a. Plants 20–40 cm; umbellules 10–20-flowered; petals pale yellow, densely pubescent; seed face plane (Xinjiang) 2. *E. pelliottii*
 2b. Plants 35–70 cm (smaller plants with purple petals); umbellules 8–10(–12)-flowered; petals light yellow or purple, slightly pubescent; seed face slightly concave (Xizang) 3. *E. nuda*

1. *Eriocyclus albescens* (Franchet) H. Wolff in Engler, Pflanzenz. 90(IV. 228): 107. 1927.

绒果芹 rong guo qin

Plants 20–70 cm, olive-green, pubescent. Basal leaves withered at flowering. Lower stem leaves petiolate, petioles 0.5–1.5 cm, purplish; blade narrowly oblong in outline, $5-12 \times 1-5$ cm, 1-pinnate; pinnae 4–7 pairs, oblong, $6-15(-50) \times 8-12(-30)$ mm, entire or 2–3(–5)-lobed. Leaves reduced upwards becoming 3-lobed or entire. Umbels 3–5 cm across; bracts 1, linear, inconspicuous or absent; rays (2–)4–6, $5-15(-20)$ mm; bracteoles 6–10, linear-lanceolate, shorter than flowers; umbellules 8–20-flowered. Calyx teeth obsolete. Petals white, obovate, abaxially pubescent. Fruit $3-4 \times 1.2-1.5$ mm, densely white pubescent. Seed face plane. Fl. Aug–Sep, fr. Sep–Oct.

• Arid limestone slopes, limestone talus slopes; 500–1100 m. Hebei, NW Liaoning, Nei Mongol.

- 1a. Pinnae usually small, $6-15 \times 8-12$ mm ... 1a. var. *albescens*
 1b. Pinnae large, $25-50 \times 15-30$ mm 1b. var. *latifolia*

1a. *Eriocyclus albescens* var. *albescens*

绒果芹(原变种) rong guo qin (yuan bian zhong)

Pimpinella albescens Franchet, Pl. David. 1: 239. 1884;

Seseli albescens (Franchet) Pimenov & Kljuykov; *S. provostii* H. de Boissieu.

Plants gray-green, pubescent. Pinnae $6-15 \times 8-12$ mm.

• Limestone talus slopes. Hebei, Nei Mongol.

1b. *Eriocyclus albescens* var. *latifolia* R. H. Shan & C. C. Yuan, Acta Phytotax. Sin. 21: 88. 1983.

大叶绒果芹 da ye rong guo qin

Plants pale greenish, sparsely pubescent. Pinnae large, $25-50 \times 15-30$ cm.

• Arid limestone slopes; 500–1100 m. Hebei, NW Liaoning.

2. *Eriocyclus pelliottii* (H. de Boissieu) H. Wolff in Engler, Pflanzenz. 90(IV. 228): 106. 1927.

新疆绒果芹 xin jiang rong guo qin

Pituranthos pelliottii H. de Boissieu, Bull. Mus. Hist. Nat. (Paris) 16: 163. 1910; *Seseli pelliottii* (H. de Boissieu) Pimenov & Kljuykov.

Plants 20–40 cm, sparsely pubescent. Basal leaves caespitose, petiole 1.5–3 cm; leaf blade oblong in outline, $3-6 \times 1-2.5$ cm, 1–2-pinnate; primary pinnae 4–5 pairs; ultimate segments ovate, margins irregular serrulate. Stem leaves much reduced or

absent. Umbels 3–5 cm across; bracts 2–5, 3–9 mm, subulate; rays 3–5(–10), unequal, 2–4 cm; bracteoles 4–7, linear-lanceolate, 2–4 mm; umbellules 10–20-flowered. Calyx teeth minute, pubescent or obsolete. Petals pale yellow, abaxially densely pubescent. Fruit 2.5–4(–5) × 1.5–2 mm, densely pubescent. Seed face plane. Fl. Jul–Sep, fr. Sep–Oct.

• Limestone slopes, river banks; 2700–3000 m. SW Xinjiang (Akto, Artux, Wuqia).

3. *Eriocyclus nuda* Lindley in Royle, Ill. Bot. Himal. Mts. 1: 232. 1835.

裸茎绒果芹 *luo jing rong guo qin*

Plants (15–)35–70(–100) cm. Stems caespitose. Basal leaves caespitose, petiole 1.5–4 cm; blade narrowly triangular-ovate or oblong-ovate, 3–7 × 1.5–3.5 cm, (1–)2-pinnate; primary pinnae 3–4 pairs; ultimate segments ovate, 5–10 × 3–6 mm, 3–4-lobed. Cauline leaves almost absent or few bladeless sheaths. Umbels 3–5 cm across; bracts 3–5, linear-lanceolate, 1–5 × 1–1.5 mm, pubescent; rays 3–6(–10), 2–9 cm; bracteoles 5–10, 1–3 × 0.4–0.8 mm, similar to bracts; umbellules 8–10 (–12)-flowered; pedicels 1–4 mm, pilose. Calyx teeth minute, triangular, inconspicuous. Petals pale yellow, tinged purple or

purple, oblong-ovate, abaxially pubescent. Fruit oblong-ovoid, 3–4 × 1.5–2 mm, densely white pubescent. Seed face slightly concave. Fl. Jun–Jul, fr. Jul–Sep.

Stony slopes, screes; 2900–4800 m. S Xizang [NW India, Kashmir, W Nepal, Pakistan].

1a. Plants 35–70(–100) cm; petals pale yellow 3a. var. *nuda*
1b. Plants ca. 15 cm; petals purple 3b. var. *purpurescens*

3a. *Eriocyclus nuda* var. *nuda*

裸茎绒果芹(原变种) *luo jing rong guo qin* (*yuan bian zhong*)

Pituranthos nudus (Lindley) Bentham ex C. B. Clarke; *Seseli nudum* (Lindley) Pimenov & Kljuykov.

Plants 35–70(–100) cm. Petals pale yellow.

Stony slopes, screes; 2900–4000 m. SW Xizang (Gyirong, Zanda) [NW India, Kashmir, W Nepal, Pakistan].

3b. *Eriocyclus nuda* var. *purpurescens* R. H. Shan & C. C. Yuan, Acta Phytotax. Sin. 18: 376. 1980.

紫花裸茎绒果芹 *zi hua luo jing rong guo qin*

Plants ca. 15 cm. Petals purple.

• Arid stony slopes; 2900–4800 m. S Xizang.

42. *CRYPTOTAENIA* de Candolle, Coll. Mém. 5: 42. 1829, nom. cons.

鸭儿芹属 *ya er qin shu*

Pan Zehui (潘泽惠); Mark F. Watson

Deringa Adanson, nom. rej.

Herbs, perennial, essentially glabrous (minutely scabrous along leaf veins). Rootstock small, tuberous, branched. Stem terete, branched, purplish, base without remnant sheaths. Leaves petiolate, sheaths oblong, membranous, inflated; blade ternate; leaflets rhombic-ovate or subcordate, base broad-cuneate or cuneate, margin acute-biserrate. Umbels compound, grouped into a panicle, terminal; inflorescence branches and rays flexuose in flower, stiffening in fruit; bracts and bracteoles present or absent; rays several, very unequal; umbellules few-flowered; pedicels very unequal. Calyx teeth minute triangular. Petals white, obovate, apex incurved. Stylopodium long-conic, divided and tapering into the short, erect styles. Fruit elongate, oblong, slightly dorsally compressed, apex abruptly tapered, base rounded, glabrous; ribs 5, prominent, pale; vittae 1–3 in each furrow, 4 on commissure. Seed face plane. Carpophore 2-cleft to base.

Five or six species: Africa, E Asia, Europe, North America; one species in China.

1. *Cryptotaenia japonica* Hasskarl, Retzia 1: 113. 1855.

鸭儿芹 *ya er qin*

Cryptotaenia canadensis (Linnaeus) de Candolle subsp. *japonica* (Hasskarl) Handel-Mazzetti; *C. canadensis* var. *japonica* (Hasskarl) Makino.

Plants 20–100 cm. Basal and lower petioles 5–20 cm, with oblong sheaths; blade triangular to broad-ovate, 2–14 × 3–7 cm; middle leaflets rhombic-obovate or cordate, 2–9 × 1.5–10 cm; lateral leaflets obliquely long-ovate to obovate, 1.5–8 × 1–6 cm. Bracts absent or 1, linear, 4–10 × 0.5–1.5 mm; rays 2–3, 0.5–3.5 cm, very unequal; bracteoles 1–3, subulate, 4–10 mm;

pedicels 2–4, 1–14 mm, very unequal. Calyx teeth 0.1–0.3 mm, unequal. Petals 1–1.2 × ca. 0.6–1 mm. Fruit 4–6 × 1–1.5 mm. Fl. and fr. Feb–Oct. *n* = 11*.

Damp places in forests, ditches; 200–2400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan [Japan, Korea].

This species is used in traditional Chinese medicine as a tonic for strengthening the body. It is a distinctive, widespread taxon exhibiting almost continuous variation in leaf and inflorescence form across the range. It is here treated as a species (with three forms: f. *japonica*, f. *dissecta* (Y. Yabe) Hara, and f. *pinnatisecta* S. L. Liou) closely resembling, but distinct from, the North American *Cryptotaenia canadensis* (Linnaeus) de Candolle.

43. *AMMI* Linnaeus, Sp. Pl. 1: 243. 1753.

阿米芹属 *a mi qin shu*

She Menglan (佘孟兰 Sheh Meng-lan); Mark F. Watson

Visnaga Gaertner.

Herbs, annual or biennial, glabrous. Stem erect, terete, branching. Leaves petiolate, sheath narrow; blade ternate-pinnate or pinnatisect, membranous; ultimate segments filiform to lanceolate. Umbels compound, terminal and lateral; bracts numerous, entire or

pinnately divided, reflexed in fruit; bracteoles many, entire. Calyx teeth obsolete or inconspicuous, minute. Petals white or yellowish, obcordate or deeply 2-lobed, lobes unequal, base tapering, clawed, apex inflexed, outer petals in outer flowers radiant. Stylopodium low-conic, base slightly undulate; styles slender, more than twice as long as stylopodium, reflexed. Fruit ovoid or ovoid-oblong, slightly compressed laterally, commissure constricted, mericarps pentagonal in cross section, glabrous; ribs 5, acute; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore entire or 2-cleft to base.

About six species: Mediterranean region; cultivated elsewhere; two species (introduced) in China.

- 1a. Biennial; ultimate leaf segments 0.5–1 mm; rays in fruiting umbel becoming erect, rigid and tightly constricted on discoid torus 1. *A. visnaga*
 1b. Annual; ultimate leaf segments 5–20 mm; rays in fruiting umbel divergent, not so thickened, only slightly constricted, not on a discoid torus 2. *A. majus*

1. *Ammi visnaga* (Linnaeus) Lamarck, Fl. Franç. 3: 462. 1779.

阿米芹 a mi qin

Daucus visnaga Linnaeus, Sp. Pl. 1: 242. 1753.

Plants biennial, ca. 1 m. Basal leaves petiolate, petioles ca. 10 cm; blade pinnate; ultimate segments slender, linear, 20–30 × 0.5–1 mm, entire, divergent, apex setaceous. Upper leaves 2–3-pinnate. Umbels 6–10 cm across; peduncles elongate, 6–20 cm; bracts many, 1–2-pinnate, equaling or longer than rays; rays 60–100(–150), slender, 2–5 cm, unequal, spreading when young, in fruit becoming thick, rigid, erect and constricted on discoid torus (thickened base of rays); bracteoles numerous, subulate, 3–10 mm, entire, equaling flowers; umbellules many-flowered; pedicels 1.5–10 mm, base thickening in fruit into a discoid torus similar to rays. Calyx teeth inconspicuous, minute, ca. 0.2 mm. Petals white. Fruit 2–2.5 × 1–1.5 mm. Carpophore entire. Fl. Jun–Jul, fr. Jul–Aug.

Cultivated in some specialist gardens and medicinal farms, adventive in alkaline grasslands and on dry mountain slopes; below 500 m. Provincial distribution unknown [native to the Mediterranean region].

This species has reputed medicinal value.

2. *Ammi majus* Linnaeus, Sp. Pl. 1: 243. 1753.

大阿米芹 da a mi qin

Plants annual, 20–100(–150) cm. Basal leaves petiolate, petiole 3–13 cm; blade ternate-3-pinnate; lateral ultimate segments narrowly elliptic, terminal segments obovate-elliptic, 10–15 × 5–20 mm, base cuneate, margin finely setaceous-serrate, apex obtuse or acute, gray-green. Cauline leaves 2-pinnate; ultimate segments ovate or oblong, distally narrowly lanceolate, entire or 3-lobed. Umbels 4–10 cm across; peduncles 8–14 cm; bracts numerous, 3-lobed, pinnate or entire, longer than rays; rays 20–50(–60), 2–8 cm, slender, inner faces hispid, spreading when young, in fruit becoming slightly constricted; bracteoles numerous, linear-acuminate or linear-lanceolate, 2–6 mm, spreading or reflexed; umbellules many-flowered; pedicels 1.5–7 mm, very thin, unequal. Fruit oblong, 1.5–2 × 0.6–1 mm. Carpophore 2-cleft to base. Fl. Jun–Jul, fr. Jul–Aug.

Cultivated in some medicinal farms, adventive in ruderal areas, wasteland, or along roads; below 200 m. Provincial distribution unknown [native to the Mediterranean region].

44. *CARUM* Linnaeus, Sp. Pl. 1: 263. 1753.

葛缕子属 ge lü zi shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs biennial or short lived perennial, glabrous. Taproot tuberous, fusiform, elongate or cylindrical. Stem usually branched above, base with or without papery remnant sheaths. Basal leaves petiolate, narrowly sheathing; blade 2–4-pinnate; ultimate segments linear or lanceolate. Stem leaves gradually reduced upward. Umbels compound, terminal. Calyx teeth obsolete, rarely present, narrowly triangular. Petals broadly obovate, white, rarely pinkish or purplish, midvein yellow or yellow-green, base cuneate, with an inflexed apex. Stylopodium conic; styles recurved. Fruit oblong-ellipsoid or oblong-ovoid, slightly laterally compressed, glabrous; ribs 5, filiform, prominent; vittae 1(–3) in each furrow, 2–4 on commissure. Seed face plane. Carpophore 2-parted.

About 20 species: N temperate zone; four species (one endemic) in China.

This widespread genus has very uncertain limits.

- 1a. Bracteoles as long as or longer than umbellules, margins ciliate; calyx teeth prominent 4. *C. bretschneideri*
 1b. Bracteoles shorter than umbellules or absent, margins entire; calyx teeth obsolete.
 2a. Base of stem without remnant sheaths; bracteoles absent 1. *C. carvi*
 2b. Base of stem clothed with papery remnant sheaths; bracteoles 5–8.
 3a. Basal leaves 3–4-pinnate; petals white; vittae solitary in each furrow 2. *C. buriaticum*
 3b. Basal leaves 2–3-pinnate; petals purplish-red; vittae 3 in each furrow 3. *C. atrosanguineum*

1. *Carum carvi* Linnaeus, Sp. Pl. 1: 263. 1753.

葛缕子 ge lü zi

Carum gracile Lindley; *C. carvi* var. *gracile* (Lindley) H. Wolff; *C. carvi* f. *rubriflorum* H. Wolff.

Plants 15–70(–150) cm tall. Taproot cylindrical, to 25 cm. Stems solitary, rarely 2–8, base without remnant sheaths. Basal and lower leaves oblong-lanceolate in outline, 2–3-pinnate; ultimate segments linear or linear-lanceolate, 3–5 × 1–2 mm. Leaves reduced upwards. Umbels 2.5–6 cm across; bracts absent or occasionally 1–4, linear, 4–11 mm, entire; rays 3–10, 0.6–4 cm,

extremely unequal; bracteoles absent; umbellules 4–15-flowered. Calyx teeth obsolete. Petals white or pinkish, base not clawed. Fruit oblong-ellipsoid, 3–5 × 1–2 mm; vittae 1 in each furrow, 2 on commissure. Fl. May–Jul, fr. Jul–Sep. $2n = 20$.

Forests, brushy alpine meadows, riparian grasslands, ruderal areas; 1500–4300 m. Gansu, Hebei, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Sichuan, Xinjiang, Xizang, Yunnan [widespread in Asia, Europe, and the Mediterranean region; introduced elsewhere].

2. *Carum buriaticum* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 713. 1844.

田葛缕子 tian ge lü zi

Bunium buriaticum (Turczaninow) Drude; *Carum angustissimum* Kitagawa; *C. buriaticum* f. *angustissimum* (Kitagawa) H. Wolff; *C. curvatum* C. B. Clarke ex H. Wolff; *C. furcatum* H. Wolff; *C. pseudoburiaticum* H. Wolff.

Plants 50–80 cm. Taproots cylindric, to 18 cm. Stem solitary, rarely 2–5; base with papery remnant sheaths. Basal and lower leaves oblong-ovate in outline, 3–4-pinnate; ultimate segments linear, 2–5 × (0.3–)0.5–1 mm. Umbels 4–8 cm across; bracts 2–4, linear or linear-lanceolate, ca. 3 mm; rays 9–15, 1.5–5 cm, slightly unequal; bracteoles 5–8, lanceolate, ca. 1.5 × 0.3 mm; umbellules 10–30-flowered. Calyx teeth obsolete. Petals white, base not clawed. Fruit oblong-ellipsoid, 3–4 × 1.5–2 mm; vittae 1 in each furrow, 2 on commissure. Fl. May–Jul, fr. Aug–Oct. $n = 11^*$.

Forests, alpine meadows, fields, roadsides; 1500–3600 m. Gansu, Hebei, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [Mongolia, Russia].

This species has reputed medicinal value (in Shanxi).

3. *Carum atosanguineum* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 359. 1842.

暗红葛缕子 an hong ge lü zi

Vicatia atosanguinea (Karelin & Kirilov) P. K. Mukherjee & M. Pimenov.

Plants ca. 40 cm. Taproot slender, much-branched. Stem erect, base clothed with papery remnant sheaths. Basal leaves oblong-lanceolate in outline, 2–3-pinnate; ultimate segments lanceolate, 3–5 × 1.5–2 mm. Bracts absent, occasionally 1–2, linear to lanceolate, shorter than rays; rays 5–10, 2–4 cm, very unequal; bracteoles 2–5, linear, equaling pedicels; umbellules 6–10-flowered. Calyx teeth obsolete. Petals purplish-red. Fruit oblong-ovoid, 3–4 × 1.5–2 mm; vittae 3 in each furrow, 4 on commissure. Fl. and fr. May–Sep.

Forests, shady valleys, riparian grasslands; 1800–3600 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia].

Some authors consider this species to belong in *Vicatia*, but others disagree on the basis of the fundamental difference of a flat seed face in *C. atosanguineum* compared to a sulcate one in *Vicatia*. Pending future work we here retain this species in *Carum*. The NW Himalayan (non-Chinese) *Tongolua wolffiana* Fedde ex H. Wolff (*V. wolffiana* (Fedde ex H. Wolff) C. Norman) is included by some authors in synonymy under *V. atosanguinea*; however, further work is needed in order to confirm or reject this placement.

4. *Carum bretschnideri* H. Wolff in Engler, Pflanzenr. 90 (IV. 228): 369. 1927.

河北葛缕子 he bei ge lü zi

Plants 20–45 cm. Taproot elongate, slender. Stem solitary or 2–3, little-branched, base without remnant sheaths. Basal leaves ovate-lanceolate in outline, 2–3-pinnate; ultimate segments lanceolate, 5–7 × ca. 1 mm, pinnatifid. Bracts 1–6, linear, ca. 1 cm, ciliate on the margins; rays 8–12, 1–4 cm, slightly unequal; bracteoles 5–8, similar to bracts, as long as or longer than the umbellules; umbellules 15–25-flowered. Calyx teeth small, narrowly triangular, ca. 0.5 mm. Petals white, base shortly clawed. Fruit oblong-ellipsoid, ca. 4 × 1.8 mm; vittae solitary in each furrow, 2 on commissure. Fl. and fr. Jun–Sep.

• Shady moist places; 1500–2000 m. Hebei, Shanxi.

The following species have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

Carum seselifolium H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 303. 1930), described from Shanxi (“Mienshan, Shuiwangping,” 1500–2400 m, *K. A. H. Smith 6531 & 7827*, syntypes, GB).

Carum takenakae Kitagawa (J. Jap. Bot. 26: 166. 1951 [“*takenakai*”]),

described from Hebei (“Hsiaowutaishan” [Xiaowutai Shan], *K. Takenaka 88*, holotype, T).

Carum wolffianum Fedde ex H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 303. 1930), described from Jilin (*C. C. Chien 123*, holotype, unlocalized).

45. SINOCARUM H. Wolff ex R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 18: 374. 1980.

小芹属 xiao qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson, Ingrid Holmes-Smith

Carum Linnaeus sect. *Dactylaea* Franchet; *Dactylaea* (Franchet) Farille.

Herbs, perennial, slender, glabrous (except *S. filicinum*). Rootstock fusiform or elongate, usually slender. Stems erect, solitary or 2–4, caespitose. Basal leaves petiolate; petiole sheath usually broad, ovate or oblong-ovate at base; blade ternate-1–3-pinnate or 1–

3-pinnate. Leaves reduced upwards. Inflorescence branching, umbels compound, terminal; bracts mostly absent, occasionally 1–4, linear or similar to uppermost leaf; rays few, usually 5–15; bracteoles present (rarely absent), usually linear, entire, apex rarely lobed; umbellules usually many-flowered. Calyx teeth obsolete, or conspicuous, triangular or subulate-lanceolate. Petals white or purple, ovate, oblong-ovate or obovate, base clawed, apex acute or slightly obtuse, rarely 2–3-lobed or palmately 3–5-lobed. Stylopodium flat, rarely low-conic; styles short. Fruit oblong-ovoid, slightly laterally compressed, smooth; ribs 5, filiform; vittae 1–3 in each furrow, 2–6 on commissure. Seed face plane. Carpophore 2-fid or 2-parted.

About 20 species: high-altitude Sino-Himalayan region from Nepal to SW China; eight species (four endemic) in China.

This taxonomically complex genus is closely related to, and sometimes difficult to distinguish from, *Acronema*. *Sinocarum* is usually circumscribed by a suite of characters: rhizome elongate, petiole sheaths expanded, petals obtuse at apex, clawed at base, flowers radiant, and fruit oblong-ovoid. By contrast, *Acronema* is characterized by having tuber globose or oblong, petiole sheaths narrow, petals acute to filiform at apex, cuneate at base, flowers symmetric, and fruit usually ovoid or broadly so, slightly cordate at base. However, within each genus there are species that deviate in one or more of these characters, and the generic boundaries are blurred. Revision of these two genera is hampered by a lack of complete material: specimens are usually collected in flower, and mature fruits are unknown for an alarmingly high proportion of the taxa. Initial results from molecular sequence data on Himalayan species suggest that these two genera should be combined, but further work and more collections are needed to clarify the situation across the whole geographic range.

Sinocarum pseudocruciatum H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 182. 1929) was described from Sichuan (“Washan,” *A. Henry* 7067, holotype, K). However, it is not treated in this account as it is imperfectly known.

Pimenov and Kljuykov (pers. comm.) consider the following imperfectly known taxa to be conspecific and a species of *Sinocarum*: *Trachydium souliei* H. de Boissieu (Bull. Soc. Bot. France 53: 422. 1906), described from Xizang (*J. A. Soulié* 1049, holotype, P), and *T. dielsianum* H. Wolff (Acta Horti Gothob. 2: 300. 1926), described from Sichuan (SE of “Matang,” 4800 m, *K. A. H. Smith* 4375, holotype, unlocalized).

- 1a. Bracteole apex usually 2–3-lobed or pinnatifid, rarely entire; calyx teeth conspicuous, ca. 0.5 mm, triangular-lanceolate 8. *S. dolichopodum*
- 1b. Bracteole apex entire; calyx teeth minute or obsolete.
 - 2a. Petal apex 2–3-lobed or palmately 4–5-lobed (or entire in *S. coloratum*).
 - 3a. Stem purple, at least at base; calyx teeth subulate; petal apex usually entire, occasionally 2–3-lobed 6. *S. coloratum*
 - 3b. Stem green; calyx teeth obsolete; petal apex palmately 4–5-lobed 7. *S. schizopetalum*
 - 2b. Petals always entire.
 - 4a. Calyx teeth obsolete; bracteoles absent.
 - 5a. Plants 3–5 cm; basal leaves trifoliolate; rays 2–3 4. *S. pauciradiatum*
 - 5b. Plants 40–70 cm; basal leaves 3-pinnate; rays 10–20 5. *S. pityophilum*
 - 4b. Calyx teeth minute, subulate; bracteoles present or absent.
 - 6a. Basal leaves 2-pinnate, petioles pubescent, ultimate segments oblong-ovate, abaxially pubescent; bracteoles 5–8 3. *S. filicinum*
 - 6b. Basal leaves ternate-1–3-pinnate, petioles glabrous, ultimate segments linear-lanceolate or elongate-linear, glabrous; bracteoles absent.
 - 7a. Basal leaves ternate-1–2-pinnate, ultimate segments linear-lanceolate or elongate-linear, 3–15 × 1–2 mm; rays 4–7(–10); petals violet or greenish-white 1. *S. cruciatum*
 - 7b. Basal leaves ternate-2–3-pinnate, ultimate segments elongate-linear, 10–30 × 0.5–2 mm; rays 8–15; petals white 2. *S. vaginatum*

1. *Sinocarum cruciatum* (Franchet) H. Wolff ex R. H. Shan & F. T. Pu in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(2): 33. 1985.

钝瓣小芹 *dun ban xiao qin*

Plants 10–30 cm, slender, glaucous throughout. Rootstock short, thick, ca. 2 × 0.5 mm. Stems 1–3 or numerous, 1–2-branched or unbranched. Basal leaves petiolate, petioles 5–7 cm; blade triangular in outline, 4–10 × 4–8 cm, ternate-1–2-pinnate; pinnae 3–5 pairs; ultimate segments linear-lanceolate, 3–15 × 1–2 mm. Cauline leaves elongate-linear, 5–35 × 0.5–1 mm, reduced upwards becoming 1-pinnate or 3-lobed. Umbels 1.5–2 cm across; bracts and bracteoles absent, occasionally 1; rays 4–7(–10), 1–3 cm, subequal; umbellules ca. 5 mm across, 10–15-flowered; pedicels ca. 2 mm. Calyx teeth minute, triangular, ca. 0.1 mm. Petals violet or greenish-white, entire, apex

obtuse to subacute. Young fruit oblong-ovoid (mature fruit unknown); vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Oct.

Forests, open alpine scrub, riparian grasslands; 2800–4200 m. W Sichuan, SE Xizang, NW Yunnan [N Myanmar].

This species and *Sinocarum vaginatum* form a group of narrow-leaved taxa with unclear taxonomic limits: flower color and leaflet dimensions are particularly variable. Further work with new collections will be needed to clarify the situation.

- 1a. Ultimate segments of basal leaves linear-lanceolate, 3–5 × ca. 1 mm; petal apex obtuse-rounded, not inflexed 1a. var. *cruciatum*
- 1b. Ultimate segments of basal leaves linear, 5–15 × 1–2 mm; petal apex slightly incurved 1b. var. *linearilobum*

1a. *Sinocarum cruciatum* var. *cruciatum*

钝瓣小芹(原变种) *dun ban xiao qin* (yuan bian zhong)

Carum cruciatum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 124. 1894; *Ligusticum cruciatum* (Franchet) M. Hiroe.

Basal leaves 2–3-pinnate; ultimate segments linear lanceolate, 3–5 × ca. 1 mm. Petals violet, apex obtuse-rounded, not inflexed.

• Forests, open alpine scrub, riparian grasslands; 2800–4200 m. W Sichuan, SE Xizang, NW Yunnan.

1b. *Sinocarum cruciatum* var. *linearilobum* (Franchet) R. H. Shan & F. T. Pu in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(2): 35. 1985.

尖瓣小芹 *jian ban xiao qin*

Carum cruciatum var. *linearilobum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 124. 1894; *Carum forrestii* M. Hiroe; *Sinocarum caespitosum* H. Wolff.

Stems numerous. Basal leaves 1–2-pinnate; ultimate segments elongate-linear, 5–15 × 1–2 mm. Petals greenish-white, apex obtuse, slightly incurved.

Open alpine scrub; 3500–4200 m. W Sichuan, SE Xizang, NW Yunnan [N Myanmar].

2. *Sinocarum vaginatum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 183. 1929.

阔鞘小芹 *kuo qiao xiao qin*

Carum vaginatum (H. Wolff) M. Hiroe.

Plants 10–25 cm. Rootstock short, thick, ca. 4.5 × 0.8 cm. Stems 1–2, 1–2-branched or unbranched. Basal petioles 5–18 cm, sheath ovate; blade triangular, 5–13 × 5–8 cm, ternate-2–3-pinnate; pinnae 4–6 pairs; ultimate segments elongate-linear, 10–30 × 0.5–2 mm. Cauline leaves 1–2-pinnate, reduced upwards. Umbels 3–4 cm across, often subtended by uppermost leaf with broad sheath; bracts absent or occasionally 1; rays 8–15, 1–2 cm, unequal; bracteoles absent; umbellules 8–12 mm, 10–20-flowered; pedicels 1–5 mm. Calyx teeth minute triangular, ca. 0.2 mm. Petals white, entire, apex acute, radiant. Young fruit oblong-ovoid (mature fruit unknown); vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

• Forest margins, brushy alpine meadows; 3200–4300 m. W Sichuan, SE Xizang, NW Yunnan.

See the taxonomic comment under *Sinocarum cruciatum*.

3. *Sinocarum filicinum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 182. 1929.

蕨叶小芹 *jue ye xiao qin*

Carum chinense M. Hiroe.

Plants 15–30 cm. Rootstock 2.5–5 × 0.5–1.8 mm, stout, often branched. Stems 1–3, 1–3-branched or unbranched. Basal petioles 8–15 cm, sparsely pubescent, sheaths broadly ovate; blade triangular in outline, 2–9 × 3–10 cm, 2-pinnate; pinnae 3–7 pairs, basal pinnae petiolulate; ultimate segments oblong-ovate, 5–10 × 3–5 mm, margins serrate, abaxially sparsely pubescent along veins. Upper leaves 1-pinnate. Umbels 1.5–5

cm across; bracts 1–4, linear-lanceolate, 2–4 mm, or absent; rays 2–8, 1–3 cm, subequal; bracteoles 5–8, 1–2 mm, similar to bracts; umbellules 2–12 mm across, 10–15(–20)-flowered; pedicels 2–4 mm, unequal. Calyx teeth subulate, ca. 0.2 mm. Petals white, apex subacute. Young fruit oblong, ca. 1 × 0.6 mm (mature fruit unknown). Fl. Jul–Aug.

• Alpine meadows, among rocks; 2500–4500 m. SW Sichuan (Mianning), SE Xizang (Mainling, Zayü), NW Yunnan (Binchuan, Dali).

4. *Sinocarum pauciradiatum* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 18: 374. 1980.

少辐小芹 *shao fu xiao qin*

Plants 3–5 cm. Rootstock slender, 2–10 × 0.2–0.3 mm, often swollen at nodes. Stems 1–2, sometimes tinged purple, unbranched or occasionally 1-branched. Basal petioles 1–1.5 cm, sheaths narrowly lanceolate, tinged purple; blade triangular in outline, ca. 8 × 7 mm, trifoliolate; leaflets 3-lobed; ultimate segments 1–1.5 × 0.5–1 mm. Cauline leaves 1–2, palmate. Umbels 9–18 mm across; bracts absent or occasionally 1, linear, apex 3-lobed, leaf-like; rays 2–3, 5–8 mm; bracteoles absent; umbellules 4–6 mm across, 3–10-flowered; pedicels 1–2 mm. Calyx teeth obsolete. Petals purplish-red or white, entire. Fruit ovoid-ellipsoid, ca. 2 × 1.4 mm (mature fruit unknown). Fl. and fr. Jul–Sep.

Brushy alpine meadows, limestone rock crevices; 3200–4500 m. SW Sichuan (Daocheng, Muli, Xiangcheng), SE Xizang (Cona, Mêdog), NW Yunnan (Gongshan) [Bhutan].

5. *Sinocarum pityophilum* (Diels) H. Wolff in Engler Pflanzenz. 90(IV. 228): 166. 1927.

松林小芹 *song lin xiao qin*

Carum pityophilum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 228. 1912.

Plants 40–70 cm. Rootstock fusiform, 3–3 × ca. 0.5 mm. Stem solitary, 1–2-branched. Basal petioles 1.5–3 cm, sheath broadly ovate; blade triangular in outline, ca. 5 × 5 cm, 3-pinnate; pinnae 6–9 pairs; ultimate segments linear, 2–5 × 0.3–1 mm. Umbels 3.5–6 cm across; bracts absent, occasionally 1, linear, 1–1.5 cm; rays 10–20, 2–4 cm, unequal; bracteoles absent; umbellules 1–1.5 cm across, 12–15-flowered; pedicels 3–5 mm, unequal. Calyx teeth obsolete. Petals white, entire, apex obtuse, outer petals in umbellule slightly radiant. Fruit unknown. Fl. Oct.

• Sunny slopes in *Pinus* forests; 3000–3300 m. NW Yunnan (Lijiang).

This poorly known taxon is recorded only from the type gathering (*G. Forrest 3078*).

6. *Sinocarum coloratum* (Diels) H. Wolff ex R. H. Shan & F. T. Pu in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(2): 33. 1985.

紫茎小芹 *zi jing xiao qin*

Carum coloratum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 287. 1912.

Plants 8–25 cm. Taproot elongate, 3–15 × 0.5–1 cm, thick-

ened at apex, branched. Stems 1–4, characteristically purplish, unbranched or 1–2-branched. Basal petioles 2–7 cm, sheaths oblong-ovate, purplish; blade ovate-lanceolate in outline, 2–8 × 1–3 cm, 1–2-pinnate; pinnae 4–5 pairs; ultimate segments linear-lanceolate, 3–10 × 0.5–2 mm. Umbels 2.5–6 cm across; bracts absent, occasionally 1–2, linear, occasionally leaf-like; rays 5–8(–12), 1–3 cm; bracteoles absent, rarely 1, linear, ca. 2 mm; umbellules 8–16 mm, 8–15-flowered; pedicels 3–5 mm, unequal. Calyx teeth subulate, 0.2–0.4 mm, unequal. Petals white, apex usually entire, occasionally 2–3-lobed. Young fruit oblong-ovoid, ca. 1.5 × 1 (mature fruit unknown). Fl. and fr. Jul–Oct.

Brushy alpine meadows, limestone rock crevices; 2900–4600 m. W Sichuan, S Xizang, NW Yunnan [NE India].

7. *Sinocarum schizopetalum* (Franchet) H. Wolff ex R. H. Shan & F. T. Pu in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(2): 33. 1985.

裂瓣小芹 lie ban xiao qin

Plants 10–30 cm. Rootstock a short, thick rhizome, 3–5 × 0.5–0.8 cm. Stems 1 or 2–4, branching. Basal petioles 5–8 cm, sheaths broadly lanceolate; blade triangular in outline, 1.5–3 × 1.5–3 cm, ternate to 1- or 2-pinnate, basal pinnae petiolulate; ultimate segments oblong-lanceolate, 3–5 × 1–1.5 mm. Umbels 2.5–4 cm across; bracts absent or occasionally 1, linear-lanceolate; rays (3–)5–6(–8), 1–2 cm; bracteoles 3–5, similar to the bract; umbellules 6–10(–15)-flowered; pedicels 2–4 mm, unequal. Calyx teeth obsolete. Petals white or violet, apex palmately 3–4-lobed, lobes lanceolate or oblanceolate. Stylopodium deep purple. Young fruit oblong-ovoid, ca. 1.5 × 1 mm (mature fruit unknown); vittae 2–3 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

Shady forests, alpine meadows; 2400–4000 m. E and S Xizang, NW Yunnan [NE Myanmar].

- 1a. Rootstock fusiform; leaf blade ternate to 1- or 2-pinnate; petals 3–4-lobed, lobes lanceolate or ovate-lanceolate 7a. var. *schizopetalum*
 1b. Rootstock tuberous; leaf blade trifoliate; petals 3-lobed, lobes lanceolate 7b. var. *bijiangense*

7a. *Sinocarum schizopetalum* var. *schizopetalum*

裂瓣小芹(原变种) lie ban xiao qin (yuan bian zhong)

Carum schizopetalum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 118. 1894; *Dactylaea schizopetala* (Franchet) Farille.

46. **PTERNOPETALUM** Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 246. 1885.

囊瓣芹属 nang ban qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Loy R. Phillippe

Cryptotaeniopsis Dunn.

Herbs, annual or perennial. Taproots fusiform. Stem erect. Basal leaves petiolate, sheaths ovate. Cauline leaves similar or heteromorphic to the basal, smaller or absent. Inflorescence branching or unbranched, branches bearing terminal umbels; bracts usually absent; rays 4–40, unequal, erect to ascending in flower, spreading widely and lengthening in fruit; bracteoles 1–4, linear-lanceolate, unequal; umbellules very few flowered, 2–3(–5)-flowered; pedicels extremely unequal. Calyx teeth evident triangular or sub-

Leaf blade ternate to 1- or 2-pinnate. Petals palmately 3–4-lobed, lobes ovate or lanceolate.

- Shady forests; 2400–4000 m. E and S Xizang, NW Yunnan.

7b. *Sinocarum schizopetalum* var. *bijiangense* (S. L. Liou) X. T. Liu in C. Y. Wu et al., Fl. Yunnan. 7: 521. 1997.

碧江小芹 bi jiang xiao qin

Sinocarum bijiangense S. L. Liou, Acta Phytotax. Sin. 28: 149. 1990; *Dactylaea wolffiana* Fedde ex H. Wolff; *S. wolffianum* (Fedde ex H. Wolff) R. H. Shan & F. T. Pu (1993), not (Fedde ex H. Wolff) P. K. Mukherjee & Constance (1991).

Leaf blade trifoliate. Petals palmately 3-lobed, lobes linear-lanceolate.

Alpine meadows; ca. 2400 m. NW Yunnan (Bijiang) [NE Myanmar].

This incompletely known taxon is recorded only from a few collections. In the protologue of *Dactylaea wolffiana* the type specimen was wrongly cited from Xizang (Tibet); in fact it was collected in NE Myanmar (Imaw Bum).

8. *Sinocarum dolichopodum* (Diels) H. Wolff ex R. H. Shan & F. T. Pu in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(2): 38. 1985.

长柄小芹 chang bing xiao qin

Carum dolichopodum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 287. 1912.

Plants 8–15 cm. Rootstock slender, horizontal, 5–20 × 0.2–0.5 cm. Stem solitary, purplish, usually unbranched. Basal petioles 3–6 cm, sheaths ovate, purplish; blade triangular in outline, 3–6 × 2–3 cm, 2–3-pinnate; pinnae 3–5 pairs, basal pinnae petiolate; ultimate segments ovate, 10–15 × 5–8 mm, margins 3-lobed or pinnatifid. Umbels 4–7 cm across, sometimes subtended by a reduced, 3-lobed leaf; bracts absent; rays 4–6, 4–5 cm, stout; bracteoles 2–6, linear-oblanceolate or obovate in outline, 4–7 mm, apex usually 2–3-lobed, or pinnatifid, rarely entire; umbellules 10–18 mm across, 10–15-flowered; pedicels 4–8 mm. Calyx teeth conspicuous, triangular-lanceolate, ca. 0.5 mm. Petals white or purplish, apex obtuse. Young fruit oblong-ovoid, ca. 2 × 1.5 mm (mature fruit unknown); vittae 3 in each furrow, 6 on commissure. Fl. and fr. Jul–Sep.

- Alpine meadows, rocks; 3000–4000 m. W Sichuan, NW Yunnan.

This species has reputed medicinal value. The long rhizome, leaf morphology, and divided bracteoles are rather uncharacteristic of *Sinocarum*, and this species may be better placed elsewhere.

ulate, subequal, sometimes obscure. Petals white or purplish, ovate or long-obovate, base attenuate and thickening near attachment, apex narrow, inflexed, rarely plane. Stylopodium either conic and long-tapering into elongate erect styles (styles usually twice as long as the stylopodium) or low-conic abruptly tapering into short, deflexed styles (shorter than or equal to the stylopodium). Fruit oblong-ovoid or ovoid, slightly laterally compressed, glabrous; ribs 5, denticulate, finely scabrid or filiform; vittae 1–3 in each furrow, 2–4 on the commissure. Seed face plane. Carpophore 2-parted or bifid.

About 25 species: E Asia, Himalayan region; 23 species (19 endemic) in China.

- 1a. Basal and cauline leaves homomorphic (or cauline leaves absent); fruit ribs denticulate or finely scabrid.
- 2a. Leaves only basal, cauline leaves absent (occasionally 1); inflorescence unbranched.
- 3a. Leaves 3-foliolate; fruit oblong-ovoid 11. *P. nudicaule*
- 3b. Leaves 1-pinnate; fruit ovoid 12. *P. delicatulum*
- 2b. Basal and cauline leaves present; inflorescence branched.
- 4a. Styles short, stylopodium low-conic.
- 5a. Leaves 3-foliolate; bracts and bracteoles absent 9. *P. trifoliatum*
- 5b. Leaves 2–3-ternate; bracts 2–3; bracteoles 2–3 10. *P. sinense*
- 4b. Styles elongate, stylopodium conic.
- 6a. Cauline leaves 1–2; umbellules usually 2-flowered.
- 7a. Leaf blades abaxially pale green; umbellules usually with only one flower fertile 8. *P. yiliangense*
- 7b. Leaf blades abaxially slightly glaucous; umbellules 2-flowered and all fertile.
- 8a. Leaf blades subleathery, veins and margins cartilaginous, sparsely setose; fruit ovoid 6. *P. cartilagineum*
- 8b. Leaf blades membranous, veins and margins not cartilaginous, glabrous; fruit ovoid or oblong-ovoid 7. *P. molle*
- 6b. Cauline leaves 3–5; umbellules 2–3(–5)-flowered.
- 9a. Leaves 1–2-ternate or ternate-1-pinnate; fruit ribs finely scabrid.
- 10a. Leaves 1–2-ternate, margins double serrate 4. *P. rosthornii*
- 10b. Leaves ternate-1-pinnate, margins crenate 5. *P. botrychioides*
- 9b. Leaves 1–2-ternate; fruit ribs denticulate.
- 11a. Leaves 2-ternate; petals white; vittae 1 in each furrow 3. *P. davidii*
- 11b. Leaves ternate; petals purplish; vittae 1–3 in each furrow.
- 12a. Lateral leaflets undivided; fruit ovoid 1. *P. wolffianum*
- 12b. Lateral leaflets 2–3-lobed; fruit oblong-ovoid or ovoid 2. *P. vulgare*
- 1b. Basal and cauline leaves heteromorphic, rarely homomorphic (see. *P. gracillimum*, *P. leptophyllum*, *P. subalpinum*, and *P. trichomanifolium*); fruit ribs filiform.
- 13a. Basal and cauline leaves homogeneous.
- 14a. Leaves 1–2-pinnate, ultimate segments ovate or ovate-lanceolate; styles short.
- 15a. Leaves 1-pinnate, pinnae broadly ovate; rays 5–9; petals purplish 20. *P. subalpinum*
- 15b. Leaves 2-pinnate, pinnae ovate-lanceolate; rays 6–25; petals white 21. *P. leptophyllum*
- 14b. Leaves ternate-2–4-pinnate, highly dissected, ultimate segments linear; styles short or elongate.
- 16a. Calyx teeth minute; styles short; both mericarps developing in fruit 22. *P. gracillimum*
- 16b. Calyx teeth conspicuous; styles elongate; only one mericarp developing in fruit 23. *P. trichomanifolium*
- 13b. Basal and cauline leaves heteromorphic.
- 17a. Stems profusely branched and caespitose; umbels numerous, terminal on the branches 19. *P. caespitosum*
- 17b. Stems sparsely branched or unbranched; umbels terminal, a few lateral.
- 18a. Stems 3–5-branched; umbellules 3–4-flowered; vittae 1–3 in each furrow.
- 19a. Stems 1–2; basal leaves absent; styles shorter than stylopodium; fruit ovoid 15. *P. longicaule*
- 19b. Stem solitary; basal leaves present; styles nearly as long as or longer than the stylopodium; fruit oblong-ovoid or ovoid.
- 20a. Petals white; styles elongate; fruit oblong-ovoid 13. *P. delavayi*
- 20b. Petals purplish; styles as long as the stylopodium; fruit ovoid 14. *P. cardiocarpum*
- 18b. Stems 1–2-branched; umbellules 2(–3)-flowered; vittae 1–2 in each furrow.
- 21a. Calyx teeth conspicuous, triangular or subulate; styles elongate, longer than stylopodium; fruit ovoid 16. *P. heterophyllum*
- 21b. Calyx teeth obscure or minute; styles shorter than stylopodium; fruit oblong-ovoid.
- 22a. Rhizomes nodes not tuberculate; fruit ca. 3 × 1 mm 17. *P. filicinum*
- 22b. Rhizomes nodes tuberculate; fruit 2–2.5 × 1–2 mm 18. *P. tanakae*

1. *Pternopetalum wolffianum* (Fedde ex H. Wolff) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

Cryptotaeniopsis wolffiana Fedde ex H. Wolff, Repert. Spec. Nov. 27: 327. 1930.

滇西囊瓣芹 dian xi nang ban qin

Plants 15–45 cm. Stems 1–2-branched. Basal leaves petio-

late, petioles 6–14 cm, densely strigose; blade ovate or oblong-ovate in outline, 5–15 × 3–8 cm, ternate; leaflets 3(–5), remote, broad-ovate, 2–3 × 1–2 cm, lateral leaflets undivided, strigose on the veins and margins. Cauline leaves 1–2. Umbels 2–3.5 cm across; bracts absent; rays 15–32, 1–3.5 cm; bracteoles 2–3, 0.5–1.5 mm; umbellules 2–3(–5)-flowered, pedicels 0.5–2.5 mm. Calyx teeth subulate, 0.3–0.6 mm. Petals purple-white, ca. 2 × 1 mm. Stylopodium conic; styles elongate; stylopodium plus styles 1.2–1.8 mm. Fruit ovoid, ca. 3 × 2.5 mm, ribs denticulate; vittae 1–3 in each furrow, 4 on commissure. Fl. Apr–Jun, fr. Jul–Aug.

- Forests; 2000–3300 m. Guizhou, NE and W Yunnan.

2. *Pternopetalum vulgare* (Dunn) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

五匹青 wu pi qing

Plants 20–50 cm. Stems solitary or 2–3. Basal leaves petiolate, petioles 10–20 cm, glabrous or strigose; blade triangular-ovate in outline, 5–12 × 5–11 cm, ternate; leaflets 3, lateral leaflets usually 2–3-lobed; ultimate segments ovate or rhomboidal, 1.6–6 × 0.6–3.8 cm, glabrous or strigose along veins, margins serrate, apex acute. Umbels 1.5–3 cm across (to 7 cm in fruit); bracts absent; rays 15–30, 2–4(–6) cm; bracteoles 1–4, ca. 0.5 mm, subequal; umbellules 2–5-flowered; pedicels 0.3–1.5 mm in flower. Calyx teeth triangular, 0.5–0.7 mm. Petals white or purple-white, ca. 1.8 × 0.7 mm. Stylopodium conic; styles elongate; stylopodium plus styles ca. 1.3 mm. Fruit globose-ovoid or oblong-ovoid, 3.5–5 × 2–3 mm; ribs denticulate; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

Forests, grassy slopes, shady or grassy streamsides; 1300–3500 m. S Gansu, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [NE India, N Myanmar, Nepal].

All three varieties have reputed medicinal value (in Sichuan).

- 1a. Ultimate leaf segments ovate or rhomboidal; fruit oblong-ovoid 2a. var. *vulgare*
- 1b. Ultimate leaf segments broad-ovate or ovate-lanceolate; fruit globose-ovoid.
 - 2a. Ultimate leaf segments broad-ovate, densely strigose on veins and petioles 2b. var. *strigosum*
 - 2b. Ultimate leaf segments ovate-lanceolate, sparsely strigose on veins, petioles glabrous 2c. var. *acuminatum*

2a. *Pternopetalum vulgare* var. *vulgare*

五匹青(原变种) wu pi qing (yuan bian zhong)

Cryptotaeniopsis vulgaris Dunn, Hooker's Icon. Pl. 28: t. 2737. 1902; *Deringa vulgaris* (Dunn) Koso-Poljansky; *Pimpinella clarkeana* Watt ex Banerji; *Pternopetalum vulgare* (Dunn) Handel-Mazzetti var. *foliosum* R. H. Shan & F. T. Pu.

Ultimate leaf segments ovate or rhomboidal, apex acute to acuminate. Fruit oblong-ovoid.

Forests, shady streamsides; 1400–3500 m. S Gansu, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [NE India, N Myanmar, Nepal].

2b. *Pternopetalum vulgare* var. *strigosum* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 68. 1978.

毛叶五匹青 mao ye wu pi qing

Ultimate leaf segments broad-ovate, apex acute, veins and petioles densely strigose. Fruit globose-ovoid.

- Forests, grassy slopes; 1900–2500 m. W Sichuan.

2c. *Pternopetalum vulgare* var. *acuminatum* C. Y. Wu ex R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 68. 1978.

尖叶五匹青 jian ye wu pi qing

Ultimate leaf segments ovate-lanceolate, apex acuminate, veins sparsely strigose, petioles glabrous. Fruit globose-ovoid.

• Forests, grassy streamsides; 1300–1600 m. Shaanxi, Sichuan, NW Yunnan.

3. *Pternopetalum davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 246. 1885 [“*davidii*”].

囊瓣芹 nang ban qin

Cryptotaeniopsis davidii (Franchet) H. Wolff.

Plants 20–45 cm. Stems 1–3, branching. Basal leaves petiolate, petioles 8–15 cm, sparsely strigose or glabrous; blade ovate in outline, 6–10 × 5–9 cm, 2-ternate; ultimate segments ovate or rhomboidal, 2–7 × 1–3.5 cm, strigose on the veins, margins serrate, apex acute or acuminate. Umbels 2–4 cm across in flower, to 7 cm in fruit; bracts absent; rays (6–)15–20(–25), 1.5–3.5 cm, strigose only in inner surface; bracteoles 2–3, 1–1.8 mm; umbellules 2–4-flowered; pedicels 0.3–4 mm. Calyx teeth subulate, 0.7–1 mm. Petals white, ca. 1.8 × 0.9 mm. Stylopodium conic; styles elongate; stylopodium plus styles 1–1.4 mm. Fruit ovoid, 2–3 × 2–3 mm; ribs denticulate; vittae 1 in each furrow, 2 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Forests, scrub, grasslands, streamsides; 1500–3000 m. S Gansu, Guizhou, W Hubei, S Shaanxi, W Sichuan, S and W Yunnan.

4. *Pternopetalum rosthornii* (Diels) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

川鄂囊瓣芹 chuan e nang ban qin

Pimpinella rosthornii Diels, Bot. Jahrb. Syst. 29: 495. 1900; *Cryptotaeniopsis rosthornii* (Diels) H. Wolff.

Plants rather stout, 30–80 cm tall. Stems 1–2. Basal leaves petiolate, petioles 10–20 cm, glabrous; blade ovate in outline, 3.5–15 × 3–10 cm, 1–2-ternate; ultimate segments oblong-ovate or ovate-lanceolate, 1–11 × 0.5–2.5 cm, margins double serrate, apex caudate. Umbels 1.5–3 cm across in flower, to 7 cm in fruit; bracts absent; rays (7–)15–30(–40), 2–4 cm; bracteoles 2–3, ca. 0.8 mm; umbellules 2–3-flowered; pedicels 0.2–3 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 1.5 × 0.6 mm. Stylopodium conic; styles elongate; stylopodium plus style ca. 1.1 mm. Fruit ovoid, ca. 2–3 × 1.5–2 mm; ribs finely scabrid; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Aug.

• Forests, valley sides, moist rock crevices; 1300–2100 m. W Hubei, E Sichuan.

5. *Pternopetalum botrychioides* (Dunn) Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

散血芹 san xue qin

Plants 15–60 cm. Stems 1–2(–3), branching. Basal leaves petiolate, petioles 10–15 cm, glabrous; blade ovate in outline, 3.5–8 × 3–8 cm, ternate-1-pinnate; ultimate segments ovate or rhomboidal, 1–6 × 0.5–1.5 cm, glabrous or sparsely strigose along veins, margin crenate, apex caudate. Umbels 1.5–3 cm across in flower, to 7 cm in fruit; bracts absent; rays (6–)15–30(–40), 2–3(–5) cm; bracteoles 2–3, 0.3–1 mm; umbellules (2–)3-flowered; pedicels 0.2–3 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 1.5 × 0.6 mm. Stylopodium conic; styles elongate; stylopodium plus styles ca. 1.1 mm. Fruit ovoid or broadly so, 2–3 × 1.5–2 mm; ribs finely scabrid; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Aug.

• Shady forests, valley slopes in forests, among shrubs, stream banks; 700–3000 m. Guizhou, Sichuan, W Yunnan.

- 1a. Ultimate leaf segments 0.5–1.5 cm broad; fruit broadly ovoid 5a. var. *botrychioides*
 1b. Ultimate leaf segments 2–3 cm broad; fruit ovoid 5b. var. *latipinnulatum*

5a. *Pternopetalum botrychioides* var. *botrychioides*

散血芹(原变种) san xue qin (yuan bian zhong)

Cryptotaeniopsis botrychioides Dunn, *J. Linn. Soc., Bot.* 35: 494. 1903.

Ultimate leaf segments 1–6 × 0.5–1.5 cm. Fruit broadly ovoid.

• Valley slopes in forests, among shrubs; 700–3000 m. Guizhou, Sichuan, W Yunnan.

This variety has reputed medicinal value (in Sichuan).

5b. *Pternopetalum botrychioides* var. *latipinnulatum* R. H. Shan, *Sinensia* 11: 158. 1940.

宽叶散血芹 kuan ye san xue qin

Ultimate leaf segments 1–6 × 2–3 cm. Fruit ovoid.

• Shady forests, stream banks; 800–1400 m. Sichuan.

6. *Pternopetalum cartilagineum* C. Y. Wu ex R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 16(3): 70. 1978.

骨缘囊瓣芹 gu yuan nang ban qin

Plants ca. 25 cm. Stems 1–3, slender. Basal leaves petiolate, petioles 3.5–25 cm; blade ovate in outline, 3–8 × 3–7 cm, ternate; ultimate segments broad-ovate, 2–3 × 1–3 cm, somewhat coriaceous, abaxially slightly glaucous, margins serrate, veins and margins cartilaginous and sparsely setose. Cauline leaves usually 1. Inflorescence branching, umbels 1–2 cm across in flower, larger in fruit; bracts absent; rays 10–20; bracteoles 2, ca. 0.4 mm; umbellules 2-flowered; pedicels 0.2–2 mm. Calyx teeth subulate, ca. 1 mm. Petals white. Stylopodium conic; styles elongate; stylopodium plus styles ca. 1 mm. Fruit ovoid, 2.5–3 × ca. 2.5 mm; ribs denticulate; vittae not recorded. Fl. and fr. Mar–Jul.

• Forests, riparian grasslands; 2400–2500 m. W Yunnan.

This poorly known taxon is recorded only from a few collections.

7. *Pternopetalum molle* (Franchet), Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

洱源囊瓣芹 er yuan nang ban qin

Plants 10–35 cm. Stems 1–3, glabrescent, slender. Basal leaves petiolate, petioles 5–18 cm, glabrous; blade triangular-ovate in outline, 2–10 × 2–8 cm, 1–2-ternate; ultimate segments broad-ovate or rhomboidal, 2–5 × 1–3 cm, membranous, glabrous abaxially slightly glaucous, margins serrate or crenate. Cauline leaves 1–2. Inflorescence 1–2-branches; umbels 2–3 cm across in flower, to 6 cm in fruit; bracts absent; rays (5–)10–20, 1–3.5 cm; bracteoles 2, 0.4–0.8 mm; umbellules (1–)2(–)3-flowered; pedicels 0.3–2.5 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 2 × 0.9 mm. Stylopodium conic; styles elongate; stylopodium plus styles ca. 1.3 mm. Fruit ovoid or oblong-ovoid, 2–3 × ca. 1 mm; ribs finely scabrid or minutely denticulate; vittae 1–3 in each furrow, 4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Forests, alpine meadows, streamsides; 1400–3500 m. N and W Sichuan, N and W Yunnan.

- 1a. Ultimate leaf segments 2–5 × 1–3 cm, 2–3-lobed or undivided 7a. var. *molle*
 1b. Ultimate leaf segments 4–7 × 3–5 cm, margins irregularly lobed to pinnatifid 7b. var. *dissectum*

7a. *Pternopetalum molle* var. *molle*

洱源囊瓣芹(原变种) er yuan nang ban qin (yuan bian zhong)

Carum molle Franchet, *Bull. Soc. Philom. Paris, sér. 8, 6:* 120. 1894; *Cryptotaeniopsis cuneifolia* H. Wolff; *C. mollis* (Franchet) Dunn; *Pternopetalum cuneifolium* (H. Wolff) Handel-Mazzetti; *P. molle* var. *crenulatum* R. H. Shan & F. T. Pu.

Ultimate leaf segments 2–5 × 1–3 cm, 2–3-lobed or undivided. Rays 1–2.5 cm. Fruit ovoid or oblong-ovoid.

• Coniferous forests, alpine meadows; 2600–3500 m. W Sichuan, NE and W Yunnan.

7b. *Pternopetalum molle* var. *dissectum* R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 16(3): 72. 1978.

裂叶囊瓣芹 lie ye nang ban qin

Ultimate leaf segments 4–7 × 3–5 cm, margins irregularly lobed to pinnatifid. Rays 1.5–3.5 cm. Fruit oblong-ovoid.

• Forests, streamsides; 1400–3200 m. N Sichuan, NW Yunnan.

8. *Pternopetalum yiliangense* R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 16(3): 72. 1978.

宜良囊瓣芹 yi liang nang ban qin

Plant rather stout, 30–60 cm. Stem single, 1–2-branched. Basal leaves petiolate, petioles 4–10 cm, densely strigose; blade broadly triangular-ovate in outline, 4–8 × 4–8 cm, 3–5-foliolate; ultimate segments ovate or oblong-ovate, 3–5 × 2–4 cm, abaxially pale green, strigose on veins, margins crenate. Umbels ca. 2 cm across in flower, to 4 cm in fruit; bracts absent; rays 15–32, 1–3.5 cm; bracteoles 2, ca. 0.5 mm; umbellules 2-flowered,

usually only terminal umbellule fertile; pedicels 0.2–1.5 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 1.8 × 0.8 mm. Stylopodium conic; styles elongate; stylopodium plus style ca. 1 mm. Fruit ovoid, 2.5–3 × ca. 2.5 mm; ribs denticulate; vittae 1–2 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

- Riparian grasslands; 1900–2000 m. C Yunnan.

This poorly known taxon is recorded only from a few collections.

9. *Pternopetalum trifoliatum* R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 27: 64. 1989.

鸚鵡山囊瓣芹 zhe gu shan nang ban qin

Plants 10–30 cm. Stem glabrescent, slender. Basal leaves petiolate, petioles 4–6 cm, glabrous; blade triangular-ovate in outline, 2–5 × 2–4 cm, ternate; leaflets 3, ovate, 1–3 × 0.7–1.5 cm, lateral leaflets 2–3-lobed or undivided, glabrous, margins serrate. Cauline leaves usually 2. Umbels 1.5–2.5 cm across in flower, to 4 cm in fruit; bracts and bracteoles absent; rays (3–) 10–20, 1.5–3 cm; umbellules 2–4-flowered; pedicels 0.5–1 mm. Calyx teeth triangular, ca. equaling stylopodium. Petals white. Stylopodium low conic; styles short, less than 0.5 mm. Fruit ovoid, ca. 2.5 × 2 mm; ribs denticulate; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

- Among mosses in *Abies* forests; 3400–3900 m. W Sichuan.

This poorly known taxon is recorded only from a few collections.

10. *Pternopetalum sinense* (Franchet) Handel-Mazzetti, *Symb. Sin.* 7: 719. 1933.

华囊瓣芹 hua nang ban qin

Carum sinense Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 119. 1894; *Cryptotaeniopsis sinensis* (Franchet) H. Wolff.

Plants 30–60 cm. Stems glabrescent, slender. Basal leaves petiolate, petiole 4–6 cm; blade triangular-ovate in outline, 5–7 × 3.5–5.5 cm, 2–3-ternate; ultimate segments ovate, 1–2 × 1–1.5 cm, sparsely strigose on the veins, margins crenate. Umbels 3–5 cm across in flower, to 5–7 cm in fruit; bracts 2–3, linear-lanceolate, 1–1.5 mm; rays 7–15, 1–4 cm; bracteoles 2–3, ca. 0.5 mm; umbellules 2–3-flowered; pedicels to 4 mm. Calyx teeth lanceolate, ca. 0.4 mm. Petals white. Stylopodium low conic; styles short, ca. 0.4 mm. Fruit ovate, ca. 3 × 2 mm; ribs finely scabrid; vittae absent in each furrow and on commissure. Fl. and fr. May–Aug.

- Forests; 1400–3100 m. Yunnan.

11. *Pternopetalum nudicaule* (H. de Boissieu) Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

裸茎囊瓣芹 luo jing nang ban qin

Cryptotaeniopsis nudicaulis H. de Boissieu, *Bull. Acad. Int. Géogr. Bot.* 16: 184. 1906; *Pternopetalum nudicaule* var. *esetosum* Handel-Mazzetti.

Plants 10–25 cm. Stems slender, glabrous. Basal leaves 4–6, petiolate, petioles 6–15 cm, glabrous; blade triangular in outline, 3–8(–12) × 2.5–6(–10) cm, ternate; leaflets 3, lateral leaflets ovate, terminal leaflets rhomboidal (1.5–)3–6(–8.5) × (1–)2–3(–5) cm, 2–3-lobed or entire, glabrous except sparsely set-

ulose along main veins and margins, margin serrate. Cauline leaves absent. Umbels terminal, 2.5–3 cm across in flower, to 9 cm in fruit; bracts absent; rays 10–30, 1.5–5 cm, pubescent; bracteoles 2–3, 0.5–1.5 mm; umbellules 2–3-flowered; pedicels 0.3–1.5 mm. Calyx teeth subulate, 0.6–0.9 mm. Petals white, ca. 1.3 × 0.6 mm. Stylopodium conic; styles elongate; stylopodium and styles ca. 1 mm. Fruit oblong-ovoid, 2.5–4 × 1–1.5 mm; ribs finely scabrid; vittae 1–3 in each furrow, 2–4 on commissure. Fl. and fr. Apr–Aug.

Forests, stream banks, moist shady rocks; 600–1800 m. Guangdong, Guangxi, Guizhou, Hunan, C Yunnan [NE India, N Vietnam].

This species has reputed medicinal value.

12. *Pternopetalum delicatum* (H. Wolff) Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

嫩弱囊瓣芹 nen ruo nang ban qin

Carum delicatum H. Wolff in H. Limpricht, *Bot. Reis. Chin.* 449. 1922; *Cryptotaeniopsis affinis* H. Wolff; *C. delicatum* (H. Wolff) H. Wolff; *Pternopetalum affine* (H. Wolff) M. Hiroe.

Plants 30–45 cm. Stem single, unbranched and glabrous. Basal leaves petiolate, petioles up to 25 cm; blade triangular-ovate in outline, 6–8 × 3–8 cm, 1-pinnate; pinnae 3–4-paired, ovate, broadly ovate or lanceolate, 2–3.5 × 1.2–1.8 cm, veins and margins sparsely strigose, abaxially pale green, margin incised-serrate. Cauline leaves absent or occasionally 1. Umbels usually terminal, 2.5–3 cm across in flower, 3–5 cm in fruit; bracts absent; rays ca. 30, 1–3 cm; bracteoles 2–3, ca. 0.4 mm; umbellules 2–3-flowered; pedicels to 2 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white. Stylopodium conic; styles elongate; stylopodium plus styles 0.3–0.5 mm. Fruit ovoid, 2–3 × 1–1.5 mm; ribs finely scabrid; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Apr–Sep.

- Forests; 800–3000 m. Guizhou, Sichuan, NE Yunnan.

13. *Pternopetalum delavayi* (Franchet) Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

澜沧囊瓣芹 lan cang nang ban qin

Carum delavayi Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 120. 1894; *Cryptotaeniopsis delavayi* (Franchet) Dunn.

Plants (15–)30–60(–150) cm. Stems erect, sparsely pubescent, 3–5(–7)-branched. Basal and lower leaves petiolate, petioles 4–15 cm, glabrous; blade triangular-ovate, 3–7 × 2.5–6 cm, 2-ternate; ultimate segments rhomboidal or flabelliform, 1–5 × 2–3 cm, veins and margins pubescent. Upper leaves 1–2-ternate; ultimate segments elongate-linear, 4–10 × 0.3–0.8 cm. Inflorescence branching, umbels 2–4 cm across in flower, to 8 cm in fruit, terminal on stem and branches; bracts absent; rays (4–) 13–18(–25), 0.5–5 cm; bracteoles 2–4, 0.5–1.2 mm; umbellules (2–)3–4-flowered; pedicels 0.2–2.5 mm. Calyx teeth subulate, ca. 0.3 mm. Petals white, sometimes tinged pink, ca. 1.1 × 0.8 mm. Stylopodium conic; styles elongate; stylopodium and style ca. 0.9 mm. Fruit oblong-ovoid, 2–4 × 1.2–2 mm, sometimes 1 mericarp aborted in fruit; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

• Forests, forest margins, alpine scrub and meadows; 2300–4500 m. W Sichuan, E Xizang, NW Yunnan.

This species has reputed medicinal value.

14. *Pternopetalum cardiocarpum* (Franchet) Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

心果囊瓣芹 xin guo nang ban qin

Carum cardiocarpum Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 120. 1894; *Cryptotaeniopsis cardiocarpa* (Franchet) Dunn

Plants (8–)20–40(–90) cm. Stem single, 3–5-branched. Basal and lower leaves petiolate, petioles 4–12 cm; blade triangular-ovate, 3–6 × 2.5–6 cm, 1–2-ternate; ultimate segments flabelliform or rhomboidal, ca. 1 × 1 cm, veins and margins pubescent. Upper leaves several, 1–2-ternate; ultimate segments elongate-linear, 10–25 × ca. 2 mm. Inflorescence branching, umbels 1.5–2.5 cm across in flower, to 5 cm in fruit, terminal on stem and branches; bracts absent; rays 5–25, 1.5–3 cm; bracteoles 1–3, ca. 0.5 mm; umbellules 2–4-flowered; pedicels 0.1–2 mm. Calyx teeth subulate, size ca. 0.4 mm. Petals purple-white. Stylopodium low-conic; styles ca. 0.5 mm, as long as stylopodium, reflexed. Fruit ovoid, 2–3 × 1.5–2 mm; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

• Coniferous forests, forest margins, scrub, alpine meadows; 2700–4300 m. W Sichuan, E Xizang, NW Yunnan.

This plant may be conspecific with the E Himalayan *Pternopetalum radiatum* (W. W. Smith) P. K. Mukherjee & Constance (*Acronema radiatum* (W. W. Smith) H. Wolff; *Pimpinella radiata* W. W. Smith), but further work and collections from NE India and N Myanmar are needed to confirm this.

15. *Pternopetalum longicaule* R. H. Shan, *Sinensia* 11: 161. 1940.

长茎囊瓣芹 chang jing nang ban qin

Plants 20–65 cm. Stems usually single, or occasionally 2, 1–5-branched or unbranched. Basal leaves absent. Cauline leaves long-petiolate, petioles 1.5–9 cm; blade triangular-ovate, 5–7 × 3–5 cm, ternate-2-pinnate; ultimate segments ovate or ovate-lanceolate, 5–15 × 2–10 mm, setulose on the veins. Upper leaves smaller, 2-ternate; ultimate segments ovate-lanceolate. Umbels 3–4 cm across in flower, 5(–7) cm in fruit; bracts absent; rays (4–)10–20, (1–)3–4 cm; bracteoles 2–3, 0.5–1.5 mm; umbellules (2–)3-flowered; pedicels 2–3(–5) mm. Calyx teeth subulate, ca. 0.5 mm. Petals white. Stylopodium low-conic; styles ca. 0.5 mm, shorter than stylopodium, suberect to slightly reflexed. Fruit ovoid, 2–3 × 1.5–2 mm; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Forests, alpine meadows, moist mossy rocks; 1900–3700 m. S Gansu, Guizhou, C and S Shaanxi, W Sichuan, SE Xizang.

1a. Plants 20–65 cm; rays (4–)10–20 15a. var. *longicaule*
1b. Plants 4–20(–30)cm; rays 4–6 15b. var. *humile*

15a. *Pternopetalum longicaule* var. *longicaule*

长茎囊瓣芹(原变种) chang jing nang ban qin (yuan bian zhong)

Plants 20–65 cm. Leaf blade ternate-2-pinnate. Upper leaves 2-ternate. Rays (4–)10–20. Fruit vittae 1–3 in each furrow, 4 on commissure.

• Forests, alpine meadows, moist mossy rocks; 2000–3200 m. Guizhou, W Sichuan, SE Xizang.

15b. *Pternopetalum longicaule* var. *humile* R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 16(3): 76. 1978.

短茎囊瓣芹 duan jing nang ban qin

Pternopetalum brevium (R. H. Shan & F. T. Pu) K. T. Fu; *P. longicaule* var. *brevium* R. H. Shan & F. T. Pu.

Plants low, 4–20(–30) cm. Leaves occasionally only 1, basal. Rays 4–6. Fruit vittae 1–2 in each furrow, 2 on commissure.

• Forests, alpine meadows; 1900–3700 m. S Gansu, C and S Shaanxi, NW Sichuan.

16. *Pternopetalum heterophyllum* Handel-Mazzetti, *Oesterr. Bot. Z.* 90: 122. 1941.

异叶囊瓣芹 yi ye nang ban qin

Plants 15–30 cm. Stem single, slender, 1–2-branched or unbranched. Basal leaves petiolate, petioles 3–10 cm; blade ovate-triangular, ca. 1.5–4 × 1.5–3.5 cm, ternate; leaflets 3(–5); ultimate segments flabelliform or rhomboidal, ca. 1 × 1 cm, margins serrate. Cauline leaves 1–3, 1–2-ternate; ultimate segments linear, 20–50 × 1–2 mm. Umbels 1.5–2.5 cm across in flower, to 4 cm in fruit; bracts absent; rays 10–20, 1–2 cm; bracteoles 1–3, 0.5–1.8 mm; umbellules 2(–3)-flowered; pedicels 0.1–1.8 mm. Calyx teeth triangular-subulate, ca. 0.3 mm. Petals white, ca. 1.1 × 0.7 mm. Stylopodium conic; styles elongate; stylopodium plus styles ca. 0.6 mm. Fruit ovoid, 1.5–1 × 0.7–1 mm; ribs filiform; vittae 2 in each furrow, 4 on commissure. Fl. Mar–May, fr. Jun–Aug.

• Forests, among shrubs, grasslands, streamsides; 1200–3400 m. S Gansu, W Hubei, Hunan, E Qinghai, S Shaanxi, W Sichuan.

17. *Pternopetalum filicinum* (Franchet) Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

羊齿囊瓣芹 yang chi nang ban qin

Carum filicinum Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 121. 1894; *Cryptotaeniopsis filicina* (Franchet) H. de Boissieu; *Pimpinella filicina* (Franchet) Diels.

Plants 25–40 cm. Stems 1–2, 1–2-branched or unbranched. Basal leaves petiolate, petioles 3–7 cm; blade triangular-ovate, 2–8 × 2–4 cm, ternate or ternate-2-pinnate; ultimate segments flabelliform or lanceolate, 7–16 × 3–9 mm. Upper leaves 2-ternate; ultimate segments elongate-linear, 20–40 × 1–2 mm. Umbels 2–3.5 cm across in flower, to 9 in fruit; bracts absent; rays 7–24, 2–4 cm; bracteoles 2–3, 0.3–1 mm; umbellules 2(–3)-flowered; pedicels 0.2–1.5 mm. Calyx teeth minute, almost obsolete, triangular, ca. 0.05 mm. Petals white, 0.9–0.5 mm. Stylopodium low-conic; styles shorter than stylopodium, ca. 0.15 mm, reflexed. Fruit oblong-ovoid, 2.5–3 × 0.7–1 mm; ribs filiform; vittae 1–2 in each furrow, 2 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Coniferous forests, grassy slopes; 1500–3900 m. Gansu, W Hubei, Qinghai, Shaanxi, NE and W Sichuan, NW Yunnan.

Specific boundaries with the following species, *Pternopetalum tanakae*, are indistinct and need further work.

18. *Pternopetalum tanakae* (Franchet & Savatier) Handel-Mazzetti, *Symb. Sin.* 7: 719. 1933.

东亚囊瓣芹 dong ya nang ban qin

Plants 1–25 cm. Roots fusiform; rhizomes creeping, frequently with a few tubercles at nodes. Stems 1–2, glabrous, 1–2-branched or unbranched. Basal leaves petiolate, petioles 2–10 cm; blade ovate-triangular, 2–4 × 1.5–3.5 cm, ternate-2-pinnate; ultimate segments flabelliform or lanceolate, 5–15 × 3–8 mm. Cauline leaves 1–2, ternate-1–2-pinnate or ternate; ultimate segments lanceolate or elongate-linear, 10–25 × 2–3 mm. Umbels 2–3 cm across in flower, to 7 cm in fruit; bracts absent (occasionally 1, minute); rays 5–25(–30), 1.5–3 cm; bracteoles 1–3, 0.3–2 mm; umbellules 1–2(–3)-flowered; pedicels 0.2–2.5 mm. Calyx teeth minute, ca. 0.1 mm, or obsolete. Petals white, oblong, apex acute. Stylopodium low-conic; styles ca. 0.2 mm, shorter than stylopodium. Fruit oblong ovoid, 2–2.5 × 1–2 mm; ribs filiform; vittae 1–2 in each furrow, 2 on commissure. Fl. and fr. Apr–Aug.

Forests; 700–1600 m. Anhui, Fujian, Jiangxi, Zhejiang [Japan, Korea].

Literature references to *Pternopetalum tanakae* occurring in the Himalayas are based on misidentification of material that should correctly be ascribed to *P. subalpinum*.

- 1a. Bract-like leaves absent under base of umbel 18a. var. *tanakae*
 1b. Bract-like leaves 1–2 under base of umbel 18b. var. *fulcratum*

18a. *Pternopetalum tanakae* var. *tanakae*

东亚囊瓣芹(原变种) dong ya nang ban qin (yuan bian zhong)

Carum tanakae Franchet & Savatier, *Enum. Pl. Jap.* 2: 371. 1878; *Cryptotaeniopsis tanakae* (Franchet & Savatier) H. de Boissieu; *Pimpinella tanakae* (Franchet & Savatier) Diels.

Bract-like leaves absent from base of umbel. Bracts absent. Fruit vittae 1–2 in each furrow, 2 on commissure.

Forests; 700–1600 m. Anhui, Fujian [Japan, Korea].

18b. *Pternopetalum tanakae* var. *fulcratum* Y. H. Zhang, *Bull. Bot. Res.*, Harbin 9(3): 59. 1989 [*“fulcrantum”*].

假苞囊瓣芹 jia bao nang ban qin

Leaves 1–2 under the base of umbel, bract-like, 1–2-ternate; ultimate segments elongate-linear, 10–25 × 1–2 mm. Bracts usually absent or occasionally 1, minute, linear-lanceolate. Fruit vittae 1 in each furrow.

• Among mosses in forests; ca. 1500 m. Anhui, Fujian, Jiangxi, Zhejiang.

19. *Pternopetalum caespitosum* R. H. Shan, *Sinensia* 14: 113. 1943.

丛枝囊瓣芹 cong zhi nang ban qin

Plants 20–30(–60) cm. Stems slender, profusely branched,

caespitose. Basal leaves petiolate, petioles 1.5–7 cm; blade ovate-triangular in outline, 2.5–6 × 2–5 cm, 1–2-ternate; ultimate segments ovate, ca. 1 × 1 cm, or linear-lanceolate, 2–4 × 0.3–0.5 cm. Cauline leaves ternate; ultimate segments elongate-linear, 30–70 × 3–5 mm. Umbels numerous, 2–3 cm across in flower, to 4 cm in fruit, terminal on stem and branches; bracts absent; rays 5–20, 2–4 cm, pubescent; bracteoles 2–3; umbellules 2–3-flowered. Calyx teeth minute, subulate, ca. 0.3 mm. Petals white. Stylopodium low-conic; styles ca. equaling calyx teeth, suberect to slightly reflexed. Fruit ovoid, 2–3 × 1.5–2 mm; ribs filiform; vittae 1–3 in each furrow, 2–4 on commissure. Fl. May–Jul, fr. Aug–Oct.

• Forests, forest margins, grasslands; 2300–3600 m. Gansu, Shaanxi, W Sichuan, E Xizang.

20. *Pternopetalum subalpinum* Handel-Mazzetti, *Symb. Sin.* 7: 718. 1933.

高山囊瓣芹 gao shan nang ban qin

Plants 5–10 cm. Stems 1–2, unbranched, glabrous. Basal leaves petiolate, petioles 2–6 cm; blade ovate-triangular, 8–20 × 9–18 mm, 1-pinnate; pinnae 2–4 pairs, broadly ovate, 2–6 × 2–6 mm, margins serrulate. Cauline leaves similar to basal. Umbels 0.5–1.1 cm across in flower, to 3.5 cm in fruit, terminal; bracts absent; rays 5–9, 3–25 mm, extremely unequal; bracteoles 1–2, 0.3–1.5 mm; umbellules (1–)2(–3)-flowered; pedicels to 1.3 mm. Calyx teeth minute, triangular, ca. 0.1 mm. Petals white or purplish-white, ca. 1 × 0.4 mm, apex acute. Stylopodium low-conic; styles ca. 0.15 mm, shorter than stylopodium, reflexed. Fruit ovoid, 1.5–2 × 0.75–0.9 mm; vittae not observed. Fl. and fr. Jun–Aug.

Forests, grasslands, streamsides; 3000–4100 m. NW Yunnan [Bhutan, NE India, Sikkim].

21. *Pternopetalum leptophyllum* (Dunn) Handel-Mazzetti, *Symb. Sin.* 7: 719. 1933.

薄叶囊瓣芹 bao ye nang ban qin

Cryptotaeniopsis leptophylla Dunn, *J. Linn. Soc., Bot.* 35: 495. 1903; *C. viridis* C. Norman; *Pternopetalum confusum* C. Norman; *P. viride* (C. Norman) Handel-Mazzetti.

Plants 10–30 cm. Stems 1–3, usually unbranched or occasionally of a single branch. Basal leaves petiolate, petioles 4–16 cm; blade ovate-acuminate in outline, 3–8 × 1.5–7 cm, 2-pinnate/pinnatifid; ultimate segments ovate-lanceolate, 5–15 × 3–5 mm. Cauline leaves similar to basal. Umbels 2–3 cm across in flower, to 4 cm in fruit; bracts absent; rays 6–25, 1–2 cm; bracteoles 2–4, 1–1.5 mm; umbellules 2–4-flowered; pedicels 0.5–3 mm. Calyx teeth minute, triangular, ca. 0.1 mm. Petals white, apex not inflexed. Stylopodium low-conic; styles ca. 0.4 mm, shorter than stylopodium, reflexed. Fruit oblong-ovoid, ca. 2 × 1 mm; ribs filiform; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Apr–Aug.

• Shady moist rocks; 1000–1800 m. Sichuan.

This poorly known taxon is recorded only from a few collections. It has reputed medicinal value.

22. *Pternopetalum gracillimum* (H. Wolff) Handel-Mazzetti, *Symb. Sin.* 7: 719. 1933.

纤细囊瓣芹 xian xi nang ban qin

Cryptotaeniopsis gracillima H. Wolff, *Acta Horti Gothob.* 2: 306. 1926; *Pternopetalum lamellosociliare* K. T. Fu; *P. wangianum* Handel-Mazzetti.

Plants 10–20 cm tall, glabrous. Stems 1–6, usually unbranched or occasionally of a single branch. Basal leaves petiolate, petioles 5–7 cm; blade ovate-triangular, 1.5–3 × 1–3 cm, ternate–2–3-pinnate; pinnae 4–5-paired, proximal pinnae petiolulate; ultimate segments linear, 1.5–5 × 0.5–1 mm. Cauline leaves absent, or occasionally 1, similar to the basal. Umbels 1–2 cm across in flower, to 5 cm in fruit, usually terminal; bracts absent or 1, linear-lanceolate; rays (5–)10–15(–30), 1–3 cm; bracteoles 2, 1–2 mm; umbellules 2–3-flowered; pedicels 0.2–2 mm. Calyx teeth minute, triangular, ca. 0.1 mm. Petals white. Stylopodium low-conic; styles ca. 2 mm, shorter than stylopodium, reflexed. Fruit oblong-ovoid, ca. 2 × 1.1 mm, both mericarps developed in fruit; ribs filiform; vittae 1 in each furrow, 2 on commissure. Fl. and fr. May–Aug.

• Forests, mossy rocks; 1500–3400 m. Gansu, Hubei, Sichuan, NW Yunnan.

23. *Pternopetalum trichomanifolium* (Franchet) Handel-Mazzetti, *Symb. Sin.* 7: 719. 1933.

膜蕨囊瓣芹 mo jue nang ban qin

Carum trichomanifolium Franchet, *Bull. Mus. Hist. Nat. (Paris)* 1: 64. 1895; *Cryptotaeniopsis decipiens* C. Norman; *C. kiangsiensis* H. Wolff; *C. trichomanifolia* (Franchet) H. de Boissieu; *Pimpinella trichomanifolia* (Franchet) Diels; *Pternopetalum decipiens* (C. Norman) M. Hiroe; *P. kiangsiense* (H. Wolff) Handel-Mazzetti.

Plants 30–40(–60) cm. Stems 1–3, usually unbranched or occasionally of a single branch. Leaves almost all basal, petiolate, petioles 3–18 cm; blade triangular-ovate in outline, 6–9 × 5–10 cm, ternate–3–4-pinnate, very finely dissected; ultimate segments linear, 1.5–4 × 1–2 mm. Umbels 1.5–2.5 cm across in flower, to 10 cm in fruit; bracts absent; rays (6–)15–30(–40), (2–)3–5 cm; bracteoles 2–4, 0.7–2 mm; umbellules 2–4-flowered; pedicels 0.1–2 mm. Calyx teeth subulate, ca. 1 mm. Petals white, ca. 2 × 1 mm. Stylopodium conic; styles elongate; stylopodium plus style ca. 1 mm. Fruit oblong-ovoid, 3–4 × 0.8–1.2 mm, often only one mericarp develops in fruit; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Mar–May, fr. Jun–Aug.

• Forests, shady moist rocks, streamsides; 600–2400 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Xizang, Yunnan.

This species has reputed medicinal value (in Guangxi).

The following species have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

Pternopetalum asplenioides (H. de Boissieu) Handel-Mazzetti (*Symb. Sin.* 7: 718. 1933; *Cryptotaeniopsis asplenioides* H. de Boissieu, *Bull. Herb. Boissier, sér. 2*, 2: 807. 1902), described from Chongqing (Chengkou, *P. G. Farges s.n.*, holotype, P).

Pternopetalum mire 3652, holotairei (Diels ex H. Wolff) Handel-Mazzetti (*Symb. Sin.* 7: 719. 1933; *Cryptotaeniopsis mairei* Diels ex H. Wolff in Engler, *Pflanzenr.* 90(IV. 228): 180. 1927; *Carum mairei* (Diels ex H. Wolff) M. Hiroe), described from NE Yunnan (Dongchuan, 2600 m, *E. E. Maype*, B).

47. CHAMAESCIADIUM C. A. Meyer, *Verzeichn. Pfl. Cauc.* 122. 1831.

矮伞芹属 ai san qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs, perennial, dwarf. Taproot stout, caudex thick. Stem much reduced, almost absent, base clothed in papery (rarely fibrous) remnant sheaths. Leaves in basal rosette, 1–2-pinnate; ultimate segments ovate to lanceolate, toothed or pinnatifid; petiole sheathing at base. Umbels compound, primary umbel terminal, lax, mostly sessile, lateral umbels smaller, pedunculate; bracts and bracteoles linear-lanceolate, entire; rays of terminal umbel long, stout, purplish, unequal, rays of lateral umbels short. Calyx teeth obsolete. Petals white, oblong-obovate, base cuneate, apical lobule narrow, inflexed. Stylopodium low-conic, undulate at margin; styles longer than the stylopodium. Fruit ovoid-oblong, slightly compressed laterally, glabrous; ribs 5, filiform; vittae 3–4 in each furrow, 8 on commissure. Seed face plane. Carpophore thick, 2-fid.

One species: C and SW Asia.

1. *Chamaesciadium acaule* (Marschall von Bieberstein) Boissier var. **simplex** R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 21: 81. 1983.

单羽矮伞芹 dan yu ai san qin

Plants 3–10 cm. Basal leaves 1-pinnate; pinnae 3 pairs, 4–5 × 3–4 mm, margins 5–6-toothed or entire, apex 3-lobed. Terminal umbels 3–20 cm across; bracts 4–6, 6–10 mm; rays 10–12, 4–15 cm; bracteoles 7–9, ca. 4 mm, equaling umbellules;

umbellules ca. 1 cm across, 10–15-flowered; pedicels 1.5–3 mm. Fruit 3–4 × 1.5–2 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Grasslands; 2500–2700 m. SW Xinjiang (Kashi).

See also the morphologically similar *Trachydium subnudum*, which differs in having more dissected leaves and many-flowered umbellules. *Chamaesciadium acaule* var. *acaule* occurs in Afghanistan and SW Asia (SW Caucasus, N Iran, and Turkey) and differs in having 3-lobed or pinnatifid bracteoles. It has been reported from China (Xizang) but no specimens have been seen.

48. PIMPINELLA Linnaeus, Sp. Pl. 1: 263. 1753.

茴芹属 hui qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Pimpinella subsect. *Spuriopimpinella* H. de Boissieu; *Spuriopimpinella* (H. de Boissieu) Kitagawa.

Herbs, perennial, rarely biennial or annual. Root fibrous or a taproot. Stems erect, branching, base without fibrous remnant sheaths. Basal leaves petiolate, sheathing at base; blade 1–3-ternate, 1–4-pinnate or ternate-1–3-pinnate, sometimes simple. Cauline leaves often heteromorphic. Inflorescence branching, umbels terminal and lateral; bracts and bracteoles present or absent, usually linear, apex entire; rays few to numerous. Calyx teeth usually obsolete, sometimes conspicuous, lanceolate, minute. Petals white, rarely purple, glabrous or hairy abaxially. Stylopodium conic or low-conic, rarely depressed; styles short or long, spreading or reflexed (best observed in young or mature fruit). Fruit cordate-ovoid or oblong-ovoid, slightly laterally compressed, constricted at the commissure, glabrous or variously hairy; ribs 5, filiform, sometimes obscured by the indumentum; vittae 1–3(–4) in each furrow, 2–4(–8) on commissure. Seed face plane, rarely slightly concave. Carpophore 2-fid or 2-parted.

About 150 species: disjunct between Africa, Asia, and Europe; 44 species (28 endemic, one introduced) in China.

This large, widespread, and taxonomically complex genus is generally characterized by the small, rather featureless fruits. In China, *Pimpinella* can be divided into two groups: those species with hairy, puberulent, or distinctly roughened fruits and obsolete calyx teeth; and those with smooth, glabrous fruits and obsolete or conspicuous calyx teeth. Plants falling within the former group should be also be compared with *Trachyspermum*. Several groups of allied species can be recognized within Chinese *Pimpinella* where species boundaries are indistinct; the *P. candolleana* complex is a typical example. As these groups are often widespread across Asia, full resolution of the nomenclatural and taxonomic problems can only be achieved with a broad revision across many countries.

- 1a. Calyx teeth obsolete; fruit usually ornamented, hairy, papillose or granular, occasionally smooth.
 - 2a. Annuals or biennials; bracteoles absent, rarely 1–4.
 - 3a. Stylopodium conic; fruit oblong-ovoid 1. *P. anisum*
 - 3b. Stylopodium low-conic; fruit ovoid-globose or cordate-ovoid.
 - 4a. Rays 15–20, 15–40 mm; bracteoles absent (Xinjiang) 2. *P. puberula*
 - 4b. Rays 3–5, 5–10 mm; bracteoles 2–4 (Sichuan, Yunnan) 3. *P. silvatica*
 - 2b. Perennials; bracteoles present.
 - 5a. Basal and cauline leaves homomorphic, ternate or 1-pinnate, pinnae 2 pairs; flowers fertile in terminal umbels, mainly sterile in lateral umbels 4. *P. kingdon-wardii*
 - 5b. Basal and cauline leaves heteromorphic, simple, ternate or 1–2-pinnate; flowers fertile in terminal and lateral umbels.
 - 6a. Root fibrous.
 - 7a. Petals dark purple, glabrous, base shortly clawed 5. *P. atropurpurea*
 - 7b. Petals white, hairy abaxially, base cuneate 6. *P. diversifolia*
 - 6b. Taproot cylindrical or fusiform.
 - 8a. Basal and lower leaves 1–2-pinnate or ternate-1–2-pinnate, rarely ternate.
 - 9a. Rays and pedicels extremely unequal, rays 2–70 mm 14. *P. smithii*
 - 9b. Rays and pedicels subequal or slightly unequal, rays 5–25(–30) mm.
 - 10a. Styles 2–4 × stylopodium; fruit sparsely pubescent to glabrous; basal leaves 1–2-pinnate 15. *P. fargesii*
 - 10b. Styles 1–1.5 × stylopodium; fruit densely or sparsely pubescent; basal leaves 1-pinnate, or ternate, 1–2-pinnate.
 - 11a. Rays 4–10, slightly unequal; fruit densely pubescent, basal leaves 1-pinnate, rarely ternate 16. *P. chungdienensis*
 - 11b. Rays 8–16, subequal; fruit sparsely pubescent, basal leaves ternate-1–2-pinnate 17. *P. tonkinensis*
 - 8b. Basal and lower leaves simple, 1-pinnate or ternate.
 - 12a. Basal and lower leaves ternate, rarely simple.
 - 13a. Bracteoles equal to or longer than pedicels; vittae 1 in each furrow 12. *P. tibetanica*
 - 13b. Bracteoles equal to or shorter than pedicels; vittae 1–4 in each furrow 13. *P. bisinuata*
 - 12b. Basal and lower leaves usually simple.
 - 14a. Leaf blade reniform-rotund, cordate-lanceolate or long triangular, rarely cordate-ovate.
 - 15a. Styles 1–1.5 × stylopodium; basal and lower leaves cordate-lanceolate or long triangular (Sichuan, Yunnan) 10. *P. yunnanensis*
 - 15b. Styles ca. 3 × stylopodium; basal and lower leaves reniform-rotund (Hubei) 11. *P. renifolia*
 - 14b. Leaf blade cordate-ovate.
 - 16a. Rays 6–15, 1–3 cm; bracteoles equal to or longer than flowers, densely hirsute 7. *P. rockii*
 - 16b. Rays (6–)10–25, 1.5–4(–6) cm; bracteoles shorter than or longer than flowers, glabrous.

- 17a. Styles 1–1.5 × stylopodium; fruit papillose-rugose 8. *P. coriacea*
 17b. Styles 2–3 × stylopodium; fruit finely granulate 9. *P. candolleana*
- 1b. Calyx teeth conspicuous or obsolete; fruit glabrous.
- 18a. Calyx teeth conspicuous.
- 19a. Basal and lower leaves ternate-2-pinnate, 1–3-ternate or 3–4-pinnate; rays glabrous or hirsute.
- 20a. Fruit oblong-ovoid; ultimate leaf segments linear 41. *P. valleculosa*
 20b. Fruit ovoid or cordate-ovoid; ultimate leaf segments ovate-lanceolate, ovate, broad-ovate or suborbicular.
- 21a. Ultimate leaf segments broad-ovate or suborbicular, 1–2 × 1–1.5 cm; styles ca. 1 × stylopodium;
 vittae 1 in each furrow 42. *P. xizangensis*
 21b. Ultimate leaf segments ovate-lanceolate or rhombic, 2–8 × 1–4 cm; styles 2–3 × stylopodium; vittae
 3 in each furrow.
- 22a. Rays 2–7 cm; fruit ca. 4 × 3 mm; leaflets acuminate or caudate at the apex 43. *P. arguta*
 22b. Rays 2–3.5 cm; fruit ca. 2 × 1.5–2 mm; leaflets acuminate at the apex 44. *P. komarovii*
- 19b. Basal and lower leaves 1–2-ternate or 1–2-pinnate; rays glabrous or pubescent.
- 23a. Petals purple, base shortly clawed.
- 24a. Plants 30–80 cm; seed face slightly concave (Yunnan) 35. *P. purpurea*
 24b. Plants 10–30 cm; seed face flat (Xizang) 36. *P. pimpinellisimulacrum*
- 23b. Petals white, base cuneate; seed face plane.
- 25a. Root fusiform; petals without incurved apex (Yunnan) 37. *P. liana*
 25b. Roots fibrous; petals with an incurved apex (NE China).
- 26a. Leaves ternate, leaflets ovate or broad-ovate 38. *P. brachycarpa*
 26b. Leaves 1–2-ternate, leaflets ovate, oblong-ovate, or rhombic.
- 27a. Bracts absent, occasionally 2–3; fruit cordate-ovoid, ca. 1 × 0.8 mm 39. *P. koreana*
 27b. Bracts persistent, 3–5; fruit oblong-ovoid, ca. 5 × 2 mm 40. *P. calycina*
- 18b. Calyx teeth obsolete, rarely minute.
- 28a. All leaves simple or ternate; umbels 0.5–1 cm across, mostly lateral 18. *P. rubescens*
 28b. Basal and lower leaves 1–2-ternate, ternate-2–3-pinnate or 1–3-pinnate; umbels 2–10 cm across, terminal
 and lateral.
- 29a. Basal and lower leaves 1–2-ternate or 1–2-pinnate.
- 30a. Rays 2–6; umbellules 2–8-flowered; basal leaves 1–2-ternate or 1-pinnate, pinnae 2 pairs.
- 31a. Bracteoles 2–3; pedicels 10–15 mm in fruit (Anhui) 19. *P. serra*
 31b. Bracteoles 0; pedicels 1–10 mm in fruit (Guizhou, Sichuan, Xizang, Yunnan).
- 32a. Plants glabrous; umbels 3–5 cm across, very lax; fruit ca. 2 mm, usually only one mericarp matures
 20. *P. refracta*
 32b. Plants sparsely puberulent or pubescent; umbels 1–3.5 cm across, compact or open; fruit ca. 1 mm,
 both mericarps mature.
- 33a. Plants little-branched above; rays 2–6; style ca. 1 × stylopodium 21. *P. flaccida*
 33b. Plants several- or much-branched above; rays 4–5; style ca. 2 × stylopodium 22. *P. grisea*
- 30b. Rays 5–25; umbellules 5–25-flowered; basal leaves 1–3-pinnate, pinnae 3–6 pairs.
- 34a. Bracts and bracteoles present; fruit cordate-ovoid; basal leaves 1-pinnate (Taiwan) 23. *P. nitakayamensis*
 34b. Bracts and bracteoles absent; fruit oblong-ovoid; basal leaves 1–3-pinnate-pinnatifid.
- 35a. Basal leaves 1-pinnate, pinnae incised or lacerate-pinnatifid, ultimate segments ovate-lanceolate
 or ovate 24. *P. thellungiana*
 35b. Basal leaves 2–3-pinnate, ultimate segments linear or lanceolate.
- 36a. Styles ca. 3 × stylopodium; seed face plane; basal leaves 2-pinnate (NE China) 25. *P. cnidioides*
 36b. Styles ca. 1 × stylopodium; seed face slightly concave; basal leaves 2–3-pinnate (Xizang) .. 26. *P. filipedicellata*
- 29b. Basal and lower leaves 1–3-ternate or ternate-2–3-pinnate.
- 37a. Root fibrous; basal and lower leaves ternate-2–3-pinnate 27. *P. helosciadoidea*
 37b. Taproot cylindrical or fusiform; basal and lower leaves 2-ternate or ternate-1–3-pinnate.
- 38a. Styles ca. equal to stylopodium.
- 39a. Rays 4–6(–8), extremely unequal; pedicels 2–3 mm in fruit 28. *P. brachystyla*
 39b. Rays 4–10(–13), subequal; pedicels 10–20 mm in fruit 29. *P. acuminata*
- 38b. Styles 2–3 × stylopodium.
- 40a. Rays 5–8, 1.5–2.5 cm; basal leaves ternate-2–3-pinnate 30. *P. nyingchiensis*
 40b. Rays (5–)10–25, 3–6(–8) cm; basal leaves 2–3-ternate.
- 41a. Petals obcordate, apex incurved; basal leaves 2-ternate 31. *P. caudata*
 41b. Petals oblong-ovate, apex not incurved; basal leaves 2–3-ternate.
- 42a. Rays 5–7, 4–5 cm; basal leaves 3-ternate 32. *P. triternata*
 42b. Rays 10–25, 0.5–4(–6.5) cm; basal leaves 2-ternate.

- 43a. Bracteoles 1–2, or 0; terminal leaflets oblong-ovate or oblong-rhombic 33. *P. henryi*
 43b. Bracteoles 2–5; terminal leaflets broad-ovate or rhombic 34. *P. rhomboidea*

1. *Pimpinella anisum* Linnaeus, Sp. Pl. 1: 264. 1753.

茴芹 hui qin

Anisum vulgare Gaertner; *Apium anisum* (Linnaeus) Crantz; *Carum anisum* (Linnaeus) Baillon; *Selinum anisum* (Linnaeus) E. H. L. Krause; *Sison anisum* (Linnaeus) Sprengel; *Tragium anisum* (Linnaeus) Link.

Plants annual, 10–50 cm, sparsely shortly pubescent throughout, strongly aromatic. Taproot slender. Stem much-branched. Leaves heteromorphic. Basal leaves simple; petioles 2–5 cm; blade reniform or broad-ovate, 1–3 × 1.2–2.8 cm, puberulent along veins, margin serrate. Cauline leaves 1–2-pinnate; ultimate segments ovate or ovate-lanceolate, 6–17 × 2–7 mm, 3-lobed margin serrate or lacerate. Leaves reduced upwards, becoming 3-lobed; lobes lanceolate or linear-lanceolate. Umbels 1.5–6 cm across; bracts 1 (or 2) or absent, linear-lanceolate, 1–2 mm; rays 7–15, 1–4 cm, unequal; bracteoles 1 (or 2) or absent, linear, 2–3 mm; umbellules 5–10 mm across, ca. 10-flowered; pedicels 2–6 mm, extending to 10 mm in fruit. Calyx teeth obsolete. Petals white, obcordate, abaxially pubescent, apex with incurved lobule. Stylopodium conic; styles ca. 3 × stylopodium, ca. 0.5 × fruit, spreading or reflexed. Fruit oblong-ovoid, 3–5 × 2–2.5 mm, densely appressed setose-hairy; vittae 2–4 in each furrow, 4–8 on commissure, nearly forming a continuous ring around seed. Seed face plane. Fl. Jun–Jul, fr. Aug–Sep. *2n* = 20.

Cultivated. Xinjiang [possibly native to SW Asia, but now known only in cultivation].

This species is widely cultivated in mild-temperate regions (especially C and SW Asia and C and S Europe) for its aromatic fruit (anise), which is used in perfume and to flavor alcoholic drinks and confectionary. The species has reputed medicinal value in China.

2. *Pimpinella puberula* (de Candolle) Boissier, Ann. Sci. Nat., Bot. 3: 129. 1844.

