

19. ARENARIA Linnaeus, Sp. Pl. 1: 423. 1753.

无心菜属 *wu xin cai shu*

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Herbs annual or perennial, rarely biennial. Stems erect or rarely creeping, often caespitose or pulvinate. Leaves opposite, rarely whorled; leaf blade linear to elliptic, ovate, or orbicular, usually flat, margin entire. Flowers solitary or numerous in cymes, actinomorphic. Sepals 4 or 5, apex entire, rarely emarginate. Petals 4 or 5, sometimes absent, apex entire to toothed, 2-cleft, or fimbriate. Stamens (2–5 or 8 or 10). Ovary 1-loculed; ovules numerous. Styles 2 or 3(–5). Capsule ovoid, obovoid, or globose, usually shorter than persistent sepals, rarely equaling or longer than them, 3- or 6-valved. Seeds reniform or subovoid, flattened, smooth, tuberculate, or narrowly winged.

More than 300 species: N temperate to arctic regions; 102 species (79 endemic) in China.

Arenaria has been subdivided into ten subgenera, several of which were further divided into sections and series (McNeill, Notes Roy. Bot. Gard. Edinburgh 24: 79–155. 1962). Six subgenera are represented in China, one of which (*A. subgen. Odontostemma*) contains more than half the species.

Arenaria ladyginii Kozhevnikov (Novosti Sist. Vyssh. Rast. 21: 67. 1984) was described from Xizang. However, the type has not been seen by the present authors and its identity could not be ascertained.

- 1a. Styles usually 3 and capsules 6-valved or -toothed, or styles rarely 2 and capsules 4-valved or -toothed; petal apex entire or slightly emarginate; sepals never truncate and saccate at base, not excurved.
- 2a. Sepals not incrassate at base, veins not obviously impressed; leaf blade subulate to ovate, margin and apex incrassate, apex not setiform but spinose.
- 3a. Sepal apex obtuse, margin scarious; basal leaf blade subulate to linear-lanceolate, cauline leaf blade imbricate in 4 rows (decussate), ovate, less than 5 mm, persistent; flowers solitary or 3 in cymes; plants congested caespitose or pulvinate (4. *A. subgen. Dolophragma*).
- 4a. Plants densely caespitose; stems 10–20 cm, glandular villous 33. *A. przewalskii*
- 4b. Plants densely pulvinate; stems 2.5–15 cm, glandular villous or glabrous.
 - 5a. Stems 4–15 cm, villous or glandular hairy.
 - 6a. Stems 10–15 cm, villous; sepals ovate to lanceolate-ovate 34. *A. smithiana*
 - 6b. Stems 4–9 cm, glandular villous; sepals elliptic 35. *A. oreophila*
 - 5b. Stems 2.5–6 cm, glabrous.
 - 7a. Pedicels 2–4 cm; petals ca. 2 × as long as sepals; anthers violet 36. *A. densissima*
 - 7b. Pedicels absent (flowers sessile); petals slightly longer than sepals; anthers yellow 37. *A. polytrichoides*
- 3b. Sepal apex acute, acuminate, or obtuse, apex and margin usually hard; leaf blade remote or sometimes approximate (covering each other), but never imbricate in 4 rows, lanceolate, elliptic, ovate, or orbicular, more than 5 mm, deciduous, rarely persistent; flower solitary; plants densely caespitose but never pulvinate (5. *A. subgen. Solitaria*).
- 8a. Floral disc large, with 5 obvious glands.
 - 9a. Stems 1–15 cm, villous on one side; leaf blade glabrous except ciliate at base; petals white or pink 42. *A. forrestii*
 - 9b. Stems 2–6 cm, villous all round; leaf blade glandular pubescent; petals violet 43. *A. glanduligera*
- 8b. Floral disc small or not impressed, glands small or degenerate.
 - 10a. Petals violet; anthers violet 41. *A. rhodantha*
 - 10b. Petals white or pink; anthers pale yellow, green, or black.
 - 11a. Plants hairy throughout; stems diffuse; leaf blade ovate or ovate-orbicular, margin long hairy; petals white; anthers dark green or black 38. *A. ciliolata*
 - 11b. Plants not hairy throughout; stems erect; leaf blade lanceolate or narrowly orbicular, margin shortly hairy or glabrous; petals white or pink; anthers yellow or green.
 - 12a. Stems 4–6 cm; leaf blade lanceolate or ovate-lanceolate, margin shortly hairy; inflorescence rachis bracteate proximally; sepal apex excurved; petals white or pink; anthers pale yellow 39. *A. ramellata*
 - 12b. Stems 2–5 cm; leaf blade narrowly orbicular, margin glabrous; inflorescence rachis ebracteate proximally; sepal apex erect; petals white; anthers green 40. *A. stracheyi*

- 2b. Sepals usually (rarely not) incrassate at base, veins usually obvious (rarely not); leaf blade variously shaped, margin and apex not incrassate, or margin scarious, apex spinose when blade aristate.
- 13a. Leaf blade linear to orbicular, or aristate and narrowly linear, margin not obviously scarious; sepal veins inconspicuous; plants solitary or caespitose, rarely compacted pulvinate; leaves deciduous, rarely persistent.
- 14a. Sepals slightly or not incrassate at base; leaf blade usually linear to ovate, rarely needle-shaped (1. *A.* subgen. *Arenaria*).
- 15a. Seeds with a flat wing; petals slightly shorter than or equaling sepals 6. *A. compressa*
- 15b. Seeds wingless; petals shorter than bracts, slightly shorter to longer than sepals.
- 16a. Seeds tuberculate with raised papillae; petals usually slightly shorter than sepals 1. *A. serpyllifolia*
- 16b. Seeds not tuberculate with raised papillae; petals equaling or longer than sepals.
- 17a. Seeds with curls; inflorescence usually axillary; leaf blade elliptic to ovate or orbicular.
- 18a. Leaf blade elliptic, ovate, or suborbicular; sepals glabrous abaxially 2. *A. orbiculata*
- 18b. Leaf blade elliptic-lanceolate or obovate; sepals sparsely white villous on veins abaxially 3. *A. neelgherrensis*
- 17b. Seeds reticulate; inflorescence of terminal cymes; leaf blade linear to ovate-saccate.
- 19a. Capsule 1-seeded; leaf blade linear; sepals with papillose spots abaxially 4. *A. monosperma*
- 19b. Capsule several seeded; leaf blade elliptic to elliptic-ovate; sepals white glandular villous abaxially 5. *A. puranensis*
- 14b. Sepals markedly incrassate or woody at base; leaf blade linear or linear-subulate, graminoid, rarely aristate with a spinose tip (2. *A.* subgen. *Eremogone*).
- 20a. Plants completely woody at base; sepals not herbaceous, veins inconspicuous, apex usually acuminate.
- 21a. Leaf blade apex acute; pedicels glabrous, rarely sparsely glandular hairy 14. *A. griffithii*
- 21b. Leaf blade apex spinose; pedicels densely glandular hairy 15. *A. androsacea*
- 20b. Plants not completely woody at base; sepals herbaceous throughout or only at middle, veins impressed, apex usually obtuse, rarely acute or acuminate.
- 22a. Sepals herbaceous only at middle, apex long acuminate, with (1–)3 or more parallel veins 7. *A. potaninii*
- 22b. Sepals herbaceous ± throughout, apex obtuse, 1-veined.
- 23a. Stems with congested, pale brown, long, hardened, dead leaves at base; leaves forming a sheath at base 8. *A. juncea*
- 23b. Stems without basal leaves as above; leaves not forming a sheath at base.
- 24a. Plants pulvinate; stems 4–10 cm; leaf blade linear to subulate, 1.5–5 cm.
- 25a. Stems 4–10 cm, white glandular hairy distally; sepals ± glandular villous 12. *A. formosa*
- 25b. Stems 6–10 cm, villous distally; sepals glabrous 13. *A. haitzeshanensis*
- 24b. Plants congested caespitose; stems 4–20 cm; leaf blade linear, 2–6 cm.
- 26a. Stems 4–10 cm, glandular pubescent distally 11. *A. grueningiana*
- 26b. Stems 10–20 cm; all or only peduncle proximally glandular hairy, or glabrous.
- 27a. Stems glabrous proximally, becoming glandular hairy or villous distally; sepals glabrous 9. *A. capillaris*
- 27b. Stems hirsutulous throughout; sepals densely glandular hairy 10. *A. acicularis*
- 13b. Leaf blade subulate to linear, never setiform or graminoid, margin obviously scarious; sepal veins impressed; plants caespitose to compacted pulvinate; leaves persistent (3. *A.* subgen. *Eremogoneastrum*).
- 28a. Flowers few, in cymes.
- 29a. Stems sparsely villous, 2–3 cm; leaf blade 5–6 mm; sepals 3-veined 31. *A. taibaishanensis*
- 29b. Stems glandular villous, to 8 cm; leaf blade 0.7–20 mm; sepals usually 1-veined 32. *A. festucoides*
- 28b. Flowers solitary, rarely paired.
- 30a. Flowers sessile.
- 31a. Sepals violet abaxially; petals pink, lanceolate or orbicular 27. *A. shannanensis*
- 31b. Sepals green; petals white, ovate, obovate, or saccate.
- 32a. Flowers ca. 1.8 cm in diam.; sepals ovate-lanceolate; petals broadly obovate, ca. 1.5 × as long as sepals 28. *A. edgeworthiana*

- 32b. Flowers ca. 0.8 cm in diam.; sepals elliptic-lanceolate or lanceolate; petals narrowly obovate or saccate, shorter or slightly longer than sepals.
- 33a. Sepals elliptic-lanceolate; petals narrowly obovate, slightly longer than sepals; anthers equal; styles equaling ovary 29. *A. bryophylla*
- 33b. Sepals lanceolate; petals saccate, shorter than sepals; anthers 5 long and 5 short; styles ca. 2.5 × as long as ovary 30. *A. zadoiensis*
- 30b. Flowers pedicellate.
- 34a. Pedicels glandular villous or villous.
- 35a. Pedicels villous.
- 36a. Sepals lanceolate, glabrous 19. *A. kansuensis*
- 36b. Sepals narrowly lanceolate, sparsely pilose, at least at base 20. *A. ischnophylla*
- 35b. Pedicels glandular villous.
- 37a. Sepals ovate-lanceolate, 3-veined; petals ovate, ca. 1/3–1/2 as long as sepals 16. *A. brevipedata*
- 37b. Sepals lanceolate or ovate-lanceolate, 1-veined; petals elliptic, slightly longer than sepals.
- 38a. Flowers solitary, rarely paired, pedicel 2.5–5 × as long as bracts; anthers yellow 17. *A. baxoiensis*
- 38b. Flowers solitary, never paired, pedicel shorter than bracts; anthers black 18. *A. kumaonensis*
- 34b. Pedicels glabrous.
- 39a. Pedicels 4–10 mm.
- 40a. Pedicels 5–10 mm; sepals lanceolate, ca. 5 mm; anthers yellow; petals not callose at base 21. *A. roborowskii*
- 40b. Pedicels ca. 4 mm; sepals elliptic, 3 mm; anthers white; petals with a yellow, oblong callus at base 22. *A. lancangensis*
- 39b. Pedicels 1–2 mm.
- 41a. Sepals hard, 1-veined, base ciliate, apex greenish brown 23. *A. gerzensis*
- 41b. Sepals soft, 1–3-veined, base not ciliate, apex green.
- 42a. Flowers 6–7 mm in diam. 26. *A. pulvinata*
- 42b. Flowers ca. 15 mm in diam.
- 43a. Sepals linear-lanceolate, 7–8 mm, 1–3 veined; petals elliptic-ovate, 8–9 mm; anthers yellow 24. *A. qinghaiensis*
- 43b. Sepals lanceolate, 6–7 mm, closely 3-veined; petals obovate, 4–5 mm; anthers violet 25. *A. aksayqingensis*
- 1b. Styles usually 2, sometimes 3(or 4 or 5); capsule 4-valved or -toothed, rarely 6-, 8-, or 10-valved or -toothed; petal apex entire to fimbriate; sepals truncate and ± saccate at base, excurved (6. *A.* subgen. *Odontostemma*).
- 44a. Petal apex toothed or fimbriate; filaments opposite sepals with a gland at base; styles 2.
- 45a. Petals fimbriate or toothed.
- 46a. Roots conic.
- 47a. Leaf blade 0.5–1.5 × 0.2–1 cm; sepals 4–10 mm; petals slightly longer than sepals 101. *A. delavayi*
- 47b. Leaf blade 1–3 × 0.5–0.6 cm; sepals 3–6 mm; petals ca. 2 × as long as sepals 102. *A. yunnanensis*
- 46b. Roots fusiform, solitary or caespitose, rarely each node of rhizome globose or clavate, forming a moniliform chain.
- 48a. Roots moniliform 106. *A. monilifera*
- 48b. Roots fusiform.
- 49a. Leaves glabrous; sepal margin black ciliate 92. *A. salweenensis*
- 49b. Leaves often glandular pubescent; sepals glandular pubescent but margin not black ciliate.
- 50a. Anthers yellow, rarely green.
- 51a. Stems 10–25 cm; leaf blade narrowly elliptic, orbicular-elliptic, or orbicular-lanceolate; pedicels villous or glandular hairy 97. *A. fimbriata*
- 51b. Stems 40–60 cm; leaf blade narrowly elliptic-saccate, ovate-elliptic, or ovate; pedicels multicellular pubescent or glandular hairy.
- 52a. Plants annual or biennial; stems 30–60 cm; leaves to 40 cm; seeds 2 or 3 98. *A. debilis*
- 52b. Plants perennial; stems 10–40 cm; leaves to 15 cm; seeds 11 or 12 99. *A. polysperma*
- 50b. Anthers black, violet, or yellowish brown (rarely yellow in *A. iochanensis*).
- 53a. Plants hispid; leaf blade ovate or orbicular-elliptic 93. *A. trichophora*

- 53b. Plants glandular or shortly villous; leaf blade broadly lanceolate, orbicular-ovate, or orbicular.
- 54a. Stem solitary, branched below middle; leaf blade orbicular-obovate or orbicular, 3–10 mm wide; seeds 2–4, wingless; roots several clustered together 96. *A. barbata*
- 54b. Stems branched at base, procumbent, diffuse, or erect; leaf blade lanceolate, 1–4 mm wide; seeds numerous, with a narrow wing; root solitary.
- 55a. Stems procumbent or erect; leaf blade usually broadly lanceolate, 2–4 mm wide; pedicels 0.5–1.5 cm; petal apex fimbriate; anthers violet or black 94. *A. yulongshanensis*
- 55b. Stems diffuse; leaf blade narrowly lanceolate, 1–3 mm wide; pedicels 0.5–2 cm; petal apex slightly toothed; anthers yellow 95. *A. iochanensis*
- 45b. Petal apex toothed.
- 56a. Roots solitary or several clustered together, spinose, rarely conic.
- 57a. Stems slender; leaves glabrous or sparsely hairy; petal apex 4-toothed.
- 58a. Stems glandular pubescent with 2 lines of hairs; leaves sparsely hairy; petals obovate or narrowly elliptic 80. *A. quadridentata*
- 58b. Stems and leaves glabrous; petals obovate or cuneate 81. *A. giraldii*
- 57b. Stems rigid; leaves variously hairy; petal apex with small teeth.
- 59a. Leaf blade ovate or ovate-orbicular; sepals orbicular-ovate or orbicular-lanceolate 85. *A. fridericae*
- 59b. Leaf blade mostly ovate-lanceolate or ovate; sepals lanceolate, rarely ovate.
- 60a. Sepals long villous; petals longer than sepals, but less than 2 × as long as them ... 82. *A. trichophylla*
- 60b. Sepals villous or glandular hairy; petals more than 1.5 × as long as sepals.
- 61a. Stems to 1.5 cm, with numerous branches; flower solitary, terminal, to 1.5 cm in diam.; anthers violet to yellow-brown 83. *A. pogonantha*
- 61b. Stems to 30 cm, distally with branched, dichasial cymes; flowers small, to 0.8 cm in diam.; anthers blue-green to yellow 84. *A. dimorphitricha*
- 56b. Roots conic, fleshy, rarely fibrous.
- 62a. Roots fibrous; stems brown glandular villous; leaf blade tuberculate on both surfaces, petiole 2–5 mm 86. *A. longicaulis*
- 62b. Roots conic, fleshy; stems glabrous, subglabrous, or glandular hairy; leaf blade not tuberculate, petiole 1–2 cm or leaves sessile.
- 63a. Stems glabrous or subglabrous; petiole 1–2 cm (at least proximal cauline leaves petiolate) 87. *A. longipetiolata*
- 63b. Stems villous or glandular hairy; leaves sessile or shortly petiolate.
- 64a. Stems pale brown, villous.
- 65a. Stems 4–7 cm; leaf blade elliptic or obovate-elliptic; sepals long villous abaxially 88. *A. leucasteria*
- 65b. Stems 10–15 cm; leaf blade elliptic to broadly elliptic-saccate; sepals sparsely glandular pubescent abaxially 89. *A. nivalomontana*
- 64b. Stems green, glandular hairy.
- 66a. Leaf blade thin, glabrous or glandular hairy; sepals narrowly ovate, glabrous; petals ca. 1.5 × as long as sepals; cymes spreading 90. *A. omeiensis*
- 66b. Leaf blade thick, villous with yellowish, small, nodose hairs; sepals orbicular-lanceolate, long pubescent abaxially; petals slightly longer than sepals; cymes compact 91. *A. auricomata*
- 44b. Petal apex entire, slightly emarginate, or shallowly 2-cleft, rarely lobes with 3 shallow, round teeth; filaments opposite sepals with a gland at base or not; styles 2 or 3(–5).
- 67a. Filaments opposite sepals with a gland at base; seeds globose or reniform, smooth or tuberculate.
- 68a. Stems villous with 2 lines of hairs; sepals glabrous or only ciliate at margin.
- 69a. Styles 6–7 mm; petal apex entire; leaves aggregated at stem apex, leaf blade broadly linear or linear-lanceolate 75. *A. longistyla*
- 69b. Styles ca. 1.5 mm; petal apex 2-cleft; leaves in several distant pairs, leaf blade saccate .. 76. *A. ionandra*
- 68b. Stems glandular villous, or with long, nodose bristles; sepals glandular villous or glandular villous mixed with long, nodose bristles.

- 70a. Stems and sepals densely hairy mixed with long, nodose bristles; petals ca. 10 mm 77. *A. longiseta*
- 70b. Stems and sepals hairy, without nodose bristles; petals 5–8 mm.
- 71a. Leaf blade obsaccate, petiole short; sepals 2–3 mm 78. *A. chamdoensis*
- 71b. Leaf blade linear-lanceolate, petiole absent; sepals 5–6 mm 79. *A. szechuensis*
- 67b. Filaments opposite sepals without a gland at base or gland not obvious; seeds oblate or reniform, glabrous or with small, raised tubercles, or flat but margin with a narrow wing.
- 72a. Seeds usually flat, with a narrow wing.
- 73a. Stems diffuse; flowers usually several in cymes.
- 74a. Stems sparsely villous; petals oblanceolate or obovate, apex 2- or 3-toothed 67. *A. euodonta*
- 74b. Stems glandular hairy; petals obovate or broadly ovate, apex entire or emarginate.
- 75a. Leaf blade orbicular-lanceolate or orbicular; petals broadly ovate, apex emarginate 65. *A. melanandra*
- 75b. Leaf blade linear-lanceolate; petals ovate, apex entire 66. *A. pseudostellaria*
- 73b. Stems erect or suberect; flowers solitary, rarely paired.
- 76a. Stems 3–6 cm, glabrous proximally 68. *A. dsharaensis*
- 76b. Stems 4–25 cm, villous or glandular hairy.
- 77a. Plants to 6 cm tall, white villous in 2 lines or white, yellow, or black nodose villous; petals white.
- 78a. Plants 5–6 cm tall; stems white villous in 2 lines; petal apex entire 74. *A. monantha*
- 78b. Plants to 4 cm tall; stems white, yellow, or black nodose villous; petal apex emarginate, often with a few small teeth 73. *A. inornata*
- 77b. Plants 4–25 cm tall, glandular villous; petals white, pink, or violet.
- 79a. Petal apex entire or emarginate; cauline leaf blade lanceolate, elliptic, ovate, or orbicular.
- 80a. Stems white; leaf blade violet; petal apex entire 69. *A. melandryoides*
- 80b. Stems violet; leaf blade green; petal apex slightly emarginate 70. *A. rockii*
- 79b. Petal apex entire or shallowly 2-cleft; cauline leaf blade linear-lanceolate or lanceolate, sometimes elliptic.
- 81a. Petals pink, apex shallowly 2-cleft 71. *A. roseiflora*
- 81b. Petals white, apex entire 72. *A. melandryiformis*
- 72b. Seeds reniform, subglobose, globose, or oblate, smooth or tuberculate, wingless.
- 82a. Plants usually 8–20 cm tall; proximal flowers of stem with petals and anthers reduced, distal flowers of stem with petals and anthers not reduced.
- 83a. Styles 3(or 5).
- 84a. Principal root napiform or conic, unbranched.
- 85a. Petals white; stems white; leaves glabrous 47. *A. filipes*
- 85b. Petals white or pink; stems white or violet; leaves ciliate at base, otherwise glabrous 46. *A. napuligera*
- 84b. Principal root conic, fleshy, many branched.
- 86a. Petal apex shallowly 2-lobed, lobes with small, irregular teeth; stems and leaves with septate hairs 45. *A. setifera*
- 86b. Petal apex rounded, emarginate, or bifid to near middle of petal; stems and leaves with non-septate hairs 44. *A. weissiana*
- 83b. Styles 2.
- 87a. Leaf blade linear-lanceolate, to 1.5 cm, glabrous, margin not cartilaginous; stamens 5 51. *A. schneideriana*
- 87b. Leaf blade lanceolate to orbicular, to 4 cm, subglabrous, margin cartilaginous; stamens 10.
- 88a. Leaf blade narrowly elliptic to suborbicular, 8–15 mm wide 48. *A. nigricans*
- 88b. Leaf blade lanceolate to oblanceolate, 1–5 mm wide.
- 89a. Leaf blade lanceolate or oblanceolate, 1–2 cm × 2–5 mm; sepals lanceolate, pubescent or with white, septate, glandular hairs, margin hairy; petal apex 2-cleft 49. *A. zhongdianensis*
- 89b. Leaf blade oblanceolate, 0.5–2.5 cm × 1–5 mm; sepals ovate or ovate-lanceolate, densely shortly hairy at base; petal apex entire 50. *A. xerophila*
- 82b. Plants rarely more than 8 cm tall, or very slender when more than 8 cm tall; petals and stamens sometimes degenerate or reduced to various degrees, petals (when present) ca. 2/3 as long as or equaling sepals.

- 90a. Petals absent or only 2 or 3 developed, reduced to various degrees.
 91a. Sepals 5; petals absent.
 92a. Stamens 5; leaf blade rhomboid-elliptic to saccate; stem with 1 or 2 lines of hairs ... 61. *A. reducta*
 92b. Stamens 2 or 3; leaf blade linear to linear-lanceolate; stem with 2 lines of hairs 62. *A. pharensis*
 91b. Sepals 4; petals present or absent.
 93a. Petals absent; stamens 2 or 3; sepals and leaves fleshy; pedicels and sepals glabrous 63. *A. littledalei*
 93b. Petals present; stamens 8; sepals and leaves not fleshy; pedicels and sepals hairy 64. *A. saginoides*
 90b. All floral parts present.
 94a. Styles 3.
 95a. Leaf blade subulate, 4–5 × ca. 1 mm 52. *A. minima*
 95b. Leaf blade saccate, 5–12 × 2–3 mm 53. *A. bomiensis*
 94b. Styles 2(or 3).
 96a. Petals shorter than sepals.
 97a. Cauline leaf blade ovate, petiole 0.5–1.5 cm; sepals white villous abaxially, margin
 membranous; petals ca. 2/3 as long as sepals, apex entire; styles 2 54. *A. longipes*
 97b. Cauline leaf blade lanceolate, petiole absent or inconspicuous; sepals hairy abaxially
 and at
 margin; petals shorter than sepals, apex entire, sometimes 2-cleft; styles 2 or 3 55. *A. inconspicua*
 96b. Petals equaling or longer than sepals.
 98a. Petals 1.5–2 × as long as sepals; sepals leathery 56. *A. amdoensis*
 98b. Petals equaling or up to 1.5 × as long as sepals; sepals herbaceous.
 99a. Roots conic, fleshy; leaf blade linear or saccate.
 100a. Leaf blade linear; sepals glabrous, with wide membranous margin; petal apex
 entire 68. *A. membranisepala*
 100b. Leaf blade saccate; sepals densely glandular pubescent abaxially; petal apex
 slightly emarginate or shallowly lobed 57. *A. spathulifolia*
 99b. Roots slender, fibrous, or with a rhizome; leaf blade linear-lanceolate or elliptic.
 101a. Leaf blade linear-lanceolate, herbaceous, margin ciliate; petal apex erose 59. *A. karakorensis*
 101b. Leaf blade elliptic, leathery, margin glabrous; petal apex entire 60. *A. tumengelaensis*

1. *Arenaria* subgen. *Arenaria*
 无心菜亚属 wu xin cai ya shu

Herbs annual or perennial. Stems single or sparsely caespitose, prostrate to diffuse or erect. Leaf blade usually lanceolate to ovate, rarely linear or subulate, herbaceous, rarely leathery. Inflorescence various, terminal or axillary, sometimes reduced to 1–3 flowers. Petals white, often shorter than sepals. Sepals not incrassate or only slightly so at base.

At least 106 species: centered in Europe but extending to Africa, Asia, and North America; six species (two endemic) in China. McNeill (Notes Roy. Bot. Gard. Edinburgh 24: 79–155. 1962) subdivided *Arenaria* subgen. *Arenaria* into 11 sections, four of which occur in China: *A. sect. Arenaria* (species no. 1); *A. sect. Rotundifoliae* McNeill (loc. cit.: 113; species nos. 2 and 3); *A. sect. Rariflorae* F. N. Williams (Bull. Herb. Boissier 3: 602. 1895; species nos. 4 and 5); and *A. sect. Compressae* McNeill (loc. cit.: 118; species no. 6).

1. *Arenaria serpyllifolia* Linnaeus, Sp. Pl. 1: 423. 1753.

无心菜 wu xin cai

Arenaria leptoclados Gussone; *A. petiolata* Hayata.

Herbs annual or biennial. Principal roots slender, with numerous smaller branches. Stems caespitose, erect or diffuse, 10–30 cm, densely white villous. Leaves sessile; leaf blade ovate, 4–12 × 3–7 mm, both surfaces glabrous or sparsely villous, 3-veined abaxially, base attenuate, margin ciliate, apex acute; proximal cauline leaves larger, distal ones smaller. Cymes many flowered; bracts ovate, 3–7 mm, herbaceous, usually densely villous. Pedicel slender, ca. 1 cm, densely villous or glandular pubescent. Sepals 5, lanceolate, 3–4 mm, villous abaxially, veins 3, impressed, margin

membranous, apex acute. Petals 5, white, obovate, 1/3–1/2 as long as sepals, apex obtuse. Stamens 10, shorter than sepals. Ovary ovoid. Styles 3, linear. Capsule ovoid, equaling persistent sepals. Seeds pale brown, reniform, small, tuberculate with raised papillae. Fl. Jun–Aug, fr. Aug–Sep.

Mountain grassland slopes, sandy or stony barrens, fields, gardens; 600–4000 m. Widespread in China [N Africa, Asia, Australia, Europe, North America].

This species is used medicinally.

2. *Arenaria orbiculata* Royle ex Edgeworth & J. D. Hooker in J. D. Hooker, Fl. Brit. India 1: 240. 1874.

圆叶无心菜 yuan ye wu xin cai

Herbs biennial or perennial. Stems erect or prostrate, dichotomously branched, slender, 5–40 cm, pubescent along 1 side. Leaves sessile or petiolate; leaf blade

elliptic, ovate, or suborbicular, 2–10 × 2–7 mm, both surfaces glabrous, or sparsely villous only on petiole, 1-veined, base rounded, apex obtuse or mucronulate. Cymes axillary and few flowered or flower solitary; bracts similar to leaves but smaller. Pedicel 5–10 mm, glabrous or very sparsely pubescent. Sepals 5, lanceolate, ovate-lanceolate, or ovate, 3–4 mm, glabrous, margin narrowly membranous, apex acute. Petals 5, white, obovate, shorter than sepals, base attenuate, apex obtuse. Stamens 10, shorter than sepals. Ovary ovoid. Styles 3, linear. Fl. May–Jul.