微毛茴芹 wei mao hui qin

Ptychotis puberula de Candolle, Prodr. 4: 109. 1830.

Plants annual, 30–50 cm, densely pubescent throughout. Taproot slender. Stem slender, little-branched. Leaves heteromorphic. Basal petioles 3–5 cm; blade simple or ternate; ultimate segments ovate-orbicular, cordate, 1–3 × 1–3 cm, margin serrate or incised-dentate. Cauline leaves 1–2-pinnate; ultimate segments linear or lanceolate, 5–15 × 1–2 mm. Umbels 2–5 cm across; bracts and bracteoles 0; rays (4–)15–20, very unequal, 1.5–4 cm, pubescent; umbellules 5–8 mm across, 15–25-flowered; pedicels 0.5–2 mm, unequal. Calyx teeth obsolete. Petals white, obovate, pilose abaxially, apex with incurved lobule. Stylopodium low-conic; styles 2(–3) × stylopodium, spreading. Fruit ovoid-globose, 1–1.5 × 0.9–1.2 mm, densely hairy; vittae 2–3 in each furrow, 4–8 on commissure. Seed face plane. Fl. May–Jun, fr. Jul–Sep.

Stony slopes in shaded valleys; 1000–1800 m. E Xinjiang (Hami) [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, S Russia, Tajikistan, Turkmenistan, Uzbekistan].

3. *Pimpinella silvatica* Handel-Mazzetti, Symb. Sin. 7: 714. 1933.

木里茴芹 mu li hui qin

Plants annual, 50–70 cm, slender, pubescent. Taproot slender. Stem solitary, little-branched. Basal and lower petioles 5–7 cm; blade 1–2-ternate; ultimate segments oblong-ovate, 1.5–4 × 1–2 cm, abaxially pubescent, adaxially pubescent along veins. Upper leaves smaller, 3-lobed, lobes lanceolate, 10–20 × ca. 5 mm. Umbels ca. 2 cm across; bracts 0, occasionally 1, linear; rays 3–5, 0.5–1 cm, unequal; bracteoles 2–4, linear, ca. 3 mm, longer than pedicels; umbellules ca. 6 mm across, 5–8-flowered; pedicels ca. 1 mm. Calyx teeth obsolete. Petals white, broad-ovate, apex slightly notched, with incurved lobule. Stylopodium low-conic; styles ca. 2 × stylopodium. Immature fruit ovoid, base cordate, surface pubescent (mature fruit unknown). Fl. and fr. Jul–Sep.

• Moist valleys, grassy river banks; 2500–3400 m. W Sichuan, NW Yunnan.

This poorly known taxon is recorded only from a few collections.

4. *Pimpinella kingdon-wardii* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 184. 1929.

德钦茴芹 de qin hui qin

Pimpinella asianensis M. Hiroe; *P. engleriana* Fedde ex H. Wolff (1930), not H. Wolff (1927); *P. feddei* W. C. Wu & C. Y. Wu, nom. illeg. superfl.; *P. thyrsoiflora* H. Wolff; *P. weishanensis* R. H. Shan & F. T. Pu.

Plants perennial, 30–100 cm, pubescent throughout. Roots fibrous or fascicled. Stem solitary, branching above. Basal petioles 3–10(–20) cm including sheaths; blade ternate or 1-pinnate; leaflets 3–5, ovate or broad-ovate, 3–9 × 2–6 cm, rarely undivided, cordate, pubescent on both surfaces, especially along veins. Cauline leaves homomorphic with the basal, ternate; leaflets oblong-ovate or lanceolate, 10–20 × 5–10 mm. Umbels 2.5–11 cm across; bracts usually absent, sometimes 1–5, linear, often similar to reduced uppermost leaves; rays 9–25, 1–4 cm, unequal; bracteoles 1–4, linear, 2–4 mm, unequal, ca. equal to or shorter than pedicels; umbellules 5–13 mm across, 10–25-flowered, only the terminal umbels or only outer umbellules in lateral umbels with fertile flowers, lateral umbels with sterile flowers; pedicels 1–4 mm, unequal, extending to 11 mm in fruit. Calyx teeth obsolete. Petals white, tinged purple or dark purple, apex with incurved lobule. Stylopodium short-conic; styles 1–1.5 × stylopodium, spreading. Fruit ovoid, ca. 1 × 0.8 mm, base cordate, surface shortly papillose-pubescent; vittae 3 in each furrow, 6 on commissure. Seed face plane. Fl. and fr. Jun–Sep.

• Forests, forest margins, among shrubs, grassy slopes, alpine meadows, streamsides; 1700–4000 m. W Sichuan, S Xizang, NW Yunnan.

5. *Pimpinella atropurpurea* C. Y. Wu ex R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 21: 81. 1983.

深紫茴芹 shen zi hui qin

Plants perennial, 30–40 cm, yellowish pubescent throughout. Root fibrous. Stems 1–2, striate, 3–4-branched. Basal petioles 5–15 cm; blade simple, ovate-cordate, 2.5–4.5 × 2–4 cm, margins crenate. Upper leaves heteromorphic, smaller, sessile, nearly 1-pinnate or 3-lobed, lobes lanceolate. Umbels 2.5–5 cm across; bracts 1–3, linear or linear-lanceolate, 0.8–1.5 cm, apex entire or 3-lobed; rays 8–12, 2–3 cm, densely yellowish pubescent; bracteoles 4–5, linear, 4–8 mm, ca. equal to or longer than flowers; umbellules 6–10 mm across, 10–15-flowered; pedicels 3–5 mm. Calyx teeth obsolete. Petals dark purple, abaxially glabrous, base shortly clawed, apex plane, without incurved lobule. Stylopodium low-conic; styles ca. equal to stylopodium, spreading. Young fruit ovoid, base cordate, surface sparsely puberulent (mature fruit unknown). Fl. and fr. Jul–Sep.

- Grassy slopes, alpine meadows; 2900–3500 m. W Yunnan.

This poorly known taxon is recorded only from a few collections. It has reputed medicinal value.

6. *Pimpinella diversifolia* de Candolle, Prodr. 4: 122. 1830.

异叶茴芹 *yi ye hui qin*

Plants perennial, 30–200 cm, pubescent throughout. Roots fibrous. Stem solitary, branched. Basal petioles 2–13 cm; blade ternate, leaflets ovate-cordate, 1.5–6 × 1–5 cm, margins coarsely serrate, rarely simple or 1-pinnate. Cauline leaves reduced upwards, 1-pinnate or 3-lobed, lobes narrow, lanceolate, often lacerate. Umbels 3–7 cm across; bracts 1–5, lanceolate, or absent; rays 6–15(–30), 1–4 cm; bracteoles 1–8, linear, 1–2 mm, shorter than pedicels; umbellules 3–6 mm across, 6–20-flowered; pedicels 1–3 mm, unequal. Calyx teeth obsolete. Petals white, obovate, hairy abaxially, base cuneate, apex with incurved lobule. Stylopodium conic; styles ca. 2–3 × stylopodium. Fruit ovoid, 1.3–1.6 × 1.3–1.6 mm, base cordate, surface shortly papillose-pubescent; vittae 2–3 in each furrow, 4–6 on commissure. Seed face plane. Fl. May–Sep, fr. Aug–Nov.

Forests, forest margins, montane thickets, montane scrub and grasslands, grassy slopes, streamsides; 200–3300 m. Fujian, Gansu, Guangdong, Guangxi, Hainan, Henan, Hubei, Hunan, Qinghai, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, Bhutan, Cambodia, India, Japan, Kashmir, Nepal, Pakistan, Sikkim, Vietnam].

This widespread and very variable species has reputed medicinal value in C China.

- 1a. Plants stoloniferous 6c. var. *stolonifera*
 1b. Plants without stolons.
 2a. Petals obovate, apex notched with incurved lobule 6a. var. *diversifolia*
 2b. Petals ovate-lanceolate, apex mucronate, slightly incurved ... 6b. var. *angustipetala*

6a. *Pimpinella diversifolia* var. *diversifolia*

异叶茴芹(原变种) *yi ye hui qin* (yuan bian zhong)

Helosciadium pubescens de Candolle; *Pimpinella diversifolia* var. *divisa* C. B. Clarke; *P. diversifolia* var. *simplicifolia* Kuntze; *P. sinica* Hance; *Platyrhaphis japonica* Miquel.

Plants without stolons. Petals obovate, apex notched with small incurved lobule.

Forests, forest margins, montane scrub and grasslands, streamsides; 200–3300 m. Fujian, Gansu, Guangdong, Guangxi, Hainan, Henan, Hubei, Hunan, Qinghai, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, Cambodia, India, Japan, Kashmir, Nepal, Pakistan, Vietnam].

6b. *Pimpinella diversifolia* var. *angustipetala* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 21: 81. 1983.

尖瓣异叶茴芹 *jian ban yi ye hui qin*

Plants without stolons. Petals ovate-lanceolate, apex mucronate, slightly incurved, but not notched and without incurved lobule.

- Forests, grassy slopes. SC Sichuan (Emei Shan).

6c. *Pimpinella diversifolia* var. *stolonifera* Handel-Mazzetti, Symb. Sin. 7: 714. 1933.

走茎异叶茴芹 *zou jing yi ye hui qin*

Pimpinella diversifolia var. *sermentifera* Goel & U. C. Bhattacharyya.

Plants with stolons. Petals obovate, with an incurved lobule.

Montane forests and thickets; 1800–3300 m. W Sichuan, NW Yunnan [Bhutan, Nepal, Sikkim].

7. *Pimpinella rockii* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 191. 1929.

丽江茴芹 *li jiang hui qin*

Pimpinella wolffiana Fedde ex H. Wolff.

Perennial, 10–40 cm, pubescent throughout. Root fusiform, slender, 3–20 × 0.3–0.5 cm. Stems 1–8, slender, 1–3-branched. Basal and lower petioles 2–10 cm; blade simple, cordate-ovate or rounded, 1.5–10 × 1–9 cm, margin serrate-crenate, hirsute pubescent on both surfaces. Upper leaves heteromorphic, smaller, sessile, sheaths oblong-ovate; blade 1–2-pinnate or 3-lobed; lobes lanceolate. Umbels 2.5–7 cm across; bracts 1–2, lanceolate, 1.5–3 cm, apex entire or 2–3-lobed, like uppermost leaf; rays 6–15, 1–3 cm, densely hirsute; bracteoles 1–4, linear-lanceolate, 5–9 mm, ca. equal to or longer than flowers, hirsute; umbellules 7–11 mm across, 10–15-flowered; pedicels 1.5–4 mm. Calyx teeth obsolete. Petals white or purplish, base shortly clawed, apex notched with incurved lobule. Stylopodium conic; styles 1–1.5 × stylopodium, spreading. Fruit ovoid, ca. 1.5 × 1 mm, base cordate, surface puberulent with short dense papillae; vittae 1 in each furrow, 2 on commissure. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

- Forest margins, alpine meadows, rock crevices; 2800–4500 m. NW Yunnan.

See the taxonomic note under *Pimpinella candolleana*.

8. *Pimpinella coriacea* (Franchet) H. de Boissieu, Bull. Soc. Bot. France 56: 351. 1909.

革叶茴芹 *ge ye hui qin*

Carum coriaceum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 127. 1894.

Plants perennial, 30–70 cm, sparsely pubescent. Root fusiform, ca. 5 × 0.4 cm. Stems solitary, rarely 2–3. Basal and lower leaves simple, cordate-ovate, (1–)2–5 × 1–3 cm, both surfaces pubescent, margins coarsely serrate. Upper leaves smaller, sessile, 1-pinnate or 3-lobed, lobes lanceolate. Umbels 2–5 cm across; bracts 1–2, linear, 4–8 mm, or absent; rays (8–)15–20, 2–4(–6) cm, unequal, pubescent; bracteoles 1–3, linear, 1.5–3 mm, shorter than pedicels, glabrous; umbellules ca. 8 mm across, 15–25-flowered; pedicels 0.7–3 mm, unequal. Calyx teeth obsolete. Petals white, obcordate, base cuneate, apex notched with incurved lobule, abaxially hairy. Stylopodium conic; styles 1–1.5 × stylopodium, spreading. Fruit ovoid, ca. 1.5 × 1 mm, base cordate, surface densely papillose-rugose; vittae 1–3 in each furrow, 2–4 on commissure. Seed face plane. Fl. May–Aug, fr. Aug–Nov.

• Forests, grassy streambanks; 900–3200 m. Guangxi, Guizhou, Sichuan, Yunnan.

This species has reputed medicinal value. See the taxonomic note under *Pimpinella candolleana*.

9. *Pimpinella candolleana* Wight & Arnott, Prodr. Fl. Ind. Orient. 1: 369. 1834.

杏叶茴芹 xing ye hui qin

Carum candolleianum (Wight & Arnott) Franchet.

Plants perennial, 10–100 cm, pubescent throughout. Root cylindrical or fusiform, 5–15 × 0.5–1 cm. Stems 1–2, little-branched. Basal petioles 2–20 cm; blade simple (rarely ternate), cordate-ovate, (1–)3–8 × (1–)2–7 cm, margins coarsely serrate. Cauline leaves few, ternate, 3-lobed or 1-pinnate, rarely entire. Umbels 3–6 cm across; bracts absent or 1–7, linear, 3–8 mm; rays (6–)10–25, 1.5–4 cm, unequal, pubescent or scabrous; bracteoles 1–6, linear, 2.5–4 mm, ca. equal to or longer than pedicels, glabrous; umbellules 9–12 mm across, 10–20-flowered, usually central flowers subsessile and sterile; pedicels 0.5–3.5 mm. Calyx teeth obsolete. Petals white or purplish, obcordate, apex with incurved lobule. Stylopodium conic; styles ca. 2–3 × stylopodium. Fruit cordate-ovoid, ca. 1.5–2 × 1–1.5 mm, surface granulate with dense, short papillae; vittae 2–3 in each furrow, 2–4 on commissure. Seed face plane. Fl. Apr–Aug, fr. Aug–Oct. $2n = 18^*$.

Pinus forest margins, among shrubs, grassy slopes, streambanks; 1300–3500 m. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [S India].

This species has reputed medicinal value in China. The Chinese species *Pimpinella bisinuata*, *P. candolleana*, *P. coriacea*, *P. renifolia*, *P. rockii*, *P. tibetica*, and *P. yunnanensis* form part of a species complex with papillose or granular fruits and heteromorphic leaves: basal leaves are simple or ternate (sometimes pinnate with 5 leaflets), compared to the more dissected upper leaves with more leaflets and narrower segments. These, together with similar species in India and SE Asia, are often difficult to distinguish and their species boundaries are unclear. *Pimpinella candolleana* is generally known from peninsular India, and so the application of this name to Chinese plants is controversial. However, this and other problems with these Chinese taxa cannot be resolved in isolation, and must wait for a broad revision of allied taxa in China, India, Indonesia, and SE Asia.

10. *Pimpinella yunnanensis* (Franchet) H. Wolff in Engler, Pflanzenr. 90(IV. 228): 266. 1927.

云南茴芹 yun nan hui qin

Carum yunnanense Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 128. 1894; *Pimpinella pseudocandolleana* H. Wolff.

Plants perennial, 30–60 cm, sparsely hirsute, especially above. Root cylindrical, 10–15 cm. Stems solitary, rarely 2–3, slender, 2–3-branched. Basal petioles 2–10 cm; blade simple, cordate-lanceolate or narrowly triangulate, rarely cordate-ovate, 1.5–7 × 1–5 cm, base faintly cordate or truncate, margins serrate, apex acute. Cauline leaves few, usually 1-pinnate or 3-lobed, lobes lanceolate. Umbels 3–7 cm across; bracts 1–4, linear, or absent; rays 8–20, 2–5 cm, unequal, pubescent; bracteoles 1–10, 1.5–4 mm, ca. equal to or shorter than pedicels; umbellules 7–12 mm across, 10–15-flowered; pedicels 1–5 mm, very unequal. Calyx teeth obsolete. Petals white, obovate or obcordate, apex with incurved lobule. Stylopodium conic; styles 1–1.5 × stylopodium, reflexed. Fruit ovoid, ca. 2 × 1.7 mm, base cordate, surface sparsely pubescent with short papillae; vittae 1–3 in each furrow, 2–4 on commissure. Seed face plane. Fl. May–Jul, fr. Aug–Oct.

• Valley forests, scrub by streams, alpine meadows; 1400–3200 m. SW Sichuan, N and S Yunnan.

This species has reputed medicinal value. See the taxonomic note under *Pimpinella candolleana*.

11. *Pimpinella renifolia* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 191. 1929.

肾叶茴芹 shen ye hui qin

Plants perennial, 30–75 cm, glabrous. Root fusiform. Stem solitary, 2–3-branched. Basal leaves simple; blade reniform-rotundate, broad-ovate, 5–8 × 4–6 cm, base cordate or truncate, margins coarsely serrate, apex obtuse or 3-lobed. Cauline leaves ternate, leaflets ovate or broad-ovate. Upper leaves smaller, sessile, 3-lobed, lobes lanceolate. Umbels ca. 5 cm across; bracts absent; rays 8–12, 1.5–2 cm, unequal, pubescent; bracteoles numerous, linear, nearly as long as pedicels; umbellules ca. 8 mm across, 10–20-flowered. Calyx teeth obsolete. Petals white, obovate, base cuneate, apex notched with incurved lobule. Stylopodium short conic; styles ca. 3 × stylopodium, reflexed. Fruit ovoid-ellipsoid, base cordate, surface minute granulate. Fl. Jun–Jul, fr. Aug–Sep.

• Shady forests; ca. 1800 m. W Hubei (Yichang).

This incompletely known taxon is recorded only from a few collections (possibly only the type). See the taxonomic note under *Pimpinella candolleana*.

12. *Pimpinella tibetica* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 319. 1930.

藏茴芹 zang hui qin

Plants perennial, 20–100 cm, sparsely hirsute. Root fusiform or cylindrical, 3–10 × 0.3–0.8 cm. Stems 1–3, 1–2(–5)-branched. Basal leaves few, petioles 5–15 cm; blade ternate (rarely simple); leaflets cordate-ovate, 1.5–5 × 1–3.5 cm. Cauline leaves similar to basal, 3-lobed, lobes ovate or lanceolate.

Umbels 3–5 cm across; bracts 1–5, linear, 6–16 mm, or absent; rays 8–15(–20), 1–3(–4) cm, unequal; bracteoles 3–7, linear, 2–4 mm, ca. equal to or longer than pedicels; umbellules 6–8 mm across, 10–20-flowered; pedicels 0.5–2.5 mm. Calyx teeth obsolete. Petals white, obcordate, abaxially hairy, apex notched with small incurved lobule. Stylopodium conic; styles 1.5–2 × stylopodium, reflexed. Fruit ovoid-ellipsoid, 1.7–2 × 1–1.5 mm, base cordate, surface granulate with minute papillae; vittae 1 in each furrow, 2 on commissure. Seed face plane. Fl. Jun–Jul, fr. Aug–Oct.

Forest margins, grassy slopes; 1200–3000 m. W Sichuan, S Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

This species has reputed medicinal value. It is common in the Himalayas, where the plants differ slightly in that simple basal leaves are more prevalent, the petals are sometimes dark purple, and it is recorded up to 4100 m in altitude. See also the taxonomic note under *Pimpinella candolleana*.

13. *Pimpinella bisinuata* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 332. 1930.

重波茴芹 chong bo hui qin

Plants perennial, 30–70 cm, sparsely hirsute. Root fusiform, 3–5 × ca. 0.3 cm. Stem solitary, slender, 3–4-branched. Basal petioles 3–5 cm; blade ternate, rarely simple; leaflets 1–3 × 1–1.5 cm; lateral leaflets cordate-ovate, base subtruncate or bisinuate; terminal leaflets ovate-lanceolate. Cauline leaves simple, cordate-ovate, 2.5–4 × 1.5–2 cm, sessile, 3–4-lobed, lobes lanceolate. Umbels 2.5–6 cm across; bracts usually absent, or 1–3, linear, 2–6 mm; rays 8–15, 1.2–5 cm, unequal, densely hirsute; bracteoles 3–5, linear, 1.5–2.5 mm, ca. equal to or shorter than pedicels; umbellules ca. 8 mm across, 10–20-flowered; pedicels 1–3 mm, unequal. Calyx teeth obsolete. Petals white, obovate, apex notched with incurved lobule. Stylopodium conic; styles 1–1.5 × stylopodium, reflexed. Fruit ovoid, ca. 2 × 1.8 mm, base cordate, surface pubescent with short papillae; vittae 1–4 in each furrow, 2–4 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

• Forests, grassy slopes, streamsides; 1000–3500 m. W Sichuan, Yunnan.

See the taxonomic note under *Pimpinella candolleana*.

14. *Pimpinella smithii* H. Wolff, Acta Horti Gothob. 2: 307. 1926.

直立茴芹 zhi li hui qin

Pimpinella stricta H. Wolff.

Plants perennial, 30–50 cm, generally pubescent throughout. Root cylindrical, 10–20 × ca. 1 cm. Stem much-branched. Basal and lower petioles 5–20 cm; blade ternate-2-pinnate; ultimate segments ovate or ovate-lanceolate, setulose on the veins. Upper leaves 1-pinnate or 2–3-lobed; lobes lanceolate. Umbels 3–11 cm across; bracts 0, occasionally 1, linear, like uppermost leaf; rays 5–25, 0.2–7 cm, stout, extremely unequal; bracteoles 2–8, linear, 1.2–2.3 mm, unequal; umbellules 7–12 mm across, 10–25-flowered; pedicels 1–10 mm, very unequal. Calyx teeth obsolete. Petals white, ovate or broad-ovate, base cuneate, apex notched with incurved lobule. Stylopodium conic; styles ca.

equal to stylopodium. Fruit ovoid-globose, 1.8–2 × 1.5–2 mm, sparsely pubescent or glabrescent; vittae 2–4 in each furrow, 4–6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Aug–Oct.

• Forest margins, alpine low scrub, grasslands, streamsides; 1400–3600 m. Gansu, Guangxi, Henan, Hubei, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan.

15. *Pimpinella fargesii* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 2: 808. 1902.

城口茴芹 cheng kou hui qin

Pimpinella fargesii var. *alba* H. de Boissieu.

Plants perennial, 40–100 cm, generally glabrous. Rootstock short, thick, ca. 3 × 1.5 cm; roots fusiform. Stem solitary, stout, 3–4-branched. Basal petioles 10–15 cm; blade 1–2-pinnate; pinnae 2–3 pairs; ultimate segments ovate or ovate-lanceolate, 3–4 × 1.5–3 cm, margins serrate. Cauline leaves similar to the basal, smaller, sessile, 3-lobed, lobes lanceolate. Terminal umbels 3–8 cm across, lateral umbels smaller; bracts 0, occasionally 1, linear, like uppermost leaf; rays (7–)15–25, (1–)2–3.5 cm, ca. equal; bracteoles 1–5, linear, 2.5–4 mm, reflexed, nearly as long as pedicels; umbellules ca. 13 mm across, 10–20-flowered; pedicels 3–9 mm. Calyx teeth obsolete. Petals white, obovate or ovate, apex notched with incurved lobule. Stylopodium conic; styles ca. 2–4 × stylopodium, reflexed or spreading. Fruit ovoid, ca. 3 × 1.8 mm, base cordate, surface sparsely pubescent or glabrous; vittae 2–3 in each furrow, 4 on commissure. Seed face plane. Fl. Jul–Aug, fr. Aug–Oct.

• Forest margins, grasslands, streamsides; 500–3400 m. W Hubei, Jiangxi, Sichuan.

16. *Pimpinella chungdienensis* C. Y. Wu ex R. H. Shan et al., Acta Phytotax. Sin. 18: 375. 1980.

中甸茴芹 zhong dian hui qin

Plants perennial, 30–70 cm, sparsely pubescent. Taproot cylindrical, ca. 5 × 0.8 cm. Stems 1(–2), slender, 2–3-branched or unbranched. Basal petioles 4–6 cm; blade ternate or 1-pinnate; pinnae 2–3 pairs, cordate-ovate, 1–3 × 1–2.5 cm, pubescent, margins coarsely serrate. Cauline leaves similar to the basal, smaller, 1-pinnate or 3-lobed, lobes lanceolate. Umbels 2.5–3 cm across; bracts absent, occasionally 1, linear, like uppermost leaf; rays 4–10, 5–25 mm, slightly unequal, pubescent; bracteoles 1–3, linear, ca. 3 mm, shorter than pedicels; umbellules ca. 7 mm across, 6–10-flowered; pedicels 2–4 mm. Calyx teeth obsolete. Petals white, obovate, base cuneate, apex with incurved lobule. Stylopodium low-conic; styles 1–1.5 × stylopodium, spreading. Fruit ovoid-globose, ca. 1 × 1 mm, densely pubescent; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. Jul–Sep, fr. Aug–Sep.

• Coniferous forests, among shrubs along streamsides, grasslands, rock crevices; 2400–3500 m. W Sichuan, E Xizang, NW Yunnan.

17. *Pimpinella tonkinensis* Chermeson, Bull. Soc. Bot. France 68: 511. 1921.

瘤果茴芹 liu guo hui qin

Plants perennial, 50–100 cm, puberulent. Root fusiform. Stem solitary. Basal and lower petioles 5–8 cm; blade ternate or

ternate-1-2-pinnate; ultimate segments broad-ovate, 4-6 × 1-2 cm, base cuneate or truncate, margins irregular serrate. Upper leaves smaller, 3-lobed, lobes lanceolate. Umbels 2-4.5 cm across; bracts 0 or 1-2, linear, ca. 7 mm; rays 8-16, 2-2.5 cm, subequal, pubescent; bracteoles 2-5, linear, shorter than pedicels; umbellules 5-9 mm across, 15-20-flowered; pedicels 1-4 mm. Calyx teeth obsolete. Petals white, obovate, apex with incurved lobule. Stylopodium low-conic; styles 1-1.5 × stylopodium, spreading or reflexed. Fruit ovoid-globose, ca. 1.5 × 2 mm, sparsely pubescent; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. Jul-Aug, fr. Sep-Oct.

Montane forests; 1500-2200 m. Hong Kong (Lo Fall Shan), SE Yunnan (Wenshan) [Vietnam].

18. *Pimpinella rubescens* (Franchet) H. Wolff in Handel-Mazetti, *Symb. Sin.* 7: 715. 1933.

少花茴芹 shao hua hui qin

Hydrocotyle rubescens Franchet, *Bull. Soc. Philom.* Pairs 8(6): 108. 1894.

Plants annual, 10-40 cm, slender, pubescent. Root fusiform, 5-10 × ca. 2 mm, slender. Stem flexuose, little-branched, ascending (or creeping), densely pubescent along one side, 3-5-branched from the base. Basal and lower petioles 2-5 cm; blade simple or ternate, cordate-rounded; ultimate segments broad-ovate or ovate, 5-20 × 5-20 mm, both surfaces densely pubescent, margins crenate. Upper leaves smaller, sessile, 3-lobed, lobes ovate or lanceolate. Umbels 0.5-1 cm across, usually lateral on short peduncles; peduncles 0.2-1.5 mm; bracts and bracteoles absent; rays 2-3, 0.5-8 mm, very unequal, umbellules 2-3.5 mm across, 2(-4)-flowered; pedicels 0.2-1.5 mm, extremely unequal. Calyx teeth obsolete. Petals pale pink or purple, obovate or broad-ovate, apex with incurved lobule. Stylopodium low-conic or flat; styles ca. 1 × stylopodium. Fruit ovoid, ca. 1.8 × 1.3 mm, base cordate, surface glabrous; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. May-Jul, fr. Aug.

• Shaded damp areas, among rocks along streams; 3000-3600 m. SW Sichuan, NW Yunnan.

19. *Pimpinella serra* Franchet & Savatier, *Enum. Pl. Jap.* 2: 372. 1879.

锯边茴芹 ju bian hui qin

Sium serrum (Franchet et Savatier) Kitagawa.

Plants annual, 40-70 cm, slender, glabrous. Roots fusiform, sometimes clustered. Stem erect, much branched above, rooting at the basal nodes. Basal and lower petioles 4-9 cm; blade ternate or 1-pinnate, pinnae 2 pairs; leaflets oblong-ovate or ovate, 5-7 × 2-4 cm, margins serrate, teeth cartilaginous, lateral leaflets sessile, terminal leaflets petiolate. Upper leaves usually reduced, 3-lobed, lobes oblong-ovate or lanceolate, 5-20 × 3-8 mm. Inflorescence much-branched, umbels 2.5-4 cm across; bracts absent, occasionally 1, lanceolate, 2-5 mm; rays 3-4, 1-3 cm, subequal; bracteoles 2-3, lanceolate, 0.5-2 mm, spreading; umbellules ca. 10 mm across, 3-5-flowered; pedicels 2-6 mm, elongating to 15 mm in fruit. Calyx teeth obsolete.

Petals white, ovate, apex with an incurved lobule. Stylopodium low-conic; styles 0.75-1 × stylopodium, spreading. Fruit ovoid, ca. 3 × 1.8 mm, base cordate, surface glabrous; vittae 3 in each furrow, 4-6 on commissure. Seed face plane. Fl. and fr. Jul-Sep.

Streamsides; 800-900 m. Anhui [Japan].

Recent molecular studies uphold Kitagawa's placement of this species in *Sium*.

20. *Pimpinella refracta* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 27: 190. 1929.

下曲茴芹 xia qu hui qin

Plants annual, 30-45 cm, glabrous. Taproot slender. Stem solitary, much-branched, slender. Lower petioles 1-2 cm; blade 1-2-pinnate, pinnae 3-4 pairs; ultimate segments ovate-lanceolate, 10-35 × 5-20 mm. Upper leaves 3-lobed, lobes lanceolate. Umbels numerous, 3-5 cm across, very lax; bracts 1 or absent, linear, ca. 3 mm; rays 2-3, 0.4-1.8 cm, unequal, slender, divergent; bracteoles absent; umbellules ca. 5 mm across, 3-4-flowered; pedicels 1-3 mm, to 8 mm in fruit. Calyx teeth obsolete. Petals white, obcordate, apex with small incurved lobule. Stylopodium low-conic; styles ca. equal to stylopodium, spreading. Fruit ovoid, ca. 2 × 1.5 mm, base cordate, surface glabrous, usually only one mericarp matures; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. and fr. Jun-Aug.

• Shaded areas among shrubs; ca. 2000 m. SW Guizhou (Xingyi), NW Yunnan (Dêqên, Weixi).

This poorly known taxon is recorded only from a few collections. The illustration in *FRPS* (55(2): 87. 1985) does not agree with the type of this species (*Forrest 14885*) and is something different.

21. *Pimpinella flaccida* C. B. Clarke, *J. Linn. Soc., Bot.* 25: 28. 1889.

细软茴芹 xi ruan hui qin

Carum flaccidum (C. B. Clarke) Franchet; *Pimpinella duclouxii* H. de Boissieu.

Plants annual, 30-60 cm, slender, sparsely puberulent. Taproot, 4-8 × ca. 0.3 cm. Stem branched from base. Basal petioles 0.5-3 mm; blade 1-2-ternate or 1-pinnate, pinnae 2 pairs; ultimate segments oblong-ovate or broad-ovate, 4-5 × 3-5 cm, margins crenate or coarsely serrate. Cauline leaves similar to basal, smaller, 3-lobed, lobes lanceolate. Umbels 2-3.5 cm across, spreading; bracts and bracteoles absent; rays 2-6, 0.5-2 cm, glabrous; umbellules 4-7 mm across, 2-8-flowered; pedicels 0.5-2, elongating to 10 mm in fruit. Calyx teeth obsolete. Petals white, obovate or ovate, apex with incurved lobule. Stylopodium low-conic; styles ca. 1 × stylopodium. Fruit ovoid, ca. 1 × 1 mm, base cordate, surface glabrous (occasionally papillose); vittae 3 in each furrow, 4-6 on commissure. Seed face plane. Fl. Apr-Jun, fr. Jul-Sep. $2n = 20^*$.

Forests, among shrubs, grassy slopes, alpine meadows; 2200-3800 m. W Sichuan, NW Yunnan [NE India].

Specimens attributed to this taxon have been confused with *Trachyspermum scaberulum*. Further work is needed to clarify the status of this Indian species in China.

22. *Pimpinella grisea* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 184. 1929.

灰叶茴芹 hui ye hui qin

Plants biennial, 60–80 cm, slender, pubescent throughout. Taproot slender, short, ca. 5 cm. Stems several, much-branched. Lower petioles 3–7 cm; blade ternate; leaflets ovate, 10–30 × 3–5 mm, margins serrate. Upper leaves smaller, 1-pinnate, pinnae 2–3 pairs, or 3-lobed; lobes lanceolate or linear. Umbels numerous, 1–2 cm across; bracts and bracteoles absent; rays 4–5, 5–10 mm, unequal; umbellules ca. 5 mm across, 5–10-flowered; pedicels 1–2.5 mm. Calyx teeth obsolete. Petals white, cordate-ovate, base cuneate, apex with incurved lobule. Stylopodium low-conic; styles ca. 2 × stylopodium, reflexed. Young fruit ovoid, base cordate, surface pubescent (mature fruit not known). Fl. and fr. Jun–Sep.

• Grassy slopes in valleys; 1200–4000 m. SE Xizang, NW Yunnan (Dèqên).

This poorly known taxon is recorded only from a few collections.

23. *Pimpinella niitakayamensis* Hayata, Icon. Pl. Formos. 10: 20. 1921.

台湾茴芹 tai wan hui qin

Pimpinella astilbifolia Hayata.

Plants perennial, 10–40 cm, pubescent to nearly glabrous. Root cylindrical, ca. 10 × 0.3 cm. Stems little-branched or unbranched. Basal petioles 5–10 cm; blade oblong-ovate in outline, 4–8(–20) × 1.5–3 cm, 1-pinnate; pinnae 2–4 pairs, remote, sessile, broad-ovate or suborbicular, rarely 2–3-lobed, 10–20 × 5–15 mm, base truncate, margins dentate, apex obtuse or rounded. Cauline leaves few, 1–2-pinnate, pinnae lanceolate, deeply lacerate. Umbels terminal, (2–)5–7 cm across, occasionally lateral; bracts 1–3, linear-lanceolate, 5–8 mm; rays 6–8(–12), 2–3(–4) cm, hirsute; bracteoles 1–5, linear, 2–4 mm; umbellules 5–11 mm across, 6–8-flowered; pedicels 0.5–4 mm, very unequal. Calyx teeth obsolete. Petals white or cream, apex with small incurved lobule. Stylopodium short conic; styles ca. equal to stylopodium. Fruit ovoid, 2–3 × 1.5–2 mm, base cordate, surface glabrous; vittae 2–3 in each furrow, 4–6 on commissure. Seed face plane. Fl. May–Sep, fr. Aug–Oct. $2n = 18^*$, 20^* .

• Mossy places in forests, grassy slopes; 2000–3500 m. Taiwan.

24. *Pimpinella thellungiana* H. Wolff in Engler, Pflanzenr. 90(IV. 228): 304. 1927.

羊红膻 yang hong shan

Plants perennial, 30–80(–110) cm, shortly pubescent. Root cylindrical, 50–150 × 5–10 mm. Stem little-branched. Basal and lower petioles 5–20 cm; blade oblong-ovate in outline, 4–17 × 2–6 cm, 1-pinnate; pinnae 3–5 pairs, ovate or ovate-lanceolate, 10–40(–70) × 5–20(–40) mm, margins lacerate-incised or pinnatifid, adaxially sparsely pubescent, abaxially densely pubescent. Upper leaves smaller, 1-pinnate, pinnae 2–3 pairs, or reduced to bladeless sheaths. Umbels (2.5–)4–6 cm across; bracts and bracteoles absent; rays 8–20(–25), 2–3(–4) cm, subequal, filiform, glabrous; umbellules 7–12 mm across, 10–25-flower-

ed; pedicels 1.5–5 mm, unequal, glabrous. Calyx teeth obsolete. Petals white, ovate or obovate, apex with incurved lobule. Stylopodium conic; styles ca. 2–3 × stylopodium, spreading. Fruit oblong-ovoid, ca. 3 × 2 mm, glabrous; vittae 3 in each furrow, 4–6 on commissure. Seed face plane. Fl. Jun–Aug, fr. Aug–Oct.

Forests, among shrubs, grassy slopes; 600–2300 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [SE Russia].

This species has reputed medicinal value (in Shaanxi).

25. *Pimpinella cnidioides* H. Pearson ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 183. 1929.

蛇床茴芹 she chuang hui qin

Pimpinella thellungiana H. Wolff var. *tenuisecta* Y. C. Chu.

Plants perennial, 20–40 cm, sparsely pubescent. Root cylindrical, 7–10 × ca. 1 cm. Stem little-branched. Basal and lower petioles 5–20 cm; blade 2-pinnate; primary pinnae 5–6 pairs; secondary pinnae broad linear, 5–15 × 1–2 mm, sparsely pubescent. Upper leaves reduced, 1-pinnate or 3-lobed, lobes linear. Umbels 3–5 cm across; bracts and bracteoles absent; rays 15–25, 2–4 cm; umbellules 5–10 mm across, 15–20-flowered; pedicels 2–4 mm. Calyx teeth obsolete. Petals white, obovate, base shortly clawed, apex with small incurved lobule. Stylopodium conic; styles ca. 3 × stylopodium. Fruit oblong-ovoid, ca. 3 × 2.5 mm, base cordate, glabrous; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. Jun–Jul, fr. Aug–Sep.

• Grassy slopes. Hebei, Heilongjiang, Jilin.

26. *Pimpinella filipedicellata* S. L. Liou, Acta Phytotax. Sin. 28: 145. 1990.

细柄茴芹 xi bing hui qin

Plants perennial, ca. 40 cm, glabrous throughout. Roots unknown. Stem little-branched. Lower petioles 9–11 cm; blade broad-ovate or triangular-ovate in outline, 7.5–10 × 3.5–5 cm, 2–3-pinnate; primary pinnae 4–5 pairs; ultimate segments lanceolate. Upper leaves reduced, smaller. Umbels 10–14 cm across; bracts and bracteoles absent; rays 6–8, 3.5–5 cm; umbellules 15–20 mm across, 9–14-flowered; pedicels 5–10 mm, filiform. Calyx teeth obsolete. Petals white, broad obovate, base narrow, apex with small incurved lobule. Stylopodium domed; styles ca. 1 × stylopodium, spreading. Fruit oblong-ovoid, 5–7 × 2.5–3 mm, glabrous; vittae 3 in each furrow, 4 on commissure. Seed face slightly concave. Fl. and fr. Aug–Sep.

• Montane rock crevices. E Xizang (Lhorong).

This poorly known taxon is recorded only from a few collections.

27. *Pimpinella helosciadoidea* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 2: 809. 1902.

沼生茴芹 zhao sheng hui qin

Plants perennial, 50–70 cm, glabrous. Root fibrous. Stem branched. Lower petioles 7–10 cm; blade ternate-2–3-pinnate; ultimate segments ovate-lanceolate or lanceolate, 10–20 × 5–10

mm, pubescent on the veins. Upper leaves smaller. Umbels 3–4.5 cm across; bracts absent; rays 20–30, 5–30 mm, extremely unequal; bracteoles 3–5, linear, 1.5–3 mm, ca. equal to or shorter than pedicels; umbellules 4–6 mm across, 10–20-flowered; pedicels 2–3 mm. Calyx teeth obsolete. Petals white, obovate, base cuneate, apex with incurved lobule. Stylopodium conic; styles ca. 2 × stylopodium, reflexed. Fruit ovoid, 2.5–3 × ca. 2 mm, base cordate, surface glabrous; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. Jun–Jul, fr. Aug–Sep.

- Montane forests, grassy slopes; 1300–1600 m. W Hubei, NE Sichuan.

28. *Pimpinella brachystyla* Handel-Mazzetti, Oesterr. Bot. Z. 82: 251. 1933.

短柱茴芹 duan zhu hui qin

Pimpinella nakaiana Kitagawa; *Spuriopimpinella brachystyla* (Handel-Mazzetti) Kitagawa.

Plants perennial, 30–80 cm, puberulent. Root fusiform, 4–8 × 0.3–0.6 cm. Stem 2–4-branched. Basal and lower petioles 4–15 cm; blade 2-ternate or ternate-2-pinnate; ultimate segments ovate or broad-ovate, 2–5 × 1.5–3 cm, abaxially glaucous, pubescent, margins serrate. Upper leaves 2-ternate or pinnate; ultimate segments oblong-ovate or lanceolate. Umbels 3–4 cm across; bracts absent, occasionally 1, linear-lanceolate, 3–5 mm; rays 4–6(–8), 1.5–2.5 cm, extremely unequal; bracteoles 2–4, linear, 0.5–3 mm, ca. equal to or shorter than pedicels; umbellules 5–7 mm across, 5–10-flowered; pedicels 1–3 mm. Calyx teeth obsolete. Petals white, broad-ovate, apex with incurved lobule. Stylopodium conic; styles ca. equal to stylopodium. Fruit ovoid, ca. 2 × 1.5 mm, base cordate, surface glabrous; vittae 3–4 in each furrow, 4–6 on commissure. Seed face plane. Fl. Jun–Jul, fr. Aug–Sep.

- Moist valley sides, grassy slopes, streamsides; 500–2000 m. Gansu, Hebei, Nei Mongol, Shanxi.

29. *Pimpinella acuminata* (Edgeworth) C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 686. 1879.

尖叶茴芹 jian ye hui qin

Reutera acuminata Edgeworth, Trans. Linn. Soc. London 20: 52. 1846; *Pimpinella hazariensis* H. Wolff.

Plants perennial, 60–100 cm, glabrous. Root cylindrical, 3–8 × ca. 0.8 cm. Stem little-branched, often tinged purple at base. Lower petioles 6–14 cm; blade ternate-2-pinnate; primary pinnae 4–5 pairs; ultimate segments ovate or lanceolate, 10–20 × 5–10 mm, abaxially pubescent along veins, margins irregularly incised. Upper leaves smaller, 1–2-pinnate or 3-lobed, lobes lanceolate. Umbels 4–10(–14) cm across; bracts 5–6, linear, 3–20 mm; rays 4–10(–13), 2–3 cm in flower, subequal, lengthening to 5–6 cm and spreading in fruit; bracteoles 2–6, linear-filiform, 2–13 mm; umbellules 9–15 mm across, 5–12-flowered; pedicels 0.5–6 mm, very unequal, lengthening to 10–20 mm in fruit. Calyx teeth obsolete. Petals white, broad-ovate, abaxially pilose, apex notched with incurved lobule. Stylopodium conic; styles ca. equal to stylopodium. Fruit ovoid, 2–3 × ca. 2 mm, base cordate, surface glabrous; vittae 2–3 in each furrow, 2 on commissure. Seed face slightly concave. Fl. Jun–Jul, fr. Aug–Sep.

Forests, forest margins, grassy slopes; 2000–2300 m. Qinghai, W Sichuan, Xizang, NW Yunnan [NW India, Kashmir, Pakistan].

30. *Pimpinella nyingchiensis* Z. H. Pan & K. Yao, Acta Phytotax. Sin. 30: 263. 1992.

林芝茴芹 lin zhi hui qin

Plants perennial, 40–50 cm, glabrous. Rootstock slender, swollen at nodes. Stem 2–3-branched. Basal petioles ca. 7 cm, purplish at base; blade broad-ovate in outline, 8–10 × 12–14 cm, ternate-2–3-pinnate; ultimate segments ovate or broad-ovate, 1.2–1.5 × 1–1.2 cm, abaxially papillose-scaly along the main veins and rachis. Cauline leaves similar to basal, smaller, sessile, 1–2-pinnate or 3-lobed. Umbels 2.5–4 cm across; bracts 1, reduced to sheath with aristate tip, ca. 5 mm; rays 5–8, 1.5–2.5 cm, subequal, scabrid; bracteoles 3–6, linear, ca. 2 mm, umbellules ca. 15 mm across, 12–14-flowered; pedicels 1–4 mm, unequal. Calyx teeth obsolete. Petals white, obovate, unequal, base shortly clawed, apex with incurved lobule. Stylopodium flattened; styles 2–3 × stylopodium. Fruit ovoid, ca. 2 × 1.8 mm, base cordate, surface glabrous; vittae 2–3 in each furrow, 4 on commissure. Seed face plane. Fl. and fr. Jul–Sep.

- Forests; ca. 3100 m. SE Xizang (Nyingchi).

This poorly known taxon is recorded only from the type gathering.

31. *Pimpinella caudata* (Franchet) H. Wolff in Engler, Pflanzenz. 90(IV. 228): 279. 1927.

尾尖茴芹 wei jian hui qin

Carum caudatum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 126. 1894.

Plants perennial, 30–45 cm, glabrous throughout. Root cylindrical, 10–15 × ca. 0.4 cm. Stem 2–3-branched. Basal and lower petioles 3–8 cm; blade 2-ternate; ultimate segments oblong-ovate or ovate, 1.5–2.5 × 1–1.5 cm, margins coarsely serrate, apex acuminate caudate. Upper leaves 1-pinnate, pinnae lanceolate. Umbels 4–6 cm across; bracts 2(–4), linear, 5–8 mm; rays 10–15, 2–3(–8) cm; bracteoles 1–6, linear, 1.5–3 mm, ca. equal to or shorter than pedicels; umbellules 4–6 mm across, 8–15-flowered; pedicels 2–3 mm. Calyx teeth obsolete. Petals white, obcordate, apex with incurved lobule. Stylopodium short conic; styles 2–3 × stylopodium. Fruit ovoid, ca. 2.5 × 2 mm, base cordate, surface glabrous; vittae 3 in each furrow, 6 on commissure. Seed face plane. Fl. and fr. Jul–Sep.

- Mossy forests, open forests, among shrubs, alpine meadows; 3000–3600 m. W Sichuan, E Xizang, NW Yunnan.

32. *Pimpinella triternata* Diels, Bot. Jahrb. Syst. 29: 496. 1900.

三出叶茴芹 san chu ye hui qin

Plants perennial, 30–150 cm, glabrous. Root fusiform. Basal petioles 3–7 cm; blade triangular-ovate in outline, 10–20 × 10–25 cm, 3-ternate; leaflets oblong-lanceolate or oblong-rhombic, 1–3 × 1–2 cm, margins serrate or pinnatifid. Cauline leaves similar to basal, 3-lobed, lobes linear-lanceolate, or reduced to bladeless sheaths. Umbels 3–7 cm across, terminal umbels with hermaphrodite and sterile flowers, flowers in lateral umbels all sterile; bracts absent; rays 5–7, 4–5 cm, shortly pubescent; brac-

teoles few, linear, 2–14 mm; umbellules ca. 6 mm across in flower, to 16 mm across in fruit, many-flowered; pedicels 2.5–3 mm, about equal, those of the fertile flowers elongating to 7 mm in fruit. Calyx teeth obsolete. Petals white, ovate or oblong-ovate, apex mucronate, without incurved lobule. Stylopodium conic; styles 2–4 × stylopodium. Fruit ovoid, 1.5–2.8 × 0.5–1.8 mm, base cordate, surface glabrous; vittae 3–4 in each furrow, 2–4 on commissure. Seed face slightly concave. Fl. and fr. Jul–Sep.

• Forest margins, grasslands; 800–1700 m. Chongqing (Chengkou, Nanchuan).

This poorly known taxon is recorded only from a few collections.

33. *Pimpinella henryi* Diels, Bot. Jahrb. Syst. 29: 495. 1900.

川鄂茴芹 chuan e hui qin

Pimpinella sutchuensis H. de Boissieu.

Plants perennial, 50–100 cm, stout, essentially glabrous. Root cylindrical, ca. 8 × 0.7 cm. Stem 3–5-branched. Basal petioles 18–25 cm; blade 2-ternate; leaflets oblong-ovate or oblong-rhombic, 4–12 × 2–10 cm, margins coarsely serrate or irregularly incised. Cauline leaves similar to basal, 1-pinnate or 3-lobed. Umbels 5–10 cm across; bracts absent, occasionally 1, ca. 2 mm; rays 15–25, 2–4 cm, unequal, scabrid; bracteoles 1–2, linear, ca. 1.5 mm, or absent; umbellules 5–8 mm across, 15–30-flowered, polygamous; pedicels 2–3 mm, subequal, filiform, those of fertile flowers elongating to 6 mm in fruit. Calyx teeth obsolete. Petals white, oblong-ovate, apex mucronate, not inflexed. Stylopodium conic; styles 2–4 × stylopodium, reflexed. Fruit cordate-ovoid, ca. 1.5 × 1.5 mm, glabrous; vittae 3 in each furrow, 4–6 on commissure. Seed face slightly concave. Fl. May–Jul, fr. Aug–Sep.

• Forests, forest margins, grasslands, streamsides; 1500–3100 m. Gansu, W Hubei, Shaanxi, Sichuan.

34. *Pimpinella rhomboidea* Diels, Bot. Jahrb. Syst. 29: 496. 1900.

菱叶茴芹 ling ye hui qin

Plants perennial, 50–100 cm, stout, mostly glabrous (except leaves). Root cylindrical, 10–20 × ca. 1 cm. Stem 2–4-branched. Basal leaves few, petioles 10–20 cm; blade 2-ternate; leaflets pubescent on the veins, margins coarsely serrate or irregularly incised, apex caudate; lateral leaflets oblong-ovate, 5–8 × 2–5 cm; terminal leaflets broad-ovate or rhombic, 7–9 × 3–9 cm. Cauline leaves similar to basal, smaller, sessile, 3-lobed. Umbels 3–10 cm across; bracts 1–5, linear, ca. 5 mm, or absent; rays 10–25, 0.5–4(–6.5) cm, unequal, slender; bracteoles 2–5, linear, 0.5–3 mm, ca. equal to or shorter than pedicels; umbellules 4–8 mm across, 15–30-flowered, polygamous; pedicels 0.5–3 mm in flower, in fertile flowers elongating to 8 mm in fruit. Calyx teeth obsolete. Petals white, oblong-ovate, apex mucronate or faintly incurved. Stylopodium conic; styles 2–4 × stylopodium, reflexed. Fruit ovoid, ca. 1.5 × 1.4 mm, base cordate, surface glabrous; vittae 3 in each furrow, 6 on commissure. Seed face slightly concave. Fl. May–Jul, fr. Aug–Sep.

• Forests, among shrubs, alpine meadows, moist grassland along streams; 900–3700 m. Gansu, Guizhou, Hebei, Henan, Shaanxi, Sichuan.

- 1a. Basal leaves 2-ternate, ultimate segments 5–8 × 2–5 cm 34a. var. *rhomboidea*
 1b. Basal leaves ternate-2-pinnate, ultimate segments 1–1.5 × 0.5–1 cm 34b. var. *tenuiloba*

34a. *Pimpinella rhomboidea* var. *rhomboidea*

菱叶茴芹(原变种) ling ye hui qin (yuan bian zhong)

Basal leaves 2-ternate; ultimate segments 5–8 × 2–5 cm.

• Forests, among shrubs, moist grassland along streams; 900–3700 m. Gansu, Guizhou, Hebei, Henan, Shaanxi, Sichuan.

34b. *Pimpinella rhomboidea* var. *tenuiloba* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 27: 63. 1989.

小菱叶茴芹 xiao ling ye hui qin

Basal leaves ternate-2-pinnate, ultimate segments 1–1.5 × 0.5–1 cm.

• Alpine meadows; 2600–3400 m. W Sichuan.

35. *Pimpinella purpurea* (Franchet) H. de Boissieu, Bull. Soc. Bot. France 53: 428. 1906.

紫瓣茴芹 zi ban hui qin

Carum purpureum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 27. 1894; *Pimpinella markgrafiana* Fedde ex H. Wolff.

Plants perennial, 30–80 cm, glabrous (pubescent only along abaxial leaf veins and at base of umbels and umbellules). Root cylindrical, 5–20 × 0.5–1 cm. Stem 1–2-branched. Basal petioles 3–25 cm; blade triangular-ovate in outline, 2-ternate, or 1–2-pinnate; pinnae 2–3 pairs; ultimate segments ovate or oblong-ovate, 1–5 × 0.5–3.5 cm, margins serrate or incised. Cauline leaves similar to basal, 1-pinnate or 3-lobed, lobes lanceolate. Umbels 3–6 cm across; bracts 1–2, linear or like uppermost leaf, 8–15 mm, or absent; rays 10–17, 2–6.5 cm, unequal, pubescent; bracteoles 2–3, linear, 3–6 mm, ca. equal to pedicels; umbellules 9–11 mm across, 10–20-flowered; pedicels 1.5–3.5 mm, unequal. Calyx teeth conspicuous, linear-lanceolate, 0.3–0.8 mm, unequal. Petals purple, oblong-ovate or broad-ovate, base shortly clawed, apex mucronate, without incurved lobule. Stylopodium short conic, or flat; styles 0.5–1.5 × stylopodium, spreading. Fruit ovoid, ca. 1.7 × 1.1 mm, base cordate, surface glabrous; vittae 3 in each furrow, 4 on commissure. Seed face slightly concave. Fl. Jul–Aug, fr. Sep–Oct.

Forests, among shrubs, grasslands, alpine meadows; 3000–3800 m. NW Yunnan [N Myanmar].

36. *Pimpinella pimpinellisimulacrum* (Farille & S. B. Malla) Farille, Candollea 40: 554. 1985.

喜马拉雅茴芹 xi ma la ya hui qin

Similisinocarum pimpinellisimulacrum Farille & S. B. Malla, Bull. Soc. Bot. France, Lett. Bot. 131: 70. 1984.

Plants perennial, 10–30 cm, slender, glabrous. Taproot slen-

der. Stem erect, simple. Leaves mostly basal, petioles 2–3 cm; blade ternate, orbicular to oval in outline, 2–3 × 3–4 cm; leaflets 3(–5)-lobed. Upper leaves 1–2, similar to basal or absent. Umbels 3–5 cm across; bracts (0–)1–2, linear, apex entire, rarely 2–3-fid; rays 4–6(–10), 2–3 cm, subequal, slender, scaberulous at apex; bracteoles 3–6, linear, 4–6 mm, entire, spreading to reflexed; umbellules 6–8-flowered; pedicels 3–5 mm. Calyx teeth minute, triangular, ca. 0.2 mm. Petals purple, base shortly clawed, apex short, narrow. Stylopodium domed; styles 1–1.5 × stylopodium, spreading or reflexed. Young fruit narrowly ovoid-ellipsoid, ca. 2 × 1 mm, glabrous; vittae 3 in each furrow, 4–6 on commissure (mature fruit not known). Seed face plane. Fl. & fr. Sep–Oct.

Among dwarf shrubs, alpine valleys, grassland along streams; 4100–4500 m. S Xizang (near Nyalam) [Nepal].

This incompletely known taxon is recorded only from a few collections. The slender, glabrous stem, inconspicuous calyx teeth, clawed petals, and ellipsoid fruit resemble *Simocarum*, and further work is needed.

37. *Pimpinella liana* M. Hiroe, *Umbell. Asia* 1: 60. 1958 [“*liana*”].

景东茴芹 jing dong hui qin

Plants perennial, 30–60 cm, mostly glabrous. Root fusiform. Basal petioles 8–15 cm; blade 2-ternate; ultimate segments ovate, rhombic, 2.5–7 × 1.5–5 cm, abaxially glaucous, sparsely pubescent, margins serrate, or incised. Cauline leaves similar to basal, 1-pinnate or 3-lobed; lobes ovate or lanceolate, 20–30 × 5–10 mm. Umbels 6–8 cm across; bracts absent; rays 6–15, 3–5 cm, unequal; bracteoles 1–7, linear, 3–4 mm, ca. equal to or shorter than pedicels; umbellules ca. 12 mm across, 10–20-flowered; pedicels 1.5–6 mm. Calyx teeth conspicuous, lanceolate, ca. 0.3 mm. Petals white, ovate or broad-ovate, apex mucronate, without incurved lobule. Stylopodium conic; styles 2–3 × stylopodium. Fruit oblong-ovoid, ca. 2.5 × 1.5 mm, base cordate, glabrous; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

- Forests, grassy slopes; 1200–2400 m. W Yunnan (Jingdong).

This incompletely known taxon is recorded only from a few collections.

38. *Pimpinella brachycarpa* (Komarov) Nakai, *J. Coll. Sci. Imp. Univ. Tokyo* 26(1): 261. 1909.

短果茴芹 duan guo hui qin

Pimpinella calycina Maximowicz var. *brachycarpa* Komarov, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 25: 145. 1905; *Aegopodium brachycarpum* (Komarov) Schischkin; *Spuriopimpinella brachycarpa* (Komarov) Kitagawa.

Plants perennial, 70–85 cm, essentially glabrous. Root fibrous. Stem 2–3-branched. Basal petioles 6–10 cm; blade ternate, rarely 2-ternate; leaflets pubescent on veins, margins coarsely serrate; lateral leaflets ovate, 3–8 × 4–6.5 cm; terminal leaflets broad-ovate, 5–8 × 4–6 cm. Cauline leaves similar to basal, sessile, 3-lobed, lobes lanceolate. Umbels 3–6 cm across; bracts absent, rarely 1–3, linear, 5–12 mm; rays 7–15, 2–4 cm; bracteoles 2–5, linear, 2–5 mm, shorter than pedicels; umbellules

ca. 10 mm across, 15–20-flowered, polygamous; pedicels 2–4 mm. Calyx teeth conspicuous, lanceolate, ca. 0.3 mm. Petals white, obcordate, apex with small incurved lobule. Stylopodium conic; styles 2–3 × stylopodium. Fruit ovoid, ca. 2 × 1.8 mm, base cordate, surface glabrous; vittae 2–3 in each furrow, 6 on commissure. Seed face plane. Fl. Jun–Jul, fr. Aug–Sep.

Forest margins, river banks; 500–900 m. Guizhou, Hebei, Jilin, Liaoning, Shanxi [N Korea, SE Russia].

39. *Pimpinella koreana* (Y. Yabe) Nakai, *J. Coll. Sci. Imp. Univ. Tokyo* 26(1): 261. 1909.

朝鲜茴芹 chao xian hui qin

Pimpinella nikoensis Y. Yabe var. *koreana* Y. Yabe, *Bot. Mag. (Tokyo)* 17: 106. 1958; *Spuriopimpinella koreana* (Y. Yabe) Kitagawa.

Plants perennial, 40–60 cm, essentially glabrous. Root fibrous. Stem 2–3-branched. Basal and lower petioles 5–12 cm; blade 1–2-ternate; lateral leaflets ovate or oblong-ovate, terminal leaflets rhombic, 3–10 × 1–5 cm, pubescent on veins, margins coarsely serrate or incised. Upper leaves smaller, sessile, 3-lobed, lobes ovate or lanceolate. Umbels 4–6 cm across; bracts absent, occasionally 2–3, linear, ca. 5 mm; rays 5–15, 3–4 cm; bracteoles 2–6, linear-lanceolate, 1.5–2.5 mm, ca. equal to or shorter than pedicels; umbellules 6–12 mm across, 10–20-flowered, polygamous; pedicels 1.5–5 mm, very unequal. Calyx teeth conspicuous, lanceolate, 0.4–0.6 mm, unequal. Petals white, apex with incurved lobule. Stylopodium conic; styles ca. 2 × stylopodium, reflexed. Fruit ovoid, ca. 1 × 0.8 mm, base cordate, glabrous; vittae 2–3 in each furrow, 4 on commissure. Seed face plane. Fl. and fr. Jul–Oct.

Forests, moist grassland along streams; 500–1500 m. Zhejiang [Japan, Korea].

40. *Pimpinella calycina* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 19: 182. 1873.

具萼茴芹 ju e hui qin

Spuriopimpinella calycina (Maximowicz) Kitagawa.

Plants perennial, ca. 40 cm, essentially glabrous. Root fusiform, sometimes clustered. Stem branched. Basal petioles 4–6 cm; blade 2-ternate; leaflets ovate or oblong-ovate, 1–2 × 1–1.5 cm. Cauline leaves similar to basal, petiole up to 15 cm; blade 1–2-ternate; lateral leaflets oblong-ovate or ovate, usually 2-lobed, terminal leaflets oblong-rhombic, 4–10 × 2–4 cm, pubescent on veins, 3-lobed, lobes lanceolate. Umbels (3–)6–10 cm across; bracts 3–5, linear-lanceolate, 3–8 mm, sometimes like uppermost leaf; rays 6–12(–15), 2–4(–8) cm, subequal; bracteoles 5(–8), linear-lanceolate or subulate, 1–2 mm, shorter than pedicels; umbellules 4–10 mm across, 10–15-flowered; pedicels 3–6 mm, very unequal. Calyx teeth conspicuous, lanceolate or narrowly triangular, 0.5–0.8 mm. Petals white, obovate or obcordate, apex with incurved lobule. Stylopodium conic; styles 2–3 × stylopodium. Fruit oblong-ovoid, ca. 5 × 2 mm, glabrous; vittae 2–3(–4) in each furrow, 4 on commissure. Seed face plane. Fl. Jun–Aug, fr. Sep–Oct.

Thickets, grassy slopes. NE China (unlocalized specimen) [Japan, Korea].

41. *Pimpinella valleculosa* K. T. Fu, Fl. Tsinling. 1(3): 457. 1981.

谷生茴芹 gu sheng hui qin

Plants perennial, 50–100 cm, glabrous. Root cylindrical, 10–15 × ca. 0.5 cm. Stem purplish. Basal petioles 3–12 cm; blade 3–4-pinnate; ultimate segments linear, 5–25 × 1–2 mm. Cauline leaves similar to basal, 1-pinnate or 3-lobed. Umbels 5–10 cm across; bracts absent; rays 6–10, 1–2.5 cm, unequal; bracteoles 3–7, linear, 3–4 mm, ca. equal to or shorter than pedicels; umbellules 5–15 mm across, 6–13-flowered; pedicels 4–6 mm. Calyx teeth conspicuous, acute or subulate, ca. 0.3 mm. Petals white, apex with incurved lobule. Stylopodium short conic; styles 2–3 × stylopodium, recurved. Fruit oblong-ovoid, 2.5–3 × 1.5–2 mm, glabrous; vittae 3 in each furrow, 6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Nov.

• Shaded valleys, grassy slopes; 400–1200 m. SE Gansu, E Hubei, S Shaanxi, NE Sichuan.

42. *Pimpinella xizangensis* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 24: 311. 1986.

多花茴芹 duo hua hui qin

Plants perennial, 80–100 cm, glabrous. Root cylindrical, ca. 10 × ca. 0.4 mm. Stem 2–3-branched, base clothed with fibrous remnant sheaths. Basal petioles 5–10 cm; blade triangular in outline, 10–15 × 5–10 cm, ternate-2-pinnate, primary pinnae 4–5 pairs; ultimate segments broad-ovate or suborbicular, 1–2 × 1–1.5 cm, margins coarsely serrate. Cauline leaves similar to basal, smaller, ternate-1-pinnate or 3-lobed. Umbels 6–8 cm across, mainly terminal, lateral umbels 2–3; bracts 1–3, lanceolate, 16–20 × 1–2 mm; rays 6–8, 4–6 cm, subequal; bracteoles 4–6, linear, 3–4 mm; umbellules 5–8 mm across; many-flowered; pedicels 4–6 mm. Calyx teeth conspicuous, triangular, ca. 0.3 mm. Petals white, broad-ovate, apex slightly incurved. Stylopodium domed; styles ca. 1 × stylopodium. Fruit ovoid, ca. 4 × 2.5 mm, base cordate; vittae 1 in each furrow, 2 on commissure. Seed face plane. Fl. Jun–Jul, fr. Jul–Sep.

• Valley forests; ca. 2700 m. S Xizang (Lhünzê).

This species is recorded only from a few collections.

43. *Pimpinella arguta* Diels, Bot. Jahrb. Syst. 29: 496. 1900.

锐叶茴芹 rui ye hui qin

Plants perennial, 40–100 cm, glabrous. Root fusiform or napiform, 3–6 × ca. 0.7 cm. Stem 2–3-branched. Basal petioles 6–10 cm; blade 2–3-ternate; ultimate segments ovate-lanceolate or rhombic, 2–6 × 1–2 cm, abaxially pubescent on veins, margins sharply serrate, apex acuminate or caudate. Cauline leaves similar to basal, 2-ternate or 3-lobed. Umbels 1.5–4 cm across; bracts (0–)2–6, linear, ca. 2 mm; rays 9–20, 2–7 cm, very unequal; bracteoles 3–8, linear-filiform, ca. 1 mm, shorter than pedicels; umbellules 5–8 mm across, 10–25-flowered, polygamous; pedicels 2–3 mm, elongating to 7 mm in fruit. Calyx teeth conspicuous, lanceolate, ca. 0.5 mm. Petals white, obovate, apex with incurved lobule. Stylopodium conic; styles 2–3 × stylopodium, reflexed. Fruit ovoid, ca. 4 × 3 mm, base cordate, surface glabrous; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. Jun–Aug, fr. Aug–Oct.

• Coniferous forests, grassland and scrub at forest margins; 1300–3400 m. Gansu, Guizhou, Hebei, Henan, Hubei, Shaanxi, Sichuan.

44. *Pimpinella komarovii* (Kitagawa) R. H. Shan & F. T. Pu in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(2): 111. 1985.

辽冀茴芹 liao ji hui qin

Spuriopimpinella komarovii Kitagawa, J. Jap. Bot. 17: 560. 1941.

Plants perennial, ca. 1 m, pubescent. Root fusiform. Stem 3–4-branched. Basal petioles 7–20 cm; blade 1–3-ternate; ultimate segments ovate or ovate-lanceolate, 2–8 × 1–4 cm, abaxially glaucous, pubescent on veins. margins crenate or serrate, apex acuminate. Cauline leaves similar to basal, 2–3-ternate. Uppermost leaves 3-lobed, lobes lanceolate. Umbels 4–6 cm across; bracts absent; rays 9–15, 2–3.5 cm, unequal; bracteoles 1–3, linear, 5–10 cm, ca. equal to or shorter than pedicels; umbellules 8–12 mm across, 10–15-flowered; pedicels 5–15 mm. Calyx teeth conspicuous, lanceolate, 0.3–0.5 mm. Petals white, ovate or obovate, apex with incurved lobule. Stylopodium conic; styles 2–3 × stylopodium. Fruit cordate-ovoid, ca. 2 × 1.5–2 mm, glabrous; vittae 3 in each furrow, 4 on commissure. Seed face plane. Fl. and fr. Jun–Sep.

Grassy slopes, grassland along streams. Hebei, Heilongjiang, Liaoning [N Korea].

The following species have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

Pimpinella bialata H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 188. 1929), described from Hubei (*A. Henry 2649*, holotype, ?K).

Pimpinella crispulifolia H. de Boissieu (Bull. Soc. Bot. France 56: 354. 1909), described from Yunnan (“Laokouychan,” *F. Ducloux 4083*, holotype, P).

Pimpinella decursiva H. Wolff (Repert. Spec. Nov. Regni Veg. 16: 237. 1920), described from Shandong (“Clarabucht, Tsingya,” *Krug 232 & 463*, syntypes, ?B).

Pimpinella limprichtii H. Wolff (Repert. Spec. Nov. Regni Veg. Beih.

12: 450. 1922), described from Hebei (Wuling Shan, 2000 m, *W. Limpricht 2930*, holotype, unlocalized).

Pimpinella tagawae M. Hiroe (Umbell. Asia 1: 61. 1958 [“tagawai”]), described from Taiwan (“Taipei” [Taipei], 1000–2000 m, *M. Tagawa 105*, holotype, KYO).

Pimpinella urbaniana Fedde ex H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 330. 1930), described from Yunnan (“Tong-tsichuan” [Dongchuan], *F. Ducloux 6492*, holotype, P).

49. ACRONEMA Falconer ex Edgeworth, Trans. Linn. Soc. London 20: 51. 1846.丝瓣芹属 *si ban qin shu*

Pan Zehui (潘泽惠); Mark F. Watson, Ingrid Holmes-Smith

Herbs biennial or perennial, essentially glabrous. Rhizome tuberous, globose or conic, roots fibrous. Stem erect, ribbed. Basal leaves petiolate, sheathed at base; blade broad-triangular or broad-ovate, 1–3-ternate-pinnate; ultimate segments of distal leaves often linear. Umbels compound, terminal and lateral; bracts and bracteoles often absent; rays unequal. Calyx teeth obsolete or conspicuous, triangular. Petals white or purple-red, ovate to ovate-lanceolate, apex long-linear or long-aristate, rarely acute or obtuse, stated petal lengths include the apex. Stylopodium depressed or low-conic; styles short, reflexed. Fruit ovoid, broad-ovoid, ovoid-oblong or oblong-elliptic, slightly flattened laterally, glabrous; ribs 5, filiform; vittae 1–3 in each furrow, 2–4 on commissure. Seed face plane. Carpophore usually bifid or 2-parted.

About 25 species: high-altitude Sino-Himalayan region from E Nepal to SW China; 20 species (14 endemic) in China.

This is a taxonomically complex genus with often indistinct species boundaries and problematic generic delimitation with *Sinocarum* (see the taxonomic note under that genus).

- 1a. Ultimate segments of basal and lower leaves linear or linear-lanceolate.
 - 2a. Ultimate leaf segments 2–5 mm wide; petals apex long-linear.
 - 3a. Rays (5–)8–13, (1.5–)3–5.5 cm; calyx teeth conspicuous, ovate-triangular 1. *A. schneideri*
 - 3b. Rays 3–7, 0.3–3.5 cm; calyx teeth obsolete 2. *A. graminifolium*
 - 2b. Ultimate leaf segments 1–2.5 mm wide; petals apex acute or obtuse-acute.
 - 4a. Root conic; leaf blade 2–5-pinnate 3. *A. chienii*
 - 4b. Root tuberous, ovoid-globose; leaf blade 2–3-pinnate 4. *A. yadongense*
- 1b. Ultimate segments of basal and lower leaves ovate or ovate-lanceolate.
 - 5a. Bracteoles 1–4.
 - 6a. Rays 1–2 cm; petals apex linear 5. *A. tenerum*
 - 6b. Rays less than 1 cm; petals apex short-acute, not linear 6. *A. minus*
 - 5b. Bracteoles absent.
 - 7a. Calyx teeth developed.
 - 8a. Basal leaf blade ternate, dark purple abaxially; upper leaves heteromorphic 7. *A. astrantiifolium*
 - 8b. Basal leaf blade 2–3-ternate-pinnate, not purplish abaxially; upper leaves homomorphic.
 - 9a. Leaf blade 2-ternate; petals white or pink; calyx teeth ca. 0.2 mm 8. *A. sichuanense*
 - 9b. Leaf blade 2–3-ternate-pinnate; petals purple-red; calyx teeth ca. 3 mm 9. *A. forrestii*
 - 7b. Calyx teeth obsolete.
 - 10a. Petals apex acute; fruit oblong, apex slightly separated 10. *A. chinense*
 - 10b. Petals apex linear or caudate-acute; fruit ovoid to broad-ovoid, apex not separated.
 - 11a. Plants 4–25 cm (*A. nervosum* may be taller); basal and cauline leaves homogeneous; lateral umbels 1–2.
 - 12a. Leaves 1–2-ternate.
 - 13a. Leaves ternate, leaflets crenulate 11. *A. muscicola*
 - 13b. Leaves 2-ternate, leaflets 3-toothed 12. *A. alpinum*
 - 12b. Leaves 1–2-ternate-pinnate.
 - 14a. Leaflets 2–3 mm wide, entire or 3-toothed 13. *A. nervosum*
 - 14b. Leaflets ca. 7 mm wide, irregularly pinnatifid or 3-lobed 14. *A. handelii*
 - 11b. Plants 25–80 cm; basal and cauline leaves heteromorphic; lateral umbels often numerous.
 - 15a. Rays ca. 1 cm; pedicels 1–2 mm; petals white 15. *A. brevipedicellatum*
 - 15b. Rays 1.5–6 cm; pedicels 3–15 mm; petals purple, pink or white.
 - 16a. Leaflets of basal leaves entire or apex 2-toothed; rays subequal 16. *A. xizangense*
 - 16b. Leaflets of basal leaves apex 3-lobed, irregularly coarse-toothed or serrate; rays unequal.
 - 17a. Basal leaves 1–2-ternate-pinnate; rays very unequal 17. *A. gracile*
 - 17b. Basal leaves 2–3-pinnate; rays unequal or slightly unequal.
 - 18a. Petals white (sometimes purple), apex densely papillate 18. *A. hookeri*
 - 18b. Petals purple or white with purplish-red margin, apex glabrous or papillate.
 - 19a. Leaves 2-pinnate, lower pinnae short-petiolate, leaflets ca. 6 mm wide 19. *A. commutatum*
 - 19b. Leaves 2–3-pinnate, primary and secondary pinnae all long-petiolate, leaflets 7–15 mm wide 20. *A. paniculatum*

1. *Acronema schneideri* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 301. 1929.

丽江丝瓣芹 li jiang si ban qin

Pimpinella schneideri (H. Wolff) M. Hiroe.

Plants 25–75 cm. Rhizome stout, subglobose or torulose, ca. 8 mm, thick. Stem thinly ribbed. Basal leaves few, petioles 8.5–15 cm, sheaths short, narrow; blade 7.5–11 × 6–20 cm, 2–3-pinnate; basal pinnae short-petiolate; ultimate segments linear, 4.5–9 × 2–5 mm, entire, sometimes scabrous along nerves abaxially. Terminal umbels 4–13 cm across, lateral umbels smaller; peduncles, rays and pedicels scabrous distally; bracts and bracteoles absent; rays (5–)8–13, (1.5–)3–5.5 cm, unequal, elongating to 7 cm in fruit; umbellules 10–18 mm across, 5–10-flowered; pedicels 3–6 mm, unequal, scabrous on one side, elongating to 10 mm in fruit. Calyx teeth conspicuous, ovate-triangular, ca. 0.1 mm, apex acute. Petals purple-red, rarely white-pink, ovate-lanceolate, elongate-attenuate ca. 3 × 0.5 mm; apex linear, ca. half the petal length, papillate. Young fruit ovoid, ca. 1.5 × 1.5 mm (mature fruit unknown). Fl. Jul–Aug, fr. Sep–Oct.

• Coniferous forests, dwarf scrub; 2500–4200 m. W Sichuan, NW Yunnan.

This incompletely known taxon is recorded only from a few collections. Russian authors consider this species synonymous with *Cyclo-rhiza edosmioides* (treated under *C. peucedanifolia* in this account).

2. *Acronema graminifolium* (W. W. Smith) S. L. Liou & R. H. Shan, Acta Phytotax. Sin. 18: 197. 1980.

禾叶丝瓣芹 he ye si ban qin

Pimpinella hookeri C. B. Clarke var. *graminifolia* W. W. Smith, Rec. Bot. Soc. India 4: 267. 1911; *Acronema hookeri* (C. B. Clarke) H. Wolff var. *graminifolium* (W. W. Smith) H. Wolff.

Plants 20–80 cm. Rhizome tuberous, globose, 6–8 mm thick. Stem purplish, hollow, thinly ribbed. Lower stem leaves petiolate, petioles 5–11 cm, sheaths short; blade 3–9 × 5–10 cm, 2–3-pinnate; ultimate segments linear, 2.5–7 × 2–4 mm, entire, scabrous along nerves adaxially. Umbels 3–8 cm across; bracts and bracteoles usually absent; rays 3–7, 4–35 mm, unequal; umbellules 8–15 mm across, 4–9-flowered; pedicels 0.5–1.3 cm, slender, unequal. Calyx teeth obsolete. Petals white or margin purplish, ovate, 5–5.5 × ca. 0.7 mm; apex long-linear, ca. 4 mm. Young fruit broad-ovoid, ca. 2 × 1 mm (mature fruit poorly known). Fl. Jun–Aug.

Forests, mountain slopes; 2600–4000 m. W Sichuan, S Xizang [Bhutan, Sikkim].

This is a rather poorly known taxon. In Bhutan this plant grows in mixed populations with *Acronema hookeri* and is sometimes treated as a variety of that species. Further collections are needed to resolve the taxonomy.

3. *Acronema chienii* R. H. Shan & S. L. Liou, Acta Phytotax. Sin. 18: 197. 1980.

条叶丝瓣芹 tiao ye si ban qin

Plants 50–75 cm. Rhizome stout, conic, ca. 6 × 1 cm. Stem

purplish, branched. Lower leaves petiolate, petioles 10–20 cm, sheaths ovate; blade, 8–13 × 10–15 cm, 2–5-pinnate; ultimate segments linear or linear-lanceolate, 0.3–6.5 × 1–2.5 mm. Umbels 6–8 cm across; peduncles 4–11 cm; bracts and bracteoles usually absent; rays 10–18, 1.5–6 cm, unequal, 4-angled; umbellules 8–12 mm across, 12–16-flowered; pedicels ca. 5 mm, slender. Calyx teeth obsolete or nearly so. Petals white, linear or narrowly spatulate, 1.5–3 × 0.1–0.4 mm; apex acute or obtuse-acute. Fruit broad-ovoid, ca. 1.8 × 1.5 mm, base cordate; vittae 3 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

• Forests, forest margins, river banks; 2500–4800 m. SW Sichuan, SE Xizang, NW Yunnan.

- 1a. Leaves 2–3-pinnate, ultimate segments 3–6.5 × 1–2.5 mm; rays 4–6 cm; petals narrow-spatulate, 0.2–0.4 mm wide 3a. var. *chienii*
 1b. Leaves 4–5-pinnate, ultimate segments 0.3–1.8 × ca. 1 mm; rays 1.5–4 cm; petals linear, ca. 1 mm wide 3b. var. *dissectum*

3a. *Acronema chienii* var. *chienii*

条叶丝瓣芹(原变种) tiao ye si ban qin (yuan bian zhong)

Leaves 2–3-pinnate; ultimate segments 3–6.5 × 1–2.5 mm. Rays 4–6 cm. Petals narrow-spatulate, 0.2–0.4 mm wide.

• Forests, river banks; 3000–4800 m. SW Sichuan, SE Xizang.

3b. *Acronema chienii* var. *dissectum* R. H. Shan & S. L. Liou, Acta Phytotax. Sin. 18: 198. 1980.

细裂丝瓣芹 xi lie si ban qin

Leaves 4–5-pinnate; ultimate segments 0.3–1.8 × ca. 1 mm. Rays 1.5–4 cm. Petals linear, ca. 1 mm wide.

• Forest margins; 2500–4200 m. SW Sichuan, NW Yunnan.

4. *Acronema yadongense* S. L. Liou, Acta Phytotax. Sin. 28: 147. 1990.

亚东丝瓣芹 ya dong si ban qin

Plants 35–45 cm. Rhizome tuberous, ovoid-globose, 5–6 mm across. Stem thinly ribbed, little-branched. Lower stem leaves petiolate, petioles 5–13 cm, sheaths small; leaf blade broad-triangular, 5–6 × 4–5 cm, 2–3-pinnate; ultimate segments linear, 0.5–2.5 × 1–1.5 mm. Umbels 3–5 cm across; peduncles 1.2–3 cm; bracts absent; rays 9–12, 1.5–3 cm, scabrous distally; bracteoles absent or 1–2, linear, small; umbellules ca. 5 mm across, 8–17-flowered; pedicels 2–3 mm, unequal, slender. Calyx teeth obsolete. Petals white, obovate or elliptic, 1–1.2 × ca. 1 mm; apex acute. Stylopodium purple-black. Young fruit, oblong-elliptic ca. 1.8 × 1.2 mm (mature fruit unknown). Fl. Sep.

• Forests, grassy slopes; ca. 3700 m. S Xizang (Yadong).

This incompletely known taxon is recorded only from a few collections.

5. *Acronema tenerum* (de Candolle) Edgeworth, Trans. Linn. Soc. London 20: 51. 1846.

丝瓣芹 si ban qin

Helosciadium tenerum de Candolle, Prodr. 4: 105. 1830;

Carum tenerum (de Candolle) Franchet; *Pimpinella tenera* (de Candolle) C. B. Clarke.

Plants 5–30 cm. Rhizome narrowly conic, or elongate-globose, ca. 5 mm across. Stem solitary, slender. Basal leaves petiolate, petioles 2–5 cm, sheaths narrowly lanceolate; blade triangular, 1.5–2.5 × 1.5–3 cm, 2–3-ternate-pinnate; ultimate segments cuneate-obovate or obovate, ca. 5 × 5 mm, apex often 3-toothed. Umbels 2–3 cm across; peduncles 2–5 cm, slender; bracts usually absent; rays 3–4, 1–2 cm, unequal; bracteoles 1–3, 2–3 mm; umbellules 6–14 mm across, 3–5-flowered; pedicels 2–7 mm, unequal. Calyx teeth obsolete. Petals purple-red, ovate, ca. 2 mm; apex linear, ca. 1 mm. Fruit broad-ovoid, ca. 1–1.5 × 1–1.5 mm; vittae minute, 2 in each furrow, 2 on commissure. Fl. Aug.

Damp shady crevices; 3400–3500 m. E Xizang, NW Yunnan [Bhutan, NE India, E Nepal, Sikkim, N Thailand].

Despite this species being the most widespread in the genus, fruiting material is still lacking for many areas (including China). This species is similar and closely related to *Acronema hookeri*, with which larger specimens of *A. tenerum* can be confused. The presence of bracteoles and shorter petal apices are useful in recognizing such specimens of *A. tenerum*.

6. *Acronema minus* (M. F. Watson) M. F. Watson & Z. H. Pan, Acta Phytotax. Sin. 42: 561. 2004.

矮小丝瓣芹 ai xiao si ban qin

Sinocarum minus M. F. Watson, Edinburgh J. Bot. 53: 140. 1996.

Plants 3–5 cm. Rhizome tuberous ovoid, 3–5 mm across. Stem solitary, thinly ribbed. Lower stem leaves petiolate, petioles 2–5.5 cm, sheaths short; blade broad-triangular, 4–7 × 5–8 mm, 2-ternate-pinnate; pinnae short-petiolulate, second pinnales broad-ovate, 3-lobed; ultimate segments, 1.2–1.5 × 0.7–1 mm, entire or middle ones 2–3-toothed, teeth 1–2 mm. Upper stem leaves none. Umbels 0.5–1 cm across; peduncles, 2.5–3 cm, slender; bracts 1–3, linear, 2–3 mm; rays 3–7, 1.5–5 mm; bracteoles 2–4, ca. 1 mm, shorter than pedicels; pedicels 3–5, ca. 2 mm. Calyx teeth obsolete. Petals white, ovate, ca. 1 mm; apex short-acute, not linear. Young fruit, oblong-ellipsoid, ca. 1 mm (mature fruit not known). Fl. Jun–Jul.

Mountain slopes; 3000–4600 m. S Xizang, NW Yunnan [Bhutan].

This species was misidentified in FRPS (55(2): 119–121. 1985) as *Acronema wolffianum* Fedde ex H. Wolff (*Sinocarum wolffianum* (Fedde ex H. Wolff) P. K. Mukherjee & Constance, 1991, not (Fedde ex H. Wolff) R. H. Shan & F. T. Pu, 1993), which is endemic to Bhutan and Sikkim.

7. *Acronema astrantiifolium* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 192. 1929.

星叶丝瓣芹 xing ye si ban qin

Pimpinella astrantiifolia (H. Wolff) M. Hiroe.

Plants 8–50 cm. Rhizome tuberous to long conic, 1–3 × 0.5–1 cm. Stem solitary, thinly ribbed, little-branched. Basal leaves petiolate, petioles 4–8 cm, sheaths short, narrow; blade semi-orbicular or broad-triangular in outline, 1.5–3.5 × 2–5 cm, 3-lobed or 3-foliolate; ultimate segments ovate to obovate, 1–2.5 × 0.8–2 cm, base cuneate, incised-serrate distally, adaxially

purple-green, abaxially dark purple. Upper stem leaves conspicuously heteromorphic; ultimate segments becoming linear, 15–75 × 0.5–5 mm, entire. Umbels 4–9 cm across in flower (to 12 in fruit); peduncles (2–)4.5–10 cm; bracts and bracteoles absent; rays 5–12, (0.8–)1.5–6 cm, unequal; umbellules 9–18 mm across, 7–12-flowered; pedicels 5–15 mm, unequal, slender, scabrous along one side; rays and pedicels elongating and spreading in fruit. Calyx teeth conspicuous, narrow-triangular, ca. 0.3 mm. Petals white, greenish-white or purple, ovate or ovate-lanceolate, 2–3 × ca. 0.5 mm; apex linear, ca. 1 mm, papillate-hairy abaxially. Fruit subovoid, ca. 2 × 2 mm. Fl. Aug–Oct, fr. Sep–Nov.

• Forests, grassy slopes; 2800–4000 m. W Sichuan, NW Yunnan.

8. *Acronema sichuanense* S. L. Liou & R. H. Shan, Acta Phytotax. Sin. 18: 199. 1980.

四川丝瓣芹 si chuan si ban qin

Plants 15–30 cm, slender. Rhizome tuberous, ovoid, 3–25 × 4–7 mm. Stem thinly ribbed. Lower stem leaves petiolate, petioles 2–5.5 cm, sheaths short, small; blade broad-triangular, 3.5–10 × 6–12 cm, 2-ternate-pinnate; pinnae remote, petiolules 2–5 cm, pinnales petiolules 0.2–2.5 cm, semi-orbicular, 0.5–1.5 × 0.6–1.7 cm, apex 3-lobed, lobes obovate, 2–3-toothed. Uppermost leaves reduced, segments linear, entire or sparsely incised-serrate. Umbels 2–5 cm across; peduncle 3–6 cm, slender; bracts absent or 1; rays 3–6, 1.5–4.5 cm, very unequal; bracteoles absent; umbellules 5–10 mm across, 3–10-flowered; pedicels 2–9 mm, unequal, spreading in fruit. Calyx teeth triangular, minute, ca. 0.2 mm. Petals white or pink, ovate-lanceolate, ca. 3 × 0.6 mm; apex linear, ca. 2 mm. Fruit broad-ovoid, ca. 2 × 3 mm, base cordate; vittae 2–3 in each furrow, 2–4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

• Forests, damp shady crevices; 3200–4000 m. S Qinghai, SW Sichuan, S Xizang, NW Yunnan [?Bhutan, ?Sikkim].

Plants from the E Himalayas are smaller (2.5–6.5 cm), with almost sessile, lax umbels. They may represent a different, as yet undescribed species, but further work and new collections are needed to confirm this.

9. *Acronema forrestii* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 316. 1930.

疏齿丝瓣芹 shu chi si ban qin

Pimpinella forrestii (H. Wolff) M. Hiroe.

Plants ca. 40 cm high. Root tuberous, elongate, ca. 12 × 7 mm. Stem ribbed, little-branched above. Lower leaves petiolate, petioles 7–13 cm, slender, sheaths narrowly lanceolate; blade triangular-ovate, 4–6 × 3.5–5 cm, 2–3-ternate-pinnate; pinnae 3 pairs, petiolules of proximal pinnae ca. 5 cm; ultimate segments oblong or cuneate-oblong, 3–8 × 0.5–2 mm, entire or apex sparsely obtuse-toothed. Umbels 5–7 cm across; peduncles 2.5–4 cm; bracts and bracteoles absent; rays 8–12, up to 4 cm, very unequal, slender, scabrous on inner surface; umbellules 6–11 mm across, 10–15-flowered; pedicels 3–5 mm, scabrid. Calyx teeth narrowly triangular, ca. 3 mm. Petals purple-red, narrowly lanceolate, 2–3 × 0.5–0.75 mm; apex long-linear, ca. 1 mm. Ovary broad-ovoid. Stylopodium depressed. Fruit unknown. Fl. Sep.

- Open stony pastures; 3600–4000 m. NW Yunnan.

This incompletely known taxon is recorded only from the type gathering.

10. *Acronema chinense* H. Wolff, Acta Horti Gothob. 2: 309. 1926.

尖瓣芹 jian ban qin

Plants 5–75 cm. Root tuberous, globose, 3–4 mm across. Stem slender, thinly ribbed. Basal leaves petiolate, petioles 2–5 cm, sheaths short; blade broad-triangular, 2–5 × 3–6 cm, 2-ternate-pinnate; pinnae petiolules ca. 7 mm; ultimate segments cuneate-obovate, ca. 4 × 3 mm, sessile, apex 3-toothed. Stem leaves long-petiolate, petioles 1–4 cm; ultimate segments rhombic-ovate, ca. 2 × 1 mm, apex incised-serrate. Umbels 2–5 cm across; peduncles 0.5–13 cm; bracts absent or 1, linear; rays 3–7, 2–5 cm, distinctly unequal; bracteoles absent; umbellules 7–10 mm across, 3–8-flowered; pedicels 2–10 mm, distinctly unequal. Calyx teeth obsolete. Petals white, ovate, ca. 1 × 0.5 mm; apex acute. Fruit oblong, ca. 2 × 1.2 mm, apex slightly separated; ribs filiform; vittae 1 in each furrow, 2 on commissure. Fl. Jul, fr. Aug–Sep.

- Shrubby thickets, ravines, damp crevices on rocky slopes; 3200–4900 m. Gansu, Qinghai, Sichuan, Xizang.

- 1a. Plants 30–75 cm; peduncles (4–)6–13 cm
 10a. var. *chinense*
 1b. Plants 5–10 cm; peduncles 0.5–1.5 cm 10b. var. *humile*

10a. *Acronema chinense* var. *chinense*

尖瓣芹(原变种) jian ban qin (yuan bian zhong)

Pimpinella chinensis (H. Wolff) M. Hiroe.

Plants (15–)30–75 cm. Peduncles 10–13 cm.

- Shrubby thickets, ravines; 3200–4900 m. Gansu, Qinghai, Sichuan, Xizang.

10b. *Acronema chinense* var. *humile* S. L. Liou & R. H. Shan, Acta Phytotax. Sin. 18: 200. 1980.

矮尖瓣芹 ai jian ban qin

Plants small, 5–10 cm. Peduncles short, 0.5–1.5(–3) cm.

- Damp crevices on rocky slopes; 3300–4400 m. Gansu, Qinghai, Sichuan.

11. *Acronema muscicola* (Handel-Mazzetti) Handel-Mazzetti, Symb. Sin. 7: 715. 1933 [*“muscicolum”*].

苔间丝瓣芹 tai jian si ban qin

Pimpinella muscicola Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 226. 1925.

Plants 5–20 cm. Root tuberous, short-cylindric, 5–10 × 3–5 mm. Stem solitary. Basal leaves petiolate, petioles 5–10 mm, sheaths small; blade broad-cordate, 0.5–1.6 × 1–2 cm, 3-foliolate; ultimate segments obovate, 4–8 × 4–12 mm, apex 3–5-crenate-dentate. Umbels 3.5–5 cm across; peduncles 2–5 cm; bracts and bracteoles absent; rays 3–6, 0.5–2.5 cm, unequal; umbellules 4–7 mm across, 3–7-flowered; pedicels 2–4 mm.

Calyx teeth obsolete. Petals white or dark purple, ovate or rhombic-ovate, 1.5–2 × ca. 0.4 mm; base clawed; apex linear, 1.2–1.5 mm, glandular-pubescent. Young fruit ovoid or ovoid-orbicular, base slight-cordate, ca. 1 mm (mature fruit unknown). Fl. Aug–Sep, fr. Sep–Oct.

- Damp forests; 3200–4100 m. Sichuan, Xizang, Yunnan.

Records in the literature of this species occurring further west in the Himalayas remain unconfirmed and are here considered dubious.

12. *Acronema alpinum* S. L. Liou & R. H. Shan, Acta Phytotax. Sin. 18: 200. 1980.

高山丝瓣芹 gao shan si ban qin

Plants 4–10 cm. Root tuberous, ovoid, 7–9 × 4–5 mm, thick. Stem purplish, branched. Basal leaves petiolate, petioles 1–1.5 cm, sheaths ovate-oblong; blade ovate or broad-ovate, 0.8–1.1 × 1.1–1.3 cm, 2-ternate; leaflets sessile, ovate to obovate, ca. 2 × 1.5 mm, apex 3-toothed. Umbels ca. 2 cm across; peduncles ribbed, 1–2 cm; bracts and bracteoles absent; rays 5–7, 1–2 cm, unequal, 4-angled; umbellules 0.5–0.6 mm across, 6–13-flowered; pedicels 3–5 mm. Calyx teeth obsolete. Petals color unknown, ovate, ca. 1.8 × 0.7 mm; apex linear. Stylopodium depressed, purple-black. Fruit ovoid, ca. 1.8 × 1.5 mm, base cordate; vittae unknown. Fl. Jul, fr. Aug.

- Rock crevices on alpine slopes; 4700–4800 m. Xizang.

This incompletely known taxon is recorded only from a few collections.

13. *Acronema nervosum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 315. 1929.

羽轴丝瓣芹 yu zhou si ban qin

Plants 10–25(–40) cm. Root tuberous, ovoid, ca. 5 mm across. Stem solitary, slender, little-branched. Basal leaves petiolate, petioles ca. 5 cm, slender, sheaths small; blade broad-triangular, 2.2–3 × 1.5–2.5 cm, 2-ternate-pinnate; pinnae petiolulate; ultimate segments obovate to linear-lanceolate, 5–8 × 2–3 mm, entire or 3-toothed, margins and adaxial veins minutely pubescent. Umbels 1.5–3 cm across; peduncles short; bracts and bracteoles absent (bracts occasionally 1); rays 3–6, 1.5–2.7 cm, slender; umbellules 5–12 mm, 3–9-flowered; pedicels 2–9 mm, unequal, spreading and elongating in fruit. Calyx teeth obsolete. Petals white, yellowish-white, or purple, ovate-lanceolate, 2–3 × ca. 0.5 mm; apex linear, ca. 1.5 mm. Stylopodium depressed. Fruit ovoid, ca. 1.5 × 1.5 (mature fruit unknown). Fl. Aug–Sep, fr. Sep–Oct.

Alpine forests; 4100–4500 m. SW Sichuan, S Xizang [Bhutan, NE India, Nepal, Sikkim].

This species has reputed medicinal value (in Xizang).

14. *Acronema handelii* H. Wolff in Engler, Pflanzenr. 90(IV. 228): 322. 1927.

中甸丝瓣芹 zhong dian si ban qin

Pimpinella handelii (H. Wolff) M. Hiroe.

Plants 15–20 cm. Root tuberous, oblong, ca. 10 × 3–5 mm. Stem solitary, slender and ribbed. Basal leaves petiolate, peti-

oles 2.5–3.5 cm, slender, sheaths short; blade broad-ovate, 1.5–2.5 × 1.5–2.5 cm, 1–2-ternate-pinnate; pinnae petiolulate; ultimate segments obovate or ovate, ca. 1 × 0.7 cm, base cuneate, margin irregularly pinnate or apex 3-lobed. Umbels 2.5–5 cm across; peduncles 2.5–4 cm, slender; bracts and bracteoles absent; rays 4–6, 1–3 cm, unequal; umbellules 5–10 mm across, 3–9-flowered; pedicels ca. 5 mm. Calyx teeth obsolete. Petals white, ovate or ovate-lanceolate, 2–2.5 × ca. 0.5 mm; apex linear, 1–1.5 mm. Young fruit broad-ovoid, base cordate, ca. 1.5 mm (mature fruit unknown). Fl. and fr. Jul–Aug.

Damp forests, open pastures; 3400–4000 m. NW Yunnan [NE India, Myanmar].

This rather poorly known taxon is recorded only from a few collections.

15. *Acronema brevipedicellatum* Z. H. Pan & M. F. Watson, Acta Phytotax. Sin. 42: 562. 2004.

短柄丝瓣芹 duan bing si ban qin

Plants 10–40 cm. Root tuberous, subglobose, ca. 0.7 mm thick. Stem branched. Lower leaves petiolate, petioles 4.5–9 cm, sheaths very small; blade triangular or broad-triangular, 2.5–5.5 × 2.6–4 cm, ternate-pinnate; pinnae 2–3 pairs, proximal pinnae short-petiolulate, broad-ovate, 1.3–2 × ca. 1.5 cm, apex 3–5-toothed. Leaflets of upper leaves ovate to linear. Umbels 2.5–3.5 cm across; peduncles ca. 3 cm; bracts and bracteoles absent; rays 5–7, ca. 1 cm, unequal; umbellules 2.3–3 mm across, 6–9-flowered; pedicels very short, 1–2 mm or subsessile. Calyx teeth obsolete. Petals white, ovate-lanceolate, ca. 2 × 0.5 mm; apex long-acuminate. Young fruit ovoid, ribs filiform (mature fruit unknown). Fl. Aug.

• Damp forests; 3300–3800 m. Xizang, Yunnan.

This incompletely known taxon is recorded only from a few collections. It was misidentified in FRPS (55(2): 128, fig. 51(part 10). 1985) as the E Himalayan *Acronema radiatum* (W. W. Smith) H. Wolff (*Pimpinella radiata* W. W. Smith; currently accepted as *Pternopetalum radiatum* (W. W. Smith) P. K. Mukherjee & Constance).

16. *Acronema xizangense* S. L. Liou & R. H. Shan, Acta Phytotax. Sin. 18: 202. 1980.

西藏丝瓣芹 xi zang si ban qin

Plants 30–40 cm. Root slender, cylindric, ca. 3 cm. Stem solitary, thin-ribbed. Basal leaves petiolate, petioles 7–11 cm, slender, sheaths short; blade broad-ovate or broad-triangular, 1–2-pinnate; pinnae 1.5–2 cm, 3-lobed, petiolules 0.5–1.2 cm; ultimate segments ovate to long-elliptic, 7–10 × 0.3–0.4 mm, entire or 2-toothed distally, margin and nerves scabrous adaxially. Umbels 2.5–3 cm across; bracts and bracteoles absent; rays 6–9, ca. 3 cm, subequal; umbellules 5–7 mm across, 7–13-flowered; pedicels 2.5–4 mm, slender. Calyx teeth obsolete. Petals white, ovate-lanceolate, 1.8–2.2 × ca. 0.6 mm; apex linear, 0.6–0.8 mm. Fruit broad-ovoid, ca. 1.8 × 2 mm, base subtruncate to slightly cordate; vittae unknown. Fl. Sep, fr. Oct.

• Valley sides; ca. 3400 m. Sichuan, Xizang.

This incompletely known taxon is recorded only from a few collections.

17. *Acronema gracile* S. L. Liou & R. H. Shan, Acta Phytotax. Sin. 18: 202. 1980.

细梗丝瓣芹 xi geng si ban qin

Plants 18–40 cm. Root tuberous, ovoid, 5–7 mm across. Stem ribbed, slightly branched. Basal leaves petiolate, petioles 7–13 cm, sheaths small; blade triangular, 4–5.5 × 5–6 cm, 1–2-ternate-pinnate; pinnae broad-triangular, 2–4 × 1.5–3.5 cm, 3-lobed or entire, petiolules 1–1.8 cm; ultimate segments obovate, base cuneate, cuspidate-serrate distally, scabrous along nerves adaxially. Umbels 2.2–3.4 cm across; peduncles slender; bracts and bracteoles absent; rays 5–6, 1–1.5 cm, very unequal; umbellules 6–7 mm across, 4–7-flowered; pedicels 1.6–3.5 mm, slender, unequal. Calyx teeth obsolete. Petals purple-red, broad-ovate, 3–3.5 × ca. 1 mm; apex linear, 2–2.5 mm, glandular-pubescent. Mature fruit unknown. Fl. Jul.

• Forested ravines; 3300–3800 m. Xizang.

This poorly known taxon is recorded only from a few collections.

18. *Acronema hookeri* (C. B. Clarke) H. Wolff in Engler, Pflanzenr. 90(IV. 228): 323. 1927.

锡金丝瓣芹 xi jin si ban qin

Pimpinella hookeri C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 686. 1879; *Carum hookeri* (C. B. Clarke) Franchet.