Forests, scrub meadows, alpine meadows, stony valleys; 2300–4500 m. S Sichuan, SE Xizang, Yunnan [Bhutan, India, ?Kashmir, Nepal, Sikkim].

3. *Arenaria neelgherrensis* Wight & Arnott, Prodr. Fl. Ind. Orient. 1: 43. 1834.

尼盖无心菜 ni gai wu xin cai

Herbs annual. Stems prostrate, many branched, 10–20 cm, white pubescent along 1 side. Leaves basally attenuate into a short petiole; leaf blade elliptic, elliptic-lanceolate, or obovate, 5–10 × 1.5–2 mm, midvein raised, base cuneate, margin ciliate, apex obtuse or mucronulate. Cymes axillary, few to many flowered; bracts elliptic or ovate, ca. 5 × 1 mm, herbaceous, villous along veins, midvein raised, base cuneate, apex acute or acuminate. Pedicel 2–8 mm, white pubescent. Sepals 5, ovate, ca. 3 × 1 mm, white villous on veins abaxially, 1-veined, margin white, membranous, apex acuminate. Petals 5, white, oblong, equaling or slightly longer than sepals. Stamens 10, shorter than sepals. Ovary ovoid, ca. 0.7 mm. Styles 3, linear. Fl. Jul.

Abies forests, riverside grasslands, alpine meadows, mountain rock crevices; 3200–4100 m. W Xizang [India, Nepal, Pakistan].

4. *Arenaria monosperma* F. N. Williams, J. Linn. Soc., Bot. 38: 398. 1909.

单子无心菜 dan zi wu xin cai

Stellaria monosperma (F. N. Williams) Kozhevnikov (1983), not Buchanan-Hamilton ex D. Don (1825); *S. williamsiana* Kozhevnikov.

Herbs perennial. Roots cylindrical, fleshy. Stems branched at base, violet proximally, cylindrical, slender, 10–20 cm; nodes and internodes coarsely glandular puberulent or glabrous. Leaves numerous, congested; leaf blade effuse, linear, 5–10 mm, slightly coarsened with ± short, glandular hairs, 1-veined. Cymes terminal, many flowered. Pedicel 5–10 mm, white pubescent. Sepals 5, elliptic, ca. 4 mm, ± papillose spotted abaxially, margin slightly incrassate, sometimes membranous, apex acuminate. Petals 5, white, narrowly obovate, shorter than sepals. Ovary ovoid. Styles 3,

linear. Capsule ovoid, equaling persistent sepals, apex 6-lobed. Seed 1, yellow-brown, reniform, reticulate. Fl. and fr. Jun–Oct.

• Sands, mountain rock crevices; 3300–3500 m. E Xizang.

This species may belong to *Stellaria*. Kozhevnikov (Novosti Sist. Vyssh. Rast. 20: 94–107. 1983) transferred *Arenaria monosperma* to *Stellaria*, but published a later homonym.

5. *Arenaria puranensis* L. H. Zhou in C. Y. Wu, Fl. Xizang. 1: 686. 1983.

普兰无心菜 pu lan wu xin cai

Herbs perennial. Stems many branched at base, usually yellowish, sometimes violet, 8–16 cm, glabrous and lustrous proximally, sparsely white villous distally. Leaves sessile; leaf blade elliptic-ovate, ovate-lanceolate, or elliptic, 5–10 × 1.5–5 mm, densely glandular pubescent abaxially, glabrous adaxially, 1-veined, base rounded, margin ciliate, apex acuminate. Cymes terminal, dichasial, many flowered; bracts herbaceous, similar to leaves but smaller, villous abaxially. Pedicel 1–1.5 cm, densely white glandular hairy. Sepals (4 or)5, ca. 5 × 1 mm, white glandular villous abaxially, margin broadly membranous, apex long acuminate. Petals (4 or)5, white, ovate, apex 2-cleft. Stamens (4 or)5; anthers yellow. Ovary ovoid. Styles 3, linear. Fl. Jul.

• Mountain gravelly and muddy soils. SW Xizang.

6. *Arenaria compressa* McNeill, Notes Roy. Bot. Gard. Edinburgh 24: 118. 1962.

扁翅无心菜 bian chi wu xin cai

Arenaria trichotoma Royle ex Edgeworth & J. D.

Hooker in J. D. Hooker, Fl. Brit. India 1: 235. 1874, not Boissier (1856); *A. lanceolatifolia* L. H. Zhou.

Herbs perennial. Roots robust, woody. Stems caespitose, trichotomously branched, 50–60 cm, glandular villous. Leaf blade lanceolate, 1–2.5 cm × 1–4 mm, glandular villous, base clasping, apex acute. Cymes trichotomously branched, conic, many flowered; bracts ovate-lanceolate, similar to leaves but smaller, margin broadly membranous. Pedicel 0.5–3 cm, glabrous. Sepals 5, ovate, 3.3–5 × 1.5–3 mm, glabrous, midvein raised, base broadened, margin narrowly membranous, apex acute. Petals 5, white, obovate or elliptic, equaling or slightly longer than sepals. Stamens 10, 5 long and 5 short. Ovary obovoid, ca. 3 mm. Styles 3, linear, ca. 2 mm. Seeds with flat wings. Fl. Jun–Jul.

Mountain gravels; 2600–3500 m. W Xizang [Afghanistan, NW India, Pakistan].

2. *Arenaria* subgen. *Eremogone* (Fenzl) Fenzl in Ledebour, Fl. Ross. 1: 360. 1842.

老牛筋亚属 lao niu jin ya shu

Eremogone Fenzl, Vers. Darstell. Alsin. 13. 1833.

Herbs perennial. Rhizome branched, robust. Stems pulvinate. Leaves long linear, graminoid or shortly setiform, apex spinose. Cymes terminal, occasionally contracted into a head or cymose clusters, rarely reduced to a solitary flower. Sepals conspicuously hardened at base, sometimes whole receptacle and calyx proximally becoming woody in fruit. Petals usually white.

About 70 species: primarily in C and SW Asia and North America, but extending to N Africa and Europe; nine species (three endemic) in China. McNeill (Notes Roy. Bot. Gard. Edinburgh 24: 120–127. 1962) subdivided *Arenaria* subgen. *Eremogone* into seven sections, three of which occur in China: *A.* sect. *Monogone* Maximowicz (Bull. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 3, 26: 436. 1880; species no. 7); *A.* sect. *Capillares* McNeill (loc. cit.: 122; species nos. 8–13); and *A.* sect. *Sclerophyllae* (Boissier) McNeill (loc. cit.: 126; species nos. 14 and 15).

7. *Arenaria potaninii* Schischkin in Komarov, Fl. URSS 6: 536. 1936.

五蕊老牛筋 wu rui lao niu jin

Arenaria pentandra Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 3, 26: 429. 1880, not Dufour (1820), nor Wallroth (1822), nor Turczaninow (1834), nor (J. Gay) Ardoino (1867).

Herbs perennial. Roots compacted, robust, woody. Stems pulvinate, many branched, 20–30 cm, slightly woody, glabrous. Leaves congested; leaf blade subcylindric-subulate, basal ones 2.5–4 cm, cauline ones 1–1.2 cm, base membranous, margin slightly coarsened, apex cuspidate. Cymes terminal, trichotomous; bracts lanceolate, 2.5–3 mm, transparent membranous except at midvein. Pedicel 1–2 cm, glabrous. Sepals 5, lanceolate, 4–4.5 mm, margin broadly membranous, apex long acuminate. Petals 5, white, orbicular, equaling or slightly longer than sepals, apex subtruncate or obtuse. Stamens 5 (also with 5 reduced stamens). Capsule ovoid, enveloped by persistent sepals. Seeds with concentrically ringed tubercles. Fl. Jun–Jul.

Shaded mountain forests; ca. 2400 m. Xinjiang [Kazakhstan, Russia].

8. *Arenaria juncea* Marschall von Bieberstein, Fl. Taur.-Caucas. 3: 309. 1819.

老牛筋 lao niu jin

Herbs perennial. Roots gray-brown or pale, conic, fleshy. Stems erect, 30–60 cm, hardened, glabrous at base, glandular hairy near cymes, with or without persistent, pale brown, hardened, withered leaves at base. Leaf blade narrowly linear, 1–2.5 cm × ca. 1 mm, 1-veined, base broadened, clasping and sheathing, margin sparsely dentate, shortly ciliate, often involute or flat, apex acuminate. Cymes few to many flowered; bracts ovate, 3–4 × ca. 2 mm, glandular pubescent abaxially, margin broadly membranous, apex acute. Pedicel 1–2 cm, densely glandular villous or glabrous. Sepals 5, ovate, ca. 5 × 2 mm, glabrous or glandular villous abaxially, 1–3-veined, margin broadly membranous, apex acute or acuminate. Petals 5, white, 8–10 mm, elliptic-orbicular or obovate, base shortly clawed, apex obtuse. Stamens 10; filaments ca. 4 mm, those opposite sepals with a gland at base; anthers yellow. Ovary ovoid, ca. 2 mm. Styles 3, ca. 3 mm. Capsule ovoid, equaling or slightly longer than persistent sepals, apex 3-valved; valves 2-cleft at apex. Seeds brown or black, triangular-reniform, tuberculate. Fl. and fr. Jul–Sep.

Open forest margins, mountain grasslands, sandy montane grasslands, low-elevation grassland slopes, steppes, desert steppes, rock crevices; 800–2200 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, NW Shaanxi, Shanxi [Korea, Mongolia, Russia]. This species is used medicinally.

- 1a. Stems with persistent, pale brown, hardened, withered leaves at base; pedicel densely glandular villous 8a. var. *juncea*
1b. Stems without persistent, pale brown, hardened, withered leaves at base; pedicel glabrous 8b. var. *glabra*

8a. *Arenaria juncea* var. *juncea*

老牛筋(原变种) lao niu jin (yuan bian zhong)

Arenaria dahurica Fischer ex Seringe.

Stems with persistent, pale brown, hardened, withered leaves at base. Pedicel densely glandular villous.

Open forest margins, mountain grasslands, steppes, desert steppes, rock crevices; 800–2200 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, NW Shaanxi, Shanxi [Korea, Mongolia, Russia].

8b. *Arenaria juncea* var. *glabra* Regel, Bull. Soc. Imp. Naturalistes Moscou 35: 246. 1862.

无毛老牛筋 wu mao lao niu jin

Arenaria tonsa Kitagawa.

Stems without persistent, pale brown, hardened, withered leaves at base. Pedicel glabrous.

Sandy montane grasslands, low-elevation grassland slopes. N Hebei [Russia].

9. *Arenaria capillaris* Poirlet in Lamarck, Encycl. 6: 380. 1804.

毛叶老牛筋 mao ye lao niu jin

Arenaria capillaris var. *glabra* Fenzl; *A. capillaris* var. *glabrata* (Seringe) Schischkin; *A. subulata* Seringe var. *glabrata* Seringe.

Herbs perennial. Stems 12–15 cm; mature branches woody, with withered, persistent leaves at base; new branches slender, firm, glabrous proximally, becoming glandular pubescent distally. Leaf blade linear, 2–5 cm, base broadened, margin coarsely and weakly serrate, apex acute; basal leaves densely fasciculate; cauline leaves sheathing at base, clasping at inflated nodes. Cymes few to many flowered; bracts ovate, 2–3 × ca. 1.5 mm, scarious, 1-veined, base clasping, apex long acuminate. Pedicel slender, stiff, glabrous. Sepals 5, yellow abaxially, ovate, ca. 5 × 2 mm, glabrous, 3-veined. Petals 5, white, obovate, ca. 7 × 3 mm, base shortly clawed, apex obtuse. Stamens 10; filaments opposite sepals with a gland at base. Ovary ovoid. Styles 3, linear. Fl. Jul–Aug.

Open montane grasslands, gravelly mountain summits; ca. 900 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Mongolia, Russia; North America].

10. *Arenaria acicularis* F. N. Williams, J. Linn. Soc., Bot. 38: 400. 1909.

针叶老牛筋 *zhen ye lao niu jin*

Herbs perennial. Roots long, robust, woody. Stems in compact clusters, 6–20 cm, hirsutulous. Leaf blade linear-lanceolate, 3-veined, lateral veins close to margin; distal cauline leaf blade with base broadened, membranous, forming a short sheath, margin scariosus, apex acute. Cymes dichasial, densely clustered, 6–9-flowered; rachis long. Pedicel sparsely glandular hairy. Sepals 5, erect, usually violet, lanceolate, membranous, glandular hairy, with 3 slender veins close together abaxially, margin broadly membranous, apex acuminate. Petals 5, white, obovate, 5–6 mm. Stamens 10; anthers yellow. Ovary obovoid. Styles 3. Capsule obovoid-globose, 3-valved; valves 2-cleft at apex. Fl. and fr. Jul–Aug.

• River valley grasslands; 300–4600(–5200) m. SE Xizang.

11. *Arenaria grueningiana* Pax & K. Hoffmann in Pax, Repert. Spec. Nov. Regni Veg. Beih. 12: 366. 1922.

华北老牛筋 *hua bei lao niu jin*

Arenaria formosa Fischer ex Seringe var. *angustipetala* Maximowicz.

Herbs perennial. Principal roots slender, woody; rootlets fibrous. Stems densely clustered, erect, 4–10 cm, glandular pubescent distally, with dense, withered, persistent leaves at base. Basal leaf blade linear, 1–3 cm × 0.5–1 mm, glabrous, midvein impressed, base membranous, sheathing, apex acute; cauline leaf blade lanceolate, 3–5 mm, base broadened, margin narrowly membranous, apex acute. Flower solitary, terminal; bracts lanceolate, 3–4 × ca. 1 mm, base broadened, margin membranous, ciliate, apex obtuse or acute. Pedicel 3–10 mm, densely brown glandular hairy. Sepals 5, ovate-oblong, 4–5 × 2–2.5 mm, glandular hairy abaxially, margin narrowly membranous, apex obtuse or acute. Petals 5, white, obovoid-saccate, 5–7 × 1.5–2 mm, base attenuate, cuneate, apex obtuse. Floral disc saucer-shaped, with 5 orbicular glands. Stamens 10; filaments ca. 5 mm; anthers yellow. Ovary stipitate, obovoid, ca. 1.5 mm. Styles 3, ca. 2 mm; stigmas clavate. Fl. Jul.

• Alpine meadows; ca. 3000 m. Hebei, Nei Mongol, Shanxi.

12. *Arenaria formosa* Fischer ex Seringe in de Candolle, Prodr. 1: 402. 1824.

美丽老牛筋 *mei li lao niu jin*

Arenaria formosa var. *latipetala* Maximowicz.

Herbs perennial. Principal roots hard, woody; rootlets slender. Stems densely pulvinate, erect, 4–10 cm, white glandular hairy distally, with dense, brown, withered, persistent leaves at base. Leaf blade linear or linear-subulate, 1.5–4 cm × ca. 1 mm, broadened and forming a short sheath at base, margin not involute, apex acuminate. Cymes 1–3-flowered; bracts ovate-

lanceolate, 2–3 × 1–1.5 mm, glandular hairy, base broadened, margin narrowly membranous, apex acuminate. Pedicel 5–10 mm, glandular hairy. Sepals 5, ovate-lanceolate or ovate, 5–6 × 2–3 mm, ± glandular hairy, base broadened, apex acute. Petals 5, white, obovate or obovate-orbicular, 0.8–1.2 cm. Floral disc with 5 glands; glands at base of filaments opposite sepals pale brown, orbicular. Stamens 10, 5 long and 5 short; anthers yellow. Ovary obovoid, ca. 2 mm. Styles 3, ca. 6 mm. Fl. Jul–Aug.

Mountain grasslands; 2000–2200 m. Gansu, Nei Mongol, Ningxia, Xinjiang [Kazakhstan, Mongolia, Russia].

13. *Arenaria haitzeshanensis* Y. W. Tsui ex L. H. Zhou, Acta Biol. Plateau Sin. 13: 1. 1997.

海子山老牛筋 *hai zi shan lao niu jin*

Herbs perennial. Roots black-brown, conic, woody. Stems densely clustered, pulvinate, 6–10 cm, villous distally. Basal leaf blade linear, 2–5 cm × ca. 1 mm, base broadened, apex acute; cauline leaves in 2 or 3 pairs; leaf blade subulate or linear-subulate, 1.1–2 cm × 1–2 mm, midvein raised, base broadened, margin narrowly membranous, apex spinose. Cymes 1–3-flowered; rachis densely hairy; bracts lanceolate, 6–7 mm, base broadened, margin membranous, apex spinose. Sepals 5, lanceolate, 6–7(–8) mm, 1–3-veined, base incrassate, margin narrowly membranous, apex acute. Petals 5, white, ovate, ca. 3/5 as long as sepals. Ovary obovoid, ca. 2 mm. Styles 3, 2–3 mm. Fl. Jul–Aug.

• Alpine meadows; 3700–4400 m. NW Sichuan (Dêgê Xian), E Xizang (Jomda Xian).

14. *Arenaria griffithii* Boissier, Diagn. Pl. Orient., ser. 2, 1: 89. 1853.

裸茎老牛筋 *luo jing lao niu jin*

Herbs perennial. Principal roots many branched, robust. Stems sparsely clustered, 5–20 cm, glabrous, with withered, persistent leaves at base. Leaves crowded; leaf blade linear-subulate or subulate, 8–10 × ca. 1 mm, midvein raised abaxially, margin hairy, apex acute. Cymes 1–3-flowered; bracts ovate or ovate-subulate, ca. 3 × 1.2 mm, margin membranous. Pedicel 1–1.8 cm, glabrous or ± glandular hairy with erect or slightly curved hairs. Sepals 5, orbicular-lanceolate, 3–5 × ca. 2 mm, glabrous or glandular hairy, veins not obvious abaxially, margin membranous, apex acute. Petals 5, white, sometimes pink, obovate or ovate-elliptic, 1.5–2 × as long as sepals, apex obtuse. Floral disc with 5 impressed glands. Ovary ovoid, ca. 3 mm. Styles 3, ca. 3 mm. Capsule globose, 4–6 mm, 3-valved; valves 2-cleft at apex. Seeds brown, reniform, slightly flattened, ca. 1 mm in diam., smooth. Fl. Jun–Jul.

Mountains; 2200–3000 m. Xinjiang [Afghanistan, Kazakhstan].

15. *Arenaria androsacea* Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Acad. Nauk SSSR 17: 12. 1955.

点地梅状老牛筋 *dian di mei zhuang lao niu jin*

Herbs perennial. Roots robust; rootlets many. Stems pulvinate, with numerous branches, slender, 5–10 cm × ca. 1 mm, glabrous. Leaf blade linear-subulate, 0.5–1.5 cm × ca. 1 mm, margin slightly reflexed, apex spinose.

Cymes 1–3-flowered; rachis densely glandular hairy; bracts ovate-lanceolate, 2–3 mm, margin broadly white scarious, apex acute. Pedicel densely glandular hairy. Sepals 5, ovate-lanceolate, 3–5 × 1–2 mm, glandular hairy abaxially, 1-veined, base broadened, margin narrowly membranous, apex acute. Petals 5, white, orbicular-obovate, longer than sepals, apex slightly

undulate. Floral disc with 5 glands. Stamens 10; filaments equaling sepals. Ovary ovoid. Styles 3, ca. 2 mm. Capsule ovoid, slightly longer than persistent sepals, 3-valved; valves 2-cleft at apex. Fl. and fr. Jul–Sep.

Mountains; 2300–4200 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia, Russia].

3. *Arenaria* subgen. *Eremogoneastrum* F. N. Williams, Bull. Herb. Boissier 3: 598. 1895.

雪灵芝亚属 *xue ling zhi ya shu*

Herbs perennial. Principal roots robust, woody. Stems pulvinate or caespitose. Leaves sessile, subulate to linear, always persistent, margin narrowly membranous, apex aristate. Flowers solitary or paired, rarely more in terminal inflorescences. Sepals lanceolate to ovate-lanceolate, 3-veined, midvein raised, lateral veins not obvious, margin white membranous, apex acute. Petals white, rarely pink, shorter than or equaling sepals, rarely longer than them. Floral disc scalloped lobed, glands 5, conspicuous.

About 20 species: Asia and North America; 17 species (12 endemic) in China.

16. *Arenaria brevipetala* Y. W. Tsui & L. H. Zhou in L. H. Zhou, Acta Phytotax. Sin. 18: 360. 1980.

雪灵芝 *xue ling zhi*

Herbs perennial. Principal roots robust, woody. Stems pulvinate, 5–8 cm, with numerous withered, persistent leaves at base; flowering branches much taller than vegetative ones. Leaf blade needle-shaped to linear, 1.5–2 cm × ca. 1 mm, veins raised abaxially, impressed adaxially, base broadened, clasping, margin narrowly membranous, reflexed, apex acuminate, aristate; basal leaves congested, cauline ones in 2 or 3 pairs. Flowers solitary or paired, terminal; bracts lanceolate, ca. 5 × 1–1.5 mm, herbaceous. Pedicel 0.5–1.5 mm, glandular villous, apex nutant. Sepals 5, ovate-lanceolate, 6–7 × ca. 2 mm, 3-veined, midvein raised, lateral veins not obvious, base broadened, margin white membranous, apex acute. Petals 5, white, ovate, 3–4 × ca. 2 mm. Floral disc cupular, with 5 glands. Stamens 10; anthers yellow. Ovary globose, ca. 2 mm in diam. Styles 3, ca. 3 mm. Fl. Jun–Aug.

• Alpine meadows and gravels; 3400–4600 m. SE Qinghai, NW Sichuan, NE Xizang.

This species is used medicinally.

17. *Arenaria baxoiensis* L. H. Zhou in C. Y. Wu, Fl. Xizang. 1: 676. 1983.

八宿雪灵芝 *ba su xue ling zhi*

Herbs perennial. Principal roots robust, woody. Stems pulvinate, 3–8 cm, glandular hairy. Basal leaves congested; leaf blade spinose-linear, 1–1.5 cm × ca. 1 mm, veins 3, raised, base broadened, clasping, membranous, apex acute, pillar-shaped. Cauline leaves in 1 or 2 pairs; leaf blade subulate, 5–10 × ca. 0.5 mm, 3-veined, base broadened, clasping, membranous, apex erect or curved, acute. Flowers solitary, rarely paired, terminal; bracts ovate-lanceolate, ca. 4 × 1 mm, margin broadly membranous, apex acuminate. Pedicel 1–2 cm, densely glandular villous. Sepals 5, ovate-lanceolate, 6–7 × ca. 1.5 mm, glandular hairy abaxially, 1–3-veined, base broadened, margin narrowly membranous, apex

acute. Petals 5, white, ovate, equaling sepals, apex obtuse. Stamens 10, shorter than petals; anthers yellow. Ovary ovoid. Styles 3, linear. Fl. Jun–Jul.

• Mountain grasslands; 4000–4500 m. Sichuan, E Xizang.

18. *Arenaria kumaonensis* Maximowicz, Fl. Tangut. 86. 1889.

库莽雪灵芝 *ku mang xue ling zhi*

Herbs perennial. Stems densely clustered, pulvinate, 2–3 cm. Leaf blade subulate, 2–5 × ca. 1 mm, base broadened, margin not glandular ciliate. Flower solitary. Pedicel shorter than bracts, glandular hairy. Sepals 5, lanceolate, 4–5 mm, 1-veined, base broadened, margin broadly membranous, apex obtuse. Petals 5, white, elliptic, slightly longer than sepals. Stamens 10; anthers black. Ovary obovoid, ca. 1.5 mm. Styles 3, linear. Fl. Jul–Aug.

Icy steppes; ca. 4700 m. Xizang [NW India].

19. *Arenaria kansuensis* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg, Sér. 3, 26: 428. 1880.

甘肃雪灵芝 *gan su xue ling zhi*

Arenaria kansuensis var. *acropetala* Y. W. Tsui & L. H. Zhou.

Herbs perennial. Principal roots robust, woody. Stems pulvinate, 4–5 cm, with withered, persistent leaves at base. Leaves congested; leaf blade spinose-linear, triangular in cross section, 1–2 cm × ca. 1 mm, hardened, veins raised abaxially, impressed adaxially, base slightly broadened, clasping, margin slightly reflexed, narrowly membranous, with small teeth near base, apex acute, aristate. Flower solitary, terminal; bracts lanceolate, 3–5 × 1–1.5 mm, 1-veined, base forming a short sheath, margin broadly membranous, apex acute. Pedicel 2.5–4 mm, glandular villous. Sepals 5, lanceolate, 5–6 mm, glabrous, 1-veined, base broadened, margin broadly membranous, apex acute. Petals 5, white, obovate, 4–5 mm, base narrowed, cuneate, apex obtuse. Floral disc cupular, with 5 glands. Stamens 10; filaments ca. 4 mm; anthers brown. Ovary globose, 1-loculed; ovules numerous. Styles 3, linear, ca. 3 mm. Fl. Jul.

• Alpine meadows, mountain grasslands and gravels; 3500–5300 m. S Gansu, Qinghai, W Sichuan, E Xizang, NW Yunnan.

20. *Arenaria ischnophylla* F. N. Williams, J. Linn. Soc., Bot. 38: 400. 1909.

瘦叶雪灵芝 *shou ye xue ling zhi*

Herbs perennial. Stems pulvinate, branched at base, 4–5 cm; caudex (root crown) woody, with brown, withered, persistent leaves at base. Leaves congested; leaf blade subulate or linear-subulate, triangular in cross section, 5–10 × ca. 1 mm, veins raised abaxially, impressed adaxially, base broadened, membranous, sheathing, margin thickened, hardened, apex spinose. Flower solitary, terminal. Pedicel ca. 5 mm, villous. Sepals 5, narrowly lanceolate, ca. 4 mm, usually sparsely pilose abaxially, 3-veined, margin narrowly membranous, apex erect, acute. Petals 5, white, ovate-elliptic, ca. 5 mm, base not obviously clawed, apex obtuse. Stamens 10, shorter than sepals; filaments opposite sepals with a gland at base. Ovary globose. Styles 3. Fl. Jul.

• Alpine meadows; 4500–4900(–5100) m. SE Xizang.

21. *Arenaria roborowskii* Maximowicz, Fl. Tangut. 87. 1889.

青藏雪灵芝 *qing zang xue ling zhi*

Herbs perennial. Roots robust, woody. Stems densely clustered, 5–8 cm, with crowded, withered, persistent leaves at woody base. Leaves congested; leaf blade linear, triangular in cross section, 1–1.5 cm × ca. 1 mm, veins raised abaxially, impressed adaxially, base broadened, clasping, hardened, margin slightly reflexed, narrowly membranous, sparsely hairy, apex acute. Flower solitary, terminal; bracts linear-lanceolate, 4.5–5 × ca. 1.5 mm, 1-veined, base broadened, margin narrowly membranous, apex acute. Pedicel 5–10 mm, glabrous. Sepals 5, lanceolate, ca. 5 × 1.5 mm, 1–3-veined, base broadened, margin narrowly membranous, apex acute. Petals 5, white, elliptic, ca. 4 × 1.4 mm, base cuneate, apex acute. Floral disc patelliform, with 5 large, impressed glands. Stamens 10; filaments shorter than petals; anthers yellow. Ovary globose, slightly flattened, ca. 1.5 mm in diam., 1-loculed; ovules numerous. Styles 3, linear, ca. 1.5 mm. Fl. Jul–Aug.

• Alpine meadows, shifting screens; 4200–5100 m. S Qinghai, W Sichuan, E Xizang.

22. *Arenaria lancangensis* L. H. Zhou, Acta Phytotax. Sin. 18: 357. 1980.

澜沧雪灵芝 *lan cang xue ling zhi*

Herbs perennial. Stems caespitose, pulvinate, 4–11 cm, with crowded, withered, persistent leaves at woody base. Leaf blade subulate, 6–8 × ca. 1 mm, base broadened, clasping, apex acute. Flower solitary, terminal; bracts ovate, ca. 2 × 1 mm. Pedicel slightly curved, ca. 4 mm, glabrous. Sepals 5, elliptic, ca. 3 × 1.2 mm, 3-veined, apex obtuse or acute. Petals 5, white, elliptic, 3–3.5 × ca. 1.2 mm, with a yellow, oblong callus at base. Stamens 10; filaments less than 1 mm, those opposite sepals with a gland at base; anthers white. Ovary obovate, ca. 2 mm in diam., smooth; ovules 5 or 6. Styles 3. Capsule globose, ca. 3 mm, 3-valved;

valves 2-cleft at apex. Seeds 1–3, gray, triangular-oblate, less than 1 mm in diam., glabrous. Fl. and fr. Jun–Sep.