Plants 30–80 cm. Root tuberous, globose, 8–10 × 5–8 mm across. Stem ribbed and branched, branches elongating. Basal petioles 4–8 cm, sheaths narrow; blade ovate-triangular to long-ovate-triangular, 2-pinnate; proximal pinnae short-petiolulate; ultimate segments ovate, obliquely ovate to broad-ovate, 1–2 × 7–13 mm, 3-lobed or irregularly sparsely serrulate. Umbels 2–5 cm across, many in a lax, raceme-like inflorescence; peduncles 4.5–8 cm; bracts and bracteoles absent; rays 3–6, 2.5–6 cm, slightly unequal; umbellules 8–15 mm across, 3–7-flowered; pedicels 5–15 mm, slender; rays and pedicels elongating and spreading in fruit. Calyx teeth obsolete. Petals white, pink or dark red, lanceolate or oblong-lanceolate, ca. 4 × 0.6 mm; apex filiform, 2–3 mm, densely papillate. Fruit ovoid globose, ca. 2 × 2 mm, base subcordate; vittae 2–3 in the furrows, 3–4 on commissure. Fl. Aug, fr. Sep–Oct.

Forests, riversides, streamsides; 2100–3200 m. S Xizang, NW Yunnan [Bhutan, NE India, E Nepal, Sikkim].

This widespread, quite variable species often grows in mixed populations with *Acronema graminifolium*, which some authors consider to be a variety of *A. hookeri* (as originally described as *Pimpinella hookeri* var. *graminifolia*).

19. *Acronema commutatum* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 192. 1929.

多变丝瓣芹 duo bian si ban qin

Plants 16–60 cm. Root tuberous, globose, 2–10 mm across. Stem slender, thinly ribbed. Basal leaves petiolate, petioles 2.5–5 cm, sheaths short, narrow; blade broad-triangular, 3–5 × 3–6 cm, 2-pinnate; pinnae 2–3 pairs, proximal pinnae short-petiolulate; ultimate segments broad-ovate to obovate, 5–12 × ca. 6 mm, apex 3-lobed or sparsely obtuse-serrate. Leaflets of the upper leaves linear. Umbels 5.5–7.5 cm across; peduncles 2.5–7 cm; bracts and bracteoles absent; rays 2–6, 1–3(–4.5) cm, unequal; umbellules 4–20 mm across, 2–5-flowered; pedicels 4–10 mm, slender, unequal. Calyx teeth obsolete. Petals purplish-red, narrow-lanceolate, ca. 4 × 0.2–0.3 mm; apex linear,

ca. 2 mm, finely papillate or glabrous. Fruit broad-ovoid, ca. 2 × 2 mm, base rounded or slightly cordate; ribs filiform; vittae 3 in each furrow, 4–6 on commissure. Fl. Aug, fr. Sep–Oct.

- Forests; 2700–3500 m. SW Sichuan, SE Xizang, NW Yunnan.

20. *Acronema paniculatum* (Franchet) H. Wolff in Engler, Pflanzenr. 90(IV. 228): 323. 1927.

圆锥丝瓣芹 yuan zhui si ban qin

Carum paniculatum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 122. 1894; *Pimpinella paniculata* (Franchet) M. Hiroe.

Plants 30–80 cm. Root tuberous, oblong, 8–12 × ca. 5 mm. Stem purplish at base, ribbed. Basal leaves petiolate, petioles

3.5–6 cm, sheaths short, narrow; blade broad-ovate to broad-triangular, 2–3-pinnate; pinnae petiolules 1.5–3.5 cm, pinnule petiolules 0.5–1 cm; ultimate segments broad-ovate, 1.5–2.2 × 0.7–1.5 cm, margin irregularly coarse-toothed. Leaflets of the upper leaves linear. Umbels 2–3.5 cm across; peduncles 2–8 cm; bracts and bracteoles absent; rays 3–5, 1–2.5 cm., unequal, extending to 5 cm in fruit; umbellules 4–7 mm across, 3–7-flowered; pedicels 2–3.5 mm, unequal. Calyx teeth obsolete. Petals white or margin purplish-red, ovate-lanceolate or narrow-lanceolate, 3–4 × ca. 0.5 mm; apex linear, 1–1.4 mm. Fruit broad-ovoid, ca. 1.8 × 2.1 mm, base cordate; vittae 3 in each furrow. Fl. Aug–Sep, fr. Oct.

- Forests, grasslands; 2000–3800 m. SW Sichuan, NW Yunnan.

50. HARRYSMITHIA H. Wolff, Acta Horti Gothob. 2: 310. 1926.

细裂芹属 xi lie qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs annual, slender, essentially glabrous. Taproot slender. Basal leaves 2–3-pinnately dissected. Cauline leaves reduced upwards, sometimes heteromorphic; ultimate segments thin, elongate. Umbels terminal and lateral; bracts absent, occasionally 1; bracteoles few. Flowers bisexual. Calyx teeth obsolete. Petals white, apex with incurved lobule. Stylopodium low-conic; style ca. 2 × stylopodium, spreading or reflexed. Fruit ovoid-globose, slightly flattened dorsally, surface sparsely verrucose or papillose; mericarps subpentagonal in cross section, commissure constricted; ribs prominent or narrowly winged, wings equal, usually erose, margins irregular denticulate or entire, furrows rather broad; vittae 1 in each furrow, 2 on commissure. Seed face sub-plane. Carpophore bifid at apex.

- Two species.

- 1a. Ultimate segments of basal leaves broad, lanceolate or ovate, 5–10 × 2–3 mm; fruit ribs narrowly winged, wings irregularly toothed 1. *H. heterophylla*
 1b. Ultimate segments of basal leaves narrow, linear, 1–2.5 × 0.3–0.6 mm; fruit ribs prominent, carinate, entire 2. *H. franchetii*

1. *Harrysmithia heterophylla* H. Wolff, Acta Horti Gothob. 2: 311. 1926.

细裂芹 xi lie qin

Plants 50–100 cm. Stem weakly-erect, branched above, branches 4-angled, remote, flexuose. Basal leaves petiolate; blade broadly ovate-triangular, ternate-3-pinnately dissected; ultimate segments lanceolate or ovate, 5–10 × 2–3 mm, margins with bristles, apex 2–3-lobed. Upper leaves smaller, heteromorphic; ultimate segments linear, elongate, 20–30 × 1–2 mm, usually entire. Umbels 1.5–3.5 cm across; peduncles 1–4 cm; bracts absent; rays 4–7, 6–10 mm, subequal, 4-angled, very slender, divergent; bracteoles few, minute, ca. 1.5 mm; umbellules 4–8 mm across, 3–8-flowered; pedicels 2–3 mm. Fruit ovoid-globose, ca. 2 × 1.3 mm; ribs narrowly winged, wings irregular, coarsely toothed. Fl. and fr. Jul–Sep.

- Alpine meadows; ca. 3300 m. N Sichuan (Barkam), SE Xizang.

2. *Harrysmithia franchetii* (M. Hiroe) M. L. Sheh, Acta Phytotax. Sin. 42: 562. 2004.

云南细裂芹 yun nan xi lie qin

Carum franchetii M. Hiroe, Umbell. World, 871. 1979, based on *C. dissectum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 123. 1894, not Baillon (1879); *Harrysmithia dissecta* H. Wolff ex R. H. Shan.

Plants (30–)50–100 cm. Stem, erect, hollow, much-branched above. Basal leaves petiolate, petiole 6–10 cm; blade broadly triangular, 3–4-pinnately dissected; ultimate segments linear-oblong, 1–2.5 × 0.3–0.6 mm. Upper leaves reduced, similar to basal. Synflorescence much branched; umbels 3–5 cm across; peduncles 3–8 cm; bracts usually 1, narrowly linear, ca. 4 mm; rays 5–7, 1–2.5 cm, subequal; bracteoles 4–6, linear or subulate, 0.6–2.2 mm, unequal; umbellules 6–12 mm across, 6–12(–16)-flowered; pedicels 1–5 mm, unequal. Petals white, ovate to oblong, apex with narrow inflexed lobule. Fruit subglobose, ca. 1.7–2 × 1.3–1.7 mm, base cordate; ribs prominent, carinate, equal. Fl. and fr. Jul–Sep.

- Mixed mountain forests, in shade; ca. 2500 m. N Yunnan.

51. AEGOPODIUM Linnaeus, Sp. Pl. 1: 265. 1753.

羊角芹属 yang jiao qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial, essentially glabrous. Stem erect, branching above or simple. Basal and lower leaves petiolate, sheaths broad, membranous; blade broadly triangular to triangular in outline, ternate or ternate-2–3-pinnate; ultimate segments ovate or ovate-lan-

ceolate, serrate, dentate-divided or lobed. Upper leaves reduced, usually ternate-pinnate. Umbels compound, terminal and lateral; peduncles longer than the leaves; bracts and bracteoles usually absent; rays ascending-spreading. Calyx teeth obsolete. Petals white or pinkish, obovate, apex with narrow inflexed lobule. Stylopodium conic; styles long, reflexed. Fruit oblong, oblong-ovoid or ovoid, slightly flattened laterally, glabrous; mericarp subrounded in cross section; ribs filiform, prominent to obscure; vittae inconspicuous. Seed face plane. Carpophore bifid at apex.

About seven species: Asia, Europe; five species (two endemic) in China.

Aegopodium anthriscoides (H. de Boissieu) H. de Boissieu (Bull. Soc. Bot. France 56: 350. 1909; *Carum anthriscoides* H. de Boissieu, Bull. Soc. Bot. France 53: 426. 1906) was described from Chongqing ("Tchen-Kéou" [Chengkou], *P. G. Farges s.n.*, holotype, P). However, it is not treated in this account as it is imperfectly known.

- 1a. Lower leaves ca. 23 cm, ternate-3-4-pinnate 5. *A. handelii*
 1b. Lower leaves 3-15 cm, ternate-2-pinnate, rarely 3-pinnate.
 2a. Petals with several purple-red nerves 2. *A. latifolium*
 2b. Petals with single nerve.
 3a. Ultimate leaf segments broad-ovate, doubly serrate 3. *A. tadshikorum*
 3b. Ultimate leaf segments lanceolate or ovate-lanceolate, irregularly serrate.
 4a. Ultimate leaf segments lanceolate, apex long-acuminate to caudate 4. *A. henryi*
 4b. Ultimate leaf segments ovate or ovate-lanceolate, apex acute to acuminate 1. *A. alpestre*

1. *Aegopodium alpestre* Ledebour, Fl. Altaic. 1: 354. 1829.

东北羊角芹 dong bei yang jiao qin

Aegopodium alpestre var. *daucifolium* Gorovoj; *A. alpestre* f. *scabrum* Kitagawa; *A. alpestre* f. *tenerum* Hara; *A. alpestre* f. *tenuisectum* Kitagawa; *Carum alpestre* (Ledebour) Koso-Poljansky.

Plants (20-)30-100 cm. Roots fibrous from an elongate, slender rootstock. Stem hollow. Basal petioles 5-13 cm; blade broad-triangular in outline, 3-9 × 3.5-12 cm, ternate-2-pinnate; ultimate segments long-ovate or ovate-lanceolate, 1.5-3.5 × 0.7-2 cm, sessile, base cuneate, irregularly sharp-serrate, apex acute to acuminate. Umbels 3-8 cm across; peduncles 7-15 cm; rays 9-17, 2-4.5 cm; umbellules 10-15 mm across, many-flowered; pedicels 3-10 mm, unequal. Petals white. Styles 2-3 × stylopodium. Fruit oblong or oblong-ovoid, 3-3.5 × 1.8-2.5 mm. Fl. and fr. Jun-Aug.

Mixed forests or grassy places on mountain slopes; 900-2200 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang [Japan, Korea, Mongolia, SE Russia].

Plants from E Kazakhstan, C Asia to Pakistan, and NW India are sometimes included within *Aegopodium alpestre*, but we agree with those authors who recognize these western plants as a separate species, *A. kashmiricum* (R. R. Stewart ex Dunn) Pimenov.

2. *Aegopodium latifolium* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 719. 1844.

宽叶羊角芹 kuan ye yang jiao qin

Plants 40-90 cm. Stem few-branched above. Basal petioles 5-20 cm; blade broad-triangular or rounded, 8-10 cm, width equaling or longer than the length, ternate-2-pinnate; pinnae 3-5; ultimate segments broad-ovate or obovate-oblong, 4-8 × 3-7 cm, base cuneate, glabrous on both surfaces, coarsely mucronate-dentate. Cauline leaves few, ternate-2-pinnate or 3-lobed. Terminal umbels ca. 6 cm across, lateral umbels smaller; rays 11-15, 2-3.5 cm, apical parts roughened; umbellules ca.

15 mm across. Petals white, purple-red nerves several. Styles ca. 2 × stylopodium. Fruit oblong, 3-3.5 × 2-2.5 mm. Fl. May.

Lower mountain slopes, grassy places; ca. 1000 m. Xinjiang [Russia (E Siberia)].

This is a rather poorly known species in China and was previously thought to be endemic to the Lake Baikal region of E Siberia.

3. *Aegopodium tadshikorum* Schischkin in Schischkin & Bobrov, Fl. URSS 16: 600. 1950.

塔什克羊角芹 ta shi ke yang jiao qin

Plants 70-100 cm. Stem shallowly fluted, subglabrous, few-branched above. Basal petioles 10-20 cm; blade broad-triangular, 10-15 cm, ternate-2-pinnate; pinnae petiolulate; petiolules 3-6 cm; ultimate segments subovate, 3-11 × 2-6 cm, undivided or 2-3-lobed, both surfaces slightly roughened, sharply serrate or doubly serrate. Upper leaves smaller, 3-lobed, lobes ovate or ovate-lanceolate, sharply serrate. Terminal umbels 5-9 cm across; rays 13-20, 2-5 cm, somewhat unequal, apical parts roughened; umbellules 10-15 mm across, pedicels 2-9 mm, unequal. Petals white. Styles ca. 2 mm, 4-5 × stylopodium. Fruit subovoid, 4-6 × ca. 3 mm. Fl. and fr. May-Jul.

Forests or grassy places on mountain slopes; ca. 1100 m. W Xinjiang (Xinyuan) [Kyrgyzstan, Tajikistan].

This is a rather poorly known species in China.

4. *Aegopodium henryi* Diels, Bot. Jahrb. Syst. 29: 497. 1901.

巴东羊角芹 ba dong yang jiao qin

Plants 45-100 cm. Stem terete, striped, subglabrous. Basal leaves long-petiolate, petioles 5-8 cm; blade broad-triangular, ca. 14 cm, ternate-2-3-pinnate; ultimate segments lanceolate, 1.5-4 × 0.8-1.5 cm, base subtruncate to cuneate, irregularly serrate, apex long-acuminate or caudate. Upper leaves smaller, pinnae, petioles wholly sheathing. Umbels 3.5-4 cm across; peduncles 6-20 cm; rays 8-18, 2.5-4.5 cm, roughened; umbellules ca. 1 cm across, many-flowered; pedicels ca. 4 mm, unequal. Petals white, obovate. Styles ca. 1 mm. Fruit oblong-ovoid or long-ovoid, 3-3.5 × 1.5-2 mm. Fl. and fr. Jun-Aug.

• Lower mountain slopes; 500-1700 m. Gansu, W Hubei (Ba-

dong), Shaanxi, Sichuan.

This species is treated as endemic to China as literature reports from NE India and Myanmar are here considered dubious.

5. *Aegopodium handelii* H. Wolff in Handel-Mazzetti, *Symb. Sin.* 7: 717. 1933.

湘桂羊角芹 xiang gui yang jiao qin

Plants 50–100 cm. Stem stout, terete, shallowly fluted, hollow, branches spreading. Lower leaves petiolate, petioles 4–7

cm; blade broad-triangular, ca. 23 cm, ternate-3–4-pinnate; ultimate segments ovate or broad-ovate, 1.5–2.5 × 1–1.5 cm, base cuneate, margins and nerves roughened on both surfaces. Upper leaves reduced, ternate-pinnate. Umbels 3–5 cm across; peduncles 8–15 cm, apex roughened; rays 9–11, 3–4(–6) cm, slightly roughened; umbellules 0.8–1.4 cm across, many-flowered; pedicels 3–10 mm, unequal. Petals white. Styles 1–2 × stylopodium. Fruit oblong-ovoid to long-ovoid, ca. 3.5 × 2 mm. Fl. and fr. Jul–Aug.

• Forests, among shrubs on valley sides; 800–1200 m. NE Guangxi (Longsheng), Guizhou, SW Hunan (Wugang), Zhejiang.

52. SESELOPSIS Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 13: 159. 1950.

西归芹属 xi gui qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs, biennial, glabrous. Roots fusiform, woody. Stem solitary, erect, sparsely branched. Basal leaves petiolate, petioles sheathing; blade ternate-2-pinnate; ultimate segments linear-lanceolate. Umbels compound, terminal; bracts absent; rays unequal; bracteoles several, linear or lanceolate, entire. Calyx teeth obsolete. Petals white or purplish, obcordate, base cuneate, apex notched, with narrow inward curved lobule, outer petals of umbellules slightly larger (radiant). Stylopodium low-conic; styles ca. equal to stylopodium, reflexed. Fruit ovoid, slightly dorsally compressed, glabrous; dorsal and intermediate ribs narrowly winged, lateral wings often broader; vittae solitary in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base.

Two species: C Asia; one species in China.

1. *Seselopsis tianschanica* Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 13: 159. 1950.

西归芹 xi gui qin

Plants 40–100 cm, glaucescent throughout. Stem purplish below, striate. Lower leaves petiolate, sheaths oblong-lanceolate; primary pinnae 3–4 pairs; ultimate segments linear-lanceolate, 20–90 × 1–5 mm. Upper leaves reduced, 1-pinnate, 3-lobed

or entire, sessile on expanded sheaths. Primary umbels 5–9 cm across, lateral umbels smaller; rays 4–20, 2–7 cm, unequal; bracteoles 4–9, lanceolate, ca. 3 mm, usually equal to or longer than flowers, margins membranous; umbellules many-flowered, 10–12 mm across. Fruit 3–4 × ca. 2 mm. Fl. Jul, fr. Aug.

Among shrubs, grassy slopes; 1500–2500 m. W Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

This species has reputed medicinal value.

53. HYALOLAENA Bunge, Beitr. Fl. Russl. 128. 1852.

斑膜芹属 ban mo qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Hymenolyma Korovin.

Herbs, perennial. Root turnip-shaped or fusiform, woody. Stem single, rarely 2, erect, profusely branched, base clothed with fibrous remnant sheaths. Basal leaves petiolate; blade oblong-ovate, 1–3-pinnate. Upper leaves reduced, 1-pinnate or 3-lobed, sessile on expanded sheaths. Umbels compound, terminal and lateral; bracts 5, margins broad membranous; rays unequal; bracteoles 5, similar to bracts. Calyx teeth obsolete. Petals white, obovate, base cuneate, apex notched with small incurved lobule. Stylopodium conic; styles ca. equal to stylopodium, divergent or reflexed. Fruit oblong-ovoid, somewhat dorsally compressed, commissure broad; ribs filiform or scabridulous; vittae solitary or 3–4 in each furrow, 2 or 6–10 on commissure. Seed face plane or slightly convex. Carpophore 2-cleft to base.

Six to ten species: C and SW Asia; two species in China.

- 1a. Bracteoles oblong, nerves 3, dark; vittae solitary in each furrow, 2 on commissure 1. *H. trichophylla*
1b. Bracteoles obovate, nerves 5–8 violet; vittae 3–4 in each furrow, 6–10 on commissure 2. *H. bupleuroides*

1. *Hyalolaena trichophylla* (Schrenk) Pimenov & Kljuykov, Bot. Zhurn. 67: 887. 1982.

斑膜芹 ban mo qin

Carum trichophyllum Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 61. 1841; *Bunium trichophyllum* (Schrenk)

H. Wolff; *Hymenolyma trichophyllum* (Schrenk) Korovin.

Plants 30–70 cm, glabrous or subglabrous. Rootstock fusiform. Basal petioles 2.5–4 cm; blade 2–3-pinnate; primary pinnae 5–8 pairs; ultimate segments filiform, 3–5 × 0.2–0.3 mm. Umbels 2–5 cm across; bracts oblong, ca. 10 mm; rays 8–15, 1–

4 cm, unequal; bracteoles oblong, whitish membranous, shorter than pedicels, 3-nerved; umbellules 8–15-flowered. Fruit 1–3 × 1–1.5 mm; ribs scabridulous; vittae solitary in each furrow, 2 on commissure. Fl. and fr. Jun–Jul.

Arid semi-deserts, stony slopes. W Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan].

2. *Hyalolaena bupleuroides* (Schrenk ex Fischer & C. A. Meyer) Pimenov & Kljuykov, Bot. Zhurn. 67: 887. 1982.

柴胡状斑膜芹 *chai hu zhuang ban mo qin*

Carum bupleuroides Schrenk ex Fischer & C. A. Meyer, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 3: 305.

1845; *Hymenolyma bupleuroides* (Schrenk ex Fischer & C. A. Meyer) Korovin.

Plants 40–70 cm. Root thickened, turnip-shaped. Basal petioles 5–10 cm; blade 2-pinnate; primary pinnae 5–7 pairs; ultimate segments linear-lanceolate or filiform, 2–5 × 0.2–0.5 mm. Umbels 2–5 cm across; bracts 5, oblong, 6–12 mm, margin broad membranous; rays 10–15, 1–3 cm, unequal; bracteoles obovate, 3–5 × 1.5–2 mm, conspicuous, nearly as long as flowers, pale membranous, nerves 5–8, violet; umbellules 10–15-flowered; pedicels 1.5–5 mm. Fruit ca. 3 × 1–1.5 mm; ribs filiform, prominent; vittae 3–4 in each furrow, 6–10 on commissure. Fl. and fr. May–Jun.

Arid semi-deserts, steppes, field margins. W Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

54. **NOTHOSMYRNIUM** Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 58. 1867.

白苞芹属 *bai bao qin shu*

Pu Fading (溥发鼎 *Pu Fa-ting*); Mark F. Watson

Macrochlaena Handel-Mazzetti.

Herbs, perennial. Taproot stout. Basal leaves petiolate, petioles sheathing; blade 1–3-pinnate or ternate-1–2-pinnate. Cauline leaves gradually reduced upwards, 1-pinnate or 3-lobed, smaller, sessile on expanded sheaths. Inflorescence branching; umbels compound, terminal and lateral; bracts and bracteoles present, entire, membranous; rays unequal; umbellules many-flowered; pedicels unequal. Calyx teeth obsolete. Petals white, oblong, broadly ovate or subcordate, base cuneate, apex scarcely incurved, outer petals slightly larger (radiant). Stylopodium conic; styles reflexed. Fruit ovoid, slightly dorsally compressed, constricted at the commissure; dorsal and intermediate ribs filiform, lateral ribs obscure, surface glabrous or pilose; vittae 1–2 or 3–6 in each furrow, 2 or 4–8 on commissure. Seed face plane or slightly concave. Carpophore 2-cleft to the base.

• Two species: China; one species cultivated and adventive in Japan.

1a. Petals glabrous; fruit glabrous, 2.5–3 × 1.5–2 mm; vittae 3–6 in each furrow 1. *N. japonicum*
1b. Petals ciliate or glabrous; fruit pilose, ca. 2 × 1 mm; vittae 1–2 in each furrow 2. *N. xizangense*

1. *Nothosmyrnum japonicum* Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 58: 1867.

白苞芹 *bai bao qin*

Plants 50–100 cm. Taproot stout, bearing branched, fascicled-fibrous roots. Basal leaves petiolate; blade triangular-ovate or oblong-ovate, 10–20 × 8–15 cm, 1–2-pinnate or ternate-1–2-pinnate; primary pinnae 6 pairs; ultimate segments oblong-ovate, ovate or broadly ovate, 2–8 × 2–4 cm, abaxially pubescent, base cuneate, margins serrate or incised, apex acuminate. Umbels 6–12 cm across; peduncles 5–17 cm; bracts 3–4, conspicuous, yellowish, lanceolate or ovate-lanceolate, 15–35 × 4–7 mm, often reflexed, apex cuspidate; rays 7–15, 2–5 cm, unequal, spreading-ascending; bracteoles 2–5, conspicuous, yellowish, ovate or broadly ovate, 7–10 × 3–5 mm, equal to or slightly longer than flowers, enclosing umbellules in flower, then reflexed, apex cuspidate; pedicels 5–10 mm, unequal. Petals glabrous. Fruit 2.5–3 × 1.5–2 mm, glabrous; vittae 3–6 in each furrow, 4–8 on commissure. Fl. and fr. Aug–Oct.

• Montane forests, forest margins, grasslands; 500–2900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [cultivated and adventive in Japan].

1a. Ultimate leaf segments oblong-ovate,

ovate or broadly ovate, margins serrate or incised 1a. var. *japonicum*

1b. Ultimate leaf segments lanceolate or ovate-lanceolate, margins irregularly laciniate 1b. var. *sutchuenense*

1a. *Nothosmyrnum japonicum* var. *japonicum*

白苞芹(原变种) *bai bao qin* (*yuan bian zhong*)

Macrochlaena glaucocarpa Handel-Mazzetti.

Plants 50–120 cm. Ultimate leaf segments oblong-ovate, ovate or broadly ovate, margins serrate or incised.

• Forest margins, moist grasslands; 500–2900 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Zhejiang [cultivated and adventive in Japan].

The taproot is used medically as a sedative and to relieve pain.

1b. *Nothosmyrnum japonicum* var. *sutchuenense* H. de Boissieu, Bull. Soc. Bot. France 16. 1909.

川白苞芹 *chuan bai bao qin*

Plants 80–150 cm, stout. Ultimate leaf segments lanceolate or ovate-lanceolate, margins irregularly laciniate.

• Montane forests, grasslands; 900–2500 m. Gansu, Guangdong, Guangxi, Guizhou, Hubei, Jiangxi, Shaanxi, Sichuan, Yunnan.

This variety has reputed medicinal value (in Sichuan).

2. *Nothosmyrnum xizangense* R. H. Shan & T. S. Wang, *Acta Phytotax. Sin.* 18: 375. 1980.

西藏白苞芹 xi zang bai bao qin

Plants 30–60 cm, slender. Taproot 6–7 × 2–3 cm. Basal leaves petiolate, petioles 5–6 cm; blade oblong, 8–15 × 2–2.5 cm, 2–3-pinnate; primary pinnae 5–7 pairs; ultimate segments ovate-lanceolate or lanceolate, 1.5–2 × ca. 1 cm, margins irregularly lacinate. Umbels 3–5 cm across; peduncles 8–10 cm; bracts 5, oblong, 0.8–1 × ca. 0.3 cm, ciliate, apex cuspidate, usually reflexed; rays (8–)12–16, 1–3 cm, unequal; bracteoles 5, ovate, ca. 2.5 × 1 mm, ciliate or glabrous; pedicels 2.5–4 mm, pubescent. Petals ciliate. Fruit ca. 2 × 1 mm, pilose; vittae solitary or 2 in each furrow, 2 or 4 on commissure. Seed face plane. Fl. Aug–Sep, fr. Sep–Oct.

• Coniferous forests, grassland at forest margins, streamsides, riparian weed communities; 3100–3400 m. SW Sichuan, SE Xizang.

1a. Basal leaves 2–3-pinnate; petals ciliate; vittae solitary in each furrow, 2 on commissure 2a. var. *xizangense*

1b. Basal leaves 1–2-pinnate; petals glabrous; vittae 2 in each furrow, 4 on commissure 2b. var. *simpliciorum*

2a. *Nothosmyrnum xizangense* var. *xizangense*

西藏白苞芹(原变种) xi zang bai bao qin (yuan bian zhong)

Basal leaves 2–3-pinnate. Petals broadly ovate or subcordate, ciliate, apex slightly reflexed or not. Vittae solitary in each furrow, 2 on commissure.

• Coniferous forests, streamsides; 3100–3200 m. SW Sichuan (Daocheng), SE Xizang (Mainling, Nangxian).

This variety has reputed medicinal value.

2b. *Nothosmyrnum xizangense* var. *simpliciorum* R. H. Shan & T. S. Wang, *Acta Phytotax. Sin.* 18: 376. 1980.

少裂西藏白苞芹 shao lie xi zang bai bao qin

Basal leaves 1–2-pinnate. Petals broadly ovate, glabrous, apex acute. Vittae 2 in each furrow, 4 on commissure.

• Grassland at forest margins, riparian weed communities; 3100–3400 m. SE Xizang (Mainling).

55. *CARLESIA* Dunn, Hooker's Icon. Pl. 28: t. 2739. 1902.

山茴香属 shan hui xiang shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial. Taproot stout, long-conic, usually digitate-branched. Stem erect, glabrous, branching, base densely clothed with fibrous remnant sheaths. Basal leaves numerous, petiolate; blade long-ovate to oblong, 3-pinnatisect; pinnae shortly petiolulate; ultimate segments linear, entire, margins narrowly reflexed, apex acute, both surfaces glabrous. Cauline leaves 2–3-pinnatisect. Umbels compound, terminal and lateral; bracts several, linear; rays numerous, spreading; bracteoles several, subulate to linear; pedicels short. Flowers white. Calyx teeth conspicuous, ovate-triangular. Petals obovate, apex narrowly inflexed, mid-rib conspicuous. Stylopodium conic; styles 2–3 × stylopodium, ca. equal to fruit. Fruit long-obovoid or ellipsoid-ovoid, slightly dorsally compressed, rough-puberulent; ribs obtuse; vittae 3 in each furrow, 4 on commissure. Seed face plane. Carpophore bifid at apex.

One species: China, Korea.

1. *Carlesia sinensis* Dunn, Hooker's Icon. Pl. 28: t. 2739. 1902.

山茴香 shan hui xiang

Cuminum sinense (Dunn) M. Hiroe

Plants 10–30 cm. Taproot 8–15 mm thick. Basal petioles 2.5–8.5 cm; blade 2.5–7 × 1–3.5 cm; ultimate segments linear, 4–10 × ca. 1 mm. Upper leaves reduced, 3-parted. Umbels 1.8–4 cm across; peduncles 1.5–8 cm; bracts 5–8 × ca. 1 mm; rays

7–12(–20), 1–3 cm; bracteoles 2–5 mm; umbellules many-flowered; pedicels 2–3 mm. Calyx teeth 0.6–1 × 0.2–0.5 mm, abaxially pubescent. Fruit ca. 1.3 × 0.8 mm. Fl. and fr. Jul–Sep.

Dry mountain slopes, rock crevices; 300–1000 m. S Liaoning (Zhuanghe), NE Shandong (Muping, Weihai, Yantai) [Korea].

Specimens of this species from Korea are very similar but setulose hairy throughout. Further research is needed to establish the correct taxonomic position of the Korean plants.

56. *CYCLOSPERMUM* Lagasca y Segura, Amen. Nat. Españ. 1(2): 101. 1821

[“*Ciclospermum*”], nom. et orth. cons.

细叶旱芹属 xi ye han qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, annual, glabrous. Stem slender, much-branched, spreading to erect. Leaves petiolate, sheaths membranous; blade 3–4-pinnatisect; ultimate segments narrow, slender. Cauline leaves reduced upwards, petioles becoming wholly sheathing. Synflorescence of lax terminal or leaf-opposed, compound (rarely simple) umbels; peduncles short or abortive; bracts and bracteoles absent; rays few, slender, spreading-ascending; umbellules rather few-flowered. Calyx teeth obsolete. Petals white, greenish or pinkish, ovate, acute, apex not narrow and inflexed, mid-rib conspicuous. Stylopodium low-conic; styles short to almost obsolete. Fruit ovoid to globose, rounded at both ends or slightly narrow toward apex, slightly compressed laterally, somewhat constricted at commissure, glabrous; ribs rounded-obtuse, prominent, somewhat corky; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore

bifid at apex.

About three species: tropical and temperate America; one species a widely naturalized weed in tropical and temperate regions, including China.

1. Cyclospermum leptophyllum (Persoon) Sprague ex Britton & P. Wilson, Bot. Porto Rico 6: 52. 1925.

细叶旱芹 xi ye han qin

Pimpinella leptophylla Persoon, Syn. Pl. 1: 324. 1805; *Aethusa leptophylla* (Persoon) Sprengel; *Apium leptophyllum* (Persoon) F. V. Mueller ex Benth; *Selinum leptophyllum* (Persoon) E. H. L. Krause ex Sturm.

Plants 25–45 cm. Basal petioles 2–5(–11) cm; blade ob-

long to oblong-ovate, 2–10 × 2–8 cm; ultimate segments linear to filiform. Cauline leaves ternate-pinnately decompose; ultimate segments 10–15 mm. Umbels 1.5–2.5 cm across; rays 2–3(–5), 1–2 cm; umbellules 5–23-flowered; pedicels 0.2–4 mm, unequal, the central flower often almost sessile. Fruit globose 1.5–2 × 1–2 mm. Fl. May–Jun, fr. Jun–Jul.

Streamsides, wastelands, ruderal areas. Fujian, Guangdong, Jiangsu, Taiwan [native to South America; widely naturalized as a weed in tropical and temperate regions].

57. BERULA W. D. J. Koch in Röhling, Deutschl. Fl., ed. 3, 2: 25, 433. 1826.

天山泽芹属 tian shan ze qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Siella Pimenov.

Herbs perennial, aquatic or semi-aquatic, glabrous throughout. Rhizomatous, root fibrous. Stem suberect, usually stoloniferous. Aerial leaves 1-pinnate, submerged leaves more dissected. Umbels compound, usually opposite leaves; bracts and bracteoles several, oblong or lanceolate, margins membranous, usually reflexed. Calyx teeth subulate or triangular, caducous. Petals white, obovate, base short-attenuate, apex retuse with small inflexed lobule. Stylopodium conic; styles longer than the stylopodium, recurved. Fruit ovoid, subdidymous, slightly compressed laterally, glabrous; exocarp corky and slightly thickened; dorsal and intermediate ribs filiform, lateral ribs obscure; vittae numerous, small, forming a continuous band encircling the seed. Seed face plane. Carpophore 2-cleft to base.

Two species: Africa, C and SW Asia, Australia, Central America (Mexico), Europe, North America; one species in China.

1. Berula erecta (Hudson) Coville, Contr. U.S. Natl. Herb. 4: 115. 1893.

天山泽芹 tian shan ze qin

Sium erectum Hudson, Fl. Angl. 103. 1762; *Berula angustifolia* Mertens & W. D. J. Koch, nom. illeg. superfl.; *Siella erecta* (Hudson) Pimenov; *Sium angustifolium* Linnaeus, nom. illeg. superfl.

Plants 40–50(–100) cm. Stem hollow, branched, rooting at basal nodes. Submerged leaves 3–4-pinnate; ultimate segments linear. Aerial leaves 1-pinnate; pinnae 4–9(–15) pairs, basal pairs remote, sessile, ovate-lanceolate or oblong, 1.5–5(–7) ×

0.8–2.5(–3) cm, base obliquely truncate, usually with 1 lobe at basal edge, margins serrate or irregularly incised. Upper leaves smaller, sheaths expanded. Umbels 4–6 cm across; bracts 3–6, oblong or lanceolate, 6–21 mm, entire or incised; rays 5–15 (–20), 2–3 cm, unequal; bracteoles 5–8, 1.5–5 mm, unequal, usually entire, nearly as long as or longer than the pedicels; umbellules 10–20-flowered; pedicels 2–5 mm, unequal. Calyx teeth 0.4–0.8 mm. Fruit 2–2.2 × 1.5–2 mm. Fl. May–Jun, fr. Jul–Aug.

Streamsides, other riparian habitats on plains or hills; ca. 1500 m. Xinjiang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, W Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced in the Americas and Australia].

58. SIUM Linnaeus, Sp. Pl. 1: 251. 1753.

泽芹属 ze qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs perennial, aquatic or along water margins, glabrous throughout. Roots fascicled, fusiform or fibrous. Stem solitary, striate, branched, rooting at lower nodes. Basal leaves petiolate, sheathing; leaf blade 1-pinnate; pinnae sessile, remote. Umbels compound, terminal and lateral; bracts and bracteoles present, usually recurved; rays spreading-ascending. Calyx teeth conspicuous or minute, often unequal. Petals white, obovate or subround, base cuneate, apex notched with small incurved lobule, outer petals in umbellule sometimes enlarged (radiant). Stylopodium short-conic; styles divergent or reflexed. Fruit ovoid or ellipsoid, slightly compressed laterally, glabrous; ribs prominent, corky-thickened or obscure; vittae 1–3 in each furrow, 2–6 on commissure. Seed face plane. Carpophore 2-cleft to base.

About ten species: Africa, Asia, Europe, North America; five species (one endemic) in China.

- 1a. Calyx teeth lanceolate or minute (E, N, and NE China) 1. *S. suave*
 1b. Calyx teeth minute or inconspicuous (SC and W China).
 2a. Plants slender, 5–15 cm; rays 2–3 5. *S. frigidum*
 2b. Plants stout, 30–90(–150) cm; rays (8–)10–20(–30).

- 3a. Basal leaf pinnae 2–4 pairs; rays 10–15 4. *S. sisaroidesum*
 3b. Basal leaf pinnae 2–6 pairs; rays 8–30.
 4a. Plants 30–60(–80) cm; leaflets 0.5–1 cm broad 2. *S. medium*
 4b. Plants 70–150 cm; leaflets, 0.8–2 cm broad 3. *S. latifolium*

1. *Sium suave* Walter, Fl. Carol. 115. 1788.

泽芹 ze qin

Apium cicutifolium (Schrenk) Benth & Hooker ex Forbes & Hemsley; *Cicuta dahurica* Fischer ex Schultz; *Sium cicutifolium* Schrenk; *S. formosanum* Hayata; *S. nipponicum* Maximowicz.

Plants 60–120 cm, stout. Root fibrous or fascicled, fusiform. Leaf blade oblong or ovate, 6–25 × 7–10 cm; pinnae 3–9 pairs; leaflets lanceolate or linear, 10–40 × 3–15 mm, margin serrate. Upper leaves smaller, 3-lobed or entire, sessile on expanded sheaths. Umbels 4–8 cm across, terminal on stem and branches; bracts 6–10, lanceolate or linear-lanceolate, 3–15 mm, entire or incised; rays (8–)10–20, 1.5–3 cm, unequal; bracteoles 5–10, linear-lanceolate, 1–3 mm, entire; umbellules 10–20-flowered; pedicels 3–5 mm. Calyx teeth triangular-lanceolate or minute triangular, 0.5–2 mm. Fruit ovoid, ca. 3 × 2 mm, ribs prominent, corky, thickened, narrowly winged; vittae 1–3 in each furrow, 2–6 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

Damp grasslands, marshlands, streamsides. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shandong, Taiwan [Japan, Korea, Russia; North America].

This species has reputed medicinal value. *Sium ninsi* Thunberg (Fl. Jap. 118. 1784), known from Korea, Japan, and SE Russia, is likely to occur also in SE Heilongjiang and E Jilin. The upper part of the plant is morphologically similar to *S. suave* but can be distinguished by the long-petiolate, ternate uppermost cauline leaves (vs. sessile in *S. suave*).

2. *Sium medium* Fischer & C. A. Meyer in Fischer & Avé-Lallemant, Index Sem. Hort. Petrop. 9: 19. 1843.

中亚泽芹 zhong ya ze qin

Plants 30–60(–80) cm. Roots fibrous. Basal petioles 6–15 cm; blade oblong-ovate, 12–20 × 5–13 cm; pinnae 3–5 pairs; leaflets oblong-lanceolate, 2.5–6 × 0.5–1 cm, margins serrate. Upper leaves similar to basal, smaller, sessile, pinnae 2 pairs on expanded sheaths. Umbels 3.5–5 cm across; peduncles 7–10 cm; bracts 8–9, linear or lanceolate, 5–13 mm, entire; rays 15–23, 0.8–1.9 mm, unequal; bracteoles 9–10, linear, 3–4.5 mm, shorter than pedicels, entire; umbellules 8–20-flowered; pedicels 2–5 mm. Calyx teeth minute, triangular, ca. 0.2 mm. Fruit ellipsoid, ca. 3.2 × 2 mm; ribs filiform, thinly corky; vittae 1–2 in each furrow, 2–6 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

Marshlands, lake margins, streamsides. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

3. *Sium latifolium* Linnaeus, Sp. Pl. 1: 251. 1753.

欧泽芹 ou ze qin

Plants 70–150 cm. Roots fibrous. Submerged leaves 2–3-pinnate; ultimate segments linear. Aerial leaves 1-pinnate; pinnae 2–6 pairs, leaflets lanceolate or oblong, 4–7(–16) × 0.8–2 cm, margins serrate. Upper leaves reduced, smaller; leaflets li-

near-lanceolate or linear. Umbels 6–12 cm across; peduncles elongate; bracts 2–6, linear-lanceolate, 3–5 mm, entire; rays 8–10(–30), 1.5–2.5 cm, unequal; bracteoles several, similar to bracts, 5–6 mm; umbellules 15–25-flowered; pedicels 2–3 mm. Calyx teeth minute, ca. 2 mm. Styles ca. equal to stylopodium, reflexed. Fruit ellipsoid, ca. 3 × 2 mm; ribs filiform, thin-corky; vittae 3 in each furrow, 2–5 on commissure. Fl. Jul–Aug, fr. Sep–Oct. $2n = 20$.

Marshlands, stream banks; 400–500 m. Xinjiang [Kazakhstan, Russia; C Asia, Europe; introduced in Australia].

4. *Sium sisaroidesum* de Candolle, Prodr. 4: 124. 1830.

拟泽芹 ni ze qin

Sisarum sisaroidesum (de Candolle) Schischkin ex Krylov.

Plant 50–100 cm. Root fibrous. Stems erect with creeping underground shoots. Leaves 1-pinnate; leaflets 2–4 pairs, ovate-lanceolate, 2–7 × 1–3 cm, margins serrate-dentate. Upper leaves smaller, leaflets lanceolate. Umbels 3–5 cm across; peduncles elongate; bracts 5–7, lanceolate-linear, 0.5–2 cm, margins white scarious; rays 10–15, 1.5–2.5 cm; bracteoles similar to bracts; umbellules ca. 20-flowered; pedicels 2–5 mm. Calyx teeth triangular, minute, ca. 0.2 mm. Fruit ovoid, ca. 4 × 2.5 mm. Fl. and fr. Jul–Aug.

Forests, meadows, marshes, river banks, stream banks; 100–1300 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; C and SW Asia].

5. *Sium frigidum* Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

滇西泽芹 dian xi ze qin

Chamaesium frigidum (Handel-Mazzetti) R. H. Shan ex F. T. Pu.

Plants 5–15 cm, slender. Roots fusiform or tubers, root-stock 1–3 cm. Stem sometimes rooting at lower nodes. Leaf blade oblong or lanceolate, 1–4 × 0.5–1 cm, 1-pinnate; pinnae 3–5 pairs, remote, ovate-lanceolate, 2–8 × ca. 4 mm, entire or 1–3-crenellate. Upper leaves much reduced, pinnae 2–3 pairs, linear or reduced to bladeless sheaths. Umbels 1–2 cm across, terminal or lateral; peduncles 2–7 cm; bracts 1, linear-lanceolate, ca. 3 mm, or absent; rays 2–3, 5–10 mm, unequal; bracteoles 1–2, similar to bract, 0.5–1.5 mm, shorter than pedicels, or absent; umbellules 3–5(–9)-flowered; pedicels 2–4 mm. Calyx teeth minute, triangular, ca. 0.15 mm, caducous. Stylopodium flattened; styles reflexed. Fruit ovoid, ca. 2.1 × 2.3 mm; ribs filiform, corky, obscure; vittae 2–3 in each furrow, 4 on commissure. Fl. Jul–Aug; Aug–Sep.

• Forests, damp alpine meadows, marshy areas; ca. 3500 m. NW Yunnan (Zhongdian).

This rather little-known taxon is recorded only from a few collections. It was recently suggested that it is conspecific with *Apium ventricosum* H. de Boissieu (Bull. Soc. France, 53: 425. 1906), but the

generic placement of these taxa is still unclear.

59. LIBANOTIS Haller ex Zinn, Cat. Pl. Hort. Gott. 226. 1757, nom. cons., not Hill (1756).

岩风属 *yan feng shu*

She Menglan (余孟兰 *Sheh Meng-lan*); Michael G. Pimenov, Eugene V. Kljuykov, Mark F. Watson

Herbs rarely subshrubs, perennial, stout, sometimes small, rarely acaulescent. Taproot conic, unbranched, caudex simple, rarely branched, woody. Stem often strongly angled and fluted, base densely clothed with fibrous leaf remains. Basal leaves 1–4-pinnate or 1–4-pinnatisect; ultimate segments linear, ovate or lanceolate, entire or lobed. Umbels compound, terminal and lateral; bracts few to numerous or absent; rays numerous to few; bracteoles several, linear or lanceolate. Calyx teeth conspicuous, linear, triangular or elliptic. Petals white, rarely pinkish, ovate or obcordate, apex narrow, inflexed. Stylopodium low-conic, margins often undulate at the base. Fruit ovoid or oblong, slightly to moderately dorsally compressed; dorsal ribs filiform, low or prominent, acute-ridged, lateral ribs sometimes slightly broader; vittae 1–2(–3) in each furrow, 2–4 (rarely 6–8) on commissure. Seed face plane. Carpophore entire or 2-parted.

About 30 species: Asia, Europe; 18 species (eight endemic) in China.

The taxonomic position of *Libanotis* and related genera continues to be controversial. Since its establishment authors have either accepted it as an independent genus or regarded it as a subgenus or a section of *Seseli*. The conspicuous calyx teeth, well-developed bracts and bracteoles, and almost always pubescent fruit seem to distinguish it from *Seseli*, but more material is needed for a taxonomic study to resolve this complex situation. Among the present co-authors, Pimenov and Kljuykov favor a classification where *Eriocyclus* and *Libanotis* are included within an expanded, polymorphic *Seseli*, whereas She and Watson prefer to retain these as separate genera pending further research. As is usual in *Flora of China*, where there are differences of taxonomic opinion, the Chinese view is adopted for the *Flora* and a summary of the alternative classification is provided, in this case at the end of the *Seseli* account.

- 1a. Plants acaulescent, 2–10 cm; leaves in rosette; fruit densely papillose-scaly.
 - 2a. Leaf sheaths broadly ovate; fruit vittae 2–3 in each furrow, 4–6 on commissure 17. *L. acaulis*
 - 2b. Leaf sheaths narrowly lanceolate; fruit vittae solitary in each furrow, 2 on commissure 18. *L. depressa*
- 1b. Plants caulescent, 10–130 cm; leaves not in rosette; fruit glabrous or variously hairy, not papillose-scaly.
 - 3a. Petals abaxially glabrous or sparsely pubescent; caudex short; stem strongly angled and fluted; leaves papery, matt.
 - 4a. Stem hollow; bracteoles longer than umbellules 12. *L. condensata*
 - 4b. Stem rigid, solid; bracteoles shorter than umbellules.
 - 5a. Fruit vittae 3–4 in each furrow, 6–8 on commissure 13. *L. seseloides*
 - 5b. Fruit vittae solitary in each furrow, 2–4 on commissure.
 - 6a. Leaf blade narrowly elliptic, 3-pinnatisect, ultimate segments linear, 1–2 × 0.4–0.6 mm 14. *L. incana*
 - 6b. Leaf blade oblong, 2-pinnatisect, ultimate segments ovate rhombic or linear, 8–15 × 1.2–7 mm.
 - 7a. Stem solitary; rays 35–50 15. *L. sibirica*
 - 7b. Stems usually several; rays 15–25 16. *L. schrenkiana*
 - 3b. Petals abaxially pubescent or villous; caudex stout, elongate and exposed; stem terete; leaves thick or coriaceous, shiny.
 - 8a. Rays 30–50; fruit ribs acute, prominent 1. *L. buchtormensis*
 - 8b. Rays 2–25; fruit ribs obtuse or rounded.
 - 9a. Stem suberect, branches very slender, diffusely spreading; rays 2–4 4. *L. lanzhouensis*
 - 9b. Stem erect, branches stout and ascending-spreading; rays 4–25 (except *L. laticalycina*).
 - 10a. Leaf pinnae long-petiolate.
 - 11a. Ultimate leaf segments narrow-lanceolate or elliptic-lanceolate, entire 6. *L. lancifolia*
 - 11b. Ultimate leaf segments obovate, usually dentate or 2–3-lobed.
 - 12a. Rays 2–4, short, 1.5–4 mm 7. *L. laticalycina*
 - 12b. Rays 5–9, long, 15–30 mm 8. *L. jinanensis*
 - 10b. Leaf pinnae sessile or near so.
 - 13a. Ultimate leaf segments linear, entire 2. *L. iliensis*
 - 13b. Ultimate leaf segments linear-lanceolate or ovate, toothed or shallowly lobed.
 - 14a. Plants 40–90 cm, usually subshrubs.
 - 15a. Plants grayish pubescent throughout 5. *L. spodotrichoma*
 - 15b. Plants white pubescent throughout 3. *L. wannienchun*
 - 14b. Plants 10–40(–60) cm, entirely herbaceous.
 - 16a. Rays 4–8; fruit densely lanate with gray hairs 9. *L. eriocarpa*
 - 16b. Rays 6–15; fruit densely hispid or shortly pubescent, not lanate.
 - 17a. Ultimate leaf segments linear-lanceolate, 1–5 × 0.5–1.5 mm; marginal fruit

ribs slightly larger than dorsal; vittae solitary in each furrow, 2 on commissure

10. *L. abolinii*
 17b. Ultimate leaf segments oblong to linear-lanceolate, 5–40 × 3–7 mm; marginal fruit ribs considerably larger than dorsal; vittae (1–)2–3 in each furrow, (2–)4–6 on commissure 11. *L. grubovii*

1. *Libanotis buchtormensis* (Fischer) de Candolle, Coll. Mém. 5: t. 3, f. 5. 1829.

岩风 yan feng

Bubon buchtormensis Fischer in Sprengel, Pl. Min. Cogn. Pug. 2: 55. 1815; *Libanotis cycloloba* Gilli; *Seseli buchtormense* (Fischer) W. D. J. Koch; *Seseli cyclolobum* (Gilli) Pimenov & Sdobnina; *Seseli giraldii* Diels.

Plants 20–80 cm. Taproot ca. 1.5 cm thick, caudex simple. Stem rigid, branched from base or above, strongly angled, fluted, glabrous. Petioles triangular-flattened in cross section, adaxially shallowly fluted; blade oblong-ovate or lanceolate, 5–12 × 2.5–7 cm, 2-pinnatisect, glabrous; pinnae sessile or very shortly petiolulate; ultimate segments ovate or obovate-cuneate, 5–30 × 3–15 mm, with 3–5 incised mucronate teeth, abaxially papillate only along rachis and veins. Umbels 7–12 cm across, peduncles stout, angled and branching; bracts usually absent, occasionally few, linear, small; rays 30–50, 0.8–4(–7) cm, equal, angled, tomentose; bracteoles 8–15(–20), linear, ca. equal to pedicels, villous; pedicels 2–5 mm. Calyx teeth linear-subulate to lanceolate, ca. 0.7 mm, pubescent. Petals white, abaxially densely pubescent. Fruit ellipsoid, slightly dorsally compressed, 2–4.5 × 1.5–2.5 mm, densely tomentose or squamose-scaly, especially along ridges; all ribs prominent, acute, equally keeled; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Nov.

Grassy places, sunny rocky slopes, river banks, rock crevices; 1000–3000 m. S Gansu (Huixian, Tianshui), Ningxia, SW Shaanxi (Meixian, Taibai), W Sichuan (Kangding), N Xinjiang (Altay, Tekes, Toli) [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia)].

This species has reputed medicinal value (in Shaanxi).

2. *Libanotis iliensis* (Lipsky) Korovin in Pavlov, Fl. Kazakhst. 6: 345. 1963.

伊犁岩风 yi li yan feng

Seseli iliense Lipsky in B. Fedtschenko, Pl. Turkest. 616. 1915; *S. altissimum* Popov; *S. fedtschenkoanum* Regel & Schmalhausen var. *iliense* Regel & Schmalhausen; *S. vaillantii* H. de Boissieu.

Plants 100–200 cm. Taproot to 2 cm thick, caudex simple. Stem branched from base, solid, grooved, densely minutely pubescent, base 1–2 cm thick. Petioles densely pubescent, sheaths scarious-margined; blade triangular-ovate, 40–50 × 6–10 cm, 2–3-pinnatisect; ultimate segments linear, 10–40 × 0.5–1 mm, margins reflexed. Synflorescence paniculate; umbels 2–4 cm across; bracts 5–10, white, ovate-lanceolate, 3–5 × 1–1.2 mm, pubescent; rays 10–15(–20), 1–2 cm, slightly unequal, pubescent; bracteoles 5–10, ovate-lanceolate, 1.5–4(–15) × 0.6–0.7 mm, scarious-margined, abaxially densely pubescent; umbellules 10–20-flowered, subcapitate, flowers almost sessile. Calyx teeth short-triangular or subulate, 0.2–0.5 mm, pubes-

cent. Petals white, abaxially pubescent. Fruit oblong or ellipsoid, slightly dorsally compressed, 2.8–4 × 0.6–0.7 mm, densely pubescent; ribs filiform; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jun–Sep.

Stony mountain slopes, valleys; 1000–2100 m. Xinjiang (Ili, Urumqi) [Kazakhstan, Mongolia].

This species is used in Xinjiang as a regional substitute for the traditional Chinese medicine “fang feng” (*Saposhnikovia divaricata*).

3. *Libanotis wannienchun* K. T. Fu, Fl. Tsinling. 1(3): 458. 1981.

万年春 wan nian chun

Seseli wannienchun (K. T. Fu) Pimenov.

Plants 60–80 cm, pubescent throughout. Caudex simple, stout, exposed. Stem solitary, erect, branched above, solid, finely grooved. Basal leaves numerous; petioles dilated, slightly flattened, 2–7 cm; blade narrowly oblong, 5–15 × 3–6.5 cm, 2-pinnate; leaflets 4–7 pairs, sessile or shortly petiolulate, 3-parted; lateral lobes oblong, 5–15 × 4–10 mm, 1–3 incised-toothed; terminal lobe obovate, base cuneate, 3–5-lobed or dentate, abaxially reticulate and densely pubescent. Synflorescence corymbose; umbels 2.5–4.5 cm across; peduncles stout, densely tomentose; bracts absent; rays 10–14, 0.5–2 cm, slightly unequal, densely villous; bracteoles 10–12, lanceolate, 2.5–3 mm, densely pubescent; umbellules 14–20-flowered; pedicels ca. 2.5 mm. Calyx teeth narrowly triangular or lanceolate-subulate, ca. 1.5 mm. Petals greenish-white, abaxially villous. Stylopodium low-conic; styles short. Young fruit densely pubescent (mature fruit unknown). Fl. Aug.

• Dry grassy slopes; 1200–1400 m. S Gansu (Chengxian, Huixian, Têwo).

This incompletely known taxon is recorded only from a few collections.

4. *Libanotis lanzhouensis* K. T. Fu ex R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 21: 84. 1983.

兰州岩风 lan zhou yan feng

Seseli lanzhouense (K. T. Fu ex R. H. Shan & M. L. Sheh) V. M. Vinogradova.

Plants 30–90 cm, herbaceous, densely pubescent throughout. Caudex simple. Stems several, suberect, branched from base, branches slender, spreading. Basal leaves numerous; blade oblong, 9–25 × 2–8 cm, 2–3-pinnately dissected; pinnae 4–7 pairs, pinnules 3 pairs; ultimate segments gray-green, linear or rhombic, 4–12 × 1.5–2 mm. Synflorescence paniculate; umbels 2–3 cm across; peduncles slender; bracts absent or occasionally 1 (like uppermost leaf); rays 2–4, 4–15 mm, slightly unequal; bracteoles 5–7, linear-lanceolate, 1.5–2 × ca. 1 mm; umbellules 5–10-flowered. Calyx teeth subulate, 0.6–1 mm. Petals white, abaxially puberulous. Stylopodium conic, base margin dilated, undulate. Fruit ellipsoid, flattened laterally, 2.8–3.2

× 1.4–1.5 mm, densely villous; ribs equal, filiform, slightly prominent; vittae 1(–2) in each furrow, 2 on commissure. Fl. and fr. Jul–Oct.

- Mountain slopes. Gansu (Lanzhou), Qinghai.

5. *Libanotis spodotrichoma* K. T. Fu, Acta Phytotax. Sin. 13(2): 58. 1975.

灰毛岩风 hui mao yan feng

Seseli spodotrichoma (K. T. Fu) Pimenov.

Plants (25–)40–80 cm, subshrubs, grayish pubescent throughout. Caudex simple. Stem branched above, solid, terete, woody at base. Basal leaves numerous; blade gray-green, elliptic-oblong, 10–25 × 4–8 cm, 2-pinnately dissected; pinnae 5–7 pairs, shortly petiolulate, pinnules 2–3 pairs, ovate; terminal pinnules obovate-cuneate, lateral pinnules ovate, 2.5–5 × 1.7–2.7 cm, 1–3-toothed or lobed, apex mucronate. Synflorescence paniculate; umbels 2–7 cm across; bracts absent; rays 5–12, 1–3.5 cm, slightly unequal, spreading, pubescent; bracteoles 7–10, lanceolate-linear, ca. 2 mm, entire; umbellules 15–30-flowered; pedicels ca. 3 mm, unequal. Calyx teeth narrowly triangular or lanceolate-subulate, ca. 0.6 mm. Petals white, abaxially villous. Stylopodium low-conic; styles suberect. Fruit obovate-oblong, slightly dorsally compressed, 3–4(–6) × 1–1.5 mm, grayish-villous; ribs slightly prominent, filiform; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Oct.

- Rocky slopes in valleys; 1100–1800 m. SW Shaanxi.

This species has reputed medicinal value.

6. *Libanotis lancifolia* K. T. Fu, Acta Phytotax. Sin. 13(2): 59. 1975.

条叶岩风 tiao ye yan feng

Seseli lancifolium (K. T. Fu) Pimenov.

Plants (25–)40–90 cm, subshrubs. Caudex simple. Stem solitary, dichotomously branched, usually purple-tinged, basal parts woody. Leaf blade triangular-ovate, 15–25 × 8–15 cm, ternate-2-pinnatisect; primary segments petiolulate; ultimate segments elliptic-lanceolate, 2–5 × 2.5–10(–13) mm, glaucous, entire. Cauline leaves reduced upwards, 3-parted, petioles wholly sheathing, linear-lanceolate, abaxially bristly. Synflorescence many-branched, paniculate; umbels 2–4 cm across; bracts absent; rays 4–9, 3–15 mm, slightly unequal, densely tomentose; bracteoles 5–7, linear-lanceolate, shorter than flowers, abaxially densely villous; umbellules 5–10-flowered; pedicels 1–3 mm. Calyx teeth triangular-subulate or triangular, ca. 0.5 mm. Petals white to purplish-tinged, abaxially pubescent. Fruit oblong, slightly compressed dorsally, ca. 3–3.2 × 1–1.1 mm, densely puberulent; ribs filiform; vittae 1(–2) in each furrow, 2 on commissure. Fl. Sep–Oct, fr. Oct–Nov.

- Forests, among shrubs; 400–1100 m. Hebei, Henan, SE Shaanxi (Shanyang, Huayin), Shandong, E Shanxi (Pingding, Wutai).

This species has reputed medicinal value.

7. *Libanotis laticalycina* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 21: 82. 1983.

宽萼岩风 kuan e yan feng

Seseli laticalycinum (R. H. Shan & M. L. Sheh) Pimenov.

Plants 34–70 cm. Caudex simple. Stem solitary, multi-dichotomously branched, solid, finely grooved, glabrous, scabrous under umbels. Petioles somewhat flattened, adaxially shallowly grooved; blade broadly ovate, 9–12 × 4–6 cm, 2–3-pinnate; pinnae 3–4 pairs, remote, petiolulate except for terminal or apical divisions; pinnules 3-parted, sessile; ultimate segments obovate, 10–15 × 5–10 mm, base cuneate, distally 3-lobed, apex subtruncate, mucronate, both surfaces glabrous, more or less glaucous. Synflorescence paniculate, branches short, densely puberulous; umbels 0.5–1.5 cm across; bracts 2–3, ovate-lanceolate, ca. 1.5 × 1 mm, scarious; rays 2–4, 1.5–4 mm, slightly unequal, puberulous; bracteoles 4–5, unequal, lanceolate, longer than flowers; umbellules 3–6-flowered; pedicels ca. 1 mm. Calyx teeth triangular-ovate, ca. 0.7 mm. Petals white, abaxially densely puberulous. Young fruit elliptic, slightly dorsally compressed, 1.2–1.5 mm across (mature fruit unknown); ribs almost equal, shortly keeled; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Sep.

- Mountain slopes; ca. 1600 m. Hebei, W Henan (Lingbao, Songxian), SW Shanxi (Ruicheng).

This species is used in Shanxi as a regional substitute, known as “shui fang feng,” for the traditional Chinese medicine “fang feng” (*Saposhnikovia divaricata*).

8. *Libanotis jinanensis* L. C. Xu & M. D. Xu, Bull. Bot. Res., Harbin 9(1): 37. 1989.

济南岩风 ji nan yan feng

Seseli jinanense (L. C. Xu & M. D. Xu) Pimenov.

Plants 25–50 cm, herbaceous, sparsely puberulent throughout. Caudex simple. Stem solitary, branched from base, sometimes simple, finely grooved. Basal leaves numerous; blade long-ovate, 6–32 × 2–16 cm, 2–3-pinnatisect; pinnae 4–7 pairs, petiolulate; pinnules 1–2 pairs, rhombic-obovate, 2–3-parted; terminal segments obovate-cuneate, 2–4 × 1.2–2.5 cm, irregular dentate; lateral segments oblong or ovate, 12–24 × 8–16 mm, toothed or lobed. Synflorescence much-branched; umbels 2–6 cm across; peduncles densely tomentose; bracts absent, occasionally 1–2; rays 4–9, 1.5–3 cm, ca. equal, densely tomentose; bracteoles 10–12, narrowly triangular, ca. 2 × 0.3 mm; umbellules 12–30-flowered; pedicels 2–3 mm. Calyx teeth triangular-lanceolate, ca. 0.5 mm. Petals white or pinkish, densely puberulent abaxially. Fruit oblong-ovoid, slightly dorsally compressed, 3–4 × 1.5–1.8 mm, densely white pubescent; ribs equal, shortly keeled; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Oct.

- Mountain slopes; 500–600 m. W Shandong (Jinan).

9. *Libanotis eriocarpa* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 2: 195. 1843.

绵毛岩风 mian mao yan feng

Seseli eriocarpum (Schrenk) B. Fedtschenko.

Plants (20–)40–50 cm. Caudex simple, 3–7 mm thick. Stem solitary, dichotomously branched from base or in upper part,

solid, finely grooved, glabrous. Leaf blade gray-green, oblong, 6–14 × 2–5 cm, 2-pinnate; pinnae shortly petiolulate; ultimate segments linear, 5–20 × 1–3 mm, margins narrowly revolute. Cauline leaves reduced, 3-lobed or undivided. Synflorescence paniculate; umbels 1–2(–3.5) cm across; bracts (2–)4–7, lanceolate or ovate, short, unequal, abaxially pubescent, margins scarious, bases fused together; rays (2–)4–8, 5–10 mm, densely pubescent; bracteoles 5–8, lanceolate, 0.3–1.5 mm, connate at base; umbellules 10–20-flowered, subcapitate, flowers sessile. Calyx teeth lanceolate. Petals white or pale yellow, abaxially pubescent. Styles usually purplish, more than 3 × stylopodium, divergent. Fruit oblong or oblong-ovate, dorsally compressed 5–6(–10) × 3.5–4.5(–6) mm, densely lanate with gray hairs or sparsely pilose; lateral ribs winged, broader than the keeled dorsal ribs, slightly corky; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Mountain summits, dry stony and gravelly slopes, rock crevices; ca. 1600 m. Xinjiang [Kazakhstan, Mongolia].

10. *Libanotis abolinii* (Korovin) Korovin in Pavlov, Fl. Kazakhst. 6: 351. 1963.

狼山岩风 lang shan yan feng

Phlojodicarpus abolinii Korovin, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 5: 74. 1924; *Libanotis songorica* (Schischkin) Korovin; *L. michaylovae* Korovin; *Seseli abolinii* (Korovin) Schischkin; *S. langshanense* Y. Z. Zhao & Y. C. Ma; *S. songoricum* Schischkin.

Plants 10–25(–60) cm, often grayish-blue throughout. Caudex simple, thick. Stems several, erect, branched above, solid, finely grooved, sometimes woody at base, glabrous or minutely hispid. Basal leaves numerous, petioles shorter than the blade, pubescent; blade narrowly oblong, 3–12 × 1–3.5 cm, 2–3-pinnate to pinnately dissected; pinnae 4–7 pairs, sessile; ultimate segments linear-lanceolate, 1–5 × 0.5–1 mm, glabrous. Cauline leaves reduced, 1–2-pinnately dissected, petioles wholly sheathing. Synflorescence corymbose; umbels 2–4 cm across, terminal and lateral; bracts 5–10, lanceolate, hispid; rays 5–15, unequal, hispid; bracteoles 5–8(–13), lanceolate, equaling or exceeding the flowers, margins scarious, becoming reflexed; umbellules 13–17-flowered; pedicels 1.5–2.5 mm. Petals white or tinged purple, puberulent abaxially, sometimes glabrous. Calyx teeth ovate-lanceolate or lanceolate, 0.2–0.3 mm, densely hispid. Stylopodium low-conic; styles short, erect. Fruit oblong to ellipsoid, dorsally compressed, ca. 3 × 1.5 mm, densely short-pubescent; ribs about equal, filiform; vittae 1 in each furrow, 2 on commissure. Fl. & fr. Jul–Sep.

Stony or gravelly mountain slopes, sandy areas; 1000–2100 m. Nei Mongol, Xinjiang [Kazakhstan, Mongolia].

11. *Libanotis grubovii* (V. M. Vinogradova & Sanchir) M. L. Sheh & M. F. Watson, Acta Phytotax. Sin. 42: 563. 2004.

锐棱岩风 rui leng yan feng

Seseli grubovii V. M. Vinogradova & Sanchir, Bot. Zhurn. 70: 965. 1985.

Plants (20–)30–50(–80) cm, polycarpic. Caudex branched. Stems several, branched from base, solid, terete, glabrous. Leaf

blade lanceolate to oblong, 10–20 × 3–6 cm, 1–2-pinnatisect, glabrous; pinnae sessile or shortly petiolulate; ultimate segments oblong to linear-lanceolate, 5–40 × 3–7 mm, acute. Upper leaves entire, rarely pinnate. Synflorescence paniculate; umbels 3–4 cm across; bracts 8–10, linear-lanceolate, herbaceous, puberulent; rays 6–10(–14), equal, puberulent; bracteoles 8–10, similar to bracts; umbellules 10–15-flowered. Calyx teeth lanceolate-triangular. Petals white, abaxially pubescent. Stylopodium low-conic; styles 2–3 × stylopodium, reflexed. Fruit ovoid or ellipsoid, dorsally compressed, 4.8–5.5 × 2.7–4 mm, shortly hairy; ribs unequal, dorsal ribs keeled, acute, marginal ribs shortly winged; vittae (1–)2–3 in each furrow, (2–)4–6 on commissure. Fl. and fr. Jul–Aug.

Schistose or limestone slopes, rock crevices; 1600–2400 m. Xinjiang [Mongolia].

12. *Libanotis condensata* (Linnaeus) Crantz, Class. Umbell. Emend. 105. 1767.

密花岗岩风 mi hua yan feng

Athamanta condensata Linnaeus, Sp. Pl. 2: 1195. 1753; *Libanotis laserpitiiifolia* (Palibin) K. T. Fu; *L. vulgaris* de Candolle var. *condensata* (Linnaeus) de Candolle; *Pachypleurum condensatum* (Linnaeus) Korovin; *Peucedanum condensatum* (Linnaeus) Koso-Poljansky; *Seseli condensatum* (Linnaeus) H. G. Reichenbach; *S. laserpitiiifolium* Palibin.

Plants 20–90 cm. Caudex branched. Stem solitary, branched above or simple, hollow, glabrous, angled and fluted. Leaf blade oblong, 6–30 × 2–10 cm, 2–3-pinnatisect; ultimate segments linear, 2–15 × 1–2 mm, hirsute on both surfaces along rachis and veins, margins hirsutulous, apex acuminate or acute. Synflorescence corymbose; umbels terminal, 3–7 cm across; peduncle apex densely hirsute; bracts 6–10, linear, ca. 1.5 cm, scarious-margined, pubescent; rays 15–25, ca. 2 cm, subequal, stout; bracteoles several, linear, exceeding flowers, villous; umbellules 15–20-flowered; pedicels ca. 4 mm. Calyx teeth subulate, 0.2–0.4 mm, pubescent. Petals white, glabrous or abaxially sparsely pubescent. Stylopodium dark purple, conic. Fruit ellipsoid, moderately dorsally compressed, 3–4 × 2–3 mm, densely villous; vittae 2–4 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

Forest margins, grassy places, streamsides; 1400–2400 m. Hebei, Nei Mongol, N Shanxi (Ningwu), N Xinjiang (Altay) [Kazakhstan, Mongolia, S and SE Russia].

This species has reputed medicinal value (in Shanxi).

13. *Libanotis seseloides* (Fischer & C. A. Meyer ex Turczaninow) Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 725. 1844.

香芹 xiang qin

Ligusticum seseloides Fischer & C. A. Meyer ex Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 11: 530. 1838; *Libanotis amurensis* Schischkin; *L. montana* Crantz var. *riviniiana* Ledebour; *Seseli rivinianum* (Ledebour) M. Hiroe; *S. seseloides* (Fischer & C. A. Meyer ex Turczaninow) M. Hiroe.

Plants 30–130 cm. Caudex simple. Stem solitary, rigid, branching from the middle, solid, acute-ridged, deeply fluted,

nodes puberulent or glabrous. Leaf blade broad-elliptic, 5–18 × 4–10 cm, 3-pinnatisect; ultimate segments linear-lanceolate, 3–15 × 1–4 mm, margins narrowly revolute, apex apiculate. Synflorescence much-branched; umbels 2–7 cm across; peduncles hirsute; bracts absent, occasionally 1–5, subulate or linear, ca. 4 × 0.2 mm; rays 8–20, 1–2.5 cm, inner faces and bases hispid; bracteoles 8–14, linear, ca. 1.5 × 0.1 mm, margins pubescent; umbellules 15–30-flowered; pedicels 1–5.5 mm. Calyx teeth triangular or lanceolate, ca. 0.5 mm, pubescent. Petals white, abaxially puberulent. Fruit oblong-ovoid, slightly dorsally compressed, 2.5–3.5 × ca. 1.5 mm; lateral ribs slightly broader than the dorsal; vittae 3–4 in each furrow, 6 on commissure. Fl. and fr. Jul–Oct.

Open grassy slopes. Henan, Heilongjiang, Jilin, Liaoning, Nei Mongol, Jiangsu, Shandong [E and NE Asia, C Europe].

The leaves of this species form the dietary herb “xie hao” of traditional Chinese medicine, used to aid digestion and alleviate dysentery.

14. *Libanotis incana* (Stephan ex Willdenow) O. Fedtschenko & B. Fedtschenko, *Consp. Fl. Turkest.* 3: 94. 1909.

碎叶岩风 sui ye yan feng

Athamanta incana Stephan ex Willdenow, *Sp. Pl.* 1: 1402. 1798; *Libanotis patriniana* de Candolle; *Seseli graveolens* Ledebour; *S. incanum* (Stephan ex Willdenow) B. Fedtschenko.

Plants (25–)30–60(–90) cm. Caudex simple, ca. 1 cm thick. Stem solitary, thick, branching from base or middle, finely grooved to shallowly fluted, densely gray-white tomentose. Petioles densely gray-white pubescent; blade narrow-elliptic, 10–15 × 2–6 cm, 3-pinnatisect; ultimate segments linear, 1–3 × 0.2–0.6 mm, gray-white pubescent on both surfaces, apex apiculate; rachis fluted. Umbels 6–12 cm across; bracts absent or few, linear, acuminate, ca. 5 × 0.5 mm; rays (15–)20–35, 4–5 cm, subequal, densely white tomentose; bracteoles 12–15, ovate-lanceolate, 2.5–3 × 0.5–1 mm, bases fused together, apex sometimes 2–3-toothed, densely pubescent; umbellules 40–50-flowered; pedicels 2–3 mm. Calyx teeth lanceolate, ca. 1 mm, puberulous. Petals white, abaxially puberulent. Fruit ovate or ellipsoid, slightly flattened dorsally, 3.2–4.7 × 2–3.5 mm, densely pubescent; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Aug.

Dry scrubland, gravelly slopes, sunny places; ca. 1300 m. N Xinjiang (Toli) [Kazakhstan].

15. *Libanotis sibirica* (Linnaeus) C. A. Meyer, *Verzeichn. Pfl. Cauc.* 124. 1831.

亚洲岩风 ya zhou yan feng

Athamanta sibirica Linnaeus, *Sp. Pl.* 1: 244. 1753; *Seseli libanotis* (Linnaeus) W. D. J. Koch subsp. *sibiricum* (Linnaeus) Thellung; *S. libanotis* var. *sibiricum* (Linnaeus) de Candolle; *S. sibiricum* (Linnaeus) Garcke.

Plants 30–100(–12) cm. Caudex simple, 1–2 cm thick. Stem solitary, shallowly fluted, purplish at base. Basal leaves numerous, petioles shorter than blade, distal leaf rachis shallowly grooved; blade ovate-oblong in outline, 15–40 × 5–10 cm, pinnate to 2-pinnately parted; pinnae 8–9 pairs, sessile; pinnales ovate, rhombic or lanceolate, 15–30 × 6–15 mm, 3–5-

lobed or incised-dentate, abaxially ciliate hairy along margins and veins. Umbels 7–12 cm across; bracts absent or few, linear, very small; rays (20–)35–50, 3–7 cm, unequal, hirsutulous; bracteoles 12–15, linear, 1.5–2 × ca. 0.5 mm, shorter than or equaling flowers; pedicels 1.5–5.5 mm. Calyx teeth triangular-lanceolate, ca. 0.7 mm. Petals white or pinkish, abaxially glabrous. Fruit ovoid-ellipsoid, dorsally compressed, 3–4 × 1.5–2 mm, glabrous or puberulent; vittae 1 in each furrow, 4 on commissure. Fl. and fr. Jul–Aug.

Forest margins, among shrubs, open grassy places; 1000–1400 m. Gansu, Shaanxi, Xinjiang [Kazakhstan, Russia].

This species is used in Gansu and Shaanxi as a regional substitute for the traditional Chinese medicine “fang feng” (*Saposhnikovia divaricata*).

16. *Libanotis schrenkiana* C. A. Meyer ex Schischkin in Schischkin & Bobrov, *Fl. URSS* 16: 601. 1950.

坚挺岩风 jian ting yan feng

Seseli schrenkianum (C. A. Meyer ex Schischkin) Pimenov & Sdobnina.

Plants 40–110(–130) cm. Caudex branched. Stems usually several, or solitary, erect, branched above, solid, finely ribbed, scattered puberulent. Basal leaves with long petioles, rachis shallowly grooved; blade oblong-ovate, 10–40 × 6–12 cm, 2-pinnatisect; pinnae 5–7 pairs, sessile; ultimate segments linear-lanceolate, 3–10 × 1–3 mm, sometimes ovate-rhombic, ca. 15 × 7 mm, 1–3-serrate, margins narrowly revolute, both surfaces glaucous and sparsely puberulent. Umbels (3–)5–10 cm across; peduncles stout, elongate, apex pubescent; bracts absent or 3–9, subulate to linear, 1–5 mm; rays 15–25(–40), 1–4 cm, almost equal; bracteoles 10–12, linear, 2–6 × ca. 1 mm, shorter than flowers, puberulous; umbellules many-flowered; pedicels 1.5–6(–9) mm. Calyx teeth triangular-lanceolate, ca. 0.5 mm. Petals white, glabrous. Fruit ellipsoid, slightly dorsally compressed, 2–3.5 × 0.7–2 mm, densely pubescent when young, becoming sparsely puberulous; ribs subequal, shortly keeled; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Sep.

Among shrubs, grassy slopes, gravelly soils, roadsides; 1700–2600 m. NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

17. *Libanotis acaulis* R. H. Shan & M. L. Sheh, *Acta Phytotax. Sin.* 21: 84. 1983.

Seseli acaule (R. H. Shan & M. L. Sheh) V. M. Vinogradova.

阔鞘岩风 kuo qiao yan feng

Plants 4–8 cm, acaulescent, dwarf, rosette, often diffuse. Taproot undivided. Leaf sheath broadly ovate, margin scariosus and pubescent; leaf rachis broad, shallowly grooved; blade oblong, 1–3 × 0.7–1.2 cm, 2-pinnatisect; pinnae 4 pairs; ultimate segments linear-elliptic, 2–3 × 0.8–1 mm, apex apiculate, 2-furcate, glabrous. Upper leaves sessile, sheaths broadly lanceolate, clasping, blade small, 3-lobed. Terminal umbel to 7.5 cm across, sessile, appearing as a group of simple umbels; lateral umbels 0.7–2 cm across, peduncles 0.5–1 cm; rays 7–10, 0.8–1 cm; bracts 1–2; bracteoles 10–20, lanceolate, 3–6 × 0.5–1

mm, unequal; umbellules 15–20-flowered; pedicels 2.5–3 mm. Calyx teeth triangular-lanceolate, ca. 0.8×0.5 mm. Petals white, glabrous. Fruit oblong, slightly dorsally compressed, 2–2.5 \times 1.5–1.8 mm, gray-brown, densely scaly-tomentose; vittae 2–3 in each furrow, 4–6 on commissure. Fl. and fr. Jul–Aug.

- Dry grassy places; 2300–2600 m. C Xinjiang (Hejing).

This rather poorly known species is recorded only from a few localities.

18. *Libanotis depressa* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 21: 82. 1983.

Seseli depressum (R. H. Shan & M. L. Sheh) V. M. Vinogradova.

地岩风 di yan feng

Plants 2–5 cm, dwarf, acaulescent, rosette. Taproot 2–6 \times 0.8–1.2 cm, undivided. Petioles 0.5–3.5 cm, sheaths narrowly lanceolate; blade oblong, 2–5 \times 0.5–1.8 cm, 2-pinnatisect; pinnae 2–4 pairs; ultimate segments linear-lanceolate, 0.3–1 \times 0.5–

1 mm, base and margins pilose, apex apiculate, glabrous or minutely puberulent. Terminal umbel 4–9 cm across, sessile, appearing as a group of simple umbels, lateral umbels few, smaller, on long peduncles, stout, puberulent; bracts 1–2, usually obscured by leaf rosette; rays 6–10, 1–6 cm, densely puberulent; bracteoles 7–11, acicular, 3–9 mm, very unequal, the largest longer than flowers; umbellules 10–20-flowered; pedicels 1–4 mm, pubescent. Calyx teeth lanceolate, very conspicuous, ca. 1×0.4 mm, sometimes ca. $0.5 \times$ fruit. Petals white, costa yellowish, glabrous. Styles 2–3 \times stylopodium, reflexed. Fruit oblong or suborbicular, slightly dorsally compressed, 2–2.5 \times 1.3–1.5 mm, densely scaly-hispid; ribs filiform, prominent; vittae large, 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

- Grassy places, river banks; 3400–4100 m. S Qinghai (Yushu), NW Sichuan (Dêgê), E Xizang (Gonjo).

This and the previous species have an unusual fruit ornamentation similar to that seen in *Stenocoelium*. These two species are part of a group of dwarf, high-altitude Himalayan rosette-forming umbellifers that are not easy to identify; see also *Cortia*, *Cortiella*, *Pleurospermum hedinii*, etc.

60. SESELI Linnaeus, Sp. Pl. 1: 259. 1753.

西风芹属 xi feng qin shu

She Menglan (余孟兰 Sheh Meng-lan); Michael G. Pimenov, Eugene V. Kljuykov, Mark F. Watson

Herbaceous, perennials, sometimes woody at base. Taproot conic, caudex woody, undivided or branched. Stem terete, rarely hollow. Leaf blade 1–3-pinnate or pinnately decomposed, rarely ternately dissected or simple and undivided. Umbels compound; bracts few or absent; rays few to many; bracteoles few to many, lanceolate or linear, bases often connate, scarious or scarious-margined; umbellules few- to many-flowered; pedicels short or long, occasionally subsessile. Calyx teeth obsolete or minute. Petals white or yellow, suborbicular or oblong, emarginate, apex broadly or narrowly inflexed, abaxially often pubescent or hirsute. Stylopodium conic or depressed. Fruit ovoid or ellipsoid, moderately or slightly dorsally compressed, glabrous or variously hairy; ribs prominent, rounded or keeled, subequal, marginal ribs sometimes narrowly winged; vittae 1–2(–4) in each furrow, 2 (rarely 4–8) on commissure. Seed face plane. Carpophore 2-cleft to base.

About 80 species: Asia, Europe; 19 species (nine endemic) in China.

See the taxonomic comments under *Eriocyclus* and *Libanotis*, and the alternative classification at the end of the *Seseli* account.

1a. Fruit vittae solitary in each furrow, 2 on the commissure.

2a. Caudex branched at apex, stems several.

3a. Bracteoles glabrous; fruit papillose-pubescent; rays (2–)6–10.

4a. Fruit with a white and membranous disk at base 1. *S. glabratum*

4b. Fruit without a white and membranous disk at base 2. *S. intramongolicum*

3b. Bracteoles puberulous; fruit pubescent or hirsute, but never papillose; rays 2–6(–10).

5a. Umbels 1–2.5 cm across; bracteole bases connate 3. *S. aemulans*

5b. Umbels 2–6 cm across; bracteole bases free.

6a. Ultimate leaf segments 15–40(–80) \times 0.7–1.5 mm; rays 3–4; flowers almost sessile 14. *S. togasii*

6b. Ultimate leaf segments 5–7 \times 1–2 mm; rays 6–8(–10); flowers pedicellate 15. *S. junatovii*

2b. Caudex undivided; stem solitary.

7a. Stem hollow 4. *S. nortonii*

7b. Stem solid, with pith.

8a. Plants densely white hispidulous; leaf blade 3-parted, not pinnate, ultimate segments 70–130 \times 5–10 mm 7. *S. delavayi*

8b. Plants puberulent to almost glabrous; leaf blade 2–3-pinnate, ultimate segments 3–50 \times 0.5–2 mm.

9a. Fruit oblong, 5–6.5 \times 2–3 mm 5. *S. eriocephalum*

9b. Fruit ovoid, 2–4 \times 0.8–1.5 mm.

10a. Ultimate leaf segments 5–12 \times 0.5–1 mm; ribs slightly prominent, rounded 6. *S. valentinae*

10b. Ultimate leaf segments 20–50 \times 0.5–2 mm; ribs prominent, keeled 13. *S. strictum*

- 1b. Fruit vittae 2–5 in each furrow, 4–10 on the commissure.
- 11a. Bracteoles fused to each other at base, sometimes, up to middle.
- 12a. Leaf blade 2–4-ternately dissected, ultimate segments narrow-linear 7–65 × 0.5–3 mm 8. *S. yunnanense*
- 12b. Leaf blade trifoliate or 2-ternately dissected, ultimate segments elliptic or lanceolate, 20–120 × 2–12 mm 9. *S. mairei*
- 11b. Bracteoles not fused at base.
- 13a. Caudex branched.
- 14a. Flowers sessile, umbellules capitate 10. *S. sessiliflorum*
- 14b. Flowers pedicellate, umbels loose, not capitate.
- 15a. Leaf blade greenish pubescent; stems, rays and bracts scabrous; bracteoles 5–8; fruit minutely pubescent 16. *S. asperulum*
- 15b. Plant completely glabrous; bracteoles 8–10; fruit glabrous 17. *S. coronatum*
- 13b. Caudex unbranched.
- 16a. Stylopodium conic.
- 17a. Pedicels stout, 2–4 mm; leaf sheaths dark purple 11. *S. purpureovaginatam*
- 17b. Pedicels slender, short 0.5–1.5 mm; leaf sheaths green 12. *S. squarulosum*
- 16b. Stylopodium low-conic.
- 18a. Fruit ovoid, apex narrow, densely pubescent; leaf blade 2-pinnate, ultimate segments ovate or rhombic 18. *S. sandbergiae*
- 18b. Fruit oblong glabrous; leaf blade 3-pinnate, ultimate segments ovate 19. *S. incisodentatum*

1. *Seseli glabratum* Willdenow ex Sprengel in Roemer & Schultes, Syst. Veg. 6: 406. 1820.

膜盘西风芹 mo pan xi feng qin

Seseli tenuifolium Ledebour.

Plants 25–50 cm. Caudex branched. Stems several, much-branched from base or middle, solid, rigid, finely grooved, glabrous. Leaf blade broadly ovate, 7–10 × 3–5 cm, 2-pinnatisect; ultimate segments linear, 20–40(–80) × 0.5–1(–1.5) mm, glabrous, margins revolute. Synflorescence paniculate; umbels 2–4 cm across; bracts absent or 1–2, subulate, 1–3 × 0.5–1 mm; rays 6–10, 0.6–2(–2.5) cm, subequal, glabrous; bracteoles 6–8, lanceolate or linear-subulate, shorter than flowers, usually reflexed, glabrous, margin scariosus; umbellules 8–15-flowered; pedicels 2–5 mm. Calyx teeth obsolete. Petals white, costa yellow, emarginate, glabrous. Ovary and fruit with a white, membranous disk at base, disk 0.6–1 mm across, persistent. Stylopodium conic; styles reflexed. Fruit ellipsoid or narrowly ovoid, dorsally compressed, 2.7–4.5 × 0.9–1.3 mm, finely papillose or slightly scabrous, sometimes subglabrous; ribs equal, prominent, filiform or shortly keeled; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

Grasslands, steppes, dry stony and clayey slopes, sometimes sandy areas; 1000–1500 m. N Xinjiang (Altay) [Kazakhstan, Mongolia, Uzbekistan].

2. *Seseli intramongolicum* Y. C. Ma, Fl. Intramongol. Sin. 4: 171. 1979.

内蒙西风芹 nei meng xi feng qin

Plants 25–60 cm. Caudex branched. Stems several, dichotomously much-branched from base or middle, solid, terete, glabrous or minutely scabrid at base. Basal leaves numerous, long-petiolate; blade oblong or oblong-ovate, 2–20 × 2–7 cm, 2-pinnatisect; ultimate segments linear, 3–15 × 0.5–2 mm, glabrous, margins revolute, apex apiculate. Synflorescence thyrsoid, much-branched; umbels (1–)3–6 cm across; bracts absent; rays (2–)8–10, 0.3–1.2 cm, subequal, ridged, minutely puber-

lent; bracteoles 7–10, ovate-lanceolate, shorter than flowers, fused to each other at least at base, glabrous or minutely puberulent, reflexed; umbellules 7–15-flowered; pedicels 1.5–3 mm. Calyx teeth obsolete. Petals white, occasionally yellowish, costa fulvous, abaxially puberulous. Stylopodium conic, base undulate; styles reflexed. Fruit oblong, dorsally compressed, (3–)4–6 × (1.5–)2.5–3.5 mm, densely papillose-pubescent when young, glabrescent when mature; ribs filiform, prominent; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

• Mountain slopes, dry stony places; 1500–2200 m. Gansu (Hegang Shan), SW Nei Mongol (Ih Ju Meng, Zhuozi Shan), N Ningxia (Helan Shan).

3. *Seseli aemulans* Popov, Bot. Mater. Gerb. Bot. Inst. Komarov Akad. Nauk SSSR 8(4): 73. 1940.

大果西风芹 da guo xi feng qin

Plants 40–50 cm, polycarpic. Caudex branched. Stems several, dichotomously branched from base or above, solid, finely grooved, glabrous. Basal leaves numerous, petiolate; blade ovate-oblong or oblong, 4–10 × 2–4.5 cm, 2-pinnatisect; pinnae short-petiolulate; ultimate segments linear-filiform, 5–25 × 0.5–1.1 mm, glabrous, margins revolute, apex apiculate. Cauline leaves few, reduced above becoming sessile, blade 3-parted, segments linear, elongate. Synflorescence paniculate, much-branched; umbels 1–2.5 cm across; bracts absent or 1–5, ovate, minute, margin scariosus; rays 2–6, 4–14 mm, unequal, spreading, squarrose; bracteoles 6–10, ovate, triangular-lanceolate or lanceolate-subulate, ca. 2 × 0.5–1 mm, connate at base for half their length, abaxially puberulous; umbellules 6–12-flowered; pedicels 1.5–3 mm. Calyx teeth obsolete. Petals white or pale yellow, costa yellow-brown, abaxially pubescent. Stylopodium conic; styles reflexed. Fruit ovoid or ellipsoid, apex narrow, dorsally compressed, 6–7(–10) × 3–4(–6) mm, puberulous or sparsely pilose; vittae 1 in each furrow, 2 on commissure. Fl. Aug, fr. Sep.

Dry or gravelly slopes, dry pebbly stream beds; ca. 1000 m. Xinjiang (Tian Shan) [Kazakhstan].

4. *Seseli nortonii* Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 329. 1930.

西藏西风芹 xi zang xi feng qin

Plants 30–50 cm. Caudex simple. Stem solitary, hollow, tawny or purplish, shiny, hispidulous, much-branched above. Basal leaves many, petiole sheaths broadly ovate, hispidulous, scarios-margined; blade broadly rhombic, 2-pinnate; ultimate segments ovate, 10–15 × 6–11 mm, 3-lobed, parted or sub-pinnate, serrate, white hispid on both surfaces and leaf-rachis, especially margins and veins abaxially. Umbels 8–12 cm across; bracts 5–7, lanceolate, shorter than rays, densely white-hispid; rays ca. 10, 3.5–6 cm, unequal; bracteoles numerous, similar to bracts; umbellules many-flowered; pedicels 1.5–5(–7) mm. Calyx teeth subulate, ca. 0.1 mm. Petals white, costa deep yellow, suborbicular, with a broadly inflexed apex, abaxially white-hispid. Stylopodium low-conic; style short, erect. Fruit narrowly ellipsoid, dorsally compressed, 5.5–6 × 2–2.5 mm, densely hispid; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jun–Aug.

- River banks, among stones; ca. 4000 m. Xizang (Kadah He).

This poorly known taxon is recorded only from the type. The subulate calyx teeth are atypical in the current circumscription of *Seseli*, and two of us (Pimenov and Kljuykov) consider this species should be included within *Eriocycla nuda*.

5. *Seseli eriocephalum* (Pallas ex Sprengel) Schischkin in Schischkin & Bobrov, Fl. URSS 16: 518. 1950.

毛序西风芹 mao xu xi feng qin

Bubon eriocephalus Pallas ex Sprengel, Syst. Veg. 1: 900. 1824.

Plants 40–80 cm, monocarpic. Caudex simple, 1–2 cm thick. Stem solitary, much-branched from middle, solid, finely grooved, minutely puberulent or almost glabrous. Basal leaves numerous, long-petiolate; blade triangular-ovate, 6–10 × 5–8 cm, 3-pinnate; pinnae petiolulate; ultimate segments lanceolate or linear, 3–10 × 1–2 mm, margins entire, narrowly revolute, apex mucronate. Synflorescence paniculate; umbels 2–5 cm across; bracts absent; rays 2–10(–15), 0.5–2 cm, slightly unequal, scabrous-pubescent; bracteoles 12–15, ovate-lanceolate, 2–3 × ca. 2 mm, bases connate to the middle, abaxially villous; umbellules 22–30(–40)-flowered, densely capitate, flowers sessile. Calyx teeth obsolete. Petals white, abaxially puberulous. Stylopodium depressed; styles slightly elongate, divergent. Fruit oblong, slightly dorsally compressed, 5–6.5 × 2–3 mm, densely tomentose; dorsal ribs thick, acute, prominent, lateral ribs slightly broader than dorsal; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Among shrubs, moist areas, salt-lake shores, alkaline soils. N Xinjiang (Tacheng) [Kazakhstan].

6. *Seseli valentinae* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 8(4): 73. 1940.

叉枝西风芹 cha zhi xi feng qin

Plants 30–60(–70) cm, monocarpic. Caudex simple. Stem solitary, dichotomously branched nearly from base, finely

grooved, lower parts minutely puberulent, branches elongate. Basal leaves several, petioles short; blade oblong, 5–10 × 2.5–3 cm, 2–3-pinnatisect; pinnae 4 pairs, remote; ultimate segments narrowly linear, 5–12 × 0.5–1 mm, glabrous, margins entire and revolute. Synflorescence corymbose; umbels 3–10 cm across; bracts absent; rays 6–13, 1–70 mm, very unequal; bracteoles 10–12, linear-lanceolate, about equaling flowers, bases connate, densely white pubescent, margins scarios; umbellules 20–25-flowered, capitate; pedicels very short, 1–2 mm, pubescent. Petals yellowish, abaxially white puberulous. Stylopodium low-conic; styles reflexed. Fruit ovoid or oblong-ovoid, slightly dorsally compressed, 2.2–4 × 0.8–1.5 mm, densely puberulent; ribs prominent, equal, obtuse-keeled; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

Stony mountain slopes, semi-deserts, conglomerate terraces, clayey soils; 1500–2300 m. Xinjiang (Bogda Shan, Zhaosu) [Kazakhstan, Kyrgyzstan].

7. *Seseli delavayi* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 130. 1894.

多毛西风芹 duo mao xi feng qin

Plants 50–90 cm, monocarpic, densely white hispidulous throughout. Caudex simple. Stem solitary, branched from middle, terete. Basal leaves several, petioles 10–16 cm; blade ternatisect, 4–13 × 2–6 cm; leaflets sessile, linear-lanceolate, (40–) 70–130 × 5–10 mm, primary venation parallel, usually white hispid on both surfaces, especially margins and abaxially veins. Cauline leaves few, reduced upwards, leaflets 30–50 × 2–4 mm. Synflorescence corymbose; umbels 1–3(–4) cm across; peduncles elongate, hispidulous; bracts 5–7, linear, ca. 10 × 0.5 mm, bases free, apex caudate; rays 6–8, 5–20 mm, subequal, densely white-hispid; bracteoles 5–7, linear, 6–8 mm, more than 2 × pedicels; umbellules 10–18-flowered; pedicels ca. 4 mm. Petals yellow, obovate, abaxially white-pubescent. Fruit ovoid or short ovoid, slightly dorsally compressed, ca. 3 × 2 mm, densely white hispid; ribs rounded, equal, hidden by indumentum; vittae 1 in each furrow, 2 on commissure. Fl. Aug–Sep, fr. Sep–Oct.

- Alpine meadows, limestone slopes; 1500–3000(–4500) m. NW Yunnan (Binchuan, Heqing).

This species has reputed medicinal value.

8. *Seseli yunnanense* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 129. 1894.

松叶西风芹 song ye xi feng qin

Seseli siamicum Craib.

Plants 30–80 cm, monocarpic. Caudex simple. Stem solitary, branching above, solid, terete, finely grooved, glabrous. Basal leaves numerous, petiolate; blade triangular or rhombic, 3–10 × 3–10 cm, 2–4-ternately dissected, every divided point articulated; ultimate segments narrowly linear, 7–65 × 0.5–3 mm, entire. Cauline leaves few, 1–3-ternately dissected; uppermost leaf 3-parted or simple. Synflorescence dichotomously branched, corymbose; umbels 2–4 cm across; bracts absent or occasionally 1, subulate, 1.5–4 mm; rays 6–10, 0.3–2(–4) cm, unequal; bracteoles 8–10, lanceolate, ca. 2.5 × 0.5 mm, about equaling flowers, bases connate, margin scarios; umbellules 15–30-flowered; pedicels ca. 2 mm. Calyx teeth obsolete. Petals

pale yellow, oblong or almost square, veins 3–5, brown-yellow, conspicuous, abaxially puberulent. Stylopodium low-conic; styles short, stout. Fruit ovoid or oblong-ovoid, compressed dorsally, ca. 3 × 1 mm, glabrous; ribs ca. equal, narrowly keeled or rounded; vittae 1–2 in each furrow, 2–4 on commissure. Fl. and fr. Aug–Oct.

Coniferous forests, among shrubs, valleys; 600–3100 m. S Sichuan (Dechang, Leibo), NW Yunnan (Binchuan, Dali, Heqing) [Thailand].

The roots are used in Yunnan as a regional substitute, known as “song ye fang feng,” for the traditional Chinese medicine “fang feng” (*Saposhnikovia divaricata*).

9. *Seseli mairei* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 301. 1930.

竹叶西风芹 zhu ye xi feng qin

Plants 15–80 cm, glabrous throughout. Caudex simple. Stem solitary, branched above, solid, terete, finely grooved. Basal leaves few to many, petiolate; blade triangular, 3–10 × 1–10 cm, trifoliolate or 2-ternately dissected; ultimate segments elliptic, lanceolate or linear-lanceolate, 20–120 × 2–12(–40) mm, sessile, margins entire, narrowly revolute, with 3–10 parallel venations. Upper leaves usually linear and undivided. Synflorescence corymbose; umbels 2–4.5 cm across; bracts absent or 1–2, linear, 2–5 × ca. 0.1 mm; rays 5–7, 1.5–3.5 cm, unequal; bracteoles 6–10, lanceolate, about equaling flowers, bases connate; umbellules 12–18-flowered; pedicels 1.5–3 mm. Calyx teeth obsolete. Petals yellowish, square or oblong, with 3 veins, brown-yellow and conspicuous, especially costa, abaxially puberulent. Stylopodium conic, base undulate. Fruit ovate-oblong, compressed dorsally, ca. 3 × 1 mm, purplish, glabrous. vittae 1–2 in each furrow, 4 on commissure. Fl. and fr. Aug–Oct.

Open woodlands, sunny mountain slopes, grassy places; 1200–3200 m. NW Guangxi, SW Guizhou, SW Sichuan, Yunnan [N Thailand].

Both varieties have reputed medicinal value.

1a. Basal leaf blade 1–2-ternately dissected 9a. var. *mairei*
1b. Basal leaf blade simple 9b. var. *simplicifolium*

9a. *Seseli mairei* var. *mairei*

竹叶西风芹(原变种) zhu ye xi feng qin (yuan bian zhong)

Peucedanum bupleuriforme H. Wolff; *P. bupleuroides* H. Wolff.

Leaf blade trifoliolate or 2-ternately dissected.

Open woodlands, sunny mountain slopes, grassy places; 1200–3200 m. NW Guangxi (Longlin), SW Guizhou (Xingren), SW Sichuan (Liangshan, Xichang), Yunnan [N Thailand].

The leaf dissection is very variable across the geographic range, and two of us (Pimenov and Kljuykov) prefer to treat this variety and the preceding species as one polymorphic species under the name *S. yunnanense*. Further work is needed to clarify this complex situation. See also the taxonomic note under var. *simplicifolium* below.

9b. *Seseli mairei* var. *simplicifolium* C. Y. Wu ex R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 21: 88. 1983 [“*simplicifolia*”].

单叶西风芹 dan ye xi feng qin

Seseli simplicifolium (C. Y. Wu ex R. H. Shan & M. L. Sheh) Pimenov & Kljuykov.

Leaf blade simple, elliptic or elliptic-lanceolate, apex acute. Upper leaves linear-lanceolate.

• Open woodlands, sunny mountain slopes, grassy places; 1200–3200 m. SW Sichuan (Huidong), C Yunnan (Yuanmou).

Two of us (Pimenov and Kljuykov) note that this taxon was originally projected for description by H. Wolff under the manuscript name “*Seseli plantagineum*” (herbarium P), and that specific status is preferable as, in nature, there are no mixed populations of this and the typical variety.

10. *Seseli sessiliflorum* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 3: 307. 1845.

无柄西风芹 wu bing xi feng qin

Seseli squarrosum Schischkin.