• Alpine meadows, gravelly areas; 3500–4800 m. SE Qinghai, W Sichuan, SE Xizang, SW Yunnan.

23. *Arenaria gerzensis* L. H. Zhou, Rep. Invest. Fl. Fauna Ah Li Reg. Tibet, 126. 1979.

改则雪灵芝 *gai ze xue ling zhi*

Herbs perennial. Principal roots robust, woody. Stems clustered, pulvinate, 2–5 cm, with crowded, withered, persistent leaves at woody base. Leaf blade linear, triangular in cross section, 6–10 × ca. 1 mm, subleathery, veins raised abaxially, impressed adaxially, base broadened, clasping, margin with small teeth, apex acute, awned. Flower solitary, terminal; bracts ovate-lanceolate, 2–3 × ca. 1.5 mm, 1-veined, margin membranous, apex acute. Pedicel ca. 1 mm. Sepals 5, lanceolate, 5–6 × 1.5–2 mm, subleathery, 3-veined, midvein raised, lateral veins inconspicuous, base ciliate, apex greenish brown. Petals 5, white, saccate, 8–10 × 2–3 mm. Stamens 10; filaments opposite sepals with a gland at base. Ovary narrowly ovoid, ca. 4 × 1.5 mm, apex yellow-brown. Styles 3, linear. Fl. Jun–Jul.

• Alpine meadows; 4500–4700 m. NW Xizang (Ngari Diqu).

24. *Arenaria qinghaiensis* Y. W. Tsui & L. H. Zhou in L. H. Zhou, Acta Phytotax. Sin. 18: 358. 1980.

青海雪灵芝 *qing hai xue ling zhi*

Herbs perennial. Roots robust, woody. Stems clustered, pulvinate, 5–8 cm, with crowded, withered, persistent leaves at woody base. Leaf blade linear, 1–1.5 cm × ca. 1 mm, base broadened, clasping, membranous, margin narrowly membranous, sparsely ciliate, apex slightly reflexed, acute. Flower solitary, terminal; bracts linear-elliptic, 3–4 × ca. 1 mm. Pedicel ca. 1 mm, glabrous. Sepals 5, linear-lanceolate, 7–8 × 1.5–2 mm, 1–3-veined, base broadened, margin membranous, apex acute. Petals 5, white, elliptic-ovate, 8–9 × 2.5–3 mm, apex obtuse. Floral disc patellate, with 5 large, impressed, elliptic glands. Stamens 10; filaments 4–5 mm; anthers yellow. Ovary ovoid, 2–3 mm, 1-loculed; ovules numerous. Styles 3, linear, 2.5–3 mm. Fl. Jun–Jul.

• Alpine meadows; ca. 4200 m. WC Qinghai (Dulan Xian).

25. *Arenaria aksayqingensis* L. H. Zhou, Acta Biol. Plateau Sin. 6: 25. 1987.

阿克赛钦雪灵芝 *a ke sai qin xue ling zhi*

Herbs perennial. Principal roots robust, woody. Stems clustered, pulvinate, 3–4 cm, with crowded, withered, persistent leaves at woody base. Leaf blade subulate, 5–10 × ca. 1 mm, base broadened, clasping, membranous, margin narrowly membranous, sparsely ciliate, apex acute. Flower solitary, terminal; bracts subulate, 3–4 × ca. 1 mm. Pedicel ca. 1 mm, glabrous. Sepals 5, lanceolate, 6–7 × 1.5–2 mm, closely 3-veined near margin, base broadened, margin membranous, apex acute. Petals 5, white, obovate, 4–5 mm, apex obtuse.

Floral disc patellate, with 5 ovoid glands. Stamens 10; filaments shorter than petals; anthers violet. Ovary ovoid, ca. 1.5 mm. Styles 3, linear, 2–3 mm. Fl. Jul.

• River beaches; ca. 4900 m. Xinjiang.

26. *Arenaria pulvinata* Edgeworth in J. D. Hooker, Fl. Brit. India 1: 238. 1874.

垫状雪灵芝 dian zhuang xue ling zhi

Arenaria perlevis (F. N. Williams) Handel-Mazzetti; *A. polytrichoides* Edgeworth var. *perlevis* F. N. Williams. Herbs perennial. Roots conic, slender. Stems in small, compact, subglobose clusters, pulvinate, branched at base, 4–5 cm, with crowded, withered, persistent leaves at base. Leaf blade subulate-elliptic or ovate-subulate, 3–6 × ca. 1 mm, base clasping, membranous, margin flat distally, hard, ciliate, apex acute, mucronulate. Flower solitary, terminal, 6–7 mm in diam. Sepals 5, ovate or ovate-lanceolate, 2–2.5 × ca. 1 mm, ca. 1/2 as long as petals, 3-veined, midvein raised, lateral veins short, base rounded, incrassate, margin hard, scariosus, apex obtuse. Petals 5, white, saccate or obovate, 4–5 × ca. 1.5 mm. Stamens 10; filaments opposite sepals with a gland at base; anthers yellow. Ovary obovoid, ca. 1.5 × 1 mm. Styles 3, less than 1 mm. Fl. Jul.

Alpine meadows, gravels; 4200–5000 m. SE Xizang [Bhutan, India, Nepal, Sikkim].

27. *Arenaria shannanensis* L. H. Zhou in C. Y. Wu, Fl. Xizang. 1: 677. 1983.

粉花雪灵芝 fen hua xue ling zhi

Herbs perennial. Roots slender, woody. Stems pulvinate, 3–6 cm, with crowded, withered, persistent leaves at base and distally. Leaf blade subulate, 5–7 cm, 3-veined, base broadened, membranous, apex acute. Flower solitary, terminal, sessile. Sepals 5, violet abaxially, ovate-lanceolate, 5–6 × ca. 1.5 mm, 3-veined, margin white membranous, apex acute. Petals 5, pink, lanceolate or orbicular, 6–7 × 1.5–2 mm, apex obtuse. Stamens 10; filaments shorter than sepals, those opposite sepals with a gland at base. Ovary ovoid, ca. 2 mm. Styles 3, linear, ca. 2 mm.

• Alpine meadows; ca. 4300 m. S Xizang.

28. *Arenaria edgeworthiana* Majumdar, J. Indian Bot. Soc. 44: 141. 1965.

山居雪灵芝 shan ju xue ling zhi

Arenaria monticola Edgeworth in J. D. Hooker, Fl. Brit. India 1: 238. 1874, not Buckley (1862).

Herbs perennial. Roots robust, woody. Stems pulvinate, densely branched, 4–8 cm, glabrous. Leaves crowded; leaf blade subulate-linear, 0.8–2 cm, with 1 raised vein, base broadened, margin sheathing, incrassate, membranous, hairy, apex cuspidate. Flower solitary, terminal, sessile, ca. 1.8 cm in diam. Sepals 5, lanceolate or ovate-lanceolate, 7–8 × ca. 2 mm, closely 3-veined, base broadened, margin broadly membranous, apex acute. Petals 5, white, broadly ovate, 0.9–1.2 cm, base clawed, apex obtuse. Stamens 10; filaments

shorter than sepals, those opposite sepals with a gland at base. Ovary ovoid. Styles 3, linear. Capsule ovoid, shorter than persistent sepals, 3-valved; valves 2-cleft at apex. Seeds obovoid-reniform. Fl. Jun–Jul, fr. Jul–Aug.

Alpine meadows, grasslands, river beaches; 4200–5100 m. Xizang [Bhutan, Nepal, Sikkim].

29. *Arenaria bryophylla* Fernald, Rhodora 21: 5. 1919.

藓状雪灵芝 xian zhuang xue ling zhi

Arenaria musciformis Wallich ex Edgeworth & J. D. Hooker in J. D. Hooker, Fl. Brit. India 1: 237. 1874, not Triana & Planchon (1862).

Herbs perennial. Roots robust, woody. Stems clustered, pulvinate, 3–5 cm, woody, with crowded, withered, persistent leaves proximally. Leaves crowded; leaf blade linear, triangular in cross section, 4–9 × ca. 1 mm, veins raised abaxially, impressed adaxially, base clasping, broadened, hard, margin slightly involute, narrowly membranous, sparsely ciliate, apex spreading or reflexed, acute. Flower solitary, sessile; bracts lanceolate, ca. 3 × 1 mm, 1-veined, base broadened, margin membranous, apex acute. Sepals 5, elliptic-lanceolate, ca. 4 × 1.5 mm, 3-veined, base broadened, margin membranous, apex acute. Petals 5, white, narrowly obovate, slightly longer than sepals. Floral disc patellate, with 5 orbicular glands. Stamens 10; filaments ca. 3 mm; anthers yellow. Ovary ovoid-globose, ca. 1.5 mm, 1-loculed; ovules numerous. Styles 3, linear, ca. 1.5 mm. Fl. Jun–Jul.

Alpine meadows, stony slopes, gravelly sands along rivers; 4200–5200 m. S Qinghai, Xizang [Nepal, Sikkim].

30. *Arenaria zadoiensis* L. H. Zhou, Acta Biol. Plateau Sin. 6: 26. 1987.

杂多雪灵芝 za duo xue ling zhi

Herbs perennial. Roots robust, woody. Stems clustered, pulvinate, 2–3 cm, woody at base, with crowded, withered, persistent leaves proximally. Leaf blade subulate, 4–5 × ca. 1 mm, base membranous, margin involute, apex spinose. Flower solitary, sessile; bracts lanceolate, 4–5 × ca. 1 mm. Sepals 5, lanceolate, 4–5 × ca. 2 mm, 1-veined, apex acuminate. Petals 5, white, saccate, shorter than sepals. Floral disc with 5 glands. Stamens 10, 5 long and 5 short. Ovary obovoid, ca. 1.5 mm. Styles 3, linear, ca. 3.5 mm. Fl. Jun–Jul.

• Beneath rocky cliffs; ca. 4400 m. SE Qinghai.

31. *Arenaria taibaishanensis* L. H. Zhou, Acta Phytotax. Sin. 18: 361. 1980.

太白雪灵芝 tai bai xue ling zhi

Herbs perennial. Roots with numerous wiry branches at base. Stems pulvinate, 2–3 cm, sparsely hairy. Leaf blade subulate-linear, 5–6 × ca. 1 mm, 1-veined, margin slightly involute, apex acute. Cymes 2- or 3-flowered; bracts ovate, ca. 3 × 1 mm. Pedicel 2–3 mm, sparsely hairy. Sepals 5, lanceolate, ca. 3 × 0.6 mm, sparsely hairy abaxially, with 3 raised veins, base broadened, apex obtuse. Petals white, saccate, ca. 4 × 1 mm. Stamens 10; filaments ca. 2 mm; anthers yellow. Ovary bottle-shaped, ca. 2 × 1 mm. Styles 3, ca. 2 mm. Fl. Jun–Jul.

• Alpine scrub, meadows; ca. 4000 m. Shaanxi.

32. *Arenaria festucoides* Benth. ex Royle, Ill. Bot. Himal. Mts. 1: 81. 1834.

狐茅状雪灵芝 hu mao zhuang xue ling zhi

Herbs perennial. Principal roots robust, woody; lateral roots smaller. Stems densely clustered, pulvinate, 5–8 cm, glandular villous, with crowded, withered, persistent leaves at woody base. Leaf blade linear, 0.7–2 cm × ca. 1 mm, 1-veined, base broadened, clasping, margin narrowly membranous, proximally sparsely ciliate, apex acute; proximal cauline leaves congested, distal middle ones gradually sparser. Cymes 1–3- or more flowered; bracts ovate-lanceolate, 3–4 × 1–1.5 mm, glandular hairy, 1-veined, margin membranous, apex acuminate. Pedicel to 7 mm, densely glandular hairy. Sepals 5, sometimes 4, ovate-lanceolate or broadly ovate, 3–7 × 2.5–3.5 mm, densely glandular hairy, 1–3-veined, base rounded, margin usually involute, broadly membranous, apex acuminate. Petals 5, white, obovate, 7–9 × 4–5 mm, apex truncate or obtuse, sometimes emarginate. Floral disc patellate, with 5 glands. Stamens 10; filaments 4–6 mm; anthers yellow. Ovary ovoid, ca. 2 mm. Styles 3, sometimes 4, linear, ca. 2.5 mm. Fl. Jun–Jul.

Mountain grasslands; 2000–4700 m. Qinghai, SW Xinjiang, Xizang [India, ?Kashmir, ?Nepal, Pakistan].

Two varieties have been recognized. The distinguishing characters seem to be only a matter of degree, and the variation pattern should be studied in the field. Perhaps this variation should not be the basis for formal recognition of taxa.

- 1a. Leaf blade 1–2 cm; pedicel 5–7 mm 32a. var. *festucoides*
1b. Leaf blade ca. 0.7 cm; pedicel to 5 mm 32b. var. *imbricata*

32a. *Arenaria festucoides* var. *festucoides*

狐茅状雪灵芝(原变种) hu mao zhuang xue ling zhi (yuan bian zhong)

Leaf blade 1–2 cm. Pedicel 5–7 mm.

Mountain grasslands; 2000–4700 m. Qinghai, SW Xinjiang, Xizang [India, ?Kashmir, ?Nepal, Pakistan].

32b. *Arenaria festucoides* var. *imbricata* Edgeworth & J. D. Hooker in J. D. Hooker, Fl. Brit. India 1: 237. 1874.

小狐茅状雪灵芝 xiao hu mao zhuang xue ling zhi

Leaf blade ca. 0.7 cm. Pedicel to 5 mm.

• S Xizang.

4. *Arenaria* subgen. *Dolophragma* (Fenzl) McNeill, Notes Roy. Bot. Gard. Edinburgh 24: 127. 1962.

福祿草亚属 fu lu cao ya shu

Dolophragma Fenzl, Ann. Wiener Mus. Naturgesch. 1: 63. 1836.

Herbs perennial. Roots often slender, woody. Stems usually densely pulvinate, sometimes caespitose. Leaves sessile, linear to subulate or linear-lanceolate, leathery, usually persistent, margin slightly swollen, apex usually acuminate. Inflorescence terminal, 1–3-flowered. Sepals ovate to ovate-lanceolate or elliptic, 3-veined, margin membranous, apex obtuse. Petals white, longer than sepals, sometimes only slightly so. Floral disc with 5 glands.

Seven species: Asia; five species (three endemic) in China.