Plants 15–60(–70) cm, polycarpic. Caudex branched. Stems several, suberect, branching above, solid, terete, glabrous or minutely scabrous, branches elongate and spreading. Basal leaves many, petiolate; blade oblong, 2-pinnately dissected; pinnae 4 pairs, rather remote, shortly petiolulate; ultimate segments linear, 5–20 × 1–2 mm, margins narrowly revolute, apex acute, apiculate. Upper leaves reduced, petioles wholly sheathing. Synflorescence thyrsoid; umbels 1.5–4(–6) cm across; peduncles elongate, slender; bracts 2–3, sometimes absent, broadly lanceolate, 1.5–3 × 0.5–1.5 mm, margin scarious; rays (2–)3–6(–9), ca. 10 mm, somewhat unequal; bracteoles 5–10, linear-lanceolate, 1.3–3 × ca. 1 mm, pubescent; umbellules 12–25-flowered, capitate, flowers sessile. Calyx teeth obsolete. Petals whitish or yellow, abaxially pubescent. Stylopodium conic. Fruit ovoid, dorsally compressed, 3–6 × 2–4 mm, densely or sparsely minutely pubescent; ribs filiform, prominent, margin ribs slightly winged; vittae 3 in each furrow, 6–10(–12) on commissure. Fl. and fr. Jul–Sep.

Among shrubs, dry stony and gravelly mountain slopes, screes, rock crevices; 700–1500 m. Xinjiang (Urumqi) [Kazakhstan, Kyrgyzstan].

11. *Seseli purpureovaginatatum* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 18: 377. 1980 [“*purpureo-vaginatatum*”].

紫鞘西风芹 zi qiao xi feng qin

Plant 25–50 cm, monocarpic, glabrous throughout. Caudex simple. Stem solitary, suberect, solid, little-branched above, branches short and usually arcuate. Basal leaves many, petiole sheaths narrow, dark purple scarious-margined; blade ovate, 6–10 × 3–5 cm, 2-pinnate; pinnae shortly petiolulate; ultimate segments linear or linear-elliptic, 4–10 × 1.5–5 mm, entire or 2–3-lobed, abaxially glaucescent, margins narrowly revolute, apex apiculate. Uppermost leaves sessile, with dilated, scarious-margined and dark purple sheaths; ultimate segments like basal. Synflorescence dichotomously branched, corymbose; umbels few, loose compound, 2.5–5 cm across; bracts and bracteoles absent; rays 3–5, 1.5–3 cm, subequal; umbellules 4–8-flowered; pedicels 2–4 mm. Calyx teeth obsolete or minute. Petals white, glabrous. Stylopodium conic; styles short. Fruit pale yellow,

oblong, cross section rounded-pentagonal, 3.5–5 × 2–3 mm, glabrous; ribs prominent; ribs equal, shortly keeled; vittae 2–3 in each furrow, 4 on commissure. Fl. and fr. Jul–Sep.

- Sunny mountain slopes; ca. 3800 m. E Xizang (Biru).

12. *Seseli squarulosum* R. H. Shan & M. L. Sheh, *Acta Phytotax. Sin.* 21: 86. 1983.

粗糙西风芹 *cu cao xi feng qin*

Plants 30–100 cm, monocarpic. Caudex simple. Stem solitary, much-branched above, solid, terete, finely grooved, glabrous. Basal leaves many, petiolate; blade oblong or ovate-oblong, 5–14 × 2–4 cm, 3-pinnately dissected, leaf rachis shallowly grooved, squarrose; ultimate segments linear, 3–10 × 0.5–1.5 mm, abaxially slightly glaucous and sparsely squarrose, apex acute. Synflorescence much-branched, corymbose; umbels 1.5–5 cm across; bracts absent or 1–2, small; rays (4)6–10, 1.5–3.5 cm, unequal, ridged, squarrose; bracteoles 5–6, lanceolate, shorter than or equaling flowers; umbellules 10–15-flowered; pedicels 0.5–2 mm. Petals yellow, subsquare or elliptic, costa deep yellow, sometimes abaxially puberulous. Fruit ellipsoid, slightly dorsally compressed, ca. 3.5 × 2 mm, puberulous when young; vittae 3–4 in each furrow, 6–10 on commissure. Fl. and fr. Jul–Sep.

- Sunny mountain slopes, dry valleys, grasslands; 1400–3600 m. E Qinghai (Datong, Menyuan, Tongren), W Sichuan.

The roots are used in Sichuan as a regional substitute, known as “chuan fang feng,” for the traditional Chinese medicine “fang feng” (*Saposhnikovia divaricata*). This taxon is possibly conspecific with *Seseli incisodentatum*.

13. *Seseli strictum* Ledebour, *Fl. Altaic.* 1: 338. 1829.

劲直西风芹 *jìn zhí xī fēng qīn*

Ammi ehrenbergii (H. Wolff) M. Hiroe; *Athamanta stricta* (Ledebour) Ledebour ex Steudel; *Pseudammi ehrenbergii* H. Wolff.

Plants 30–70 cm, monocarpic. Caudex simple, 4–7 mm thick. Stem solitary, branched above, finely grooved, solid, glabrous. Leaf blade triangular to ovate, 8–15 × 4–7 cm, 3-pinnatisect, glabrous; pinnae petiolulate; ultimate segments filiform or narrowly linear, 20–50 × 0.5–2 mm, obtuse. Cauline leaves appressed to stem, uppermost 2–3-pinnate. Synflorescence corymbose; umbels 5–9 cm across; bracts absent; rays 15–35, 2.5–3 cm, almost equal, ribbed, glabrous; bracteoles 8–10, linear or filiform, slightly shorter than pedicels, herbaceous; umbellules 20–30-flowered; pedicels 2.5–4 mm. Calyx teeth short, triangular, glabrous. Petals white, emarginate, glabrous. Stylopodium conic. Fruit ellipsoid to ovoid, slightly dorsally compressed, 3–4 × 1–1.5 mm, glabrous; ribs equal, keeled; vittae solitary in each furrow, 2 on commissure. Fl. and fr. Jul–Aug.

Steppe grasslands, damp areas, occasionally on saline soils; ca. 1000 m. Xinjiang [Kazakhstan, Russia].

14. *Seseli togasii* (M. Hiroe) Pimenov & Kljuykov, *Feddes Rept.* 110: 488. 1999.

绒果西风芹 *róng guo xī fēng qīn*

Deverra togasii M. Hiroe, *Umbell. World*, 504. 1979.

Plants 25–50 cm, polycarpic. Caudex branched. Stems several, branched from base or middle, solid, rigid, finely grooved, glabrous. Leaf blades rhombic or ovate, 7–10 × 3–5 cm, 2-pinnatisect, glabrous; pinnae shortly petiolulate; ultimate segments filiform or narrowly linear, 15–40(–80) × 0.7–1.5 mm, acute. Upper leaves ternate or entire. Synflorescence paniculate; umbels 2–4 cm across; bracts absent, rarely 1, small; rays 3–4, slender, minutely puberulent; bracteoles 6–9, lanceolate, puberulent; umbellules capitate, flowers almost sessile. Calyx teeth minute, pilose. Petals white, emarginate, glabrous. Stylopodium conic; styles long, reflexed. Fruit ovoid, slightly compressed dorsally, 1.5–2.3 × 1–1.7 mm, densely puberulent; ribs unequal, dorsal ribs keeled, marginal ribs broader; vittae solitary in each furrow, 2 on commissure. Fl. and fr. times not recorded.

- Stony and gravelly slopes; ca. 1000 m. Jilin (Saratsi).

This rather poorly known taxon is recorded only from a few localities.

15. *Seseli junatovii* V. M. Vinogradova, *Novosti Sist. Vyssh. Rast.* 22: 198. 1985.

硬枝西风芹 *yìng zhī xī fēng qīn*

Plants 25–35 cm, polycarpic. Caudex branched. Stems several, branched from base, solid, rigid, smooth, glabrous. Leaf blade rhombic to lanceolate-ovate, 7–12 × 2–4 cm, pinnatisect, glabrous; pinnae sessile or shortly petiolulate; ultimate segments filiform or linear-lanceolate, 5–7 × 1–2 mm, toothed, acute. Synflorescence corymbose; umbels 3–6 cm across; bracts absent or 1–2, small; rays 6–8(–10), equal, glabrous; bracteoles ca. 10, narrowly lanceolate, puberulous; umbellules 12–30-flowered. Calyx teeth narrowly triangular, small. Petals white, emarginate, abaxially puberulent. Stylopodium low-conic; styles reflexed. Ovaries and young fruit densely tomentose (mature fruit unknown); ribs equal, filiform; vittae solitary in each furrow, 2 on commissure. Fl. and fr. times not recorded.

- Schistose steppe slopes, rock crevices; ca. 1000 m. Xinjiang.

16. *Seseli asperulum* (Trautvetter) Schischkin in Schischkin & Bobrov, *Fl. URSS* 16: 520. 1950.

微毛西风芹 *wēi máo xī fēng qīn*

Seseli coronatum Ledebour var. *asperulum* Trautvetter, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 1: 32. 1871.

Plants 25–50 cm, polycarpic. Caudex branched. Stems several, dichotomously branched from middle, solid, terete, minutely puberulent. Leaf blade oblong, 8–12 × 1.5–2 cm, 2–3-pinnatisect, greenish pubescent; pinnae short-petiolulate; ultimate segments narrowly lanceolate to linear, 3–10 × 0.5–1.5 mm, acute. Upper leaf blades entire, linear, short. Synflorescence thyrsoid; umbels 1.5–2 cm across; bracts absent; rays 4–6(–10), 1–1.4 cm, slightly unequal, scabrous; bracteoles 5–8, linear-lanceolate, entire, 1.1–1.6 mm, scabrous, margin membranous; umbellules ca. 15-flowered; pedicels 1.5–2.5 mm. Calyx teeth obsolete. Petals white or pale yellow, abaxially pubescent. Stylopodium conic; styles reflexed. Fruit ovoid or obo-

void, slightly dorsally compressed, 5–6 × 2.5–3 mm, sparsely pilose when young, almost glabrous at maturity; dorsal ribs filiform, margin ribs winged; vittae 3–5 in each furrow, 10–12 on the commissure. Fl. and fr. Jun–Jul.

Dry stony schistose slopes; 700–900 m. Qinghai, Xinjiang [Kazakhstan].

This plant is very similar to the following species, *Seseli coronatum*, and is perhaps conspecific with it.

17. *Seseli coronatum* Ledebour, Fl. Altaic. 1: 336. 1829.

柱冠西风芹 zhu guan xi feng qin

Plants 25–60 cm, polycarpic, glaucescent throughout. Caudex branched. Stems several, branched at base or above, solid, terete, glabrous or minutely scabrid at base, branches elongate, rigid. Basal leaves numerous, petioles puberulous, sheaths broadly ovate-lanceolate and scarious-margined; blade oblong, 7–20 × 2–7 cm, 2–3-pinnately dissected; ultimate segments linear-lanceolate, 5–15 × 1–2 mm, acute. Synflorescence thyrsoid; umbels 3–6 cm across; rays 6–10, 0.1–2.2 cm, unequal; bracts absent or 1–2, small, early deciduous; bracteoles 6–8, ovate-lanceolate, longer than flowers, apex acuminate, pubescent, margin scarious; umbellules 7–15-flowered; pedicels 1.5–3 mm. Calyx teeth obsolete. Petals white, oblong or suborbicular, abaxially puberulous. Stylopodium conic, base undulate; styles slender, reflexed. Fruit oblong, slightly dorsally compressed, (3–)4–6 × (1.5–)2.5–3.5 mm; dorsal ribs filiform, prominent, lateral ribs slightly broader than dorsal, narrowly winged; vittae 3–5 in each furrow, 8–12 on commissure, unequal. Fl. and fr. Jun–Sep.

Dry, gravelly slopes, steppe; 1000–1300 m. Xinjiang [Kazakhstan].

This species was misidentified in FRPS (55(2): 197. 1985) as *Seseli tschuliense* Pavlov ex Korovin, which is distributed in C Asia.

18. *Seseli sandbergiae* Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 309. 1930.

山西西风芹 shan xi xi feng qin

Seseli schansiense Fedde ex H. Wolff.

Plants 50–70 cm, monocarpic. Caudex simple. Stem solitary, branched from middle, densely pubescent under synflorescence. Basal leaves subsessile, sheaths broadly lanceolate,

pubescent; blade triangular-ovate, 8–13 × 5–8 cm, 2-pinnately dissected; pinnae long-petiolulate; ultimate segments sessile, lateral segments obovate-oblong or rhombic, 2–3-lobed, terminal segments obovate-cuneate, 3-lobed, base decurrent, abaxially gray-green, sparsely puberulous on both surfaces, especially abaxially and margins. Umbels 3–7 cm across; peduncles densely pubescent; bracts absent or several, linear or linear-lanceolate, small, puberulous; rays 6–12, 1.5–4 cm, very unequal, pubescent; bracteoles 8–10, linear-lanceolate, exceeding flowers, apex caudate; umbellules 16–30-flowered; pedicels 2–4 mm. Petals white, abaxially puberulous. Stylopodium low-conic, base undulate; styles reflexed. Fruit oblong, slightly dorsally compressed, 3–5 × 2–3.5 mm, puberulent; ribs all filiform, acute-keeled; vittae 2–3 in each furrow, 4–6 on commissure. Fl. and fr. Aug–Sep.

• Mountain slopes, grasslands, roadsides; ca. 1000 m. S Shanxi (Quwo).

This poorly known taxon is recorded only from the type gathering.

19. *Seseli incisodentatum* K. T. Fu, Fl. Tsinling. 1(3): 459. 1981 [“*inciso-dentatum*”].

锐齿西风芹 rui chi xi feng qin

Plants 30–50 cm, monocarpic. Caudex simple. Stem solitary, slender, branched above, finely grooved, glabrous. Basal leaves many, petiole sheaths ovate, scarious-margined; blade ovate, 5–15 × 2–4 cm, 3-pinnate; pinnae 4–6 pairs, basally remote; ultimate segments ovate, 4–10 × 3–5 mm, deeply 3-toothed or pinnate. Cauline leaves reduced upwards, 3-lobed or pinnate, petioles wholly sheathing. Synflorescence much-branched, corymbose; umbels 3–6 cm across; peduncle apex and base of rays sparsely scaberulous; bracts absent; rays 5–7, 1–2.4 cm, unequal, thin; bracteoles 5–7, narrow-linear, 1–2 mm, shorter than flowers; umbellules 8–12-flowered; pedicels 0.7–4 mm. Calyx teeth obsolete or broadly triangular, small, ca. 0.2 mm. Petals yellowish, oblong, with an elongate narrowly inflexed apex, glabrous. Stylopodium low-conic; styles short. Fruit oblong, slightly dorsally compressed, ca. 2 × 1 mm, glabrous; ribs all filiform, slightly prominent; vittae 2–3 in each furrow, 4–6 on commissure. Fl. and fr. Aug–Oct.

• Mountain slopes, grasslands, roadsides; ca. 900 m. S Gansu (Wenxian).

This rather poorly known species is recorded only from a few collections. See the taxonomic note under *Seseli squarulosum*.

The following is a synopsis of an alternative classification of *Seseli*, including *Libanotis* and allied genera, as proposed by two of us (Pimenov and Kljuykov). Synonyms are included only where taxonomic concepts, as indicated through synonymy, differ from those used in the main accounts. Literature citations provided in the main accounts are not repeated.

SESELI Linnaeus (alternative classification)

西风芹属 xi feng qin shu

Eriocycla Lindley; *Libanotis* Haller ex Zinn; *Lomatopodium* Fischer & C. A. Meyer.

- 1a. Main stem not developed; fruit with dense white unicellular papillae and multi-cellular scales.
 - 2a. Petiole sheaths broadly ovate; bracteoles almost equal, lanceolate, shorter than flowers; vittae 2–3 in each furrow, 4–6 on commissure 1. *S. acaule*
 - 2b. Petiole sheaths narrowly lanceolate; bracteoles distinctly unequal, narrow linear, the longest longer than flowers; vittae solitary in each furrow, 2 on commissure 2. *S. depressum*
- 1b. Main stem developed; fruit glabrous or hairy, rarely with papillae, never with scales.

- 3a. Petals yellow or light yellow, rarely pinkish.
- 4a. Bracts developed.
- 5a. Leaf blades ternate; leaflet venation parallel 3. *S. delavayi*
- 5b. Leaf blades 1–2-pinnatisect; leaflet venation reticulate.
- 6a. Plants 20–40(–60) cm; caudex divided; umbellules 10–20-flowered; fruit elliptic to oblong-linear; seed face plane 4. *S. pelliotti*
- 6b. Plants (30–)35–100 cm; caudex undivided; umbellules 8–10-flowered; fruit ovoid; seed face deeply grooved 5. *S. nudum*
- 4b. Bracts obsolete.
- 7a. Plants polycarpic; caudex branched, lignified; flowers and fruit subsessile 6. *S. sessiliflorum*
- 7b. Plants monocarpic; caudex undivided; pedicels developed.
- 8a. Ovaries and fruit pubescent; umbel rays very unequal 7. *S. valentinae*
- 8b. Ovaries and fruit glabrous; umbels rays almost equal.
- 9a. Bracteoles free at base; petal secretory ducts solitary; dorsal mericarp ribs filiform, marginal ribs winged 10. *S. incisodentatum*
- 9b. Bracteoles connate at base; petals secretory ducts several; mericarp ribs almost equally short-winged.
- 10a. Leaf blade 1–2-ternately dissected 8. *S. yunnanense*
- 10b. Leaf blade simple, undivided 9. *S. simplicifolium*
- 3b. Petals white, greenish or pale.
- 11a. Umbel rays 15–50.
- 12a. Stems smooth or grooved; terminal leaf lobes narrowly linear; fruit glabrous 14. *S. strictum*
- 12b. Stems angled or sharp-ribbed; terminal leaf lobes lanceolate to ovate; fruit pubescent.
- 13a. Leaf blades shiny, rigid, terminal lobes ovate or obovate 11. *S. buchtormense*
- 13b. Leaf blades matt, not-rigid, terminal lobes lanceolate to broadly lanceolate.
- 14a. Vittae solitary in each furrow, 2 on commissure; stems angled, corymbose-branched above 12. *S. libanotis*
- 14b. Vittae 1–4 in each furrow, 4–6 on commissure; stems ribbed, thyrsoid-branched from middle 13. *S. seseloides*
- 11b. Umbel rays 2–15.
- 15a. Bracts several or many.
- 16a. Fruit glabrous; leaf blade 1–2-pinnatisect 17. *S. mucronatum*
- 16b. Fruit pubescent; leaf blade usually 2–3-pinnatisect, rarely pinnatisect.
- 17a. Umbellules (15–)16–50-flowered.
- 18a. Vittae 2–4 in each furrow; stems hollow; bracteoles longer than flowers; styles straight or slightly reflexed 31. *S. condensatum*
- 18b. Vittae solitary in each furrow; stems solid; bracteoles shorter than flowers; styles reflexed.
- 19a. Plants monocarpic; stem solitary, gray-white tomentose; caudex undivided 32. *S. incanum*
- 19b. Plants polycarpic; stems several, green, scattered hairy; caudex branched 33. *S. schrenkianum*
- 17b. Umbellules 2–14(–15)-flowered.
- 20a. Terminal leaf lobes ovoid, ovoid-lanceolate or rhombic 34. *S. laticalycinum*
- 20b. Terminal leaf lobes narrowly lanceolate to linear.
- 21a. Calyx teeth obsolete; plants polycarpic; caudex branched, lignified; stems and leaves glabrous; fruit 7.5–10 mm 35. *S. aemulans*
- 21b. Calyx teeth prominent; plants monocarpic and polycarpic; caudex branched or undivided; stems and leaves pubescent or glabrous; fruit 2.8–5.5 mm (except 7.5–10 mm in *S. eriocarpum*).
- 22a. Plants 100–200 cm, monocarpic; caudex undivided; stems thick 36. *S. vaillantii*
- 22b. Plants 25–60(–80) cm, polycarpic; caudex branched.
- 23a. Fruit ribs equal, filiform; vittae solitary in each furrow 37. *S. eriocarpum*
- 23b. Fruit ribs unequal, dorsal ribs keeled, marginal ribs larger; vittae solitary or 2–3 in each furrow.
- 24a. Marginal fruit ribs slightly larger than dorsal, all ribs thickened, obtuse; vittae solitary in the furrows, 2 on the commissure 38. *S. abolinii*
- 24b. Marginal fruit ribs considerably larger than dorsal, all ribs keeled, acute; vittae 2–3 in the furrows, 4–6 on the commissure 39. *S. grubovii*
- 15b. Bracts absent or 1–2.
- 25a. Fruit and ovaries with white membranous disk at base; fruit almost glabrous 15. *S. glabratum*
- 25b. Fruit and ovaries without disk at base; fruit pubescent, rarely glabrous.
- 26a. Fruit and ovaries glabrous.
- 27a. Bracteoles absent 16. *S. purpureovaginatam*
- 27b. Bracteoles several 17. *S. mucronatum*
- 26b. Ovaries pubescent; fruit pubescent, almost glabrous (*S. asperulum*), or glabrous (*S. coronatum*).
- 28a. Caudex branched; plants polycarpic.

- 29a. Terminal leaf lobes rhombic to ovoid; rays 3–4 18. *S. togasii*
 29b. Terminal leaf lobes linear-lanceolate to linear; rays 4–10.
 30a. Calyx teeth prominent; fruit densely pubescent; ribs equal, filiform; vittae solitary in each furrow, 2 on commissure 19. *S. junatovii*
 30b. Calyx teeth obsolete; fruit glabrous or minutely pubescent; dorsal ribs filiform, marginal ribs narrowly winged; vittae 3–5 in each furrow, 8 on commissure.
 31a. Leaf blade greenish pubescent; stems, rays and bracts scabrous; bracteoles 5–8; mature fruit minutely pubescent 20. *S. asperulum*
 31b. Plant completely glabrous; bracteoles 8–10; fruit glabrous 21. *S. coronatum*
 28b. Caudex undivided; plants monocarpic.
 32a. Bracteoles connate up to middle; flowers almost sessile; umbellules 20–30-flowered 22. *S. eriocephalum*
 32b. Bracteoles free, or connate only at base; pedicels prominent; umbellules 5–20(–30)-flowered.
 33a. Stems and leaves glabrous.
 34a. Fruit papillate; stylopodium low-conic; styles reflexed; terminal leaf lobes 3–15 × 0.5–1 mm 23. *S. intramongolicum*
 34b. Fruit densely hairy; stylopodium conic; styles almost straight; terminal leaf lobes 30–60 × 5–7 mm 24. *S. lancifolium*
 33b. Stems and leaves puberulent.
 35a. Leaves 2–3-pinnatisect, primary segments long petiolulate.
 36a. Rays very unequal; vittae 2–3 in each furrow, 4–6 on commissure 25. *S. sandbergiae*
 36b. Rays ca. equal; vittae solitary in each furrow, 2 on commissure 26. *S. jinanense*
 35b. Leaves 1-pinnatisect, primary segments short petiolulate or sessile.
 37a. Stem base not covered by remnant sheaths; styles reflexed 30. *S. albescens*
 37b. Stem base densely covered by triangular or lanceolate remnant sheaths; styles straight or reflexed.
 38a. Rays 3–4; plants slender; terminal leaf lobes lanceolate to linear, 4–12 mm 27. *S. lanzhouense*
 38b. Rays 5–15; plants robust; terminal leaf lobes ovoid, 15–50 mm.
 39a. Rays 5–12; rays and pedicels sparsely pubescent; terminal leaf lobes pubescent; petals white 28. *S. spodotrichoma*
 39b. Rays 10–15; rays and pedicels densely pubescent; terminal leaf lobes minutely pubescent or almost glabrous; petals greenish-white 29. *S. wannienchun*
- 1. *Seseli acaule*** (R. H. Shan & M. L. Sheh) V. M. Vinogradova, *Novosti Sist. Vyssh. Rast.* 26: 124. 1989.
Libanotis acaulis R. H. Shan & M. L. Sheh.
- 2. *Seseli depressum*** (R. H. Shan & M. L. Sheh) V. M. Vinogradova, *Novosti Sist. Vyssh. Rast.* 26: 124. 1989.
Libanotis depressa R. H. Shan & M. L. Sheh.
- 3. *Seseli delavayi*** Franchet.
- 4. *Seseli pelliottii*** (H. de Boissieu) Pimenov & Kljuykov, *Bot. Zhurn.* 85(10): 105. 2000.
Eriocyclus pelliottii (H. de Boissieu) H. Wolff; *Platytaenia depauperata* Schischkin; *Semenovia depauperata* (Schischkin) Mandenova; *Seseli depauperatum* (Schischkin) V. M. Vinogradova; *Zosima depauperata* (Schischkin) M. Hiroe.
- 5. *Seseli nudum*** (Lindley) Pimenov & Kljuykov, *Bot. Zhurn.* 85(10): 105. 2000.
Eriocyclus nuda Lindley; *Scaphespermum trilobum* Edgeworth; *Seseli nortonii* Fedde ex H. Wolff; *Seseli trilobum* (Edgeworth) C. B. Clarke.
- 6. *Seseli sessiliflorum*** Schrenk.
- 7. *Seseli valentinae*** Popov.
- 8. *Seseli yunnanense*** Franchet.
Seseli mairei H. Wolff.
- 9. *Seseli simplicifolium*** (C. Y. Wu ex R. H. Shan & M. L. Sheh) Pimenov & Kljuykov, *Feddes Repert.* 110: 488. 1999.
Seseli mairei H. Wolff var. *simplicifolium* C. Y. Wu ex R. H. Shan & M. L. Sheh.
- 10. *Seseli incisodentatum*** K. T. Fu.
Seseli squarrulosum R. H. Shan & M. L. Sheh.
- 11. *Seseli buchtormense*** (Fischer) W. D. J. Koch, *Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur.* 12(1): 111. 1824.
Libanotis buchtormensis (Fischer) de Candolle.
- 12. *Seseli libanotis*** (Linnaeus) W. D. J. Koch, *Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur.* 12(1): 111. 1824.
Athamanta libanotis Linnaeus, *Sp. Pl.* 1: 244. 1753; *Libanotis intermedia* Ruprecht; *L. montana* Crantz; *L. sibirica* C. A. Meyer; *L. vulgaris* Linnaeus; *Seseli intermedium* (Ruprecht) Vodopianova.
- 13. *Seseli seseloides*** (Fischer & C. A. Meyer ex Turczaninow) M. Hiroe, *Umbell. Asia* 1: 135. 1958.
Libanotis amurensis Schischkin; *L. seseloides* (Fischer & C. A. Meyer ex Turczaninow) Turczaninow; *Seseli laserpittifolium* Palibin.
- 14. *Seseli strictum*** Ledebour.

- 15. *Seseli glabratum*** Willdenow ex Sprengel.
- 16. *Seseli purpureovaginatum*** R. H. Shan & M. L. Sheh.
- 17. *Seseli mucronatum*** (Schrenk) Pimenov & Sdobnina, Byull. Moskovsk. Obšč. Isp. Prir., Otd. Biol. 78(4): 139. 1973.
Ligusticum mucronatum (Schrenk) Leute; *L. thomsonii* C. B. Clarke; *Pleurospermum longicaule* H. Wolff; *Neogaya urbis-malorum* Popov.
- 18. *Seseli togasii*** (M. Hiroe) Pimenov & Kljuykov.
- 19. *Seseli junatovii*** V. M. Vinogradova.
- 20. *Seseli asperulum*** (Trautvetter) Schischkin.
- 21. *Seseli coronatum*** Ledebour.
- 22. *Seseli eriocephalum*** (Pallas ex Sprengel) Schischkin.
- 23. *Seseli intramongolicum*** Y. C. Ma.
- 24. *Seseli lancifolium*** (K. T. Fu) Pimenov, Feddes Repert. 110: 487. 1999.
Libanotis lancifolia K. T. Fu.
- 25. *Seseli sandbergiae*** Fedde ex H. Wolff.
- 26. *Seseli jinanense*** (L. C. Xu & M. D. Xu) Pimenov, Feddes Repert. 110: 487. 1999.
Libanotis jinanensis L. C. Xu & M. D. Xu.
- 27. *Seseli lanzhouense*** (K. T. Fu ex R. H. Shan & M. L. Sheh) V. M. Vinogradova, Novosti Sist. Vyssh. Rast. 22: 200. 1985.
Libanotis lanzhouensis K. T. Fu ex R. H. Shan & M. L. Sheh.
- 28. *Seseli spodotrichoma*** (K. T. Fu) Pimenov, Feddes Repert. 110: 487. 1999 [“*spodotrichomum*”].
Libanotis spodotrichoma K. T. Fu.
- 29. *Seseli wannienchun*** (K. T. Fu) Pimenov, Feddes Repert. 110: 487. 1999.
Libanotis wannienchun K. T. Fu.
- 30. *Seseli albescens*** (Franchet) Pimenov & Kljuykov, Bot. Zhurn. 85(10): 107. 2000.
Eriocyclus albescens (Franchet) H. Wolff.
- 31. *Seseli condensatum*** (Linnaeus) H. G. Reichenbach, Icon. Fl. Germ. Helv. 21: 37. 1867.
Libanotis condensata (Linnaeus) Crantz (but excluding *Seseli laserpitiifolium* Palibin; see species no. 13, *S. seseloides*).
- 32. *Seseli incanum*** (Stephan ex Willdenow) B. Fedtschenko, Rastit. Turkest. 617. 1915.
Libanotis incana (Stephan ex Willdenow) O. Fedtschenko & B. Fedtschenko.
- 33. *Seseli schrenkianum*** (C. A. Meyer ex Schischkin) Pimenov & Sdobnina, Bot. Zhurn. 60: 1119. 1975.
Libanotis schrenkiana C. A. Meyer ex Schischkin.
- 34. *Seseli laticalycinum*** (R. H. Shan & M. L. Sheh) Pimenov, Feddes Repert. 110: 487. 1999.
Libanotis laticalycina R. H. Shan & M. L. Sheh.
- 35. *Seseli aemulans*** Popov.
- 36. *Seseli vaillantii*** H. de Boissieu, Bull. Mus. Hist. Nat. (Paris) 16: 165. 1910.
Libanotis iliensis (Lipsky) Korovin.
- 37. *Seseli eriocarpum*** (Schrenk) B. Fedtschenko, Rastit. Turkest.: 617. 1915.
Libanotis eriocarpa Schrenk.
- 38. *Seseli abolinii*** (Korovin) Schischkin in Schischkin & Bobrov, Fl. URSS 16: 505. 1950.
Libanotis abolinii (Korovin) Korovin.
- 39. *Seseli grubovii*** V. M. Vinogradova & Sanchir, Bot. Zhurn. 70: 965. 1985.
Libanotis grubovii (V. M. Vinogradova & Sanchir) M. L. Sheh & M. F. Watson.

61. OENANTHE Linnaeus, Sp. Pl. 1: 254. 1753.

水芹属 shui qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Dasyloma de Candolle; *Phellandrium* Linnaeus.

Herbs, perennial, glabrous. Roots fibrous or fusiform to ovoid tubers. Stems erect, branching, decumbent, weakly diffuse or stoloniferous, hollow, angular, striate, rooting at basal nodes. Basal and lower leaves petiolate, wholly sheathing; blade 1–4-pinnate, homomorphic or heteromorphic to the cauline leaves. Umbels compound, loose, terminal and axillary or leaf-opposed; bracts absent, or occasionally 1; rays 4–15(–30); bracteoles numerous. Calyx teeth prominent, lanceolate, nearly as long as stylopodium. Petals white or pale pink, obovate, base cuneate, apex emarginate, with small incurved lobule, outer petals in umbellule usually enlarged (radiant). Stylopodium conic; styles elongate, erect or divergent, sometimes reflexed in fruit. Fruit ovoid or subglobose, slightly compressed dorsally or laterally, glabrous; dorsal and intermediate ribs slightly thickened, corky, or somewhat protruding, filiform, subequal; lateral ribs dilated, subtriangular, corky; vittae solitary in each furrow, 2 on commissure. Seed face plane. Carpophore obsolete.

Between 25 and 30 species: Africa, Asia, Europe, North America; five species in China.

- 1a. Dorsal and intermediate fruit ribs thickened, corky; leaves homomorphic, ultimate segments ovate or rhombic-ovate, 2–6 × 1–2 cm 1. *O. javanica*

- 1b. Dorsal and intermediate fruit ribs slightly thickened, corky, or somewhat protruding, filiform; leaves homomorphic or heteromorphic, ultimate segments linear, lanceolate, rarely ovate or rhombic-ovate, smaller, 1–3 × 0.5–1 cm.
- 2a. Peduncles 0.5–1(–2) cm, or obsolete; ultimate segments rhombic-ovate, rarely lanceolate 2. *O. benghalensis*
- 2b. Peduncles 2–25 cm; ultimate segments linear, lanceolate, rarely rhombic-ovate.
- 3a. Leaves 1-pinnate, pinnae mostly reduced, rachis only with a few subulate and remote pinnae 3. *O. hookeri*
- 3b. Leaves 1–4-pinnate, pinnae not reduced.
- 4a. Leaves 1–2-pinnate, ultimate segments linear, 20–40 × 1–2 mm, rarely rhombic-ovate 4. *O. linearis*
- 4b. Leaves 3–4-pinnate, linear, minute, 2–3 × 1–2 mm 5. *O. thomsonii*

1. *Oenanthe javanica* (Blume) de Candolle, Prodr. 4: 138. 1830.

水芹 shui qin

Plants 10–80 cm. Roots fibrous. Stems decumbent. Basal petioles 5–10 cm; blade oblong-ovate, 1–2-pinnate; ultimate segments ovate or rhombic-ovate, 5–50 × 5–20 mm, margins serrate. Cauline leaves gradually reduced upwards, smaller, becoming sessile on expanded sheaths. Umbels 3–5 cm across; peduncles 2–16 cm; bracts absent, or occasionally 1, linear, 3–11 mm; rays 6–16(–30), 1–3 cm, subequal or unequal; bracteoles 2–8, linear, 2–4 cm, as long as pedicels; umbellules ca. 20-flowered; pedicels 1.5–4 mm. Calyx teeth ca. 0.5 mm. Styles patent, 1.2–2 mm. Fruit subglobose or ovoid, ca. 2.5 × 2 mm; dorsal and intermediate ribs slightly corky-thickened.

Grassland at forest margins, marshlands, water meadows, lake-shores, river banks, muddy stream banks, shallow water; 600–4000 m. Throughout China [India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Russia, Thailand, Vietnam].

The complex nomenclatural history reflects the taxonomic problems with these morphologically very variable, widespread plants. Leaf morphology is particularly variable, and the size and shape of the leaves of the subsp. *javanica* converge with subsp. *rosthornii* in Malaysia and adjoining areas. Outside China, some authors have a broader species concept for *Oenanthe javanica*, including *O. benghalensis* and *O. linearis* within it. Further work over a wide geographic area is needed to resolve the classification.

- 1a. Rays subequal, 1–3 cm; bracteoles linear; fruit subglobose 1a. subsp. *javanica*
- 1b. Rays unequal, 2–6 cm; bracteoles lanceolate; fruit ovoid 1b. subsp. *rosthornii*

1a. *Oenanthe javanica* subsp. *javanica*

水芹(原亚种) shui qin (yuan ya zhong)

Sium javanicum Blume, Bijdr. Fl. Ned. Ind. 5: 881. 1826; *Dasyloma javanicum* (Blume) Miquel; *D. subbipinnatum* Miquel; *Falcaria javanica* (Blume) de Candolle; *Oenanthe decumbens* Koso-Poljansky; *O. javanica* subsp. *stolonifera* (Roxburgh) Murata; *O. kudoii* Suzuki & Yamamoto; *O. normanii* Metcalf; *O. stolonifera* (Roxburgh) de Candolle; *O. stolonifera* var. *javanica* (Blume) Kuntze; *O. subbipinnata* (Miquel) Drude; *Phellandrium stoloniferum* Roxburgh.

Plants slender. Umbels 3–5 cm across. Rays subequal, 1–3 cm. Bracteoles linear. Fruit subglobose. Fl. Jun–Jul, fr. Aug–Sep. 2n = 20.

Marshlands, lakeshores, muddy stream banks, shallow water; 600–3000 m. Throughout China [India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Russia, Thailand, Vietnam].

The shoots and leaves comprise the dietary herb “shui qin” of traditional Chinese medicine.

1b. *Oenanthe javanica* subsp. *rosthornii* (Diels) F. T. Pu, Novon 8: 70. 1998.

卵叶水芹 luan ye shui qin

Oenanthe rosthornii Diels, Bot. Jahrb. Syst. 29: 498. 1900; *O. alatinervis* Y. Y. Qian; *O. pterocaulon* S. L. Liu et al.

Plants stout. Umbels 3–7.6 cm across; rays unequal, 2–6 cm; bracteoles lanceolate. Fruit ovoid. Fl. Aug–Sep, fr. Oct–Nov.

Grassland at forest margins, marshes, water meadows, river banks; 1400–4000 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Sichuan, Taiwan, Yunnan [Thailand].

This variety has reputed medicinal value.

2. *Oenanthe benghalensis* (Roxburgh) Kurz, J. Asiat. Soc. Bengal 2: 115. 1877.

短辐水芹 duan fu shui qin

Seseli benghalense Roxburgh, Fl. Ind., ed. 1832, 2: 93. 1832; *Dasyloma benghalense* (Roxburgh) de Candolle; *D. glaucum* de Candolle.

Plants 15–60 cm. Roots fibrous. Stems usually erect, angular, branched from base. Basal petioles 1–4 cm; blade triangular-ovate, 1–2-pinnate; ultimate segments rhombic-ovate, rarely lanceolate, 5–20 × 1–5 mm. Upper leaves smaller, sessile, 1-pinnate, pinnae rhombic ovate or lanceolate. Umbels 0.5–3.5 cm across; peduncles short, 0.5–1(–2) cm, often leaf-opposed, or obsolete; bracts absent; rays 4–10, 0.5–1 cm; bracteoles numerous, linear, as long as pedicels, umbellules 8–15-flowered; pedicels 0.5–2 mm. Calyx teeth ca. 0.4 mm. Styles 1.4–1.8 mm. Fruit ovoid, 2.5–3 × 1.5–2 mm; dorsal and intermediate ribs slightly thickened, corky. Fl. May–Jun, fr. Jun–Jul.

Moist ground at forest margins, muddy banks, irrigation ditches; 500–1500 m. Guangdong, Sichuan, Yunnan [N India].

This species has reputed medicinal value. It is very similar to, and possibly not distinct from, *Oenanthe javanica* (see the comment under the latter species); the two differ in umbel and fruit characters.

3. *Oenanthe hookeri* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 697. 1879.

高山水芹 gao shan shui qin

Plants 40–80 cm, slender. Stems decumbent, scarcely branched, rooting at lower nodes. Leaves mostly reduced, 1-pinnate, fistular; pinnae few, remote on the rachis, subulate, 5–15 × 0.5–1 mm. Umbels 1.5–3 cm across; peduncles elongate,

5–8 cm; bracts absent, or occasionally 1, linear, 0.5–2.5 cm; rays 4–8, 0.5–1.5 cm, unequal, sometimes pubescent; bracteoles 3–5, linear, 3–3.5 × ca. 0.5 mm, unequal; umbellules 15–20-flowered; pedicels 2–3 mm, unequal. Calyx teeth ca. 0.6 mm. Styles ca. 0.6 mm. Fruit ovoid, ca. 2 × 1.5 mm; dorsal and intermediate ribs protruding, filiform. Fl. Jun–Jul, fr. Aug–Sep.

Moist places at forest margins, alpine marshlands, wet meadows, streamsides; 2500–4600 m. W Sichuan, S Xizang, NW Yunnan [Bhutan, India, Nepal].

4. *Oenanthe linearis* Wallich ex de Candolle, Prodr. 4: 138. 1830.

线叶水芹 xian ye shui qin

Plants 30–70 cm. Roots fibrous or fusiform. Stems decumbent, rooting at lower nodes, unbranched or few-branched above. Leaves heteromorphic, lower petioles 1–10 cm; blade triangular-ovate, 3–7 × 2–5 cm, mostly 1-pinnate, rarely 2-pinnate; ultimate segments linear, 20–40 × 1–2 mm, rarely rhombic-ovate or lanceolate, 5–30 × 2–5 mm. Upper leaves sessile, 1-pinnate; pinnae linear, 10–40 × 1–3 mm. Umbels 2–4(–5) cm across, often leaf-opposed; peduncles 2–10 cm; bracts absent, or 1, linear; rays 3–12, 1.5–3 cm, unequal; bracteoles 3–8, linear or linear-lanceolate, 3–6 mm, unequal; umbellules 8–20-flowered; pedicels 1.5–4 mm. Calyx teeth ca. 0.5 mm. Styles ca. 2 mm, reflexed. Fruit ovoid, ca. 2 × 1.5 mm; dorsal and intermediate ribs filiform. Fl. May–Jul, fr. Jul–Aug.

Open forests, Moist shade under shrubs and trees, grassy valley slopes, marshlands, grassy places near water; 800–3000 m. Chongqing, Guizhou, Hubei, Sichuan, Taiwan, Xizang, Yunnan [India, Indonesia, Laos, Myanmar, Nepal, Vietnam].

Some authors consider both varieties conspecific with *Oenanthe javanica* (see the taxonomic note under that species).

- 1a. Pinnae of lower leaves mostly linear, entire; fruit dorsal and intermediate ribs filiform 4a. subsp. *linearis*
 1b. Pinnae of lower leaves rhombic-ovate, margins incised or lacinate; fruit dorsal and intermediate ribs slightly thickened, corky 4b. subsp. *rivularis*

4a. *Oenanthe linearis* subsp. *linearis*

线叶水芹(原亚种) xian ye shui qin (yuan ya zhong)

Oenanthe dielsii H. de Boissieu; *O. javanica* (Blume) de Candolle subsp. *linearis* (Wallich ex de Candolle) Murata; *O. sinensis* Dunn.

Plants slender. Lower leaves 1-pinnate, rarely 2-pinnate; pinnae linear, 20–40 × 1–2 mm, narrowly lanceolate or rhombic-ovate, 5–30 × 2–5 mm. Fruit dorsal and intermediate ribs mainly filiform.

Moist shade under shrubs and trees, marshes, grassy places near water; 800–3000 m. Chongqing, Guizhou, Hubei, Sichuan, Taiwan, Xizang, Yunnan [India, Indonesia, Myanmar, Nepal, Vietnam].

This variety has reputed medicinal value

4b. *Oenanthe linearis* subsp. *rivularis* (Dunn) C. Y. Wu & F. T. Pu in W. T. Wang, Vasc. Pl. Hengduan Mts. 1: 1332. 1993.

蒙自水芹 meng zi shui qin

Oenanthe rivularis Dunn, J. Linn. Soc., Bot. 35: 496. 1903.

Plants stout. Lower leaves almost 1-pinnate; pinnae rhombic-ovate, 15–30 × 5–10 mm, margins incised to lacinate. Fruit dorsal and intermediate ribs slightly thickened, corky.

• Open forests, grassy valley slopes, marshlands; 1100–2500 m. Guizhou, Sichuan, Yunnan [Laos].

Recent records from Laos require confirmation. This variety is used in Guizhou and Yunnan as a regional substitute for “shui qin,” a dietary herb of traditional Chinese medicine (see *Oenanthe javanica*).

5. *Oenanthe thomsonii* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 697. 1879.

多裂叶水芹 duo lie ye shui qin

Plants 20–50 cm, weak, diffuse. Roots fascicled or fibrous. Stems slender, creeping, branched. Leaves homomorphic, 3–4(–5)-pinnate; primary pinnae 5–7 pairs; ultimate segments short linear, 2–3 × 1–2 mm. Umbels 3–8 across, frequently leaf-opposed; peduncles elongate, 2.5–10 cm; bracts absent; rays 4–12, 1.5–3.5 cm, unequal; bracteoles 5–7, linear, 1.5–4 mm; umbellules 15–20-flowered; pedicels 3–5 mm, unequal. Styles ca. 1 mm, reflexed. Fruit subglobose, ca. 2 × 1.5 mm; dorsal and intermediate ribs protruding, filiform. Fl. Jul–Aug, fr. Sep–Oct.

Moist shaded areas among shrubs and trees, marshy meadows, moist grasslands, river banks, streamsides; 1000–3500 m. Chongqing, Guangdong, Guizhou, Hubei, Jiangxi, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim, Vietnam].

- 1a. Leaves 3–4(–5)-pinnate; ultimate segments linear, 2–3 × 1–2 mm 5a. subsp. *thomsonii*
 1b. Leaves 2–3-pinnate; ultimate segments linear, 5–20 × ca. 1 mm 5b. subsp. *stenophylla*

5a. *Oenanthe thomsonii* subsp. *thomsonii*

多裂叶水芹(原亚种) duo lie ye shui qin (yuan ya zhong)

Oenanthe caudata C. Norman.

Stems creeping. Leaves 3–4(–5)-pinnate; ultimate segments short, linear, 2–3 × 1–2 mm.

Marshy meadows, moist grasslands, streamsides; 1800–3500 m. Guangdong, Guizhou, Hubei, Jiangxi, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

This variety has reputed medicinal value.

5b. *Oenanthe thomsonii* subsp. *stenophylla* (H. de Boissieu) F. T. Pu, Novon 8: 71. 1998 [“*stenophyllum*”].

窄叶水芹 zhai ye shui qin

Oenanthe thomsonii var. *stenophylla* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 843. 1903; *O. dielsii* H. de Boissieu subsp. *stenophylla* (H. de Boissieu) C. Y. Wu & F. T. Pu; *O. dielsii* var. *stenophylla* (H. de Boissieu) H. de Boissieu.

Stems erect. Leaves 2–3-pinnate; ultimate segments linear, 5–20 × ca. 1 mm.

• Moist shaded areas among shrubs and trees, river banks; 1000–2500 m. Chongqing, Sichuan [Vietnam].

Recent records from Vietnam require confirmation. This variety has reputed medicinal value in C China.

62. SCHULZIA Sprengel, *Neue Schriften Naturf. Ges. Halle* 2(1): 30. 1813, nom. cons.,
not *Shultzia* Rafinesque (1808).

苞裂芹属 bao lie qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs perennial, glabrous. Tap root cylindric. Stem conspicuous, erect, or obsolete, base clothed in fibrous remnant sheaths. Basal leaves petiolate, sheaths dilated, white and membranous at margins; blade 2–3-pinnate; ultimate segments linear-lanceolate or linear. Umbels compound, terminal and lateral; rays stout, subequal or unequal; bracts and bracteoles 2–3-pinnate; umbellules many-flowered. Calyx teeth minute or obsolete. Petals white, obovate, base cuneate, apex with small incurved lobule. Stylopodium conic; styles erect, divergent or reflexed. Fruit oblong-ovoid or ovoid, slightly compressed laterally; ribs narrow, slightly winged; vittae 3–4 in each furrow, 4–8 on commissure. Seed face plane. Carpophore 2-parted.

About four species: C Asia, Himalayan region; four species in China.

1a. Rays subequal; bracteoles nearly as long as or exceeding umbellules.

2a. Leaves 3-pinnate; bracteoles 2–3-pinnate, nearly equal to umbellules 1. *S. crinita*

2b. Leaves 2-pinnate; bracteoles 3-lobed or 1-pinnate, subequal or exceeding flowering umbellules 2. *S. dissecta*

1b. Rays unequal; bracteoles subequal or shorter than umbellules.

3a. Leaves 2–3-pinnate; rays of terminal umbel stout, elongate; bracteoles entire, 2–3-lobed or pinnate 3. *S. prostrata*

3b. Leaves 3-pinnate; rays of terminal and lateral umbellules subequal; bracteoles 2-pinnate 4. *S. albiflora*

1. *Schulzia crinita* (Pallas) Sprengel, *Neue Schriften Naturf. Ges. Halle* 2(1): 30. 1813.

长毛苞裂芹 chang mao bao lie qin

Sison crinitum Pallas, *Acta Acad. Sci. Imp. Petrop.* 2: 250. 1779; *Athamanta crinita* (Pallas) Ledebour; *Carum crinitum* (Pallas) Koso-Poljansky.

Plants 10–45 cm. Rootstock rather thick, branched. Stem single, striate, little-branched or unbranched. Basal leaves petiolate; blade oblong, 6–12 × 1.5–2.5 cm, 3-pinnate; ultimate segments linear, 2–3 × 0.5–1 mm. Cauline leaves gradually reduced upward. Umbels 1–3, rarely more, 4–8 cm across; bracts 2–3-pinnate, nearly as long as rays; rays 12–15, stout, subequal; bracteoles numerous, similar to bracts, nearly as long as umbellules. Calyx teeth obsolete. Styles erect or divergent after flowering, ca. 2 mm, 2–3 times as long as stylopodium. Fruit oblong-ovoid, 3–4 × 1.5–2 mm; vittae 3–4 in each furrow, 4–8 on commissure. Fl. and fr. Jul–Aug.

Mossy forests, among shrubs in alpine meadows; 2500–2900 m. Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

2. *Schulzia dissecta* (C. B. Clarke) C. Norman, *J. Bot.* 76: 231. 1938.

苞裂芹 bao lie qin

Trachydium dissectum C. B. Clarke in J. D. Hooker, *Fl. Brit. India* 2: 672. 1879.

Plants 5–30 cm, slender. Stem simple or 1–2-branched at base. Leaves 2-pinnate; ultimate segments linear, 1–2 × 0.5–0.8 mm. Umbels 1–3 cm across; bracts oblong or oval, apex pinnatifid; rays 10–20, 1–3 cm, subequal; bracteoles 5–7, similar to bracts, subequal or exceeding flowers; umbellules 8–20-flowered. Calyx teeth obsolete. Fruit ovoid, brown with pale ridges when mature, 2–3 × ca. 0.75 mm, slightly compressed dorsally; ribs filiform or obscure; vittae 3–4 in each furrow, 4–8 on commissure. Fl. and fr. Aug–Oct.

High-altitude semi-stable screes; 5100–5300 m. S Xizang (Rongbuk N of Qomolangma Feng, Yadong) [Bhutan, Nepal, Sikkim].

3. *Schulzia prostrata* Pimenov & Kljuykov, *Bot. Zhurn.* 75(1): 94. 1990.

天山苞裂芹 tian shan bao lie qin

Plants ca. 10 cm. Stem short, unbranched. Leaves petiolate; blade oblong-lanceolate in outline, 2–3-pinnate; primary pinnae 3–5 pairs; ultimate segments lanceolate or linear, 2–3 × ca. 1 mm, acute. Terminal umbels 12–15 cm across, lateral umbels 3–4 cm across; bracts 3–5, entire or apex 2–3-lobed; rays of terminal umbel 5–13, very stout, elongate, 8–13 cm, unequal and diffuse; bracteoles 5–10, apex 2–3-lobed or pinnate, rarely entire. Calyx teeth minute or obsolete. Fruit broadly ovoid, ca. 3 × 1.5–2 mm, tuberculate; vittae 2–3 in each furrow, 6 on commissure. Fl. and fr. Jun–Aug.

Alpine meadows; 2500–3200 m. Xinjiang (Tian Shan) [Kyrgyzstan].

This species was misidentified in FRPS (55(1). 203. 1979) as *Trachydium tianshanicum* Korovin, which is distributed in C Asia.

4. *Schulzia albiflora* (Karelin & Kirilov) Popov, *Fl. Almaat Gos. Zapovedn.* 35. 1940.

白花苞裂芹 bai hua bao lie qin

Chamaescidium albiflorum Karelin & Kirilov, *Bull. Soc. Imp. Naturalistes Moscou* 15: 360. 1842.

Plants 20–30 cm. Stem usually obsolete, branches spreading-ascending from the base. Leaves oblong-lanceolate, 3-pinnate; ultimate segments linear-lanceolate or linear, 2–4 × 0.5–1 mm. Umbels numerous, 3–7 cm across; bracts numerous, 2-pinnate, similar to leaves, nearly as long as rays; rays 10–20(–30), 1.5–3 cm, unequal; bracteoles similar to bracts, nearly as long as pedicels. Calyx teeth obsolete. Fruit oblong-ovoid, ca. 3 × 1 mm; vittae 3 in each furrow, 8 on commissure. Fl. and fr. Jul–Aug.

Alpine meadows, grassy slopes; 2700–4600 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia (Siberia), Tajikistan].

63. FOENICULUM Miller, Gard. Dict. Abr., ed. 4. 1754.茴香属 *hui xiang shu*

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, annual or perennial, all parts strongly aromatic (anise-scented). Stem erect, terete, gray-green or lurid-green, glabrous. Leaves petiolate, sheaths membranous-margined; blade pinnately decompound; ultimate segments linear. Umbels compound, terminal and lateral; bracts and bracteoles absent; rays numerous, upwards-spreading, unequal. Calyx teeth obsolete. Petals yellow, ovate, mid rib conspicuous, apex with narrowly inflexed lobule. Stylopodium conic; styles very short, reflexed. Fruit oblong, terete, glabrous; ribs 5, acute or round-obtuse; vittae 1 in each furrow, 2 on commissure. Seed face plane or slightly concave. Carpophore 2-cleft to base.

One species: Mediterranean region; cultivated and adventive worldwide, including in China.

1. *Foeniculum vulgare* Miller, Gard. Dict., ed. 8, *Foeniculum* no. 1. 1768.

茴香 *hui xiang*

Anethum foeniculum Linnaeus, Sp. Pl. 1: 263. 1753; *A. pannorium* Roxburgh; *Foeniculum officinale* Allioni; *F. pannorium* (Roxburgh) de Candolle; *Ligusticum foeniculum* (Linnaeus) Crantz; *Meum foeniculum* (Linnaeus) Sprengel; *Selinum foeniculum* (Linnaeus) E. H. L. Krause; *Seseli foeniculum* (Linnaeus) Koso-Poljansky.

Plants 0.4–2 m. Lower petioles 5–15 cm; blade broadly

triangular in outline, 4–30 × 5–40 cm, 4–5-pinnatisect; ultimate segments linear, 1–6 × ca. 0.1 mm. Umbels 5–9 cm across; peduncles 2–25 cm; rays 6–29(–40), unequal, 1.5–10 cm; umbellules 14–39-flowered; pedicels thin, 2–10 mm, unequal. Fruit 4–6(–10) × 1.5–2.2(–2.5) mm. Fl. May–Jun, fr. Jul–Sep.

Cultivated and adventive; 200–2600 m. Throughout China [native to the Mediterranean region; cultivated and adventive worldwide].

The stem, leaves, and fruit are commonly used as the dietary herb “xiao hui xiang” in traditional Chinese medicine to aid digestion. The leaves are used for flavoring and the fruits are used as a spice (fennel).

64. ANETHUM Linnaeus, Sp. Pl. 1: 263. 1753.蒈萝属 *shi luo shu*

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, annual or biennial. Stem erect, terete. Basal leaves petiolate, sheaths scarious-margined; blade 2–3-pinnately dissected; ultimate segments narrowly linear. Inflorescence of loose compound umbels; peduncles much-branched; bracts and bracteoles absent; rays numerous, unequal. Calyx teeth obsolete. Petals yellow, costa brown, apex very incurved. Stylopodium conic, styles short, erect when young, spreading or recurved after flowering. Fruit ellipsoid or ovoid-ellipsoid, conspicuously flattened dorsally; dorsal ribs filiform, slightly prominent, lateral ribs narrowly winged, tapering at both ends; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base.

One species: Mediterranean region; cultivated and adventive worldwide, including in China.

1. *Anethum graveolens* Linnaeus, Sp. Pl. 1: 263. 1753.

蒈萝 *shi luo*

Anethum graveolens subsp. *sowa* (Roxburgh) N. F. Koren; *A. sowa* Roxburgh; *Ferula marathrophylla* W. G. Walpers; *Peucedanum anethum* Baillon; *P. graveolens* (Linnaeus) Hiern; *P. sowa* (Roxburgh) Kurz.

Plants 30–75(–100) cm, glabrous, strongly aromatic. Basal leaf blade broadly ovate, 3–4-pinnately dissected; ultimate seg-

ments narrow linear, 4–20 × ca. 0.5 mm. Upper leaves smaller and less divided, petioles sheathing throughout. Umbels 5–15 cm across; rays 10–25, 3–5 cm; umbellules 15–25-flowered; pedicels 6–10 mm. Fruit brown, 3–5 × 2–2.5 mm; lateral ribs gray-white, narrowly winged. Fl. May–Aug, fr. Jul–Sep.

Cultivated and adventive; 200–1500 m. Gansu, Guangdong, Guangxi, Sichuan [native to the Mediterranean region; cultivated and adventive worldwide].

The fruits are used in the traditional Chinese medicine “shi luo” and as a spice (dill).

65. SILAUM Miller, Gard. Dict. Abr., ed. 4. 1754.亮叶芹属 *liang ye qin shu*

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Silaus Bernhadi.

Herbs, perennial, glabrous. Stem erect, solid, striate, base clothed in fibrous remnant sheaths. Leaves long-petiolate, 3–4-pinnate; ultimate segments broadly lanceolate to linear, acute. Umbels compound, terminal and lateral; bracts absent or few, linear, deciduous; bracteoles numerous. Calyx teeth minute, conspicuous. Petals yellow, outer reddish-tinged, ovate, midvein elevated on both surfaces, apex narrowly inflexed. Stylopodium low-conic; styles short, reflexed. Fruit ovoid-oblong to subcylindrical, glabrous;

mericarps subpentagonal in cross section; ribs 5, acute, narrowly winged; vittae small, numerous, obscure when mature. Seed face plane. Carpophore 2-cleft to base.

One to five species: Europe and the Mediterranean region; one species (introduced) in China.

The circumscription of *Silaum* is controversial, with some authors treating it as a unispecific genus (with only *S. silaus*) and others including up to five species.

1. *Silaum silaus* (Linnaeus) Schinz & Thellung, Vierteljahrschr. Naturf. Ges. Zürich 60: 359. 1915.

亮叶芹 liang ye qin

Peucedanum silaus Linnaeus, Sp. Pl. 1: 246. 1753; *Seseli pratense* Crantz; *Silaum flavescens* Bernhardt; *S. pratensis* (Crantz) Besser.

Plants 40–100 cm. Leaf blade triangular-ovate, 7–20 × 6–10 cm; lateral pinnae short-petiolulate, 2–5-lobed, terminal pin-

nae 3–7-lobed; ultimate segments lanceolate to linear-lanceolate, 13–20 × 2–3 mm, abaxial veins prominent, margins cartilaginous, apex acute or acuminate, apiculate. Upper leaves 2-pinnate, narrowly linear, apical leaves reduced, segments filiform. Umbels 2.5–4 cm across; rays 5–10, 1–3 cm, unequal; bracteoles linear-lanceolate, 3–5 mm, shorter than flowers, margin scarious; umbellules many-flowered; pedicels 4–8 mm. Fruit 4–8 × 2–3 mm. Fl. and fr. Jun–Sep.

Adventive in wet meadows; 100–300 m. Jiangsu [native to Europe and the Mediterranean region].

66. **PTERYGOPLURUM** Kitagawa, Bot. Mag. (Tokyo) 51: 654. 1937.

翅棱芹属 chi leng qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs, perennial, essentially glabrous, inflorescence slightly scabrous. Root fusiform. Stem erect, branched, striate, sometimes rooting at basal nodes. Basal leaves petiolate, sheathing; blade 1–2-pinnate or ternate-2–3-pinnate; ultimate segments linear or linear-lanceolate, entire. Inflorescence little-branched, umbels compound, terminal and lateral, rarely only terminal; bracts and bracteoles linear; rays rather few, spreading. Calyx teeth conspicuous. Petals white, obovate, base cuneate, apex retuse with small incurved lobule. Stylopodium conic; styles slightly longer than the stylopodium, reflexed. Fruit ovoid, slightly compressed laterally; ribs 5, prominent, corky dilated at base, narrowly winged; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base.

One species: China, Japan, Korea.

1. *Pterygopleurum neurophyllum* (Maximowicz) Kitagawa, Bot. Mag. (Tokyo) 51: 655. 1937.

脉叶翅棱芹 mai ye chi leng qin

Edosmia neurophylla Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 18: 286. 1873; *Carum neurophyllum* (Maximowicz) Franchet & Savatier; *Perideridia neurophylla* (Maximowicz) T. I. Chuang & Constance; *Sium neurophyllum* (Maximowicz) H. Hara.

Plants 70–100 cm. Basal leaves ovate, 10–15 × 4–8 cm; ultimate segments 20–100 × 1–3 mm. Upper cauline leaves

smaller, 3-lobed or entire, sessile on expanded sheaths. Terminal umbels 3–5 cm across; peduncles 1–5 cm; bracts 5–10, linear, 3–10 × 1–2 mm; rays 6–8(–20), 2–3.5 cm, subequal; bracteoles 6–8, similar to bracts, 1–3 mm; pedicels slender, 3–8 mm, unequal. Calyx teeth lanceolate, ca. 1 mm, longer than the stylopodium. Fruit 3–3.5 × 2.5–3 mm. Fl. and fr. Sep–Nov.

Streamsides, damp areas. Anhui, Jiangsu, Zhejiang [Japan, Korea].

Chuang and Constance (Univ. Calif. Publ. Bot. 55: 28–30. 1969) treated this species (and hence the genus) as an Asian outlier of the American genus *Perideridia*, but this placement remains to be confirmed.

67. **LITHOSCIADIUM** Turczaninow, Bull. Soc. Imp. Naturalises Moscou 17: 730. 1844.

石蛇床属 shi she chuang shu

Pu Fading (溥发鼎 Pu Fa-ting); Michael G. Pimenov

Herbs glabrous, perennial, monocarpic. Rootstock vertical, branched. Stem solitary, branched from the base, hollow, ribbed, base clothed in fibrous remnant sheaths. Basal leaves long-petiolate; blade 1–2-pinnatisect; terminal segments broadly ovate to obovate. Stem leaves reduced upwards. Umbels compound, terminal and lateral; bracts few; bracteoles numerous, linear, entire, connate at base. Calyx teeth obsolete. Petals greenish, emarginate, apex inflexed. Stylopodium flat, deeply lobed; styles reflexed. Fruit oblong, slightly dorsally compressed, glabrous; ribs ridged, subequal; commissure narrow; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base.

Two species: C and N Asia; one species in China.

1. *Lithosciadium kamelinii* (V. M. Vinogradova) Pimenov ex Gubanov, Konsp. Fl. Vneshnei Mongolii, 79. 1996.

石蛇床 shi she chuang

Cnidium kamelinii V. M. Vinogradova, Novosti Sist. Vyssh. Rast. 25: 122. 1988.

Plants (20–)30–45(–60) cm. Basal leaf blade broadly ovate,

1-pinnatisect, 5–11 × 1.5–5 cm; pinnae broadly ovate, petiolulate, rigid, margin serrate, apex obtuse. Primary umbels 8–15 cm across; rays 25–40, unequal, rigid. Fruit 4–5.5 × 1.8–2.2 mm. Fl. and fr. Jul–Aug.

Stony schistose hillsides, river banks, streamsides; 2600–2900 m. N Xinjiang (Altay, Qinghe) [Mongolia].

68. CNIDIUM Cusson, Mém. Soc. Méd. Emul. Paris, 280. 1782.

蛇床属 she chuang shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs, perennial or biennial, rarely annual. Stems usually solitary, sometimes several, branches slender. Basal and lower leaves 2–3-pinnate or 1–2-pinnate; ultimate segments obovate, linear-lanceolate or linear. Upper leaves reduced, smaller, sessile on expanded sheaths. Umbels compound, terminal and lateral; bracts several, usually persistent, linear to lanceolate, rarely caducous; rays 6–15(–20); bracteoles several, linear. Calyx teeth usually obsolete, occasionally minute. Petals white or pinkish, base cuneate, apex notched, with narrow incurved lobule. Stylopodium conic or low-conic; styles longer than stylopodium, reflexed after flowering. Fruit oblong-ovoid or subglobose, slightly compressed dorsally; ribs 5, narrowly corky-winged, lateral ribs a little broader than the others, or ribs subequal; vittae 1 in each furrow, 2 on commissure. Seed face plane, rarely slightly concave. Carpophore 2-parted.

Six to eight species: Asia, Europe; five species (one endemic) in China.

- 1a. Bracteoles oblong or oblong-ovate, broadly white membranous-margined; fruit oblong-ovoid, 3–5 × 2–3 mm 1. *C. dauricum*
 1b. Bracteoles linear, narrowly or hardly membranous-margined; fruit ovoid, oblong-ovoid or subglobose, 1.5–3.5 × 1–3.5 mm.
 2a. Fruit subglobose, 2–3.5 × 2–3.5 mm; stems several; leaves 1–2-pinnate 2. *C. japonicum*
 2b. Fruit ovoid or oblong-ovoid, 1.5–3 × 1–2 mm; stem solitary; leaves 2–3-pinnate.
 3a. Bracts persistent; bracteole margin very finely ciliate 3. *C. monnieri*
 3b. Bracts caducous; bracteole margin slightly scabrous, without cilia.
 4a. Ultimate leaf segments linear-lanceolate or falcate, 5–30 × 1.5–3 mm 4. *C. salinum*
 4b. Ultimate leaf segments linear, 4–15 × 0.5–1 mm 5. *C. sinchianum*

1. *Cnidium dauricum* (Jacquin) Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 2: 33. 1836.

兴安蛇床 xing an she chuang

Laserpitium dauricum Jacquin, Hort. Bot. Vindob. 3: 22. 1776.

Plants perennial, 80–100 cm. Taproot rather thick. Stem solitary, erect, striate. Basal and lower petioles 5–15 cm; blade ovate-triangular, 10–20 × 7–15 cm, 2–3-pinnate; ultimate segments ovate-lanceolate to lanceolate, 5–15 × 2–3 mm. Umbels 5–8 cm across; bracts 6–8, lanceolate, 5–15 mm, margins broadly white membranous; rays 10–20, 2–4 cm, unequal; bracteoles 4–7(–9), oblong or oblong-ovate, ca. equal to or longer than pedicels, margins broadly white membranous, apex cuspidate; umbellules 10–20-flowered; pedicels 5–8 mm. Calyx teeth obsolete. Stylopodium conic. Fruit oblong-ovoid, 3–5 × 2–3 mm; ribs subequal. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

Riparian wet grasslands or meadows; 500–2000 m. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia].

2. *Cnidium japonicum* Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 60. 1867.

滨蛇床 bin she chuang

Selinum japonicum (Miquel) Franchet & Savatier.

Plants perennial or biennial, 15–20 cm. Taproot elongate, 5–13 cm, or fusiform, ca. 8 mm thick. Stems several. Basal petioles 1–5(–7) cm; blade oblong-ovate, 5–6 × 2–3 cm, 1–2-pinnate; pinnae 3–4 pairs; ultimate segments oblanceolate or obovate, 5–8(–10) × 1.5–4 mm. Umbels 1–2 cm across; bracts 4–5(–8), linear, 3–5 mm; rays 6–9, 1–2 cm, unequal; bracteoles 4–5(–10), linear, 2–4 mm, nearly equal pedicels, hardly membranous margined; umbellules 8–10-flowered. Fruit subglobose, 2–3.5 × 2–3.5 mm; lateral ribs slightly broader than the dorsal. Seed face plane. Fl. Aug–Sep, fr. Sep–Oct. $2n = 20$.

Seashores. Liaoning [Japan, Korea].

3. *Cnidium monnieri* (Linnaeus) Cusson, Mém. Soc. Méd. Emul. Paris, 280. 1782.

蛇床 she chuang

Plants annual, 10–60(–80) cm. Taproot 2–3 mm thick. Stem solitary, striate, scabrous. Lower petioles 3–8 cm; blade ovate-lanceolate, 3–8 × 2–5 cm, 2–3-pinnate; ultimate segments linear to linear-lanceolate, 3–10 × 1–1.5 mm, veins and margins scabrous. Umbels 2–3(–5) cm across; bracts 6–10, linear to linear-lanceolate, 2–3 mm, persistent, margins narrowly white membranous, very finely ciliate; rays 8–20(–30), 5–20 mm, unequal; bracteoles 5–9, linear, nearly equal pedicels, margins ciliate; umbellules 15–20-flowered; pedicels 3–5 mm. Calyx teeth obsolete or minute. Stylopodium conic; styles 3–4 times longer than stylopodium. Fruit ovoid, 1.5–3 × 1–2 mm; lateral

ribs slightly broader than the dorsal. Seed face plane. Fl. Apr–Jul, fr. Jul–Oct.

Riparian grasslands, field margins. Almost throughout China [India, Korea, Laos, Mongolia, Russia, Vietnam; Europe; adventive in North America].

- 1a. Bracteoles nearly as long as pedicels; calyx teeth inconspicuous; fruit ovoid, 1.5–3 × 1–2 mm 3a. var. *monnieri*
 1b. Bracteoles longer than pedicels; calyx teeth minute; fruit subglobose, 1–2 × 1–2 mm 3b. var. *formosanum*

3a. *Cnidium monnieri* var. *monnieri*

蛇床(原变种) she chuang (yuan bian zhong)

Selinum monnieri Linnaeus, Cent. Pl. I: 9. 1755; *Cicuta monnieri* (Linnaeus) Crantz; *C. sinensis* Zuccagni; *Cnidium microcarpum* Turczaninow; *C. mongolicum* H. Wolff; *Ligusticum mongolicum* (H. Wolff) Leute; *L. monnieri* (Linnaeus) Calestani; *Pinasgelon monnieri* (Linnaeus) Rafinesque; *Seseli daucifolium* C. B. Clarke.

Plants 10–80 cm. Bracteoles nearly as long as pedicels. Calyx teeth obsolete. Fruit ovoid, 1.5–3 × 1–2 mm.

Riparian grasslands, field margins. Almost throughout China [India, Korea, Laos, Mongolia, Russia, Vietnam; Europe; adventive in North America].

The fruits are used as “she chuang zi,” a common herb of traditional Chinese medicine.

3b. *Cnidium monnieri* var. *formosanum* (Y. Yabe) Kitagawa, J. Jap. Bot. 48: 237. 1973.

台湾蛇床 tai wan she chuang

Cnidium formosanum Y. Yabe, J. Coll. Sci. Imp. Univ. Tokyo 16(4): 63. 1902.

Plants 10–30 cm. Bracteoles longer than pedicels. Calyx teeth minute, triangular. Fruit subglobose, 1–2 × 1–2 mm long. $2n = 20^*$.

- Taiwan.

The fruits used as a regional substitute for the medicinal herb “she chuang zi” (see var. *monnieri*).

The following species have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

Cnidium affine H. Wolff (Repert. Spec. Nov. Regni Veg. Beih. 12: 451. 1922, not C. A. Meyer, 1849), described from Jilin (“Hsiau Wutai Shan” [Xiaowutai Shan], *W. Limpricht* 545, holotype, ?B).

Cnidium limprichtii H. Wolff (Repert. Spec. Nov. Regni Veg. Beih. 12: 451. 1922; *Tilingia limprichtii* (H. Wolff) Leute), described from

4. *Cnidium salinum* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 733. 1844.

碱蛇床 jian she chuang

Cnidium salinum var. *rhizomaticum* Y. C. Ma; *Kadenia salina* (Turczaninow) Lavrova & V. N. Tikhomirov; *Ligusticum salinum* (Turczaninow) Koso-Poljansky; *Selinum dubium* (Schkuhr) Leute subsp. *salinum* (Turczaninow) Leute; *S. salinum* (Turczaninow) Vodopianova.

Plants perennial or biennial, 20–50(–70) cm. Root 3–6 mm thick; nodes sometimes inflated. Stem solitary, striate. Basal and lower petioles 5–10 cm; blade oblong-ovate, 6–12 × 3–10 cm, 2–3-pinnate, rarely 1–2-pinnate; ultimate segments linear-lanceolate or falcate, 5–30 × 1.5–3 mm, margins slightly revolute. Umbels 3–6 cm across; bracts caducous or occasionally one persistent, linear; rays (6–)10–15, unequal, slightly scabrous inside; bracteoles 4–6, linear, longer than pedicels, margins narrowly membranous, slightly scabrous, not ciliate. Petals white or pinkish. Stylopodium low-conic; styles 2–3 times longer than stylopodium, reflexed. Fruit oblong-ovoid, 2.5–3 × ca. 1.5 mm. Seed face plane or slightly concave. Fl. Jul–Aug, fr. Aug–Sep.

Damp grasslands, wet meadows. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai [Mongolia, Russia].

5. *Cnidium sinchianum* K. T. Fu, Fl. Tsinling. 1(3): 459. 1981.

辛加山蛇床 xin jia shan she chuang

Selinum sinchianum (K. T. Fu) C. Q. Yuan & L. B. Li.

Plants perennial, 20–35 cm. Root coniform, slender. Stem erect, unbranched, glabrous. Lower leaves petiolate; blade triangular-ovate, 2–3-pinnate; ultimate segments linear, 4–15 × 0.5–1 mm. Umbels terminal, peduncle 4–5.5 cm; bracts caducous; rays 6–11, 10–17 mm; bracteoles 8–10, linear, exceeding pedicels, scabrous at margins; umbellules 12–16-flowered; pedicels 2–4 mm. Calyx teeth obsolete. Stylopodium low-conic; styles slightly recurved, ca. 1.2 mm. Fruit oblong-ovoid, ca. 4 mm. Fl. Jun–Sep, fr. Sep–Oct.

- Shady moist places. Shaanxi (Xingjia Shan).

This species is incompletely known, but differs from *Selinum* in the obsolete calyx teeth and the thick, slightly corky fruit ribs.

69. SELINUM Linnaeus, Sp. Pl., ed. 2, 1: 350. 1762, nom. cons., not Linnaeus (1753).

亮蛇床属 liang she chuang shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs perennial. Roots stout, taproot elongate or cylindrical. Stems erect, base clothed with fibrous remnant sheaths. Basal leaves 2–3-pinnate or ternate-2-pinnate. Stem leaves gradually reduced upwards, becoming sessile on expanded sheaths. Umbels

compound, terminal and lateral; bracts entire, 2–3-lobed at apex, or 1–2-pinnate, or absent; rays numerous; bracteoles usually similar to bracts. Calyx teeth evident, linear-lanceolate, equaling or exceeding the stylopodium, unequal. Petals white or pinkish, obovate, base cuneate, apex notched with small incurved lobule (except *L. weberbauerianum*). Stylopodium conic; styles ca. $2 \times$ stylopodium, reflexed after flowering. Fruit oblong-ovoid, ovoid or suborbicular, compressed dorsally, glabrous; dorsal ribs thickened or narrowly winged; lateral ribs broad-winged ($2 \times$ dorsal wings); vittae 1(–4) in dorsal furrows, 1–4 in lateral furrows, 2–8 on commissure. Seed face plane. Carpophore 2-cleft to base.

About eight species: Asia, Europe; three species (two endemic) in China.

See the taxonomic comment under *Ligusticum*.

- 1a. Bracts absent; bracteoles 2-pinnate; vittae 3–4 in each furrow; leaves 2-pinnate 1. *S. longicalycium*
 1b. Bracts several; bracteoles entire, rarely 2–3(–4)-lobed at the apex; vittae 1 in dorsal furrows, 1–4 in lateral; leaves 2–3-pinnate or ternate-2–3-pinnate.
 2a. Bracteoles lanceolate, longer than umbellules, ascending, margins white membranous; fruit oblong-ovoid; dorsal ribs thickened 2. *S. wallichianum*
 2b. Bracteoles linear, shorter than umbellules, reflexed, margins scabrid; fruit ovoid; dorsal ribs narrowly winged 3. *S. cryptotaenium*

1. *Selinum longicalycium* M. L. Sheh, J. Pl. Resources & Environm. 1(3): 1. 1992.

长萼亮蛇床 chang e liang she chuang

Ligusticopsis longicalycia (M. L. Sheh) Pimenov & Kljuykov.

Plants 40–60 cm. Taproot cylindrical, ca. 5 mm thick. Stem erect, grooved, angled, pubescent. Basal leaves petiolate; petioles 10–15 cm, pubescent; blade oblong-ovate, $7\text{--}9 \times 5\text{--}7$ cm, 2-pinnate; pinnae 5–6 pairs; ultimate segments lanceolate-ovate, $5\text{--}15 \times 3\text{--}6$ mm, veins hispid, margins serrate. Umbels 2.5–5 cm across; peduncles hirsute; bracts absent; rays 11–15, stout, subequal, 1.5–3 cm, hispid; bracteoles numerous, 2-pinnate, hispidulous, equal to or longer than pedicels; umbellules ca. 20-flowered. Calyx teeth linear, 1–2 mm. Petals white. Fruit ovoid, base rounded, apex constricted; dorsal ribs thickened, lateral ribs winged; vittae 3–4 in each furrow, 8 on commissure. Fl. Aug–Sep, fr. Oct.

- *Abies* forests; ca. 3600 m. NW Yunnan (Weixi).

2. *Selinum wallichianum* (de Candolle) Raizada & H. O. Saxena, Indian Forester 92: 323. 1966.

细叶亮蛇床 xi ye liang she chuang

Peucedanum wallichianum de Candolle, Prodr. 4: 181. 1830; *Cortia wallichiana* (de Candolle) Leute; *Ligusticum conifolium* de Candolle; *L. tenuifolium* Franchet; *Pleurospermum cicutarium* Lindley; *Selinum candollei* Edgeworth (1846), not de Candolle (1830); *S. tenuifolium* Wallich ex C. B. Clarke (1879), not Salisbury (1796).

Plants 0.5–1(–1.5) m, stout. Taproot cylindrical, ca. 1 cm thick or more. Stem erect, ribbed, scarcely angled, branched above. Basal petioles 20–30 cm, wholly sheathing; sheaths inflated, 5–10 cm broad, purplish; blade broadly ovate, $20\text{--}25 \times 15\text{--}20$ cm, 3-pinnate; pinnae 4–5 pairs; ultimate segments linear, $2\text{--}5 \times$ ca. 1 mm. Umbels 6–10 cm across (to 20 cm in fruit); bracts 4–8, linear, caducous; rays (10–)20–35, subequal, 2–5 cm, elongating in fruit; bracteoles 5–12, lanceolate, unequal, longer than umbellules, ascendant, entire or apex 2–3-lobed, margins white membranous; umbellules 20–25-flowered. Calyx teeth linear-lanceolate, 0.5–1 mm, longer than stylopodium. Petals white or pinkish, purplish-red when in bud. Fruit oblong-

ovoid; dorsal ribs slightly thickened, lateral ribs winged; vittae 1 in dorsal furrows, 1–3 in lateral furrows, 4–6 on commissure. Fl. Jul–Aug, fr. Sep. $2n = 22$.

Forests, montane scrub, grassy slopes; 2600–4200 m. SW Sichuan, S Xizang, NW Yunnan [Bhutan, India, Kashmir, Nepal, Pakistan, Sikkim].

This is a mid- to high-elevation Himalayan species distributed from Pakistan to China. Variation in leaf dissection in both this species and the closely related *Selinum candollei* de Candolle is complex and complicates identification, particularly in the C Himalayas. These species are in need of taxonomic revision across their whole geographic range. *Selinum candollei* has not been found in China, but it has been reported to have medicinal properties.

3. *Selinum cryptotaenium* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 847. 1903.

亮蛇床 liang she chuang

Pleurospermum glaucescens H. Wolff.

Plants 0.4–2 m, stout. Taproot 2–3 cm thick, branched. Stem erect, striate, branched above. Basal petioles 10–20 cm; sheaths somewhat inflated, 2–7 cm broad, purplish; blade triangular-ovate, $8\text{--}10 \times$ ca. 8 cm, ternate-2–3-pinnate, glabrous or scabrid; pinnae 4–8 pairs; ultimate segments oblong-ovate or lanceolate, $10\text{--}20 \times 5\text{--}8$ mm. Umbels 8–10 cm across (to 20 cm across in fruit); bracts 12–15, linear, densely hispid, recurved, caducous; rays 12–28(–50), subequal, 5–7 cm, elongating in fruit, hispid; bracteoles 5–10, linear, entire or apex 2–4-lobed, ca. equaling pedicels, recurved. Calyx teeth linear-lanceolate, ca. 1 mm. Petals white or faintly pinkish, pinkish in bud. Styles short when young, ca. $2 \times$ stylopodium in fruit. Fruit ovoid, ca. $4 \times 3.5\text{--}4$ mm; dorsal ribs subequal, narrowly winged, lateral ribs broad-winged; vittae 1 in dorsal furrows, 2–3 in lateral furrows, 4–6 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

- Montane forests; 2500–4100 m. SW Sichuan, C and NW Yunnan.

The type of *Pleurospermum glaucescens* (Yunnan: Lijiang, J. F. Rock 4481, E) and Wolff's original description show no membranous margin on the bracteoles, well-developed, linear calyx teeth, and dorsally compressed fruit. These features are uncharacteristic of *Pleurospermum*, and so this species is treated here as a synonym of *Selinum cryptotaenium*.

70. STENOCEOELIUM Ledebour, Fl. Altaic. 1: 297. 1829.

狭腔芹属 xia qiang qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs, perennial. Root rather thick. Stem inconspicuous or short-caulescent, base clothed with fibrous remnant sheaths. Basal leaves numerous, rosulate, petiolate, sheathing; blade 2-pinnate. Umbels compound, primary umbel terminal; bracts and bracteoles numerous, linear or linear-lanceolate, with short hairs, margins broadly white-membranous; rays stout, angular; umbellules many-flowered; lateral umbels smaller. Calyx teeth conspicuous, acute-triangular. Petals white, midrib violet, obovate, base cuneate, apex notched with a narrow incurved lobule, pubescent abaxially. Stylopodium short-conical; styles ca. $2 \times$ stylopodium, reflexed. Fruit ovoid, slightly compressed dorsally; ribs thick-obtuse, very prominent, irregularly denticulate especially along ribs, denticles stiff-membranous or with stiffly scarios-processes and hairs; furrows narrow; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base.

Three species: high-altitude C Asia and Siberia; two species in China.

- 1a. Pedicels subglabrous; fruit sparsely short hairy or glabrous, ribs irregularly denticulate, denticles stiff-membranous 1. *S. popovii*
 1b. Pedicels densely short hairy; fruit covered with stiffly scarios-processes and short hairs along ribs 2. *S. trichocarpum*

1. Stenocoelium popovii V. M. Vinogradova & Fedoronczuk, Novosti Sist. Vyssh. Rast. 16: 148. 1979.

狭腔芹 xia qiang qin

Plants (8–)15(–20) cm. Stem well developed, usually violet, 3–5-branched, with short stiff hairs. Basal leaves oblong, $3\text{--}7 \times 1\text{--}2.5$ cm, 2-pinnate; ultimate segments lanceolate, $3\text{--}5 \times 1\text{--}2$ mm. Terminal umbel 8–20 across; bracts 5–7, linear, with short hairs, margins broadly white-membranous; rays 9–28, unequal, 3–10 cm; bracteoles numerous, similar to bracts. Pedicels unequal, subglabrous. Calyx teeth ca. 0.5 mm. Fruit ovoid, $4\text{--}5 \times$ ca. 3 mm, sometimes tinged purplish-red, glabrous or with sparse short hairs, ribs irregularly denticulate, denticles stiff-membranous. Fl. and fr. Jul–Aug.

Pebbly slopes, screes, glacial moraines. N Xinjiang (Manas, Toli, Urumqi) [Kazakhstan, Mongolia, Russia (Siberia)].

The Chinese record in FRPS (55(2): 230. 1985) of *Stenocoelium athamantoides* (Marschall von Bieberstein) Ledebour is referable to this species.

2. Stenocoelium trichocarpum Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 1: 80. 1843.

毛果狭腔芹 mao guo xia qiang qin

Seseli trichocarpum (Schrenk) B. Fedtschenko.

Plants 5–10(–20) cm, entirely densely covered in short stiff white hairs. Stem usually inconspicuous, rarely to 7 cm, branched at base. Basal leaves oblong, $2\text{--}9 \times 1\text{--}3$ cm, 2-pinnate; ultimate segments oblong-lanceolate, $1\text{--}3 \times 0.5\text{--}1$ mm, often violet below. Terminal umbel ca. 10 cm across; peduncle 2–18 cm; bracts numerous, linear-lanceolate, margins broadly white membranous; rays numerous, unequal, 2–5 cm; bracteoles similar to bracts, smaller. Calyx teeth ca. 0.5 mm. Fruit ovoid, $3\text{--}5 \times 2\text{--}3$ mm. ribs with stiffly scarios-processes and hairs. Fl. and fr. Jun–Jul.

Pebbly slopes, screes, glacial moraines. Xinjiang (Urumqi) [Kazakhstan].

71. CENOLOPHIUM W. D. J. Koch, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12(1): 103(addit.). 1824.

空棱芹属 kong leng qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs perennial, glabrous. Taproot stout. Stems 1–3, striate, often purplish, more or less curved at nodes, little branched above, base clothed in fibrous remnant sheaths. Basal leaves petiolate, sheathing; diffusely 3–4-pinnate; ultimate segments linear or linear-lanceolate, entire. Synflorescence with a few branches; umbels compound, terminal and lateral; bracts absent or occasionally 1–4, linear; bracteoles several, linear or linear-subulate, ca. equaling pedicels. Calyx teeth obsolete. Petals white, obovate, base cuneate, apex retuse with a small incurved lobule. Stylopodium conic; styles $2 \times$ stylopodium, reflexed. Fruit oblong-ellipsoid, slightly dorsally compressed; ribs prominent, nearly equal, very narrowly winged, hollow; vittae 1 in each furrow, 2 on commissure. Seed face plane, in ripe fruit seeds nearly free, easily separating from pericarp. Carpophore 2-cleft to base.

One species: China, Russia (Siberia); C Asia, SW Asia (Caucasus), Europe.

1. Cenolophium denudatum (Fischer ex Hornemann) Tutin, Feddes Repert. 74: 31. 1967.

空棱芹 kong leng qin

Athamanta denudata Fischer ex Hornemann, Suppl. Hort. Bot. Hafn. 32. 1819; *Angelica fischeri* Sprengel; *Cnidium fischeri* (Sprengel) Sprengel; *Cenolophium fischeri* (Sprengel) W. D. J. Koch; *Crithmum mediterraneum* Marschall von Bieberstein.

Plants 50–150 cm. Basal leaf blade triangular, 10–20 × 8–18 cm; ultimate segments 10–60 × 1–5 mm. Upper leaves smaller, 2-ternate or 3-lobed, sessile on expanded sheaths. Umbels (3–)5–7(–10) cm across; rays 10–25, ca. equal, 3–4(–6) cm; bracteoles 5–7; umbellules 12–16-flowered. Fruit 3.5–5 × 1.5–2.5 mm. Fl. and fr. Jul–Aug.

Forests, marshes, riparian grasslands; 400–1800 m. Xinjiang [Russia (Siberia); C Asia, SW Asia (Caucasus), Europe].

72. *LIGUSTICUM* Linnaeus, Sp. Pl. 1: 250. 1753.

藜本属 gao ben shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Coristospermum Bertoloni; *Dystaenia* Kitagawa; *Ligusticopsis* Leute; *Paraligusticum* V. N. Tikhomirov; *Rupiphila* Pimenov & Lavrova; *Tilingia* Regel & Tiling.

Herbs perennial. Root cylindrical or fusiform; rootstock thick or slightly inflated. Stem erect, striate, base usually clothed in fibrous remnant sheaths. Basal and lower leaves petiolate, sheathing; blade 1–3-pinnate or ternate–2–4-pinnate. Cauline leaves gradually reduced upward or absent. Inflorescence branching, rarely unbranched; umbels compound, terminal and lateral, or only terminal; bracts few, usually caducous or absent; rays often slightly incurved, convergent in fruit; bracteoles lanceolate or linear, entire or apex 2–3-lobed or 1–3-pinnate. Calyx teeth conspicuous, shorter than to subequal the stylopodium or obsolete. Petals white, purple, violet or pale pinkish, apex notched with incurved apical lobule. Stylopodium conic; styles spreading or erect in flower, reflexed after flowering. Fruit oblong or oblong-ovoid, dorsally compressed; ribs all prominent or lateral ribs narrowly winged; vittae (1–)2–5 in each furrow, 2–10 on commissure. Seed face plane, rarely slightly concave. Carpophore 2-cleft to base.

About 60 species: Asia, Europe, North America; 40 species (35 endemic) in China.

Ligusticum is a widespread, complex genus the taxonomy of which is in a state of flux. Relationships with nearby genera such as *Cnidium*, *Hymenidium*, *Ligusticopsis*, *Pachypleurum*, *Paraligusticum*, *Rupiphila*, *Selinum*, and *Tilingia* are still being clarified. As a general consensus has yet to be reached, and many species are very poorly known (often only from a type collection), a conservative, traditional classification has been adopted here, with the knowledge that *Ligusticum* in the broad sense is an artificial assemblage.

- 1a. Bracteoles 1–3-pinnate or 2–3-lobed at apex, rarely entire.
 - 2a. Bracteoles 2–3-lobed or 1-pinnate, rarely entire.
 - 3a. Calyx teeth obsolete.
 - 4a. Plants 6–20 cm; leaves 2-pinnate, ultimate segments linear-lanceolate, 2–4 × ca. 1 mm; bracteoles longer than umbellules 33. *L. capillaceum*
 - 4b. Plants 40–60 cm; leaves ternate–2–3-pinnate, ultimate segments lanceolate, 5–15 × 2–5 mm; bracteoles nearly as long as umbellules 34. *L. yunnanense*
 - 3b. Calyx teeth persistent.
 - 5a. Leaves 1-pinnate.
 - 6a. Bracteoles 4–8(–10), entire or 2–3-lobed at apex, rarely 1-pinnate, margins ciliate; petals white 29. *L. likiangense*
 - 6b. Bracteoles 10–12, 1-pinnate, pilose; petals white or pinkish tinged 30. *L. involucratum*
 - 5b. Leaves 2–3-pinnate.
 - 7a. Rays 1.5–2 cm; petals purplish, base cuneate 31. *L. franchetii*
 - 7b. Rays (1.5–)3–8 cm; petals white, base shortly clawed 32. *L. sikiangense*
 - 2b. Bracteoles 2–3-pinnate, rarely 1–2-pinnate.
 - 8a. Bracteoles 1–2-pinnate, margins white membranous; calyx teeth obsolete 35. *L. oliverianum*
 - 8b. Bracteoles 2–3-pinnate, margins not white membranous; calyx teeth persistent.
 - 9a. Leaves 1–2-pinnate, pinnae ovate, 15–40 × 5–20 mm 36. *L. rechingerianum*
 - 9b. Leaves 2–4-pinnate, ultimate segments linear to lanceolate, 2–6 × 1(–5) mm.
 - 10a. Plants hispid-setulose throughout; stem simple, usually very short; rays up to 24 cm 37. *L. hispidum*
 - 10b. Plants glabrous; stem up to 50 cm; rays 1–6 cm.
 - 11a. Stem unbranched, subscapose; cauline leaves usually absent 38. *L. scapiforme*
 - 11b. Stem usually branched; cauline leaves present.
 - 12a. Stem single; petals purplish; vittae 1–3 in each furrow, 4–6 on commissure 39. *L. daucooides*
 - 12b. Stem multicapitate; petals white or violet; vittae 2–5 in each furrow, 6–10 on commissure 40. *L. multivittatum*
 - 1b. Bracteoles linear or lanceolate, entire.
 - 13a. Ultimate leaf segments narrow, linear, 1–30 × 0.5–3 mm.
 - 14a. Calyx teeth obsolete; ultimate segments of leaf linear to broadly linear, elongate, 5–30 × 1–3 mm.
 - 15a. Leaves 2–3-pinnate; bracteoles longer than umbellules 26. *L. nematophyllum*
 - 15b. Leaves ternate–3–4-pinnate; bracteoles shorter than or nearly as long as umbellules.
 - 16a. Bracteole margin white membranous; vittae 1 in each furrow, 2 on commissure 27. *L. tenuissimum*
 - 16b. Bracteoles without white membranous margins; vittae 3–5 in each furrow, 6–10 on commissure 28. *L. tenuisectum*
 - 14b. Calyx teeth persistent; ultimate segments of leaf linear to setuliform, 3–15 × 0.5–1 mm.

- 17a. Bracteoles without narrow membranous margin.
 18a. Calyx teeth conspicuous, subulate; leaves 3–4-pinnate 24. *L. brachylobum*
 18b. Calyx teeth inconspicuous, minute; leaves ternate-2–3-pinnate 25. *L. mairei*
- 17b. Bracteoles with narrow membranous margin.
 19a. Plants 10–30 cm; umbels 2–4 cm across; petal bases shortly clawed (N China) 21. *L. tachiroei*
 19b. Plants 30–120 cm; umbels (3–)5–10 cm across; petal bases cuneate (SC and WC China).
 20a. Ultimate leaf segments linear, 3–10 × 1–2 mm; vittae 1 in each furrow 22. *L. striatum*
 20b. Ultimate leaf segments setuliform, 1–5 × ca. 0.5 mm; vittae 3 in each furrow 23. *L. delavayi*
- 13b. Ultimate leaf segments broad, ovate or lanceolate, 5–50 × 5–30 mm.
 21a. Leaves 1-pinnate.
 22a. Umbels terminal; rays elongate, 10–17 cm; petals purple 1. *L. yanyuanense*
 22b. Umbels terminal and lateral; rays short, 1.5–3 cm; petals white.
 23a. Vittae 1–2 in each furrow, 4 on commissure (Xinjiang) 2. *L. mucronatum*
 23b. Vittae 2–4 in each furrow, 6–8(–10) on commissure (NC, SC, and WC China) 3. *L. thomsonii*
- 21b. Leaves 1–3-pinnate or ternate-2–4-pinnate.
 24a. Calyx teeth persistent.
 25a. Bracteoles margin narrow membranous 4. *L. gyirongense*
 25b. Bracteoles without narrow membranous margin.
 26a. Plant pubescent throughout; leaves 1–2-pinnate 5. *L. xizangense*
 26b. Plant subglabrous; leaves ternate-2–3-pinnate.
 27a. Petal apex mucronate without incurved lobule 17. *L. weberbauerianum*
 27b. Petal apex notched with incurved lobule.
 28a. Rays 15–20; seed face slightly concave (Xizang) 6. *L. littledalei*
 28b. Rays 7–11; seed face plane (E and NE China) 7. *L. ajanense*
- 24b. Calyx teeth obsolete.
 29a. Rootstock apparently swollen at nodes; styles longer than or ca. 0.5 × fruit.
 30a. Internodes of rootstock short; rays 15–30, 3–5 cm; petal base cuneate; styles ca. equaling fruit (or plants not flowering) 8. *L. sinense*
 30b. Internodes of rootstock slender; rays 10–14, 1.5–2 cm; petal base short-clawed; styles ca. 0.5 × fruit 9. *L. reptans*
- 29b. Rootstock not swollen at nodes; styles usually less than 0.5 × fruit.
 31a. Rays extremely unequal.
 32a. Plants 30–50 cm; rays 5–8, 1–3 cm 10. *L. litangense*
 32b. Plants 100–150 cm or more; rays (10–)20–50.
 33a. Rays (10–)20–25, 1–6 cm; petals purple (NC and SW China) 11. *L. angelicifolium*
 33b. Rays 30–50, 3–12 cm; petals white (Xinjiang) 12. *L. discolor*
- 31b. Rays slightly unequal to subequal.
 34a. Bract margins narrow membranous (NE and NW China) 14. *L. jeholense*
 34b. Bracts without narrow membranous margin (NC, SC, and WC China).
 35a. Umbels 15–20 cm across; rays 4–8(–15) cm 13. *L. kingdon-wardii*
 35b. Umbels 5–10(–12) cm across; rays 2–4 cm.
 36a. Rays 8–10; pinnae abaxial glaucescent 15. *L. glaucifolium*
 36b. Rays (7–)12–25(–40); pinnae abaxial pale green.
 37a. Leaves 1–3-pinnate; bracts 1–4 (Xizang) 16. *L. elatum*
 37b. Leaves ternate-3-pinnate; bracts 5–10, sometimes caducous (NC and SC China).
 38a. Rootstock slender; secondary pinnae 3–5 pairs, remote; terminal pinnae acute 18. *L. pteridophyllum*
 38b. Rootstock thick; secondary pinnae 8–10 pairs, crowded; terminal pinnae caudate.
 39a. Fruit oblong-ovate, ca. 3 × 2 mm; vittae 2–3(–4) in each furrow, 6–8 on commissure 19. *L. acuminatum*
 39b. Fruit oblong-obovate, ca. 4 mm long; vittae absent 20. *L. nullivittatum*

1. *Ligusticum yanyuanense* F. T. Pu, Acta Phytotax. Sin. 29: 526. 1991.

盐源藁本 *yan yuan gao ben*

Plants ca. 30 cm, glabrous. Rootstock cylindrical, 3–5 × ca. 5 mm, little-branched. Basal and lower leaves petiolate; petioles 2–4 cm; sheaths ovate; blade lanceolate, 6–8 × 2–4 cm, 1-pinnate, pinnae 5–6 pairs, remote, ovate to lanceolate; proximal pinnae usually 2-lobed, 1–2 × 0.5–1.5 cm, margins serrate.

Umbels terminal, 10–25 cm across; bracts absent; rays 6–8, stout, unequal, 10–17 cm; bracteoles 5–7, oblanceolate, unequal, ca. equal to pedicels, entire; umbellules 10–15-flowered. Calyx teeth obsolete. Petals purple, obovate, base cuneate. Stylopodium conic; styles 2–2.5 × stylopodium. Fruit oblong-ovoid, ca. 3 × 2 mm; dorsal and intermediate ribs filiform, lateral ribs narrowly winged; vittae 2 in each furrow, 4 on commissure. Seed face plane. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine scrub, meadows; ca. 3800 m. SW Sichuan (Yanyuan).

2. *Ligusticum mucronatum* (Schrenk) Leute, Ann. Naturhist. Mus. Wien 74: 473. 1970.

短尖藁本 duan jian gao ben

Neogaya mucronata Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 2: 40. 1842; *Libanotis dolichostyla* Schischkin; *L. subsimplex* Popov; *Pachypleurum dolichostylum* (Schischkin) Korovin ex Kamelin; *P. mucronatum* (Schrenk) Schischkin; *Seseli dolichostylum* (Schischkin) M. Hiroe; *S. mucronatum* (Schrenk) Pimenov & Sdobnina.

Plants 15–80 cm. Rootstock cylindrical. Stems single or multicapital, base densely clothed with fibrous remnant sheaths. Basal leaves petiolate; petioles 4–15 cm; blade oblong, 5–12 × 1.5–5 cm, 1-pinnate; pinnae 5–7 pairs, oblong-ovate, 1–4 × 0.5–1.5 cm, shallowly to deeply 3–5-lobed, strigose on veins and margins. Cauline leaves few, much reduced. Umbels terminal and lateral, 2–7 cm across; bracts few, linear, margins narrowly white membranous, usually caducous; rays 15–32, 1.5–3 cm; bracteoles 5–10, linear-lanceolate, margins white membranous. Calyx teeth minute, triangular. Petals white obovate, base cuneate. Styles ca. 1/3 × fruit. Fruit oblong-ovoid, ca. 3 × 1.5–2 mm; dorsal and intermediate ribs prominent, lateral ribs narrowly winged; vittae 1–2 in each furrow, 4 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

Wooded valleys, grassy slopes; 1700–3300 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Russia].

3. *Ligusticum thomsonii* C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 698. 1879.

长茎藁本 chang jing gao ben

Ligusticum thomsonii var. *evolutius* C. B. Clarke; *Pleurospermum longicaule* H. Wolff.

Plants 20–90(–150) cm, subglabrous. Rootstock cylindrical, 5–15 × 1–2 cm. Stems multicapital, striate, base densely clothed with fibrous remnant sheaths. Basal leaves petiolate; petioles 2–10 cm; blade narrowly oblong, 2–12 × 1–3 cm, 1-pinnate (rarely 2-pinnate); pinnae 5–9 pairs, ovate or oblong, 5–20 × 5–10 mm, veins sparsely pubescent, margins irregularly serrate to deeply lobed. Cauline leaves 1–3, reduced upward becoming sessile. Terminal umbels 4–6 cm across, lateral umbels smaller, sometimes staminate; bracts 5–6(–8), linear, margins white membranous; rays 10–20, 1–2.5 cm; bracteoles 10–15, linear to linear-lanceolate, margins white membranous. Calyx teeth minute, triangular. Petals white ovate, base cuneate. Styles reflexed. Fruit oblong-ovoid, 3.5–5 × 2–3 mm; dorsal and intermediate ribs prominent, lateral ribs narrowly winged; vittae 2–4 in each furrow, 6–8(–10) on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct. $2n = 22^*$.