33. *Arenaria przewalskii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg, Sér. 3, 26: 428. 1880.

福祿草 fu lu cao

Herbs perennial. Principal roots slender, woody; lateral roots brittle. Stems densely caespitose, prostrate at base, erect distally, 10–20 cm, densely pale brown glandular villous, with withered, persistent leaves. Basal leaf blade linear, 2–3 cm × 1–2 mm, both surfaces glabrous, midvein raised, base broadened, membranous, sheathing, margin slightly involute, denticulate, apex obtuse or acute. Cauline leaf blade lanceolate or narrowly so, 1–1.5 cm × 2–3 mm, margin slightly involute, denticulate, apex obtuse. Cymes 3-flowered; bracts ovate-elliptic, 4–7 × 1–2 mm, glandular hairy abaxially, base narrowed, apex obtuse. Pedicel 3–4 mm, densely glandular hairy. Sepals 5, violet, broadly ovate, 4–5 × 2–3 mm, densely glandular hairy, base broadened, margin membranous, usually ciliate proximally, apex obtuse or sometimes emarginate. Petals 5, white, obovate, 8–10 × ca. 4 mm, base cuneate, apex obtuse or emarginate. Floral disc patellate, with 5 elliptic glands. Stamens 10; filaments ca. 5 mm; anthers

yellow. Ovary stipitate, globose-obovoid. Styles 3, linear, ca. 3 mm. Fl. Jul–Aug.

• Alpine meadows, cirques; 2600–4200 m. Gansu, Qinghai.

The whole plant is used medicinally.

34. *Arenaria smithiana* Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 334. 1932.

大花福祿草 da hua fu lu cao

Arenaria oresbia W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 197. 1920, not Greenman (1904).

Herbs perennial. Stems densely pulvinate, 10–15 cm, sparsely villous; mature branches woody, with crowded, withered, persistent leaves. Basal leaf blade linear or subulate-linear, 0.6–1.5 cm × 1–2 mm, 3-veined, midvein raised, base broadened, sheathing, margin involute, denticulate, apex acute, spinose. Cauline leaves in 2 or 3 pairs; leaf blade linear-lanceolate or ovate, 3–8 × 1–2 mm, shortly villous, base broadened, sheathing, margin involute, yellow, ciliate, apex hard. Flower solitary, terminal. Pedicel 1–2 cm, shortly villous. Sepals 5, ovate or lanceolate-ovate, 6–10 × 3–4 mm, sparsely white hairy abaxially, inconspicuously 3-veined, base broadened, margin membranous, apex obtuse. Petals 5, white or yellowish, obovate, 1.2–1.5 cm × 4–6 mm, apex obtuse. Stamens

10; filaments equaling sepals, those opposite sepals with a gland at base. Ovary ovoid. Styles 3, linear. Fl. Jul.

• Alpine meadows; 4000–4500 m. SE Xizang, NW Yunnan.

35. *Arenaria oreophila* J. D. Hooker, Fl. Brit. India 1: 238. 1874.

山生福祿草 shan sheng fu lu cao

Arenaria lichiangensis W. W. Smith.

Herbs perennial. Stems densely pulvinate, 4–9 cm, densely glandular hairy. Basal leaf blade linear, 1–2 cm × ca. 1.5 mm, midvein raised, base broadened, membranous, margin white, hard, apex acute. Cauline leaves in 2 or 3 pairs; leaf blade ovate or ovate-lanceolate, ca. 5 × 1.5 mm, margin hairy, apex obtuse. Flower solitary, terminal. Pedicel 5–8 mm, densely glandular hairy. Sepals 5, elliptic, ca. 5 × 2 mm, glandular villous, 3-veined, margin narrowly membranous, apex obtuse. Petals 5, white, narrowly obovate, 7–8 mm. Stamens 10; filaments 5–8 mm, those opposite sepals with a gland at base; anthers yellow. Ovary obovoid, ca. 3 mm. Styles 3, linear, ca. 2 mm. Capsule ovoid, equaling persistent sepals, 3-valved; valves 2-cleft at apex. Seeds brown, reniform-horseshoe-shaped, ca. 1 mm in diam., smooth. Fl. Jun–Jul, fr. Jul–Aug.

Alpine meadows, shifting screes; 3500–5000 m. SE Qinghai, SW Sichuan, NW Yunnan [Sikkim].

36. *Arenaria densissima* Wallich ex Edgeworth & J. D. Hooker in J. D. Hooker, Fl. Brit. India 1: 239. 1874.

密生福祿草 mi sheng fu lu cao

Cherleria juniperina D. Don, Prodr. Fl. Nepal. 214. 1825, not *Arenaria juniperina* Linnaeus (1767), nor Villars (1789), nor Pursh (1813); *Dolophragma juniperinum* Fenzl.

Herbs perennial. Stems densely pulvinate, densely branched, 4–5 cm. Leaves congested, imbricate; leaf blade subulate, 5–10 × ca. 1 mm, veins raised abaxially, impressed adaxially, margin involute, apex excurved, spinose. Flower solitary, terminal; bracts lanceolate, ca.

2 × 1 mm. Pedicel 2–4 mm, glabrous. Sepals 5, elliptic or ovate, ca. 2.5 × 1.5 mm, 3-veined, base broadened, margin membranous, apex obtuse or acute. Petals 5, white, saccate or narrowly so, ca. 5 × 2 mm. Stamens 10; filaments ca. 2 mm, those opposite sepals with a gland at base; anthers violet. Ovary obovate, ca. 1.2 mm in diam. Styles 3. Capsule ovoid, ca. 2.5 mm, 3-valved; valves 2-cleft at apex. Seeds brown, trigonous-reniform, glabrous. Fl. and fr. Jun–Aug.

Alpine meadows, shifting screes; 3600–5300 m. SE Qinghai, W Sichuan, S Xizang [Bhutan, India, Nepal, Sikkim].

37. *Arenaria polytrichoides* Edgeworth in J. D. Hooker, Fl. Brit. India 1: 237. 1874.

团状福祿草 tuan zhuang fu lu cao

Herbs perennial. Principal roots robust, woody. Stems densely clustered, 2.5–11 cm, forming hemispheric cushions 1–1.5 cm in diam.; branches cylindric, woody at base, with congested, withered, persistent leaves along their length. Leaves imbricate; leaf blade subulate, 5–10 × ca. 1 mm, veins raised abaxially, impressed adaxially, base broadened, clasping, membranous, margin involute distally, thickened, sparsely ciliate near base, apex cuspidate. Flower solitary, terminal, sessile; bracts lanceolate, 2.5–3 × ca. 1 mm, base broadened, clasping, forming a membranous sheath, margin reflexed, hard, apex spinose. Sepals 5, ovate, ovate-elliptic, or broadly elliptic, ca. 3 mm, obscurely 3-veined, base broadened, apex obtuse. Petals 5, white, ovate or broadly obovate, slightly longer than sepals. Floral disc patellate, with 5 dark glands. Stamens 10; filaments ca. 1.5 mm; anthers yellow. Ovary ovoid or obovoid, ca. 1 mm. Styles 3, ca. 1 mm. Capsule ovoid, ca. 1.5 mm, 3-valved; valves 2-cleft at apex. Seeds ellipsoid, black-brown, slightly ridged. Fl. Jun–Jul, fr. Aug–Sep.

• Alpine meadows, shifting screes; 3500–5300 m. SE Qinghai, W Sichuan, Xizang.

5. *Arenaria* subgen. **Solitaria** McNeill, Notes Roy. Bot. Gard. Edinburgh 24: 128. 1962.

单花亚属 dan hua ya shu

Herbs perennial. Stems clustered, short. Leaves lanceolate to ovate-orbicular, base narrowed, margin usually slightly hard, cartilaginous. Flowers solitary, rarely paired, terminal, showy. Sepals elliptic or lanceolate to narrowly orbicular, margin membranous, usually cartilaginous, apex acute. Petals white, pink, or violet, obovate to obovate-elliptic.

Six species: Asia; six species (two endemic) in China.

38. *Arenaria ciliolata* Edgeworth in J. D. Hooker, Fl. Brit. India 1: 240. 1874.

缘毛无心菜 yuan mao wu xin cai

Herbs perennial, hairy throughout. Roots conic, branched at base. Stems densely clustered, yellow, 5–8 cm, white villous. Leaves sessile (rarely petiole 2–3 mm), ovate or ovate-orbicular, 5–10 × 2–5 mm, adaxially sparsely brown hairy, base cuneate, margin thick, ciliate, apex cuspidate or acuminate. Flower

solitary, terminal. Pedicel 5–10 mm, white villous. Sepals 5, elliptic or orbicular-lanceolate, 7–8 mm, sparsely hairy abaxially, margin thick, ciliate, apex acuminate. Petals 5, white, obovate or broadly so, 9–10 mm, apex obtuse. Stamens 10; filaments shorter than sepals; anthers dark green or black. Ovary ovoid. Styles 3, linear. Fl. Jul–Aug.

Alpine meadows; 4000–4600 m. S Xizang [Bhutan, Nepal, Sikkim].

39. *Arenaria ramellata* F. N. Williams, J. Linn. Soc., Bot. 38: 399. 1909.

嫩枝无心菜 *nen zhi wu xin cai*

Herbs perennial, glabrous. Stems branched at base, 4–6 cm; branches ascending. Leaves congested, sessile, lanceolate or ovate-lanceolate, 5–9 mm, veins inconspicuous, base attenuate, margin ciliate, apex acute. Flower solitary, terminal. Pedicel 5–10 mm. Sepals 5, elliptic or lanceolate, 5–6 × ca. 2 mm, margin narrowly membranous, ciliate, apex excurved, obtuse. Petals 5, white or pink, obovate, ca. 1.5 × as long as sepals, base shortly clawed, apex obtuse. Stamens 10; filaments ca. 2/3 as long as sepals; anthers pale yellowish. Ovary ovoid. Styles 3, linear, ca. 5 mm. Fl. May.

• Alpine scrub or meadows; 4200–5000 m. S Xizang.

40. *Arenaria stracheyi* Edgeworth in J. D. Hooker, Fl. Brit. India 1: 240. 1874.

藏西无心菜 *zang xi wu xin cai*

Herbs perennial, dwarf, glabrous. Stems sparsely clustered, suberect, 2–5 cm. Leaf blade narrowly orbicular, flat, 5–6 × 2–3 mm, fleshy, veins inconspicuous, base narrowed, margin not thickened, apex acute or acuminate. Flower solitary, terminal. Pedicel 5–8 mm, apex erect or nutant. Sepals 5, suberect, narrowly orbicular, 4–5 × 3–4 mm, margin membranous, apex acute. Petals 5, white, broadly obovate, 1.5–2 × as long as sepals, apex obtuse. Stamens 10; filaments longer than sepals; anthers green. Ovary ovoid. Styles 3, linear. Capsule ovoid, shorter than persistent sepals, apex 6-valved. Seeds subreniform, small, smooth, not lustrous. Fl. and fr. Jul–Aug. Swamp meadows, gravelly mountain grasslands, river beaches, broken alpine rocks; 3000–5300 m. W Xizang [India, ?Nepal].

41. *Arenaria rhodantha* Pax & K. Hoffmann in Pax, Repert. Spec. Nov. Regni Veg. Beih. 12: 366. 1922.

红花无心菜 *hong hua wu xin cai*

Herbs perennial. Stems sparsely clustered, erect, slender, 2–5 cm, glabrous. Leaf blade elliptic, ovate, or lanceolate, 5–6 × 2–3 mm, margin thick, ciliate, rarely narrowly membranous, apex acute, cuspidate. Flower solitary, terminal. Pedicel 0.7–1.5 cm, glandular pubescent. Sepals 5, violet or green, lanceolate or orbicular, ca. 5 × 2 mm, midvein and margin nodose hairy, apex obtuse or acute. Petals 5, violet, obovate or broadly so, 8–9 mm, apex obtuse. Stamens shorter than petals; anthers violet. Ovary ovoid. Styles 3, linear. Fl. Jun–Jul.

• Alpine meadows, gravels, exposed rocks; 4000–5000 m. W Sichuan, E Xizang [?India, ?Nepal].

42. *Arenaria forrestii* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 181. 1912.

西南无心菜 *xi nan wu xin cai*

6. *Arenaria* subgen. *Odontostemma* (Bentham ex G. Don) F. N. Williams, Bull. Herb. Boissier 3: 603. 1895.

齿瓣亚属 *chi ban ya shu*

Odontostemma Bentham ex G. Don, Gen. Hist. 1: 449. 1831; *Gooringia* F. N. Williams.

Herbs annual, biennial, or perennial. Leaf blade linear to ovate, rarely subulate. Inflorescences various, but often with vegetative branches arising within them. Sepals curved, often saccate, veins inconspicuous, margin broadly

Arenaria forrestii f. *cernua* (F. N. Williams) C. Y. Wu; *A. forrestii* f. *micrantha* (F. N. Williams) C. Y. Wu; *A. forrestii* f. *roseotincta* (W. W. Smith) C. Y. Wu; *A. glanduligera* F. N. Williams var. *cernua* F. N. Williams; *A. glanduligera* var. *micrantha* F. N. Williams; *A. roseotincta* W. W. Smith.

Herbs perennial. Stems clustered, 1–15 cm, glabrous or sparsely white villous along 1 side. Proximal cauline leaf blade scalelike, 3–4 × 1–1.5 mm; distal cauline leaf blade orbicular-lanceolate or orbicular-ovate, 5–12 × 1.5–3 mm, leathery, glabrous, midvein raised, base narrowed, margin slightly hard, cartilaginous, apex acute. Flower solitary, terminal. Pedicel 0.5–1.5 cm, villous in a line. Sepals 5, yellow, orbicular-lanceolate, 5–8 × 2–3 mm, base narrowed, margin membranous, apex acute. Petals 5, white or pink, obovate-elliptic, 0.7–1.5 cm × 4–6 mm, base narrowed, cuneate, apex obtuse, sometimes truncate or emarginate. Stamens 10; filaments 5–6 mm; anthers yellow. Ovary ovoid, slightly flattened, ca. 2 mm; ovules 6–8. Styles 3, linear, ca. 2.5 mm. Fl. Jul–Aug.

Mountains, alpine meadows, swamp meadows, shifting screes, broken rocks, limestone crevices; 2900–5300 m. S Gansu, SE Qinghai, W Sichuan, SE Xizang, NW Yunnan [Nepal].

43. *Arenaria glanduligera* Edgeworth in J. D. Hooker, Fl. Brit. India 1: 240. 1874.

小腺无心菜 *xiao xian wu xin cai*

Herbs perennial. Roots conic, branched at base. Stems clustered, yellow, lustrous, slender, 2–6 cm, glabrous proximally, white glandular hairy distally. Leaf blade greenish, ovate-lanceolate, ovate, or elliptic-orbicular, flat, 5–6 × 2–3 mm, both surfaces white glandular pubescent, veins inconspicuous, base attenuate into petiole, margin ciliate, apex acute or acuminate. Flowers solitary or paired, terminal; bracts similar to leaves but smaller. Pedicel yellow, slender, 0.5–2 cm, sparsely white villous. Sepals 5, spreading or excurved, lanceolate or ovate-lanceolate, 4–5 × ca. 1.5 mm, glandular hairy abaxially, veins inconspicuous, margin narrowly membranous, apex obtuse or acute. Petals 5, violet, obovate or ovate-elliptic, 5–7 × 2–3 mm, apex obtuse. Stamens 10; filaments ca. 3 mm; anthers greenish or yellow. Ovary ovoid. Styles 3, linear, pillar-shaped or clavate.

Alpine meadows, shifting screes; 4500–5500 m. Xizang [Bhutan, Nepal, Sikkim].

membranous, apex truncate. Petals usually longer than sepals (but sometimes smaller, cleistogamous flowers present), apex emarginate or shallowly bifid or toothed. Styles usually 2, rarely 3. Seeds often inflated, roughened, without reticulate striae.

About 65 species: Asia; 59 species (57 endemic) in China.

McNeill (Notes Roy. Bot. Gard. Edinburgh 24: 129. 1962) mentioned that *Arenaria* subgen. *Odontostemma* is heterogeneous, but did not further subdivide it. The following five groups have been recognized in China: A. sect. *Pseudoeuthalia* C. Y. Wu (in W. T. Wang et al., Vasc. Pl. Hengduan Mount. 1: 396. 1993, but invalid as without Latin diagnosis; species nos. 44–51); A. sect. *Reductae* C. Y. Wu (loc. cit., but invalid as without Latin diagnosis; species nos. 52–64); A. sect. *Moehringella* Franchet (Pl. Delavay. 96. 1889; species nos. 65–74); A. sect. *Macrogynae* Franchet (Bull. Soc. Bot. France 33: 432. 1885; species nos. 75–79); and A. sect. *Odontostemma* (G. Don) Pax (in Engler & Prantl, Nat. Pflanzenfam. 3(1b): 84. 1889; species nos. 80–102).

44. *Arenaria weissiana* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 47. 1920.

多柱无心菜 *duo zhu wu xin cai*

Herbs perennial. Roots fusiform or conic. Stems clustered, 2–10 cm, glandular hairy in 2 lines or yellow or densely white glandular hairy. Leaves diffusely paired; petiole 2–5 mm; leaf blade lanceolate, elliptic, obovate, or saccate, 5–10 × 3–5 mm, granular, sparsely glandular pubescent or densely villous, midvein impressed, base cuneate, apex rounded or obtuse. Flower solitary or cymes few flowered; bracts similar to leaves but smaller. Pedicel 1–4 cm, sparsely glandular hairy. Sepals 5, greenish abaxially, ovate or lanceolate, 4–7 × 2–3 mm, sparsely glandular pubescent or densely villous, midvein impressed, base broadened, margin narrowly membranous, ciliate, apex acute. Petals 5, white, obcordate, ca. 2 × as long as sepals, base narrowly cuneate, apex rounded or bifid nearly to middle. Floral disc with 5 fleshy glands. Stamens 10, longer than sepals; anthers brown or green. Ovary ovoid, ca. 1.5 × 1.2 mm. Styles 4 or 5 (in female flowers), ca. 1.5 mm. Fl. Jul–Aug.

• Alpine meadows, shifting screes, rock crevices; 2800–4800 m. Sichuan, NW Yunnan.

A related species, which has not been validly published (*Arenaria galiiformis* C. Y. Wu in W. T. Wang et al., Vasc. Pl. Hengduan Mount. 1: 402. 1993), differs from *A. weissiana* in having stems dichotomously branched, slender, hard; leaves usually in whorls of 4, blade 5–10 × 3–8 mm, thickened, both surfaces white powdery, densely hairy, base attenuate, apex obtuse; sepals densely and shortly glandular pubescent; petals broadly ovate or suborbicular, apex emarginate; ovary ovoid, 2–3 mm; and styles 3, ca. 2.5 × as long as ovary. It grows in rock crevices, from 4200–4300 m, in SW Sichuan. Three varieties of *Arenaria weissiana* have been recognized. Field studies are needed to better characterize these entities.

1a. Petal apex bifid nearly to middle ... 44b. var. *bifida*

1b. Petal apex rounded, entire.

2a. Plants glandular hairy in 2 lines

..... 44a. var. *weissiana*

2b. Plants densely white glandular

hairy 44c. var. *puberula*

44a. *Arenaria weissiana* var. *weissiana*

多柱无心菜(原变种) *duo zhu wu xin cai* (*yuan bian zhong*)

Plants glandular hairy in 2 lines. Petal apex rounded, entire.

• Alpine meadows, shifting screes; 2800–4800 m. SW Sichuan, NW Yunnan.

44b. *Arenaria weissiana* var. *puberula* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 34. 1987.

微毛无心菜 *wei mao wu xin cai*

Plants densely white glandular hairy. Leaves and sepals densely villous. Petal apex rounded, entire.

• Rock crevices; ca. 3900 m. Sichuan.

44c. *Arenaria weissiana* var. *bifida* H. Chuang in C. Y. Wu et al, Fl. Yunnan. 6: 836. 1995.

裂瓣无心菜 *lie ban wu xin cai*

Plants glandular hairy. Petal apex bifid nearly to middle.

• Alpine meadows; ca. 3700 m. NW Yunnan.

45. *Arenaria setifera* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 37. 1987.

刚毛无心菜 *gang mao wu xin cai*

Herbs. Roots conic. Stems slender, 5–10 cm, hard, densely glandular pubescent and with hard, multicellular hairs. Leaf blade ovate, 5–6 × 2.5–3 mm, base rounded, margin villous with sparse, hard, multicellular hairs, apex acuminate. Cymes several flowered; bracts similar to leaves but smaller. Pedicel 1–2.5 cm, with hard, multicellular hairs. Sepals 5, lanceolate, 4–5 × 1–1.5 mm, with hard, multicellular hairs abaxially, apex long acuminate. Petals 5, white, obovate, ca. 2 × as long as sepals, apex 2-cleft; lobes shallowly toothed. Stamens 10, nearly equaling sepals. Ovary ovoid, ca. 2 mm. Styles 3, linear, longer than ovary. Fl. Jun–Jul.

• Alpine meadows, rock crevices; 3600–4200 m. SW Yunnan.

46. *Arenaria napuligera* Franchet, Bull. Soc. Bot. France 33: 429. 1886.

滇藏无心菜 *dian zang wu xin cai*

Herbs annual. Roots napiform. Stems branched proximally or unbranched, slender, 5–15 cm, hard, white or violet glandular villous. Leaf blade orbicular, narrowly so, or linear, 5–8 × 1.5–4 mm, base cuneate, margin ciliate proximally, apex obtuse. Cymes sometimes conic, few to many flowered, or sometimes flower solitary. Pedicel erect, slender, 0.5–2.5 cm, hard, glandular villous. Sepals 5, violet or green, lanceolate or ovate-lanceolate, 6–7 × ca. 2 mm, glandular pubescent abaxially, margin broadly membranous, apex obtuse. Petals 5, white or pink, ca. 2 × as long as sepals, apex entire, emarginate, or 2-cleft. Stamens 10, ca. 3/4 as long as petals. Ovary obovoid, ca. 2 mm. Styles 2 or 3, linear, ca. 3 mm. Fl. Jun–Jul.

• Alpine grasslands and meadows; 3000–5100 m. W Sichuan, E Xizang, NW Yunnan.

1a. Stems branched proximally; flowers few to many per cyme; styles 3 46a. var. *napuligera*

1b. Stems unbranched; flower solitary; styles 2 46b. var. *monocephala*

46a. *Arenaria napuligera* var. *napuligera*

滇藏无心菜(原变种) dian zang wu xin cai (yuan bian zhong)

Stems branched proximally. Flowers few to many per cyme. Styles 3.

• Alpine grasslands; 3000–5000 m. W Sichuan, E Xizang, NW Yunnan.

46b. *Arenaria napuligera* var. *monocephala* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 196. 1920.

单头无心菜 dan tou wu xin cai

Stems unbranched. Flower solitary. Styles 2.

• Alpine meadows; 3600–5100 m. SE Xizang, NW Yunnan.

47. *Arenaria filipes* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 34. 1987.

细柄无心菜 xi bing wu xin cai

Herbs. Roots napiform, branched at base. Stems clustered, branched distally, 8–12 cm, shortly villous in 1 line. Leaf blade decurved, saccate-oblongate or saccate-orbicular proximally, orbicular-lanceolate distally, 5–10 × 2–3 mm, glabrous, base obtuse, apex attenuate. Cymes few to many flowered; bracts similar to leaves but smaller. Pedicel 2.5–5 cm, densely glandular pubescent. Sepals 5, orbicular-lanceolate, 3–4 mm, sparsely pubescent, base broadened, margin white, apex acute. Petals 5, white, obovate, ca. 2 × as long as sepals, apex entire or emarginate. Stamens 10; anthers yellowish green. Ovary ovoid; ovules numerous. Styles 3, filiform. Fl. Jul–Aug.

• Montane forest margins; ca. 2800 m. SW Sichuan.

48. *Arenaria nigricans* Handel-Mazzetti, Symb. Sin. 7: 196. 1929.

变黑无心菜 bian hei wu xin cai

Herbs. Root solitary, small; rootlets white, long, fibrous. Stems branched at base, 10–25 cm, black glandular hairy. Basal leaves petiolate; leaf blade suborbicular. Cauline leaves with sheathing petiole; leaf blade narrowly elliptic to suborbicular, 1–4 × 0.7–1.5 cm, thick, bullate, both surfaces glabrous, base attenuate, margin ciliate, apex obtuse. Cymes many flowered; bracts ovate or broadly so, 5–8 mm, apex acute. Pedicel erect in fruit, 1–4 cm, becoming shorter distally on cymes, glandular villous. Sepals 5, orbicular, 4–5 mm, glandular pubescent abaxially, base narrowed, margin membranous, apex rounded. Petals 5, white, obovate, 1–2 × as long as sepals, apex truncate or emarginate. Floral disc small, with 5 subglobose glands. Stamens 10, equaling sepals; anthers yellow. Ovary turbinate-obovoid, ca. 1/3 as long as sepals. Styles 2, equaling ovary.

Capsule 4-valved. Seeds brown, large, smooth, narrowly fimbriate. Fl. Jul–Sep.

• Limestone and montane rock crevices; 2600–3500 m. W Yunnan.

Two varieties have been recognized. The distinguishing characters seem to be only a matter of degree or ecologically induced, and the variation pattern should be studied in the field. Perhaps this variation should not be the basis for formal recognition of taxa.

1a. Leaves 1.5–4 × 0.8–1.5 cm, changing to black when dry; petals 1.5–2 × as long as sepals 48a. var. *nigricans*

1b. Leaves 1–3 × ca. 0.7 cm, not changing to black when dry; petals subequaling sepals 48b. var. *zhenkangensis*

48a. *Arenaria nigricans* var. *nigricans*

变黑无心菜(原变种) bian hei wu xin cai (yuan bian zhong)

Leaves 1.5–4 × 0.8–1.5 cm, changing to black when dry. Petals 1.5–2 × as long as sepals.

• Limestone crevices; 2600–3200 m. NW Yunnan.

48b. *Arenaria nigricans* var. *zhenkangensis* (C. Y. Wu ex L. H. Zhou) C. Y. Wu in C. L. Tang, Fl. Reipubl. Popularis Sin. 26: 209. 1996.

镇康无心菜 zhen kang wu xin cai

Arenaria zhenkangensis C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 36. 1987.

Leaves 1–3 × ca. 0.7 cm, not changing to black when dry. Petals subequaling sepals.

• Montane rock crevices; 2800–3500 m. SW Yunnan.

49. *Arenaria zhongdianensis* C. Y. Wu in C. Y. Wu et al., Fl. Yunnan. 6: 835. 1995.

中甸无心菜 zhong dian wu xin cai

Herbs. Stems dichotomously branched at base, yellow or violet, 15–20 cm, sparsely and shortly hairy. Leaf blade lanceolate or oblanceolate, 1–2 cm × 2–5 mm, thick, both surfaces with raised granulosities, glabrous or with sparse, hard hairs, base attenuate, apex obtuse. Cymes often capitate; bracts ovate, 3–5 × 2–4 mm, base broadened, both surfaces with raised granulosities, margin hairy, apex obtuse. Pedicel 2–5 mm, densely white villous. Sepals 5, lanceolate, 3–5 mm, abaxially shortly white nodose glandular hairy or white pubescent, margin narrowly membranous, apex obtuse. Petals 5, white, obovate, equaling sepals, apex 2-cleft. Stamens 10. Ovary globose. Styles 2. Fl. Jul–Aug.

• Ravine margins; ca. 3300 m. NW Yunnan (Zhongdian Xian).

50. *Arenaria xerophila* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 198. 1920.

旱生无心菜 han sheng wu xin cai

Herbs perennial. Roots conic or shortly fusiform. Stems suberect or ascending, branched at base, violet, 5–20 cm; branchlets numerous, diffuse, pseudodichotomously branched, slender, hard, sparsely white villous or glabrous. Leaf blade oblanceolate, 0.5–2.5 cm × 1–5 mm, papery, adaxially with or without small, clavate protuberances, base attenuate into a short sheath, apex acute, not cuspidate. Cymes conic,

sparsely many flowered; bracts similar to leaves but smaller. Pedicel slender, 0.5–1.5 cm, soft, hairy. Sepals 5, green abaxially, ovate-lanceolate or ovate, 2–6 × 1–3 mm, midvein and basal veins hairy, base broadened, margin white, ciliate, apex obtuse. Petals 5, white, obovate or broadly so, 3–8 mm, equaling or slightly longer than sepals, apex obtuse. Stamens 10. Ovary ovoid-globose. Styles 2 or 3, 2–5 mm. Fl. Aug–Sep.