Margins of coniferous forests, grassy valley slopes, alpine scrub and meadows; 2200–4200 m. Gansu, SE Qinghai, W Sichuan, Xizang, NW Yunnan [Afghanistan, NW India, Kashmir, Pakistan].

This species has reputed medicinal value (in SW China).

4. *Ligusticum gyirongense* R. H. Shan & H. T. Chang, Acta Phytotax. Sin. 24: 315. 1986.

吉隆藁本 ji long gao ben

Plants 30–50 cm, glabrous. Root cylindrical. Stem single, striate, base clothed in fibrous remnant sheaths. Basal leaves petiolate; petioles 5–12 cm; blade broadly ovate, 6–10 × 7–9 cm, 2-pinnate; primary pinnae 4–5 pairs, remote; ultimate segments ovate or broadly ovate, 10–15 × 5–10 mm, margins shallowly 3-lobed to pinnatifid. Cauline leaves few, gradually reduced upwards. Umbels ca. 5 cm across in fruit; bracts 5, linear to lanceolate, margins narrowly membranous; rays ca. 12, 2–2.5 cm; bracteoles 5–8, similar to bracts; umbellules 10–15-flowered. Calyx teeth conspicuous, triangular, ca. 1 mm. Petals white obovate. Styles reflexed. Fruit oblong-ovoid, ca. 3 × 1.5 mm; ribs prominent, subequal; vittae 1–2 in each furrow, 2–4 on commissure. Seed face plane or slightly concave. Fl. Jul–Sep, fr. Oct–Nov.

• Grassland at forest margins; 2500–3000 m. S Xizang (Gyirong), NW Yunnan (Eryuan).

5. *Ligusticum xizangense* Z. H. Pan & M. L. Sheh, Acta Phytotax. Sin. 30: 265. 1992.

西藏藁本 xi zang gao ben

Plants 15–25 cm, pubescent throughout. Taproot thick, branched. Stems multicapital, purplish and striate, base clothed with fibrous remnant sheaths. Basal leaves numerous, short petiolate; sheaths purplish; blade narrow-oblong, 3.5–6 × 1.5–3 cm, 1–2-pinnate; pinnae 2–4 pairs, ovate to broad-ovate, 4–8 × 3–6 mm, margins pinnatifid. Cauline leaves 1–2, similar to basal, smaller. Umbels terminal, 2–3 cm across; peduncles stout, 6–10 cm; bracts 1–2, linear, 1.5–2.5 cm, rarely 2–3-lobed at the apex; rays 15–25, slightly unequal, 1.2–2 cm; bracteoles 10–12, linear, margin not membranous; umbellules 20–30-flowered. Calyx teeth conspicuous, subulate unequal. Petals white, obovate, base shortly clawed. Styles ca. 2–3 × stylopodium, reflexed. Fruit oblong-ovoid, 3–4 × 2.5–3 mm; dorsal and intermediate ribs filiform, lateral ribs narrowly winged; vittae 3 in each furrow, 5–6 on commissure. Fl. and fr. Aug–Oct.

• Alpine meadows; ca. 4500 m. SE Xizang (Nyingchi).

6. *Ligusticum littledalei* Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 327. 1930.

利特藁本 li te gao ben

Plants 30–50 cm, subglabrous. Root cylindrical. Stem erect, striate, 2–3-branched, base clothed in fibrous remnant sheaths. Basal and lower leaves petiolate; petioles 10–15 cm; blade triangular, 8–12 × 6–10 cm, ternate-3-pinnate, primary pinnae 5–7 pairs; ultimate segments ovate or ovate-lanceolate, 10–25 × 5–15 mm, margins irregularly serrate. Upper leaves smaller, 2-pinnate. Umbels terminal and lateral, 4–5 cm across; peduncles 15–20 cm; bracts absent or occasionally 1, linear; rays 15–20, subequal, 1–3 cm; bracteoles numerous, linear and hispid, margin not membranous. Calyx teeth conspicuous, triangular. Petals white, obovate or oblong-ovate, base cuneate. Styles ca. equal to stylopodium. Fruit ovoid; dorsal and intermediate ribs prominent, lateral ribs narrowly winged; vittae 3–4 in each furrow, 8 on commissure. Seed face slightly concave. Fl. Jul, fr. Aug.

• *Abies* and *Picea* forests; above 3000 m. C and SE Xizang.

7. *Ligusticum ajanense* (Regel & Tiling) Koso-Poljansky, Bull. Soc. Imp. Naturalistes Moscou, n.s., 29: 120. 1916.

黑水岩茴香 hei shui yan hui xiang

Tilingia ajanensis Regel & Tiling, Fl. Ajan. 97. 1858; *Cnidium ajanense* (Regel & Tiling) Drude; *Selinum tilingia* Maximowicz, nom. illeg. superfl.; *Cnidium tilingia* (Maximowicz) Takeda.

Plants 50–80 cm, essentially glabrous (rays puberulent). Root cylindrical, thick. Stem single or multicapital, purplish, striate and branched, base clothed in fibrous remnant sheaths. Basal leaves petiolate; petioles 5–10 cm; blade triangular-ovate, 8–10 × 5–8 cm, ternate–2–3-pinnate, primary pinnae 4–6 pairs; ultimate segments oblong-ovate. Upper leaves ternate–1-pinnate, or 3-lobed, segments linear. Umbels terminal and lateral, 2.5–4 cm across; peduncles 3–15 cm; bracts 1–5, linear or absent; rays 7–11, unequal, 1–3 cm; bracteoles 3–5(–8), linear; umbellules 10–15-flowered. Calyx teeth conspicuous, triangular-lanceolate. Petals white or pinkish, base shortly clawed. Stylopodium short conic; styles reflexed, ca. 2 × stylopodium. Fruit oblong-ovoid, 3–4 × 2–3 mm; ribs prominent, subequal; vittae 1–3 in each furrow, 2–4(–6) on commissure. Seed face plane. Fl. Jul–Aug, fr. Aug–Oct.

Pebbly slopes, grasslands. Hebei, Heilongjiang, Jilin, Shandong [Japan, Russia (Siberia)].

8. *Ligusticum sinense* Oliver, Hooker's Icon. Pl. 20: t. 1958. 1891.

藁本 gao ben

Plants 0.5–1 m tall. Rootstock thick, apparently swollen at nodes, internodes short. Stem single, erect, striate and branching. Basal petioles 10–20 cm; blade triangular-ovate, 15–20 × 10–15 cm, ternate to 1- or 2-pinnate, primary pinnae 4–6 pairs, proximal pinnae remote; ultimate segments ovate or oblong-ovate, 2–3 × 1–2 cm, margins irregularly serrate. Cauline leaves similar to basal, reduced, sessile, 1-pinnate. Umbels terminal and lateral, 6–8 cm across in fruit; bracts 5–6(–10), linear; rays 15–30, subequal, 3–5 cm; bracteoles 5–8, linear, shorter than pedicels, reflexed. Calyx teeth obsolete. Petals white, obovate, base cuneate. Styles ca. equaling fruit, reflexed. Fruit oblong-ovoid, 2–3 × 1.5–2 mm; dorsal and intermediate ribs prominent, filiform, lateral ribs narrowly winged; vittae 1–3(–4) in each furrow, 4–6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct. $2n = 22^*$.

• Forests, montane scrub, grassy slopes, streamsides, moist roadsides, also cultivated; 500–2700 m. Gansu, Guizhou, Henan, Hubei, Jiangxi, Nei Mongol, Shaanxi, Sichuan, Yunnan.

Two varieties and three cultivars can be recognized in China.

- 1a. Ultimate leaf segments incised to lacinate or pinnatifid; rootstock a thick tuber; plants never or very rarely flowering or setting seed.
 - 2a. Ultimate leaf segments incised to lacinate 8d. 'Fuxiong'
 - 2b. Ultimate leaf segments pinnatifid 8e. 'Chuanxiong'
- 1b. Ultimate leaf segments irregularly serrate;

rootstock swollen at nodes or tuberous; plants usually flowering and setting seed.

- 3a. Fruit ribs all narrowly winged, subequal 8c. var. *hupehense*
- 3b. Fruit ribs prominent, or only lateral ribs narrowly winged.
 - 4a. Dorsal and intermediate fruit ribs prominent, filiform, lateral ribs narrowly winged; rootstock slightly swollen at nodes 8a. var. *sinense*
 - 4b. Fruit ribs all prominent, filiform, subequal, wingless; rootstock tuberous 8b. 'Jinxiong'

8a. *Ligusticum sinense* var. *sinense*

藁本(原变种) gao ben (yuan bian zhong)

Ligusticum harrismithii M. Hiroe; *L. markgrafianum* Fedde ex H. Wolff; *L. pilgerianum* Fedde ex H. Wolff; *L. silvaticum* H. Wolff.

Plants freely flowering and setting seed. Rootstock slightly swollen at nodes. Leaves ternate to 3-pinnate; ultimate segments irregularly serrate. Dorsal and intermediate fruit ribs prominent, filiform, lateral ribs narrowly winged.

• Forests, grassy slopes, streamsides, also cultivated; 500–2700 m. S part of Huang He basin.

Neither *Ligusticum markgrafianum*, described from Hubei (*A. Henry 4954*, isotype, E) nor *L. pilgerianum* Fedde ex H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 322. 1930, not H. Wolff, loc. cit. 307. 1930; *L. harrismithii*), described from Gansu (*J. F. Rock 14590*, syntype) and Shanxi (*H. Smith 7112*, syntype) can be separated from *L. sinense* var. *sinense*, so we here treat them in synonymy.

This is an important plant of traditional Chinese medicine, in which the roots and rootstock are used in "gao ben" (see also *Ligusticum jeholense*: "liao gao ben"), a common herb used as an analgesic and anti-inflammatory, in the treatment of heart diseases and asthma. The seedlings are also eaten as a vegetable.

8b. *Ligusticum sinense* 'Jinxiong' H. D. Zhang et al., Acta Phytotax. Sin. 28: 477. 1990.

金芎 jin xiong

Plants usually flowering and setting seed. Rootstock tuberous. Ultimate leaf segments incised. Fruit ribs all prominent, filiform, subequal, wingless. $2n = 33^*$.

• Montane scrub, grassy slopes, also cultivated; 800–3100 m. Guizhou, Shaanxi, Sichuan, Yunnan.

This taxon is closely allied to var. *sinense* but is triploid.

8c. *Ligusticum sinense* var. *hupehense* H. D. Zhang, Acta Phytotax. Sin. 31: 281. 1993.

水藁本 shui gao ben

Plants usually flowering and setting seed. Rootstock swollen at nodes or tuberous. Stems single or multicapital. Ultimate leaf segments irregularly serrate. Fruit ribs all narrowly winged, subequal. $2n = 22^*$.

• Moist roadsides; 1500–1600 m. Hubei.

This taxon is used medicinally in Hubei as “shui gao ben,” a regional substitute for “gao ben.”

8d. *Ligusticum sinense* ‘Fuxiong’ S. M. Fang & H. D. Zhang, *Acta Phytotax. Sin.* 22: 38. 1984.

抚芎 fu xiong

Plants very rarely flowering or setting seed. Rootstock a thick tuber. Ultimate leaf segments incised to lacinate. $2n = 33^*$.

- Cultivated. Hubei, Jiangxi, Sichuan.

8e. *Ligusticum sinense* ‘Chuanxiong’ S. H. Qiu et al., *Acta Phytotax. Sin.* 17(2): 102. 1979, pro sp.

川芎 chuan xiong

Plants never flowering or setting seed. Rootstock a thick tuber. Ultimate leaf segments pinnatifid. $2n = 22^*$.

- Cultivated. Gansu, Henan, Hubei, Nei Mongol, Shaanxi, W Sichuan.

This cultivar was historically used medicinally in Sichuan as “mi wu,” but nowadays it has fallen from use.

9. *Ligusticum reptans* (Diels) H. Wolff, *Acta Horti Gothob.* 2: 316. 1926.

匍匐藁本 pu fu gao ben

Peucedanum reptans Diels, *Bot. Jahrb. Syst.* 29: 502. 1900.

Plants ca. 30 cm. Rootstock slender creeping, apparently swollen at nodes, internodes elongated. Stem single, striate. Basal petioles 5–9 cm; blade triangular-ovate, 3–6 × 2–5 cm, ternate-2-pinnate; ultimate segments ovate or ovate-lanceolate, 10–20 × 8–15 mm, margins 3–5-lobed. Upper leaves sessile, 1-pinnate. Umbels terminal, 3–4 cm across; lateral umbels smaller, usually staminate; bracts 5–6, linear, reflexed; rays 10–14, 1.5–2 cm; bracteoles 5–6, linear, reflexed. Calyx teeth obsolete. Petals white, obovate, base shortly clawed. Styles ca. 0.5 × fruit. Fruit oblong-ovoid, ca. 3 × 2 mm; dorsal and intermediate ribs prominent, lateral ribs ca. 0.5 mm; vittae 1 in each furrow, 2–4 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

- Grassy slopes, moist rock surfaces; 2000–2200 m. NE Guizhou (Fanjing Shan), Chongqing (Nanchuan).

10. *Ligusticum litangense* F. T. Pu, *Acta Phytotax. Sin.* 29: 534. 1991.

理塘藁本 li tang gao ben

Plants 30–50 cm. Root fusiform. Stem erect purplish. Leaves petiolate; blade triangular-ovate, ternate-2-pinnate, primary pinnae 3–4 pairs; ultimate segments ovate, 10–20 × 5–10 mm, margins serrate. Upper leaves reduced, sessile, 1-pinnate or 3-lobed; ultimate segments lanceolate. Umbels 3–3.5 cm, terminal and lateral; bracts absent; rays 5–8, extremely unequal, 1–3 cm; bracteoles 2–5, linear, shorter than umbellules, ca. 5 mm. Calyx teeth obsolete. Petals white, obovate, base cuneate. Styles ca. equaling stylopodium. Fruit oblong-ovoid, ca. 4 × 3 mm; ribs narrowly winged, lateral ribs slightly broader than

dorsal and intermediate ribs; vittae 2–3 in each furrow, 4–6 on commissure. Seed face slightly concave. Fl. Jul–Aug, fr. Sep–Oct.

- Alpine scrub and meadows; ca. 4300 m. W Sichuan (Litang).

This rather poorly known taxon is recorded only from a few collections.

11. *Ligusticum angelicifolium* Franchet, *Bull. Soc. Philom. Paris, sér. 8, 6:* 133. 1894.

归叶藁本 gui ye gao ben

Ligusticopsis angelicifolia (Franchet) Leute; *Angelica angelicifolia* (Franchet) Kljuykov.

Plants 1–1.5 m or more. Root cylindrical. Stem erect, striate and branched. Lower leaves petiolate; petioles 8–12 cm; blade triangular-ovate, 15–30 × 20–40 cm, ternate-3-pinnate; ultimate segments oblong-ovate, 2.5–5 × 1–3 cm, margins serrate. Upper leaves very reduced. Umbels 5–7 cm across, terminal and lateral, base of umbels densely yellow hispid; bracts absent; rays (10–)20–25, extremely unequal, 1–6 cm; bracteoles few, linear, ca. 10 mm. Calyx teeth obsolete. Petals purple. Styles ca. 2 × stylopodium, reflexed. Fruit oblong-ovoid, 4–5 × 2.5–3 mm; dorsal and intermediate ribs prominent, filiform, lateral ribs winged; vittae 3–4 in each furrow, 4–6(–8) on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep.

- Grassland at forest margins, scrub at streamsides, alpine meadows; 1800–4200 m. Shaanxi, W Sichuan, SE Xizang, W Yunnan.

This species has reputed medicinal value.

12. *Ligusticum discolor* Ledebour, *Fl. Altaic.* 1: 321. 1829.

异色藁本 yi se gao ben

Pleurospermum discolor (Ledebour) M. Hiroe; *Paraligusticum discolor* (Ledebour) V. N. Tikhomirov

Plants 0.6–2 m, stout. Rootstock cylindrical. Stem single, erect, striate, hollowed and branching, base densely covered in fibrous remnant sheaths. Lower leaf petioles 20–40 cm; blade triangular-ovate, 30–35 × 20–25 cm, ternate-3-pinnate; ultimate segments ovate or oblong-ovate, 2–4 × 1–1.5 cm, puberulent on the veins, abaxially olivaceous, purplish. Upper leaves much reduced. Umbels 5–10 cm across, terminal and lateral; peduncle 20–40 cm, base of umbels densely pubescent; bracts 5–8, linear, 5–20 mm; rays 30–50, extremely unequal, 3–12 cm; bracteoles numerous, linear, 4–6 mm, shorter than umbellules. Calyx teeth obsolete. Petals white, ovate. Fruit oblong-ovoid, ca. 4 × 2.5 mm; dorsal and intermediate ribs filiform, lateral ribs narrowly winged; vittae 3–4 in each furrow, 8–10 on commissure. Seed face plane. Fl. and fr. Jul–Sep.

- Montane scrub; ca. 1200 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Russia (Siberia), Tajikistan].

13. *Ligusticum kingdon-wardii* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 27: 306. 1930.

草甸藁本 cao dian gao ben

Plants 0.8–2 m, stout. Root fusiform elongate, 20–30 × ca. 1.5 cm, woody. Stem single, erect, purplish fistular, striate,

branching, base covered in fibrous remnant sheaths. Basal and lower petioles 15–30 cm; blade deltoid-ovate, ca. 30 × 20 cm, ternate-3-pinnate, primary pinnae 5–6 pairs; ultimate segments lanceolate, 20–30 × 5–10 mm, margins pinnatifid. Upper leaves reduced to bladeless sheaths. Umbels terminal, 15–20 cm across, lateral umbels smaller; bracts 6–12, linear; rays 25–35(–45), slightly unequal, 4–8(–15) cm; bracteoles 8–10, linear, entire, rarely 2–3-lobed at apex, slightly exceeding umbellules, margins pubescent. Calyx teeth obsolete. Petals white obovate, base cuneate. Styles ca. equaling stylopodium. Fruit oblong-ovoid, 4–5 × ca. 3 mm; dorsal and intermediate ribs filiform, lateral ribs narrowly winged; vittae 3–4 in each furrow, 6 on commissure. Fl. and fr. Aug–Oct.

• Wooded valleys, alpine meadows; 3000–3900 m. SW Sichuan, N Yunnan.

14. *Ligusticum jeholense* (Nakai & Kitagawa) Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 4 [Index Fl. Jehol.]: 90. 1936.

辽藁本 liao gao ben

Cnidium jeholense Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 1 [Pl. Nov. Jehol. 1]: 38. 1934; *Tilingia jeholensis* (Nakai & Kitagawa) Leute.

Plants 30–80 cm. Root fusiform; rootstock short. Stem erect, purplish striate, branching. Lower petioles 10–19 cm; blade broad-ovate, 10–20 × 8–16 cm, ternate-2–3-pinnate, primary pinnae 4–6 pairs; ultimate segments ovate, 2–3 × 1–2 cm, hispid on veins, margins 3–5-lobed. Upper leaves reduced. Umbels terminal and lateral, 3–7 cm across; bracts 2, linear, scabrid, margins narrow membranous, caducous; rays 8–16, subequal, 2–3 cm; bracteoles 8–10, linear, longer than umbellules in flower, and subequal to pedicels in fruit. Calyx teeth obsolete. Petals white, oblong-ovate. Styles ca. 0.5 × fruit, reflexed. Fruit oblong, 3–4 × 2–2.5 mm; dorsal and intermediate ribs filiform, lateral ribs narrowly winged; vittae 1(–2) in each furrow, 2–4 on commissure. Seed face plane. Fl. Aug–Sep, fr. Sep–Oct.

• Forests, meadows, streamsides, damp places; 1200–2500 m. Hebei, Jilin, Liaoning, Shandong, Shanxi.

The roots and rootstock are used as “liao gao ben” (see also *Ligusticum sinense*, “gao ben”), an important, analgesic and anti-inflammatory herb of traditional Chinese medicine.

15. *Ligusticum glaucifolium* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 312. 1930.

白叶藁本 bai ye gao ben

Plants 40–60 cm, glabrous. Root cylindrical. Stem single, erect, striate, 1–2-branched. Basal leaves ovate or broad-ovate, 15–20 × 5–15 cm, 1–2-pinnate, pinnae 3–6 pairs; ultimate segments ovate or rhombic, 10–20 × 5–20 mm, abaxial glaucous, margins serrate. Upper leaves similar to the basal, reduced, sessile on expanded sheaths. Umbels terminal and lateral, 3–5 cm across; bracts 2–4, linear, or absent; rays 8–10, subequal, 2–3 cm; bracteoles 6–8, linear, ca. equaling umbellules in flower; umbellules many-flowered; pedicels subequal. Calyx teeth obsolete. Petals purple, obovate, base cuneate. Styles

divergent, equaling stylopodium. Fruit oblong-ovoid, 4–5 × 3–3.5 mm; ribs narrowly winged, subequal. Fl. and fr. Aug–Oct. $2n = 22^*$.

• Shady forests, pebbly slopes, stream banks; 3000–3300 m. W Yunnan.

This rather poorly known species is recorded only from a few collections.

16. *Ligusticum elatum* (Edgeworth) C. B. Clarke, in J. D. Hooker, Fl. Brit. India 2: 698. 1879.

高升藁本 gao sheng gao ben

Cortia elata Edgeworth, Trans. Linn. Soc. London 20: 55. 1846; *Levisticum argutum* Lindley.

Plants 30–120 cm or more, stout, subglabrous. Root cylindrical. Stem erect, striate, branched, base clothed in fibrous remnant sheaths. Basal petioles 5–10 cm; blade ovate-lanceolate, 5–8(–15) × 3–5(–10) cm, 2–3-pinnate, primary pinnae 4–5 pairs, remote; ultimate segments oblong-ovate, 10–20 × 5–10 mm, abaxially pale green, margins incised. Upper leaves reduced, 1-pinnate or 3-lobed, sessile. Umbels terminal and lateral, 3–5 cm across; bracts 1–4, linear, caducous; rays 15–25(–40), subequal, 2–4 cm; bracteoles 6–12, linear; umbellules many-flowered. Calyx teeth small, triangular, caducous. Petals white, obovate, base cuneate. Styles ca. 2 × stylopodium. Fruit oblong, 3–5 × 1.5–3 mm; ribs all narrowly winged, lateral wings broader; vittae 2–3 in each furrow, 4–6(–8) on commissure. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

Forest margins; ca. 3600 m. Xizang [Afghanistan, Bhutan, NW India, Nepal, Pakistan].

17. *Ligusticum weberbauerianum* Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 312. 1930.

尖瓣藁本 jian ban gao ben

Notopterygium weberbauerianum (Fedde ex H. Wolff) Pimenov & Kljuykov.

Plants ca. 70 cm tall, glabrous. Root cylindrical. Stem single, striate, 2–3-branched. Basal petioles 5–10 cm; blade triangular-ovate, 20–25 × 15–25 cm, ternate-3-pinnate, primary pinnae 5–6 pairs; ultimate segments ovate-lanceolate, 2–2.5 × 0.5–1 cm, margins pinnatifid. Cauline leaves few, reduced. Terminal umbels 4–6 cm across, lateral umbels smaller; bracts 1–2, linear, or absent; rays 12–20, slender, subequal, 4–5 cm; bracteoles 5, linear, shorter than pedicels; umbellules many-flowered. Calyx teeth conspicuous, triangular. Petals white, oblong-ovate, base cuneate, apex mucronate. Styles ca. 2 × stylopodium. Immature fruit oblong-ovoid (mature fruit not known). Fl. and fr. Jul–Sep.

• Forests; ca. 3300 m. C Gansu.

Recent research has suggested that this poorly known species and *Ligusticum pilgerianum* H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 307. 1930, not Fedde ex H. Wolff, loc. cit. 322. 1930) are conspecific with *Notopterygium incisum*. Certainly the petal shape is unusual in *Ligusticum*, but further work is needed to confirm these findings; if upheld the name *N. weberbauerianum* should be applied to the taxon. *Ligusticum pilgerianum* H. Wolff was described from Sichuan, and is

allied to *L. acuminatum* according to the original description, but we have not seen the type (*H. Smith 3544*).

18. *Ligusticum pteridophyllum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 132. 1894.

蕨叶藁本 jue ye gao ben

Ligusticopsis pteridophylla (Franchet) Leute.

Plants 30–80 cm, glabrous. Rootstock swollen at nodes, small globose, internodes slender. Stem erect, striate and hollowed. Basal and lower petioles 15–20 cm; blade ovate, 15–20 × 10–15 cm, ternate–2–3-pinnate, primary pinnae 5–7 pairs, remote; ultimate segments obovate or flabelliform, ca. 10 × 5 mm, acute at apex, margins crenate. Upper leaves reduced. Umbels terminal and lateral, 5–7 cm across; bracts 8–10, linear; rays 13–20, subequal, 2–3 cm; bracteoles 6–10(–12), linear. Calyx teeth obsolete. Petals white or purplish tinged, base cuneate. Fruit oblong, ca. 5 × 3 mm, dorsal and intermediate ribs prominent, lateral ribs narrowly winged; vittae 3 in each furrow, 4–6 on commissure. Seed face plane. Fl. Aug–Sep, fr. Sep–Oct. $2n = 44^*$.

• Forests, grassy slopes, streamsides, rock crevices; 1800–3600 m. S Gansu, W Sichuan, E Xizang, Yunnan.

This species is used in NW Yunnan (Dali area) as a regional substitute, known as “hei gao ben,” for the traditional Chinese medicine “gao ben” (see *Ligusticum sinense* and *L. jeholense*).

19. *Ligusticum acuminatum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 131. 1894.

尖叶藁本 jian ye gao ben

Ligusticopsis acuminata (Franchet) Leute.

Plants 1–2 m, stout, glabrous. Rootstock thick. Stems 1–2, purplish tinged, hollow, branching. Lower petioles 5–10 cm; blade triangular-ovate, ternate–3-pinnate, pinnae 4–6 pairs, crowded, terminal pinna caudate; ultimate segments subovate, 5–15 × 5–10 mm, apex acuminate or caudate. Upper leaves reduced, sessile, 1-pinnate. Terminal umbels ca. 4 cm across, lateral umbels smaller; peduncles 5–15 cm; bracts 5–6, linear, caducous; rays (7–)12–23, subequal, 2–3 cm; bracteoles 5–10, linear. Calyx teeth obsolete. Petals white, obovate, base cuneate. Styles reflexed. Fruit oblong-ovoid, ca. 3 × 2 mm; dorsal and intermediate ribs narrowly winged, lateral ribs more broadly winged; vittae 2–3(–4) in each furrow, 6–8 on commissure. Seed face plane or slightly concave. Fl. Jul–Aug, fr. Sep–Oct. $2n = 22^*$.

• Forests, forest margins, alpine scrub and meadows; 1500–4000 m. Gansu, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

This species is used in W Sichuan as a regional substitute, known as “xin jiang gao ben,” for the traditional Chinese medicine “gao ben” (see *Ligusticum sinense* and *L. jeholense*).

20. *Ligusticum nullivittatum* (K. T. Fu) F. T. Pu & M. F. Watson, Acta Phytotax. Sin. 42: 564. 2004.

无管藁本 wu guan gao ben

Cnidium nullivittatum K. T. Fu, Fl. Tsinling. 1(3): 460. 1981; *Selinum nullivittatum* (K. T. Fu) C. C. Yuan & L. B. Li.

Plants 50–120 cm. Stem erect, branching, glabrous. Lower leaves petiolate; blade triangular-ovate, ternate–2–3-pinnate, secondary pinnae usually 8–10 pairs, crowded, terminal pinna caudate; ultimate segments ovate or lanceolate, 5–22 mm, much incised or shallowly pinnatifid. Umbels 6–9 cm across; peduncles 5–11 cm, strigose; bracts caducous; rays ca. 30, 2–3.5 cm, subequal, scabrous; bracteoles 8–10, linear, exceeding pedicels; umbellules 20–30-flowered. Calyx teeth obsolete. Petals white, obovate-cordate. Fruit oblong-obovate, ca. 4 mm, dorsal and intermediate ribs narrowly winged, lateral ribs broadly winged; vittae absent. Fl. Aug–Sep, fr. Sep–Oct.

• Sparse forests, scrub, moist land; 1400–2400 m. W Hubei, S Shaanxi, E Sichuan.

This is an incompletely known species.

21. *Ligusticum tachiroei* (Franchet & Savatier) M. Hiroe & Constance, Umbell. Jap. 1: 74. 1958.

岩茴香 yan hui xiang

Seseli tachiroei Franchet & Savatier, Enum. Pl. Jap. 2: 373. 1878; *Cnidium filisectum* Nakai & Kitagawa; *C. tachiroei* (Franchet & Savatier) Makino; *Ligusticum filisectum* (Nakai & Kitagawa) M. Hiroe; *L. koreanum* H. Wolff; *L. tachiroei* var. *filisectum* (Nakai & Kitagawa) S. Y. He & W. T. Fan; *Rupiphila tachiroei* (Franchet & Savatier) Pimenov & Lavrova; *Tilingia filisecta* (Nakai & Kitagawa) Nakai & Kitagawa; *T. tachiroei* (Franchet & Savatier) Kitagawa.

Plants 10–30 cm tall, slender, glabrous. Root cylindrical. Stem single or multicapital, little-branched or unbranched. Basal petioles 5–7(–12) cm; blade ovate, 5–10 × 5–7 cm, 3-pinnate, primary pinnae 5–7 pairs; ultimate segments linear, 3–15 × 0.5–1 mm. Cauline leaves similar to basal, reduced. Umbels terminal and lateral, 2–4 cm across; bracts 2–7, lanceolate, margins white membranous, usually caducous; rays 5–10, unequal, 5–15(–40) mm; bracteoles 5–8, similar to bracts, ca. equaling pedicels. Calyx teeth conspicuous, lanceolate, ca. 0.5 mm. Petals white or pinkish, base shortly clawed. Styles ca. 2 × stylopodium. Fruit oblong, 3–4 × 1–2 mm; ribs prominent, subequal; vittae 1 in each furrow, 2 on commissure. Seed face plane to slightly concave. Fl. Jul–Aug, fr. Aug–Sep.

Pebbly slopes, damp river banks, rock crevices; 1200–2500 m. Hebei, Henan, Jilin, Liaoning, Shanxi [Japan, Korea, Mongolia].

22. *Ligusticum striatum* de Candolle, Prodr. 4: 158. 1830.

条纹藁本 tiao wen gao ben

Cortia striata (de Candolle) Leute; *Ligusticum wallichii* Franchet, nom. illeg. superfl.; *Oreocome striata* (de Candolle) Pimenov & Kljuykov; *Selinum striatum* (de Candolle) Benth & J. D. Hooker (1867); *S. striatum* Benth & J. D. Hooker (1879).

Plants 30–120 cm, glabrous. Root cylindrical. Stem single, little-branched, base clothed in fibrous remnant sheaths. Basal leaf blades ovate in outline, 4–8 × 3–6 cm, 3–4-pinnate, primary pinnae 4–5 pairs; ultimate segments linear, 3–10 × 1–2 mm. Cauline leaves few, gradually reduced upward. Terminal

umbels 5–7 cm across, lateral umbels smaller; bracts 4–6, linear; rays 8–14, unequal, 2–4 cm; bracteoles 4–8, linear, ca. equaling pedicels, margins narrowly white membranous. Calyx teeth lanceolate, ca. 0.6 mm. Petals white, obovate, base cuneate. Fruit oblong-ovoid, 3.5–4 × 3–3.5 mm; ribs prominent, subequal; vittae 1 in each furrow, 2 on commissure. Seed face plane. Fl. and fr. Jul–Sep.

Shady slopes in forests; 1500–3700 m. NW Yunnan (Heqing) [NW India, Kashmir, Nepal].

23. *Ligusticum delavayi* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 131. 1894.

丽江藜本 li jiang gao ben

Hymenidium delavayi (Franchet) Pimenov & Kljuykov.

Plants 30–80 cm, glabrous. Root cylindrical, up to 10 cm. Stem single or multicapital, little-branched above. Basal and lower petioles 6–25 cm; blade oblong-ovate or lanceolate, 5–15 × 2–10 cm, 2–3-pinnate, primary pinnae 6–8 pairs; ultimate segments setuliform, 1–5 × ca. 0.5 mm. Upper leaves reduced, sessile, 1–2-pinnate. Umbels terminal and lateral, 3–10 cm across; bracts 1–4, linear-lanceolate, 5–15 mm, with white membranous margins; rays (6–)10–14, subequal, 3–4 cm; bracteoles 8–10, lanceolate, 5–8 mm, narrowly membranous margined. Calyx teeth conspicuous, subulate, ca. 0.5 mm, unequal. Petals white, obovate, base cuneate. Fruit oblong-ovoid, ca. 4 × 3 mm; dorsal and intermediate ribs raised, lateral ribs narrowly winged; vittae 3 in each furrow, 6 on commissure. Seed face plane. Fl. Aug–Sep, fr. Sep–Oct. $2n = 22^*$.

• Montane thickets, alpine pastures; 2800–4500 m. S Xizang, NW Yunnan.

This species has reputed medicinal value.

24. *Ligusticum brachylobum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 134. 1894.

短片藜本 duan pian gao ben

Ligusticopsis brachyloba (Franchet) Leute; *Peucedanum cavaleriei* H. Wolff.

Plants to 1 m tall, stout, puberulent throughout. Root fusiform. Stem erect, striate, hollow, branching, base clothed in fibrous remnant sheaths. Basal petioles 9–25 cm; blade triangular-ovate, 10–20 × 8–18 cm, 3–4-pinnate; ultimate segments linear, ca. 3 × 1 mm. Upper leaves reduced, sessile. Umbels terminal and lateral, terminal umbels 4–6 cm across; bracts 2–4 or absent; rays 15–30, 2–6 cm, scabrid; bracteoles 10–12, linear, densely pubescent, without white membranous margin. Calyx teeth conspicuous, subulate, ca. 0.5 mm. Petals white, broad-obovate, base cuneate. Fruit oblong-ovoid, ca. 5 × 4 mm; dorsal and intermediate ribs raised, lateral ribs winged; vittae 2–3 in each furrow, 4–6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct. $2n = 22^*$.

• Forests, forest margins, alpine scrub and meadows, grassy slopes, stream banks; 1600–4100 m. NE Guizhou, Qinghai, Shaanxi, SE and W Sichuan, E Xizang, Yunnan.

This species is used in Guizhou and Sichuan as a regional substitute, known as “duan pian fang feng,” for the traditional Chinese medicine “fang feng” (see *Saposhnikovia divaricata*).

25. *Ligusticum mairei* M. Hiroe, Umbell. Asia 1: 108. 1958.

白龙藜本 bai long gao ben

Plants 14–25 cm. Root cylindrical. Stem multicapital, striate, branched, base clothed in fibrous remnant sheaths. Basal petioles 2–5 cm, sheaths oblong-ovate, puberulent; blade ovate, 3–5 × 2–4.5 cm, ternate-2–3-pinnate; ultimate segments linear, 3–10 × 0.5–1 mm. Cauline leaves similar to the basal, reduced, sessile. Terminal umbels 4–7 cm across, lateral umbels smaller, 1–3 cm across, base of umbels puberulent; bracts absent; rays 20–35, unequal, 1–4.5 cm, slender, puberulent; bracteoles 7–12, linear or linear-lanceolate, slightly connate at base, ca. equaling pedicels, without white membranous margin; umbellules 15–25-flowered. Calyx teeth inconspicuous, triangular, minute. Petals white, obovate, base cuneate. Immature fruit oblong-ovoid (mature fruit unknown). Fl. Aug.

• Grassy slopes; ca. 3300 m. NE Yunnan.

This incompletely known taxon is recorded only from the type locality.

26. *Ligusticum nematophyllum* (Pimenov & Kljuykov) F. T. Pu & M. F. Watson, Acta Phytotax. Sin. 42: 564. 2004.

线叶藜本 xian ye gao ben

Conioselinum nematophyllum Pimenov & Kljuykov, Willdenowia 33: 361. 2003, based on *Ligusticum filifolium* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 29: 538. 1991, not J. D. Hooker (1864).

Plants 30–80 cm, glabrous. Root fusiform or tuberous, ca. 3 × 1.5 cm, clustered. Stem single, purplish, slightly inflated at basal nodes, 1–2-branched or unbranched above. Basal petioles 8–10 cm; blade triangular-ovate, 8–10 × 6–10 cm, 2(–3)-pinnate, primary pinnae 6–10 pairs; ultimate segments linear, elongate, 5–15 × 1–2 mm. Cauline leaves gradually reduced upward, uppermost 2-pinnate. Umbels terminal and lateral, terminal umbels 3–5 cm across; bracts 1–2, linear; rays 8–13, subequal, 1.5–3 cm, hispid; bracteoles 5–8, linear, ca. 2 × umbellules. Calyx teeth obsolete. Petals white, obovate, base cuneate. Stylopodium short conic; styles divergent. Fruit oblong-ovoid, ca. 4 × 2–2.5 mm; dorsal and intermediate ribs prominent, lateral ribs narrowly winged; vittae 1–3 in each furrow, 2–6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

• Forest margins, alpine scrub and meadows, streamsides; 3000–4200 m. W Sichuan.

27. *Ligusticum tenuissimum* (Nakai) Kitagawa, J. Jap. Bot. 17: 563. 1941.

细叶藜本 xi ye gao ben

Angelica tenuissima Nakai, Bot. Mag. (Tokyo) 33: 10. 1919.

Plants 60–100 cm. Root branched, caudex short. Stem erect, purplish, hollow, branching. Basal leaves withered at flowering, lower petioles up to 20 cm; blade ternate-3–4-pinnate; ultimate segments linear, 5–30 × 1–3 mm. Umbels terminal and lateral, terminal umbels 3–5 cm across; bracts 1–2, linear, 1–2 cm, white membranous margined, usually caducous; rays 10–18, slightly unequal, 2–5 cm; bracteoles 5–8, lanceolate, 8–15 mm, shorter

than umbellules, white membranous margined; pedicels unequal, 5–10 mm. Calyx teeth obsolete. Petals white, obovate, base cuneate. Stylopodium short conic; styles reflexed. Fruit oblong, ca. 4×2 –2.5 mm; dorsal and intermediate ribs prominent, lateral ribs narrowly winged; vittae 1 in each furrow, 2 on commissure. Seed face plane. Fl. Aug–Sep, fr. Sep–Oct.

Forests, rocky slopes; 1000–2000 m. Hebei, Liaoning [Korea].

This species is used in NE China (especially Liaoning) as a regional substitute, known as “han gao ben” (or “huo gao ben” or “shan gao ben”), for the traditional Chinese medicine “gao ben” (see *Ligusticum sinense* and *L. jeholense*).

28. *Ligusticum tenuisectum* H. de Boissieu, Bull. Herb. Boissier 3: 843. 1903.

细裂藁本 xi lie gao ben

Ligusticopsis tenuisecta (H. de Boissieu) Leute.

Plants ca. 40 cm, glabrous. Root fusiform. Stem erect, branched. Lower leaves petiolate; blade triangular-ovate, ternate-3–4-pinnate; ultimate segments linear, 3 – $10 \times$ ca. 0.5 mm. Upper leaves reduced, 1–2-pinnate. Umbels terminal and lateral, terminal umbels 3–5 cm; bracts absent or occasionally 1, linear; rays 15–20, subequal, 2–3 cm, bracteoles 5, linear, ca. equaling umbellules in flower, pubescent; umbellules many-flowered. Calyx teeth obsolete. Petals white, obovate, base cuneate. Styles ca. $2 \times$ stylopodium. Fruit oblong-ovoid, 4 – $5 \times$ ca. 3 mm; dorsal and intermediate ribs prominent, lateral ribs winged; vittae 3–5 in each furrow, 6–10 on commissure. Seed face slightly concave. Fl. and fr. Aug–Sep.

• Scrub, grassy slopes, alpine meadows; 2000–4500 m. W Hubei, NE Sichuan, NW Yunnan.

This species has reputed medicinal value.

29. *Ligusticum likiangense* (H. Wolff) F. T. Pu & M. F. Watson, Acta Phytotax. Sin. 42: 563. 2004.

美脉藁本 mei mai gao ben

Pleurospermum likiangense H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 116. 1929; *Ligusticopsis integrifolia* (H. Wolff) Leute; *L. likiangensis* (H. Wolff) Lavrova & Kljuykov; *Ligusticum calophlebicum* H. Wolff; *L. integrifolium* H. Wolff; *Pleurospermum calophlebicum* (H. Wolff) M. Hiroe; *Trachydium chinense* M. Hiroe; *T. hispidum* H. Wolff (1930), not Franchet (1894); *T. lichiangense* C. Y. Wu, nom. illeg. superfl.

Plants 15–50 cm. Root subnapiform, ca. 15×1 cm, branched. Stem erect, profusely branched from base, base clothed in fibrous remnant sheaths. Basal petioles 2–4(–10) cm; blade oblong-ovate, 4 – 8×2.5 –6 cm, 3-lobed or 1-pinnate, pinnae 2–3 pairs; ultimate segments oblong-ovate or lanceolate, 20 – 30×5 –10 mm, terminal segments rhombic-ovate, 3 – 5×1.5 –2 cm, margins serrate or 3–5-lobed. Upper leaves few, reduced, sessile, 3-lobed. Umbels terminal and lateral, 3–4 cm across; bracts 2–7, linear, entire, 2–3-lobed at the apex, rarely pinnate, caducous; rays 8–25, subequal, 1–5 cm; bracteoles 4–8(–10), similar to bracts, exceeding the umbellules, margins ciliate; umbellules 20–30(–40)-flowered. Calyx teeth 1–2, subulate or triangular, prominent, unequal. Petals white, obcordate, base short clawed.

Fruit oblong-ovoid, 2.5 – 3×1.5 –2 mm; dorsal and intermediate ribs prominent, lateral ribs narrowly winged; vittae 1–2 in each furrow, 6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

• Sparse forests, alpine meadows; 2800–4000 m. W Sichuan, NW Yunnan.

This species is used in NW Yunnan (Lijiang) as a regional substitute, known as “mei mai gao ben,” for the traditional Chinese medicine “qian hu” (see *Peucedanum praeruptorum* and *Angelica decursiva*).

30. *Ligusticum involucratum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 132. 1894.

多苞藁本 duo bao gao ben

Plants 12–40 cm, pilose throughout. Root fusiform, branched. Stem erect, profusely branched, base densely clothed with fibrous remnant sheaths. Basal petioles 3–9 cm; blade oblong-ovate or broad-lanceolate, 8 – 10×4 –10 cm, pinnate, pinnae 4–5 pairs; ultimate segments oblong-ovate or oblong, 2 – 5×1.5 –3 cm, densely pilose on veins, margins incised to pinnatifid. Cauline leaves similar to basal, reduced upwards. Umbels terminal and lateral, 3–9 cm across; bracts 7–10, 2–4 cm, pinnate, densely pilose; rays 20–35, subequal, 2.5–5 cm; bracteoles 10–12, longer than umbellules, 5–10 mm, pinnate, pilose. Calyx teeth conspicuous, triangular, ca. 0.5 mm. Petals white or faintly pinkish, obovate or obcordate, base shortly clawed. Fruit oblong-ovoid, ca. 4×2 mm; dorsal and intermediate ribs prominent, filiform, lateral ribs winged; vittae 1–3 in each furrow, 4–6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct. $2n = 22^*$.

• Coniferous forests, alpine scrub and meadows, riparian grasslands, rock crevices; 2800–4900 m. W Sichuan, SE Xizang, NW Yunnan.

31. *Ligusticum franchetii* H. de Boissieu, Bull. Soc. Bot. France 53: 432. 1906.

紫色藁本 zi se gao ben

Ligusticopsis franchetii (H. de Boissieu) Leute.

Plants 20–35 cm, slender, glabrous. Root fusiform. Stem single, purplish, 1–2-branched above. Basal petioles 7–9 cm, sheaths purplish, oblong-ovate; blade triangular-ovate, 2–3-pinnate, primary pinnae 5–6 pairs; ultimate segments lanceolate, 3 – 5×1 –2 mm. Cauline leaves similar to basal, reduced, short petiolate to sessile, 1–2-pinnate. Umbels terminal and lateral, 2–4 cm across; bracts absent; rays 6–12, subequal, 1.5–2 cm; bracteoles 4–6, linear, entire, apex 2–3-lobed or 1-pinnate, narrowly membranous-margined; umbellules many-flowered. Calyx teeth subulate, ca. 0.5 mm. Petals purplish obovate or ovate, base cuneate. Stylopodium short conic; styles reflexed. Fruit oblong-ovate, ca. 4×2 mm; dorsal and intermediate ribs prominent, filiform, lateral ribs winged; vittae (1–)2–3 in each furrow, 4–6 on commissure. Seed face plane. Fl. Aug–Sep, fr. Oct–Nov.

• Alpine scrub and meadows, rock crevices; 3800–3900 m. SW Sichuan, NW Yunnan.

32. *Ligusticum sikiangense* M. Hiroe, *Umbell. Asia* 1: 107. 1958.

川滇藁本 chuan dian gao ben

Plants (7–)30–60 cm, glabrous. Root fusiform. Stems single or 2–3, 1–2-branched. Basal petioles 3–7 cm; blade oblong or lanceolate, (3–)5–10 × (2–)3–5 cm, 2–3-pinnate; ultimate segments oblanceolate, 2–3 × 0.5–1 mm, 3-lobed at the apex. Cauline leaves 1–2, similar to basal, reduced. Umbels terminal and lateral, 4–7 cm across; bracts 2–3, linear, entire, apex caudate, rarely 1–2-pinnate; rays (5–)8–10, unequal, (1.5–)3–8 cm; bracteoles 5–7, linear-lanceolate, entire, caudate or apex 2–3-lobed, rarely pinnate, connate at base; umbellules many-flowered. Calyx teeth triangular, ca. 0.4 mm. Petals white, obovate, base shortly clawed. Styles erect to divergent. Fruit oblong-ovoid, ca. 3 × 2 mm; ribs all narrowly winged; vittae 4–5 in each furrow, 8–10 on commissure. Seed face slightly concave. Fl. Jul–Aug, fr. Sep.

• Coniferous forests, alpine scrub and meadows, alpine talus slopes; 3400–4500 m. W Sichuan, NW Yunnan.

Russian authors consider this species to be synonymous with *Hyemenidium chloroleucum* (see *Pleurospermum hookeri* var. *thomsonii*).

33. *Ligusticum capillaceum* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 27: 311. 1930.

细苞藁本 xi bao gao ben

Ligusticopsis capillacea (H. Wolff) Leute; *Pleurospermum capillaceum* (H. Wolff) M. Hiroe.

Plants 6–20 cm, hispid throughout. Root stout, 8–25 × 0.5–1 cm; caudex 1–1.5 cm thick. Stems single or 2–4, unbranched or 1-branched, base densely covered in fibrous remnant sheaths. Basal petioles 2–5 cm; blade oblong-ovate, 4–8(–10) × 1.5–3 cm, 2-pinnate, pinnae 5–7 pairs; ultimate segments linear-lanceolate, 2–4 × ca. 1 mm. Cauline leaves 1–2, reduced. Umbels 2–5 cm across; peduncles up to 15 cm, base of umbels densely hispid; bracts 1–2, 1-pinnate, caducous; rays (4–)10–20, subequal, (1–)3 cm; bracteoles 6–8, similar to bracts, slightly exceeding umbellules. Calyx teeth obsolete. Petals white or purple, obcordate, pubescent, base cuneate. Styles ca. 0.5 × fruit, reflexed. Fruit oblong-ovoid, ca. 6 × 3 mm, glabrous; dorsal and intermediate ribs filiform, lateral ribs winged; vittae 1–3 in each furrow, 4–6 on commissure. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

• Sparse forests, alpine meadows; 2500–4000 m. W Sichuan, NW Yunnan.

34. *Ligusticum yunnanense* F. T. Pu, *Acta Phytotax. Sin.* 29: 543. 1991.

云南藁本 yun nan gao ben

Plants 40–60 cm, pilose throughout. Stem erect, 1–2-branched. Lower leaves petiolate, sheathing; blade subtriangular, 10–15 × 8–12 cm, ternate-2–3-pinnate, primary pinnae 5–6 pairs; ultimate segments lanceolate, 5–15 × 2–5 mm. Upper leaves reduced, 1-pinnate. Umbels terminal and lateral, terminal umbels 3–5–5 cm across; peduncles 8–10 cm; bracts 2–5, 1–2-pinnate; rays 15–20, subequal, ca. 4 cm; bracteoles 5–6, 1-pin-

nate, nearly as long as umbellules. Calyx teeth obsolete. Petals white, obovate, base cuneate. Styles ca. equaling stylopodium. Fruit oblong-ovoid, ca. 4 × 2.5–3 mm; dorsal and intermediate ribs prominent, filiform, lateral ribs narrowly winged; vittae 2–3 in each furrow, 4 on commissure. Seed face plane. Fl. and fr. Jul–Sep.

• Grassy slopes. Yunnan.

35. *Ligusticum oliverianum* (H. de Boissieu) R. H. Shan, *Sinensia* 12: 175. 1941.

膜苞藁本 mo bao gao ben

Selinum oliverianum H. de Boissieu, *Bull. Herb. Boissier* 2: 846. 1903; *Ligusticopsis oliveriana* (H. de Boissieu) Lavrova; *Ligusticum daucooides* (Franchet) Franchet var. *souliei* H. de Boissieu.

Plants 20–40 cm, glabrous throughout. Root fusiform. Stems multicapital, sparingly branched, base clothed in fibrous remnant sheaths. Basal and lower petioles (4–)10–20 cm; blade oblong-lanceolate, 2–6 × 1–2 cm, 2–3-pinnate, primary pinnae 5–7 pairs; ultimate segments linear, 2–5 × 0.5–1 mm. Upper leaves few, similar to basal, reduced. Umbels terminal and lateral, 2–3 cm across; bracts 5–10, lanceolate, apex pinnate, margin white membranous; rays 6–13, subequal, 1–2 cm; bracteoles 5–10, lanceolate, 1–2-pinnate or apex 3-lobed, rarely entire, margin white membranous, longer than umbellules. Calyx teeth obsolete. Petals white, oblong-obovate, base cuneate. Stylopodium short conic; styles reflexed. Fruit oblong-ovoid, 5–6 × 3–4 mm; dorsal and intermediate ribs filiform, lateral ribs narrowly winged; vittae 1–2 in each furrow, commissure. Seed face plane. Fl. Aug, fr. Sep–Oct.

• Coniferous forests, alpine scrub and meadows, grassy valley slopes, marshland, rock crevices; 2000–4300 m. Hubei, NE and W Sichuan, S Xizang, NW Yunnan.

36. *Ligusticum rechingerianum* (Leute) R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 29: 544. 1991 [*“rechingerana”*].

玉龙藁本 yu long gao ben

Ligusticopsis rechingeriana Leute, *Ann. Naturhist. Mus. Wien* 73: 75. 1969 [*“rechingerana”*].

Plants (15–)20–80 cm. Root cylindrical, branched. Stems single or 2, sparsely pilose or glabrous, branched from base, base clothed in fibrous remnant sheaths. Basal and lower petioles 5–10 cm; blade oblong-ovate, 8–15 × 3–4 cm, 1–2-pinnate, pinnae 3–5 pairs; ultimate segments ovate to oblong-ovate, 15–40 × 5–20 mm, margins incised or pinnatifid. Upper leaves reduced, sessile, 1-pinnate. Terminal umbels 4–7 cm across, lateral umbels 1–2, smaller; bracts 2–8, 1-pinnate, pinnae linear; rays 15–30, subequal, 3–4 cm; bracteoles 6–8, 2–3-pinnate, pinnae linear, longer than umbellules; umbellules many-flowered. Calyx teeth linear-lanceolate. Petals white or purplish, obcordate, base cuneate. Styles ca. equaling stylopodium in fruit, reflexed. Fruit oblong-ovoid, ca. 4 × 2.5 mm; dorsal and intermediate ribs filiform, lateral ribs winged; vittae 2–3 in each furrow, 6–10 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

• Montane thickets, alpine meadows; 1500–4600 m. W Sichuan, NW Yunnan.

37. *Ligusticum hispidum* (Franchet) H. Wolff in Handel-Mazzetti, *Symb. Sin.* 7: 723. 1933.

毛蕲本 mao qiao ben

Trachydium hispidum Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 113. 1894; *Ligusticopsis hispida* (Franchet) Lavrova & Kljuykov; *Ligusticum changii* M. Hiroe; *Trachydium chinense* M. Hiroe; *T. rockii* H. Wolff.

Plants 8–60 cm, hispid-setulose throughout. Root cylindrical, elongate. Stem very short, base clothed in fibrous remnant sheaths. Leaves lanceolate in outline, 5–10 × 1–3 cm, 2–3-pinnate, primary pinnae 3–4 pairs; ultimate segments lanceolate, 3–5 × 2–5 mm, usually 3–5-lobed, lobes linear. Umbels terminal and lateral, terminal umbels 10–18 cm across; bracts 1–3, 1–2-pinnate; rays (8–)12–22, unequal, elongate up to 24 cm; bracteoles numerous, 2-pinnate, pinnae linear. Calyx teeth ovate or subulate, unequal. Petals white, base cuneate. Styles ca. 1/3 × fruit, reflexed. Fruit oblong-ovoid, ca. 3 × 2 mm; dorsal and intermediate ribs filiform, lateral ribs winged; vittae 1–2 in each furrow, 4 on commissure. Seed face plane. Fl. Aug, fr. Oct. $2n = 22^*$.

• Alpine meadows, grassy slopes, rock crevices; 2600–4500 m. W Sichuan, Xizang, Yunnan.

38. *Ligusticum scapiforme* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 27: 308. 1930.

抽葶蕲本 chou ting gao ben

Ligusticopsis scapiformis (H. Wolff) Leute; *Ligusticum maxonianum* H. Wolff.

Plants 5–30 cm. Root cylindrical, elongate, branched. Stems 2–3, unbranched, subscapose, base clothed in fibrous remnant sheaths. Basal petioles 2–3 cm; blade oblong-lanceolate, 3–5 × 2–3 cm, 2–3-pinnate, primary pinnae 4–5(–10) pairs; ultimate segments linear to lanceolate, 2–3 × 0.5–1 mm. Cauline leaves absent or occasionally 1, reduced. Umbels terminal, 3–6 cm wide, pilose at base; bracts 1–3, linear, pinnate or apex 3-lobed, rarely entire; rays (7–)9–15, unequal, 1–3 cm; bracteoles 8–10, 1–2-pinnate or apex 3-lobed, ca. equaling umbellules. Calyx teeth conspicuous. Petals white or purplish, obovate, base shortly clawed. Styles ca. equaling stylopodium. Fruit oblong-ovoid, 4–5 × 3–4 mm; dorsal and intermediate ribs filiform, lateral ribs winged; vittae 1–4 in each furrow, 4–6(–8) on commissure. Seed face plane. Fl. Jun–Aug, fr. Sep–Oct.

• Coniferous forests, montane thickets, grassland at forest margins, alpine scrub and meadows, river banks; 2700–4800 m. W Sichuan, S Xizang, NW Yunnan.

This species has reputed medicinal value. The original description and a cited isotype of *Ligusticum maxonianum* (Yunnan: Lijiang, *J. F. Rock 10380*, E) possess a combination of characters in common with *L. scapiforme*.

39. *Ligusticum daucooides* (Franchet) Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 135. 1894.

羽苞蕲本 yu bao gao ben

Trachydium daucooides Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 2, 8: 245. 1886; *Angelica daucooides* (Franchet) M. Hiroe; *Ligusticopsis daucooides* (Franchet) Lavrova & Kljuykov; *Ligusticum dielsianum* H. Wolff; *Ligusticopsis dielsiana* (H. Wolff) Pimenov & Kljuykov.

Plants 20–50 cm, glabrous. Root stout, cylindrical, 4–10 × ca. 1.5 cm. Stem single, 2–3-branched or unbranched, base clothed with fibrous remnant sheaths. Basal petioles 8–18 cm; blade oblong-ovate, 8–20 × 4–5 cm, 3–4-pinnate, primary pinnae 5–6 pairs; ultimate segments linear, 3–4 × ca. 1 mm. Cauline leaves sessile, sheathing, blade similar to basal, reduced. Umbels terminal and lateral, 7–10 cm across; bracts 1–2, pinnate or absent; rays (10–)14–23, unequal, 1.5–6 cm, scabrid; bracteoles 8–10, 1–2-pinnate, longer than umbellules. Calyx teeth 2–3, subulate, unequal, 1–2 mm. Petals white or purplish abaxially, obovate, base cuneate. Styles ca. equaling stylopodium. Fruit oblong, 6–8 × 3–4 mm; dorsal and intermediate ribs raised, lateral ribs winged; vittae 1–3 in each furrow, 4–6 on commissure. Seed face plane. Fl. Jun–Aug, fr. Sep–Oct. $2n = 22^*$.

• Coniferous forest margins, alpine scrub and meadows, grassy slopes, moist rock crevices; 2600–4800 m. W Hubei, Sichuan, S Xizang, N Yunnan.

This species has reputed medicinal value (in Sichuan and Yunnan). An isotype of *Ligusticum dielsianum* (Yunnan: Huize, Ta-hai, *E. E. Maire 1027*, E) is so similar to *L. daucooides* that the two entities cannot be separated.

40. *Ligusticum multivittatum* Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 133. 1894.

多管蕲本 duo guan gao ben

Ligusticopsis multivittata (Franchet) Leute; *Ligusticum modestum* Diels; *L. pseudomodestum* H. Wolff.

Plants (6–)20–40 cm, glabrous. Root cylindrical or fusiform, elongate, 10 cm or more. Stem multicapital, purplish, erect, 1–2-branched or unbranched, base clothed with fibrous remnant sheaths. Basal petioles 4–12 cm; blade oblong-ovate, 5–7 × 3–5 cm, 2–3-pinnate, primary pinnae 5–8 pairs; ultimate segments linear or lanceolate, 3–6 × 1–2 mm. Cauline leaves 1–2, smaller or absent. Umbels terminal, 3–4 cm across, peduncles 4–22 cm; lateral umbels 1–2, smaller; bracts 1–2, pinnate, rarely entire, pinnae entire, hispid; rays 5–10(–20), subequal, 1–2(–3) cm; bracteoles 1–2-pinnate, rarely only apex 2–3-lobed, hispid, longer than umbellules. Calyx teeth conspicuous, triangular or subulate. Petals white or violet, obovate, base cuneate. Fruit oblong, 4–6 × ca. 3 mm; dorsal and intermediate ribs raised, lateral ribs winged; vittae 2–5 in each furrow, 6–10 on commissure. Seed face plane. Fl. Jul–Aug, fr. Sep–Oct.

• Forests, bamboo scrub, grasslands, talus slopes; 3000–4100 m. W Sichuan, NW Yunnan.

The holotypes of *Ligusticum modestum* (Yunnan: Lijiang, *G. Forrest 2856*, E), and *L. pseudomodestum* (Yunnan: *J. Kingdon Ward 4664*, E) are so similar to *L. multivittatum* that the three entities cannot be separated.

The following taxa have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

- Ligusticum elegans* H. Wolff (Acta Horti Gothob. 2: 312. 1926), described from Hebei ("Hsiao-wu-tai-shan [Xiaowutai Shan], Yangkia-p'ing, Hsi-lin," ca. 2200 m, *K. A. H. Smith 1167*, holotype, GB).
- Ligusticum falcarioides* H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 311. 1930), described from Yunnan ("Hiss-chong-chang," 2600 m, *E. E. Maire 3942*, holotype, P).
- Ligusticum ferulaceum* Franchet (Bull. Soc. Philom. Paris, sér. 8, 6: 135. 1894, not Lamarck, 1779, nor Allioni, 1785, nor Lapeyrouse, 1813), published in observations without type information.
- Ligusticum glaucescens* Franchet (Bull. Soc. Philom. Paris, sér. 8, 6: 134. 1894), described from Yunnan ("Pee-ngay-tze" & "Mo-che-tchin, supra Tapin-tze," *P. J. M. Delavay 446 & s.n.*, syntypes, P).
- Ligusticum jeholense* (Nakai & Kitagawa) Nakai & Kitagawa var. *tenuisectum* Y. C. Chu (Fl. Pl. Herb. Chin. Bor.-Orient. 6: 293. 1977), described from Liaoning (Benxi, Huanren, *Deng Yu-chen 1263*, holotype, FPI).
- Ligusticum kiangsiense* H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 326. 1930), described from Jiangxi (*Du Bois-Reymond 733*, holotype, unlocalized).
- Ligusticum kulingense* H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 314. 1930), described from Jiangxi ("Kuling Suschangebigge," ca. 1100 m, *Du Bois-Reymond s.n.* holotype, unlocalized).
- Ligusticum levisticifolium* H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 323. 1930 [*"levisticifolium"*]), described from Xizang ("Tsé-Kou," *J. T. Monbeig 85*, holotype, E; isotype ?P).
- Ligusticum limprichtii* H. Wolff (Repert. Spec. Nov. Regni Veg. Beih. 12: 452. 1922), described from Sichuan ("Paoshing" [Baoxing], 2850 m, *W. Limpricht 1053*, holotype, unlocalized).
- Ligusticum longilobum* H. Wolff (Acta Horti Gothob. 2: 313. 1926), described from Jilin ("Hsiaoowhutai Shan" [Xiaowutai Shan], 2300 m, *K. A. H. Smith 101*, holotype, W).
- Ligusticum pseudoangelica* H. de Boissieu (Bull. Herb. Boissier, sér. 2, 3: 845. 1903; *Pleurospermum pseudoangelica* (H. de Boissieu) H. de Boissieu), described from W Sichuan ("Tongolo," *J. A. Soulié 119 & 122*, syntypes, P).
- Ligusticum pseudodaucooides* H. Peng & Yin Z. Wang (Novon 8: 50. 1998; *Ligusticopsis pseudodaucooides* (H. Peng & Yin Z. Wang) Pimenov & Kljuykov), described from Yunnan (Jingdong, Wuliang Shan, Mt. Maotou, ca. 3300 m, *H. Peng 2579*, holotype, KUN).
- Ligusticum rockii* M. Hiroe (Umbel. Asia 1: 110. 1958), described from Yunnan ("Mount Mitzuga, W of Muil Gomba," 3050–4875 ft, *J. F. C. Rock 16541*, holotype, UC).
- Ligusticum sinense* Oliver var. *alpinum* R. H. Shan ex K. T. Fu (Fl. Tsinling. 1(3): 461. 1981), described from Shaanxi ("Hwain Hsien, Tapaiyangcha," 1400–1900 m, *K. T. Fu 17254*, holotype, WNU).
- Ligusticum smithii* H. Wolff (Acta Horti Gothob. 2: 314. 1926), described from Hebei ("Hsiao-wu-tai-shan [Xiaowutai Shan], Yangkia-p'ing, Hsi-lin," 1600–2600 m, *K. A. H. Smith 1097*, holotype, GB).
- Ligusticum tibeticum* H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 317. 1930), described from Gansu (*E. Licent 4810*, syntype, unlocalized) and Xizang ("Kokonor," *Anderson 1215* and *Futerer & Holderer 96*, syntypes, unlocalized).
- Ligusticum wawrae* H. Wolff (Repert. Spec. Nov. Regni Veg. 27: 318. 1930), described from Beijing ("Tse-tai-ssú," *H. Wawra von Fernsee 1065*, holotype, W).

73. PACHYPLEURUM Ledebour, Fl. Altaic. 1: 296. 1829.

厚棱芹属 hou leng qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Arpitiium Necker & Sweet.

Herbs, perennial. Taproot stout, usually branched. Stem single or multicapital, usually short, sometimes acaulescent, base densely clothed with fibrous remnant sheaths. Basal leaves 2–3-pinnate or ternate-2–3-pinnate. Umbels compound, terminal sessile, laterals pedunculate; bracts several, lanceolate or linear-lanceolate; rays 5–40; bracteoles lanceolate or linear-lanceolate, entire or 1–2-pinnate. Calyx teeth prominent, triangular or lanceolate. Petals white or purple, oblong-ovate or cordate-ovate, base cuneate or shortly clawed, apex notched with small incurved lobule. Stylopodium conic or subglobose; styles longer than stylopodium. Fruit oblong-ovoid, ovoid or broadly ovoid, dorsally compressed; ribs all winged, subequal; vittae 1(–2) in each furrow, 2(–4) or absent on commissure. Seed face plane.

About six species: Asia, Europe; five species (four endemic) in China.

- 1a. Plants shortly caulescent to acaulescent; bracteoles 2–3-pinnate.
 - 2a. Calyx teeth lanceolate, ca. equaling stylopodium; fruit oblong-ovoid; dorsal ribs adjacent; commissure vittae 2, evident 1. *P. nyalamense*
 - 2b. Calyx teeth linear, several times longer than stylopodium; fruit ovoid; all ribs evenly spaced; commissure vittae absent 2. *P. lhasanum*
- 1b. Plants distinctly caulescent, stems erect, ascending; bracteoles lanceolate or linear-lanceolate, entire.
 - 3a. Bracteoles lanceolate, margins white membranous; leaves 2-pinnate 3. *P. alpinum*
 - 3b. Bracteoles linear-lanceolate, margins scabrous; leaves ternate-2–3-pinnate.
 - 4a. Plants 10–30 cm; rays 20–40; petals white; fruit broadly ovoid; vittae 1 in each furrow 4. *P. xizangense*
 - 4b. Plants 70–120 cm; rays 5–10; petals purple; fruit oblong-ovoid; vittae 2 in each furrow 5. *P. muliense*

1. *Pachypleurum nyalamense* H. T. Chang & R. H. Shan, *Acta Phytotax. Sin.* 18: 376. 1980.

聂拉木厚棱芹 nie la mu hou leng qin

Plants 10–15 cm, short-caulescent or acaulescent. Taproot stout, 1 cm thick or more, branched. Basal leaves only, petiolate; petioles ca. 2 cm, sheathing; blade oblong-lanceolate, 7–10 × 1.5–2 cm, 2–3-pinnate, rachis densely hispid, pinnae 7–9 pairs; ultimate segments linear. Umbels 6–10 cm across, sessile or peduncle very short; rays 13–20, unequal, 8–10 cm, extending after flowering to 20 cm, angular, scabrous; bracteoles 5–8, 5–10 mm, 1–2-pinnate. Calyx teeth lanceolate, ca. 0.3 mm, ca. equaling stylopodium. Petals white, oblong-ovate. Stylopodium conic; styles ca. 2 × stylopodium. Fruit oblong-ovoid, ca. 6 × 4 mm, glabrous; dorsal ribs adjacent; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

- Alpine scrub and meadows; 3500–3600 m. E and S Xizang.

2. *Pachypleurum lhasanum* H. T. Chang & R. H. Shan, *Acta Phytotax. Sin.* 18: 377. 1980.

拉萨厚棱芹 la sa hou leng qin

Plants acaulescent, 10–20 cm. Taproot rather thick. Leaves petiolate, petioles 2–3 cm, sheaths inflated at base; blade oblong-lanceolate, 3–6 × 1–2 cm, 2–3-pinnate, pinnae 4–7 pairs, remote; ultimate segments ovate-lanceolate, 2–3 × ca. 1 mm. Umbels 8–10 cm across, sessile; rays 11–14, extremely unequal, 4–20 cm; bracteoles 6–8, 1–2-pinnate. Calyx teeth linear, several times longer than stylopodium. Petals white, oblong-ovate. Stylopodium conic; styles elongate, ca. 2 mm. Fruit ovoid, 3–4 × ca. 2 mm; all ribs evenly spaced; vittae 1 in each furrow, vittae absent on commissure. Fl. and fr. Jul–Sep.

- Alpine meadows; 4300–4600 m. W Sichuan, S Xizang.

3. *Pachypleurum alpinum* Ledebour, *Fl. Altaic.* 1: 297. 1829.

高山厚棱芹 gao shan hou leng qin

Arpitium alpinum (Ledebour) Koso-Poljansky.

Plants 12–20 cm. Taproot vertical, slightly thickened, branched. Stem well developed, single or 2–3, erect, striate, usually unbranched. Basal leaves petiolate, petioles 3–5 cm, sheathing, sheaths inflated; blade ovate or oblong-ovate, 3–5 × 1–2 cm, 2-pinnate, pinnae 3–5 pairs; ultimate segments linear or linear-lanceolate, 1–1.5 × 0.5–1 mm. Cauline leaves absent or 1–2, similar to basal, reduced, sessile. Umbels 2–3 cm across; bracts 6–8, lanceolate, margins white membranous; rays 10–15, subequal, 1–1.5 cm; bracteoles 8–10, lanceolate, margins white membranous, ca. equaling umbellules in flower, apex sometimes incised. Calyx teeth triangular. Petals white, cordate-ovate, base shortly clawed. Stylopodium subglobose; styles reflexed after flowering. Fruit oblong-ovoid, ca. 6 × 4 mm; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Jul–Aug.

74. HAPLOSPHAERA Handel-Mazzetti, *Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz.* 57: 143. 1920.

单球芹属 dan qiu qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial. Stem terete, erect, fluted, glabrous, branched above, hollow. Basal and lower leaves long-petiolate, sheath

Grassy slopes; 2400–2500 m. N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

4. *Pachypleurum xizangense* H. T. Chang & R. H. Shan, *Acta Phytotax. Sin.* 18: 376. 1980.

西藏厚棱芹 xi zang hou leng qin

Plants 10–30 cm. Taproot elongate; caudex rather thick, 2–3 cm across, slightly woody. Stem well developed, caespitose, purplish, striate, branched. Basal leaves petiolate, wholly sheathing; sheaths inflated, purplish; blade oblong or oblong-ovate, 10–15 × 3–5 cm, ternate-2–3-pinnate, pinnae 3–4 pairs, remote; ultimate segments lanceolate or oblanceolate, 1–2 × 1–1.5 mm. Cauline leaves few, similar to basal, reduced, shortly petiolate or sessile. Umbels 3–6 cm across, enlarging after flowering up to 10 cm across; bracts 10–15, linear-lanceolate, ca. 15 mm, veins purplish, scabrous; rays 20–40, 3–5 cm, scabrous, slightly recurved in fruit; bracteoles 8–10, linear-lanceolate, 7–8 mm, scabrous; umbellules 15–20-flowered. Calyx teeth lanceolate, unequal, 1–1.5 mm. Petals white, oblong-ovate. Stylopodium conic; styles ca. 2 × stylopodium. Fruit broadly ovoid, 5–7 × 4–5 mm; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

- Alpine meadows, grassy valley slopes; 3700–4600 m. Xizang.

5. *Pachypleurum muliense* R. H. Shan & F. T. Pu, *Acta Phytotax. Sin.* 27: 62. 1989.

木里厚棱芹 mu li hou leng qin

Ostericum muliense (R. H. Shan & F. T. Pu) Pimenov & Kljuykov.

Plants 70–120 cm. Root cylindrical, ca. 8 mm thick. Stem well developed, single, erect, branching. Basal and lower leaves petiolate, wholly sheathing; blade triangular-ovate, 8–10 × 4–8 cm, ternate-2–3-pinnate, pinnae 4–5 pairs, remote; ultimate segments lanceolate, 5–15 × 1.5–4 mm. Upper leaves reduced, sessile; blade 1–2-pinnate. Umbels 3–7 cm across; bracts 3–5, linear, 0.5–1 cm; rays 5–10, unequal, 1.5–5 cm; bracteoles 3–5, linear-lanceolate, equaling pedicels, scabrous; umbellules 15–20-flowered. Calyx teeth lanceolate, ca. equaling stylopodium. Petals purple, cordate-ovate, base shortly clawed. Stylopodium conic; styles ca. 2 × stylopodium. Fruit oblong-ovoid, 5–6 × 3–4 mm; vittae 2 in each furrow, 4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

- Low shrubs at streamsides; ca. 2600 m. SW Sichuan (Muli).

This rather poorly known taxon is recorded only from a few collections. Recent research suggests that it is conspecific with *Ostericum maximowiczii* var. *alpinum* C. Q. Yuan & R. H. Shan, and should be included in *Ostericum* at species rank under the name *O. muliense*.

membranous and clasping; blade broad-triangular or triangular-ovate, ternate-pinnate; ultimate segments irregularly dentate or serrate. Leaves reduced upwards. Flowers densely crowded into a compact, globose heads, inflorescence appearing simple, umbels terminal and lateral; bracts several, subulate to linear-lanceolate, entire. Calyx teeth minute, ovate-triangular. Petals dark brown or purplish brown, obovate apex narrowly inflexed, or spoon-shaped, apex acute. Stylopodium depressed; styles short. Fruit obovoid-oblong or long-ellipsoid, glabrous, slightly dorsally compressed; ribs conspicuous to narrow-winged; vittae (1–)3 in each furrow, 3–6 on commissure. Seed face plane. Carpophore not seen.

Two species: Bhutan, China, NE India; two species (one endemic) in China.

- 1a. Basal leaves ternate-1–2-pinnate; petals obovate, apex narrowly inflexed 1. *H. phaea*
 1b. Basal leaves 3-pinnate; petals broad-ovate, spoon-shaped apex acute 2. *H. himalayensis*

1. *Haplosphaera phaea* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 143. 1920.

单球芹 dan qiu qin

Plants 50–90 cm. Root branched; rootstock stout, dark brown. Lower petioles 10–25 cm; blade broad-triangular or triangular-ovate, 8–15 × 7–15 cm, ternate-1–2-pinnate; lower petiolules 1.5–5.5 cm, lateral pinnae ovate to ovate-lanceolate, 2.5–5 × 1.5–2.5 cm, base oblique; median pinnae ovate or obovate, 3-parted, base cuneate; ultimate segments dentate. Umbels 1–2 cm across; peduncles 4–22 cm; bracts several, subulate, linear or linear-lanceolate, 5–10 × ca. 1 mm; pedicels ca. 3 mm. Petals usually purplish brown, obovate, apex narrowly inflexed, mid-rib conspicuous. Fruit obovoid-oblong or long-ellipsoid, ca. 4 × 2–2.5 mm; ribs narrow-winged; vittae 3 in each furrow. Fl. and fr. Jul–Aug.

• Forested mountain slopes; 3000–4200 m. SW Sichuan (Daocheng), NW Yunnan (Deqin, Lijiang, Zhongdian).

2. *Haplosphaera himalayensis* Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 5: 276. 1976.

西藏单球芹 xi zang dan qiu qin

Plants 80–120 cm. Root little-branched; rootstock 1–1.5 cm thick, clothed with remnant sheaths. Basal leaves numerous, petioles 10–15 cm; blade ovate-triangular, 12–15 × 13–15 cm, 3-pinnate, rigid when dry; pinnae 3–6 pairs, triangular or narrowly ovate-triangular; pinnules 3–4 pairs, lower pinnules short-petiolulate, pinnatisect; ultimate segments mucronate, acute-dentate. Umbels 2–6, 1.5–2.5 cm across, rays elongating in fruit becoming conspicuously compound umbel when mature; peduncles 5–10 cm; bracts absent; umbellules 6–18-flowered; pedicels stout, 2–3 mm; bracteoles 4–8, subulate, ca. 6 mm. Petals dark brown, broad-ovate, spoon-like, ca. 1.5 × 1–1.2 mm, apex acute. Filaments greenish white, ca. 1 mm; anthers dull green. Fruit broadly obovoid, ca. 3 × 1.5 mm; ribs conspicuous. Fl. and fr. Aug–Sep.

Mountain slopes; ca. 3900 m. SE Qinghai, SE Xizang (Nyingchi) [Bhutan, NE India].

75. *CORTIELLA* C. Norman, J. Bot. 75: 94. 1937.

栓果芹属 shuan guo qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial, low, acaulescent or shortly caulescent, usually forming compact rosettes closely appressed to soil surface. Tap root stout, vertical. Stem base densely clothed in fibrous remnant sheaths. Leaves petiolate; blade oblong, 2–3-pinnatisect; ultimate segments linear. Umbels compound, solitary terminal umbel usually sessile, appearing as a cluster of simple umbels, lateral umbels few, pedunculate, obviously compound; bracts many, foliaceous, 1–2-pinnate; rays 10–15; bracteoles numerous, linear or apex 3-lobed. Calyx teeth prominent, linear-lanceolate or triangular-acuminate, unequal. Petals ovate, entire or emarginate, apex narrowly inflexed. Fruit pale yellow or purplish tinged when mature, flat-globose, dorsally compressed, cordate at both ends; ribs broadly winged, wings corky-spongy, unequal, lateral wings usually broader than dorsal; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base.

Three species: Bhutan, China, NE India, Nepal, Sikkim; three species (one endemic) in China.

- 1a. Petioles and rachis glabrous, ultimate segments obovate, 3-lobed, apex rounded 2. *C. caespitosa*
 1b. Petioles and rachis densely puberulous, ultimate segments linear, apex acute.
 2a. Dorsal ribs wings broad, slightly narrower than lateral wings, often convoluted and crowded when mature; ultimate leaf segments less than 4 mm; styles (1.5–)2–3.5 mm after flowering 1. *C. hookeri*
 2b. Dorsal ribs wings narrow, often poorly developed, much narrower than lateral wings, not convoluted and crowded; ultimate leaf segments usually more than 4 mm; styles 1.75–3 mm after flowering 3. *C. cortioides*

1. *Cortia hookeri* (C. B. Clarke) C. Norman, J. Bot. 75: 94. 1937.

栓果芹 shuan guo qin

Cortia hookeri C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 702. 1879; *Schulzia hookeri* (C. B. Clarke) M. Hiroe; *Cor-*

tiella cauwetmarciana Farille & S. B. Malla; *Cortia glacialis* Bonner; *Pleurospermum glaciale* (Bonner) M. Hiroe.

Leaf rachis and petioles fluted, densely fulvous puberulous; blade narrowly oblong, 2.5–7 × 0.8–2 cm, 2–3-pinnatisect; pinnae 4–5 pairs, sessile, puberulous; ultimate segments linear, 2–4 × 0.4–0.8 mm, margins narrowly revolute, apex acute.

Umbellules 1–1.5 cm across; bracts several, foliaceous, 1–2-pinnatisect; rays 8–18, unequal, stout, pubescent; bracteoles ca. 10, linear or long-obovate, 8–12 × 0.5–1 mm, 3-lobed, lobules lanceolate. Petals white or pinkish white, occasionally purplish, ovate, apex acute, slightly incurved. Styles (1.5–)2–3.5 mm after flowering. Fruit oblong-globose, 3–6 × 3–5 mm, wings occasionally tinged dark purple; dorsal ribs wings broad, slightly narrower than lateral wings, often convoluted and crowded when mature. Fl. Aug, fr. Oct.

Grassy places in mountain valleys; ca. 4200 m. Xizang [Bhutan, Nepal, Sikkim].

2. *Cortiella caespitosa* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 18: 376. 1980.

宽叶栓果芹 kuan ye shuan guo qin

Leaf rachis and petioles short, flattened, glabrous; blade oblong, 2-pinnate-or-pinnatisect; ultimate segments obovate, 3–6 × 2–3 mm, 3-lobed, thick-papery, sessile, apex rounded. Bracts 2–4, foliaceous, pinnate; bracteoles 4–8, linear, 3–5 × ca. 0.3 mm, entire; rays and pedicels thick, pedicels dilated at tip. Petals white or purplish tinged, ovate or elliptic, apex acute, slightly incurved, costa purplish-brown, very conspicuous.; styles ca. 2 mm in fruit, divergent or slightly recurved. Fruit yellowish white, oblong-globose, ca. 6 × 5.5 mm, ribs all

broadly corky-winged, wings 1–1.2 mm wide. Fl. and fr. Aug–Oct.

• Gravelly slopes in grasslands; 4900–5200 m. Xizang (Nyêmo, Tingri).

3. *Cortiella cortioides* (C. Norman) M. F. Watson, Edinb. J. Bot. 53: 130. 1996.

锡金栓果芹 xi jin shuan guo qin

Selinum cortioides C. Norman, J. Bot. 75: 95. 1937; *Cortiella hookeri* C. B. Clarke, p.p.

Leaves petiolate, petioles 3–8 cm, pubescent; blade oblong or oblong-ovate, 3–10 × 1.5–4 cm, 2–3-pinnate; pinnae 3–4 pairs; ultimate segments linear to linear-lanceolate, 4–7(–13) × 0.75–1 mm. Bracts absent; rays numerous, arising from caudex, 3–6 cm, hispid; bracteoles 4–6, linear, entire, or apex 2–3-lobed; umbellules 18–25-flowered; pedicels 2–3 mm. Petals white, occasionally tinged purple. Styles 1.75–3 mm after flowering. Fruit suborbicular, 4–5.5 × 4–5 mm; lateral ribs broadly winged, dorsal ribs narrowly winged, wings often poorly developed and often reduced to aborted structures at base. Fl. Aug–Sep, fr. Sep–Oct.

Mountain rock crevices, scree slopes and sandy areas; 4000–5400 m. S Xizang (Yadong) [Bhutan, NE India, Nepal, Sikkim].

76. *CORTIA* de Candolle, Prodr. 4: 186. 1830.

喜峰芹属 xi feng qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial, acaulescent or shortly caulescent, ascending, rosette but rarely closely appressed to soil surface. Taproot stout, vertical, elongate. Stem base densely clothed in fibrous remnant sheaths. Basal leaves petiolate; blade 2–3-pinnatisect; ultimate segments linear. Umbels compound, solitary terminal umbel usually sessile, appearing as a cluster of simple umbels, lateral umbels few to several, pedunculate, obviously compound; bracts and bracteoles few to several, foliaceous, 1–2-pinnate, ultimate segments linear; rays numerous, very unequal. Calyx teeth conspicuous, linear or lanceolate, unequal. Petals white, purplish to deep purple, obovate, costa yellowish, apex inflexed, acute. Fruit dorsally compressed; dorsal ribs filiform, prominent, narrowly winged, lateral broadly winged, wings more than 2 × width of dorsal wings; vittae 1–2 in each furrow, 2–4 on commissure. Seed face slightly concave. Carpophore 2-cleft to base.

Three or four species: Afghanistan, China, Bhutan, N India, Nepal, Pakistan, Sikkim; one species in China.

1. *Cortia depressa* (D. Don) C. Norman, J. Bot. 75: 96. 1937.

喜峰芹 xi feng qin

Athamanta depressa D. Don, Prodr. Fl. Nepal. 184. 1825; *Cortia lindleyi* de Candolle; *C. oreomyrrhiformis* Farille & S. B. Malla; *C. nepalensis* C. Norman; *Schulzia nepalensis* (C. Norman) M. Hiroe.

Plants 5–10(–20) cm. Petioles and rachis thick, adaxially shallowly fluted, pubescent; blade 1.5–10 × 0.75–3 cm, 2–3-

pinnatisect, pinnae 5–7 pairs; ultimate segments linear, 3–5 × 0.5–1 mm, margins entire, narrowly revolute. Bracts few, 2-pinnate, segments linear; rays numerous, 3–6 cm, unequal. pubescent; bracteoles 10–15, 2-pinnatisect, narrow-linear, longer than flowers; umbellules 25–30-flowered. Styles 0.5–1.5 mm, little elongated in fruit. Fruit ovoid-oblong, 4–5 × 3–4 mm. Fl. and fr. Jul–Sep.

Alpine meadows; ca. 4400 m. SC Xizang (Namling) [Bhutan, India, Pakistan, Sikkim].

77. *OREOCOMOPSIS* Pimenov & Kljuykov, Acta Phytotax. Sin. 34: 2. 1996.

羽苞芹属 yu bao qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Michael G. Pimenov, Eugene V. Kljuykov.

Herbs, perennial. Stem solitary, base clothed with fibrous remnant sheaths. Leaves 2–4-pinnate; ultimate segments lanceolate or rhombic, margins dentate. Bracts several, similar to the upper cauline leaves, pinnate, rarely entire; bracteoles linear or filiform, 2–3 × umbellules, reflexed. Calyx obsolete. Petals oblanceolate or obovate, base cuneate, apex acuminate, incurved. Stylopodium conical; styles short, reflexed. Fruit ovoid, scarcely dorsally compressed, glabrous, commissure narrow; ribs prominent, winged, wings

on lateral ribs broader; vittae (1–)2–3 in each furrow, 4–6 on commissure. Seed face slightly concave. Carpophore 2-cleft to base.

Two species: Himalayan region, W China: one species (endemic) in China.

Oreocomopsis resembles *Oreocome* Edgeworth, but differs in having bracts pinnate (rarely entire); bracteoles linear or filiform, 2–3 × umbellules; mericarp commissure narrowed; and mesocarp parenchyma not lignified.

1. *Oreocomopsis xizangensis* Pimenov & Kljuykov, Acta Phytotax. Sin. 34: 3. 1996.

西藏羽苞芹 xi zang yu bao qin

Plants 25–30 cm, roots cylindrical. Stem erect, 4–5 mm thick, often violet at base. Basal leaves petiolate, petioles 8–10 cm, glabrous; blade rhomboid in outline, 6–12 × 6–12 cm, 3–4-pinnate, primary pinnae petiolate, but distal sessile; ultimate segments rhomboid or ovate ca. 6–10 mm, margin pinnate, dentate or lobed on each side. Upper leaves few (1–2), similar to basal, but reduced. Umbels 6–10 cm across; bracts 6–10, ca. equaling rays, 1–2-pinnate, pilose; rays 12–26, unequal, 4–9

cm, pilose; bracteoles numerous, filiform, entire or 2-lobed, 2–3 × umbellules, reflexed, pilose. Petals deep violet, 1.2–2.3 mm. Fruit 6–6.5 × 3.5–4 mm. Fr. Sep.

• *Rhododendron* forests, valleys; 5100–5300 m. S Xizang (Nyalam, Rinbung).

This rather poorly known taxon is recorded from only a few collections. One of us (Pu) has examined no specimens. The species is closely allied to *Oreocomopsis stelliphora* (Cauwet & Farille) Pimenov & Kljuykov, from Nepal, in having bracts foliaceous and bracteoles 2–3 × as long as umbellules, but it differs most noticeably in having pilose rays, bracts, and bracteoles; rays 12–26 (vs. 6–8); and calyx teeth absent (vs. evident).

78. *CONIOSELINUM* Fischer ex Hoffmann, Gen. Pl. Umbell. xxxiii, 180. 1814.

山芎属 shan xiong shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, perennial. Stem hollow, ribbed, base without fibrous remnant sheaths. Leaves petiolate, base sheathing; blade 2–3-pinnatisect or 2–3-ternate-pinnatisect. Umbels compound, terminal and lateral; bracts absent or few; bracteoles numerous, linear. Calyx teeth obsolete. Petals white, ovate or obovate, apex incurved. Stylopodium low-conic to conic. Fruit oblong to ovoid, dorsally compressed, glabrous; dorsal ribs prominent, lateral ribs broad membranous-winged; vittae 1–3 in each furrow, 2–9 on commissure. Seed face plane or slightly concave. Carpophore 2-cleft to base.

About 12 species: E Asia, C Europe, North America; three species (one endemic) in China.

- 1a. Bracts absent; rays smooth (Xinjiang) 2. *C. vaginatum*
 1b. Bracts 1–5, linear to lanceolate; rays scabrous or pubescent.
 2a. Rays 10–13, slightly scabrous; vittae 1 in each furrow, 4 on commissure (SE China) 1. *C. chinense*
 2b. Rays 8–10, pubescent; vittae 4 or 5 in each furrow, 8–9 on commissure (Taiwan) 3. *C. morrisonense*

1. *Conioselinum chinense* (Linnaeus) Britton et al., Prelim. Cat. 22. 1888.

山芎 shan xiong

Athamanta chinensis Linnaeus, Sp. Pl. 1: 245. 1753; *Cnidium chinense* (Linnaeus) Sprengel ex Steudel; *Kreidon chinensis* (Linnaeus) Rafinesque; *Ligusticum chinense* (Linnaeus) Crantz; *Selinum chinense* (Linnaeus) Druce.

Plants 50–100 cm. Root dark brown, branched. Stem branched. Basal and lower petioles ca. 5 cm, sheaths narrow-ovate; blade ovate to triangular-ovate, 15–20 × 10–15 cm, 2–3-ternate-pinnate; pinnae petiolulate, pinnules ovate, 1–5 × 0.5–3 cm; ultimate segments linear, 3–7 × 1–3 mm. Umbels ca. 5 cm across; bracts 1–2, linear, 1–1.5 cm, narrowly scarious-margined; rays 10–13, 2–3 cm, subunequal, slightly scabrous; bracteoles 5–8, linear, 0.5–1 cm. Petals obovate. Stylopodium low-conic. Fruit oblong to ellipsoid, ca. 5 × 4 mm, dorsally compressed; dorsal ribs prominent, narrowly winged, lateral ribs broad-membranous-winged; vittae small, 1 in each furrow, 4 on commissure. Fl. and fr. Aug–Oct. *n* = 22.

Mountain ravines, stream banks; ca. 1000 m. Anhui, Jiangxi [Japan, Russia; North America].

2. *Conioselinum vaginatum* (Sprengel) Thellung in Hegi, Ill.

Fl. Mitt.-Eur. 5(2): 1329. 1927.

鞘山芎 qiao shan xiong

Ligusticum vaginatum Sprengel, Pl. Min. Cogn. Pug. 2: 57. 1815; *Conioselinum univittatum* Turczaninow ex H. Karsten & Kirilow; *C. tataricum* Hoffmann.

Plants 60–120 cm. Root conic, branched; rhizome stout. Stem branched. Basal leaves deciduous. Cauline leaves petiolate, petioles 6–9 cm, base sheathing; blade triangular-ovate, 16–25 × 15–23 cm, 2–3-ternate-pinnate; ultimate segments long-ovate to lanceolate, 1.5–2 × 0.5–0.8 cm, pinnatifid. Umbels 5–10 cm across; bracts absent; rays 10–14, 2–4 cm; bracteoles 5–8, linear, ca. 5 mm. Petals obovate. Stylopodium short-conic. Fruit ellipsoid, slightly flattened dorsally; ribs all prominent; vittae 2–3 in each furrow, 4–6 on commissure. Fl. and fr. Jul–Sep.

Shrubby thickets, grasslands; 1300–2700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia (Siberia), Turkmenistan, Uzbekistan: C Asia, SW Asia, C Europe].

This species is used in Taiwan as a regional substitute for the traditional Chinese medicine “gao ben” (see *Ligusticum sinense* and *L. jeholense*).

3. *Conioselinum morrisonense* Hayata, Icon. Pl. Formosan. 10: 20. 1921.

台湾山芎 tai wan shan xiong

Plants 60–100 cm, stout. Stem rarely branched. Basal leaves petiolate, petioles 5–10 cm, base sheathing; blade ovate to triangular, 12–15 × 10–12 cm, 2–3-pinnatisect; pinnules ovate to ovate-lanceolate, 1–1.5 × 0.5–1 cm, deeply lobed. Umbels ca. 5 cm across; bracts ca. 5, linear to lanceolate; rays

8–10, subequal, pubescent; bracteoles ca. 5, filiform, 3–5 mm; umbellules ca. 8 mm across, ca. 15-flowered. Petals oblong-ovate. Stylopodium conic; styles long, reflexed. Fruit oblong-oval, ca. 6 × 4–5 mm, not strongly dorsally compressed; ribs all prominent; vittae 4 or 5 in each furrow, 8–9 on commissure. Fl. and fr. Aug–Oct.

- Mountain shrubland; 1500–3200 m. Taiwan.

This species has reputed medicinal value (in Taiwan).

79. ARCHANGELICA Wolf, Gen. Pl. 32. 1776.

古当归属 gu dang gui shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, perennial, stout. Stem hollow. Leaves large, 2–3-pinnatisect. Umbels compound, terminal or lateral; rays numerous; bracts and bracteoles several, lanceolate or linear-lanceolate. Calyx teeth obsolete. Petals white, elliptic to oblong, apex acuminate, inflexed. Stylopodium short conic, margin sinuate. Fruit ellipsoid, flattened dorsally, glabrous; ribs all corky-winged, lateral wings slightly broader than dorsal, intervals broad; vittae many, moderate in size to small and almost encircling the seed. Seed face plane or slightly concave. Carpophore 2-cleft to base.

About ten species: N temperate region; two species in China.

Archangelica is closely allied to *Angelica*; see the taxonomic comment under that genus.

- 1a. Leaves pubescent or hispidulous, terminal leaflets undivided; vittae 3–4 in each furrow, 6–7 on commissure 1. *A. brevicaulis*
1b. Leaves glabrous, terminal leaflets often 3-lobed; vittae many, small and encircling the seed 2. *A. decurrens*

1. Archangelica brevicaulis (Ruprecht) Reichenbach, J. Bot. 14: 45. 1876.

短茎古当归 duan jing gu dang gui

Angelocarpa brevicaulis Ruprecht in Osten-Sacken & Ruprecht, Sert. Tianschan. 48. 1869; *Angelica brevicaulis* (Ruprecht) B. Fedtschenko; *Coelopleurum brevicaulis* (Ruprecht) Drude.

Plants 40–100 cm. Root brown, cylindrical, stout, with annular rings, aromatic. Stem 2–3 cm thick, sometimes shortened, thinly ribbed. Basal and lower petioles 9–20 cm, sheaths oblong or saccate, 3–6 cm wide, hispidulous along nerves; blade broad-ovate, 13–17 × 10–17 cm, 2–3-pinnate; leaflets short-petiolulate, ovate to oblong, 3–7 × 1.5–3 cm, base attenuate, margin obtusely or acutely toothed, pubescent adaxially, densely hispidulous abaxially. Umbels 6–15 cm across; peduncles, rays and pedicels hispidulous; bracts 1–2, narrow-lanceolate, margin ciliate; rays 20–40, 4–7 cm; bracteoles many, linear-lanceolate, longer than pedicels, hispidulous; umbellules 24–25-flowered. Petals oblong. Fruit 6–8 × 3–5 mm; dorsal ribs thick-winged, lateral ribs broadly winged, but narrower than the body; vittae 3–4 in each furrow, 6–7 on commissure. Fl. Jul–Aug, fr. Aug–Sep. *n* = 11*.

Meadows, damp stream banks; 2500–3400 m. W Xinjiang [Kyrgyzstan, Tajikistan].

This species has reputed medicinal value and is cultivated in Xin-

jiang, where the roots are used as a regional substitute for the traditional Chinese medicine “du huo” (see *Angelica biserrata*).

2. Archangelica decurrens Ledebour, Fl. Altaic. 1: 316. 1829.

下延叶古当归 xia yan ye gu dang gui

Angelica officinalis Moench var. *decurrens* (Ledebour) Avé-Lallemant; *Angelica archangelica* var. *decurrens* (Ledebour) Weinert.

Plants 1–2 m. Root brown, cylindrical, stout. Stem 2–6 cm thick, thinly ribbed. Basal leaves to 100 cm (including petiole). Cauline leaves petiolate, petioles 8–17 cm, sheaths saccate-inflated, to 6 cm wide, glabrous; blade broadly triangular-ovate, 11–15(–20) × 11–17 cm, 2–3-pinnate; leaflets subsessile, oblong to ovate-lanceolate, base cuneate, margin irregularly toothed, glabrous, terminal leaflets often 3-lobed, decurrent along petiolules. Umbels subglobose, 7–15 cm across; bracts 4–7, lanceolate, pubescent; rays 20–50, 2.5–5 cm, subequal, hispidulous; bracteoles 5–10, linear-lanceolate, margin ciliate, shorter than or equaling pedicels; umbellules 30–50-flowered. Petals broad-ovate. Fruit 5–10 × 3–5 mm; ribs all thick-winged, lateral ribs narrower than the body; vittae numerous, small, encircling the seed. Fl. Jul–Aug, fr. Aug–Sep.

Forests, shrubby thickets, ravines, river banks, damp areas; 500–1500 m. Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia); C and E Asia].

This species has reputed medicinal value in Nei Mongol.

80. COELOPLEURUM Ledebour, Fl. Ross. 2: 361. 1844.

高山芹属 gao shan qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Homopteryx Kitagawa; *Physolophium* Turczaninow.

Herbs, perennial. Stem hollow. Leaves 2–3-pinnate or 2–3-ternate-pinnate, sheaths inflated. Umbels compound, terminal or lateral. Calyx teeth obsolete. Petals white, long-elliptic, apex inflexed. Stylopodium short-conic, margin often sinuate. Fruit ellipsoid or ovoid-ellipsoid, slightly flattened dorsally, glabrous; ribs all broad, thickly winged, lateral ribs slightly broader than the dorsal or nearly equal; vittae 1–3 in each furrow, 2–4 on commissure. Seed face plane or concave. Carpophore 2-cleft to base.

About four species: E Asia, North America; two species in China.

This genus differs from *Angelica* and other related genera in its nearly equally winged fruit and chromosome number $n = 14$; see also the taxonomic comment under *Angelica*.

- 1a. Leaves 2–3-ternate-pinnate, leaflets to 7×4 cm, glabrous; dorsal ribs broad, vittae 1 in each furrow, 2 on commissure 1. *C. saxatile*
 1b. Leaves 2–3-pinnate, leaflets to 2×1.2 cm, pubescent; dorsal ribs narrow, vittae 1–3 in each furrow, 3–4 on commissure 2. *C. nakaianum*

1. *Coelopleurum saxatile* (Turczaninow ex Ledebour) Drude in Engler & Prantl, Nat. Pflanzenfam. 3(8): 213. 1898.

高山芹 gao shan qin

Angelica saxatilis Turczaninow ex Ledebour, Fl. Ross. 2: 296. 1844; *A. gmelinii* (de Candolle) Pimenov subsp. *saxatilis* (Turczaninow ex Ledebour) Voroschilov; *Coelopleurum alpinum* Kitagawa; *Physolophium saxatile* (Turczaninow ex Ledebour) Turczaninow.

Plants 60–80 cm. Root brown, cylindric, ca. 2 cm thick. Stem purplish-green, sparsely pubescent, little-branched above, thin-ribbed. Basal and lower leaves long-petiolate, deciduous. Middle leaves short petiolate, sheaths broad-membranous; blade 2–3-ternate-pinnate; leaflets subsessile, rhombic-ovate or oblique-ovate, up to 7×4 cm, base cuneate or subrounded, margin coarse-serrate, apex acuminate, glabrous. Umbels 5–9 cm across; bracts absent; rays 20–27, 3–4.5 cm, densely pubescent; bracteoles 7–8, linear, ciliate, much longer than pedicels; pedicels 20–30, hispidulous. Fruit ellipsoid, 4–5 \times 2–3 mm; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep. $n = 14^*$.

Damp forests, ravines, steep slopes, grasslands; above 1900 m. Jilin (Changbai Shan) [Korea, Russia].

This species differs from *Coelopleurum gmelinii* (de Candolle)

Ledebour, from Russia (Kamchatka and Siberia), in having fruit with broad intervals and few vittae.

2. *Coelopleurum nakaianum* (Kitagawa) Kitagawa, J. Jap. Bot. 43: 427. 1968.

长白高山芹 chang bai gao shan qin

Homopteryx nakaiana Kitagawa, Bot. Mag. (Tokyo) 51: 809. 1937.

Plants 20–40 cm. Root brown, cylindric, ca. 1 cm thick. Stem green or purple-green branched, nodes hispidulous. Basal and lower petioles 4–6 cm, sheaths membranous-inflated; blade broad-ovate, 3–5 \times 3–7 cm, 2–3-pinnate; leaflets sessile, oblong to broad-ovate, up to 2×1.2 cm, base cuneate, margin cuspidate-toothed, apex acuminate, white-pubescent adaxially, glabrous or sparse pubescent abaxially; proximal leaflets often 3-lobed. Umbels 3–7 cm across, enlarging to 10 cm in fruit; bracts absent or 1, linear-lanceolate, deciduous; rays 12–15, scabrous; bracteoles 6–10, linear, ca. 1 cm, much longer than pedicels, sparsely pubescent. Petals broad-obovate. Anthers dark purple. Fruit ovoid, 3.5–5 \times 2.5–4 cm; vittae 1–3 in each furrow, 3–4 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

Alpine meadows; above 2000 m. Jilin (Changbai Shan) [N Korea].

81. **CZERNAEVIA** Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 739. 1844.

柳叶芹属 liu ye qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, biennial. Stem hollow, thinly ribbed, essentially glabrous, scabrous below umbel. Leaves petiolate, sheaths inflated; blade 2-pinnatisect. Umbels compound, terminal and lateral; bracts 1, deciduous; bracteoles 3–5. Calyx teeth obsolete or minute, triangular. Petals white, apex incurved, outer petals conspicuously enlarged. Fruit suborbicular or broad-ovoid, dorsally compressed, glabrous; dorsal ribs prominent, lateral ribs broad-winged; vittae 3–5 in each furrow, 4–10 on commissure. Seed face plane. Carpophore 2-cleft to base.

One species: China, Korea, Russia (Siberia).

Czernaevia is sometimes included within *Angelica*, but differs in the dimorphic petals and absence of coumarins and flavonoids; see also the taxonomic comment under *Angelica*.

1. *Czernaevia laevigata* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 740. 1844.

柳叶芹 liu ye qin

Plants 60–120 cm. Root cylindric, 0.8–1.5 cm thick. Stem simple or little-branched. Petioles 8–12 cm, sheaths narrowly

oblong; leaf blade triangular-ovate or oblong-ovate, 15–30 \times 10–25 cm, 2-pinnate; leaflets subsessile, lanceolate or oblong-lanceolate to oblong-ovate, 1.5–7 \times 0.5–4 cm, base slightly oblique, sometimes 1–2-minute-toothed, acutely serrate with white cartilaginous margin, apex acuminate, glabrous or hispidulous along nerves abaxially. Umbels 5–15 cm across; bracts

1, like uppermost leaves, deciduous; rays 12–30, 2–5 cm; bracteoles 3–5, linear; umbellules 15–30-flowered. Fruit 2.5–4 × 1.5–3 mm. Fl. Jul–Aug, fr. Sep–Oct.

Forests, shrubby thickets, meadows, damp grasslands, river banks; 300–700 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Korea, Russia (Siberia)].

- 1a. Fruit suborbicular, lateral ribs broadly winged 1a. var. *laevigata*
 1b. Fruit broad-ovoid, lateral ribs almost wingless 1b. var. *exalatocarpa*

1a. *Czernaevia laevigata* var. *laevigata*

柳叶芹(原变种) liu ye qin (yuan bian zhong)

Conioselinum czernaevia Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 2: 33. 1836 [“1835”]; *Angelica czernaevia*

(Fischer & C. A. Meyer) Kitagawa; *A. flaccida* Komarov; *A. gracilis* Franchet; *Czernaevia laevigata* f. *latipinna* Y. C. Chu.

Plants green. Fruit suborbicular, lateral ribs broadly winged. $n = 11^*$.

Shrubby thickets, damp grasslands, river banks. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Korea, Russia (Siberia)].

The young stems and leaves can be used as a vegetable and for forage. The leaves contain 0.3% aromatic oil.

1b. *Czernaevia laevigata* var. *exalatocarpa* Y. C. Chu, Pl. Herb. Chin. Bor.-Orient. 6: 266, 298. 1977.

无翼柳叶芹 wu yi liu ye qin

Plants green or purplish green. Fruit broad-ovoid, lateral ribs almost wingless.

• Forests, meadows. Hebei, Heilongjiang, Jilin, Liaoning.

82. ANGELICA Linnaeus, Sp. Pl. 1: 250. 1753.

当归属 dang gui shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs, biennial or perennial. Root often stout, conic or cylindrical. Leaves petiolate, petiole sheaths conspicuously inflated; blade 1–4-pinnate or 1–3-ternate-pinnate. Umbels compound, terminal and lateral; bracts many or a few, rarely absent; rays many to several; bracteoles many or a few, entire. Calyx teeth obsolete or ovate-triangular. Petals white, rarely pink or dark purple, ovate to obovate, apex incurved. Stylopodium short-conic. Fruit ovoid to orbicular, dorsally compressed; dorsal ribs filiform, lateral ribs broad- or narrow-winged, separated when mature; vittae often 1–2 in each furrow, 2–4 on commissure. Seed face plane or slightly concave. Carpophore 2-cleft to base.

Over 90 species: N temperate zone; 45 species (32 endemic) in China.

The classification of *Angelica* and related genera (*Archangelica*, *Coelopleurum*, *Czernaevia*, *Ostericum*, etc.) is complex and controversial, and many species are known only from a few specimens. A comprehensive revision of this large group, including new collections and analyses of DNA sequence data, is needed before any major changes to the traditional classification can be accepted.

Angelica taiwaniana S. S. Ying (Quart. J. Chin. Forest. 8(4): 125. 1975) was described from Taiwan (“Daikwanzan to kwanzan,” 2800 m, *N. Fukuyama s.n.*, holotype, TAI). However, it is not treated in this account as it is imperfectly known.

- 1a. Leaf sheaths pubescent or spinulose.
 2a. Leaf rachis densely pubescent 1. *A. duclouxii*
 2b. Leaf rachis glabrous.
 3a. Leaves glabrous.
 4a. Bracts 5–9; vittae absent on commissure 2. *A. apaensis*
 4b. Bracts absent or 1; vittae 2 on commissure 3. *A. anomala*
 3b. Leaves hispid or setulose along nerves.
 5a. Leaf sheaths spinulose; fruit ellipsoid to narrow-ellipsoid; vittae 4 on commissure 4. *A. valida*
 5b. Leaf sheaths pubescent; fruit suborbicular to ellipsoid; vittae 2 on commissure 5. *A. setchuenensis*
 1b. Leaf sheaths smooth (occasionally slightly pubescent in *A. biserrata*).
 6a. Rachis and petiolules geniculate.
 7a. Ovary puberulent or hispidulous.
 8a. Bracteoles absent 6. *A. fargesii*
 8b. Bracteoles many, linear 7. *A. genuflexa*
 7b. Ovary glabrous.
 9a. Bracteoles white-scarious-margined; fruit narrow-oblong, 6–7 × 3–3.5 mm 8. *A. tianmuensis*
 9b. Bracteoles not white-scarious-margined, fruit oblong-ellipsoid, 6–7 × 3–5 mm 9. *A. polymorpha*
 6b. Rachis and petiolules not geniculate.
 10a. Basal and lower cauline leaves 1–4-pinnate.
 11a. Rays 7–20.
 12a. Apex of leaves obtuse 10. *A. nitida*
 12b. Apex of leaves acute to long-acuminate.
 13a. Bracteoles lanceolate, apex long-aristate 11. *A. dielsii*

- 13b. Bracteoles small, subulate 12. *A. omeiensis*
- 11b. Rays 20–50.
- 14a. Leaves 2–4-pinnate.
- 15a. Leaflet margin ciliate, apex long-caudate-acuminate 18. *A. longipes*
- 15b. Leaflet margin not ciliate, apex acute.
- 16a. Petals white; calyx teeth obsolete 19. *A. sylvestris*
- 16b. Petals greenish; calyx teeth conspicuous, triangular-ovate 20. *A. dailingensis*
- 14b. Leaves 1–2-pinnate.
- 17a. Leaves pinnate.
- 18a. Pedicels 10–25 mm (Yunnan) 13. *A. longipedicellata*
- 18b. Pedicels 4–7 mm (Taiwan) 14. *A. tarokoensis*
- 17b. Leaves 2-pinnate.
- 19a. Leaflets glabrous 15. *A. songpanensis*
- 19b. Leaflets pubescent along nerves.
- 20a. Bract and bracteole margin ciliate; rays densely pubescent 16. *A. pseudoselinum*
- 20b. Bract and bracteole margin not ciliate; rays subglabrous 17. *A. morrisonicola*
- 10b. Basal and lower cauline leaves 1–3-ternate or 1–3-ternate-pinnate.
- 21a. Leaves 1–3-ternate.
- 22a. Apex of leaves acuminate; vittae 2–3 in each furrow, 4 on commissure (Gansu, Shaanxi) 21. *A. tsinlingensis*
- 22b. Apex of leaves obtuse-rounded or acute; vittae 1 in each furrow, 2 on commissure (Xinjiang) 22. *A. ternata*
- 21b. Leaves 1–3-ternate-pinnate.
- 23a. Petals hirsute abaxially; ovary hispid 23. *A. hirsutiflora*
- 23b. Petals and ovary glabrous (ovary pubescent in *A. dahurica* var. *formosana*).
- 24a. Calyx teeth conspicuous, triangular-ovate to subulate.
- 25a. Leaves ternate to ternate-pinnate; secondary ribs of fruit 2, slightly prominent 24. *A. oncosepala*
- 25b. Leaves 1–2-ternate-pinnate; secondary ribs of fruit not developed.
- 26a. Bracteoles pinnate 25. *A. pinnatiloba*
- 26b. Bracteoles not pinnate.
- 27a. Leaflets decurrent on petioles, hispidulous adaxially 26. *A. decursiva*
- 27b. Leaflets not decurrent, glabrous 28. *A. kangdingensis*
- 24b. Calyx teeth obsolete.
- 28a. Bract and bracteole margin ciliate.
- 29a. Stem glabrous.
- 30a. Fruit narrow-oblong, 5–9 × 2.5–4 mm; vittae 3–6 on commissure 29. *A. longicaudata*
- 30b. Fruit suborbicular, 4–6 × 3–5 mm; vittae 2 on commissure 30. *A. laxifoliata*
- 29b. Stem pubescent or hispidulous.
- 31a. Leaflet margin serrulate and ciliate, rays 40–60 31. *A. maowenensis*
- 31b. Leaflet margin irregularly biserrate; rays 10–25 32. *A. biserrata*
- 28b. Bract and bracteole margin not ciliate.
- 32a. Leaflet base decurrent, rachis conspicuously winged.
- 33a. Bracts absent; petals white 33. *A. cartilaginomarginata*
- 33b. Bracts 2; petals dark purple-red 27. *A. gigas*
- 32b. Leaflets base not decurrent (*A. dahurica* slightly decurrent), rachis not winged.
- 34a. Stem and leaves glabrous.
- 35a. Bracts absent; fruit narrow-oblong 34. *A. acutiloba*
- 35b. Bracts developed; fruit ellipsoid to suborbicular.
- 36a. Rays 17–30, unequal; fruit 5–7 mm long 35. *A. paeoniifolia*
- 36b. Rays 10–20, subequal; fruit 7–12 mm long.
- 37a. Proximal pinnules of leaves 3-foliolose; dorsal ribs of fruit equally winged (Xizang) 36. *A. glauca*
- 37b. Proximal pinnules of leaves not 3-foliolose; dorsal ribs of fruit unequally winged (Xinjiang) 37. *A. multicaulis*
- 34b. Stem and leaves usually hairy.
- 38a. Rachis, peduncles, rays and pedicels all densely hispidulous 38. *A. amurensis*
- 38b. Rachis, peduncles, rays and pedicels partly hairy or glabrous.
- 39a. Leaves 1–2-ternate-pinnate; bracteoles entire to 2–3-lobed 39. *A. balangshanensis*
- 39b. Leaves 2–3-ternate-pinnate; bracteoles entire.
- 40a. Leaflets 2–3.5 × 0.8–2.5 cm.
- 41a. Bracteoles pubescent; lateral ribs of fruit narrow-winged, wings narrower than the body ... 40. *A. morii*
- 41b. Bracteoles glabrous; lateral ribs of fruit broad-winged, wings wider than the body 41. *A. sinensis*

- 40b. Leaflets 5–15 × 2–10 cm.
 42a. Bracteoles absent; petals dark purple-red 42. *A. megaphylla*
 42b. Bracteoles several; petals usually white.
 43a. Leaflet margin inconspicuously serrulate; bracteole apex long-aristate 43. *A. likiangensis*
 43b. Leaflet margin coarsely cuspidate-serrate or biserrate; bracteole apex not aristate.
 44a. Leaflet margin ciliate; rays 16–18 44. *A. cincta*
 44b. Leaflet margin not ciliate; rays 18–40 45. *A. dahurica*

1. *Angelica duclouxii* Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 28: 111. 1930.

东川当归 dong chuan dang gui

Plants perennial. Stem stout, ribbed, villous when young. Cauline leaves petiolate, petioles ca. 10 cm, winged with narrow-oblong sheaths, densely pubescent; blade broad-ovate, 30–35 cm, 3-ternate-pinnate, rachis densely pubescent; pinnae 4 pairs, long petiolulate, leaflets subsessile, oblong-ovate to suborbicular, 2.5–6 × 1.7–4.5 cm, entire or 2–3-lobed, margin serrulate, pubescent along nerves on both surfaces. Peduncles 4–6 cm, densely pubescent; bracts absent; rays 25–50, 3–10 cm, unequal, scabrous along one side; bracteoles 7–10, linear-lanceolate, 4–6 mm, sparse-ciliate, pedicels 4–10 mm. Calyx teeth obsolete. Petals white, obovate, notched. Stylopodium short-conic. Fruit young, ribs narrow-winged (mature fruit unknown). Fl. Aug.

• Valleys, streamsides; 2800–3500 m. NE Yunnan (Loupou near Dongchuan).

This poorly known species is recorded only from the type (*Ducloux 6499*).

2. *Angelica apaensis* R. H. Shan & C. Q. Yuan, Act. Pharmac. Sin. 13(5): 329. 1966.

阿坝当归 a ba dang gui

Heracleum apaense (R. H. Shan & C. Q. Yuan) R. H. Shan & T. S. Wang.

Plants perennial, 1–2 m, stout. Root cylindrical, ca. 2.5 cm thick. Stem stout, ribbed, white-pubescent. Petioles 8–10 cm, sheaths ca. 7 × 3.5–4 cm, broad-ovate or saccate, pubescent; blade elliptic or triangular-ovate, 2–3-pinnate, glabrous; pinnae 3–4 pairs, subsessile, leaflets long-elliptic or lanceolate, 4–5 × 1.5–2.5 cm, margin serrate, sometimes 1–3-lobed. Umbels 10–20(–32) cm across; peduncles 16–20 cm, pubescent; bracts 5–9, long-lanceolate, puberulent; rays 28–65, 6–15 cm, purple-green, pubescent; bracteoles 4–8, 12–14 mm, linear; umbellules 25–50-flowered. Calyx teeth obsolete. Petals white, ovate. Fruit ellipsoid, broad-ovoid to suborbicular, 5–10 × 5–9 mm; dorsal ribs prominent, thick, obtuse, lateral ribs thick, broad-winged; vittae 1 in each furrow, absent on commissure. Fl. Jun–Jul, fr. Aug–Sep. *n* = 11*.

• Shrubby thickets, damp grassy slopes; 3000–4000 m. Sichuan, Xizang, Yunnan.

The roots are used in Sichuan and Yunnan as a traditional Chinese medicine. The fruit shape and structure of *Angelica apaensis* is similar to the Himalayan species *A. nubigena* (C. B. Clarke) P. K. Mukherjee and *A. cyclocarpa* (C. Norman) M. Hiroe, but differs significantly from these and other members of *Angelica*. Further research may show that this species belongs to a new genus.

3. *Angelica anomala* Avé-Lallemant in Fischer & Avé-Lallemant, Index Sem. Hort. Petrop. 9: 57. 1843.

狭叶当归 xia ye dang gui

Angelica jaluana Nakai.

Perennial, 80–150 cm. Root stout, yellowish brown, conic, up to 20 × 3 cm. Stem purplish, thinly ribbed, pubescent. Basal and lower petioles 5–13 cm, sheaths narrow-oblong, amplexicaule, dense-pubescent; blade triangular-ovate, 15–30 × 8–25 cm, 2–3-ternate-pinnate, pinnae 2–4 pairs, glabrous; leaflets subsessile, elliptic to lanceolate, 2–4 × 0.3–1.5 cm, sometimes 3-lobed, base slightly decurrent, margin white-cartilaginous and mucronate-serrate. Peduncles, rays and pedicels all dense hispidulous; peduncles 5–20 cm; bracts absent or 1, deciduous; rays 20–45, subequal; bracteoles 3–7, subulate, pubescent; umbellules 20–40-flowered. Calyx teeth obsolete. Petals white, obovate. Fruit ellipsoid, 4–6 × 3–4 mm; dorsal ribs filiform, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep. *n* = 22.

Forests, forest margins, grasslands, streamsides; 500–1000 m. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Siberia)].

The roots are used in NE China as a regional substitute for the traditional Chinese medicine “bai zhi” (see *Angelica decursiva*).

4. *Angelica valida* Diels, Bot. Jahrb. Syst. 29: 501. 1901.

金山当归 jin shan dang gui

Plants perennial, 30–75 cm. Root cylindrical, black-brown, 8–15 × 0.8–2 cm. Stem purplish green, thinly ribbed, densely pubescent above. Petioles 5–20 cm, sheaths narrow-oblong, spinulose; blade broad-ovate, 10–25 × 11–28 cm, 1–2-ternate-pinnate; leaflets ovate or oblong-ovate, ca. 6 × 3.5 cm, base obtuse-rounded, often 1–2-lobed, margin crenulate, apex acuminate, densely hispid along nerves on both surfaces. Umbels ca. 15 cm across; peduncles 2–6 cm; bracts 1–3, deciduous; rays 25–55; bracteoles 8–10, subulate, ciliate, 5–7 mm, longer than pedicels; umbellules 30–40-flowered. Calyx teeth obsolete. Petals white, obovate, notched. Fruit ellipsoid or narrow-ellipsoid, 4–5 × 2–3 mm, base truncate; dorsal ribs filiform, lateral ribs narrow-winged; vittae 1 in each furrow, 4 on commissure. Fl. Jul–Aug, fr. Aug–Sep. *n* = 11*.

• Damp grasslands, crevices of slopes; 1000–1800 m. Chongqing.

The roots are used in Chongqing as a regional substitute for the traditional Chinese medicine “dang gui” (see *Angelica sinensis*).

5. *Angelica setchuenensis* Diels, Bot. Jahrb. Syst. 29: 500. 1901.

四川当归 si chuan dang gui

Angelica henryi H. Wolff.

Herbs ca. 75 cm high. Rhizome long, creeping. Stem ribbed, setulose above. Basal and middle leaves petiolate, petioles 12–15 cm, sheaths ovate, pubescent; blade broad-triangular, 12–20 × 16–28 cm, 2-ternate-pinnate; leaflets subsessile, obliquely triangular-ovate, ca. 5 × 2.5 cm, base truncate, margin incised-serrate, teeth white-mucronulate, sparsely setulose on nerves abaxially. Upper leaves reduced, sheaths broad-inflated. Bracts few, linear-lanceolate; rays 15–40, 2–4 cm, setulose, unequal; bracteoles several, short-linear to lanceolate, reflexed. Petals white, obcordate, ca. 2 × 2 mm, 1-nerved. Fruit suborbicular or ellipsoid, 5–6 × 4–5.5 mm; dorsal ribs prominent, lateral ribs thin-winged, wings wider or as wide as the body; vittae 1 in each furrow 2 on commissure. $n = 11^*$.

- Forests; 2400–3600 m. W Hubei (Yichang), E Sichuan.

This poorly known species is recorded only from a few localities.

6. *Angelica fargesii* H. de Boissieu, Bull. Herb. Boissier 3: 850. 1903.

曲柄当归 qu bing dang gui

Plants to 2 m. Stem purplish, ribbed, setulose-tomentose above. Basal petiole sheaths narrow-oblong; blade broad-ovate, 20–30 cm, 2-ternate-pinnate, pinnae petiolulate, rachis and petiolules geniculate; leaflets narrow-lanceolate to lanceolate, 5–10 × 2.5–4.5 cm, sparsely hispidulous along nerves abaxially, margin coarsely and deeply incised-serrate, apex acuminate. Upper leaves 3-lobed, sheaths much inflated. Peduncles setulose-tomentose; bracts and bracteoles absent; rays ca. 10, unequal, tomentose; umbellules 25–30-flowered; pedicels unequal, tomentose. Petals white, oblong-ovate. Ovary sparsely puberulent. Young fruit oblong-orbicular (mature fruit unknown). Fl. Jul.

- Thickets; 900–1100 m. Chongqing (Chengkou).

This poorly known species is recorded only from a few localities. Recent research suggests that it is conspecific with *Angelica laxifoliata*.

7. *Angelica genuflexa* Nuttall in Torrey & A. Gray, Fl. N. Amer. 1: 620. 1840.

毛珠当归 mao zhu dang gui

Angelica genuflexa subsp. *refracta* (F. Schmidt) M. Hiroe; *A. refracta* F. Schmidt.

Herbs 0.5–2 m high. Rhizome vertical, 1–1.5 cm thick. Petioles 3–8 cm, sheaths inflated; blade ovate to triangular, 10–40 cm, 1–2-ternate-pinnate, rachis and petiolules often geniculate; leaflets subsessile, lanceolate to ovate-lanceolate, 5–13 × 1–6 cm, margin coarsely mucronulate-serrate, apex acuminate, hispidulous. Peduncles 20–30 cm, hispidulous; bracts absent; rays 20–40, 5–8 cm, unequal; bracteoles many, linear, 11–20 mm, hispidulous; pedicels 5–15 mm. Petals white, ovate, puberulent. Ovary hispidulous. Fruit suborbicular, 4–8 × 3.6–6 mm, pubescent or glabrous; dorsal ribs acute-prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Forests; 200–300 m. Liaoning [Japan, Russia (Siberia); North America].

8. *Angelica tianmuensis* Z. H. Pan, & T. D. Zhuang, Acta Phytotax. Sin. 33: 86. 1995.

天目当归 tian mu dang gui

Plants perennial, 1–2 m. Stem thinly ribbed, pubescent at upper nodes. Basal and lower leaves petiolate, petioles 15–25 cm, sheaths inflated; blade ovate to broad-ovate, 20–30 × 15–30 cm, 2–3-ternate-pinnate, rachis and petiolules geniculate; leaflets long-ovate, 3–6 × 1.7–2.5 cm, base cuneate, margin irregularly coarse-serrate, sometimes 1–2-lobed, spiny-hispid along nerves adaxially. Umbels 4–7 cm across; bracts 1, long-ovate, 2–2.5 cm, apex acuminate; rays 14–20, 1.5–3.5 cm, unequal, scabrous; bracteoles 5–7, linear, 5–7 mm, white-scarious-margined, pubescent; umbellules 20–25-flowered; pedicels unequal, pubescent. Calyx teeth obsolete. Petals white, ovate to broad-ovate. Fruit narrow-oblong, 6–7 × 3–3.5 mm; dorsal ribs thickly protruding, lateral ribs narrow-winged; vittae 1 in each furrow, 2–4 on commissure. Fl. and fr. Aug–Oct. $n = 55^*$.

- Forests; ca. 1100 m. N Zhejiang (Tianmu Shan).

This rather poorly known species is recorded only from a few collections.

9. *Angelica polymorpha* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 19: 185. 1874.

拐芹 guai qin

Angelica sinuata H. Wolff; *Peucedanum taquetii* H. Wolff; *Rompelia polymorpha* (Maximowicz) Koso-Poljansky; *Selinum coreanum* H. de Boissieu.

Plants perennial, 0.5–1 m. Root conic, gray-brown. Stem solitary, purplish around nodes, thinly ribbed, glabrous or sparsely hispidulous above. Petioles up to 15 cm, sheaths narrow-oblong; blade triangular-ovate, 15–30 × 15–25 cm, 2–3-ternate-pinnate, rachis and petiolules geniculate; leaflets ovate or rhombic-oblong, 3–5 × 2.5–3.5 cm, irregularly 2–3-lobed and incised-cuspidate-serrate, scabrous along nerves bifacially or glabrous abaxially. Umbels 4–10 across; peduncles, rays and pedicels densely hispidulous; bracts absent or 1–3, narrow-lanceolate and ciliate; rays 10–20, 1.5–3 cm; bracteoles 7–10, narrow-linear, purplish, ciliate. Calyx teeth obsolete. Petals white, spatulate. Fruit oblong-ellipsoid, 6–7 × 3–5 mm; dorsal ribs prominent, narrow-winged, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. Aug–Sep, fr. Sep–Oct. $n = 11^*$.

Forests, damp grasslands, streamsides; 1000–1500 m. Anhui, Hebei, Heilongjiang, Hubei, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Zhejiang [Japan, Korea].

The roots have reputed medicinal properties.

10. *Angelica nitida* H. Wolff, Acta Horti Gothob. 2: 317. 1926.

青海当归 qing hai dang gui

Angelica chinghaiensis R. H. Shan ex K. T. Fu; *A. wulsiniana* H. Wolff.

Plants perennial, 30–90 cm. Root conic, yellowish brown, 5–10 cm. Stem purplish green, ribbed, hispidulous above. Basal and lower cauline leaves petiolate, petioles 3–5 cm, sheaths ovate, 4–6.5 × ca. 2 cm; blade triangular-ovate, 1–2-pinnate; leaflets oblong to elliptic, 1.5–4 × 1–2 cm, base almost flat,

margin crenate, apex obtuse, hispidulous along nerves and margin. Umbels 6–10 cm across; bracts absent; rays 9–19, 1.5–4 cm, thick, unequal and scabrous; bracteoles 6–10, linear, caudate-acuminate; umbellules 18–40-flowered; pedicels unequal. Calyx teeth obsolete. Petals white or yellowish white, rarely purple-red, long-ovate. Stylopodium dark purple. Fruit oblong to ovoid, 5–6.5 × 3.5–5 mm; dorsal ribs broad, plane, lateral ribs broad-winged, but narrower than the body; vittae 1–2 in each furrow, 2–3 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

- Shrubby thickets, mountain ravines, meadows; 2600–4000 m. Gansu, Qinghai, Sichuan.

The roots have reputed medicinal properties.

11. *Angelica dielsii* H. de Boissieu, Bull. Herb. Boissier 3: 850. 1903.

城口当归 cheng kou dang gui

Plants perennial, up to 2.5 m. Stem stout, villous below umbel. Leaves petiolate, sheaths ovate, glabrous; blade 2-pinnate, proximal pinnae 3-lobed; leaflets ovate to oblong-ovate, 5–7 × 2–4 cm, base cuneate, margin deeply and irregularly serrate-dentate, apex long-acuminate, glabrous. Peduncles long, villous; bracts absent; rays 15–25, unequal, 2–5 cm, villous; bracteoles ca. 8, lanceolate, apex long-aristate, villous. Calyx teeth obsolete. Petals pinkish-white, obcordate. Young fruit ovoid-suborbicular (mature fruit unknown); lateral ribs winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Sep.

- Thickets; 1300–1800 m. Chongqing (Chengkou), Hubei, C Sichuan (Guanxian).

This rather poorly known species is recorded only from a few collections. Recent research suggests that it is conspecific with *Angelica laxifoliata*.

12. *Angelica omeiensis* C. C. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1983: 6. 1985 [“1983”].

峨眉当归 e mei dang gui

Plants perennial, 1.2–2.5 m. Root conic, brown, annular distally, aromatic. Stem purple-green, ribbed, subglabrous. Petioles 5–15 cm, sheaths purple, oblong; blade triangular-long-ovate, 10–18 × 5–12 cm, 2–3-pinnate; leaflets oblong to ovate-oblong, 1.5–5.5 × 0.7–2.5 cm, base often 2-lobed, margin incised-toothed, apex acute to caudate-acuminate. Umbels 3–6 cm across; peduncles, rays and pedicels hispidulous; peduncles 4–7 cm; bracts absent; rays 14–18(–21), 2–5 cm, ascending; bracteoles 5–12, small, subulate; pedicels 15–23(–27). Calyx teeth obsolete. Petals yellowish-green, ovate, notched. Fruit suborbicular, 4–7 × 3.5–6 mm; dorsal ribs filiform, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Aug, fr. Aug–Nov. *n* = 11*.

- Forests, slopes, damp meadows; 2100–3000 m. Sichuan.

The roots have reputed medicinal properties. This poorly known species is recorded only from a few collections. Recent research suggests that it is conspecific with *Angelica wilsonii* (here recognized as *A. sinensis* var. *wilsonii*).

13. *Angelica longipedicellata* (H. Wolff) M. Hiroe, Umbell. World, 1430. 1979.

长柄当归 chang bing dang gui

Porphyroscias longipedicellata H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 306. 1930; *Ostericum longipedicellatum* (H. Wolff) Pimenov & Kljuykov.

Plants perennial, ca. 80 cm. Stem purple-green, ca. 1 cm thick at base, ribbed, branched above. Lower stem leaves petiolate, sheaths inflated; blade pinnate, pinnae 3–4 pairs; leaflets sessile, broadly rhombic-ovate, ca. 4 × 2.5 cm, apical leaflets petiolulate, 3-lobed, margin coarsely mucronate-serrate. Bracts absent; rays up to 30, very unequal, to 7 cm when in fruit, scabrid along ribs; bracteoles few, linear; umbellules ca. 40-flowered; pedicels slender, 1–2.5 cm, very unequal. Calyx teeth obsolete. Petals greenish white. Fruit ovoid, 4–5 mm; dorsal ribs filiform, the lateral winged. Fl. and fr. Aug–Sep.

- Open forests; ca. 3000 m. Yunnan (Tong Shan).

This rather poorly known species is recorded only from a few collections. Recent work suggests that it is better placed in *Ostericum*.

14. *Angelica tarokoensis* Hayata, Icon. Pl. Formosan. 10: 27. 1921.

太鲁阁当归 tai lu ge dang gui

Plants perennial, 30–50 cm, stout. Root short conic. Petioles 5–10 cm, sheaths inflated; blade ovate, up to 20 × 10–15 cm, pinnate; proximal pinnae 3-lobed, middle and distal pinnae oblong-lanceolate, 5–8 × 1–2 cm, base attenuate or broad-cuneate, margin serrate, apex acuminate. Umbels 10–12 cm across; peduncles ca. 5 cm; bracts linear-lanceolate, ca. 1 cm, deciduous; rays 20–50, unequal, scabrous; bracteoles linear, 4–7 mm, glabrous; pedicels ca. 20, up to 7 mm. Calyx teeth minute, triangular-ovate. Petals white, oblong. Stylopodium margin sinuate. Fruit oblong, 5–8 × 3–4 mm, dorsal ribs prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Oct.

- Slopes; 400–2000 m. Taiwan.

The roots have reputed medicinal properties.

15. *Angelica songpanensis* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 33: 480. 1995.

松潘当归 song pan dang gui

Plants perennial, 30–80 cm. Root long-conic, 8–12 cm, yellowish brown, branched. Stem solitary, purplish green, ribbed, pubescent. Basal leaves petiolate, petioles up to 25 cm, sheaths oblong, purplish striate sheaths; blade 2-pinnate, pinnae 3-paired, glabrous; ultimate segments ovate or long-ovate, 3–7 × 2–3.5 cm, margin serrate. Umbels 6–7 cm across; bracts 2–3, linear, ca. 1.5 cm; rays 20–25, 1–5 cm, very unequal, hispid; bracteoles similar to bracts; pedicels 5–15, 2–7 mm, unequal. Calyx teeth minute, triangular. Petals white, obovate, notched. Fruit subovoid, 6–7 × 3–4 mm; dorsal ribs prominent, lateral ribs winged; vittae 1–2 in each furrow, 2 on commissure. Fr. Oct.

- Forests; 2900–4000 m. N Sichuan (Songpan).

This rather poorly known species is recorded only from a few collections.

16. *Angelica pseudoselinum* H. de Boissieu, Bull. Herb. Boissier 2: 848. 1903.

管鞘当归 guan qiao dang gui

Plants perennial, 0.6–1.8 m. Root cylindrical, yellowish brown, 7–15 × 0.6–1.2 cm. Stem purple-green, scabrous above. Petioles up to 22 cm, sheaths purple, 4–7 cm, narrow-oblong; blade triangular-ovate, 10–14 × 8–15 cm, 2-pinnate; leaflets oblong to oblong-lanceolate, 3–5 × 1.5–3 cm; terminal leaflet base decurrent; basal leaflets 2–3-lobed, margin brown-cuspidate-serrate, apex obtuse-acute, pubescent along nerves. Umbels 4–10 cm across; bracts 2–3, narrow-lanceolate or linear, ciliate, margin purplish; rays 20–60, 2–5.5 cm, unequal, densely pubescent; bracteoles 5–7, similar to bracts; umbellules 16–22-flowered. Calyx teeth obsolete. Petals white, ovate. Fruit suborbicular, 4–5 × 3–4 mm; dorsal ribs filiform, lateral ribs winged, wings narrower than the body; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

- Shrubby thickets, grasslands; 1500–3600 m. W Hubei, Sichuan.

17. *Angelica morrisonicola* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 129. 1911.

玉山当归 yu shan dang gui

Plants perennial, 1–2 m high. Root thick, short-conic. Stem stout, glabrous or pubescent. Leaves petiolate, petioles ca. 25 cm, sheaths inflated; blade triangular-ovate, up to 25 × 30 cm, 2-pinnate; pinnae petiolules ca. 6 cm; leaflets short-petiolulate, oblong, 4–7 × 1.5–3 cm, sometimes 3-lobed, margin serrate, pubescent along nerves abaxially or densely hispid on both sides. Bracts linear, ca. 1.5 cm, deciduous; rays ca. 50, ca. 4 cm; bracteoles several, linear, 2–4 mm; pedicels ca. 30. Calyx teeth obsolete. Petals white, oblong. Fruit ovoid, ca. 5 × 3.5 mm, base cordate; dorsal ribs filiform, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Sep–Nov.

- Alpine grasslands; 3000–3500 m. Taiwan.

The roots have reputed medicinal properties.

- 1a. Leaves brown-pubescent along nerves abaxially 17a. var. *morrisonicola*
 1b. Leaves densely hispid on both surfaces and rather small 17b. var. *nanhutashanensis*

17a. *Angelica morrisonicola* var. *morrisonicola*

玉山当归(原变种) yu shan dang gui (yuan bian zhong)

Peucedanum morrisonicola (Hayata) M. Hiroe.

Leaves brown-pubescent along nerves abaxially.

- Alpine grasslands; 3000–3500 m. Taiwan.

17b. *Angelica morrisonicola* var. *nanhutashanensis* S. L. Liu, C. Y. Chao & T. I. Chuang, Quart. J. Taiwan Mus. 14(1–2): 21. 1961.

南湖当归 nan hu dang gui

Peucedanum morrisonicola var. *nanhutashanense* (S. L. Liu, C. Y. Chao & T. I. Chuang) Q. X. Liu.

Leaves rather small, densely hispid on both surfaces.

- NE Taiwan (Yilan).

18. *Angelica longipes* H. Wolff, Repert. Spec. Nov. Regni Veg. 33: 75. 1933.

长序当归 chang xu dang gui

Plants perennial, 2.4–2.7 m. Stem stout, ribbed, branched above. Middle and upper cauline leaves petiolate, sheaths inflated; blade 2–3-pinnate; leaflets short petiolulate or sessile, lanceolate, 5–10 × 2–5 cm, base cuneate or decurrent, margin irregularly serrate and ciliate, apex long caudate-acuminate. Umbels up to 20 cm across; peduncles long; bracts absent; rays ca. 40, unequal, up to 8 cm in fruit; bracteoles several, linear, equaling pedicels; pedicels 25–50, up to 25 mm, subequal, slender, scabrous. Young fruit dorsal ribs prominent, lateral ribs broad-winged (mature fruit unknown); vittae 1 in each furrow. Fl. Jul–Aug.

- Open places; 1100–3000 m. Guizhou, W Yunnan (Chimili).

This rather poorly known species is recorded only from a few collections.

19. *Angelica sylvestris* Linnaeus, Sp. Pl. 1: 251. 1753.

林当归 lin dang gui

Plants perennial, 0.8–2 m. Root conic, thick, slightly aromatic. Stem 1–2.5 cm thick, ribbed, pubescent below umbel. Basal and lower leaves petiolate, petioles long, sheaths ovate to saccate-inflated; blade broadly triangular-ovate, 2–3-pinnate; leaflets sessile, lanceolate to ovate, 2.5–8 × 1–4 cm, base cuneate, margin serrulate, slightly hispidulous along nerves. Umbels 10–20 cm across; bracts absent or 1–2, linear, deciduous; rays 15–30, pubescent; bracteoles many, linear, as long as pedicels. Calyx teeth obsolete. Petals white, ovate to obovate. Fruit broad-ovoid, 5–6 × 3.5–5 mm; dorsal ribs filiform, lateral ribs winged; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Aug–Sep. $n = 11^*$.

Forest margins, damp grasslands, marshy areas, river banks; 900–1100 m. Xinjiang [Russia (Siberia); C and N Europe].

The roots have reputed medicinal properties.

20. *Angelica dailingensis* Z. H. Pan & T. D. Zhuang, Acta Phytotax. Sin. 33: 88. 1995.

带岭当归 dai ling dang gui

Plants perennial, 1.5–2 m. Stem purple-green, ribbed, branched. Basal and lower leaves petiolate, petioles 10–30 cm, sheaths inflated; blade broad-ovate, 25–60 × 20–50 cm, 3–4-pinnate; leaflets ovate to broad-ovate, 3–7 × 2–5 cm, base oblique, margin coarse-toothed, scabrous along nerves adaxially, glaucous abaxially. Umbels 6–8 cm across; bracts 1, ovate, acuminate, deciduous; rays 20–30, 2–5 cm, unequal; bracteoles ca. 5, linear, ca. 3 mm; pedicels 25–30, unequal. Calyx teeth conspicuous, triangular-ovate. Petals green, obovate. Fruit suborbicular, 5–7 × 5–7 mm; dorsal ribs prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep. $n = 11^*$.

- Grassy slopes; ca. 600 m. Heilongjiang (Yichun).

This rather poorly known species is recorded only from a few collections.

21. *Angelica tsinlingensis* K. T. Fu, Fl. Tsinling. 1(3): 461. 1981.

秦岭当归 qin ling dang gui

Plants perennial, 60–130 cm. Root conic. Stem glabrous, branched. Basal and lower petioles long, sheathing at base; blade broad-ovate, 1–2-ternate; median leaflets short-petiolate, rhombic-obovate, 7–13 × 5–9 cm, base cuneate; lateral leaflets broad-ovate, often 1–2-lobed, base truncate or slightly cordate, margin incised-serrate, apex acuminate. Peduncles 6–12 cm; bracts absent; rays 20–25, unequal, up to 8 cm in fruit; bracteoles 6–8, linear-lanceolate, 5–8 mm; pedicels 25–35, slender, up to 1 cm. Calyx teeth obsolete. Petals broad-obovate, the outer slightly enlarged. Fruit oblong to suborbicular, 3–6 × 3–4 mm; dorsal ribs narrow-winged, lateral ribs conspicuously wider than the dorsal; vittae 2–3 in each furrow, 4 on commissure. Fl. Aug–Sep, fr. Sep–Oct.

- Forests, shrubby thickets; 1200–2300 m. Gansu, Shaanxi.

Recent research indicates that this species may be conspecific with *Notopterygium franchetii*.

22. *Angelica ternata* Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 590. 1878 [*“ternata”*].

三小叶当归 san xiao ye dang gui

Angelica stratoniana Aitchison & Hemsley; *Callisace ternata* (Regel & Schmalhausen) Koso-Poljansky.

Plants perennial, 40–80 cm, glabrous. Root stout, up to 50 × 2.5 cm, brown, dense annular scars, aromatic. Stem thinly ribbed, branched. Basal and lower petiole sheaths long-ovate; blade broad-triangular, 15–30 × 15–20 cm, 2–3-ternate, pinnae petiolate; leaflets broad-ovate, 3–6 × 1.5–4 cm, base cuneate to cordate, 5–6-basal-nerved, margin irregularly serrulate, apex obtuse-rounded or acute. Umbels 6–12 across; bracts absent; rays 12–23; bracteoles 6–8, lanceolate, reflexed; umbellules 15–25-flowered. Calyx teeth obsolete. Petals white or yellowish green, ovate. Fruit narrow-oblong, 7–11 × 4–6 mm; dorsal ribs obtuse-rounded, lateral ribs broad-winged, as wide as the body; vittae small, 1 in each furrow, 2 on commissure. Fl. Jun–Jul, fr. Jul–Aug. $n = 11^*$.

Shrubby thickets, streamsides, damp crevices; 2800–3400 m. Xinjiang [Kyrgyzstan, Russia, Tajikistan].

23. *Angelica hirsutiflora* S. L. Liu, C. Y. Chao & T. I. Chuang, Quart. J. Taiwan Mus. 14(1–2): 19. 1961.

滨当归 bin dang gui

Angelica japonica var. *hirsutiflora* (S. L. Liu, C. Y. Chao & T. I. Chuang) T. Yamazaki.

Plants perennial, 1–2 m, stout. Root thick, tuberous. Stem 3–6 cm thick. Basal and lower petiole sheaths inflated; blade triangular-ovate, 50–100 cm, ternate-pinnate; leaflets broad-ovate, 15–20 × 10–15 cm, base cordate or rounded, margin obtuse-serrate, apex obtuse, pubescent along nerves on both surfaces. Umbels large, densely pubescent; peduncles 5–15 cm, stout; bracts 1–2 or absent; rays 20–30, 4–7 cm, subequal; bracteoles several, linear-lanceolate, apex acute, pubescent; pedicels

0.5–1 cm, ascending. Calyx teeth obsolete. Petals white, ovate, hirsute abaxially; stamens ca. 2 × petals; stylopodium short-conic. Ovary hispid. Fruit oblong, 6–8 × 4–6 mm, pubescent; dorsal ribs obtuse-prominent, the lateral thickly broad-winged; vittae 2–3 in each furrow, 7–8 on commissure. Fl. and fr. Jul–Sep.

- Coastal areas; below 100 m. Taiwan.

24. *Angelica oncosepala* Handel-Mazzetti, Symb. Sin. 7: 726. 1933.

隆萼当归 long e dang gui

Heracleum oncosepalum (Handel-Mazzetti) Pimenov & Kljuykov.

Plants perennial, 30–60 cm. Root cylindrical, brownish. Stem solitary, thinly ribbed, villous above. Petioles 8–15 cm, sheaths small, oblong; blade broad-ovate, 9–13 × 8–10 cm, ternate or ternate-pinnate; leaflets short-petiolate, broad-ovate, 2–3-lobed, base truncate to cordate, margin irregularly coarse-crenate, apex acute, whitish sparse-villous on both surfaces. Peduncles 8–20 cm, villous; bracts 2–3, linear, scabrous, deciduous; rays 13–20, 2–4.5 cm, unequal, villous; bracteoles ca. 5, linear-lanceolate, 0.3–0.5 cm, longer or as long as umbellules; umbellules 10–20-flowered; pedicels pubescent. Calyx teeth conspicuous, triangular-ovate or ovate-lanceolate. Petals white or purplish red, obovate, notched. Fruit obovoid-orbicular, 5–6 × 4–5 mm; dorsal ribs and 2 secondary ribs slightly prominent, lateral ribs broadly thick-winged; vittae 1(–2) in each furrow, 3–4(–6) on commissure. Fl. and fr. Aug–Oct. $n = 11^*$.

- Alpine meadows; 3500–4300 m. NW Yunnan.

The roots have reputed medicinal value. Recent carpological research indicates that this species may be better placed in *Heracleum*.

25. *Angelica pinnatifida* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 33: 481. 1995.

羽苞当归 yu bao dang gui

Plants perennial, 25–30 cm. Root long-conic, yellowish brown, 4–10 cm. Stem thinly ribbed, pubescent. Basal leaves 5–8, petioles 4–10 cm, sheaths small, ovate; blade 2-ternate-pinnate, pinnae 2–3 pairs; leaflets sessile, broad-ovate to long-ovate, 3–5.5 × 1–2.5 cm, margin serrate, apex acute. Umbels ca. 15 cm across; bracts absent or 1, entire, rays 25–30, 3–7 cm, unequal; bracteoles 5–15, lanceolate, much longer than umbellules, pinnate, rarely 3-lobed or entire; pedicels many, 2–15 mm, unequal. Calyx teeth subulate. Petals white, obovate. Fruit broad-ellipsoid, 3–4 × ca. 3 mm; dorsal ribs prominent, lateral ribs winged, nearly as wide as the body; vittae 1 in each furrow, 2 on commissure. Fr. Oct.

- Forest margins, streamsides; ca. 2700 m. N Sichuan (Songpan).

This rather poorly known species is recorded only from a few collections.

26. *Angelica decursiva* (Miquel) Franchet & Savatier, Enum. Pl. Jap. 1: 187. 1875.

紫花前胡 zi hua qian hu

Porphyroscias decursiva Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 62. 1867; *Peucedanum decursivum* (Miquel) Maximowicz; *P. grandifolioides* H. Wolff; *P. melanotilingia* (H. de Boissieu) H. de Boissieu; *P. porphyroscias* Makino, nom. illeg. superfl.; *Selinum melanotilingia* H. de Boissieu; *Ligusticum melanotilingia* (H. de Boissieu) Kitagawa; *Ostericum melanotilingia* (H. de Boissieu) Kitagawa.

Plants perennial, 1–2 m high. Root brown, conic, 1–2 cm thick, strongly aromatic. Stem often purple-green, ribbed, glabrous. Petioles 13–36 cm, sheaths purple, elliptic; blade triangular to ovate, 10–25 cm, 1–2-ternate-pinnate; leaflets ovate or oblong-lanceolate, 5–15 × 2–5 cm, base decurrent, margin white-cartilaginous and cuspidate-serrate, apex acute, midribs often purple-green, hispidulous along nerves adaxially. Peduncles 3–8 cm, pubescent; bracts 1–3, purplish, ovate, sheath-like, reflexed; rays 10–22, 2–4 cm, pubescent; bracteoles 3–8, linear to lanceolate, green or purple; pedicels pubescent. Calyx teeth triangular-subulate. Petals dark purple, obovate or ellipsoid-lanceolate, apex incurved but not notched. Anthers dark purple. Fruit oblong to ovoid-orbicular, 4–7 × 3–5 mm; dorsal ribs filiform, acute, lateral ribs thickly narrow-winged; vittae 1–3 in each furrow, 4–6 on commissure. Fl. Aug–Sep, fr. Sep–Nov. $n = 11^*$.

Forest margins, shrubby thickets, slopes, streamsides; 200–800 m. Anhui, Guangdong, Guangxi, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Taiwan, Zhejiang; also NE China [Japan, Korea, Russia (Siberia), Vietnam].

The roots are used in the important traditional Chinese medicine “qian hu” (see also *Peucedanum praeruptorum*), particularly in the treatment of colds, coughs, and fevers. White-flowered plants in NE China may be referred to *Angelica decursiva* f. *albiflora* (Maximowicz) Nakai (J. Coll. Sci. Imp. Univ. Tokyo 16(1): 268. 1909; *Peucedanum decursivum* var. *albiflorum* Maximowicz, Melanges Biol. Bull. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 12: 473. 1886).

27. *Angelica gigas* Nakai, Bot. Mag. (Tokyo) 31: 100. 1917.

朝鲜当归 chao xian dang gui

Plants perennial, 1–2 m, stout. Root conic, gray brown, 2–5 cm thick. Stem purplish, ribbed. Basal and lower leaves petiolate, petioles 30–45 cm, sheaths broad; blade triangular-ovate in outline, 20–40 × 20–30 cm, 2–3-ternate-pinnate, basal pinnae petiolulate; leaflets oblong-lanceolate, 4–15 × 1.5–5 cm, base decurrent, margin irregularly coarse-toothed, apex acute, slightly scabrous along nerves adaxially. Upper leaves purple-green, sheaths broadly inflated, often bladeless. Umbel purple, subglobose, 5–8 cm across, up to 12 cm in fruit, peduncles, rays and pedicels all hispidulous; peduncles 2–6 cm; bracts 2, saccate, dark purple; rays many, stout, 2–3 cm; bracteoles dark purple, several, ovate-lanceolate; pedicels many, 3–8 mm. Calyx teeth obsolete. Petals dark purple-red, obovate. Anthers purple. Fruit ellipsoid, 5–8 × 3–5 mm; dorsal ribs prominent, lateral ribs broad-winged; vittae 1(–2) in each furrow, 2(–4) on commissure. Fl. Jul–Aug, fr. Aug–Sep. $n = 11^*$.

Forests, grasslands, streamsides; ca. 1000 m. Heilongjiang, Jilin, Liaoning [Japan, Korea].

The roots are used in traditional Chinese medicine.

28. *Angelica kangdingensis* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 33: 478. 1995.

康定当归 kang ding dang gui

Plants perennial, ca. 80 cm. Root long-conic, ca. 6 × 1 cm. Stem purplish, 1-branched above. Basal and lower leaves petiolate, sheaths oblong; blade 2-ternate-pinnate, pinnae 3–4 pairs, remote; leaflets ovate or long-ovate, 1–3 × 0.5–2 cm, margin acute-serrate. Umbels ca. 10 cm across; bracts 2–3, lanceolate, 0.5–1 cm; rays 30–40, purplish, 2–5 cm, very unequal, slender; bracteoles 3–5, lanceolate; pedicels many, unequal. Calyx teeth conspicuous, triangular. Petals white, obovate, notched. Fruit suborbicular, 3–4 × ca. 3.5 mm; dorsal ribs prominent, lateral ribs winged; vittae 1 in each furrow, 2 on commissure. Fr. Sep.

- Alpine low shrubland; ca. 3000 m. W Sichuan (Zheduo Shan).

This rather poorly known species is recorded only from a few collections.

29. *Angelica longicaudata* C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1983: 10. 1985 [“1983”].

长尾叶当归 chang wei ye dang gui

Plants perennial, 60–100(–150) cm. Root stout, yellow-brown, 10–20 × 1.5–2.5 cm. Stem thinly ribbed, glabrous. Leaves petiolate, petioles 9–20 cm, sheaths 4–6 cm, narrowly oblong; blade triangular-ovate, 15–18(–25) × 13–15(–22) cm, 1–2-ternate-pinnate; leaflets sessile, lanceolate to oblong-lanceolate, 4–7 × 1.5–3 cm, base cuneate slightly decurrent, margin irregularly deep-serrate, hispid along midribs. Umbels 7–15 cm across; peduncles, rays and pedicels hispidulous; peduncles 7–15 cm; bracts 3–7, linear-lanceolate, ciliate; rays 20–32; bracteoles 6–10, linear, slightly shorter than pedicels, ciliate; umbellules 13–22-flowered. Calyx teeth obsolete. Petals white, ovate, notched. Fruit narrow-oblong, 5–9 × 2.5–4 mm; dorsal ribs protruding, acute, lateral ribs winged, wings slightly narrower than the body; vittae 1–2 in each furrow, 3–6 on commissure. Fl. May–Jul, fr. Jun–Aug.

- Grassy slopes, ditchsides, crevices of rocky ravines; ca. 1500 m. Sichuan, Yunnan.

30. *Angelica laxifoliata* Diels, Bot. Jahrb. Syst. 29: 499. 1901.

疏叶当归 shu ye dang gui

Angelica erythrocarpa H. Wolff.

Plants perennial, 30–90(–150) cm. Root cylindrical, gray-yellow, 7–18 × 1–2 cm, slightly aromatic. Stem purplish green, thinly ribbed, glabrous. Leaves petiolate, petioles 10–30 cm, sheaths 4–7 cm, narrow-ovate; blade rhombic-triangular, 12–17 × 10–12 cm, 2-ternate-pinnate, pinnae remote, 3–4 pairs; leaflets lanceolate to broad-lanceolate, 2.5–4 × 1–2 cm, base subrounded to cuneate, margin densely cuspidate-serrulate, glabrous or puberulous along nerves abaxially. Umbels 5–10 cm across; peduncles ribbed, pubescent along ribs; bracts 3–9, purplish, lanceolate, ciliate; rays 30–50, 2.5–4 cm, up to 9 cm when fruiting, unequal, ribbed, pubescent along ribs; bracteoles 6–10, long-lanceolate, ciliate; umbellules 10–35-flowered. Calyx teeth obsolete. Petals white, obovate. Fruit suborbicular, 4–

6 × 3–5 mm, margin often purplish red; dorsal ribs prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Sep, fr. Aug–Oct. $n = 11^*$.

- Grassy slopes; 2300–3000 m. Gansu, Shaanxi, Sichuan.

This species has reputed medicinal value.

31. *Angelica maowenensis* C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1983: 11. 1985 [“1983”].

茂汶当归 mao wen dang gui

Plants perennial, 80–150 cm. Root cylindrical, brown, ca. 12 × 1–3 cm, aromatic. Stem stout, dark purple at base, ribbed, densely white-hispidulous. Leaves petiolate, petioles 15–40 cm, sheaths 2–3 cm wide membranous, inflated; blade triangular-ovate, up to 25 × 17 cm, 2-ternate-pinnate; leaflets subsessile, oblong to elliptic, 5–9 × 2–3 cm, often 2–3-lobed, terminal leaflets base decurrent, margin white-cartilaginous, serrulate and ciliate, apex acuminate, white-pubescent abaxially. Bracts several, linear-lanceolate, ciliate, villous abaxially, apex sometimes pinnate; rays 40–60(–80), densely pubescent; bracteoles 3–7, linear-lanceolate, ciliate; umbellules 40–60-flowered. Calyx teeth obsolete. Petals white. Styles pubescent. Fruit broad-ellipsoid, 4–6 × 3–4 mm; dorsal ribs acute-prominent, lateral ribs broad-winged, as wide as or slightly narrower than the body; vittae 1 in each furrow, 3–4 on commissure. Fl. Aug, fr. Aug–Sep. $n = 11^*$.

- Shrubby thickets, slopes, grasslands; 2000–3400 m. Sichuan.

32. *Angelica biserrata* (R. H. Shan & C. Q. Yuan) C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1983: 9. 1985 [“1983”].

重齿当归 chong chi dang gui

Angelica pubescens Maximowicz f. *biserrata* R. H. Shan & C. Q. Yuan, Acta Pharm. Sin. 13: 366. 1966.

Plants perennial, 1–2 m, stout. Root cylindrical, brown, up to 15 × 1–2.5 cm, aromatic. Stem purplish green, up to 1.5 cm thick, thinly ribbed, hispid above. Basal and lower leaves petiolate, petioles 30–50 cm, sheaths oblong, inflated, 5–7 cm, glabrous or slightly pubescent abaxially; blade broad-ovate, 20–30(–40) × 15–25 cm, 2-ternate-pinnate; leaflets ovate-long-elliptic, 5.5–18 × 3–6.5 cm, base often decurrent along rachis, margin irregularly cuspidate-biserrate, apex acuminate, pubescent along nerves and margin. Peduncles 5–16(–20) cm, densely hispidulous; bracts 1, long-subulate, ciliate, deciduous; rays 10–25, 1.5–5 cm, densely hispidulous; bracteoles 5–10, broad-lanceolate, apex long-cuspidate, ciliate, pubescent abaxially; umbellules 17–28(–36)-flowered. Calyx teeth obsolete. Petals white, obovate. Styles conspicuously elongate, reflexed in fruit. Fruit ellipsoid, 6–8 × 3–5 mm; dorsal ribs prominent, lateral ribs broad-winged; vittae 2–3 in each furrow, 2–4(–6) on commissure. Fl. Aug–Sep, fr. Sep–Oct. $n = 11^*$.

- Sparse shrubby thickets, damp slopes; 1000–1700 m. Anhui, Hubei, Jiangxi, Sichuan, Zhejiang.

The roots are widely used as the important traditional Chinese medicine “du huo,” especially as an analgesic and anti-inflammatory in the treatment of rheumatism and rheumatoid arthritis.

33. *Angelica cartilaginomarginata* (Makino ex Y. Yabe) Nakai, Fl. Kor. 1: 269. 1909.

长鞘当归 chang qiao dang gui

Plants biennial, 0.5–1.5 m. Root short-conic, branched. Stem often single, thinly ribbed, branched above. Basal and lower leaves petiolate, petioles widening into narrow-ovate sheaths, ca. 5 cm, glabrous, rarely sparse-pubescent abaxially; blade ovate to long-ovate, pinnate or 1–2-ternate-pinnate, pinnae 3–9 pairs; basal pinnae short-petiolate, 2–3-lobed, the terminal 3-lobed; ultimate segments lanceolate to oblong, 4–9 × 0.8–3 cm, base conspicuously decurrent, margin white-cartilaginous, serrate, apex acute, glabrous or scabrous along midrib. Umbels 3–8 cm across; peduncles 2–6 cm, scabrous; bracts absent; rays 7–14; bracteoles 2–4, linear, scarious-margined, glabrous; umbellules 10–25-flowered. Calyx teeth obsolete. Petals white and ovate. Fruit ellipsoid to ovoid, 2.5–4 × 2–3 mm; dorsal ribs prominent, lateral ribs narrow-winged; vittae black-brown, 1–2 in each furrow, 4 on commissure. Fl. Aug–Sep, fr. Sep–Oct.

Forest margins, shrubby thickets, slopes, grasslands; 300–1000 m. Anhui, Jiangsu, Jilin, Liaoning [Japan, Korea].

The roots have reputed medicinal value.

- 1a. Basal and lower leaves pinnate, ultimate segments lanceolate or ovate-lanceolate, 0.8–2.5 cm wide 33a. var. *cartilaginomarginata*
- 1b. Basal and lower leaves 2-ternate-pinnate, ultimate segments oblong, 2–3 cm wide 33b. var. *foliosa*

33a. *Angelica cartilaginomarginata* var. *cartilaginomarginata*

长鞘当归(原变种) chang qiao dang gui (yuan bian zhong)

Peucedanum cartilaginomarginatum Makino ex Y. Yabe, Rev. Umbell. Jap. 100. 1902; *Angelica cartilaginomarginata* var. *matsumurae* (H. de Boissieu) Kitagawa; *A. crucifolia* Komarov; *Pimpinella cartilaginomarginata* (Makino ex Y. Yabe) H. Wolff; *Sium matsumurae* H. de Boissieu.

Basal and lower leaves pinnate; ultimate segments lanceolate or ovate-lanceolate, 0.8–2.5 cm wide. $n = 11^*$.

Forest margins, shrubby thickets, slopes. Jilin, Liaoning [Japan, Korea].

33b. *Angelica cartilaginomarginata* var. *foliosa* C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1983: 5. 1985 [“1983”].

骨缘当归 gu yuan dang gui

Plants stout. Leaves dense, 1–2-ternate-pinnate; ultimate segments oblong, 5–6.5 × 2–3 cm, often 2–3-lobed.

- Slopes, grasslands. Anhui, Jiangsu.

34. *Angelica acutiloba* (Siebold & Zuccarini) Kitagawa, Bot. Mag. (Tokyo) 51: 658. 1937.

东当归 dong dang gui

Ligusticum acutilobum Siebold & Zuccarini, Pl. Jap. Fam. Nat. 2: 203. 1845.

Plants perennial, 30–100 cm. Root yellow-brown, 10–25 × 1–2.5 cm, strongly aromatic. Stem solid, purplish, thinly ribbed. Basal and lower leaves petiolate, petioles 10–30 cm, sheaths oblong; blade triangular-ovate, 10–25 cm, 1–2-ternate-pinnate, glabrous; pinnae short-petiolulate, 2–9 × 1–3 cm, 3-lobed, segments lanceolate, margin irregularly acute-serrate, apex acuminate to acute; peduncles 5–20 cm, glabrous or pubescent; bracts absent or 1 to several, linear-lanceolate, 1–2 cm; rays 18–30, unequal, pubescent; bracteoles 5–8, linear, 5–15 mm; umbellules ca. 30-flowered; pedicels slender. Calyx teeth obsolete. Petals white, obovate to oblong. Fruit narrow-oblong, 4–5 × 1–1.5 mm; dorsal ribs filiform, lateral ribs narrow-winged; vittae 3–4 in each furrow, 4–8 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

Cultivated; ca. 400 m. Jilin [native to Japan and Korea].

The roots are used in Jilin as a regional substitute for the traditional Chinese medicine “dang gui” (see *Angelica sinensis*).

35. *Angelica paeoniifolia* C. Q. Yuan & R. H. Shan, Acta Phytotax. Sin. 18: 378. 1980.

牡丹叶当归 mu dan ye dang gui

Plants perennial, 60–150 cm. Root cylindrical, brown, 1–2 cm thick, aromatic. Stem purplish, thinly ribbed. Basal and lower leaves petiolate, petioles 5–15 cm, sheaths 1–1.5 cm wide; blade broadly triangular-ovate, 10–15 × 13–18 cm, 2–3-ternate-pinnate, glabrous; leaflets short-petiolulate or sessile, ovate or rhombic-ovate, 2–4 × 1–3 cm, base cuneate, margin 3–5-coarse-toothed, apex acute. Peduncles 10–15 cm; bracts 3 to several, linear-lanceolate; rays 17–30, unequal; bracteoles 4–8, linear, scarious, nearly as long as pedicels; umbellules 14–20-flowered; pedicels glabrous or scabrous. Calyx teeth obsolete. Petals yellowish green or purplish, ovate. Fruit ellipsoid, 5–7 × 3–4 mm; dorsal ribs filiform, lateral ribs winged, wings narrower than the body; vittae 1 in each furrow, 2 on commissure. Fl. Jun–Aug, fr. Jul–Sep.

• Shrubby thickets, gravelly grasslands, river banks; 3500–4200 m. Xizang.

The roots have reputed medicinal properties.

36. *Angelica glauca* Edgeworth, Trans. Linn. Soc. London 20: 53. 1846.

灰叶当归 hui ye dang gui

Plants 1–2.5 m, glabrous, aromatic. Root thick, long-conic. Stem stout, ribbed. Leaves long-petiolate; blade triangular, 20–30 × 20–25 cm, 2–3-ternate-pinnate, primary pinnae long-petiolulate, proximal pinnules 3-foliolose; leaflets subsessile, ovate to oblong-ovate, 3–5 × 1.5–2.5 cm, base cuneate, margin mucronulate-serrate, glaucous abaxially. Peduncles 15–25 cm; bracts 5, linear, 1.5–2.5 cm, reflexed; rays 15–20, 2–6 cm, subequal; bracteoles 6–10, linear, ca. 6 mm, reflexed. Calyx teeth obsolete. Petals white, obovate. Fruit oblong-ellipsoid, 8–12 × 4–6 mm; dorsal ribs prominent, thick, obtuse-rounded, lateral ribs broad-winged; vittae 1 in each furrow, 2–4 on commissure. Fl. and fr. Jun–Aug.

Ditchsides; ca. 3000 m. W Xizang [Afghanistan, NW India, Pakistan].

37. *Angelica multicaulis* Pimenov, Bjull. Moskovsk. Obšč. Isp. Prir., Otd. Biol. 77(5): 85. 1972.

多茎当归 duo jing dang gui

Angelica tichomirovii V. Vinogradova.

Plants perennial, up to 1 m. Root long-cylindric, brown, distal annular scars. Stem thinly ribbed, branched, glabrous. Basal leaves petiolate, petioles 10–12 cm, sheaths small; blade ovate-orbicular or triangular-ovate, 2–3-ternate-pinnate, pinnae remote, glabrous; leaflets short-petiolulate, ovate or oblong-ovate, 3–6 × 1.8–2.3 cm, base cuneate, margin acute-crenulate. Bracts 5–7, linear-lanceolate, white-margined; rays 10–15, subequal, up to 10 cm in fruit; bracteoles 7–13, lanceolate, white-margined. Calyx teeth obsolete. Petals white or yellowish green. Fruit ellipsoid, 7–11 × 4–7 mm; dorsal ribs unequally winged, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fr. Jul–Aug.

Shrubby thickets, damp areas; 1000–1100 m. N Xinjiang [Russia].

38. *Angelica amurensis* Schischkin in Schischkin & Bobrov, Fl. URSS 17: 19. 1951.

黑水当归 hei shui dang gui

Plants perennial, 60–150 cm. Root conic, black-brown, 1.5–3 cm thick, pungent aromatic. Stem stout, purplish green, puberulous above. Basal and lower leaves long-petiolate, sheaths purplish oblong-ovate; blade broadly triangular-ovate, 20–40 × 20–30 cm, 2–3-ternate-pinnate, pinnae 2–3 pairs, petiolulate; leaflets subsessile, ovate to oblong-ovate, 3–8 × 1.5–4 cm, base cuneate, margin white-cartilaginous and incised-mucronate-serrate, apex acute, pubescent abaxially. Rachis, peduncles, rays and pedicels all densely hispidulous; peduncles 6–20 cm; bracts absent; rays 20–45, subequal; bracteoles 5–7, lanceolate, villous; umbellules 30–45-flowered. Calyx teeth obsolete. Petals white, broad-ovate, ca. 1 mm. Fruit ellipsoid to suborbicular, 5–7 × 3–5 mm; dorsal ribs prominent, lateral ribs broad-winged, wings equal or wider than the body; vittae 1 in each furrow, (2–3)–4 on commissure. Fl. Jul–Aug, fr. Aug–Sep. $n = 22$.

Forest margins, grassy mountain slopes, streamsides; 500–1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia (Siberia)].

The young stems are eaten as a spring vegetable, and the roots have reputed medicinal value.

39. *Angelica balangshanensis* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 33: 476. 1995.

巴郎山当归 ba lang shan dang gui

Plants perennial, 1–1.2 m. Root long-conic, 10–12 × 2–2.5 cm. Stem thinly ribbed, rarely pubescent. Basal petioles 10–15 cm, puberulent, sheaths oblong; blade triangular-ovate, 20–28 × 15–18 cm, 1–2-ternate-pinnate; leaflets long-ovate, 3–9 × 3–6 cm, base cuneate or truncate, margin obtuse-serrate, 1–2-lobed, apex acuminate. Umbels 12–17 cm across in fruit; bracts absent; rays 50–60, 4–12 cm, unequal, puberulent; bracteoles 5–6,

oblanceolate or lanceolate, unequal, 0.5–2 × ca. 0.5 mm, entire to 2–3-lobed; pedicels 15–35, unequal. Calyx teeth obsolete. Petals white, obovate. Fruit ovoid, ca. 5 × 3.5 mm; dorsal ribs prominent, lateral ribs broad-winged, vittae 1 in each furrow, 2 on commissure. Fr. Sep.

• Meadows, alpine low shrubland; ca. 3500 m. W Sichuan (Bangshan).

This rather poorly known species is recorded only from a few collections. Recent research suggests that it is conspecific with *Angelica duclouxii*.

40. *Angelica morii* Hayata, Icon. Pl. Formosan. 10: 24. 1921.

福参 fu shen

Plants perennial, 50–10 cm. Root conic, brown, ca. 10 cm. Stem ca. 1 cm thick, sparingly branched, ribbed. Leaves petiolate, petioles 5–20 cm, sheaths oblong, glabrous; blade triangular-ovate, 7–20 × 12–17 cm, 2–3-ternate-pinnate; leaflets sessile, ovate to ovate-lanceolate, often 3-lobed, 2–3 × 1–2 cm, base cuneate, margin ciliate, incised-serrate, apex acuminate, glabrous or pubescent along nerves. Umbels 8–10 cm across; peduncles 5–10 cm, pubescent; bracts absent or 1–2, deciduous; rays 10–20(–50), subequal, scabrous; bracteoles 5–8, linear-lanceolate, pubescent, longer or equaling pedicels; umbellules 15–20-flowered. Calyx teeth minute or obsolete. Petals yellowish white, long-ovate. Fruit ellipsoid-oblong, 4–5 × 3–4 mm; dorsal ribs filiform, lateral ribs winged, wings narrower than the body; vittae in each furrow, 2 on commissure. Fl. Apr–May, fr. Jun–Jul.

• Damp grasslands, streamsides; 800–1200 m. Fujian, Taiwan, Zhejiang.

The roots have reputed medicinal value.

41. *Angelica sinensis* (Oliver) Diels, Bot. Jahrb. Syst. 29: 500. 1901.

当归 dang gui

Plants perennial, 0.4–1 m. Root cylindrical, branched, rootlets many, succulent, strongly aromatic. Stem purplish green, ribbed, branched above. Basal and lower petioles 5–20 cm, sheaths purplish green, ovate, membranous-margined; blade ovate, 10–30 × 12–25 cm, 2–3-ternate-pinnate, pinnae 3–4 pairs, proximal and middle pinnae long-petiolulate; leaflets ovate or ovate-lanceolate, 2–3.5 × 0.8–2.5 cm, 2–3-lobed, margin irregularly coarse-cuspidate-serrate, sparse papillate-hairy along nerves and margin. Peduncles 8–20 cm, pubescent or subglabrous; bracts absent or 2, linear; rays 10–30, unequal, scabrous; bracteoles 2–4, linear, 3–5 mm; umbellules 13–36-flowered; pedicels slender, 1–3 cm in fruit. Calyx teeth obsolete, rarely minute, ovate. Petals white, rarely purplish red. Fruit ellipsoid or suborbicular, 4–6 × 3–4 mm; dorsal ribs filiform, prominent, lateral ribs broadly thin-winged, wings as wide as or wider than the body; vittae 1 in each furrow, 2 or absent on commissure. Fl. Jun–Jul, fr. Jul–Sep.

• Wild or cultivated in forests, shrubby thickets; 2500–3000 m. Gansu, Hubei, Shaanxi, Sichuan, Yunnan.

The roots are frequently used in the important traditional Chinese medicine “dang gui.”

- 1a. Fruit ellipsoid or ovate, vittae 1–2 on commissure 41a. var. *sinensis*
 1b. Fruit obovoid or suborbicular, vittae absent on commissure 41b. var. *wilsonii*

41a. *Angelica sinensis* var. *sinensis*

当归(原变种) dang gui (yuan bian zhong)

Angelica polymorpha Maximowicz var. *sinensis* Oliver, Hooker's Icon. Pl. 20: t. 1999. 1891.

Fruit ellipsoid or ovate, vittae 1–2 on commissure. *n* = 11*.

• Wild or cultivated in forests; 2500–3000 m. Gansu, Hubei, Shaanxi, Sichuan, Yunnan.

41b. *Angelica sinensis* var. *wilsonii* (H. Wolff) Z. H. Pan & M. F. Watson, Acta Phytotax. Sin. 42: 562. 2004.

川西当归 chuan xi dang gui

Angelica wilsonii H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 335. 1930.

Fruit obovoid or suborbicular, vittae absent on commissure.

• Shrubby thickets; ca. 2500 m. W Sichuan.

42. *Angelica megaphylla* Diels, Bot. Jahrb. Syst. 29: 500. 1901.

大叶当归 da ye dang gui

Peucedanum megaphyllum (Diels) H. de Boissieu.

Plants perennial, 0.7–2.5 m. Root conic, brown. Stem ca. 2 cm thick, thinly ribbed, glabrous or sparsely hispidulous. Petioles ca. 20 cm, sheaths ovate, 2.5–4 cm; blade triangular-ovate, 20–40 × 20–35 cm, 2-ternate-pinnate, pinnae 1–3 pairs, long-petiolulate, the terminal pinnae unequally 2-lobed; leaflets oblong to elliptic, 5–12 × 2–6 cm, irregularly 2–3-lobed, margin acute-serrate, apex acuminate or caudate-acuminate, hispidulous along nerves on both surfaces. Umbels up to 10 cm across; peduncles 4–10 cm, densely brown-hispidulous; bracts absent or 1; rays 20–40, very unequal, densely brown-hispidulous; bracteoles absent; umbellules 16–32-flowered; pedicels glabrous or pubescent. Calyx teeth obsolete. Petals dark purple-red, oblong-ovate. Fruit ovoid to suborbicular, 4.5–7 × 4–6 mm; dorsal ribs prominent, lateral ribs broad-winged, wings wider than the body; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Sep, fr. Sep–Oct.

• Forests, grasslands, streamsides; 1500–2000 m. Sichuan.

The roots are used in Sichuan as a regional substitute for the traditional Chinese medicines “dang gui” (see *Angelica sinensis*) and “du huo” (see *A. biserrata*).

43. *Angelica likiangensis* H. Wolff, Repert. Spec. Nov. Regni Veg. 28: 110. 1930.

丽江当归 li jiang dang gui

Plants perennial, 80–100 cm. Root brown, conic, branched. Stem thinly ribbed, puberulent. Basal and lower leaves peti-

olate, petioles 7–12 cm, sheaths small; blade broad-ovate, 10–20 cm, 3-ternate-pinnate, pinnae long-petiolulate; leaflets subsessile, ovate to ovate-lanceolate, 1.5–4 × 0.7–2 cm, base broad-cuneate, margin inconspicuously serrulate, apex acuminate, hispid along nerves adaxially. Peduncles 10–15 cm, pubescent; bracts absent; rays 40–60, 3–6 cm, up to 12 cm in fruit, unequal, scabrous; bracteoles 6–8, linear-lanceolate, apex long-auriculate; pedicels 20–30, 3–6 mm, puberulent. Calyx teeth obsolete. Petals white, obovate, notched. Fruit ellipsoid or suborbicular, 5–7 mm; dorsal ribs prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Nov.

- Forests, grassy slopes; 3100–4000 m. Guizhou, Yunnan.

44. *Angelica cincta* H. de Boissieu, Bull. Soc. Bot. France 53: 436. 1906.

湖北当归 hu bei dang gui

Plants stout. Stem thinly ribbed, pubescent. Leaves petiolate, sheaths inflated; leaf blade 2-ternate-pinnate; leaflets subrhombic or ovate, occasionally 3-lobed, 8–14 × 6–10 cm, margin cuspidate-serrate or biserrate, ciliate, apex acute to caudate-acute, pubescent along nerves abaxially. Bracts absent; rays 16–18, 4–12 cm, unequal, densely yellowish pubescent; bracteoles many, lanceolate, apex caudate-acuminate, ca. 0.5 × pedicels; pedicels numerous, flat, unequal, pubescent. Calyx teeth obsolete. Petals ovate or obovate. Anthers purple-red. Fruit narrow-ellipsoid, 5–6 × 3–3.5 mm; dorsal ribs filiform, lateral ribs narrow-winged, wings about half as broad as the body; vittae 1 in each furrow, 4 on commissure. Fl. Aug.

- Forests; 1000–1600 m. W Hubei.

This incompletely known taxon is recorded only from a few collections.

45. *Angelica dahurica* (Fischer ex Hoffmann) Benth. & J. D. Hooker ex Franchet & Savatier, Enum. Pl. Jap. 1: 187. 1875.

白芷 bai zhi

Plants perennial 1–2.5 m, stout. Root cylindrical, brown, 3–5 cm thick, strongly aromatic. Stem purplish green, 2–5(–7–8) cm thick, ribbed, pubescent above. Basal and lower leaves long-petiolate, sheaths oblong-inflated, glabrous; blade triangular-ovate, 30–50 × 25–40 cm, 2–3-ternate-pinnate; leaflets sessile, oblong-elliptic to oblong-lanceolate, 4–10 × 1–4 cm, base

slightly decurrent, margin white-cartilaginous and coarse-cuspidate-serrate, apex acute, pubescent along nerves adaxially. Upper leaves reduced, sheaths saccate-inflated, bladeless. Umbels 10–30 cm across; peduncles 5–20 cm, scabrous; bracts absent or 1–2, like uppermost leaves; rays 18–40(–70), short-hairy; bracteoles many, linear-lanceolate, scarious; pedicels many, scabrous. Calyx teeth obsolete. Petals white, obovate and notched. Ovary glabrous or pubescent. Fruit suborbicular, 4–7 × 4–6 mm; dorsal ribs prominent, obtusely thick-rounded, much wider than furrows, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

Forest margins, valley grasslands, streamsides; 500–1000 m. Hebei, Heilongjiang, Jilin, Liaoning, Shaanxi, N Taiwan [Japan, Korea, Russia (Siberia)].

This species is widely cultivated in N China, where the roots are used as the important traditional Chinese medicine “bai zhi” and as a substitute, known as “dong bei da huo,” for the traditional Chinese medicine “du huo” (see *Angelica biserrata*). Two cultivars are common: *A. dahurica* ‘Hangbaizhi’ and *A. dahurica* ‘Qibaizhi.’

- 1a. Ovary and fruit glabrous (NE China) 45a. var. *dahurica*
- 1b. Ovary and fruit pubescent (Taiwan) ... 45b. var. *formosana*

45a. *Angelica dahurica* var. *dahurica*

白芷(原变种) bai zhi (yuan bian zhong)

Callisace dahurica Fischer ex Hoffmann, Gen. Pl. Umbell., ed. 2, 170. 1816; *Angelica macrocarpa* H. Wolff; *A. porphyrocaulis* Nakai & Kitagawa; *A. porphyrocaulis* var. *albiflora* (Maximowicz) Makino; *A. tschiliensis* H. Wolff

Ovary and fruit glabrous. *n* = 11*.

Forest margins, valley grasslands, streamsides; 500–1000 m. Hebei, Heilongjiang, Jilin, Liaoning, Shaanxi [Japan, Korea, Russia (Siberia)].

45b. *Angelica dahurica* var. *formosana* (H. de Boissieu) Yen, J. Taiwan Pharm. Assoc. 17(2): 68. 1963.

台湾当归 tai wan dang gui

Angelica formosana H. de Boissieu, Bull. Soc. Bot. France 56: 354. 1909.

Plants stout. Upper umbels densely pubescent, lower umbels glabrous or sparsely pubescent. Ovary and fruit pubescent.

- Forest margins; 600–800 m. N Taiwan.

83. *OSTERICUM* Hoffmann, Gen. Pl. Umbell., ed. 2, 162. 1816.

山芹属 shan qin shu

Pan Zehui (潘泽惠); Mark F. Watson

Gomphopetalum Turczaninow.

Herbs, perennial. Stem hollow, ribbed. Petiole sheaths inflated; leaf blade 2–3-ternate-pinnate. Umbels compound, terminal and lateral; bracts few, lanceolate or linear-lanceolate; bracteoles several, linear to linear-lanceolate. Calyx teeth conspicuous, triangular or ovate. Fruit oblong-ovoid, base cordate, flattened dorsally; surface covered with many convex and shining dots; dorsal ribs prominent, the lateral broadly thin-winged; vittae 1–3 in each furrow, 2–8 on commissure; mesocarp thin, hollow in mature fruit. Seed face plane. Carpophore 2-cleft to base.

About ten species: C and E Asia, E Europe; seven species (three endemic) in China.

Ostericum is closely allied to *Angelica*; see the taxonomic comment under that genus.

- 1a. Ultimate leaf segments linear or oblong-lanceolate, entire or inconspicuously serrulate.
 2a. Ultimate leaf segments entire; bracts 1–3, 5–8 mm 1. *O. maximowiczii*
 2b. Ultimate leaf segments margin inconspicuously serrate; bracts 6–8, ca. 4 mm 2. *O. citriodorum*
- 1b. Ultimate leaf segments ovate to broad-elliptic, margin serrate, crenate or incised.
 3a. Central umbels with short peduncles, lateral umbels opposite or cyclic with long peduncles; petals green ... 3. *O. viridiflorum*
 3b. Central umbels with long peduncles, lateral umbels not opposite nor cyclic, with short peduncles; petals white.
 4a. Fruit vittae 1–3 in each furrow, 4–8 on commissure.
 5a. Bracts 2–5; fruit suborbicular, 5–7 mm 4. *O. scaberulum*
 5b. Bracts 1–2; fruit ellipsoid, 4–5.5 mm 5. *O. sieboldii*
 4b. Fruit vittae 1 in each furrow, 2 on commissure.
 6a. Petioles acute-triangular; bracts 1–4, unequal, apex long-aristate 6. *O. huadongense*
 6b. Petioles rounded; bracts 4–8, equal, apex acute 7. *O. grosseserratum*

1. *Ostericum maximowiczii* (F. Schmidt ex Maximowicz) Kitagawa, J. Jap. Bot. 12: 232. 1936.

全叶山芹 *quan ye shan qin*

Plants 40–100 cm. Rhizome inconspicuous or slender and creeping. Stem 2–5 mm thick, thinly ribbed, sparingly branched above, glabrous or sparsely hispidulous. Basal and lower leaves petiolate, petioles 3–10 cm, sheaths narrow; blade triangular-ovate, 7–16 × 5–13 cm, 2–4-ternate-pinnate; ultimate segments linear to ovate-lanceolate, 1–4 × 0.5–0.9 mm, glabrous or hispidulous along nerves. Middle and upper leaves reduced, sheaths purplish, inflated. Umbels 3.5–7 cm across; bracts 1–3, broad-lanceolate, 5–8 mm, scarious-margined; rays 10–17, hispidulous; bracteoles 5–7, linear-lanceolate, acuminate; umbellules 10–30-flowered; pedicels glabrous. Calyx teeth broadly triangular-ovate, hispidulous. Petals suborbicular, base clawed. Fruit broad-ovoid, 4–5.5 × 3.5–5 mm; dorsal ribs prominent, marginal ribs broad-winged, broader than the body; vittae 1 in each furrow, 2–4 on commissure. Fl. Aug–Sep, fr. Sep–Oct.

Forests, grasslands, damp meadows, river banks; 2200–2300 m. Heilongjiang, Jilin, Sichuan [Korea, Russia].

- 1a. Rhizome inconspicuous; rays less than 10 1d. var. *alpinum*
 1b. Rhizome slender, creeping; rays 10–17.
 2a. Leaf rachis geniculate, ultimate segments linear, 0.5–1 mm wide ... 1c. var. *filisectum*
 2b. Leaf rachis not geniculate, ultimate segments linear, linear-lanceolate to ovate-lanceolate, 1–9 mm wide.
 3a. Stem 40–100 cm; ultimate leaf segments linear or linear-lanceolate, 1–4 mm wide 1a. var. *maximowiczii*
 3b. Stem up to 150 cm; ultimate leaf segments ovate-lanceolate, 5–9 mm wide 1b. var. *australe*

1a. *Ostericum maximowiczii* var. *maximowiczii*

全叶山芹(原变种) *quan ye shan qin (yuan bian zhong)*

Gomphopetalum maximowiczii F. Schmidt ex Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 126. 1859; *Angelica maximowiczii* (F. Schmidt ex Maximowicz) Benth. ex Maximowicz.

Ultimate leaf segments linear or linear-lanceolate, 1–4 mm wide. *n* = 11*.

Forests, damp meadows. Heilongjiang, Jilin [Korea, Russia].

1b. *Ostericum maximowiczii* var. *australe* (Komarov) Kitagawa, Lin. Fl. Manshur. 3: 1. 340. 1939.

大全叶山芹 *da quan ye shan qin*

Angelica maximowiczii f. *australis* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 25: 165. 1905; *A. maximowiczii* var. *australis* (Komarov) Gorovoj; *Ostericum maximowiczii* f. *australe* (Komarov) Kitagawa.

Ultimate leaf segments 5–9 mm wide.

Forests, damp meadows. Heilongjiang, Jilin [Korea, Russia].

1c. *Ostericum maximowiczii* var. *filisectum* (Y. C. Chu) C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1984–1985: 3. 1985 [“1984”].

丝叶山芹 *si ye shan qin*

Ostericum filisectum Y. C. Chu, Pl. Herb. Chin. Bor.-Orient. 6: 245, 294. 1977.

Rachis, petioles and petiolules geniculate.

• Forests, damp grasslands, river banks. Heilongjiang.

1d. *Ostericum maximowiczii* var. *alpinum* C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1984–1985: 3. 1985 [“1984”].

高山全叶山芹 *gao shan quan ye shan qin*

Rhizome inconspicuous, root slender, brown; rays less than 10.

• Grasslands in mountains; 2200–2300 m. Sichuan.

This is a rather poorly known taxon, and recent work suggests that it is conspecific with *Pachypleurum muliense*; see the note under that species.

2. *Ostericum citriodorum* (Hance) C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1984–1985: 3. 1985 [“1984”].

隔山香 *ge shan xiang*

Angelica citriodora Hance, J. Bot. 131. 1871.

Plants 0.5–1.3 m, glabrous. Root short-conic, brown, crown surrounded by fibrous remnant sheaths. Stem 2–5 mm thick, branched above. Petioles 5–30 cm, sheaths triangular-ovate, 0.5–1.5 cm; blade oblong-ovate to broadly triangular-ovate, 15–22 × 13–20 cm, 2–3-ternate-pinnate; leaflets subsessile, oblong-lanceolate to lanceolate, 3–6.5 × 0.4–2.5 cm, mar-

gin inconspicuously serrulate, apex acute and mucronate. Peduncles 6–9 cm; bracts 6–8, lanceolate, ca. 4 mm, multi-striate; rays 5–12; bracteoles 5–8, linear, 2–3 mm, reflexed. Calyx teeth conspicuous, triangular-ovate. Petals white, obovate, apex inflexed. Fruit ellipsoid to broad-ovoid, 3–4 × 3–3.5 mm, yellowish brown; dorsal ribs prominent, lateral ribs broad-winged, wings wider than the body; vittae 1–3 in each furrow, 2 on commissure. Fl. Jun–Aug, fr. Aug–Oct. $n = 11^*$.

• Forest margins, shrubby thickets, grasslands; 800–1200 m. Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang.

The roots are used in traditional Chinese medicine as an analgesic and antipyretic.

3. *Ostericum viridiflorum* (Turczaninow) Kitagawa, J. Jap. Bot. 12: 235. 1936.

绿花山芹 lǜ huā shān qīn

Gomphopetalum viridiflorum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 14: 540. 1841; *Angelica viridiflora* (Turczaninow) Benth. ex Maximowicz.

Plants 0.5–1 m. Root conic, yellowish brown, branched. Stem purplish green, acute-angled, pubescent. Petioles ca. 10 cm, acute-triangular, sheaths triangular-ovate; leaf blade triangular-ovate, 10–15 × 15–20 cm, 2-pinnate, pinnae long-petiolulate; leaflets sessile, ovate or oblong, 4–7(–10) × 2–4(–6) cm, base truncate or obliquely broad-cuneate, margin white-cuspidate-serrate, apex acuminate, scabrous along nerves abaxially. Central umbels 4–9 across, peduncle very short, lateral umbels opposite or cyclic, peduncles longer, scabrous; bracts 2–3, lanceolate, ca. 1 cm; rays 10–18, 1–2 cm, unequal, hispidulous; bracteoles 3–9, linear-lanceolate; umbellules 10–20-flowered; pedicels hispidulous. Calyx teeth ovate. Petals green or greenish white, ovate. Fruit ellipsoid-orbicular, 4–6 × 2.5–4 mm; dorsal ribs acute-prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep. $n = 11^*$.

Damp meadows, riversides, stream banks; 800–1100 m. Heilongjiang, Jilin, Liaoning [Russia (Siberia)].

The young plants are eaten as a spring vegetable.

4. *Ostericum scaberulum* (Franchet) C. Q. Yuan & R. H. Shan, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1984–1985: 3. 1985 [“1984”].

疏毛山芹 shū máo shān qīn

Plants 50–70(–100) cm. Root cylindrical, brown, rametaceous, punctate on branches. Stem 0.3–0.6 cm thick, purplish green, thinly ribbed. Petioles 6–10(–18) cm, sheaths oblong; leaf blade broad-ovate, 15–25 × 15–20 cm, 2–3-ternate-pinnate; leaflets ovate to oblong-elliptic, 3.5–6.5 × 2.5–5 cm, base oblique, margin coarse-serrate and ciliate, apex long-caudate-acuminate, sparse pubescent along nerves abaxially. Peduncles 7–15 cm; bracts 2–5, lanceolate, scabrous; rays 13–19(–29), scabrous; bracteoles 6–12, linear-lanceolate, purplish, scabrous, apex acuminate, inflexed. Calyx teeth triangular-ovate. Petals white or yellowish white, ovate. Fruit suborbicular, 5–7 × 4–6.5 mm; dorsal ribs prominent, lateral ribs winged, wings much broader than the body; vittae 2 in each furrow, 4 on commissure. Fl. Jul–Sep, fr. Sep–Oct.

• Forests, shrubby thickets, grasslands, meadows; 2500–3400 m. Yunnan.

The roots have reputed medicinal properties.

- 1a. Bracteoles linear, ca. 0.5 mm wide, usually shorter than pedicels 4a. var. *scaberulum*
1b. Bracteoles linear, ca. 1 mm wide, 1–1.5 × pedicels 4b. var. *longiinvolutellatum*

4a. *Ostericum scaberulum* var. *scaberulum*

疏毛山芹(原变种) shū máo shān qīn (yuán biàn zhǒng)

Angelica scaberula Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 144. 1894.

Bracteoles linear, ca. 0.5 mm wide, usually shorter than pedicels.

• Forests, grasslands; 2500–3300 m. Yunnan.

4b. *Ostericum scaberulum* var. *longiinvolutellatum* C. Y. Wu & F. T. Pu, Novon 8: 70. 1998.

长苞山芹 cháng bāo shān qīn

Bracteoles linear, ca. 1 mm wide, 1–1.5 × pedicels.

• Shrubby thickets, meadows; 2700–3400 m. Yunnan.

5. *Ostericum sieboldii* (Miquel) Nakai, J. Jap. Bot. 18: 219. 1942.

山芹 shān qīn

Plants 0.5–1.5 m. Root stout, brown, 2–3-branched. Stem ribbed, glabrous or sparsely pubescent. Petioles acute-triangular in cross section, 5–20 cm, sheaths triangular-ovate; leaf blade triangular-ovate, 20–45 × 17–40 cm, 2–3-ternate-pinnate; leaflets sessile or short-petiolulate, long-ovate to elliptic, 2.5–12 × 1–6 cm, base obliquely cordate to cuneate, margin coarse-toothed or serrate, apex acuminate, glabrous or hispidulous along nerves. Umbels 4–8 cm across; bracts 1–2, narrow-lanceolate; rays 7–13, unequal, scabrous; bracteoles 6–10, linear-lanceolate, unequal; umbellules ca. 20-flowered; pedicels glabrous. Calyx teeth ovate. Petals white, broad-ovate. Fruit ellipsoid, 4–5.5 × 3.5–4 mm; dorsal ribs prominent, lateral ribs broad-winged; vittae 1–3 in each furrow, 4–6(–8) on commissure. Fl. Aug–Sep, fr. Sep–Oct.

Forests, ravines, grassy slopes, grasslands; 600–1200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong [Japan, Korea, Russia].

- 1a. Leaflets short-petiolulate, ovate, 3–6 cm wide, base cordate to truncate 5a. var. *sieboldii*
1b. Leaflets sessile, elliptic to rhombic-ovate, 1–3 cm wide, base cuneate 5b. var. *praeteritum*

5a. *Ostericum sieboldii* var. *sieboldii*

山芹(原变种) shān qīn (yuán biàn zhǒng)

Peucedanum sieboldii Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 63. 1867; *Angelica miqueliana* Maximowicz; *A. urticifoliata* H. Wolff; *Ostericum miquelianum* (Maximowicz) Kitagawa; *O. sieboldii* var. *microphyllum* Y. C. Ma; *Peucedanum miquelianum* (Maximowicz) H. Wolff.

Leaflets short-petiolulate, ovate, 5–12 × 3–6 cm, base oblique cordate. $n = 11^*$.

Forests, ravines, grassy slopes; 600–1200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong [Japan, Korea, Russia].

The young plants are eaten as a spring vegetable, and the roots have reputed medicinal value as a regional substitute for the traditional Chinese medicine “du huo” (see *Angelica biserrata*).

5b. *Ostericum sieboldii* var. *praeteritum* (Kitagawa) Y. Huet Huang, Pl. Herb. Chin. Bor.-Orient. 6: 252. 1977.

狭叶山芹 xia ye shan qin

Ostericum praeteritum Kitagawa, J. Jap. Bot. 46: 369. 1971; *O. praeteritum* f. *piliferum* Kitagawa.

Leaflets sessile, elliptic or rhombic-ovate, 2.5–8 × 1–3 cm, base cuneate.

Forests, grasslands; 800–1000 m. Heilongjiang, Jilin, Nei Mongol, Shaanxi [Korea].

6. *Ostericum huadongense* Z. H. Pan & X. H. Li, J. Pl. Resources Environm. 5(2): 48. 1996.

华东山芹 hua dong shan qin

Plants 60–90 cm. Stem ribbed, branched. Basal and lower leaves petiolate, petioles 6–15 cm, acute-triangular, sheaths small, narrow-ovate; blade triangular-ovate, 15–20 × 12–18 cm, 2-ternate-pinnate, pinnae petiolulate; leaflets subsessile, broad-ovate to rhombic-ovate, 2.5–5 × 1.8–3 cm, base oblique cuneate or broad-cuneate, margin cartilaginous, not divided or 1–2-lobed, coarsely cuspidate-dentate, apex short-acuminate, slightly scabrous along nerves abaxially. Umbels 5–8 cm across; peduncles 4–6 cm; bracts 1–4, linear to lanceolate, 3.5–9 mm, unequal, apex long-aristate; rays 10–14, 1.5–3.5 cm, unequal, scabrous; bracteoles 6–8, linear, 3–5 mm; umbellules 14–28-flowered; pedicels 4–12 mm, unequal, scabrid. Calyx teeth tri-

angular-ovate. Petals white obovate, notched. Anthers purple. Fruit ellipsoid, 7–8 × 4–5 mm; dorsal ribs prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Oct. $n = 11^*$.

• Forests or grasslands in ravines; 400–600 m. Anhui, Jiangsu, Zhejiang.

7. *Ostericum grosseserratum* (Maximowicz) Kitagawa, J. Jap. Bot. 12: 233. 1936.

大齿山芹 da chi shan qin

Angelica grosseserrata Maximowicz, Melanges Biol. Bull. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 9: 253. 1873; *A. koreana* Maximowicz; *A. mongolica* Franchet; *A. peucedanoides* H. Wolff; *A. smithii* H. Wolff.

Plants 80–120 cm. Root cylindric, brown, simple or branched. Stem thinly ribbed, base purplish green, branched above. Basal and lower petioles 4–18 cm, sheaths narrow-ovate, white-membranous-margined; leaf blade broadly triangular-ovate, 2–3-ternate-pinnate, primary and secondary pinnae petiolulate; leaflets subsessile, broad-ovate to rhombic-ovate, 2–5 × 1.5–3 cm, base cuneate, margin 2–4-lobed, coarsely white-mucronate-toothed, apex acute to long-acuminate, hispidulous along nerves on both surfaces. Umbels 2–10 cm across; bracts 4–8, linear-lanceolate to lanceolate, 5–8 mm; rays 6–14, 1.5–3 cm, unequal, scabrous; bracteoles 5–10, subulate to linear-lanceolate. Calyx teeth triangular-ovate, acute. Petals white, obovate, base clawed. Fruit broad-ellipsoid, 4–6 × 4–5.5 mm; dorsal ribs prominent, lateral ribs broad-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Sep, fr. Aug–Oct. $n = 9^*$.

Grassy slopes, meadows, stream banks; 300–2400 m. Anhui, Fujian, Hebei, Henan, Jiangsu, Jilin, Liaoning, Qinghai, Shaanxi, Shanxi, Sichuan, Zhejiang [Korea, Mongolia].

All parts of the species contain aromatic oil and the roots have reputed medicinal value. In some regions they are used as a substitute for the traditional Chinese medicine “du huo” (see *Angelica biserrata*).

84. *LEVISTICUM* Hill, Brit. Herb. 423 (not 410). 1756, nom. cons.

欧当归属 ou dang gui shu

Pan Zehui (潘泽惠); Mark F. Watson

Hipposelinum Britton & Rose.

Herbs perennial, stout. Leaves 2–3-pinnate. Umbels compound, terminal and lateral; bracts and bracteoles several. Calyx teeth obsolete. Petals yellowish green to yellow, elliptic, apex incurved. Fruit ellipsoid, slightly flattened dorsally; dorsal ribs obtusely prominent, lateral ribs narrowly thick-winged; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft to base.

Three species: Afghanistan, SW Asia, Europe, North America; one species (introduced) in China.

1. *Levisticum officinale* W. D. J. Koch, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12(1): 101. 1824.

欧当归 ou dang gui

Ligusticum levisticum Linnaeus, Sp. Pl. 1: 250. 1753; *Hipposelinum levisticum* (Linnaeus) Britton & Rose; *Selinum levisticum* (Linnaeus) E. H. L. Krause.

Plants 1–2.5 m, aromatic. Rhizome stout, 4–5 cm thick. Stem purplish green, lower branches alternate, upper branches opposite or whorled. Basal and lower leaves long-petiolate,

sheaths purple-red; blade broadly-triangular-ovate, 2–3-pinnate, pinnae all petiolulate; ultimate segments obovate or rhombic-ovate, 4–11 × 2–7 cm, 2–3-lobed, with a few coarse teeth. Umbels ca. 12 cm across; bracts 7–11, lanceolate, reflexed, scabrous, white-scarious-margined; rays 12–20, subequal; bracteoles 8–11, similar to bracts. Fruit brown, 5–7 × 3–4 mm. Fl. Jun–Aug, fr. Aug–Sep. $n = 11$.

Widely cultivated; 100–600 m. Hebei, Henan, Jiangsu, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [native to SW Asia and Europe].

This species was introduced to China in 1957. It is used as a sub-

stitute for the traditional Chinese medicine “dang gui” (see *Angelica sinensis*) and for flavoring. The young shoots and leaves can be eaten as a vegetable.

85. GLEHNTIA F. Schmidt ex Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 61. 1867.

珊瑚菜属 shan hu cai shu

Pan Zehui (潘泽惠); Mark F. Watson

Phellopterus Benth.

Herbs, perennial, white-pubescent throughout. Stem strongly shortened, branched. Leaves long-petiolate, sheathing at base; blade 1–2-ternate. Umbels compound, terminal and lateral, crowded; bracts absent; rays unequal; bracteoles several, lanceolate; umbellules subcapitate; pedicels inconspicuous. Calyx teeth minute, ovate-lanceolate. Petals white or purple-red, obovate-lanceolate, hairy abaxially, apex incurved. Stylopodium short-conic. Fruit obovoid to subglobose, slightly flattened dorsally, densely hirsute and velutinous; ribs all corky-winged, equal or lateral ribs slightly broader than the dorsal; vittae 1–3 in each furrow, 2–6 on commissure. Seed face subplane. Carpophore 2-cleft.

Two species: E Asia, North America; one species in China.

1. *Glehnia littoralis* F. Schmidt ex Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 61. 1867.

珊瑚菜 shan hu cai

Phellopterus littoralis (F. Schmidt ex Miquel) Benth.

Plants 20–70 cm. Taproot elongate, cylindrical or fusiform, 20–70 × 0.5–1.5 cm, yellowish white. Basal and lower leaves long-petiolate, 5–15 cm; blade broad-ovate, 1–2-ternate; ultimate segments oblong to broadly obovate, 1–6 × 0.8–3.5

cm, scabrous along nerves, incised-serrate with white-cartilaginous-margins, apex obtuse-rounded. Umbels 3–6 cm across; peduncles 2–6 cm; rays 8–16, 1–3 cm, unequal; bracteoles linear-lanceolate; pedicels 15–20. Calyx teeth 0.5–1 mm. Fruit 6–13 × 6–10 mm. Fl. and fr. Jun–Aug. $n = 11^*$.

Sandy beaches, also cultivated in sandy soils; 50–100 m. Fujian, Guangdong, Hebei, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang [Japan, Korea, Russia].

The roots are used in traditional Chinese medicine for treating coughs.

86. ARCUATOPTERUS M. L. Sheh & R. H. Shan, Bull. Bot. Res., Harbin 6(4): 11. 1986.

弓翅芹属 gong chi qin shu

She Menglan (佘孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial, glabrous throughout. Stem solitary, erect or scrambling, hollow. Basal leaves long-petiolate, 2–3-pinnatisect, petiole sheathing; ultimate segments ovate or obovate. Inflorescence loose compound umbels, peduncles terminal and axillary, many-branched, lateral umbels usually exceeding central; bracts and bracteoles absent, or occasionally bracts 1, deciduous; rays usually slender, unequal. Calyx teeth minute, triangular. Petals white, purplish or dull cream, obovate, apex broadly inflexed, costa red-brown, conspicuous, base clawed. Stylopodium conic or low-conic, margin slightly undulate. Fruit oblong or ellipsoid, strongly dorsally compressed; dorsal ribs obscure or very slightly raised, lateral ribs broadly winged, wings thin to corky, margin often incurved; vittae 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-cleft.

Three to five species: E Himalayas and SW China: three species (two endemic) in China.

Generic relationships between *Angelica*, *Arcuatopterus*, *Ferula*, *Peucedanum sensu lato*, etc. continue to be explored, with recent results indicating that several Himalayan taxa should now be included within *Arcuatopterus*, a genus once thought to be endemic to SW China.

- 1a. Fruit reddish brown when mature, less than 6 × 4 mm 1. *A. sikkimensis*
 1b. Fruit not reddish brown when mature, more than 6 × 4 mm.
 2a. Ultimate leaf segments linear-lanceolate, apex long-acuminate or caudate, base attenuate or obtuse-rounded 2. *A. linearifolius*
 2b. Ultimate leaf segments ovate or obovate, apex acute or acuminate, base cuneate 3. *A. thalictroides*

1. *Arcuatopterus sikkimensis* (C. B. Clarke) Pimenov & Ostroumova, Feddes Repert. 111: 557. 2000.

弓翅芹 gong chi qin

Peucedanum sikkimense C. B. Clarke in J. D. Hooker, Fl. Brit. India 2: 710. 1879; *Angelica sikkimensis* (C. B. Clarke) P. K. Mukherjee; *Arcuatopterus filipedicellus* M. L. Sheh & R. H. Shan.

Plants 80–100(–200) cm. Stem much-branched, erect, weakly erect or scrambling, lower parts tinged purple when young, becoming deep purplish-red throughout. Basal leaves ovate in outline, 18–40 × 8–25 cm, 2–3-pinnate; ultimate segments long-ovate or ovate-lanceolate, 1.2–6 × 0.5–2 cm, petiolulate, base rounded to cuneate, irregularly serrate, acuminate to long-acuminate. Umbels diffusely branched, 5–15 cm across; rays 6–12(–16), very unequal, 0.5–5.5 cm; umbellules 5–14-flowered; pedicels filiform, 3–8 mm, unequal. Fruit ovoid-ellip-

soid or ellipsoid, 5–6.5(–7.5) × 3.5–5(–6) mm, glabrous, reddish brown when mature; dorsal ribs obscure, lateral wings broad, subcorky, 1.2–2 mm wide, margin incurved. Fl. Aug–Sep, fr. Sep–Oct.

Mountain slopes, woodland; (1500–)2200–3000 m. SE Xizang, NW Yunnan (Binchuan, Lijiang) [Bhutan, Sikkim].

2. *Arcuatopteris linearifolia* M. L. Sheh & R. H. Shan, Bull. Bot. Res., Harbin 6(4): 14. 1986.

条叶弓翅芹 tiao ye gong chi qin

Herbs 50–120 cm. Stem erect, much-branched, usually tinged purple. Basal leaves petiolate; blade triangular-ovate, 2–3-pinnately dissected; ultimate segments linear-lanceolate, 2–9 × 3–6 mm, distally finely serrate to incised, apex long-acuminate to caudate. Cauline leaves reduced, petioles with dilated sheaths, ultimate segments linear and small. Inflorescence copiously branched; rays 5–11, unequal, 0.5–4 cm; umbellules 7–10-flowered; pedicels filiform, unequal. Stylopodium low-conic; styles short, recurved. Fruit ellipsoid ca. 6 × 4–5 mm; dorsal ribs inconspicuous or slightly raised, lateral ribs winged, wings broad, subcorky, margin incurved. Fl. Aug–Sep, fr. Sep–Oct.

• Grassy slopes at roadsides; 2400–2700 m. SW Sichuan (Yanyuan), NW Yunnan (Binchuan).

3. *Arcuatopteris thalictrioideus* M. L. Sheh & R. H. Shan, Bull. Bot. Res., Harbin 6(4): 15. 1986.

唐松叶弓翅芹 tang song ye gong chi qin

Plants (40–)80–110 cm. Stems erect, lower parts deep purple, branches numerous, slender, remote, divaricate. Basal leaves petiolate; blade triangular-ovate, 2–3-pinnately dissected; ultimate segments ovate or obovate, 1–2 × 0.6–1.2 cm, base cuneate, thinly papery, abaxial veins strongly prominent, red-brown and scaly-tomentose, margins crenate-apiculate. Inflorescence copiously branched, forming many spreading and divaricate panicles; rays (3–)5–7, 1–4.5 cm, very unequal, divaricate; umbellules 4–10-flowered; pedicels (1–)5–15 mm, very unequal, filiform, divaricate. Stylopodium conic, margin undulate. Fruit oblong, 6–7 × 4–6 mm, pale brown; dorsal ribs obscure, lateral ribs broadly corky-winged, wings 1.4–2 mm wide. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine meadows; 1900–2800 m. W Sichuan (Luding, Muli), SE Xizang (Cona), NC Yunnan (Fumin).

87. *FERULA* Linnaeus, Sp. Pl. 1: 246. 1753.

阿魏属 a wei shu

She Menglan (佘孟兰 Sheh Meng-lan); Mark F. Watson

Euryangium Kauffmann; *Sumbulus* H. Reinsch.

Herbs, perennial, monocarpic or polycarpic, often onion-*(Allium)*-scented. Taproot stout, often woody. Stem branching, alternate, opposite or verticillate, base often clothed in fibrous remnant sheaths. Leaves petiolate, base sheathing, usually broadly so; blade 2–4-pinnate or 2–4-pinnatisect. Cauline leaves reduced upwards. Inflorescences often polygamous, terminal umbels compound, flowers perfect; lateral umbels both compound and simple, flowers bisexual or staminate; bracts usually absent; bracteoles present or absent. Calyx teeth obsolete or minute, triangular (except *F. kingdon-wardii*). Petals yellow or pale yellow (rarely greenish-yellow), ovate or lanceolate-oblong, apex acuminate, inflexed. Stylopodium conic, base sometimes dilated, lobed. Fruit ellipsoid or ovate-globose, strongly dorsally compressed, glabrous (rarely sparsely puberulent); dorsal ribs filiform, usually prominent, lateral ribs winged, wings narrow or broad; vittae 1–4 in each furrow, 2–12 on commissure. Seed face plane or slightly concave. Carpophore 2-cleft to base.

About 150 species: N Africa, C and SW Asia, Mediterranean region; 26 species (seven endemic) in China.

- 1a. Inflorescence of compound and simple umbels, compound umbels terminal, simple umbels axillary, opposite or successively verticillate forming crowded moniliform racemes.
 - 2a. Stem 1–1.5 m, stout, simply branched 24. *F. feruloides*
 - 2b. Stem 0.3–0.6 m, slender, duplicately branched.
 - 3a. Leaves roughened, hispid and deciduous; fruits ca. equal to pedicels 25. *F. caspica*
 - 3b. Leaves adaxially glabrous, abaxially pubescent, not deciduous; fruits longer than pedicels 26. *F. dubjanskyi*
- 1b. Inflorescence of only compound umbels in an ample loose panicle.
 - 4a. Petals persistent for a long time after flowering; polycarpic; vittae 3–4 in each furrow, 10–12 on commissure 10. *F. lehmannii*
 - 4b. Petals deciduous after flowering, monocarpic or polycarpic.
 - 5a. Stem stout, spongy; leaves usually smooth, not papillose, deciduous.
 - 6a. Segments of leaves larger, oblong-ovate, more than 5 cm.
 - 7a. Plants strongly onion-scented; stem elongate-conic; fruit ribs narrowly winged 1. *F. conocaula*
 - 7b. Plants not onion-scented; stem terete; fruit ribs broadly winged 2. *F. jaeschkeana*
 - 6b. Segments of leaves smaller, shapes various, less than 5 cm.
 - 8a. Petals abaxially glabrous 9. *F. canescens*
 - 8b. Petals abaxially pubescent.
 - 9a. Stem slender, suberect or flexuose, 15–50 cm high, plants not onion-scented.

- 10a. Plants 15–30 cm; bracteoles densely white villous; fruits 5–8 mm, longer than pedicels; vittae 2 on commissure 7. *F. syreitschikowii*
- 10b. Plants ca. 50 cm; bracteoles glabrous; fruits 8–10 mm, shorter than pedicels; vittae 2–6 on commissure 8. *F. hexiensis*
- 9b. Stem stout, erect, above 1 m high, plants strongly onion-scented.
- 11a. Segments of leaves lobed or toothed; fruit vittae 3–5 in each furrow, 10–14 on commissure.
- 12a. Stem roughened, pubescent; mature fruits 10–12 mm, equaling or shorter than pedicels 3. *F. sinkiangensis*
- 12b. Stem subglabrous; mature fruits 12–16 mm, longer than pedicels 4. *F. fukanensis*
- 11b. Segments of leaves lanceolate; fruit vittae 1–2(–3) in each furrow, 6 on commissure.
- 13a. Umbellules 10–20-flowered; fruit 10–12 mm, vittae 1–2 in each furrow 5. *F. teterrima*
- 13b. Umbellules 10–13-flowered; fruit ca. 14 mm, vittae 2 in each furrow, rarely 3 6. *F. krylovii*
- 5b. Stem slender, not spongy; leaves roughened; usually papillose, persistent until plant has withered.
- 14a. Leaves thick, sub-leathery, rigid, not deciduous.
- 15a. Ultimate leaf segments linear, 1–2 mm, branchlets often verticillate; bracteoles deciduous 14. *F. dissecta*
- 15b. Ultimate leaf segments elliptic or ovate, never linear.
- 16a. Plants low, 30–60 cm, leaves densely puberulous, bluish green; rays 4–15, spreading, unequal; lateral umbel absent 11. *F. bungeana*
- 16b. Plants tall, 1–3 m, leaves roughened, hispid or sparingly pubescent; lateral umbel present.
- 17a. Ultimate leaf segments 5–10 mm, toothed or lobed; fruit vittae 4–8 on commissure 12. *F. ovina*
- 17b. Ultimate leaf segments 20–30 mm, parted, lobules entire or serrate; fruit vittae 2 on commissure 13. *F. lapidosa*
- 14b. Leaves thin, papery, flexible, deciduous.
- 18a. Ultimate segments linear or lanceolate.
- 19a. Leaves ternate-3–4-pinnatisect, ultimate segments up to 30 mm 20. *F. songarica*
- 19b. Leaves 2–3-pinnatisect, ultimate segments 2–10 mm.
- 20a. Plants sparsely pubescent, leaves adaxially glabrous, abaxially pubescent; fruit 5–7 mm, vittae 2 on commissure 21. *F. gracilis*
- 20b. Plants glabrous; fruit (7–)10–15 mm, vittae 4–8 on commissure 22. *F. licentiana*
- 18b. Ultimate segments elliptic-ovate, never linear or lanceolate.
- 21a. Plants glabrous.
- 22a. Leaf blade 2–3-pinnatisect, ultimate segments oblong, 0.3–1 × 0.2–0.6 cm; calyx teeth conspicuous, long-triangular 17. *F. olivacea*
- 22b. Leaf blade 3-pinnate, ultimate segments long-ovate or broadly ovate; calyx teeth obsolete or rarely subulate 18. *F. kingdon-wardii*
- 21b. Plant pubescent or hispid.
- 23a. Leaves adaxially glabrous, abaxially pubescent, articulate between petiole and blade.
- 24a. Stem 0.5–1 m, 1 × branched; leaf blade ternate-pinnate, pinnae pinnately parted; lateral umbels single 15. *F. moschata*
- 24b. Stem 2–3 m, 2 × branched; leaf blade ternate-3-pinnatisect; lateral umbels absent 16. *F. kirialovii*
- 23b. Leaves roughened, hispid, not articulate between petiole and blade.
- 25a. Leaves adaxially glabrous, abaxially sparsely hirsute, basal leaves long-petiolate; bracteoles persistent 19. *F. akitschkensis*
- 25b. Leaves hispid on both surfaces, basal leaves sessile or short-petiolate; bracteoles deciduous 23. *F. karataviensis*

1. *Ferula conocaula* Korovin, Monogr. *Ferula*, 33. 1947.

圆锥茎阿魏 *yuan zhui jing a wei*

Plants ca. 2 m, monocarpic, strongly onion-scented. Stem solitary, very stout, up to 15 cm thick at base, tapering towards apex, hispid, paniculate-branched, branches thick, lower branches alternate, upper branches verticillate, purplish tinged with age. Basal leaves petiolate; blade triangular in outline, ternate-pinnatifid; ultimate segments lanceolate or lanceolate-elliptic, to 27 × 7 cm, finely crenate, adaxially glabrous, abaxially densely puberulous. Cauline leaves reduced with expanded sheaths, uppermost almost wholly sheathing. Terminal umbels often sessile or short-pedunculate, lateral umbels long-pedunculate, usually exceeding terminal; umbels 8–14 mm across; bracts absent; rays 12–50, subequal; bracteoles few, lanceolate, small, decidu-

ous; umbellules ca. 15-flowered. Stylopodium low-conic, base dilated; styles elongate, recurved. Fruit ellipsoid, ca. 10 × 5 mm; vittae 1–2 in each furrow, 8–14 on commissure. Fl. May–Jun, fr. Jun–Jul.

Mountain valleys, semi-deserts; ca. 2800 m. SW Xinjiang (Wuqia) [Kyrgyzstan].

This species is used in Xinjiang as a regional substitute for the traditional Chinese medicine “a wei” (*Ferula assafoetida* Linnaeus).

2. *Ferula jaeschkeana* Vatke, Index Sem. Hort. Berol. 1876, App. 2. 1876.

中亚阿魏 *zhong ya a wei*

Ferula jaeschkeana var. *parkeriana* O. E. Schulz; *Peucedanum jaeschkeanum* (Vatke) Baillon.

Plants 1–2 m, monocarpic, not strongly scented. Stem solitary, thick, robust, reddish brown, paniculate-branched, lower branches alternate, upper branches verticillate. Basal leaves petiolate; blade broadly triangular in outline, 2-ternately dissected, glabrous adaxially, pubescent abaxially, soon wilting; segments broadly ovate, ternate-bipinnatisect, ultimate segments oblong or oblong-lanceolate, 10–15 × 4–5 cm, 2-pinnatisect, base decurrent, finely serrate, apex short-acuminate. Cauline leaves reduced upwards, sheaths ovate-lanceolate, embracing. Umbels 3–10 cm across; terminal umbels sessile or subsessile, lateral umbels long-pedunculate, exceeding terminal; rays (5–)10–20 (–25), unequal; bracts absent; umbellules 15–20-flowered. Petals long-elliptic, apex acuminate, incurved. Stylopodium low-conic, base dilated, margin undulate; styles elongate. Fruit ellipsoid, 14–20 × 8–12 mm; vittae 1 in each furrow, 4–6 on commissure. Fl. Jun, fr. Jul.

Grassy slopes, among shrubs; ca. 3600 m. W Xizang (Ngari, Zanda) [Afghanistan, Bhutan, NE India, W Pakistan; C Asia].

3. *Ferula sinkiangensis* K. M. Shen, Acta Phytotax. Sin. 13(3): 88. 1975.

新疆阿魏 xin jiang a wei

Plants 0.5–1.5 m, strongly onion-scented. Rootstock thick, conical. Stem stout, pubescent, paniculate-branched, lower branches alternate, upper branches verticillate, often purplish red. Leaf blade gray-green, triangular-ovate in outline, ternate-3-pinnatisect; ultimate segments broadly elliptic, ca. 10 mm, shallowly lobed or toothed, base decurrent, adaxially sparsely pubescent, abaxially densely puberulent. Terminal umbel subsessile, lateral umbels (1–)2–4, opposite or alternate, peduncles elongate, exceeding terminal; umbels 8–12 cm across; bracts absent; rays 5–25, puberulent; bracteoles broadly lanceolate, deciduous. Petals abaxially puberulous. Stylopodium low-conic, base dilated, undulated-margined. Fruit ellipsoid, 10–12 × 5–6 mm, sparsely puberulent; vittae 3–4 in each furrow, unequal, 12–14 on commissure. Fl. and fr. Apr–Jun.

- Desert gravels; 800–900 m. W Xinjiang (Yining).

This species is used in Xinjiang as a regional substitute for the traditional Chinese medicine “a wei” (*Ferula assafoetida* Linnaeus).

4. *Ferula fukanensis* K. M. Shen, Acta Phytotax. Sin. 13(3): 89. 1975.

阜康阿魏 fu kang a wei

Plants 0.5–1.5 m, strongly onion-scented. Stem solitary, stout, subglabrous, paniculate-branched, lower branches alternate, upper branches verticillate. Leaf blade ovate in outline, ternate-2-pinnatisect; ultimate segments oblong, proximally parted, distally lobed or toothed, ca. 20 mm, adaxially glabrous, abaxially puberulent, base decurrent, irregular crenate. Umbels 6–10 cm across; terminal peduncle 3–5 cm, lateral peduncles 6–15 cm, exceeding terminal; bracts absent; rays 5–18(–31), unequal; bracteoles lanceolate, deciduous; umbellules 7–21-flowered. Petals abaxially sparsely pubescent. Stylopodium conic, base dilated, margins shallowly lobed; styles elongate and reflexed. Fruit ellipsoid, 12–16 × 6–8 mm; vittae 4–5 in each furrow, unequal, 10–12 on commissure. Fl. and fr. Apr–Jun.

- Valley sides at desert margins; ca. 700 m. NC Xinjiang (Fukang).

This species is used in Xinjiang as a regional substitute for the traditional Chinese medicine “a wei” (*Ferula assafoetida* Linnaeus).

5. *Ferula teterrima* H. Karsten & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 363. 1842.

臭阿魏 xiu a wei

Plants ca. 2 m, strongly onion-scented. Taproot fusiform, thickened. Stem solitary, stout, conspicuously fluted, pubescent, paniculate-branched, lower branches alternate, upper branches verticillate. Basal leaves broadly ovate in outline, ternate-3-pinnatisect; ultimate segments gray-green, lanceolate, ca. 10 mm, thin-leathery, soon wilting, distally crenulate to slightly lobed, densely pubescent, base cuneate, deciduous. Cauline leaves often less divided than basal, uppermost reduced to bladeless sheaths. Terminal umbels subsessile, lateral umbels 2–3, smaller, verticillate with elongate peduncles exceeding terminal; umbels ca. 12 cm across; bracts absent; rays 15–23, subequal, sparsely pubescent; bracteoles lanceolate, deciduous; umbellules 12–20-flowered. Petals abaxially pubescent. Fruit ellipsoid, ca. 10–12 mm; vittae 1–2 in each furrow, 6 on commissure. Fl. and fr. Apr–Jun.

Desert gravels; ca. 900 m. N Xinjiang (Ili) [Kazakhstan, Russia].

This species has reputed medicinal value.

6. *Ferula krylovii* Korovin, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kujbyševa. 2–3: 2. 1934.

托里阿魏 tuo li a wei

Plants 0.5–1.5 m, strongly onion-scented. Taproot fusiform, thickened, rootstock unbranched. Stem solitary, stout, paniculate-branched, lower branches alternate, upper branches verticillate, usually pale purplish-red with age. Leaves broadly ovate, ternate-3-pinnatisect; ultimate segments gray-green, oblong, lobed or toothed, lobules lanceolate, densely pubescent, deciduous. Cauline leaves reduced upwards, sheaths lanceolate. Terminal umbel sessile, lateral umbels 2–3, with elongate peduncles exceeding terminal; umbels ca. 12 cm across; bracts absent; rays 12–23, rather short, umbels subglobose; umbellules 10–13-flowered. Petals abaxially pubescent. Stylopodium conic, base dilated; styles elongate. Fruit long-ellipsoid, ca. 14 mm; lateral ribs narrowly winged; vittae 2–3 in each furrow, 6 on commissure. Fl. and fr. May–Jul.

Alkaline grasslands; 600–800 m. NW Xinjiang (Toli) [Russia (W Siberia); C Asia].

This species has reputed medicinal value.

7. *Ferula syreitschikowii* Koso-Poljansky, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 3: 71. 1922 [*“syreitschikowi”*].

荒地阿魏 huang di a wei

Plants 15–30 cm, not onion-scented. Stem slender, slightly flexuose, densely hirsute, corymbose-branched, branches alternate. Basal leaves subsessile or sessile; leaf blade rhombic, 2–3-pinnatisect, ultimate segments gray-green, elliptic, ca. 2 cm, densely pubescent on both surfaces, 3–5-lobed, lobules tri-

angular, deciduous. Uppermost leaves often bladeless, petioles sheathing throughout. Compound umbels terminal on stem and branches; umbels 4–6 cm across; rays 6–12, subequal; bracteoles lanceolate, densely white pubescent, persistent; umbellules 1–25-flowered. Petals abaxially puberulous. Stylopodium low-conic, base dilated, undulate-margined. Fruit ellipsoid, 5–8 × ca. 3 mm; lateral ribs narrowly winged, wings grayish white; vittae large, 1 in each furrow, 2 on commissure. Fl. and fr. May–Jun.

Valley sides, gravelly slopes, sandy places in cultivated land; 500–1000 m. N Xinjiang [Kyrgyzstan, Uzbekistan].

8. *Ferula hexiensis* K. M. Shen, Acta Phytotax. Sin. 24: 314. 1986.

河西阿魏 he xi a wei

Plants ca. 50 cm, roughened and hispid throughout, not onion-scented. Stem slender, solitary, paniculate-branched, lower branches alternate, upper branches verticillate. Leaf blades broadly ovate, ternate-3–4-pinnatisect; ultimate segments ca. 5 mm, margins triangular-toothed or lobed, apex acute, mucronate. Upper leaves often bladeless, petioles wholly sheathing. Terminal umbel long-pedunculate, lateral umbels few, shorter than terminal; umbels 5–10 cm across; bracts few, linear, persistent; rays 10–18, subequal; bracteoles several, subulate or narrow-lanceolate, glabrous; umbellules 10–15-flowered. Petals abaxially sparsely pubescent. Stylopodium low-conic, base dilated. Fruit broadly ellipsoid or obovoid, 8–10 × 4–7 mm, sparsely pubescent; lateral wings broad; vittae 1 in each furrow, 2–6 on commissure, unequal. Fl. Jun, fr. Jul.

- Moist places on mountain slopes. N Gansu (Sunan).

9. *Ferula canescens* (Ledebour) Ledebour, Fl. Ross. 2: 302. 1844.

灰色阿魏 hui se a wei

Peucedanum canescens Ledebour, Fl. Altaic. 1: 307. 1829.

Plants 30–40 cm. Stem slender, slightly flexuose, corymbose-branched, lower branches alternate, upper branches opposite. Leaves triangular-ovate in outline, 3-pinnate/pinnatisect; ultimate segments gray-green, oblong-lanceolate or ovate, 5–10 mm, densely pubescent on both surfaces, deciduous. Cauline leaves few, less divided than basal, uppermost often bladeless, petioles wholly sheathing, sheaths oblong-lanceolate, pubescent. Terminal umbel pedunculate, lateral umbels 1–2, exceeding terminal; umbels 3–6 cm across; bracts absent; rays (2–)4–5(–8), subequal; bracteoles few, lanceolate, scarious-margined; umbellules ca. 10-flowered. Petals glabrous. Stylopodium low-conic, base dilated, lobed. Fruit oblong-ellipsoid, 8–14 × 3.5–6 mm; vittae 1 in each furrow, large, 2 on commissure. Fl. Jun, fr. Jul.

Desert gravels; ca. 800 m. N Xinjiang (Fuyun) [Kyrgyzstan, Russia (W Siberia), Uzbekistan].

10. *Ferula lehmannii* Boissier, Fl. Orient. 2: 992. 1872.

大果阿魏 da guo a wei

Plants 40–50 cm, polycarpic, strongly onion-scented. Cau-

dex thick, branched. Stem solitary, erect, paniculate-branched, lower branches alternate, upper branches verticillate. Basal leaves short-petiolate, sheaths dilated; blade broadly ovate, ternate-2-pinnatisect; ultimate segments gray-green, long-ovate, ca. 20 mm, pinnate or sometimes 3–5 crenate-toothed, pubescent, base decurrent. Cauline leaves reduced, uppermost bladeless, petioles wholly sheathing, pubescent. Terminal umbel sessile or short-pedunculate, lateral umbels 1–2, exceeding terminal; umbellules 6–10-flowered. Petals abaxially puberulent, persistent for a long time after flower. Fruit long-ellipsoid, 12–14 × 6–7 mm; vittae 3–4 in each furrow, 10–12 on commissure, very unequal. Fl. and fr. May–Jun.

Sandy places on low mountain slopes; 1000–1100 m. NC Xinjiang (Manas) [Afghanistan, Kazakhstan, Kyrgyzstan, W Pakistan, Uzbekistan; C Asia, SW Asia (Iran)].

The rootstock is used medicinally.

11. *Ferula bungeana* Kitagawa in J. Jap. Bot. 31: 304. 1956.

硬阿魏 ying a wei

Peucedanum rigidum Bunge.

Plants 30–60 cm. Stems slender, 2–3 × corymbose-branched, lower branches alternate, upper branches opposite or verticillate. Basal leaves rosetted; blade broadly ovate or triangular, 2–3-pinnatisect; ultimate segments glaucous-blue, long-elliptic or ovate, 1–3 × 1–2 mm, pinnatifid, lobules cuneate-obovate, apex 3-triangular-toothed, sub-leathery, rigid, densely pubescent, base cuneate, apex mucronate. Cauline leaves few, uppermost leaves bladeless, petioles wholly sheathing. Umbels 4–12(–25) cm across; bracts absent or 1–2, subulate; rays 4–15, unequal, spreading; bracteoles 3–5, linear-lanceolate, unequal; umbellules 5–12-flowered. Stylopodium low-conic, base dilated. Fruit broadly ellipsoid, 10–15 × 4–6 mm; lateral ribs narrowly winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. May–Jul.

- Gravelly slopes, sandy places; 200–2500 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi.

This species has reputed medicinal value.

12. *Ferula ovina* (Boissier) Boissier, Fl. Orient. 2: 986. 1872.

羊食阿魏 yang shi a wei

Peucedanum ovinum Boissier, Diagn. Pl. Orient., ser. 1, 6: 61. 1846 [“1845”]; *P. thomsonii* C. B. Clarke; *Ferula stewartiana* var. *affghanica* O. E. Schulz.

Plants 50–100 cm. Stems slender, 1–2, rigid, often purplish red, nodes slightly swollen, paniculate-branched, lower branches alternate, upper branches verticillate. Leaf blade ovate, ternate-3–4-pinnatisect; ultimate segments ovate, 5–10 mm, densely hispid, sub-leathery, margins toothed or lobed. Cauline leaves reduced upwards to small, broad, leathery ovate-lanceolate sheaths. Terminal umbel sessile or short-pedunculate, lateral umbels 1–2(–5), exceeding terminal; umbels 4–6 cm across; bracts absent; rays 3–10; bracteoles squamose, deciduous; umbellules 5–12-flowered. Stylopodium low-conic, base dilated. Fruit ellipsoid, 5–10 × 2–5 mm; lateral ribs narrowly winged;

vittae 1 in each furrow, 4–8 on commissure, large. Fl. and fr. May–Jul.

Gravelly slopes; 1200–1700 m. N Xinjiang (Altay, Tacheng) [Afghanistan, Kazakhstan, Kyrgyzstan, W Pakistan, Tajikistan; SW Asia (Iran)].

13. *Ferula lapidosa* Korovin, Monogr. Ferula, 59. 1947.

多石阿魏 duo shi a wei

Plants 60–100 cm, hispid throughout. Stems slender, several, nodes slightly swollen, paniculate-branched, lower branches alternate, upper branches verticillate. Basal leaves short-petiolate, sheaths dilated; blade broadly rhombic, 3-pinnatisect, sub-leathery; ultimate segments broadly elliptic, 2–3(–4) × 1–2 cm, base cuneate, distally lobed, lobules entire or toothed, base decurrent. Upper leaves bladeless, petioles wholly sheathing, sheaths enlarged, elliptic-lanceolate, rigid and clasping. Terminal umbel sessile or short-pedunculate, lateral umbels 1–3, opposite or verticillate with elongate peduncles, exceeding terminal; umbels 3–6 cm across; bracts and bracteoles lanceolate, deciduous; rays 6–16, subequal; umbellules 10–15-flowered. Stylopodium low-conic; styles elongate. Fruit ellipsoid, ca. 10 mm; lateral ribs narrowly winged; vittae 1 in each furrow, large, 2 on commissure. Fl. Jun, fr. Jul.

Grassy places on gravelly slopes; ca. 1200 m. W Xinjiang (Qapqal) [Kyrgyzstan].

14. *Ferula dissecta* (Ledebour) Ledebour, Fl. Ross. 2: 301. 1844.

全裂叶阿魏 quan lie ye a wei

Peucedanum dissectum Ledebour, Fl. Altaic. 1: 306. 1829.

Plants 40–100 cm. Stem slender, often purplish red, nodes swollen, paniculate-branched, branches usually verticillate. Basal leaves short-petiolate, sheaths dilated; blade broadly ovate, 3–4(–5)-pinnatisect; ultimate segments gray-green, linear, 1–2 mm, densely hispid, sub-leathery. Cauline leaves reduced upwards, sheaths lanceolate or ovate, embracing, becoming rigid when old. Terminal umbel sessile or pedunculate, lateral umbels 1–5, long-pedunculate, exceeding terminal; umbels 4–8 cm across; bracts absent; rays 4–14, subequal; bracteoles small, lanceolate, deciduous; umbellules 8–15-flowered. Stylopodium low-conic, base dilated; styles elongate. Fruit ellipsoid, 7–11 × 3–5 mm; vittae 1 in each furrow, 6 on commissure. Fl. May, fr. Jun.

Gravelly slopes; 1000–1700 m. N Xinjiang (Altay, Tacheng) [Kazakhstan, Russia (W Siberia)].

15. *Ferula moschata* (H. Reinsch) Koso-Poljansky, Bjull. Obšč. Estestvoisp. Voronežsk. Gosud. Univ. 1: 94. 1926.

麝香阿魏 she xiang a wei

Sumbulus moschatus H. Reinsch, Jahrb. Pract. Pharm. Verwandte Fächer 13: 69. 1846; *Euryangium sumbul* Kaufmann; *Ferula sumbul* (Kauffmann) J. D. Hooker.

Plants 0.5–1 m, pubescent becoming subglabrous. Stem slender, corymbose-branched, lower branches alternate, upper branches verticillate. Leaf blade broadly elliptic-triangular, ternate-2-pinnatisect; ultimate segments oblong or lanceolate, 20–

35 × 10–15 mm, remote, rather thick, adaxially glabrous, abaxially pubescent, sometimes sparsely papillose along veins, distally lobed, lobules entire or toothed. Terminal umbel long-pedunculate, lateral umbels 1–2, solitary or opposite, slightly exceeding terminal; umbels 4–6 cm across; bracts absent; rays 6–12, subequal; bracteoles lanceolate; umbellules 9–12-flowered. Stylopodium low-conic, base dilated, margins undulate. Fruit ellipsoid, ca. 7 mm; vittae 1 in each furrow, 2 on commissure. Fl. Jun, fr. Jul.

Scrub on gravelly slopes; 1500–1600 m. W Xinjiang (Zhaosu) [Kyrgyzstan, Tajikistan].

16. *Ferula kirialovii* Pimenov, Bjull. Moskovsk. Obšč. Isp. Prir., Otd. Biol. 84(5): 110. 1979.

山蛇床阿魏 shan she chuang a wei

Plants 2–3 m. Stem slender, purplish red-tinged, 2 × corymbose-branched, lower branches alternate, upper branches verticillate, branchlets often opposite, rarely alternate or single. Basal leaves long-petiolate, articulate between petiole and blade; blade triangular-ovate, 3-ternate, leaflets 2-pinnatisect; ultimate segments broadly elliptic or long-elliptic, 10–30 × 5–20 mm, abaxially pubescent, pinnate, lobules entire or toothed. Upper leaf bladeless, sheaths lanceolate. Umbels 4–8 cm across, terminal on stem, branches and branchlets; bracts absent; rays 6–12, subequal; bracteoles several, lanceolate or subulate, persistent; umbellules 12–17-flowered. Stylopodium low-conic, base dilated. Fruit ellipsoid, ca. 7 × 3 mm; vittae small, 1 in each furrow, 2 on commissure. Fl. Jun, fr. Jul.

Scrub or grassy places on gravelly slopes; ca. 1500 m. Xinjiang (Tian Shan) [C Asia (W Tian Shan)].

17. *Ferula olivacea* (Diels) H. Wolff in Handel-Mazzetti, Symb. Sin. 7: 727. 1933.

榄绿阿魏 lan lü a wei

Peucedanum olivaceum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 290. 1912.

Plants 30–60 cm, glabrous throughout, glaucous. Stem solitary, corymbose-branched, branches alternate, remote. Basal leaves short-petiolate; blade broadly ovate, 2–3-pinnatisect; ultimate segments broadly elliptic or ovate, pinnatifid, lobules elliptic or obovate, rather thick, veins elevated abaxially, base cuneate, decurrent, margin toothed, apex mucronate. Umbels terminal on stem and branches, ca. 12 cm across; bracts absent or few, linear, unequal, occasionally foliaceous, deciduous; rays 8–16, unequal; bracteoles linear, persistent; umbellules 10–20-flowered; pedicels unequal, 5–10 mm. Petals yellowish green. Stylopodium low-conic, base thickened. Fruit oblong or ellipsoid, ca. 10 × 5 mm; vittae 1 in each furrow, 2 on commissure. Fl. and fr. May–Jul.

• Forests, grassy slopes, rock crevices on valley sides; 3300–3800 m. NW Yunnan (Lijiang).

This species has reputed medicinal value.

18. *Ferula kingdon-wardii* H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 326. 1930.

草甸阿魏 cao dian a wei

Peucedanum kingdon-wardii (H. Wolff) Korovin.

Plants 0.5–1 m, glabrous throughout, glaucous. Stem fluted. Leaf blade broadly triangular-ovate, 3-pinnate, pinnae 4–5 pairs; ultimate segments long-ovate or broadly ovate, 1.5–2.5 × 1–1.8 cm, subleathery, abaxially glaucous, base cuneate or truncate, irregularly coarsely toothed. Upper leaves 3-lobed, lobules ovate-lanceolate, sheaths dilated, suborbicular. Umbels 8–13 cm across; bracts 1–2, broadly ovate or ovate-lanceolate, unequal; rays 7–16, stout, 4–7 cm; bracteoles 6–8, linear-lanceolate, shorter than flowers; umbellules 12–20-flowered. Calyx teeth obsolete or subulate. Stylopodium low-conic. Fruit ellipsoid, 0.8–1 × ca. 0.5 cm; lateral ribs narrowly winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Aug–Oct.

• Gaps among stones on grassy slopes; 2700–3300 m. NW Yunnan.

19. *Ferula akitschkensis* B. Fedtschenko ex Koso-Poljansky, Bjull. Obšč. Estestvoisp. Voronežsk. Gosud. Univ. 1: 94. 1926.

山地阿魏 shan di a wei

Plants 1–1.5 m. Stem slender, paniculate-branched, lower branches alternate, upper branches verticillate. Basal leaves long-petiolate; blade broadly rhombic, ternate-3-pinnatisect; ultimate segments oblong or ovate-oblong, 8–15(–30) × 3–5 (–10) mm, usually pinnatisect, lobules linear, entire, adaxially glabrous, abaxially sparsely hispid. Upper leaves bladeless, sheaths lanceolate. Terminal umbel sessile or short-pedunculate, lateral umbels 2–4, opposite or verticillate, rarely single, exceeding terminal; umbels 5–10 cm across; bracts lanceolate; rays 10–20(–25), subequal, very spreading; bracteoles 5–7, lanceolate, persistent; umbellules 8–16-flowered. Stylopodium low-conic, base dilated; style elongate, very reflexed when mature. Fruit ellipsoid, ca. 8 mm; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jun–Jul.

Mountain slopes, scrub or grassy places on gravelly slopes; 900–2100 m. N Xinjiang (Altay, Bole, Tacheng) [Kazakhstan, Kyrgyzstan, Russia].

20. *Ferula songarica* Pallas ex Sprengel in Roemer & Schultes, Syst. Veg. 6: 598. 1820.

准噶尔阿魏 zhun ga er a wei

Plants 1–1.5 m. Stems 1–3 robust, rigid, purplish red with age, paniculate-branched, lower branches alternate, upper branches verticillate. Basal leaves long-petiolate; blade broadly triangular, ternate-3–4-pinnatisect; ultimate segments green, linear, 1.5–3 × 1–2 mm, thick-papery, glabrous, entire, soon wilting, deciduous. Cauline leaves reduced upwards, small, less divided than basal, sheaths lanceolate, thin-leathery. Terminal umbel short-pedunculate, lateral umbels (1–)2–4 or absent, long-pedunculate, exceeding terminal; umbels 4–7 cm across; rays 10–20, subequal; bracteoles 5, lanceolate, persistent; umbellules 15–20-flowered. Stylopodium low-conic; style elongate. Fruit ellipsoid, ca. 8 × 5 mm; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jun–Jul.

Scrub or grassy places on mountain slopes; 1100–1800 m. N Xinjiang (Altay, Tacheng) [Kazakhstan, Russia (W Siberia)].

21. *Ferula gracilis* (Ledebour) Ledebour, Fl. Ross. 2: 304. 1844.

细茎阿魏 xi jing a wei

Peucedanum gracile Ledebour, Fl. Altaic. 1: 308. 1829.

Plants 50–80 cm, sparsely pubescent. Stem slender, erect, solitary, paniculate-branched from middle, branches alternate. Basal leaves short-petiolate; blade broadly ovate, ternate-2–3-pinnatisect; ultimate segments ovate or oblong-elliptic, pinnatifid, lobules lanceolate, ca. 5–10 mm, adaxially glabrous, abaxially sparsely pubescent, thin-papery. Cauline leaves reduced upwards, uppermost leaves bladeless, sheaths lanceolate, deciduous. Terminal umbel pedunculate or subsessile, lateral umbels 1–2, pedunculate, usually slightly shorter than terminal; bracts absent; rays 4–8, unequal; bracteoles lanceolate, membranous, deciduous; umbellules 10–15-flowered. Stylopodium low-conic, base dilated; styles elongate. Fruit ellipsoid, 5–7 mm; vittae 1 in each furrow, 2 on commissure. Fl. Jun, fr. Jul.

Grassy places, gravelly slopes on valley sides; 730–1700 m. N Xinjiang (Altay) [Russia (W Siberia)].

22. *Ferula licentiana* Handel-Mazzetti, Oesterr. Bot. Z. 82: 252. 1933.

太行阿魏 tai hang a wei

Plants (60–)120–180 cm, glabrous throughout. Stem solitary, slender, usually flexuose, paniculate-branched, lower branches alternate, upper branches verticillate. Basal leaves petiolate; blade broadly ovate-triangular, 3–4-pinnatisect; ultimate segments ovate-oblong, often pinnately parted or lobed, lobules lanceolate, 2–4 mm, both surfaces glabrous. Upper leaves reduced, bladeless, sheaths lanceolate, embracing. Terminal umbel short-pedunculate, lateral umbels 1–3, simple or opposite, exceeding terminal; bracts absent or 1–3, linear, small; rays 7–11, 2.5–3 cm, subequal; bracteoles 4–5, lanceolate; umbellules 7–15-flowered. Stylopodium low-conic. Fruit pale brown, oblong or oblong-obovate, (7–)10–15 mm; lateral broadly winged; vittae (1–)3–4 in each furrow, 4–8 on commissure. Fl. and fr. Jun–Jul.

• Mountain slopes; 100–2100 m. EC Anhui, N Henan, NW Jiangsu, S Shaanxi, W Shandong, E Shanxi.

1a. Plants 120–180 cm; rays 7–11, 3–5 cm

..... 22a. var. *licentiana*

1b. Plants 60–120 cm; rays 3–7, 1.5–3 cm

..... 22b. var. *tunshanica*

22a. *Ferula licentiana* var. *licentiana*

太行阿魏(原变种) tai hang a wei (yuan bian zhong)

Plants 120–180 cm. Rays 7–11, 3–5 cm. Fruit 10–15 mm; vittae 3–4 in each furrow, 4–8 on commissure.

• Sunny mountain slopes; 1200–2100 m. N Henan, S Shaanxi (Qin Ling), E Shanxi (Taihang Shan).

22b. *Ferula licentiana* var. *tunshanica* (S. W. Su) R. H. Shan & Q. X. Liu, Bull. Nanjing Bot. Gard. Mem. Sun Yat Sen 1987: 37. 1987.

铜山阿魏 tong shan a wei

Ferula tunshanica S. W. Su, Fl. Jiangsu. 2: 584, 935. 1982.

Plants 60–120 cm. Rays 3–7, 1.5–3 cm. Fruit 7–10 mm; vittae 1–3 in each furrow, 4–6 on commissure.

• Mountain slopes; 100–200 m. EC Anhui (Dingyuan), NW Jiangsu (Suining, Tongshan), W Shandong (Jinan).

23. *Ferula karataviensis* (Regel & Schmalhausen) Korovin ex Pavlov, *Index Sem. Hort. Bot. Univ. As. Med.* 191. 1926.

短柄阿魏 duan bing a wei

Peucedanum karataviense Regel & Schmalhausen, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 5: 598. 1878.

Plants 0.5–1 m. Root cylindrical, with spherical tuberous swellings. Stem corymbose-branched above, branches alternate. Basal leaves sessile or short-petiolate with expanded sheaths; blade triangular-ovate, ternate–2–3-pinnatisect; ultimate segments broadly elliptic, usually pinnately parted, lobules lanceolate, ca. 5 mm, roughened, both surfaces sparsely hispid, apex mucronate. Terminal umbel pedunculate or sessile, lateral umbels 2–3, opposite or verticillate, rarely single, long-pedunculate, exceeding terminal; bracts subulate, deciduous; rays 4–10, unequal; bracteoles subulate, deciduous; umbellules 4–15-flowered. Stylopodium low-conic, base dilated. Fruit ellipsoid, ca. 8 mm; vittae 1 in each furrow, large, 2 on commissure. Fl. and fr. May–Jul.

Gravelly slopes; 1100–1700 m. W Xinjiang (Xinyuan) [C Asia (Altay, Pamir, Tian Shan)].

24. *Ferula feruloides* (Steudel) Korovin, *Monogr. Ferula*, 77. 1947 [*“ferulaeoides”*].

多伞阿魏 duo san a wei

Peucedanum feruloides Steudel, *Nomencl. Bot.*, ed. 2, 2: 311. 1841 [*“ferulaeoides”*].

Plants 1–1.5 m. Root fusiform. Stem stout, solitary, rarely 2–4, sparsely pubescent, paniculate-branched from middle, branches verticillate, occasionally alternate. Basal leaf blade broadly ovate, ternate–4-pinnate/pinnatifid; ultimate segments ovate, ca. 10 mm, usually parted, lobules entire or toothed, densely pubescent, deciduous. Inflorescence copiously cymose-branched, often several simple umbels successively verticillate on the same branch, forming a crowded moniliform raceme; umbels ca. 2 cm across; bracts absent; rays 4, subequal; bracteoles small, deciduous; umbellules ca. 10-flowered. Stylopodium depressed-conic. Fruit ellipsoid, 3–7 × 1.5–3 mm; vittae 1 in each furrow, 2 on commissure. Fl. May, fr. Jun.

Desert gravels; 400–1100 m. NC Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Uzbekistan].

88. *SCHUMANNIA* Kuntze, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 10: 192. 1887.

球根阿魏属 qiu gen a wei shu

She Menglan (佘孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial. Taproot long, deeply rooted, irregularly thickened, usually with 1 to several globose tubers. Stem solitary, erect, base densely clothed in fibrous remnant sheaths. Leaves bluish green with prominent white veins, petiolate; blade 3–4-ternately dissected; ultimate segments linear, plane or falcate. Umbels compound, terminal on stem and branches; bracts absent; umbellules many-flowered, capitate; bracteoles several, lanceolate or ovate lanceolate, entire; pedicels obsolete. Calyx teeth subulate or lanceolate when young, becoming dilated. Petals yellowish, obovate, apex incurved, abaxially pubescent, paler, margins green or purplish-red. Stylopodium low-conic, base dilated, undulate; styles elongate, recurved. Fruit ellipsoid, strongly dorsally compressed, densely

In C Asia the leaves are harvested for cattle fodder, and the plants have reputed medicinal value, presumably as a regional substitute for the traditional Chinese medicine “a wei” (*Ferula assafoetida* Linnaeus).

25. *Ferula caspica* Marschall von Bieberstein, *Fl. Taur.-Caucas.* 1: 220. 1808.

里海阿魏 li hai a wei

Peucedanum caspicum (Marschall von Bieberstein) Link.

Plants 30–60 cm. Root fusiform; caudex branched. Stem single, rarely 2–3, slender, 2 × paniculate-branched, branches alternate, branchlets opposite or alternate. Basal leaves short-petiolate; blade broadly ovate, 3-pinnate/pinnatifid; ultimate segments ovate, usually lobed, lobules lanceolate, both surfaces roughened, hispid, apex acute, deciduous. Compound umbels terminal, simple umbels lateral on branches and branchlets, 1–3, opposite or verticillate, umbels 1.5–3 cm across; bracts and bracteoles absent; rays 1–6, subequal; umbellules 8–10(–15)-flowered. Stylopodium low-conic, base dilated; styles elongate. Fruit ellipsoid, ca. 4–5(–9) × 3–4(–7) mm; lateral ribs narrowly winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. May–Jul.

Rock crevices on low mountain slopes; 500–1800 m. N Xinjiang [Kyrgyzstan, W Mongolia, Russia (Siberia), Uzbekistan; C and SW Asia].

26. *Ferula dubjanskyi* Korovin ex Pavlov, *Fl. Kazakhstana* 2: 539. 1934.

沙生阿魏 sha sheng a wei

Ferula dshaudshamyr Korovin.

Plants 50–70 cm. Stem solitary, 2 × paniculate-branched. Leaf blade broadly elliptic, 3-pinnate/pinnatifid; ultimate segments elliptic, 5–10 mm, usually lobed or toothed, adaxially glabrous, abaxially densely pubescent. Compound umbels terminal on stem and branches, simple umbels lateral on branches and branchlets, 1–2, solitary or opposite; umbels 1–4 cm across; bracts and bracteoles absent; rays 2–7, subequal; umbellules 6–10-flowered. Stylopodium low-conic, base dilated, margins undulate; styles elongate. Fruit ellipsoid, 4–6 × 2–4 mm; lateral ribs narrowly winged, wings whitish; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jun–Jul.

Sandy slopes in deserts; 400–600 m. N Xinjiang (Altay) [Kazakhstan, Kyrgyzstan, W Mongolia, Uzbekistan; C Asia].

pubescent; dorsal ribs obscure, lateral ribs broad-winged; vittae 3–5 in each furrow, 10–12 on commissure. Seed face plane. Carpophore 2-cleft near base.

One species: China, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran).

1. *Schumannia karelinii* (Bunge) Korovin, Monogr. Ferula, 81. 1947.

球根阿魏 qiu gen a wei

Ferula karelinii Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 7: 306. 1851; *Schumannia turcomanica* Kuntze.

Plants 40–100 cm. Stem slender, glabrous, lower branches alternate, upper branches verticillate. Leaf blade obtriangular or

broadly ovate, 8–40 × 6–30 cm; ultimate leaf segments 2–20 × 0.5–1 mm, entire or serrate apically. Umbels 3–12 cm across; rays 5–29, subequal, glabrous, white-striate; bracteoles 5–6, pubescent, margins scarious; umbellules very small, 4–7 mm across, remote. Calyx teeth broadly triangular, white membranous in fruit. Fruit 10–15 × 5–8 mm; Fl. and fr. May–Jul.

Sandy places in deserts; 500–700 m. N Xinjiang (Altay Shan, Huo Cheng, Tian Shan) [Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

89. **SORANTHUS** Ledebour, Icon. Pl. 1: 20. 1829.

簇花芹属 cu hua qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs, perennial, entirely glabrous. Taproot elongate. Stem solitary, erect, base densely clothed in fibrous remnant sheaths. Leave petiolate; blade broadly ovate, 3-pinnatisect; ultimate segments linear. Umbels compound, terminal on stem and branches; bracts absent; bracteoles several, ovate or ovate-lanceolate. Flowers subsessile, forming numerous globular-capitate umbellules, central flowers in umbellules staminate, peripheral flowers pistillate, median flowers bisexual. Calyx teeth short, acute. Petals pale green, ovate, apex narrow inflexed, abaxially puberulous. Stylopodium low-conic, base slightly dilated, lobed; styles recurved. Fruit ellipsoid, strongly dorsally compressed; dorsal ribs filiform, prominent, lateral ribs broadly winged; vittae 1 in each furrow, 2–4 on commissure. Seed face plane. Carpophore 2-cleft to base.

One species: China, Kazakhstan, Russia (W Siberia).

1. *Soranthus meyeri* Ledebour, Icon. Pl. 1: 20. 1829.

簇花芹 cu hua qin

Ferula meyeri (Ledebour) Bunge; *Seseli meyeri* (Ledebour) D. Dietrich.

Plants 40–100 cm. Stem bluish green, lower branches alternate or opposite, upper branches verticillate, sparsely pubes-

cent, glabrescent with age. Ultimate leaf segments 15–50 × 1.5–3 mm, entire or rarely 3-lobed, apex apiculate. Umbels 5–15 cm across; rays 5–20(–36); bracteoles abaxially pubescent, margins ciliate. Petals greenish, broad-ovate, abaxially pubescent. Ovary and young fruit sparsely hirsute, becoming glabrescent. Fruit 15–16 × 7–8 mm. Fl. May, fr. Jun.

Sandy areas, hillsides, river margins; 400–800 m. Xinjiang [Kazakhstan, Russia (W Siberia)].

90. **PHLOJODICARPUS** Turczaninow ex Ledebour, Fl. Ross. 2: 331. 1844.

胀果芹属 zhang guo qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Ferulopsis Kitagawa.

Herbs, perennial. Caudex stout, woody, digitally branched. Stem angled, fluted, base usually clothed in fibrous remnant sheaths. Basal leaves numerous, sheaths scarious-margined; blade 2–3-pinnatisect; ultimate segments narrow. Umbels compound, terminal; bracts and bracteoles several to numerous, sometimes deciduous. Calyx teeth lanceolate or linear. Petals white to purplish tinged, obovate, emarginate, base clawed, apex narrow, inflexed. Stylopodium low-conic; styles erect when young, reflexed in fruit. Fruit oblong or ellipsoid, strongly dorsally compressed; dorsal ribs rounded, very prominent, lateral ribs broadly corky-winged; pericarp thickened and corky; vittae 1 in each furrow, 2 on commissure (Chinese species), sometimes obsolete. Seed face plane. Carpophore 2-cleft to base.

Two to four species: China, Korea, Mongolia, Russia; two species in China.

- 1a. Inflorescence, flowers and fruit glabrous (rarely sparsely pubescent) 1. *P. sibiricus*
1b. Inflorescence, flowers and fruit villous or hispidulous 2. *P. villosus*

1. *Phlojodicarpus sibiricus* (Fischer ex Sprengel) Koso-Poljansky, Spisok Rast. Gerb. Russk. Fl. Bot. Muz. Rossiisk. Akad. Nauk 8: 117. 1922.

胀果芹 zhang guo qin

Cachrys sibirica Fischer ex Sprengel, Syst. Veg. 1: 892. 1824; *Angelica sibirica* (Fischer ex Sprengel) M. Hiroe.

Plants 15–60 cm. Leaf blade oblong-ovate, 2–3-pinnatisect; ultimate segments linear, 5–13 × 1–2.5 mm, apex obtuse,

mucronate, margins narrowly revolute, both surfaces glabrous. Umbels 3–9 cm across; bracts 5–10, linear-lanceolate, unequal, occasionally the largest one foliaceous; rays 6–20, unequal, sparsely puberulent; bracteoles ca. 10, ovate-lanceolate; umbellules more than 10-flowered. Petals glabrous. Fruit pale yellow when mature, oblong, 6–7 × 4–5 mm; vittae sometimes obscure. Fl. and fr. Jun–Aug.

Rocky crevices or grassy places on sunny slopes; 500–1100 m. Hebei, Heilongjiang, N Nei Mongol (Manzhouli) [Mongolia, Russia (Siberia)].

2. *Phlojodicarpus villosus* (Turczaninow ex Fischer & C. A. Meyer) Turczaninow ex Ledebour, Fl. Ross. 2: 331. 1844.

柔毛胀果芹 rou mao zhang guo qin

Libanotis villosa Turczaninow ex Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 31. 1835; *Phlojodicarpus sibiricus* (Fischer ex Sprengel) Koso-Poljansky subsp. *villosus* (Turczan-

inow ex Fischer & C. A. Meyer) Voroschilov; *P. sibiricus* var. *villosus* (Turczaninow ex Fischer & C. A. Meyer) Y. C. Chu; *Stenocoelium villosum* (Turczaninow ex Fischer & C. A. Meyer) Koso-Poljansky.

Plants 15–65 cm. Stem purple-tinged at base. Leaf blade gray-green, oblong-ovate, 3-pinnatisect, 4–10 × 1–3 cm; pinnae 4–7 pairs, pinnules 2–3 pairs; ultimate segments lanceolate, (2–) 4–20 × 0.5–2.5 mm, apex acute, apiculate, terminal segment decurrent at base, both surfaces glabrous, margins narrowly revolute. Umbels 3–8 cm across; peduncles villous; bracts 5–10, linear-lanceolate, unequal, sparsely or densely villous; rays 8–14, stout, pubescent; bracteoles 6–12, linear, white membranous, villous. Petals abaxially puberulous. Fruit ellipsoid, lateral ribs broadly corky-winged, 6–7 × 4–5 mm, hispidulous. Fl. and fr. Jun–Aug.

Dry stony slopes; 800–1200 m. N Nei Mongol (Ergun Youqi, Manzhouli) [Mongolia, Russia (Siberia)].

91. PEUCEDANUM Linnaeus, Sp. Pl. 1: 245. 1753.

前胡属 qian hu shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Kitagawia Pimenov.

Herbs perennial. Rootstock short, crown usually bearing remnant leaf sheaths. Stem finely striate, dichotomously branched above. Leaves petiolate; petioles sheathing. Umbels loosely compound, terminal and lateral; bracts numerous or absent; rays numerous or few; bracteoles numerous, rarely few or absent. Calyx teeth short or obsolete. Petals usually white, occasionally pinkish or purplish, rarely pale yellow, orbicular to obovate, with a narrow inflexed apex. Stylopodium low-conic. Fruit ellipsoid, oblong to suborbicular, dorsally compressed; dorsal ribs filiform, slightly prominent, lateral ribs thickened and narrowly winged, wings closely appressed to one another; vittae 1 to several in each furrow, 2 to several on commissure. Seed face plane or slightly concave. Carphophore bipartite.

Between 100 and 200 species: Africa, Asia, Europe; 40 species (33 endemic) in China.

The taxonomy of this widespread, heterogeneous genus has long been problematic. The broad circumscription of *Peucedanum* adopted here includes some 100–120 species from many parts of the Old World that are weakly united by basic (especially external) fruit structure. These fruit characters are undoubtedly the result of several lines of convergent evolution, and some authors prefer to recognize several segregate genera and reduce *Peucedanum* to only 8–10 Eurasian species based around the nomenclatural type, *P. officinale* Linnaeus. As the taxonomy of this genus is still unresolved (it is currently the focus of an international, multi-disciplinary study), a traditional treatment is adopted for the following account. Several Chinese taxa are represented by only a few herbarium specimens, a few (particularly species nos. 32–40) are recorded only from the type gatherings, and specific boundaries are not always clear. The Chinese members of this genus would benefit from a detailed revision augmented with new collections. The following key excludes *P. thasense* (species no. 40) because there are insufficient data.

1a. Calyx teeth obsolete or inconspicuous.

2a. Bracts several or numerous, persistent.

3a. Plants small, 5–20 cm, acaulescent; peduncles numerous; scapiform.

4a. Leaf blade 2–3-pinnate; bracteoles entire fruit hispid (Xizang) 2. *P. nanum*

4b. Leaf blade 3–4-pinnatisect; bracteoles pinnate; fruit glabrous (Yunnan) 3. *P. acaule*

3b. Plants tall, more than 20 cm, caulescent.

5a. Plants 50–100 cm; leaf blade 3-pinnately dissected, 3-lobed or 2-ternate.

6a. Ultimate segments of leaves linear, entire; fruit vittae 1 in each furrow, 2 on commissure (Heilongjiang, Jilin) 1. *P. elegans*

6b. Ultimate segments of leaves ovate or ovate-rhombic; fruit vittae 1–2 in each furrow, 2–4 on commissure (Guangxi, Jiangxi) 11. *P. longshengense*

5b. Plants 20–50 cm; leaf blade 1–2-pinnate.

7a. Bracteoles pinnate; fruit vittae (1–)2–3 in each furrow, 4–6 on the commissure (Yunnan) 4. *P. delavayi*

7b. Bracteoles entire; fruit vittae 1(–)2 in each furrow, 2 on the commissure (Sichuan).

8a. Bracts large, 3-lobed or pinnate; fruit glabrous (N Sichuan) 12. *P. songpanense*

8b. Bracts small, undivided; fruit pubescent (W Sichuan) 32. *P. torilifolium*

2b. Bracts usually absent or few bracts and falling early.

- 9a. Stem stout, hollow.
- 10a. High altitude (above 2500 m) plants, leaves green; fruit ca. 8 × 6 mm, glabrous; vittae large, 1 in each furrow, 2 on commissure (SW China) 5. *P. angelicoides*
- 10b. Coastal plants, leaves glaucous; fruit to 6 × 4 mm, pubescent; vittae small, 3–5 in each furrow, 6–10 on commissure (E, S, and SE China) 13. *P. japonicum*
- 9b. Stem stout or slender, solid.
- 11a. Ultimate segments of leaves narrow, linear, less than 0.5 mm wide.
- 12a. Synflorescence many-branched, corymbose; fruit vittae 1 in each furrow, 2 on the commissure (NE China) 6. *P. stepposum*
- 12b. Synflorescence little-branched; fruit vittae 2–3 in each furrow, 6 on the commissure.
- 13a. Rays 3–6; lateral wings of fruit very narrow (Sichuan) 33. *P. veitchii*
- 13b. Rays 10–15; lateral wings of fruit broad (Nei Mongol) 34. *P. pricei*
- 11b. Ultimate segments of leaves variously shaped, more than 4 mm wide.
- 14a. Leaf blade 3–4-pinnate; petiole 15–33 cm.
- 15a. Bracteoles 8–12, ovate-lanceolate (Chongqing) 8. *P. wulongense*
- 15b. Bracteoles less than 7, linear or subulate.
- 16a. Rays 12–16; umbellules 10–20-flowered (Chongqing, Hubei) 7. *P. dielsianum*
- 16b. Rays 5–7; umbellules 5–10-flowered (SW China) 35. *P. chinense*
- 14b. Leaf blade 1–2-ternate or 2–3-pinnate; petioles 3–15 cm.
- 17a. Leaf blade narrowly ovate; ultimate segments narrow, linear, oblanceolate or obovate, 1–2.5 × 0.5–1 cm (Gansu, Sichuan) 9. *P. turgeniifolium*
- 17b. Leaf blade triangular-ovate or broadly triangular; ultimate segments usually large, rhombic-obovate or long-ovate, 1.5–7 × 1.2–5 cm.
- 18a. Leaflets sharply serrate with setaceous teeth; bracteoles longer than flowers; fruit densely hispid (S and SE China) 10. *P. formosanum*
- 18b. Leaflets coarsely toothed or crenate-dentate; bracteoles shorter than flowers; fruit sparsely puberulent (widespread in China) 14. *P. praeruptorum*
- 1b. Calyx teeth conspicuous.
- 19a. Lateral wings of fruit very narrow, less than 1/3 width of the body, thick.
- 20a. Leaf blade 1- to several-pinnate or pinnately dissected.
- 21a. Leaf dissection diffuse; ultimate segments of basal leaves linear elongate, usually 3–10 × 0.1–0.3 cm; flowers pale yellow (Xinjiang) 31. *P. morisonii*
- 21b. Leaf dissection compact; ultimate segments of basal leaves much shorter and broader; flowers white.
- 22a. Stems many, often diffuse-caespitose; fruit vittae 1–2 in each furrow, 2 on commissure (N China) 17. *P. caespitosum*
- 22b. Stems several or solitary, not diffuse-caespitose; fruit vittae (1–)2–4 in each furrow (2–)4–6 on commissure (SW China).
- 23a. Leaf sheath auriculate at apex; bracts 2–3, unequal, occasionally pinnate; rays 12–20; bracteoles 6–8, linear, undivided or 3-incised to pinnate (Sichuan, Yunnan) 19. *P. macilentum*
- 23b. Leaf sheath not auriculate at apex; bracts 6–10, linear, equal; rays 24–40; bracteoles 10, linear or linear-lanceolate (Sichuan, Yunnan) 20. *P. rubricaulis*
- 20b. Leaf blade ternate-1–2-pinnate or 2–3-ternate.
- 24a. Basal leaves densely pubescent on both surfaces; rays 10–15, densely tomentose or hispid all round (Sichuan, Yunnan) 18. *P. pubescens*
- 24b. Basal leaves glabrous sparsely pubescent; rays 5–8 or 15–34, inner faces pubescent or glabrous, outer faces glabrous.
- 25a. Umbels small, 1–4 cm across; rays less than 2 cm (Anhui, Jiangsu, Shandong) 16. *P. wawrae*
- 25b. Umbels large, 8–15 cm across; rays more than 5 cm.
- 26a. Rays 15–34; bracteoles 10–16 (Shaanxi) 15. *P. ampliatum*
- 26b. Rays 5–6; bracteoles absent (Hubei) 36. *P. henryi*
- 19b. Lateral wings of fruit rather broad, thin, ca. 1/3 as wide as body.
- 27a. Bracts 3–10, persistent.
- 28a. Bracteoles pinnate (NE China) 37. *P. piliferum*
- 28b. Bracteoles linear, entire (Henan, Shaanxi) 38. *P. ledebourielloides*
- 27b. Bracts absent, occasionally few but falling early.
- 29a. Leaf blade 2–3-ternate, rarely 2-pinnate; primary umbels large, 7–15 cm across (C and S China) 30. *P. medicum*
- 29b. Leaf blade 1- to several-pinnate or pinnately dissected; primary umbels smaller, usually less than 7 cm across.
- 30a. Rays roughened or pubescent on all sides, or glabrous.
- 31a. Whole plant glabrous; ultimate segments of leaves elongate-linear (Xinjiang) 24. *P. falcaria*

- 31b. Plant puberulent, at least around nodes and rays; ultimate segments of leaves not elongate-linear.
- 32a. Stem solid, with pith (Guangxi) 28. *P. mshanense*
- 32b. Stem hollow.
- 33a. Fruit vittae 3–4 in each furrow, 8 on commissure (Xizang) 27. *P. violaceum*
- 33b. Fruit vittae 1 in each furrow, 2 on commissure (Yunnan) 39. *P. yunnanense*
- 30b. Inner faces of rays strigose or pubescent, outer faces glabrous.
- 34a. Leaf blade 2–3-pinnately dissected; ultimate segments small, linear and entire (N and NE China) ... 23. *P. baicalense*
- 34b. Leaf blade 1–4-pinnate or pinnately dissected; ultimate segments large, ovate, rhombic, obovate or ovate-lanceolate.
- 35a. Fruit vittae 1 in each furrow, 2–4 on commissure.
- 36a. Plants large, 30–120 cm; stem solid, with pith; leaf blade 2–3-pinnate/pinnatifid (N and NE China) 21. *P. terebinthaceum*
- 36b. Plant small, 20–30 cm; stem hollow; leaf blade pinnate (Yunnan) 22. *P. franchetii*
- 35b. Fruit vittae 1–4 in each furrow, 4–10 on commissure.
- 37a. Fruit large, 6–8 × 3.5–4.2 mm, glabrous (Chongqing, Guizhou, Sichuan) 25. *P. dissolutum*
- 37b. Fruit smaller 4–5 × 3–4 mm, pubescent.
- 38a. Leaf blade broadly triangular-ovate, 3-pinnate/pinnatifid, pubescent (sometimes sparsely), papery (N, NE, and NW China) 26. *P. harry-smithii*
- 38b. Leaf blade ovate-oblong, 2-pinnate, glabrous, thinly coriaceous (Guangxi) 29. *P. guangxiense*

1. *Peucedanum elegans* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 430. 1900.

刺尖前胡 ci jian qian hu

Kitagawia komarovii Pimenov.

Plants 70–80 cm. Stem solitary, glabrous. Basal leaf blade ovate-oblong, 8–10 × 6–8 cm, 3-pinnatisect, both surfaces glabrous; ultimate segments linear, 4–20 × ca. 1 mm, entire, apex spinose-apiculate; petiole sheath narrow. Cauline leaves reduced upwards, less divided, upper leaves 3-lobed or reduced to sheath, linear. Synflorescence subcorymbosely branched; umbels 5–7 cm across; bracts numerous, lanceolate, 8–12 × 1–1.2 mm, apex caudate; rays 20–25, 2–3 cm, rigid, inner faces strigose; bracteoles 7–9, linear-lanceolate, slightly shorter than or equaling flowers; umbellules ca. 20-flowered. Calyx teeth inconspicuous or obsolete. Petals white or purplish-tinged, obovate-orbicular. Styles short. Fruit oblong-ellipsoid, 3–4 × 2–2.5 mm, smooth; dorsal ribs filiform, slightly prominent, lateral ribs broadly winged; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Sparse *Acer* forests, valley sides, stony mountain slopes; 300–800 m. S Heilongjiang (Shangzhi), S Jilin (Antu, Changbai, Hunchun) [Japan, Korea, Russia].

2. *Peucedanum nanum* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 18: 377. 1980.

矮前胡 ai qian hu

Plants 15–20 cm, hispid throughout, acaulescent, scapiform. Basal leaves sessile, with broad long-ovate sheaths; leaf blade ovate-oblong, 2–3-pinnate/pinnatisect, pinnae 3–6 pairs; ultimate segments linear, 3–5 × ca. 1 mm. Cauline leaves 1–2 or absent, reduced upwards. Umbels 4–9 cm across; peduncles stout, 5–12 cm; bracts 3–5, linear, 6–12 × 0.5–1 mm; rays 8–16, stout, unequal; bracteoles 5–10, linear; umbellules 10–20-flowered. Calyx teeth obsolete or inconspicuous. Petals white, obovate, midrib pale yellow, abaxially sparsely pubescent. Anthers purplish-tinged. Styles short. Fruit ovoid, 3.5–4 × 2.5–3 mm, apex purplish, squamose-pubescent; dorsal ribs prom-

inent, densely hispid, lateral ribs narrowly winged; vittae 3–4 in each furrow, 6 on commissure. Fl. and fr. Aug–Sep.

- Dry mountain slopes; 3500–3800 m. S Xizang (Lhasa, Xigazê).

3. *Peucedanum acaule* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 24: 308. 1986.

会泽前胡 hui ze qian hu

Plants 5–10 cm, acaulescent, scapiform. Leaves numerous sessile or subsessile, with broad sheaths; leaf blade ovate-oblong, 3–4-pinnate/pinnatisect; pinnae 4–7 pairs; ultimate segments linear, 1–2.5 × 0.4–1 mm, adaxially glabrous, abaxially roughened and tomentose, margin narrowly reflexed. Umbels numerous; peduncles stout, 2–7 cm, scaly-tomentose, especially toward the apex; bracts 2–6, linear, entire or pinnate, about half as long as the rays; rays 5–12, unequal, 0.8–2.5 cm, inner faces white scaly-tomentose; bracteoles 6–8, longer than flowers, pinnate, ultimate segments 1–4 × ca. 0.3 mm, white puberulent; umbellules 12–18-flowered. Petals white or purplish, ovate-oblong. Anthers dark purple. Fruit oblong-ovoid, 3–4 × 2–2.5 mm, glabrous; lateral ribs narrowly winged, wings thickened; vittae 1–3 in each furrow, 6 on commissure. Fl. and fr. Sep.

- Alpine meadows; ca. 3500 m. NE Yunnan (Huize).

4. *Peucedanum delavayi* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 143. 1894.

滇西前胡 dian xi qian hu

Sinodielsia delavayi (Franchet) Pimenov & Kljuykov.

Plants 20–50 cm. Stems several, erect, grayish-purple, distally fluted, puberulent; caudex stout, densely clothed with fibrous remnant sheaths. Basal leaves numerous; leaf blade ovate-oblong, 2-pinnate, pinnae 3–4 pairs; basal pinnae shortly petiolulate, others sessile; ultimate segments ovate to linear, 6–10 × 3–6 mm, 1–3-toothed, apex mucronate, pubescent abaxially on rachises and veins. Cauline leaves reduced upwards; petioles wholly sheathing. Umbels terminal, 6–10 cm across; peduncles densely hispid; bracts 3–4, linear, lanceolate or pinnate; rays 6–15(–24), subequal, 2–5 cm, hirsute; bracteoles 4–7, longer than

flowers, pinnate; ultimate segments linear-lanceolate, hirsute. Calyx teeth absent. Petals white, obovate. Styles short. Fruit ellipsoid, ca. 4×2.5 mm; lateral ribs narrowly winged, wings slightly thickened; vittae (1–)2–3 in each furrow, 4–6 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

• Mountain slopes, grasslands, rock crevices; 2600–3400 m. NW Yunnan (Eryuan, Lijiang).

This poorly known species is recorded only from a few collections. Its taxonomic placement is not fully resolved, and some authors consider it to be synonymous with *Sinodielsia yunnanensis* (*Meeboldia yunnanensis* in the present account).

5. *Peucedanum angelicoides* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 27: 313. 1929.

芷叶前胡 zhi ye qian hu

Plants stout, to 1 m. Stem hollow, fluted above especially around nodes. Petioles pubescent, broadly sheathing; leaf blade broadly triangular-ovate, 2–3-ternate, ultimate segments large, hispid on rachises and veins, especially abaxially, base cuneate, irregularly doubly serrate, terminal segments elliptic, $3-6 \times 2-4$ cm, lateral segments often oblique-ovate, $1.5-3.5 \times 1-2.5$ cm. Leaves reducing upwards. Umbels 8–12 cm across; peduncles stout; bracts absent or 1, ovate-lanceolate; rays 10–15, 1.5–5 cm, unequal, tomentose; bracteoles several, linear-lanceolate, longer than flowers; umbellules 10–18-flowered. Calyx teeth obsolete. Styles short. Petals white. Fruit ellipsoid, ca. 8×6 mm, glabrous; dorsal ribs prominent, rounded, lateral ribs broadly winged; vittae very large, 1 in each furrow, 2 on commissure, very large. Fl. and fr. Aug–Sep.

• Forest margins, scrub; 2500–3000 m. SW Guizhou (Xingyi), NC and SW Sichuan (Lixian, Muli), NW Yunnan (Dèqén, Zhongdian).

6. *Peucedanum stepposum* Y. Hwei Huang, *Fl. Pl. Herb. Chin. Bor.-Orient.* 6: 294. 1977.

草原前胡 cao yuan qian hu

Plants 30–60 cm. Basal leaves numerous; leaf blade broadly ovate in outline, 3-pinnatisect, glabrous; pinnae 4–6 pairs, sessile; ultimate segments linear, $7-28 \times$ ca. 0.5 mm, entire, margins narrowly reflexed, apex apiculate. Stem leaves reduced upwards. Synflorescence corymbosely branched; bracts 1–3, lanceolate, deciduous; rays 4–6(–12), unequal, 4-angled, inner faces hispidulous; bracteoles 5–8, linear-lanceolate, apex long-acuminate, scarious-margined, unequal, often longer than flowers. Calyx teeth inconspicuous. Petals white, obovate. Styles longer than the stylopodium, ca. 1.5 mm. Fruit ovate-ellipsoid, ca. $4 \times 2.5-3$ mm, glabrous; lateral ribs winged, wings rather thick; vittae large, 1 in each furrow, 2 on commissure. Fl. Aug–Sep, fr. Sep–Oct.

• Grasslands; 100–1300 m. W Heilongjiang (Anda, Zhaodong), W Jilin (Shuangliao, Qian Gorlos), N Liaoning (Faku).

7. *Peucedanum dielsianum* Fedde ex H. Wolff, *Repert. Spec. Nov. Regni Veg.* 33: 246. 1933.

竹节前胡 zhu jie qian hu

Plants 60–90 cm, essentially glabrous. Rootstock elongate, woody, bearing annular leaf scars. Basal leaves several; petioles

rigid; leaf blade broadly triangular, 3-pinnatisect, pinnae 5–7 pairs; ultimate segments ovate-lanceolate (sometimes oblong or linear), base cuneate or decurrent, 1–3-toothed or -lobed, $1-3(-4) \times 0.4-1.5$ cm, thinly coriaceous, abaxially glaucous. Umbels 4–8 cm across; peduncles stout; bracts absent or occasionally 1–2, linear, membranous; rays 12–26, unequal, 1–4 cm, 4-angled, inner faces scaberulous; bracteoles 2–4, linear or subulate, shorter than flowers; umbellules 10–20-flowered. Calyx teeth obsolete. Petals white. Fruit long-ellipsoid, $3-5 \times 2.5-3$ mm, glabrous; lateral ribs broadly winged, wings rather thick; vittae 1–2 in each furrow, 4–6 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

• Moist rocky slopes; 600–1500 m. Chongqing, SW Hubei.

The root is used in Chongqing as a regional substitute, known as “zhu jie fang feng,” for the traditional Chinese medicine “fang feng” (see *Saposhnikovia divaricata*).

8. *Peucedanum wulongense* R. H. Shan & M. L. Sheh, *Acta Phytotax. Sin.* 24: 309. 1986.

武隆前胡 wu long qian hu

Plants to 1 m, essentially glabrous. Stem solitary, much branched above, branches long and slender. Basal leaf blade broadly triangular-ovate, 3–4-pinnate, pinnae 3–4 pairs; petiole long, 17–33 cm; ultimate segments long-obovate, $1.5-4.5 \times 0.4-1.4$ cm, base cuneate, 1–2-lobed or toothed towards apex, apex apiculate. Stem leaves reduced upwards, petioles short or wholly sheathing, segments linear or oblanceolate, $10-20 \times 3-5$ mm. Umbels 1–8 cm across; bracts absent or 2–3, linear, $5-7 \times$ ca. 0.5 mm; rays 8–13, unequal, 4-ridged, sparsely pubescent; bracteoles 8–12, ovate-lanceolate, as long as or slightly longer than flowers. Calyx teeth obsolete. Petals white. Styles short. Fruit oblong-ellipsoid, $3-4 \times 2.5-3$ mm, glabrous; lateral ribs winged, wings thick; vittae 2–3 in each furrow, 4 on commissure. Fl. and fr. Aug–Oct.

• Riversides, stony slopes; ca. 600 m. Chongqing.

9. *Peucedanum turgeniifolium* H. Wolff, *Acta Horti Gothob.* 2: 323. 1926.

长前胡 chang qian hu

Peucedanum pulchrum H. Wolff.

Plants 40–70 cm. Stem solitary, often purplish, erect, puberulent. Basal leaf blade long-ovate in outline, 2–3-pinnate, pinnae 3–4 pairs; petiole 8–15 cm; ultimate segments obovate or oblong, $1-2.5 \times 0.5-1.5$ cm, abaxially more or less glaucous and hispidulous, base cuneate, 2–4-irregularly-toothed or lobed, margin ciliate. Synflorescence little-branched; peduncles hispid; umbels 2–10 cm across; bracts absent; rays 5–12(–20), 0.3–4 cm, very unequal, pubescent; bracteoles 8–12, linear or lanceolate, longer than flowers, densely pubescent; umbellules 10–20-flowered. Calyx teeth obsolete. Petals white, suborbicular, abaxially pubescent. Styles short. Fruit ovate-ellipsoid, $3-3.5 \times 2-3$ mm, sparsely puberulous; lateral ribs narrowly winged; vittae 3–4 in each furrow, 6–8(–10) on commissure. Fl. and fr. Jul–Oct. $n = 11^*$.

• Scrub, valley sides, open grasslands; 2000–3600 m. S Gansu (Jone, Têwo), N Sichuan.

This species has reputed medicinal value.

10. *Peucedanum formosanum* Hayata, Icon. Pl. Formos. 10: 22. 1921.

台湾前胡 tai wan qian hu

Peucedanum terebinthaceum (Fischer ex Treviranus) Ledebour subsp. *formosanum* (Hayata) Kitagawa.

Plant robust, 1–3 m. Stem tomentose in upper parts. Leaf blade broadly triangular, ternate or ternate-pinnate; ultimate segments ovate or long-ovate, irregularly parted or lobed, sharply serrate with setaceous teeth, base cuneate or truncate. Umbels 3–8 cm across; peduncles stout, tomentose; bracts few or absent, linear to lanceolate, 10–15 × 1–2 mm; rays 10–18, 2–4 cm, unequal, densely tomentose; bracteoles 10–12, ovate-lanceolate, caudate or 3-lobed, mostly longer than flowers, abaxially tomentose, margins white-ciliate; umbellules 15–25-flowered. Calyx teeth obsolete or inconspicuous. Petals white. Style short. Fruit oblong-ovate or suborbicular, 3–4 × 2–2.5 mm, densely hispid; lateral ribs winged, wings narrow and thick; vittae 3–5 in each furrow, 7–8 on commissure. Fl. and fr. Jul–Oct.

• Forest margins, grasslands; 600–2000 m. Guangdong, Guangxi, S Jiangxi, C Taiwan (Nantou).

This species has reputed medicinal value.

11. *Peucedanum longshengense* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 24: 306. 1986.

南岭前胡 nan ling qian hu

Plants 60–100 cm. Stem solitary. Basal leaves numerous; leaf blade broadly triangular in outline, ternate or ternate-pinnate, thickly chartaceous; terminal segments often 3-lobed, base decurrent, lateral segments broadly rhombic-ovate, often 2–3-pinnately divided, base rounded or truncate, 2–6 × 1.5–3.5 cm, adaxially pubescent along veins, abaxially glabrous, margins irregular dentate, short ciliate. Synflorescence many-branched, umbels 3–7 cm across; peduncles hispid; bracts 1–8, occasionally absent, linear-lanceolate, 0.8–1 cm, abaxially pubescent; rays 14–25, 1.5–4 cm, inner faces white hirsute; bracteoles 6–8, linear, as long as or slightly longer than flowers, abaxially puberulous; umbellules 14–18-flowered. Styles short, reflexed. Fruit oblong-ellipsoid, ca. 6 × 3 mm, smooth; dorsal ribs filiform, acute prominent, lateral ribs winged; vittae 1–2 in each furrow, 4–6 on commissure, rather large. Fl. and fr. Jul–Sep.

• Forest margins, mountain slopes, grasslands; 800–2100 m. NE Guangxi, S Jiangxi (Shangyou, Xunwu).

12. *Peucedanum songpanense* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 27: 65. 1989.

松潘前胡 song pan qian hu

Plants 30–40 cm. Stem purplish, unbranched or 1–2-branched above. Leaf blade pinnate (sometimes with 3 leaflets); ultimate segments ovate to long-ovate, 1.5–4 × 0.5–2 cm. Cauline leaves reduced upwards, petioles sheathing throughout. Umbels terminal and lateral, loosely compound, terminal umbels often 1–2 branched; umbels 4–9 cm across; bracts 1–8, lanceolate, unequal, 5–50 × 1–5 mm, entire, apex 3-lobed or

pinnate; rays 8–25, purplish-red, unequal, 2–6 cm; bracteoles linear or lanceolate, unequal, 3–10 × 0.5–1 mm; umbellules 8–20-flowered. Pedicels 3–12 mm, unequal. Calyx teeth absent. Petals white, obovate unequal. Styles short. Fruit oblong, 5–7 × 4–5 mm; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Sep–Oct.

• Sparse *Betula* forests, margins of cultivated areas; 2800–3000 m. N Sichuan (Songpan).

13. *Peucedanum japonicum* Thunberg in Murray, Syst. Veg., ed. 14, 280. 1784.

滨海前胡 bin hai qian hu

Anethum japonicum (Thunberg) Koso-Poljansky.

Plants stout, (30–)40–70(–100)cm, essentially glabrous. Stem often flexuous. Leaf blade broadly ovate-triangular, to 35 × 25 cm, thinly coriaceous, 1–2-ternate; leaflets ovate-orbicular, 3-parted, 7–9 cm broad, glaucous; central segments obovate-cuneate, lateral segments oblique-ovate. Umbels (4–)5–10 cm across; bracts 2–3 or absent, ovate-lanceolate, 5–10 × ca. 2 mm, pubescent; rays 15–30, 1–5 cm, unequal, puberulous; bracteoles 8–10, linear-lanceolate, equaling or longer than flowers; umbellules ca. 20-flowered. Calyx teeth obsolete. Petals purple or white, abaxially hispidulous. Styles short. Fruit oblong-ovate or ellipsoid, 4–6 × 2.5–4 mm, hirsute, especially on dorsal ribs; lateral ribs winged, wings very thick; vittae small, 3–5 in each furrow, 6–10 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

Coastal areas, seashores; below 100 m. Fujian, Hong Kong, Jiangsu, Shandong, Taiwan, Zhejiang [Japan, Korea, Philippines].

14. *Peucedanum praeruptorum* Dunn, J. Linn. Soc., Bot. 35: 497. 1903.

前胡 qian hu

Plants 10–100 cm. Stem solitary, branched above, branchlets puberulous. Basal leaf blade triangular-ovate, 2–3-ternate; pinnae long-petiolulate, pinnules long-ovate, 3–5-lobed, 1.5–6 × 1.2–4 cm, both surfaces glabrous, occasionally puberulous, abaxially nerves prominent, base cuneate, margins irregular serrate, apex acuminate. Synflorescence much-branched; umbels 3.5–9 cm across; bracts absent or few, linear; rays 6–15, unequal, 0.5–4.5 cm, inner faces pubescent; bracteoles 8–12, ovate-lanceolate, shorter than flowers, rough-puberulous; umbellules 15–20-flowered. Calyx teeth obsolete. Petals white. Styles short. Fruit ovoid, ca. 4 × 3 mm, sparsely pubescent; lateral ribs winged, wings rather thick; vittae 3–5 in each furrow, 6–10 on commissure. Fl. Aug–Sep, fr. Oct–Nov. $n = 11^*$.

• Forest margins, grassy slopes; 200–2000 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Zhejiang.

The root is used as the important traditional Chinese medicine “qian hu.”

15. *Peucedanum ampliatum* K. T. Fu, Fl. Tsinling. 1(3): 462. 1981.

天竺山前胡 tian zhu shan qian hu

Plants 6–100 cm. Stem pubescent. Basal leaf blade ternate/1–2-pinnate broadly ovate, both surfaces glabrous; basal

pinnules often 2–3-lobed or parted; middle pinnules 3-lobed or undivided, sessile, 6–7 × 3–4.5 cm, coarsely serrate; terminal pinnules broadly ovate, 6–7 × 6.5–8 cm, 3-parted, base broadly cuneate, decurrent. Upper stem leaves reduced above, 3-dissected, lobules 3-lobed or parted, sharply serrate. Umbels 8–15 cm across; peduncles stout, densely pubescent; bracts absent or few, linear-lanceolate, ca. 15 × 0.5–1 mm, puberulous; rays 15–34, unequal, 1–7 cm, densely pubescent; bracteoles 10–16, linear or lanceolate, unequal, abaxially puberulous; umbellules 14–26-flowered. Calyx teeth conspicuous, subulate. Petals white. Styles about twice as long as stylopodium. Fruit ellipsoid, ca. 5 × 3 mm, densely pubescent; vittae 3 in each furrow, 6–8 on commissure. Fl. and fr. Jul–Sep.

- Grassy slopes; 1600–2000 m. SE Shaanxi (Shanyang).

16. *Peucedanum wawrae* (H. Wolff) Su ex M. L. Sheh in R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(3): 149. 1992.

泰山前胡 tai shan qian hu

Seseli wawrae H. Wolff, Repert. Spec. Nov. Regni Veg. 27: 315. 1930.

Plants 30–100 cm. Stem glabrous, dichotomously branching above. Basal leaf blade triangular-orbicular in outline, 2–3-ternate; basal pinnae long-petiolulate; ultimate segments obovate-cuneate, 1.2–3.5 × 0.8–2.5 cm, 3-parted, lobed or undivided, abaxially glaucous, both surfaces glabrous, sharply serrate, apex mucronate. Upper leaves reduced, 3-lobed, petioles wholly sheathing, tomentose. Synflorescence branched; umbels 1–4 cm; peduncles tomentose; bracts 1–3 or absent, linear, 3–4 × 0.5–1 mm; rays 6–8, unequal, 0.5–2 cm; bracteoles 4–6, linear, longer than flowers; umbellules ca. 10-flowered. Calyx teeth conspicuous subulate. Petals white. Fruit ovate-orbicular or oblong, ca. 3 × 1.2 mm, tomentose; vittae 2–3 in each furrow, 2–4 on commissure. Fl. and fr. Aug–Nov. $n = 11^*$.

- Forest margins, grassy slopes; below 500 m. Anhui (Chaohu, Chuxian, Xiaoxian), N and W Jiangsu, Shandong (Tai Shan, Zhifu).

The root is used in Shandong as a regional substitute for the traditional Chinese medicine “qian hu” (see *Peucedanum praeruptorum*).

17. *Peucedanum caespitosum* H. Wolff, Acta Horti Gothob. 2: 323. 1926.

北京前胡 bei jing qian hu

Peucedanum trinioides H. Wolff.

Plants 20–60 cm. Stems several, central stem erect, others ascending-caespitose, much branched, glabrous and purplish. Basal leaves numerous; petioles fluted, with short, broadly ovate scarious-margined sheaths; leaf blade ovate-oblong, 2–3-pinnate/pinnatisect, pinnae 4–7 pairs; ultimate segments narrow, linear, 5–10 × ca. 1 mm, both surfaces glabrous, margins narrowly reflexed. Synflorescence much branched; umbels 2–4 cm across; bracts 3–7, ovate-lanceolate, 4–5 × 2–3 mm, broadly scarious-margined; rays 10–12, 1.1–1.5 cm, 4-angled, inner faces hirsute; bracteoles numerous, elliptic-lanceolate, longer than flowers; umbellules 15–20-flowered. Calyx teeth conspicuous. Petals white. Styles moderate, ca. 2 mm. Fruit ovate-ellip-

soid, ca. 5 × 2.5 mm, smooth; dorsal ribs prominent; lateral ribs winged, wings thick, very narrow; vittae 1–2 in each furrow, 2 on commissure. Fl. and fr. Aug–Sep.

- Upland stony areas; 1300–2500 m. Hebei.

18. *Peucedanum pubescens* Handel-Mazzetti, Symb. Sin. 7: 728. 1933.

毛前胡 mao qian hu

Plants 30–70 cm, densely pubescent throughout. Stem solitary, hollow, branches few, short and stout. Basal leaves few; petioles with broadly scarious-margined sheaths; leaf blade triangular-ovate in outline, 8–10 × 8–10 cm, 2–3-ternate, pinnae sessile or subsessile; ultimate segments obovate, 1–4.5 × 0.8–2 cm, rather thick, both surfaces tomentose, more densely so on abaxial nerves, coarsely serrate or crenate, base cuneate or truncate. Leaves reduced upwards, uppermost very small, 3-lobed or toothed, petioles wholly sheathing. Synflorescence subcorymbosely branched; umbels 2.5–4 cm across; peduncles angled; bracts 6–8, linear-lanceolate; rays 10–15, subequal, 1–2 cm; bracteoles 5–7, linear-lanceolate, longer than flowers; umbellules ca. 10-flowered. Calyx teeth subulate. Petals white. Styles long, ca. 2 mm. Fruit ovoid or obovate-orbicular, ca. 4 × 3 mm, hispid; vittae large, 2–3 in each furrow, 6 on commissure. Fl. and fr. Aug–Oct.

- Alpine meadows; 1900–3000 m. SW Sichuan (Huili, Miyi), Yunnan (Lufeng, Luquan, Wuding).

19. *Peucedanum macilentum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 142. 1894.

细裂前胡 xi lie qian hu

Plants 30–70 cm. Stems solitary or several, not caespitose, branched above, branches hollow, puberulous, nodes densely tomentose. Basal leaves numerous; petioles 5–10 cm, sheaths large, purplish, apex broadly auriculate, often pubescent and scarious-margined; leaf blade triangular-ovate in outline, 3–4-pinnatisect, pinnae 5–6 pairs; ultimate segments linear or obovate-cuneate, 1.5–3 × 0.8–1.2 mm. Inflorescences terminal; umbels 4–7 cm across; bracts 2–3, linear, entire or occasionally 3-lobed; rays 12–20(–30), 2–3 cm, slender, inner faces sparsely pubescent; bracteoles 6–8, linear, 3-lobed or pinnate, pubescent; umbellules 12–16-flowered. Calyx teeth conspicuous, lanceolate. Petals white, obovate. Styles short. Fruit ovoid-ellipsoid, ca. 3 × 2 mm; dorsal ribs prominent, lateral ribs narrowly winged; vittae 1–2 in each furrow, 4 on commissure. Fl. and fr. Aug–Sep.

- Grassy places on mountain slopes; 3000–4200 m. SW Sichuan (Miyi, Yanyuan), NW Yunnan (Heqing, Tengchong, Weixi).

20. *Peucedanum rubricaulle* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 24: 305. 1986.

红前胡 hong qian hu

Plants 30–80 cm. Taproot and rootstock stout, reddish-brown. Stem solitary, erect, purplish, hollow, pubescent. Basal petioles with purplish, puberulous and scarious-margined sheaths, not auriculate at apex; leaf blade triangular-ovate, 3-pinnatisect; pinnae 3–5 pairs, pinnules 3–4 pairs; ultimate seg-

ments linear, 3–10 × 1–1.6 mm, both surfaces glabrous, apex mucronate. Umbels 5–10 cm across; bracts 6–10, linear, 10–15 × ca. 0.5 mm, puberulous; rays numerous, 24–40, subequal, 3–5 cm; bracteoles ca. 10, linear-lanceolate; umbellules ca. 20-flowered. Calyx teeth conspicuous, triangular, acute. Fruit ellipsoid, 4–6 × 3–4 mm, glabrous; dorsal ribs slightly prominent, lateral ribs narrowly winged, wings rather thick; vittae 1–2(–3) in each furrow, 4–6 on commissure. Fl. Jul–Aug, fr. Sep–Oct.

• Scrub, grassy slopes, rock crevices; 2000–3000 m. S Sichuan, NW Yunnan.

21. *Peucedanum terebinthaceum* (Fischer ex Treviranus) Ledebour, Fl. Ross. 2: 314. 1844.

石防风 shi fang feng

Plants 30–120 cm. Stem puberulous above. Basal leaf blade elliptic or triangular-ovate, 2-pinnate/pinnatisect; pinnae 3–5-paired; ultimate segments lanceolate, 0.8–3 × 0.5–1.2 cm, both surfaces glabrous, sometimes pubescent near basal veins, base cuneate, margins lobed or 2–3-toothed. Synflorescence much branched, apex of peduncles hispid; umbels 3–10(–15) cm across; bracts absent or 1–2, linear-lanceolate; rays 8–20 (or more), unequal, 4-angled, inner faces hispid, outer faces glabrous; bracteoles 6–10, linear, shorter than flowers. Calyx teeth long-subulate. Petals white, midvein pale yellow. Styles longer than stylopodium. Fruit ellipsoid or ovoid-ellipsoid, 3.5–4 × 2.5–3.5 mm, glabrous; dorsal ribs prominent, lateral ribs winged, wings ca. 1 mm, ca. 1/3 width of body, thin; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Sep, fr. Sep–Oct.

Mixed forests, forest margins, scrub, grassy slopes; 200–1200 m. NE Hebei, Heilongjiang, S Jilin, Liaoning, E Nei Mongol (Da Hinggan Ling) [Japan, Korea, Russia].

- 1a. Leaf blade elliptic to triangular-ovate; ultimate segments lanceolate or ovate-lanceolate 21a. var. *terebinthaceum*
 1b. Leaf blade broadly triangular-ovate; ultimate segments ovate 21b. var. *deltoideum*

21a. *Peucedanum terebinthaceum* var. *terebinthaceum*

石防风(原变种) shi fang feng (yuan bian zhong)

Selinum terebinthaceum Fischer ex Treviranus, Ind. Sem. Hort. Vratisl. App. 3: 3. 1821; *Kitagawia terebinthacea* (Fischer ex Treviranus) Pimenov; *Peucedanum paishanense* Nakai; *P. terebinthaceum* var. *paishanense* (Nakai) Y. Huei Huang.

Leaf blade elliptic to triangular-ovate; ultimate segments lanceolate or ovate-lanceolate, 0.8–3 × 0.5–1.2 cm. $n = 11^*$.

Forest margins, grassy slopes; 200–1200 m. NE Hebei, Heilongjiang (Lebei, Shangzhi), S Jilin (Antu), Liaoning (Anshan, Qian Shan), E Nei Mongol (Da Hinggan Ling) [Russia (Siberia)].

The root is used as a regional substitute for the traditional Chinese medicine “qian hu” (see *Peucedanum praeruptorum*).

21b. *Peucedanum terebinthaceum* var. *deltoideum* (Makino ex Y. Yabe) Makino, Bot. Mag. (Tokyo) 22: 173. 1908.
 宽叶石防风 kuan ye shi fang feng

Peucedanum deltoideum Makino ex Y. Yabe, J. Coll. Sci. Imp. Univ. Tokyo 16(4): 99. 1902.

Leaf blade broadly triangular-ovate; ultimate segments ovate, 3–6 × 2–3.5 cm, rather thick and rigid, irregularly coarsely toothed.

Mixed forests, scrub; 200–600 m. NE Hebei (Xinglong), Heilongjiang (Yichun), S Jilin (Antu), Liaoning (Qian Shan) [Japan, Korea, Russia].

22. *Peucedanum franchetii* C. Y. Wu & F. T. Pu, Novon 8: 70. 1998.

异叶前胡 yi ye qian hu

Peucedanum heterophyllum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 141. 1894, not Visiani (1836).

Plants 20–30 cm, pallid-green, often purplish-tinged. Stems several, hollow, puberulous above. Leaf blade long-ovate, pinnate, thinly coriaceous, abaxially strongly reticulate, white villous, margins dentate and slightly reflexed; pinnae 1–2 × 0.5–1 cm, 2–3 pairs, lateral pinnae rhombic or oblique-ovate, base cuneate or truncate, apical pinnae ovate, base cuneate, decurrent. Umbels terminal, 2–3 cm across; peduncles elongate, straight, apex villous; bracts absent; rays 8–14, 1–2 cm, 4-angled, inner faces white hispid, outer faces glabrous; bracteoles 8–10, linear, entire or 3-lobed, lobules linear or subulate; umbellules 12–16-flowered. Calyx teeth short, triangular. Petals white. Styles longer than stylopodium. Fruit ovoid-oblong, ca. 3 × 2 mm, glabrous; dorsal ribs prominent, lateral ribs winged, wings ca. 1 mm, ca. 1/3 width of body, thin; vittae 1 in each furrow, 4 on commissure. Fl. and fr. Aug–Oct.

• Alpine meadows in limestone areas; ca. 3000 m. NW Yunnan (Eryuan, Heqing, Lijiang).

23. *Peucedanum baicalense* (I. Redowsky ex Willdenow) W. D. J. Koch, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12(1): 94. 1824.

兴安前胡 xing an qian hu

Selinum baicalense I. Redowsky ex Willdenow, Enum. Pl. 1: 306. 1809; *Kitagawia baicalensis* (I. Redowsky ex Willdenow) Pimenov; *Peucedanum polyphyllum* Ledebour.

Plants 30–100 cm. Stem solitary, erect. Basal leaves numerous; blade oblong, 2–3-pinnatisect; pinnae 4–5 pairs, long-ovate, pinnatisect, pinnules 2–3 pairs; ultimate segments narrowly linear, 2–10 × 0.8–1 mm, both surfaces glabrous, glaucous, entire, apex apiculate, petioles sheathing throughout, rachises pubescent. Leaves reduced upwards, uppermost subulate. Synflorescence corymbosely branched; umbels 3–4(–10) cm across; bracts 1–3, lanceolate, glabrous and scarious; rays 10–15, 1–2(–4) cm, inner face puberulent, outer face glabrous; bracteoles 6–8, linear-lanceolate, white scarious, longer than or about equaling flowers; umbellules 8–10-flowered. Calyx teeth small, acute. Petals white. Styles longer than stylopodium. Fruit ellipsoid, 3–4 × 2.5–3 mm, glabrous; dorsal ribs prominent, lateral ribs winged, wings ca. 1 mm, ca. 1/3 width of body, thin; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Jul–Sep.

Sandy or stony slopes in *Pinus* woods; 200–800 m. Heilongjiang,

Nei Mongol [Mongolia, Russia (Siberia)].

24. *Peucedanum falcaria* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 192. 1832.

镰叶前胡 *lian ye qian hu*

Plants 40–60, completely glabrous. Stem solitary, usually unbranched, thinly fluted. Basal leaves few; petioles short, sheathing throughout, scarious-margined; leaf blade long-ovate or elliptic, 1–2-pinnate/pinnatisect; pinnae 2–4 pairs, remote; ultimate segments linear-lanceolate, often slightly falcate, 10–35 × 1–3 mm, glaucous-green. Stem leaves few, reduced upwards, blade usually 3-parted. Umbels 3–6 cm across; bracts absent or 1–2, subulate, caducous; rays 7–12, 2.5–4 cm, unequal, glabrous; bracteoles 10–13, lanceolate-linear, unequal, shorter than flowers, scarious-margined; umbellules 15–20-flowered; pedicels unequal. Calyx teeth triangular-lanceolate, acute. Petals white. Stylopodium deep purplish-red; styles longer than stylopodium. Fruit obovoid or ovoid, 5–6 × 4–4.5 mm; dorsal ribs prominent, lateral ribs winged, wings ca. 1 mm, ca. 1/3 width of body, thin; vittae 3 in each furrow, 4–6 on commissure. Fl. Jul, fr. Aug.

Dry grassy slopes; ca. 1900 m. NE Xinjiang (Barkol) [N Mongolia, Russia (Siberia)].

25. *Peucedanum dissolutum* (Diels) H. Wolff, Repert. Spec. Nov. Regni Veg. 21: 246. 1925.

南川前胡 *nan chuan qian hu*

Angelica dissoluta Diels, Bot. Jahrb. Syst. 29: 499. 1901.

Plants 50–80 cm. Rootstock elongate, annular leaf scars numerous and prominent, often deep purplish. Stem base purplish and shallowly fluted. Leaf blade triangular-ovate in outline, 2-pinnate; pinnae 4–6 pairs, both surfaces glabrous or occasionally adaxially pubescent on veins, abaxially glaucous, nerves reticulation conspicuous, margins 1–3-lobed, irregularly serrate; pinnules 2–3 pairs; ultimate segments 3–4.5 × 1–3 cm, lateral segments ovate, 2–3-lobed, base round-obtuse, apical pinnules obovate, base cuneate. Synflorescence much branched; umbels 8–12 cm across; bracts absent or 1, linear or ovate; rays 10–23, 3–6 cm, pubescent on inner face; bracteoles 8–14, narrowly ovate or linear, unequal; umbellules ca. 20-flowered. Calyx teeth ovate, small. Petals white. Styles longer than stylopodium. Fruit narrowly ovoid, 6.5–8 × 3.5–4.2 mm, glabrous; dorsal ribs indistinct, lateral ribs winged, wings ca. 1/3 width of body, thin; vittae 1–3 in each furrow, 4–6 on commissure. Fl. and fr. Jun–Sep.

• Forest margins, wet shady rocky slopes; 1100–2200 m. Chongqing, NE Guizhou (Yanhe), SE Sichuan (Hejiang).

26. *Peucedanum harry-smithii* Fedde ex H. Wolff, Repert. Spec. Nov. Regni Veg. 33: 247. 1933.

华北前胡 *hua bei qian hu*

Plants (30–)60–100 cm. Stem white tomentose, especially above, with fibrous collar. Leaf blade triangular-ovate, ternate-2-pinnate; ultimate segments rhombic-obovate or ovate, 1–4 × 1.2–3 cm, adaxially sparsely pubescent, abaxially roughened,

densely pubescent, gray-green. Synflorescence much branched; umbels 2.5–8(–16) cm across; bracts absent or few, linear, ca. 5 mm, deciduous; rays 8–15(–22), 1–3(–10) cm, unequal, inner faces hispid, outer faces glabrous; bracteoles 6–10, lanceolate, unequal, shorter than flowers, densely pubescent; umbellules 12–20-flowered. Calyx teeth small, triangular. Petals white, adaxially finely papillose, abaxially white pubescent. Styles longer than stylopodium. Fruit ovoid-ellipsoid, 4–5 × 3–4 mm, densely hispid; dorsal ribs somewhat prominent, lateral ribs winged, wings ca. 1/3 width of body, thin; vittae 3–4 in each furrow, 6–8 on commissure. Fl. and fr. Aug–Oct.

• Forest margins, valleys, river banks, gaps among rocks in dry valleys, waste places; 300–2600 m. SE Gansu, Hebei, S and W Henan, S Nei Mongol, S Shaanxi, C and NE Shanxi, NE Sichuan.

- 1a. Leaf blade abaxially densely white pubescent, dark gray-green when dry 26a. var. *harry-smithii*
- 1b. Leaf blade abaxially glabrous or sparsely pubescent, yellowish-green when dry.
 - 2a. Umbels small, 3–8(–10) cm across; rays 1–3 cm 26b. var. *subglabrum*
 - 2b. Umbels large, 10–16 cm across; rays 0.5–10 cm 26c. var. *grande*

26a. *Peucedanum harry-smithii* var. *harry-smithii*

华北前胡(原变种) *hua bei qian hu* (yuan bian zhong)

Peucedanum hirsutiunculum (Y. C. Ma) V. M. Vinogradova; *P. praeruptorum* Dunn subsp. *hirsutiunculum* Y. C. Ma.

Leaf blade abaxially densely white pubescent, dark gray-green when dry. Umbels small, 3–8(–10) cm across; rays 8–15, 1–3 cm, unequal.

• Forest margins, valleys, river banks; 600–2600 m. SE Gansu (Pingliang), Hebei, W Henan (Lingbao, Luoning), S Nei Mongol (Daqing Shan, Liangcheng), S Shaanxi (Qin Ling), C Shanxi (Taiyuan), NE Sichuan (Guangyuan).

26b. *Peucedanum harry-smithii* var. *subglabrum* (R. H. Shan & M. L. Sheh) R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(3): 164. 1992.

少毛北前胡 *shao mao bei qian hu*

Peucedanum hirsutiunculum var. *subglabrum* R. H. Shan & M. L. Sheh, Acta Phytotax. Sin. 24: 310. 1986.

Plants including stem, leaves, inflorescence, etc., very sparsely pubescent or subglabrous. Umbels small, 3–8(–10) cm across; rays 8–15, 1–3 cm, unequal.

• Forest margins, waste places; ca. 1000 m. S and W Henan, S Shaanxi (Hu Xian, Shang Xian).

26c. *Peucedanum harry-smithii* var. *grande* (K. T. Fu) R. H. Shan & M. L. Sheh, Fl. Reipubl. Popularis Sin. 55(3): 164. 1992.

广序北前胡 *guang xu bei qian hu*

Peucedanum praeruptorum var. *grande* K. T. Fu, Fl. Tsinling. 1(3): 463. 1981.

Plant sparsely pubescent. Primary umbel 10–16 cm across; rays 8–22, 0.5–10 cm, very unequal.

• Gaps among rocks in dry valleys; 300–2000 m. W Hebei (Xiaowutai Shan), S Shaanxi, NE Shanxi (Wutai).

27. *Peucedanum violaceum* R. H. Shan & M. L. Sheh, *Acta Phytotax. Sin.* 18: 378. 1980.

紫茎前胡 *zi jing qian hu*

Plants 50–90 cm. Stem solitary, hollow, purplish-tinged, rough-puberulous. Basal leaves numerous, sheaths pubescent; leaf blade ovate, 3–4-pinnatisect; pinnae 4–5-paired; ultimate segments obovate-cuneate, 1.5–5 × 1–2 mm, usually 3-lobed, hispid on both surfaces. Synflorescence much branched, terminal umbel 6–9 cm across, lateral umbels 2–5 cm; bracts absent or 1–2, subulate, deciduous; rays 10–20, unequal, 1–5 cm, sparsely pubescent; bracteoles 8–12, linear-lanceolate, puberulous. Calyx teeth subulate. Petals white. Styles slender, longer than stylopodium. Fruit ellipsoid, 3–4 × 2.5–3 mm; dorsal ribs filiform, prominent, lateral ribs narrowly winged, wings ca. 1/3 width of body, thin; vittae 3–4 in each furrow, 8 on commissure. Fl. and fr. Jul–Sep.

• Sparse forests, grassy places on river banks; 2100–3500 m. SE Xizang (Mainling, Nyingchi).

This species has reputed medicinal value.

28. *Peucedanum mshanense* R. H. Shan & M. L. Sheh, *Acta Phytotax. Sin.* 24: 304. 1986.

马山前胡 *ma shan qian hu*

Plants 40–70 cm. Stem rigid, solid, tomentose near apex. Basal leaves numerous; leaf blade broadly triangular-ovate, 2–3-pinnatisect/pinnate; pinnae 2–4 pairs, pinnules 1–2 pairs; ultimate divisions long-ovate or long-rhombic, 1–3.5 × 0.3–3 cm, coriaceous, both surfaces glabrous, occasionally tawny tomentose along veins, base cuneate, margins irregularly incised. Upper leaves reduced, 2-pinnatisect; petioles sheathing throughout. Umbels 2–5 cm across; peduncles stout, apex densely tawny tomentose or hispid; bract absent; rays 9–18, spreading widely, 0.8–2 cm, tawny tomentose; bracteoles 4–5, linear-lanceolate, shorter than flowers; umbellules 10–15-flowered. Calyx teeth triangular-subulate. Petals white. Styles longer than stylopodium. Fruit ellipsoid, ca. 4 × 3 mm, dorsal ribs slightly prominent, lateral ribs winged, wing about 1/3 width of body, thin; vittae 3–4 in each furrow, 6 on commissure. Fl. and fr. Aug–Nov.

• Scrub, mountain slopes, rock crevices; ca. 300 m. WC Guangxi (Mashan).

29. *Peucedanum guangxiense* R. H. Shan & M. L. Sheh, *Acta Phytotax. Sin.* 24: 308. 1986 [*“guangxiense”*].

广西前胡 *guang xi qian hu*

Plants 30–80 cm. Rootstock elongate, woody, digitately branched, gray-brown. Stems numerous, rigid, glabrous, without fibrous collar. Basal leaves numerous; blade ovate-oblong, ternate-2-pinnate; pinnae 2–3 pairs; ultimate segments ovate or ovate-orbicular, 2–3-lobed, 1–4 × 0.6–3 cm, both surfaces glabrous, adaxially shiny, irregularly apiculate-serrate. Synflorescence branched; peduncles brown-tomentose; umbels 3–7 cm

across; bracts absent or 1 deciduous, linear, membranous; rays 7–13, 4-angled, brown-tomentose on inner faces, glabrous on outside; bracteoles 3–5, linear-lanceolate, unequal, shorter than flowers. Calyx teeth subulate. Petals white, midvein yellowish, abaxially pubescent. Fruit narrowly ellipsoid, 4–5 × 2–2.5 mm, tomentose when young, becoming glabrescent; dorsal ribs somewhat prominent, lateral ribs narrowly winged, wings ca. 1/3 width of body, thin; vittae 3–4 in each furrow, 6–10 on commissure. Fl. Sep–Oct, fr. Oct–Dec.

• Sparse scrub, limestone areas on mountain slopes, rock crevices; ca. 300 m. W Guangxi (Jingxi, Wuming).

30. *Peucedanum medicum* Dunn, *J. Linn. Soc., Bot.* 35: 496. 1903.

华中前胡 *hua zhong qian hu*

Plants 50–200 cm. Taproot roughened; rootstock stout, gray-brown, often purplish-tinged, annular leaf scars numerous and conspicuous. Leaf blade triangular-ovate in outline, 2–3-ternate, rarely 2-pinnate; pinnae 3 pairs, ternate or pinnate; terminal pinnules ovate-rhombic, 3-lobed, base cuneate, apex long acuminate, lateral pinnules oblique-ovate, 3-lobed or undivided, 2–5 × 1.5–5 cm, abaxially glaucous, margins coarsely toothed. Umbels 7–15(–20) cm across; bracts absent or 1, deciduous; rays 15–30, unequal, pubescent; bracteoles numerous, linear-lanceolate, shorter than the flowers; umbellules 10–30-flowered. Calyx teeth triangular-ovate, ca. 1.2 mm. Petals white. Styles slender, ca. 1.5 mm. Fruit ovoid-ellipsoid, 6–7 × 3–4 mm, tawny or gray-tawny, dorsal ribs slightly prominent, lateral ribs winged, wing ca. 1/3 width of body, thin; vittae 3 in each furrow, 8–10 on commissure. Fl. Jul–Sep, fr. Oct–Nov.

• Wet rocky slopes, grassy places; 700–2000 m. Chongqing, N Guangdong, NE Guangxi, E Guizhou, W Hubei, Hunan, W Jiangxi, NE Sichuan.

- 1a. Plants stout; leaf blade broadly triangular-ovate, subcoriaceous, adaxially shiny ... 30a. var. *medicum*
- 1b. Plants slender; leaf blade triangular-ovate, narrower and thinner, adaxially not shiny
..... 30b. var. *gracile*

30a. *Peucedanum medicum* var. *medicum*

华中前胡(原变种) *hua zhong qian hu* (*yuan bian zhong*)

Plants tall and stout; leaf blade broadly triangular-ovate in outline, 20–40 × 10–20 cm, subcoriaceous, shiny adaxially.

• Wet rocky slopes, grassy places; 700–2000 m. Chongqing, N Guangdong (Lian Xian), NE Guangxi (Guanyang), E Guizhou (Zhenyuan), W Hubei (Badong, Jianshi), Hunan (Jishou, Shaoyang), W Jiangxi (Lianhua, Wugong Shan), NE Sichuan (Wanyuan).

The root is used in Hebei as a regional substitute for the traditional Chinese medicine “qian hu” (see *Peucedanum praeruptorum*).

30b. *Peucedanum medicum* var. *gracile* Dunn ex R. H. Shan & M. L. Sheh, *Acta Phytotax. Sin.* 24: 310. 1986.

岩前胡 *yan qian hu*

Plants slender; leaf blade triangular-ovate in outline, 14–25 × 7–12 cm, narrower and thinner, not shiny adaxially.

• Wet rocky slopes, grassy places; ca. 1100 m. Chongqing, SW Hubei (Hefeng, Lichuan).

31. *Peucedanum morisonii* Besser ex Sprengel in Roemer & Schultes, Syst. Veg. 6: 567. 1820 [*"morisoni"*].

准噶尔前胡 zhun ga er qian hu

Plants 5–130 cm. Stem glabrous. Basal leaf blade broadly triangular in outline, ternate/3–4-pinnatisect; ultimate segments elongate, narrowly linear, (1–)3–10 × 0.1–0.3 cm, glabrous. Stem leaves less divided than basal, upper leaves with bladeless, lanceolate sheaths. Umbels 5–15 cm across; bracts 3–7, subulate to linear, unequal; rays 15–25(–30), unequal, spreading in flower, becoming rigidly contracted; bracteoles 5–13, linear to subulate, unequal, shorter than flowers; umbellules 25–30-flowered. Calyx teeth conspicuous, triangular. Petals pale yellow, elliptic, with a narrowly inflexed apex. Stylopodium styles short. Fruit ellipsoid, 8–9 × 4–5 mm; dorsal ribs filiform, slightly prominent, lateral narrow-winged; vittae 1 in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Aug–Sep.

Scrub, grassy places; 1200–1700 m. N Xinjiang [Kazakhstan, Russia (Siberia)].

The following nine species are incompletely known and their treatment here is tentative. In many cases these species are recorded only from a few rather poor collections, often the type gathering only.

32. *Peucedanum torilifolium* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 852. 1903.

窃衣叶前胡 qie yi ye qian hu

Plants to 50 cm. Stem terete, lower parts densely retrorse-villous. Basal leaves numerous, villose; petiole elongate; leaf blade lanceolate-linear, 2-pinnate, ultimate segments lanceolate, base cuneate, slightly crispate, entire or rarely parted. Peduncle elongate, glabrous; bracts numerous, small; rays 5–12, crispate-pubescent; bracteoles linear, longer than pedicels. Calyx teeth obsolete. Petals white, elongate. Fruit ovoid, pubescent; dorsal and intermediate ribs slightly prominent, lateral ribs broadly winged; vittae 1(–2) in each furrow, 2 on commissure, sometimes extending only part-way to base of the mericarp. Fl. and fr. Jul–Sep.

• Forest margins and roadsides on mountain slopes. W Sichuan (Kangding).

This species is recorded only from the holotype (*J. A. Soulié s.n.*, P).

33. *Peucedanum veitchii* H. de Boissieu, Bull. Soc. Bot. France 53: 436. 1906.

华西前胡 hua xi qian hu

Plants glabrous throughout, pale green. Stem slender, many-branched. Lower leaves long-petiolate, sheaths slightly dilated; leaf blade triangular, 2-pinnate; pinnae pinnatifid, with 2–7 narrow linear segments, thinly coriaceous. Segments of stem leaves much longer than those of basal leaves, upper leaves 1–3-divided, petioles wholly sheathing. Synflorescence little-branched; peduncles elongate; bracts absent; rays 3–6, rigid, unequal; bracteoles 8–10. Pedicels very short. Calyx teeth obsolete. Petals white, broadly obovate. Fruit ellipsoid, small; dorsal ribs

filiform, obtuse, lateral ribs narrowly winged, closely appressed to one another; vittae 3 in dorsal furrow, 2–3 in lateral furrows, 6 on commissure. Fl. and fr. Jul–Sep.

• Mountain slopes; ca. 2900 m. N Sichuan (Songpan).

This species is recorded only from the holotype (*E. H. Wilson 3705*, P).

34. *Peucedanum pricei* N. D. Simpson, J. Linn. Soc., Bot. 41: 419. 1913.

蒙古前胡 meng gu qian hu

Plants ca. 50 cm, glabrous. Rootstock stout. Stem solitary, shallowly fluted above. Basal leaves 6–12 cm; petioles ca. 3 cm, sheaths dilated; blade 2-pinnate, pinnae 3-paired, 2–3-pinnatifid; ultimate segments narrowly lanceolate or linear, acute, 10–15(–20) × 1–2 mm. Stem leaves few, reduced above. Bracts 1(–2), linear, ca. 4 mm; rays 10–15, fluted, unequal, up to 3.2 cm; bracteoles numerous, linear, ca. 4.5 mm, unequal, scarious-margined; umbellules numerous-flowered. Pedicels ca. 1 cm. Calyx teeth obsolete. Petals white, broadly spoon-shaped, with an inflexed apex. Fruit obcordate, ca. 5.5 × 4 mm, lateral wings white, ca. 1 mm broad; vittae 2–3 in each furrow, 6 on commissure. Fl. and fr. Jul–Sep.

Grasslands. Nei Mongol [N and W Mongolia].

35. *Peucedanum chinense* M. Hiroe, Umbell. World, 1572. 1979 [*"chinensis"*].

林地前胡 lin di qian hu

Peucedanum diversifolium H. Wolff, Repert. Spec. Nov. Regni Veg. 33: 247. 1933, not Bentham & J. D. Hooker (1867).

Basal leaf blade broadly rhombic, 4-pinnatisect; pinnae 7–9 pairs, long-petiolulate, lower pinnae broadly ovate-lanceolate, with 6 pairs of pinnules; pinnules with divisions in 3–4 pairs, subdecussate, ultimate segments lanceolate-linear, 3–4-parted or -lobed, 3–4 × ca. 1 cm, thin, papery, acute, mucronate; distal pinnae smaller and less divided. Leaves reducing upwards to a bladeless leaf, petioles wholly sheathing. Umbels few; peduncles elongate and erect; bracts absent; rays 5–7, unequal, ca. 3 cm, roughened; bracteoles few, linear, short and acute; umbellules 5–10-flowered. Calyx teeth obsolete. Styles short. Fruit ellipsoid; lateral ribs narrow-winged; vittae 1–3 in each furrow, 4–6 on commissure. Fl. and fr. unknown.

• Forests. W Sichuan.

This species is recorded only from the type gatherings (*Wilson 3671 & 3705*).

36. *Peucedanum henryi* H. Wolff, Repert. Spec. Nov. Regni Veg. 33: 248. 1933.

鄂西前胡 e xi qian hu

Plants to 50 cm. Stem rigid, hollow, sparingly branched, branches slender and elongate. Basal leaves small; petioles about equaling leaf blades, sheaths very short; leaf blade 3-ternate, pinnae long-petiolulate; pinnules sessile or subsessile, cuneate-obovate or ovate, ca. 20 × 14 mm, abaxially glaucous, parted or lobed. Synflorescence little-branched; peduncles equaling rays; bracts absent; rays 5–6, unequal, spreading in fruit; bracteoles

absent; umbellules ca. 20-flowered; pedicels filiform, subequal. Calyx teeth conspicuous, small. Petals yellowish, oblong, with a narrow and very inflexed apex. Styles long. Mature fruit unknown, developing fruit ellipsoid, smooth; dorsal ribs filiform, lateral ribs narrowly winged; vittae 3–4 in each furrow, 4 on commissure. Fl. Jul.

- Mountain slopes. W Hubei (Yichang).

This species is recorded only from the holotype (*A. Henry 3604*, K).

37. *Peucedanum piliferum* Handel-Mazzetti, *Oesterr. Bot. Z.* 82: 252. 1933.

乳头前胡 ru tou qian hu

Kitagawia pilifera (Handel-Mazzetti) Pimenov.

Plants ca. 45 cm. Stem terete, hollow, glabrous. Basal leaf petioles ca. 8 cm; leaf blade ovate in outline, 3–4-pinnate, ca. 11 × 8 cm; pinnae 6 pairs, sessile, remote; ultimate segments linear-oblong, 1.5–7 × ca. 1 mm, rather thick, apex obtuse. Peduncles ca. 6.5 cm; bracts ca. 10, linear, very acute, about equaling rays, margins pale tawny; rays 20, ca. 3 cm, rays and pedicels densely papillose-pubescent; bracteoles 12, pinnately lobed, pubescent, exceeding flowers; umbellules ca. 30-flowered, pedicels ca. 7 mm in fruit. Calyx teeth conspicuous, small. Ovary papillose. Styles slender. Mature fruit unknown. Fl. and fr. Jul–Sep.

- Grassy slopes at forest margins. NE China.

This species is recorded only from the holotype (*Fenzl 352*, unlocalized).

38. *Peucedanum ledebourielloides* K. F. Fu, *Fl. Tsinling*. 1(3): 463. 1981.

华山前胡 hua shan qian hu

Plants 40–90 cm, essentially glabrous. Basal leaves numerous, oblong-ovate, 2-pinnate or pinnatisect, 10–20 cm; pinnae petiolulate, 5–6 pairs, pinnules 1–2 pairs, ovate, 3-lobed or parted, lobules acute, apiculate. Stem leaves reduced upwards. Synflorescence copiously dichotomously branched; umbels 1–2.5 cm across; peduncles 4–10 cm, granular-roughened or hispidulous; bracts 3–4, linear-lanceolate, 1–3 mm; rays 3–5, 2–4 cm; bracteoles 2–5, linear, 1–2 mm; umbellules 3–8-flowered, pedicels 1–2 mm. Calyx teeth triangular, minute. Petals white, obovate. Ovary pulverous-hispid. Fruit obovate-oblong, 4–5

mm, granular-hispidulous; dorsal ribs filiform, prominent, lateral ribs narrowly winged, wings thin; vittae 1 in each furrow, 2 on commissure. Fl. Aug–Sep, fr. Oct.

- Rock crevices or sandy places in mountain valleys; 400–1000 m. W Henan (Lingbao), SE Shaanxi (Hua Shan).

The root is used in Shaanxi as a regional substitute for the traditional Chinese medicine “fang feng” (see *Saposhnikovia divaricata*).

39. *Peucedanum yunnanense* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 21: 247. 1925.

云南前胡 yun nan qian hu

Herbs stout. Stem hollow, slightly roughened, little-branched, hispidulous. Basal leaves numerous, very remote. Cauline leaves 2–3-pinnatisect; ultimate segments lanceolate, entire or finely serrate, apex acute, sessile, petioles wholly sheathing, sheaths very broad. Umbels with long peduncles, hispidulous; bracts absent; terminal umbel with rays ca. 25, ca. 4 cm, subequal, pulverous-roughened; bracteoles numerous, narrow-linear, longer than flowers; umbellules ca. 30-flowered, pedicels unequal, ca. 10 mm, roughened. Calyx teeth conspicuous. Developing fruit ellipsoid (mature fruit unknown); dorsal ribs slightly prominent, lateral ribs thinly winged; vittae 1 in each furrow, (2–)2–4 on commissure. Fl. and fr. Jul–Sep.

- Mountain slopes; ca. 2000 m. Yunnan (Kunming).

This species is recorded only from the holotype (*Cavalerie s.n.*, P).

40. *Peucedanum lhasense* C. B. Clarke ex H. Wolff, *Repert. Spec. Nov. Regni Veg.* 33: 249. 1933.

拉萨前胡 la sa qian hu

Stem slender, branched above. Basal leaves shortly petiolate; blade ternate-2-pinnate, pinnae 5–6, pinnately lobed; ultimate segments narrowly lanceolate, to 25 × 4 mm, shortly acuminate, margin scabrous. Upper leaves reduced upwards. Bracts absent; rays ca. 10, to 7 cm, slender, divaricate; bracteoles absent. Styles shorter than stylopodium. Mature fruit unknown. Fl. Aug.

- Hillsides. Xizang (Lhasa).

This species is recorded only from the holotype (Xixang: hills above Lhasa, Aug 1904, *Walton s.n.*, K) and has not been included in the key because data are deficient.

92. *CHUANMINSHEN* M. L. Sheh & R. H. Shan, *Acta Phytotax. Sin.* 18: 47. 1980.

川明参属 chuan ming shen shu

She Menglan (佘孟兰 Sheh Meng-lan); Mark F. Watson

Herbs perennial, plant withered in every summer, sprouting again in autumn. Taproot long-cylindric, deep-rooted with a slender and elongated stem to soil surface. Aerial stem terete, erect, base purplish, distally glaucous, branched above. Basal leaves numerous, 2–3-ternate-pinnate. Umbels loosely compound; inflorescence branches many-branched and spreading; bracts and bracteoles usually absent, rarely with 1–3 linear, membranous and deciduous bracts or bracteoles. Calyx teeth conspicuous, narrowly triangular. Petals white or purplish, midvein conspicuous. Stylopodium conic; styles much longer than stylopodium, often reflexed. Fruit ellipsoid, dorsally compressed; dorsal ribs filiform, prominent, lateral ribs narrowly winged, wings thickened; vittae 2–3 in each furrow, 4–6 on commissure. Seed face plane.

- One species.

1. Chuanminshen violaceum M. L. Shen & R. H. Shan, *Acta Phytotax. Sin.* 18: 48. 1980.

川明参 chuan ming shen

Taproot surface pale tawny brown, inner parts white, starchy. Leaves mainly in basal rosette; petiole sheaths broad, purplish and scarious margin; leaf blade broadly triangular-ovate, ternate-2-3-pinnate; pinnae 3-4 pairs, pinnules 1-2 pairs; ultimate segments ovate to long-ovate, 2-3 × 0.6-2 cm, abaxially

glaucous, base cuneate or rounded, margins irregularly 2-3-lobed or dentate, apex acuminate. Umbels 3-10 cm across; rays 4-8, 0.5-6(-8) cm, very unequal. Fruit 5-7 × 2-4 mm. Fl. and fr. Apr-Jun.

• Grassy places along stream banks, also cultivated on mountain slopes; 100-800 m. Hubei, Sichuan.

The root is used in Hubei and Sichuan as a regional substitute for the traditional Chinese medicine "ming dang shen" (see *Changium*).

93. TALASSIA Korovin, *Trudy Inst. Bot. Akad. Nauk Kazakhst. SSR* 13: 257. 1962.

伊犁芹属 yi li qin shu

She Menglan (余孟兰 Sheh Meng-lan); Mark F. Watson

Herbs perennial. Taproot branching, thickened, woody, crown densely covered in fibrous remnant sheaths. Stem much-branched, gray-green, glabrous. Leaves petiolate, articulate between the petiole and leaf blade; leaf blade ovate or broadly-ovate in outline, 3-pinnatisect, bluish-green; ultimate segments lanceolate or linear. Compound umbels terminal; bracts and bracteoles absent; umbellules few to many-flowered. Calyx teeth triangular, apex obtuse. Petals yellow. Stylopodium depressed, base dilated, erect in fruit; style short, recurved. Fruit ellipsoid, dorsally compressed, glabrous; ribs filiform, dorsal and intermediate ribs close together, lateral ribs remote; vittae 1 in each furrow, 2 on commissure, very small. Seed face plane or slightly convex. Carpophore parted to near base.

Two species: C Asia; one species in China.

Some current authors consider this genus part of *Ferula*.

1. Talassia transiliensis (Regel & Herder) Korovin in Pavlov, *Fl. Kazakhst.* 6: 384. 1963.

伊犁芹 yi li qin

Peucedanum transiliense Regel & Herder, *Bull. Soc. Imp. Naturalistes Moscou* 39(3): 78. 1866; *Ferula transiliensis* (Regel & Herder) Pimenov.

Plants to 1 m. Ultimate segments of leaves 3-10 mm, rather

thick, entire or 3-lobed. Umbels 5-10 cm across; rays 8-18, unequal, glabrous, sometimes with a foliaceous bract at the base; umbellules 10-20-flowered; pedicels very unequal. Petals broad-elliptic, apex acuminate, incurved. Stylopodium depressed-conic. Fruit 6-8 mm; dorsal ribs slightly prominent, lateral ribs obscure. Fl. Jun, fr. Jul.

Thin turf, gravelly slopes; 2100-2800 m. W Xinjiang (Wuqia, Zhaosu) [C Asia].

94. PASTINACA Linnaeus, *Sp. Pl.* 1: 262. 1753.

欧防风属 ou fang feng shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs biennial. Rootstock thick, long-conic. Stem hollow or solid, ribbed. Leaves pinnate, usually glabrous on both surfaces; pinnae serrate or pinnatifid, sessile. Umbels terminal and lateral; bracts and bracteoles absent; rays numerous, ascending. Calyx teeth minute, triangular. Petals ovate, yellow, incurved at apex. Stylopodium short-conic; styles short, divaricate. Fruit broad ellipsoid, glabrous, strongly flattened dorsally; dorsal ribs thinly filiform, the lateral broadly winged; vittae 1 in each furrow, 2-4 on commissure. Seed face plane.

About 14 species: Asia, Europe; one species (introduced) in China.

1. Pastinaca sativa Linnaeus, *Sp. Pl.* 1: 262. 1753.

欧防风 ou fang feng

Anethum pastinaca (Linnaeus) Wibel; *Elaphoboscum sativum* (Linnaeus) Ruprecht; *Peucedanum pastinaca* (Linnaeus) Bentham & J. D. Hooker; *Selinum pastinaca* (Linnaeus) Crantz.

Plants stout, 1-1.6 m high. Root yellowish-brown, up to 30 × 10 cm, fleshy becoming fibrous with age. Basal petioles ca. 13 cm, sheathing; leaf blade oblong-ovate, 20-30 × 10-16 cm, pinnate; pinnae oblong to ovate, 5-8 × 2.4-4 cm. Peduncles stout,

5-12 cm; rays 10-30, 3-8(-10) cm, unequal; umbellules ca. 1 cm across, ca. 20-flowered; pedicels 5-10 mm, slender. Petals 1-1.2 × ca. 1 mm. Fruit 5-6 × 4-6 mm. Fl. and fr. Jun-Aug. *n* = 11.

Widely cultivated in China [generally thought to be native to Europe; widely cultivated].

The root is rich in starch and sugar and is used as food (parsnip), animal fodder, and for wine making. The sap is liable to cause skin irritation by sensitizing skin to UV radiation.

95. ZOSIMA Hoffmann, *Gen. Pl. Umbell.* xxx, 145. 1814.

艾叶芹属 *ai ye qin shu*

Pan Zehui (潘泽惠); Michael G. Pimenov

Pichleria Stapf & Wettstein.

Herbs, biennial or monocarpic perennial. Root fusiform, yellow-red. Stem usually solitary, densely pubescent, angled, corymbose-branched, base clothed in fibrous remnant sheaths. Leaves 1–2 pinnatisect. Inflorescence compound umbels; bracts and bracteoles present; flowers hermaphrodite. Calyx teeth minute. Petals whitish, obcordate, apex narrow, inflexed, outer petals slightly enlarged (radiant). Fruit broadly ovate, strongly dorsally compressed, densely minute-pubescent; dorsal ribs filiform, marginal ribs broadly thin-winged, distal parts inflated and corky; outer mesocarp layer parenchymatous, inner layer sclerified; vittae large, 1 in each furrow, 2 on commissure. Seed face plane. Carpophore 2-parted to base.

Four species: C and SW Asia; one species in China.

1. *Zosima korovinii* Pimenov, *Byull. Glavn. Bot. Sada* (Moscow) 101: 45. 1976.

艾叶芹 *ai ye qin*

Plants 20–80 cm. Basal leaves numerous, petioles short; blade ovate to lanceolate-ovate, 6–14 cm, densely gray pubescent; ultimate segments ovate, 1.5–5 cm, sessile, margin lacinate to lobed. Upper leaves similar to basal, reduced upwards with enlarged, toothed sheaths. Umbels 5–14 cm across; bracts

and bracteoles 4–9, linear-lanceolate to narrowly linear, short and reflexed, almost completely membranous, whitish, hirsute to tomentose; rays 5–25, to 6 cm, ca. equal; umbellules 20–25-flowered; pedicels hispidulous (becoming glabrous), filiform, ca. 1 cm at maturity. Calyx teeth minute, triangular. Stylopodium flattened, margin undulate; styles to 1 mm, reflexed. Fruit 6–9 × 5–7 mm. $2n = 6$.

Stony clayey slopes, rocky areas; 1200–1500 m. SW Xinjiang (Wuqia) [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

96. HERACLEUM Linnaeus, *Sp. Pl.* 1: 249. 1753.独活属 *du huo shu*Pu Fading (溥发鼎 *Pu Fa-ting*); Mark F. Watson*Sphondylium* Miller; *Tetrataenium* (de Candolle) Mandenova.

Herbs, perennial, rarely biennial. Root fusiform or cylindrical, thickened, rarely fibrous. Stem erect, terete and often ribbed or striate, branching. Basal and lower leaves petiolate; petiole sheaths usually conspicuously broad; blade ternately or pinnately compound, hairy or glabrous. Umbels loose compound, terminal and lateral, terminal umbel with bisexual flowers, the lateral often with only staminate flowers; bracts few or absent, often caducous; rays numerous, spreading-ascending; bracteoles several, linear or lanceolate, entire; umbellules many-flowered. Calyx teeth triangular, lanceolate or obsolete. Petals white, rarely pinkish or pale yellow, obovate or obcordate, base cuneate, apex notched with a narrowly incurved lobule; outer flowers of the umbel often radiant with outer petals enlarged, broadly obovate, apex deeply 2-lobed. Stylopodium conic; styles short, erect or reflexed. Fruit obovoid, ovoid, broadly ovoid or suborbicular, strongly dorsally compressed, hairy or glabrous; dorsal and intermediate ribs filiform, sometimes raised, lateral ribs usually winged; vittae 1(–2) in each furrow, 2(–6) or absent on commissure, narrow, reaching to base of mericarp or clavate and much shorter than mericarp. Seed face plane, rarely slightly concave. Carpophore parted to base, usually persistent.

About 70 species: mainly in Asia and Europe, one species in North America, a few species in E Africa; 29 species (21 endemic) in China.

This is a widespread, taxonomically complex genus with the Hengduan Mountains forming one of two centers of diversity. Generic delimitation is problematic, both within *Heracleum* (recent molecular studies have shown it not to be monophyletic) and with several other genera with dorsally compressed fruit (e.g., *Angelica*, *Peucedanum*, and *Semenovia*). The distinctly clavate vittae, shorter than the length of the mericarp, are characteristic of many *Heracleum* species, but this does not hold for some of the Chinese species. Problems are compounded by the general paucity of good herbarium specimens and the inadequacy of historic type material. Many species are robust and tall plants, in which the primary inflorescences and basal leaves are large and therefore difficult to accommodate in a specimen press. Unfortunately, collectors have tended to select the smaller, lateral branches and upper leaves, which are less informative. Good fruiting material is also often lacking, and some taxa are recorded only from a very few collections. Revised classifications have been proposed for parts of the range of the genus, but as present knowledge is incomplete for Chinese taxa a traditional treatment is followed here.

Many species have reputed medicinal uses, and some are important elements in traditional Chinese medicine.

1a. Commissural vittae obscure, apparently absent.

2a. Calyx teeth obsolete 1. *H. xiaojinense*

2b. Calyx teeth present.

3a. Rays 14–17; leaves ternate 2. *H. fargesii*3b. Rays 6–13; leaves pinnate, pinnae 3–4 pairs 3. *H. subtomentellum*

1b. Commissural vittae evident, 2–6.

4a. Dorsal and intermediate ribs closely spaced; lateral wings broader than body of mericarp; vittae filiform.

5a. Lower leaves 2-pinnate; rays 35–45; vittae solitary in each furrow, 2 on commissure 6. *H. nyalamense*

- 5b. Lower leaves 2–3-pinnate; rays 6–25; vittae 1–2 in each furrow, 2–6 on commissure.
- 6a. Vittae 1–2 in dorsal furrows, extending to 1/2 length of mericarp 4. *H. kingdonii*
- 6b. Vittae solitary in dorsal furrows, extending almost to base of mericarp 5. *H. bivittatum*
- 4b. Dorsal and intermediate ribs widely spaced; lateral wings narrower than body of mericarp; vittae filiform or clavate.
- 7a. Vittae filiform, extending at least 3/4 the length of mericarp.
- 8a. Plants slender, to 60 cm high; rays 6–10; fruit ca. 4 × 4 mm 9. *H. yunnanense*
- 8b. Plants stout, 80–200 cm high; rays 10–40(or more); fruit 8–17 × 7–12 mm.
- 9a. Petals yellowish, outer petals slightly radiant, hardly enlarged; vittae solitary in each furrow, 2 on commissure (Xinjiang) 7. *H. olgae*
- 9b. Petals white or pinkish, outer petals conspicuously radiant, greatly enlarged; vittae 1–2 in each furrow, 2–4 on commissure (Yunnan) 8. *H. nepalense*
- 7b. Vittae clavate, extending to 1/2(–3/4) length of mericarp.
- 10a. Basal leaves ternate or 1–3-ternate/pinnate.
- 11a. Calyx teeth obsolete.
- 12a. Basal leaves ternate; fruit glabrous 10. *H. tiliifolium*
- 12b. Basal leaves ternate-pinnate; fruit sparsely hispidulous 11. *H. moellendorffii*
- 11b. Calyx teeth conspicuous.
- 13a. Terminal leaflets cordate at base; fruit suborbicular; vittae 1–2 in each furrow 12. *H. wenchuanense*
- 13b. Terminal leaflets truncate at base; fruit obovate; vittae solitary in each furrow 13. *H. vicinum*
- 14a. Calyx teeth prominent, lanceolate; ultimate segments of leaves ovate-lanceolate or obovate-lanceolate 22. *H. henryi*
- 14b. Calyx teeth minute or obsolete; ultimate segments of leaves ovate, broadly ovate, or ovate-rhombic.
- 15a. Calyx teeth minute; fruit obovoid; vittae extending to 3/4 the mericarp 23. *H. rapula*
- 15b. Calyx teeth obsolete; fruit suborbicular; vittae extending to 1/2 the mericarp 24. *H. wolongense*
- 10b. Basal leaves 1–4-pinnate.
- 16a. Basal leaves 1-pinnate.
- 17a. Leaf blade densely grayish or silvery-white hairy, tomentose 28. *H. candicans*
- 17b. Leaf blade glabrous, sparsely pubescent or hispid.
- 18a. Robust, thick-stemmed plants, umbels 20–30-rayed 18. *H. dissectum*
- 18b. Slender, thin-stemmed plants, umbels 10–25-rayed.
- 19a. Leaflets shallowly lobed, lobes broadly ovate 15. *H. hemsleyanum*
- 19b. Leaflets deeply lobed to pinnatifid, lobes narrowly ovate to lanceolate.
- 20a. Adaxial surface of leaf segments apparently bullate 16. *H. scabridum*
- 20b. Adaxial surface of leaf segments not bullate.
- 21a. Rays 10–25; bracteoles linear, acuminate at apex, distinctly shorter than pedicels 14. *H. forrestii*
- 21b. Rays 20–25; bracteoles lanceolate, caudate at apex, equal to or slightly longer than pedicels 17. *H. oreocharis*
- 16b. Basal leaves 2–4-pinnate.
- 22a. Basal leaves 3–4-pinnate, ultimate segments less than 10 mm, linear 29. *H. millefolium*
- 22b. Basal leaves 2–3-pinnate, ultimate segments more than 10 mm, ovate or lanceolate.
- 23a. Basal leaves 2-pinnate; bracts absent.
- 24a. Leaflets lacerate-pinnatifid, segments lanceolate, terminal leaflets without decurrent wings at base; calyx teeth minute; fruit suborbicular, 4–6 mm 19. *H. dissectifolium*
- 24b. Leaflets serrate, segments ovate, terminal leaflets with decurrent wings at base; calyx teeth triangular; fruit ovate or obovate, 6–9 mm.
- 25a. Rays 12–22; fruit ovoid, 8–9 mm; vittae 2–4 on commissure 20. *H. franchetii*
- 25b. Rays 30–35; fruit obovoid, 6–7 mm; vittae 2 on commissure 21. *H. souliei*
- 23b. Basal leaves 2–3-pinnate; bracts 1–3.
- 26a. Ultimate segments of leaf ovate, terminal leaflets cuneate or cordate at base 25. *H. stenopteroides*
- 26b. Ultimate segments of leaf lanceolate; terminal leaflets decurrent along rachis at base.
- 27a. Calyx teeth lanceolate; fruit obovoid, sparsely pilose 26. *H. stenopterum*
- 27b. Calyx teeth triangular; fruit ovoid, almost glabrous 27. *H. yungningense*

1. *Heracleum xiaojinense* F. T. Pu & X. J. He, Acta Phytotax. Sin. 31: 372. 1993.

小金独活 xiao jin du huo

Plants stout, ca. 1 m high. Root cylindrical, aromatic. Stem purplish, pubescent. Basal leaves petiolate; leaf blade 3-pinnate,

ultimate segments lanceolate, 5–6 × 1–1.5 cm, margins serrate. Cauline leaves similar to the basal, reduced upward, sessile; petiole with dilated sheath. Terminal umbel 20–30 cm wide, lateral umbels smaller; bracts absent; rays more than 30, unequal, 8–13 cm; bracteoles numerous, linear, 8–15 mm, nearly as long as fruiting pedicels. Calyx teeth obsolete. Petals white, outer

flowers in umbel somewhat radiant. Fruit suborbicular, 5–6 × ca. 6 mm; dorsal and intermediate ribs raised, lateral ribs thin winged, wings ca. 0.8 mm wide; vittae solitary in each furrow, clavate, about 3/4 as long as mericarp, commissure without vittae. Seed face slightly concave. Fl. and fr. Jul–Sep.

- Forest margins, alpine scrub and meadows; 3500–4000 m. W Sichuan.

Recent research indicates that this species is conspecific with *Angehlica apaensis*.

2. *Heracleum fargesii* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 853. 1903.

城口独活 cheng kou du huo

Plants ca. 80 cm high. Root cylindrical. Stem densely hispid. Basal leaves petiolate, sparsely pubescent; leaf blade ternate, lateral leaflets ovate, 3–5-lobed, terminal leaflets broadly ovate, 12–17 × 10–14 cm, both surfaces sparsely pubescent, especially on abaxial veins. Cauline leaves similar to the basal, gradually reduced upward. Peduncles 10–20 cm; bracts absent; rays 14–17, unequal, hispid; bracteoles 5–7, linear, reflexed. Calyx teeth lanceolate. Petals white, outer flowers in umbel somewhat radiant. Fruit broadly ovoid, 6–8 × 5–7 mm, glabrous; dorsal and intermediate ribs filiform, lateral ribs winged, wing ca. 0.8 mm wide; vittae solitary in each furrow, clavate, slightly exceeding 1/2 length of mericarp, commissure without vittae. Seed face plane. Fl. and fr. Aug–Oct.

- Montane forests; 1500–2000 m. NE Sichuan.

This species has reputed medicinal value.

3. *Heracleum subtomentellum* C. Y. Wu & M. L. Sheh, Acta Bot. Yunnan. 13: 274. 1991.

微绒毛独活 wei rong mao du huo

Plants 45–80 cm high, tomentulose throughout. Taproot woody; caudex 1.5–3 cm wide. Basal leaves numerous in rosette; petioles 5–11 cm; leaf blade ovate-oblong in outline, 5–9 × 3–5 cm, pinnate, pinnae 3–4 pairs; proximal pinnae short petiolulate, ovate or ovate-oblong, entire or 3-lobed, 1.3–3.5 × 1.2–2.5 cm, abaxially slightly glaucous, veins prominent, base truncate or subcuneate, margins irregularly serrulate, apex obtuse or rotund; terminal leaflet rhombic or suborbicular, 3-lobate or 3-parted; other pinnae subsessile, entire. Peduncles stout, 5–15 cm; bracts 3–4, linear, caducous; rays 6–13, unequal, 1.5–4 cm; bracteoles 2–4, linear or ovate-lanceolate, membranous, unequal, 1–3 × 0.5–1.2 mm. Calyx teeth conspicuous, lanceolate-triangular. Petals white, outer flowers in umbel somewhat radiant. Fruit suborbicular, 6–8 × 5–6 mm; dorsal and intermediate ribs filiform, lateral ribs winged, wings to 1 mm; vittae solitary in each furrow, large, clavate, commissure without vittae. Seed face plane. Fl. Aug, fr. Sep.

- Alpine scrub and meadows; ca. 4400 m. NW Xizang (Ngari).

This species is recorded only from the type.

4. *Heracleum kingdonii* H. Wolff, Repert. Spec. Nov. Regni Veg. 33: 76. 1933 [*"kingdoni"*].

贡山独活 gong shan du huo

Plants stout, 50–90 cm high. Stem pubescent. Petioles of lower leaves ca. 20 cm; leaf blade ovate-oblong, 20–30 × 10–15 cm, 1–2-pinnate; pinnae ovate or ovate-oblong, 2–3-lobed or 3-partite, 6–11 × 3–7 cm, margin crenate or serrate, apex acuminate. Upper leaves reduced, 3-lobed. Peduncles 14–22 cm, pubescent; bract 5(–8), lanceolate, ca. 10 × 1 mm; rays 6–22, unequal, 2–5 cm; bracteoles 5(–10), lanceolate. Calyx teeth triangular. Petals white, outer flowers in umbel somewhat radiant. Fruit suborbicular or obovoid, 5–7 × 4–7 mm; dorsal and intermediate ribs filiform closely spaced, lateral ribs broadly winged, wings ca. 2 mm wide, wider than width of mericarp body; vittae filiform, more than half the mericarp body, 1–2 in each dorsal furrow, 1–3 in lateral furrows, 2 on commissure often with 2 additional fragmentary vittae. Fl. Jul–Aug, fr. Sep–Oct.

Montane forests, streamsides; 600–3200 m. ?W Guangxi, ?Guizhou, SE Xizang, NW Yunnan [NE Myanmar].

The Chinese record in FRPS (55(3): 199. 1992) of *Heracleum burmanicum* Kurz (as "*barmanicum*") is referable to this species.

5. *Heracleum bivittatum* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 855. 1903.

二管独活 er guan du huo

Plants 80–100 cm high. Leaf blade ovate or broad-ovate, 2-pinnate, primary pinnae 3–4 pairs, ultimate segments ovate-oblong, 3–7 × 1.5–3 cm, margins irregularly incised or sharply serrate, apex acuminate. Upper leaves smaller, sessile, pinnate, pinnae lanceolate. Peduncles 10–20 cm; bracts 3–5, lanceolate, 4–5 mm, reflexed; rays 15–20, extremely unequal, 2–6 cm, pubescent; bracteoles lanceolate or linear. Calyx teeth triangular. Petals white, outer flowers in umbel somewhat radiant. Fruit obovoid, 5–6 × ca. 5 mm; dorsal and intermediate ribs filiform, closely spaced; lateral ribs broadly winged, wings ca. 1.5 mm wide, wider than width of mericarp body; vittae filiform, extending almost the length of the mericarp body, solitary in each dorsal furrow, 2 in each lateral furrow, 2–6 on commissure. Seed face plane. Fl. Jul–Sep, fr. Sep–Oct.

Montane forest margins; ca. 3000 m. Guangxi, Guizhou, SW Sichuan, S and W Yunnan [Laos, Vietnam].

This species has reputed medicinal value.

6. *Heracleum nyalamense* R. H. Shan & T. S. Wang, Acta Phytotax. Sin. 18: 378. 1980.

聂拉木独活 nie la mu du huo

Plants stout, to 1 m high. Lower leaves broadly ovate, to 28 × 11 cm, 2-pinnate; ultimate segments ovate to broadly ovate, 4–5 × 2–3 cm, abaxially puberulent on major veins, margins serrate. Upper leaves reduced, smaller, sessile. Peduncles stout, 7–12 cm; bracts 5, linear, 1–1.5 cm; rays 35–45, unequal, 7–9 cm, puberulent; bracteoles 5, linear, 2–4 mm. Calyx teeth conspicuous, narrowly triangular. Petals white, outer flowers in umbel radiant. Fruit obovoid, 7–9.5 × 7–10 mm, glabrous; dorsal and intermediate ribs filiform, closely spaced, lateral ribs broadly winged, wings 2.5–3.5 mm, wider than width of mericarp body; vittae filiform, extending to 1/2 or 2/3 of mericarp, solitary in each furrow, 2 on commissure. Seed face plane. Fl. and

fr. Jul–Sep.

- Montane forests; ca. 2300 m. S Xizang (Nyalam).

7. *Heracleum olgae* Regel & Schmalhausen, *Izv. Imp. Obšč. Ljubit. Estestv. Moskovsk. Univ.* 34(2): 38. 1882.

大叶独活 da ye du huo

Platytaenia olgae (Regel & Schmalhausen) Korovin; *Tetraenaenium olgae* (Regel & Schmalhausen) Mandenova.

Plants stout, 80–200 cm high. Caudex thickened, woody, covered with residual fibers of sheaths. Stem solitary, ± densely hispid, branching from middle. Lower leaves trifoliolate; leaflets ovate or broadly ovate, adaxially finely scabrous-hairy, abaxially sparsely or densely hairy to white tomentose, margin serrate. Upper leaves reduced, small, scarcely divided, blade sessile on expanded sheaths. Umbels numerous, 6–11 cm wide; bracts absent; rays 10–40 (or more), unequal, 2–5 cm, densely hispid; bracteoles 5–7, linear, nearly as long as umbellule; umbellules 20–25-flowered. Calyx teeth triangular. Petals yellowish, abaxially hairy, outer flowers in umbel slightly radiant. Fruit obovoid or suborbicular, 8–12 × 7–9 mm, scarious hairy only along ribs; dorsal and intermediate ribs ridged, lateral ribs broadly winged, wings narrower than body of mericarp; vittae solitary in each furrow, filiform, extending 3/4 length of mericarp, 2 on commissure, ca. 1/4 the length of mericarp. Fl. and fr. Jul–Sep.

Stony talus slopes; ca. 2000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

8. *Heracleum nepalense* D. Don, *Prodr. Fl. Nepal.* 185. 1825.

尼泊尔独活 ni po er du huo

Heracleum nepalense var. *bivittatum* C. B. Clarke; *Tetraenaenium nepalense* (D. Don) Mandenova.

Plants stout, to 2 m high. Root cylindrical, ca. 15 cm long. Stem solitary, pubescent. Basal leaves long-petiolate; leaf blade broad-ovate, 20–45 × 20–35 cm, trifoliolate or 1–2-pinnate, pinnae 3–7 pairs; leaflets broadly ovate, 9–20 × 5–12 cm, both surfaces finely pubescent, especially along veins, margins serrate. Cauline leaves similar to the basal, reduced upward, smaller, 3-lobed sessile on expanded sheaths. Umbels (11–)15–30 cm wide; bracts 1–5, linear or absent; rays numerous, (8–)15–60 (or more), 6–9 cm, unequal, extending in fruit; bracteoles 5–8, linear, unequal, 5–9 mm, persistent; umbellule 8–30-flowered. Calyx teeth subulate. Petals white, occasionally pinkish, outer flowers in umbel conspicuously radiant; radiant petals 2-lobed, to 3 × 2.3 mm. Young ovary densely hairy. Fruit obovoid, 9–11 (–17) × 7–10 (–14) mm; dorsal ribs filiform, lateral ribs broadly winged, wings 2.2–4 mm wide; vittae filiform, solitary in dorsal furrows, extending to 2/3 length of mericarp, 1–2 in lateral furrows, shorter than dorsal, 2–4 on commissure, about 2/3 as long as mericarp. Seed face plane. Fl. and fr. Jun–Sep.

Forests, scrub, grassy slopes, roadsides; 2000–4000 m. N and W Yunnan [Bhutan, NE India, Myanmar, Nepal, Sikkim].

9. *Heracleum yunnanense* Franchet, *Bull. Soc. Philom. Paris,*

sér. 8, 6: 143. 1894.

云南独活 yun nan du huo

Plants slender, ca. 60 cm high. Root cylindrical; caudex covered with a few residual fibers of sheaths. Stem solitary, little-branched, sparsely setulose. Lower leaves pinnate; pinnae ovate, base cordate or obtuse, margins serrulate. Distal leaves 3-lobed, smaller, sessile. Bracts 1–3, linear; rays 6–10, unequal, 2–4 cm; bracteoles 4–5, linear, shorter than pedicels; umbellule 10–15 (–20)-flowered. Calyx teeth lanceolate. Petals white, outer flowers in umbel conspicuously radiant. Fruit suborbicular, small, ca. 4 × 4 mm; dorsal ribs filiform, lateral ribs broadly winged; vittae filiform, solitary in dorsal furrows, 2 in lateral furrows, extending to 3/4 length of mericarp, 4 on commissure, slightly shorter than dorsal. Seed face plane. Fl. Jun–Jul, fr. Aug–Sep.

- Grassy slopes; 3600–4100 m. N Yunnan.

This incompletely known species is recorded only from a few collections.

10. *Heracleum tiliifolium* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 33: 80. 1933.

椴叶独活 duan ye du huo

Plants stout, 1–2 m high. Root cylindrical. Basal leaves long-petiolate; leaf blade ternate, trifoliolate; leaflets round-ovate, undivided or 3-lobed, 6–9 × 5–14 cm, both surfaces sparsely hispidulous, base cordate, margin crenate-serrate or serrate, apex mucronate or acuminate. Cauline leaves similar to the basal, reduced upward, 3-lobed, sessile, sheaths broad-ovate. Terminal umbels ca. 15 cm wide; bracts absent; rays 10–15 (–22), unequal, 4–8 cm, villous; bracteoles 5, lanceolate, shorter than pedicels; umbellules 25–30-flowered. Calyx teeth obsolete. Petals white, outer flowers of umbels radiant, enlarged petals deeply 2-lobed. Young ovary puberulous. Fruit obovoid, 6–10 × 4–6 mm, glabrous; dorsal ribs filiform, lateral ribs broadly winged, wing less than width of mericarp body; vittae solitary in each furrow, clavate, extending to 3/4 length of mericarp, 2 on commissure, about half as long as mericarp. Seed face plane. Fl. Jun–Aug, fr. Aug–Sep.

• Forest margins, thickets on streamsides; ca. 1000 m. Hunan, N Jiangxi (Lu Shan).

This species has reputed medicinal value.

11. *Heracleum moellendorffii* Hance, *J. Bot.* 16: 12. 1878.

短毛独活 duan mao du huo

Plants stout, 1–2 m tall, hispidulous throughout. Root cylindrical. Stem solitary, branched. Basal and lower petioles 10–30 cm; leaf blade ternate or ternate-pinnate; leaflets 3–5, broadly ovate, 10–20 × 7–18 cm, 3–5-lobed, margin sharply serrate. Upper leaves sessile on expanded sheaths. Peduncles 4–15 cm; bracts few, linear-lanceolate, or caducous; rays 12–30, unequal; bracteoles 5–10, lanceolate; flowers more than 20 per umbellule. Calyx teeth obsolete. Petals white, on outer flowers of umbels radiant, enlarged, ca. 7 mm. Fruit obovoid, 6–8 × 5–7 mm, sparsely hispidulous or almost glabrous; dorsal ribs filiform, lateral ribs broadly winged, wings less than width of mericarp

body; vittae solitary in each furrow, 2 on commissure, clavate, extending to 1/2 length of mericarp. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

Open forests, forest margins, shaded valleys, alpine meadows, streamsides; below 3200 m. Anhui, Gansu, Hebei, Heilongjiang, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [Japan, Korea].

- 1a. Basal leaves almost 2-pinnate, ultimate segments ovate-lanceolate 11c. var. *subbipinnatum*
 1b. Basal leaves ternate or ternate-pinnate, ultimate segments broad-ovate.
 2a. Fruit obovoid, dorsal and lateral vittae 4 per mericarp in total 11a. var. *moellendorffii*
 2b. Fruit suborbicular, dorsal and lateral vittae 2 per mericarp in total 11b. var. *paucivittatum*

11a. *Heracleum moellendorffii* var. *moellendorffii*

短毛独活(原变种) duan mao du huo (yuan bian zhong)

Heracleum barbatum Ledebour subsp. *moellendorffii* (Hance) M. Hiroe; *H. dissectum* Ledebour subsp. *moellendorffii* (Hance) Voroschilov; *H. lanatum* Michaux subsp. *moellendorffii* (Hance) H. Hara; *H. microcarpum* Franchet; *H. morifolium* H. Wolff.

Basal and lower leaves ternate or ternate-pinnate, leaflets 3–5. Fruit obovoid; vittae solitary in furrows, 2 on commissure.

Open forests, forest margins, shaded valleys, streamsides; below 3200 m. Anhui, Gansu, Hebei, Heilongjiang, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [Japan, Korea].

This variety has reputed medicinal value.

11b. *Heracleum moellendorffii* var. *paucivittatum* R. H. Shan & T. S. Wang, Acta Phytotax. Sin. 24: 316. 1986.

少管短毛独活 shao guan duan mao du huo

Basal and lower leaves ternate or ternate-pinnate, leaflets 3–5. Fruit suborbicular; dorsal and lateral vittae 2 per mericarp in total (solitary or absent in the furrows), 2 on commissure.

- Streamsides; below 100 m. NE Shandong (Penglai).

This variety is recorded only from the type.

11c. *Heracleum moellendorffii* var. *subbipinnatum* (Franchet) Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 5: 157. 1941.

狭叶短毛独活 xia ye duan mao du huo

Heracleum microcarpum var. *subbipinnatum* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 18. 1883; *H. moellendorffii* f. *angustum* (Kitagawa) Kitagawa; *H. moellendorffii* f. *subbipinnatum* (Franchet) Kitagawa; *H. morifolium* f. *angustum* Kitagawa.

Basal and lower leaves almost 2-pinnate, primary pinnae 3–4 pairs, ultimate segments ovate-lanceolate.

Open forests, forest margins, alpine meadows; 1000–3000 m. Hebei, Heilongjiang, Jilin, Nei Mongol [Korea].

12. *Heracleum wenchuanense* F. T. Pu & X. J. He, Acta Phytotax. Sin. 31: 368. 1993.

汶川独活 wen chuan du huo

Plants 1–1.5 m high. Root fibrous. Stem solitary, branched, pubescent. Basal petioles 40–50 cm; leaf blade triangular ovate in outline, 20–28 × 20–25 cm, ternate; lateral leaflets broadly ovate, 12–15 × 12–13 cm, terminal leaflet flabelliform, 16–18 × 19–29 cm, both surfaces sparsely pubescent, base cordate, margin serrulate. Cauline leaves similar to the basal, reduced upward, smaller, 3-lobed. Umbels 9–14 cm wide; bracts 1–3, linear, 1.5–2 cm; rays 17–20, unequal, 4–8 cm, pubescent; bracteoles 5–8, linear, longer than pedicels; umbellule 20–30-flowered. Calyx teeth subulate. Petals white, outer flowers in umbels radiant. Fruit suborbicular, 8–9 × 7–8 mm; vittae 2 in dorsal furrows, 1 in lateral furrows, 2 on commissure, clavate, about 1/2 length of mericarp. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

- Forest margins; ca. 3500 m. NC Sichuan (Wenchuan).

This species is recorded only from the type.

13. *Heracleum vicinum* H. de Boissieu, Bull. Herb. Boissier, sér. 2, 3: 853. 1903.

平截独活 ping jie du huo

Plants to 1 m high. Root cylindrical. Stem solitary, branched, sparsely hispid or almost glabrous. Basal leaves ternate, both surfaces hispidulous; lateral leaflets ovate, 3–5 × ca. 3 cm, base cuneate; terminal leaflets broadly ovate, ca. 6 × 5 cm, 3–5-lobed, base truncate. Cauline leaves similar to the basal, lower leaves usually larger than basal, gradually reduced upward. Terminal umbels to 13 cm wide, lateral umbels smaller; peduncles 15–20 cm, densely hispid; bracts absent; rays 15–20, unequal, 5–9 cm, hispid; bracteoles 4–5, linear; flowers more than 20 per umbellule. Calyx teeth triangular, conspicuous. Petals white, outer flowers in umbels radiant. Fruit obovoid, 8–9 × 5–6 mm, sparsely hispidulous or almost glabrous; vittae solitary in each furrow, clavate, about half the length of mericarp, 2 on commissure, less than half or extending to half the length of mericarp. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep. $2n = 22^*$.

- Montane forests and thickets; 2600–3100 m. NE and W Sichuan.

This species has reputed medicinal value.

14. *Heracleum forrestii* H. Wolff, Repert. Spec. Nov. Regni Veg. 33: 75. 1933.

中甸独活 zhong dian du huo

Plants 0.8–1 m tall. Root cylindrical. Stem solitary, slender ca. 8 mm thick at base, branches few, sparsely puberulent. Basal leaves, pinnate, long-petiolate; petiole to 25 cm, narrowly sheathing at base; pinnae 2–3 pairs, ovate or broad-ovate in outline, 3–10 × 3–9 cm, deeply lacerate almost to base into 3 or 5 narrowly ovate lobes, both surfaces puberulent along veins, margins serrate. Cauline leaves gradually reduced, ternate/pinnate; leaflets broad-ovate, 8–9 × 3–8 cm, pinnatifid. Umbels ca. 13 cm wide; bracts 1, or absent; rays 10–25, 2–5(–9) cm, scabrous; bracteoles 2–5, linear, 2–4 mm; umbellules 15–25-flowered. Calyx teeth obsolete or minute. Petals white, outer flowers in umbels radiant; ovary scabrous. Fruit obovoid, 7–10 × 6–7

mm, lateral ribs winged, wings narrower than fruit body; vittae solitary in each furrow, 2 on commissure, clavate, ca. 3/4 length of mericarp. Seed face slightly concave. Fl. Jul–Aug, fr. Aug–Sep.

- Forest margins, dwarf scrub margins, grassy slopes, streamsides; 2700–3900 m. Chongqing (Chengkou), NW Yunnan (Zhongdian).

This incompletely known species is recorded only from a few collections. Species delimitation between this and the following three species from SW China is problematic and in need of taxonomic revision.

15. *Heracleum hemsleyanum* Diels, Bot. Jahrb. Syst. 29: 503. 1900.

独活 du huo

Plants 1–1.5 m tall. Root fusiform. Stem solitary, slender ca. 7 mm thick at base, branched above. Basal leaves long-petiolate; petiole to 25 cm, narrowly sheathing at base; leaf blade pinnate, 3–5-foliolate; pinnae ovate or broad-ovate in outline, 8–13 × 4–10 cm, shallowly or deeply (to 3/4) lobed into 2 or 3 broad-ovate lobes, sparsely pubescent on both surfaces especially on the veins, margins serrate. Cauline leaves gradually reduced upward, sessile, 3-lobed on expanded sheaths. Peduncles 20–30 cm, sparsely puberulent; bracts 1–2, linear-lanceolate; rays 10–25, unequal, 2–7 cm, sparsely pubescent; bracteoles 5–8, linear lanceolate, shorter than pedicels; umbellules 20–25-flowered. Calyx teeth obsolete. Petals white, outer flowers in umbels radiant, enlarged petals broadly obcordate, deeply lobed. Ovary scabrous. Fruit suborbicular, 6–7 × 5–6 mm; vittae solitary in each furrow, 2 on commissure, clavate, slightly exceeding 1/2 length of mericarp. Seed face plane. Fl. May–Jun, fr. Aug–Sep. $2n = 22^*$.

- Shady forests, moist thickets; 2000–3000 m. Hubei, SE and W Sichuan.

This species has reputed medicinal value.

16. *Heracleum scabridum* Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 145. 1894.

糙独活 cao du huo

Plants 40–100 cm tall, hispid throughout. Root fusiform, aromatic. Stem solitary, ca. 8 mm thick at base, branched above. Basal leaves ovate-oblong, nearly as long as petioles, 10–20 × 5–22 cm, pinnate; pinnae ovate or broad-ovate in outline, 1.5–5 × 1–3 cm, deeply divided into 2 or 3 ovate or lanceolate lobes, hispid on both surfaces, adaxially apparently with bullate creases, margins serrate. Cauline leaves gradually reduced upward. Peduncles to 16 cm, densely hispid near apex; bracts 1–3, linear, or absent; rays 10–20, unequal, 2–5 cm, densely hispid; bracteoles 5–7, linear, shorter than pedicels; flowers more than 30 per umbellule. Calyx teeth minute, triangular. Petals white, outer flowers in umbels radiant, enlarged petals broadly obcordate, deeply lobed. Fruit ovoid-elliptic, 6–8 × 5–7 mm, glabrous; vittae solitary in each furrow, 2 on commissure, clavate, extending to 2/3 length of mericarp. Seed face plane. Fl. May–Jul, fr. Aug–Sep.

- Forests, grassy slopes; 2000–2700 m. SW Sichuan, NW Yunnan.

This species has reputed medicinal value.

17. *Heracleum oreocharis* H. Wolff, Repert. Spec. Nov. Regni Veg. 33: 77. 1933.

山地独活 shan di du huo

Plants 60–80 cm tall. Root cylindrical. Stem solitary, little-branched. Basal leaves pinnate; pinnae 2–3 pairs, ovate, 9–12 × 7–9 cm, 2–3-lobed to pinnatifid, sparsely pubescent on both surfaces, margins serrate; terminal leaflets rhombic, 10–13 × 8–12 cm, 3-lobed, base decursive winged. Cauline leaves gradually reduced upward. Umbels ca. 13 cm wide; bracts 8–10, lanceolate, caudate at apex, sparsely pubescent, or caducous; rays 20–25, unequal, 2–6 cm; bracteoles 5–7, similar to the bracts, or linear, unequal, narrow membranous at the margins, equal to or slightly longer than pedicels (characteristic of this species). Calyx teeth minute. Petals white, outer flowers in umbels radiant, enlarged petals broadly obcordate, deeply lobed. Ovary sparsely hirsute. Fruit suborbicular, ca. 7 × 7 mm, dorsal ribs filiform, lateral ribs broadly winged; vittae solitary in each furrow, 2 on commissure, about 2/3 length of mericarp. Seed face plane. Fl. and fr. Jul–Oct.

- Montane forest margins; 2800–4200 m. NW Yunnan.

This incompletely known species is recorded only from a few collections.

18. *Heracleum dissectum* Ledebour, Fl. Altaic. 1: 301. 1829.

兴安独活 xing an du huo

Plants 50–150 cm tall, robust. Root fusiform. Stem solitary, branched with spreading hairs. Basal and lower leaves pinnate, ca. 40 × 30 cm; pinnae 2–3 pairs, broad-ovate, ovate-oblong, pinnatifid, adaxially appressed puberulent, abaxially densely grayish puberulent, base subcordate, oblique, margins serrate. Upper leaves reduced, sessile, sheaths broad-ovate, leaf blade 3-lobed. Peduncles 10–17 cm, terminal umbels ca. 20 cm wide; bracts absent; rays 20–30, unequal, 6–11 cm, glabrous or sparsely pubescent inside; bracteoles 4–7, linear, nearly as long as pedicels, to 13 mm. Calyx teeth triangular, minute. Petals white, outer flowers in umbels radiant, enlarged petals broadly obcordate, deeply lobed. Fruit obovoid, 8–10 × 5–7 mm, glabrous or sparsely puberulent; vittae solitary in each furrow, clavate, extending to 2/3 length of mericarp, 2 on commissure, 1/2 length of mericarp. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

Montane forests, forest margins, moist grasslands; below 2200 m. Heilongjiang, Jilin, Xinjiang [Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Uzbekistan].

19. *Heracleum dissectifolium* K. T. Fu, Fl. Tsinling. 1(3): 464. 1981.

多裂独活 duo lie du huo

Plants 60–100 cm tall. Root cylindrical. Stem solitary, branched above. Basal leaves 2-pinnate; pinnae 3–4 pairs, lacerate-pinnatifid, ultimate segments lanceolate, abaxially sparsely puberulent, margins sharply serrate. Cauline leaves gradually reduced upward. Peduncles 7–20 cm; bracts absent; rays 30–50, unequal, 6–12(–20) cm; bracteoles few, linear; umbellules many-flowered. Calyx teeth minute. Petals white, outer flowers

in umbels radiant. Fruit suborbicular, 4–6 × 4–5 mm; vittae solitary in each furrow, 2 on commissure, clavate, exceeding 1/2 length of mericarp. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

- Montane thickets, grassy slopes; 1900–3200 m. Gansu, Sichuan.

The taxonomy of this and the following two species is in need of revision.

20. *Heracleum franchetii* M. Hiroe, *Umbell. World*, 1749. 1979.

尖叶独活 jian ye du huo

Heracleum acuminatum Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 144. 1894, not Schleicher (1821).

Plants 60–100 cm. Root cylindrical, stout. Stem solitary, lower parts glabrous, pilose above. Basal leaves long-petiolate, sheaths purple; blade ovate-triangular, 16–30 × 9–16 cm, (1–)2-pinnate; pinnae 2 pairs, trifid, ultimate segments ovate-oblong, or lanceolate, 2–5 × 1–1.5 cm, abaxially pubescent, terminal leaflets decursive winged at the base, margin serrate, acuminate or acute at the apex. Cauline leaves gradually reduced upward, 3-lobed. Peduncles stout, 10–20 cm; bracts absent; rays 12–22, 3–9 cm, pilose; bracteoles 2–5, linear, shorter than pedicels; umbellules 10–20-flowered. Calyx teeth triangular. Petals white, outer flowers in umbels radiant. Fruit ovoid, 8–9 × 5–6 mm; vittae solitary in each furrow, 2–4 on commissure, clavate, more than 1/2 length of mericarp. Seed face plane. Fl. Jun–Aug, fr. Aug–Sep.

- Coniferous forests, forest margins, scrub, grassland, alpine meadows, streamsides; 2500–4500 m. W Hubei, Qinghai, W Sichuan, NW Yunnan.

This species has reputed medicinal value.

21. *Heracleum souliei* H. de Boissieu, *Bull. Herb. Boissier*, sér. 2, 3: 852. 1903.

康定独活 kang ding du huo

Plants to 1 m tall. Root stout. Stem branching, villous. Basal leaves 2-pinnate; ultimate segments ovate or lanceolate, terminal leaflets rhombic, base with decursive wings, apex acuminate. Cauline leaves reduced upward. Umbels 13–14 cm wide; peduncles up to 25 cm, villous; bracts absent; rays 30–35, puberulent; bracteoles few, linear; flowers more than 20 per umbellule. Calyx teeth triangular. Petals white, outer flowers in umbels radiant. Fruit obovoid, 6–7 × 4–5 mm; vittae solitary in each furrow, 2 on commissure, clavate, more than 1/2 length of mericarp. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep.

- Thickets, grassy slopes; 2600–3500 m. W Sichuan.

This incompletely known species is recorded only from a few collections. It has reputed medicinal value.

22. *Heracleum henryi* H. Wolff, *Repert. Spec. Nov. Regni Veg.* 33: 76. 1933.

思茅独活 si mao du huo

Plants to 80 cm high. Root cylindrical. Stem few-branched, hirsute. Basal leaves ternate-1–2-pinnate, ultimate segments ovate-oblong or ovate-lanceolate, 2–8 × 2–4.5 cm, sparsely hirsute abaxially or at least along the veins, margin serrate-crenate.

Cauline leaves gradually reduced, 1–2-pinnate to 3-lobed. Peduncles ca. 30 cm, densely hirsute; bracts 5–6, lanceolate, apex caudate; rays 25–32, subequal, ca. 4 cm, hispidulous; bracteoles 6–10, lanceolate or linear, unequal; umbellule 20–30-flowered. Calyx teeth lanceolate. Petals white, apex mucronate, outer flowers in umbel radiant, enlarged petals deeply 2-lobed. Fruit suborbicular, 5–6 × 4–5 mm, hirtellous; vittae solitary in each furrow, 2 on commissure. Fl. Jul–Aug, fr. Sep. $2n = 44^*$.

- Sparse forests, forest margins, thickets on streamsides, grassy slopes; 1300–2300 m. Yunnan.

This species has reputed medicinal value.

23. *Heracleum rapula* Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 6: 145. 1894.

鹤庆独活 he qing du huo

Plants 80–120 cm high. Stem solitary, branched, setulose. Lower leaves ternate/pinnate; leaflets broad-ovate, 8–10 × 5–8 cm, adaxially sparsely setulose, abaxially densely setulose on the veins, 3–5-lobed, lobes ovate-triangular. Upper leaves smaller, sessile, 3-lobed on expanded sheaths. Bracts absent; rays 18–25, unequal; bracteoles 4–6, linear; flowers ca. 20 per umbellule. Calyx teeth minute. Petals white, outer flowers of umbels radiant. Fruit obovoid, 6–7 × 5–6 mm, glabrous; vittae solitary in each furrow, 2 on commissure, clavate, extending to 3/4 length of mericarp. Seed face plane. Fl. and fr. Jul–Oct.

- Streamsides, rice field margins; 2000–2200 m. Yunnan.

This incompletely known species is recorded only from a few collections. It has reputed medicinal value.

24. *Heracleum wolongense* F. T. Pu & X. J. He, *Acta Phytotax. Sin.* 31: 370. 1993.

卧龙独活 wo long du huo

Plants stout, 1–1.5 m tall, pubescent throughout. Root fusiform. Basal petioles 35–50 cm; leaf blade ternate-2-pinnate; primary pinnae 4 pairs, ultimate segments ovate or ovate-rhombic, 5–12 × 3–6 cm, 3–5-lobed, both surfaces densely pubescent on veins, base cuneate or obtuse, margins serrate, apex acute or acuminate. Cauline leaves gradually reduced upward. Umbels 11–20 cm wide; bracts absent; rays 24–35, unequal, 4–10 cm; bracteoles 5, linear, shorter than pedicels; umbellule 30–40-flowered. Calyx teeth obsolete. Petals white, obovate, outer flowers in umbel conspicuously radiant. Fruit suborbicular, 7–9 × 6–8 mm; vittae solitary in each furrow, slightly exceeding 1/2 length of mericarp, 2 on commissure, shorter than the dorsal. Seed face plane. Fl. Jul–Aug, fr. Aug–Sep. $2n = 22^*$.

- Forest margins, thickets, grassy slopes; 1900–2200 m. NC Sichuan (Wenchuan).

25. *Heracleum stenopteroides* Fedde ex H. Wolff, *Repert. Spec. Nov. Regni Veg.* 33: 79. 1933.

腾冲独活 teng chong du huo

Plants 80–120 cm tall. Root cylindrical. Stem solitary, rather stout, branched above. Basal leaves 2–3-pinnate; petiole sheaths broad-ovate; primary pinnae 3–4 pairs, ultimate segments ovate, 1.5–3.2 × 1–2 cm, rachises and veins hispidulous,

base cuneate or cordate, margins serrate. Cauline leaves gradually reduced upward. Peduncles 4–12 cm; bracts 1–3, lanceolate, or caducous; rays 25–30, unequal, 3–9 cm, densely hispidulous; bracteoles 6–8, lanceolate, nearly as long as or shorter than pedicels. Calyx teeth lanceolate. Petals white, outer flowers in umbel radiant, enlarged petals deeply 2-lobed. Ovary densely hispidulous. Mature fruits unknown. Fl. May–Jul.

- Forests, thickets; 2000–2300 m. W Yunnan (Tengchong).

This incompletely known species is recorded only from a few collections.

26. *Heracleum stenopterum* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 291. 1912.

狭翅独活 xia chi du huo

Plants 40–100 cm tall, hispid. Root cylindrical. Stem solitary, branched above. Basal leaves 2–3-pinnate; petiole, sheaths broad-ovate; blade lacerate-pinnatifid; ultimate segments lanceolate, 3–8 × 1–3 cm, base cuneate, margins coarsely serrate; terminal leaflets decursive at base. Cauline leaves gradually reduced upward. Terminal umbels 10–20 cm wide; bracts 2–3, linear; rays 25–35, unequal, 4–10 cm; bracteoles 5–8, linear, nearly as long as pedicels; umbellule 30–40-flowered. Calyx teeth lanceolate. Petals white, outer flowers in umbel radiant, enlarged petals deeply 2-lobed. Fruit obovoid, 6–7 × 4–5 mm, sparsely pilose; vittae solitary in each furrow, 2 on commissure, clavate, about 1/2 as long as mericarp. Seed face plane. Fl. Jul–Aug, fr. Sep. $2n = 22^*$.

- Coniferous forests, alpine scrub and meadows, alpine talus slopes; 2700–4300 m. W Sichuan, W Yunnan.

This species has reputed medicinal value (in Yunnan).

27. *Heracleum yungningense* Handel-Mazzetti, Symb. Sin. 7: 729. 1933.

永宁独活 yong ning du huo

Plants to 1 m tall. Root cylindrical. Stem sparsely hispid or glabrous. Petioles of lower leaves 15–17 cm, hispid; blade ovate-oblong, 15–20 × 6–8 cm, 2–3-pinnate, primary pinnae 3 pairs; ultimate segments ovate-lanceolate, 5–8 × 3–4 cm, both surfaces hispidulous, margins irregularly serrate. Upper leaves gradually reduced, sessile, pinnate to 3-lobed on expanded sheaths. Peduncles 16–30(–40), hispid; bracts few, linear, or absent; rays (13–)20–30, unequal, 3–8 cm; bracteoles few, linear; umbellules 20–30(–40)-flowered. Calyx teeth triangular. Petals white, outer flowers in umbel radiant. Fruit ovoid, 5–6 × ca. 5 mm, subglabrous; vittae solitary in each furrow, 2 on commissure, clavate, slightly exceeding 1/2 length of mericarp. Fl. Jul–Aug, fr. Sep–Oct. $2n = 22^*$.

- Coniferous forests, forest margins, thickets on streamsides, grasslands; 2700–4500 m. W Sichuan, NW Yunnan.

This species has reputed medicinal value.

28. *Heracleum candicans* Wallich ex de Candolle, Prodr. 4: 192. 1830.

白亮独活 bai liang du huo

Plants 40–100(–200) cm tall, pubescent or tomentose. Root stout, cylindrical. Stem solitary, branched. Basal and lower leaves pinnate; pinnae 2–3 pairs, ovate-oblong, 5–7(–20) × 3–5 cm, pinnatifid, abaxially silvery, densely white tomentose, margins serrate, apex mucronate or obtuse. Upper leaves reduced, sessile, 3-lobed on expanded sheaths. Peduncles 15–30 cm, pubescent; bracts 1–3, linear, caducous; rays 15–25(–35), unequal, 3–7(–10) cm, pubescent; bracteoles 5–8, linear; umbellules 20–25-flowered. Calyx teeth minute. Petals white, outer flowers of umbels radiant. Fruit obovoid, 5–8(–10) × 4–6 mm, glabrous when mature; vittae solitary in each furrow, 2 on commissure, clavate, extending to 2/3 length of mericarp. Seed face plane. Fl. May–Jul, fr. Aug–Sep. $2n = 22^*$.

Sparse forests, coniferous forest margins, scrub, alpine meadows, arid grassy slopes, streamsides; 1800–4500 m. W Sichuan, E and S Xizang, C and N Yunnan [Bhutan, N India, Kashmir, Nepal, Pakistan, Sikkim].

This species is very variable, particularly in the size and dissection of the leaves and the shape of the leaflets.

- 1a. Pinnae ovate-oblong, apex mucronate or obtuse 28a. var. *candicans*
- 1b. Pinnae ovate, broad-ovate or rotund, apex obtuse 28b. var. *obtusifolium*

28a. *Heracleum candicans* var. *candicans*

白亮独活(原变种) bai liang du huo (yuan bian zhong)

Tetrataenium candicans (Wallich ex de Candolle) Mandenova.

Pinnae ovate-obovate, apex mucronate or obtuse. Vittae 2 on commissure.

Sparse forests, coniferous forest margins, scrub on arid slopes and in abandoned fields, streamsides; 1800–4500 m. W Sichuan, E and S Xizang, C and N Yunnan [N India, Kashmir, Nepal, Pakistan].

This variety has reputed medicinal value.

28b. *Heracleum candicans* var. *obtusifolium* (Wallich ex de Candolle) F. T. Pu & M. F. Watson, Acta Phytotax. Sin. 42: 562. 2004.

钝叶独活 dun ye du huo

Heracleum obtusifolium Wallich ex de Candolle, Prodr. 4: 191. 1830; *Tetrataenium obtusifolium* (Wallich ex de Candolle) Mandenova.

Pinnae ovate, broad-ovate or rotund, apex obtuse. Vittae 2(–4) on commissure. $2n = 22^*$.

Scrub, alpine meadows, arid grassy slopes; 3000–4200 m. W Sichuan, S Xizang, C and NW Yunnan [Bhutan, NE India, Nepal, Sikkim].

29. *Heracleum millefolium* Diels, Repert. Spec. Nov. Regni Veg. 2: 65. 1906.

裂叶独活 lie ye du huo

Plants 10–50 cm tall, white puberulent. Root fusiform, 30–50 × 5–10 mm; stem collar fibrous with residual sheaths. Stem

2–3-branched, hispid. Leaves mostly basal; petioles 1.5–9 cm; leaf blade narrowly oblong or lanceolate, 2.5–16 × 0.6–2.5 cm, 3–4-pinnate; primary pinnae 4–7 pairs, ultimate segments linear, 2–5 × 0.5–1 mm. Cauline leaves few, similar to the basal, smaller. Inflorescence 1–2-branched, terminal umbels 3–4 cm wide, compact; peduncles 5–25 cm, hispid; bracts 4–5, linear, 2–6 mm, sparsely puberulent; rays 4–12, unequal, 0.5–2.5 cm, scabrid; bracteoles 4–5, linear-lanceolate, 3–5 mm, sometimes 2-lobed at apex, hispidulous. Calyx teeth prominent, triangular, ca. 0.75 mm, unequal. Petals white, yellowish or purplish, outer flowers in umbel radiant, enlarged petals very conspicuous, deeply 2-lobed, abaxially hispidulous. Ovary sparsely puberulent. Fruit broad ovoid, 5–6 × ca. 4 mm, puberulent; lateral ribs narrowly winged; vittae solitary in each furrow, 2 on commissure, clavate, slender, extending to 3/4 length of mericarp. Seed face plane. Fl. Jun–Aug, fr. Sep–Oct. $2n = 22^*$.

Coniferous forests, sparse forests, forest margins, alpine scrub and meadows, riparian grasslands, crop margins; 2800–5000 m. C and SW Gansu, Qinghai, W Sichuan, SE Xizang, NW Yunnan [Bhutan].

This species is retained within the genus *Heracleum* on account of the radiant outer flowers and clavate vittae.

- 1a. Primary pinnae close to each other along the rachis, ultimate segments short, 2–5 mm 29a. var. *millefolium*
 1b. Primary pinnae remotely inserted on

the rachis, ultimate segments long, 5–8 mm 29b. var. *longilobum*

29a. *Heracleum millefolium* var. *millefolium*

裂叶独活(原变种) lie ye du huo (yuan bian zhong)

Heracleum smithii Fedde ex H. Wolff; *Peucedanum malcolmii* Hemsley & H. Pearson; *Semenovia millefolia* (Diels) V. M. Vinogradova & Kamelin.

Primary pinnae 4–7 pairs, close to each other along the rachis, ultimate segments linear, 2–5 × 0.5–1 mm.

Sparse forests, forest margins, alpine scrub and meadows, riparian grasslands; 2900–5000 m. SW Gansu, Qinghai, W Sichuan, SE Xizang, NW Yunnan [Bhutan].

This variety has reputed medicinal value.

29b. *Heracleum millefolium* var. *longilobum* C. Norman, J. Arnold Arbor. 14: 25. 1933.

长裂叶独活 chang lie ye du huo

Heracleum longilobum (C. Norman) M. L. Sheh & T. S. Wang; *Semenovia montana* Kamelin & V. M. Vinogradova.

Primary pinnae remotely inserted on the rachis, ultimate segments linear, 5–8 × 1–2 mm. $2n = 22^*$, 24^* .

• Coniferous forests, alpine scrub and meadows, crop margins; 2800–3500 m. C and SW Gansu, SE Qinghai, W Sichuan, SE Xizang.

The following taxa have been described or reported from Chinese material, but are imperfectly known by the present authors because no specimens have been seen or the specimens are inadequate.

Heracleum canescens Lindley (in Royle, Ill. Bot. Himal. Mts. 232. 1839), described from NW India (“Mussooree,” *J. F. Royle s.n.*, lectotype, K), has been doubtfully reported from Xizang and NW Yunnan. All Chinese specimens allegedly of this W Himalayan (NW India, Pakistan) species seen by us were inadequate for accurate determination.

Heracleum kansuense Diels (Repert. Spec. Nov. Regni Veg. 2: 66. 1906), described from Ningxia (“Gansu: Hsi ning fu” [Xiningpu]), *W. Filchner 21*, holotype, P).

Heracleum likiangense H. Wolff (Repert. Spec. Nov. Regni Veg. 33: 78. 1933), described from Yunnan (Lijiang, 13500 ft, *J. F. C. Rock 4957*, holotype, unlocalized).

Heracleum moellendorffii var. *sageniifolium* K. T. Fu (Fl. Tsinling. 1(3): 464. 1981 [“*sageniifolium*”]), described from Gansu and Shaanxi (*K. T. Fu 17238*, holotype, WNU).

Heracleum schansianum Fedde ex H. Wolff (Repert. Spec. Nov. Regni Veg. 33: 78. 1933), described from Shanxi (*K. A. H. Smith 7632*, holotype, GB).

97. SEMENOVIA Regel & Herder, Bull. Soc. Imp. Naturalistes Moscou 39(3): 78. 1866.

大瓣芹属 da ban qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Neoplatytaenia Geldikhanov; *Platytaenia* Nevski & Vvedensky.

Herbs, perennial. Taproot fusiform, crown usually clothed with fibrous remnant sheaths. Stem usually solitary. Basal and lower leaves 1–2-pinnate. Umbels terminal and lateral; umbellules 10–30-flowered. Calyx teeth minute or conspicuous. Petals white, rarely pale yellow, outer flowers of the umbel radiant with outer petals enlarged, broad obovate, apex deeply 2-lobed, abaxially puberulent. Stylopodium conic; styles slightly longer than stylopodium, reflexed. Fruit ovoid or ovoid-oblong, pilose to glabrous, dorsally compressed; dorsal and intermediate ribs raised, rarely undulate, lateral ribs broadly winged or nearly as wide as the dorsal; vittae 1 in each furrow, 2 on commissure, filiform, usually extending to the base or at least to 3/4 length of mericarp. Seed face plane or slightly concave. Carpophore 2-parted to base.

About 20 species: C Asia, SW Asia (Iran); four species in China.

- 1a. Calyx teeth conspicuous, unequal; lateral ribs of fruit broadly winged.
 2a. Petals white, purple veining absent; fruit pilose; basal leaves pinnate, pinnae broad-ovate to ovate-oblong, 20–30 × 10–20 mm 1. *S. transiliensis*
 2b. Petals white or yellowish-white, with purple medial veins; fruit glabrous; basal leaves 2-pinnate, ultimate segments linear, ca. 5 × 1 mm 2. *S. rubtzovii*
 1b. Calyx teeth minute, inconspicuous; lateral ribs of fruit narrowly winged.

- 3a. Fruit ribs undulate; basal leaves 1–2-pinnate, pinnae ovate-oblong, 5–8 × 3–4 mm 3. *S. pimpinelloides*
 3b. Fruit ribs filiform, elevated; basal leaves pinnate, pinnae ovate or broad-ovate, 30–60 × 25–50 mm 4. *S. dasycarpa*

1. *Semenovia transiliensis* Regel & Herder, Bull. Soc. Imp. Naturalistes Moscou 39(3): 79. 1866.

大瓣芹 da ban qin

Heracleum transiliense (Regel & Herder) O. Fedtschenko & B. Fedtschenko.

Plants 20–60 cm tall. Stem slender, branching, glabrous rarely sparsely puberulent. Basal leaves pinnate; pinnae 5–6 pairs, broad-ovate to ovate-oblong, 2–3 × 1–2 cm, margin pinnatifid to pinnatisect. Cauline leaves similar to the basal, reduced upward with strongly expanding sheaths; pinnae lanceolate, glabrous or finely pubescent. Bracts 3–5, linear; rays 4–15, subequal, 3–4 cm, densely hairy with spreading hairs; bracteoles 3–5, linear, nearly as long as umbellule; flowers 15–20 per umbellule. Calyx teeth conspicuous, unequal. Petals white. Fruit ovoid, 6–8 × 4–5 mm, pilose; lateral ribs broadly winged; dorsal vittae filling the furrow, 3/4 length of mericarp, lateral vittae sometimes shorter, commissure vittae narrower than dorsal. Fl. and fr. Jul–Sep.

Grassy slopes, alpine meadows; 1900–3200 m. WC Xinjiang [Kazakhstan, Kyrgyzstan].

2. *Semenovia rubtzovii* (Schischkin) Mandenova, Trudy Tbilissk. Bot. Inst. 20: 23. 1959.

光果大瓣芹 guang guo da ban qin

Platytaenia rubtzovii Schischkin in Schischkin & Bobrov, Fl. URSS 17: 357. 1951; *Zosima rubtzovii* (Schischkin) M. Hiroe.

Plants 40–60 cm tall. Taproot 1–2 cm across. Stem profusely branched, villose. Basal leaves 2-pinnate; ultimate segments linear, 4–6 × ca. 1 mm, puberulent. Cauline leaves similar to the basal, reduced upward. Umbels terminal and many lateral, 3–8 cm across; bracts 2–3, lanceolate, villose, membranous at margins; rays 7–13, unequal, 1.5–3 cm, pubescent; bracteoles 5, similar to the bracts; umbellules 15–20-flowered. Calyx teeth conspicuous, triangular. Petals white or yellowish-white, medial veins purple. Fruit ovoid, 5–7 × 3–4 mm, glabrous; dorsal and intermediate ribs filiform, lateral ribs broadly winged; vittae extending to base of mericarp, commissure vittae shorter than dorsal. Seed face plane. Fl. and fr. Jun–Aug.

Pebbly slopes, rock crevices. N Xinjiang (Ili) [Kazakhstan].

3. *Semenovia pimpinelloides* (Nevski) Mandenova, Trudy Tbilissk. Bot. Inst. 20: 22. 1959.

密毛大瓣芹 mi mao da ban qin

Platytaenia pimpinelloides Nevski, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 4: 271. 1937; *Neoplattytaenia pimpinelloides* (Nevski) Geldikhanov; *Zosima pimpinelloides* (Nevski) M. Hiroe.

Plants small, 25–40 cm tall. Taproot ca. 1 cm across. Stems 1–2, branched from base, pubescent. Basal leaves rosulate, pinnate; pinnae 3–4 pairs, pinnatifid, ovate-oblong, 5–8 × 3–4 mm, both surfaces densely pubescent, olivaceous; petiole short. Cauline leaves similar to basal, reduced upward. Umbels terminal, 2–5 cm across; bracts 4–6, lanceolate, densely villose, with membranous margins; rays 5–10, subequal, 1.5–2 cm, pubescent; bracteoles similar to the bracts, shorter than pedicels. Calyx teeth minute. Petals pale yellow. Fruit ovoid, 5–7 × 3–5 mm, puberulent; all ribs raised, undulate, narrowly winged; vittae reaching to the base of mericarp. Seed face slightly concave. Fl. and fr. Jul–Aug.

Arid pebbly slopes in alpine zone; 2600–3100 m. SW Xinjiang (Wuqia) [Kazakhstan].

4. *Semenovia dasycarpa* (Regel & Schmalhausen) Korovin ex Pimenov & V. N. Tikhomirov in Czerepanov, Sosud. Rast. SSSR, 29. 1981.

毛果大瓣芹 mao guo da ban qin

Pastinaca dasycarpa Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 598. 1878; *Malabaila dasycarpa* (Regel & Schmalhausen) Schischkin; *Platytaenia dasycarpa* (Regel & Schmalhausen) Korovin; *P. komarovii* (Mandenova) Schischkin; *Semenovia komarovii* Mandenova; *Tordyliopsis komarovii* (Mandenova) Mandenova; *Zosima komarovii* (Mandenova) M. Hiroe.

Plants small, 3–50 cm tall. Taproot ca. 1.5 cm across, crown semi-woody. Stem single, little-branched, pubescent. Basal leaves pinnate; pinnae 3–4 pairs, ovate or broad-ovate, 3–6 × 2.5–5 cm, 2–3-lobed, both surfaces sparsely pubescent, margins sharply serrate. Cauline leaves similar to the basal, reduced upward. Umbels 4–6 cm across; bracts 4–6, linear-lanceolate, densely pubescent, with narrow membranous margins; rays 4–14, unequal, up to 7 cm, densely pubescent; bracteoles similar to the bracts, connate at the base, nearly as long as umbellule; flowers 20–30 per umbellule. Calyx teeth minute. Petals white. Fruit ovoid-oblong, ca. 10 × 6 mm, puberulent; dorsal and intermediate ribs filiform, raised, lateral ribs narrowly winged; vittae reaching to the base of mericarp. Seed face plane. Fl. and fr. Jul–Aug.

Grassy slopes, meadows; 2000–2300(–3000) m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

98. **TORDYLIOPSIS** de Candolle, Prodr. 4: 199. 1830.

阔翅芹属 kuo chi qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Mark F. Watson

Herbs, perennial, clump-forming. Rootstock short, stout, branched. Stem erect, slender, simple or sparingly branched, bases clothed in fibrous remnant sheaths. Basal leaves pinnate, oblong in outline, petioles slender, narrowly sheathing. Stem leaves reduced upwards, sheaths expanded. Umbels compound; bracts and bracteoles numerous, ovate-lanceolate, largely enveloping flowers. Calyx

teeth linear, unequal. Petals greenish- or purplish-white, obovate, dimorphic, outer petals in umbellules enlarged (radiant), apex notched, narrowly inflexed. Stylopodium domed; styles long. Fruit ellipsoid, strongly compressed dorsally, sparsely hairy when young, smooth at maturity; dorsal ribs inconspicuous, lateral ribs extended into broad wings, wings with strengthening cells beneath the inner margin; vittae 1 in each furrow, clavate, extending for more than 1/2 fruit, 1–4 or absent on commissure (often abortive). Seed face plane. Carpophore 2-cleft to base.

One species: Bhutan, China, Nepal, Sikkim.

1. *Tordyliopsis brunonis* de Candolle, Prodr. 4: 199. 1830.

珠峰阔翅芹 zhu feng kuo chi qin

Heracleum brunonis (de Candolle) C. B. Clarke.

Plants 20–60 cm. Basal petioles 10–25 cm; leaflets 5–9, oblong-ovate, 2–3.5 × 1.5–3 cm, sessile, base rounded, margin irregularly serrate, apex acute, softly pubescent especially abax-

ially. Umbels 4–6 cm across; rays 4–10, 1.5–3 cm, densely softly pubescent; bracts 4–6, lanceolate-acuminate, 15–30 × 2–5 mm; umbellules 1.5–2 cm across; bracteoles similar to bracts, overtopping flowers. Outer radiant petals to 7 × 4 mm. Styles 3–4 mm. Fruit 6–7 × 5–6 mm, wings ca. 1 mm. Fl. Jul–Aug, fr. Aug–Sep.

Subalpine moist dwarf scrub, among shrubs and boulders; 4200–4300 m. S Xizang [Bhutan, Nepal, Sikkim].

99. SAPOSHNIKOVIA Schischkin in Schischkin & Bobrov, Fl. URSS 17: 359. 1951.

防风属 fang feng shu

Pan Zehui (潘泽惠); Mark F. Watson

Herbs perennial, glabrous. Rootstock thick and branched, annular, crown surrounded by fibrous remnant sheaths. Stem much-branched from base, thinly ribbed, branches almost equaling stem. Leaves 2–3-pinnate/pinnatisect. Umbels terminal and lateral; bracts absent; bracteoles several, linear-lanceolate. Calyx teeth short, triangular-ovate. Petals white, obovate with incurved tip, glabrous. Stylopodium conic; styles short, elongated and reflexed in fruit; ovary densely white tuberculate. Fruit oblong-ellipsoid, strongly dorsally compressed; dorsal ribs slightly prominent, lateral ribs narrowly winged; vittae 1 in each furrow, one large vittae in each rib, 2 on commissure. Seed face plane.

One species: China, Korea, Mongolia, Russia (E Siberia).

1. *Saposhnikovia divaricata* (Turczaninow) Schischkin in Schischkin & Bobrov, Fl. URSS 17: 54. 1951.

防风 fang feng

Stenocoelium divaricatum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 17: 734. 1844; *Cachrys seseloides* (Hoffmann) Marschall von Bieberstein; *Johrenia seseloides* (Hoffmann) Koso-Poljansky; *Laser divaricatum* (Turczaninow) Thellung; *Ledebouriella divaricata* (Turczaninow) M. Hiroe; *L. seseloides* (Hoffmann) H. Wolff; *Rumia seseloides* Hoffmann; *Siler divaricatum* (Turczaninow) Benth & J. D. Hooker; *Trinia dahurica* Turczaninow ex Besser; *T. seseloides* (Hoffmann) Ledebour.

Plants 30–80 cm high. Rootstock to 2 cm thick. Basal

leaves numerous; petioles flattened, with ovate sheaths; leaf blades oblong-ovate to broad-ovate, 14–35 × 6–8(–18) cm, 2-pinnate; pinnae 3–4 pairs, petiolulate; ultimate segments linear-lanceolate or cuneate-obovate, 3-lobed at apex, 2–5 × 0.5–2.5 cm. Leaves reduced upwards. Umbels numerous, ca. 6 cm across; peduncles 2–5 cm; rays 5–7, 3–5 cm; bracteoles 4–6, ca. 3 mm, acuminate; umbellules 4–5-flowered. Petals ca. 1.5 mm. Fruit 4–5 × 2–3 mm, tuberculate when young, becoming smooth when mature. Fl. Aug–Sep, fr. Sep–Oct. $n = 8^*$.

Scrub, hillsides, grasslands, stony slopes; 400–800 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Korea, Mongolia, Russia (E Siberia)].

The root is used as the important traditional Chinese medicine “fang feng.”

100. DAUCUS Linnaeus, Sp. Pl. 1: 242. 1753.

胡萝卜属 hu luo bo shu

She Menglan (佘孟兰 Sheh Meng-lan); Mark F. Watson

Herbs biennial. Stem solitary erect, branching, retrorsely hispid. Basal leaves petiolate; blade pinnately decompose, ultimate segments small and narrow. Leaves reduced upwards becoming sessile, wholly sheathing, divisions narrow and elongate. Umbels terminal and axillary, loosely compound; bracts numerous, pinnate, rarely entire, usually reflexed; rays numerous, spreading or incurved after anthesis, tightly compact in fruit; bracteoles numerous, toothed or entire; umbellules many-flowered, central flowers usually sterile with enlarged purple petals. Pedicels unequal. Calyx teeth obsolete to conspicuous. Petals white or yellow, orbiculate, with an inflexed apex, outer petals in outer flowers of an umbellule enlarged and radiant. Stylopodium conic; styles short. Fruit ellipsoid, dorsally compressed; primary ribs filiform, bristly; secondary ribs winged, wings with glochidiate prickles; vittae 1 in furrows under the secondary ribs, 2 on commissure. Seed face shallowly concave to nearly plane. Carpophore entire or bifid at apex. (Generic description relates to Chinese taxa only.)

About 20 species: N Africa, SW Asia, Europe; cultivated and adventive worldwide in temperate regions; one species in China.

1. *Daucus carota* Linnaeus, Sp. Pl. 1: 242. 1753.

野胡萝卜 ye hu luo bo

Plants to 120 cm. Leaves oblong, 2–3-pinnate/pinnatisect; ultimate segments linear to lanceolate, 2–15 × 0.5–4 mm, glabrous to hispid especially on the veins and margins, acute, mucronate. Peduncles 10–55 cm, retrorsely hispid; bracts foliaceous, pinnate, rarely entire, lobes linear, 3–30 mm, margin scarious; rays 2–7.5 cm, unequal; bracteoles 5–7, linear, entire or 2–3-lobed, more or less scarious and ciliate, equaling or exceeding flowers. Petals white, sometimes yellow or pinkish. Fruit 3–4 × ca. 2 mm. Fl. May–Jul.

Mountain slopes, ruderal areas, also widely cultivated; 2000–3000 m. Anhui, Guizhou, Hubei, Jiangsu, Jiangxi, Sichuan, Zhejiang [N Africa, SW Asia, Europe; cultivated and adventive worldwide in temperate regions].

The fruit used for medicine (“hu luo bo”) and oil.

- 1a. Taproot thickened, elongate terete or clavate,
fleshy, reddish, reddish-yellow, or yellow
(a carrot) 1b. var. *sativa*

- 1b. Taproot slender, branched, woody, not fleshy,
usually brown 1a. var. *carota*

1a. *Daucus carota* var. *carota*

野胡萝卜(原变种) *ye hu luo bo* (*yuan bian zhong*)

Taproot slender, branched, woody, not fleshy, usually brown.

Mountain slopes, ruderal areas; 2000–3000 m. Anhui, Guizhou, Hubei, Jiangsu, Jiangxi, Sichuan, Zhejiang [N Africa, SW Asia, Europe; adventive worldwide in temperate regions].

1b. *Daucus carota* var. *sativa* Hoffmann, Deutschl. Fl. 91. 1791.

胡萝卜 *hu luo bo*

Daucus carota subsp. *sativa* (Hoffmann) Archangeli.

Taproot thickened, elongate terete or clavate, fleshy, reddish, reddish-yellow, or yellow.

Widely cultivated in China [of cultivated origin; cultivated worldwide].

The root is widely used as a vegetable (carrot).