• *Pinus* forest margins, mountain grasslands; 2600–3600 m. Sichuan, NW Yunnan.

Two weakly distinguished varieties have been recognized.

1a. Styles 2 50a. var. *xerophila*

1b. Styles 3 50b. var. *xiangchengensis*

50a. *Arenaria xerophila* var. *xerophila*

旱生无心菜(原变种) han sheng wu xin cai (yuan bian zhong)

Sepals 2–6 × 1–3 mm. Petals slightly longer than the sepals. Styles 2.

• Mountain grasslands; 2600–3600 m. Sichuan, NW Yunnan.

50b. *Arenaria xerophila* var. *xiangchengensis* (L. H. Zhou) C. Y. Wu in W. T. Wang et al., *Vasc. Pl. Hengduan Mount.* 1: 404. 1993.

乡城无心菜 xiang cheng wu xin cai

Arenaria xiangchengensis L. H. Zhou, *Acta Biol. Plateau Sin.* 6: 36. 1987.

Sepals 4–5 × 1–1.5 mm. Petals equaling sepals. Styles 3.

• *Pinus* forest margins; ca. 3000 m. W Sichuan (Xiangcheng Xian).

51. *Arenaria schneideriana* Handel-Mazzetti, *Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz.* 57: 46. 1920.

雪山无心菜 xue shan wu xin cai

Herbs. Roots conic, wiry toward tip. Stems erect, dichotomously branched, yellowish or violet, slender, cylindric, 4–8 cm, white pubescent on 1 or 2 sides. Basal leaf blade ligulate, gradually inflated distally, small, soon withering. Distal cauline leaf blade often excurved, linear-lanceolate, ca. 1.5 cm × 2 mm, slightly fleshy, glabrous, 1-veined, base attenuate into a very short sheath, apex obtuse. Cymes few flowered. Pedicel recurved at anthesis, suberect in fruit, 4–13 mm, wiry, glandular villous. Sepals 5, elliptic, ca. 4 mm, glandular pubescent abaxially, veins absent, margin membranous, apex often excurved. Floral disc orbicular, with 5 elliptic, flat glands. Petals 5, white or rose, narrowly obovate, shorter than or equaling sepals, with very slender veins, base clawed, apex emarginate or shallowly 2-cleft. Stamens 5; filaments slightly shorter than petals; anthers yellow or green. Ovary obovoid, ca. 0.5 mm. Styles 2, ca. 1/2 as long as ovary. Capsule ovoid, ca. 4 mm, 4-lobed, apex subacute. Seeds 8, large, obtusely tuberculate. Fl. and fr. Jul–Aug.

• Alpine meadows; 4400–4700 m. NW Yunnan.

52. *Arenaria minima* C. Y. Wu ex L. H. Zhou, *Acta Biol. Plateau Sin.* 6: 35. 1987.

微无心菜 wei wu xin cai

Herbs small. Roots gray, conic. Stems densely dichotomously branched at base, 3–6 cm; branchlets violet, subglabrous. Leaf blade subulate, 4–5 × ca. 1 mm, base broadened into a sheath, apex acute. Cymes several flowered; bracts similar to leaves but smaller. Pedicel 3–10 mm, stiff. Sepals 5, lanceolate, ca. 2 × 1 mm, base broadened, margin ciliate, apex obtuse. Petals 5, white, narrowly lanceolate, shorter than sepals, apex obtuse. Stamens 10, equaling petals. Ovary ovoid. Styles 3, equaling ovary. Capsule ovoid, longer than sepals, 3-valved; valves 2-cleft at apex. Fl. and fr. Jul–Aug.

• Mountain rock crevices; ca. 4000 m. SW Sichuan.

53. *Arenaria bomiensis* L. H. Zhou in C. Y. Wu, *Fl. Xizang.* 1: 685. 1983.

波密无心菜 bo mi wu xin cai

Herbs small, soft. Stems yellow, slender, 5–6 cm, soft, sparsely white pubescent. Petiole 2–6 mm, sparsely villous at base. Leaf blade saccate, 0.5–1.2 cm × 2–3 mm, base attenuate into petiole, margin crisped-undulate, apex acute. Flower solitary, terminal; bracts similar to leaves but smaller. Pedicel slender, 5–9 mm, white villous in 1 line. Sepals 5, ovate, ca. 5 mm, base broadened, margin ciliate at base, apex obtuse. Petals 5, white, obovate, ca. 6 mm, apex emarginate. Stamens 10, shorter than sepals. Ovary ovoid. Styles 3, linear, ca. 4 mm. Fl. Jul.

• Mountain grasslands; ca. 3700 m. E Xizang.

A presumably related species, which has not been validly published (*Arenaria microstella* C. Y. Wu in C. L. Tang, *Fl. Reipubl. Popularis Sin.* 26: 213. 1996), differs from *A. bomiensis* in having long hairs and small retrorse bristles; leaf blade 2–4 × 1–2 mm, both surfaces raised granular, base attenuate, margin retrorsely ciliate, apex acute; cymes several flowered; and styles 3. It is known from shifting screes, from 4200 to 4300 m, in SW Sichuan.

54. *Arenaria longipes* C. Y. Wu ex L. H. Zhou, *Acta Biol. Plateau Sin.* 6: 39. 1987.

长梗无心菜 chang geng wu xin cai

Herbs annual. Roots slender. Stems branched at base, yellow, slender, 5–10 cm, glandular villous. Petiole 0.5–1.5 cm; leaf blade ovate, 4–5 × 2–4 mm, both surfaces glabrous, apex rounded or obtuse. Cymes dichasial, many flowered; bracts similar to leaves but smaller. Pedicel 0.5–1.5 cm, sparsely white villous. Sepals 5, lanceolate-ovate or ovate, ca. 2 × 1.5 mm, white villous abaxially, margin membranous, apex obtuse or acuminate. Petals 5, white, obovate, ca. 2/3 as long as sepals, apex entire. Stamens 10. Ovary ovoid; ovules numerous. Styles 2. Capsule ovoid, ca. 1.5 × as long as persistent sepals. Seeds gray-black, subglobose. Fl. and fr. Jul–Sep.

• Rocky cliffs; ca. 3500 m. SW Sichuan (Muli Zang Zu Zizhixian).

55. *Arenaria inconspicua* Handel-Mazzetti, Symb. Sin. 7: 197. 1929.

不显无心菜 bu xian wu xin cai

Herbs perennial. Roots napiform. Stems 1 or 2, branched at base, 1–5 cm, with black, hard hairs. Basal leaf blade saccate; cauline leaf blade lanceolate, 8–10 × 1–2.5 mm, glabrous or with sparse, short, hard hairs, midvein inconspicuous, apex obtuse or acute. Flower solitary, terminal, or cymes few flowered. Pedicel robust, ca. 1 cm. Sepals 5, lanceolate or orbicular, 2–3 mm, herbaceous, abaxially with sparse, brown, hard hairs, base saccate, margin membranous, apex acute. Petals 5, white, elliptic or narrowly ovate, shorter than sepals, apex rounded, acute, or dentate to 2-cleft. Stamens 10; filaments unequal; anthers pale brown. Ovary ovoid. Styles 2 or 3. Capsule ovoid, equaling persistent sepals, 4-lobed. Seeds brown, oblate. Fl. and fr. Jul–Sep.

• Alpine meadows; 3600–4600 m. NW Yunnan.

56. *Arenaria amdoensis* L. H. Zhou in C. Y. Wu, Fl. Xizang. 1: 688. 1983.

安多无心菜 an duo wu xin cai

Herbs small, glandular pubescent. Roots numerous, conic, slender. Stems erect, densely dichotomously branched at base, proximally yellowish and lustrous, distally green or violet, 2–4 cm, glandular villous. Petiole short; leaf blade saccate, 4–10 × 1–3.5 mm, leathery, both surfaces sparsely glandular villous, base attenuate, margin densely ciliate, apex obtuse. Cymes 3–5-flowered, rarely flower solitary. Pedicel green or brown, 2–7 mm, densely glandular villous. Sepals 5, ovate, 2–3 × ca. 1 mm, leathery, glandular villous abaxially, 1-veined, base broadened, margin narrowly membranous, apex obtuse. Petals 5, white, broadly obovate, 1.5–2 × as long as sepals, apex emarginate or 2-cleft. Stamens 10, longer than sepals; anthers black. Ovary ovoid, ca. 1.3 mm. Styles 2, linear, ca. 1 mm. Fl. Jul.

• River beaches; 4800–5000 m. E Xizang (Amdo Xian).

57. *Arenaria spathulifolia* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 35. 1987.

匙叶无心菜 chi ye wu xin cai

Arenaria muliensis C. Y. Wu ex L. H. Zhou.

Herbs small. Roots conic. Stems dichotomously branched at base, 3–10 cm; branches violet, slender, hard, glandular hairy. Leaf blade saccate, 5–6 × 2–3 mm, both surfaces glandular villous, base attenuate, margin ciliate, apex obtuse. Cymes few flowered; bracts similar to leaves but smaller. Pedicel slender, 0.5–1.5 cm, densely glandular villous. Sepals 5, lanceolate, ca. 3 × 1 mm, glandular villous abaxially, base connate, margin ciliate, apex acute. Petals 5, white, obovate, 3–4 mm, apex emarginate or dentate lobed. Stamens 10, shorter than sepals; anthers yellow. Ovary obovoid. Styles 2, linear. Fl. Jul–Aug.

• Mountain grasslands; 3500–4200 m. SW Sichuan, NW Yunnan.

58. *Arenaria membranispala* C. Y. Wu in C. Y. Wu et al., Fl. Yunnan. 6: 835. 1995.

膜萼无心菜 mo e wu xin cai

Herbs slender. Roots conic. Stems dichotomously branched at base, ca. 10 cm, white pubescent, shortly glandular villous. Leaves in several pairs; leaf blade linear, 3–8 × 0.5–1.5 mm, both surfaces glabrous, veins inconspicuous, base shortly sheathed, apex obtuse. Cymes terminal or axillary; rachis slender, 1.5–2.5 cm, densely pubescent, also shortly glandular pubescent in 1 line. Sepals 5, lanceolate-orbicular, 3–4 × 1–1.5 mm, glabrous, veins inconspicuous, margin broadly membranous, apex obtuse. Petals 5, white, obovate, equaling sepals, base clawed, apex entire. Stamens 10, equaling sepals. Ovary globose, ca. 1 mm; ovules numerous. Styles 2, equaling ovary. Capsule globose, 3–4 mm, deeply 4-valved. Seeds 2 or 3, flat, orbicular, 1.5–2 mm.

• NW Yunnan (Lijiang Naxi Zu Zizhixian).

59. *Arenaria karakorensis* Em. Schmid, Repert. Spec. Nov. Regni Veg. 31: 42. 1932.

克拉克无心菜 ke la ke wu xin cai

Sagina karakorensis (Em. Schmid) Kozhevnikov.

Herbs annual. Stems branched at base, ca. 3 cm, glandular hairy. Petiole narrow; leaf blade linear-lanceolate, 1-veined, margin ciliate, apex obtuse. Cymes few flowered; flowers nutant. Pedicel glandular hairy. Sepals 5, narrowly ovate, ca. 1.8 mm, 1-veined, margin white membranous, glandular ciliate. Petals 5, white, narrowly ovate, 2–2.5 mm, apex erose. Floral disc with 5 glands. Stamens 10; filaments ca. 2 mm. Ovary ovoid. Styles 2, sparsely villous. Capsule nutant, 3–3.5 mm, 4-lobed. Seeds gray, flat, ca. 1.5 × 1 mm.

• Mountains; 5000–5100 m. Xizang.

60. *Arenaria tumengelaensis* L. H. Zhou, Acta Phytotax. Sin. 18: 357. 1980.

土门无心菜 tu men wu xin cai

Herbs perennial. Stems branched at base, slender, 2–10 cm. Leaf blade greenish, elliptic, 0.7–1.5 cm × 2–5 mm, leathery, midvein and lateral veins raised and green, base cuneate, margin glabrous, apex obtuse. Cymes compound, corymbose, 3-flowered. Sepals 5, violet, ovate, 5–6 mm, leathery, glabrous abaxially, 3-veined, base broadened, margin ciliate, apex cymbiform. Petals 5, white, broadly obovate or suborbicular, 7–9 mm, apex entire. Stamens 10; filaments 3–5 mm, those opposite sepals with a gland at base; anthers yellow. Ovary obovoid, ca. 2.5 × 1.5 mm. Styles 2, ca. 2 mm, clavate. Fl. Jun–Jul.

• Riverside grasslands; 4600–5300 m. NE Xizang.

61. *Arenaria reducta* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 47. 1920.

减缩无心菜 jian suo wu xin cai

Herbs small. Roots conic, slender, short. Stems dichotomously branched at base, often violet, slender, 2–4 cm,

sparsely pubescent or glabrous. Leaf blade rhomboid-elliptic or saccate, 1–3 mm, base narrowed, apex acute. Cymes many flowered; bracts similar to leaves but smaller. Pedicel often violet, 2–5 mm, hard, sparsely white pubescent or glabrous. Sepals 5, violet, ovate-lanceolate or ovate, ca. 2 mm, base broadened, margin narrowly membranous, ciliate, apex acute. Petals absent. Stamens 5. Ovary ovoid, equaling sepals. Styles 2, equaling ovary. Capsule ovoid, 4-lobed. Seeds pale brown, triangular-reniform. Fl. and fr. Jul–Sep.

• *Abies* forests, alpine meadows, chalky soils; 3500–4200 m. SW Sichuan, NW Yunnan.

62. *Arenaria pharensis* McNeill & Majumdar, Bot. J. Linn. Soc. 80: 373. 1980.

帕里无心菜 pa li wu xin cai

Herbs annual. Roots conic or spinose. Stems densely branched at base, 2–4 cm; branches slender, ca. 0.5 mm in diam., retrorsely white pubescent in 2 lines. Petiole absent or short; leaf blade linear or linear-lanceolate, 4–5 × 1–2 mm, tuberculate, 1–3-veined, midvein impressed proximally. Pedicel 3–5.5 mm. Sepals 5, narrowly elliptic, hooded, 1.5–3 × 0.5–1 mm, villous abaxially, 3-veined, midvein impressed, lateral veins inconspicuous, base broadened, margin narrowly membranous, apex obtuse or acute. Petals absent. Stamens 2 or 3, ca. 1 mm. Capsule ellipsoid-ovoid, 2.5–3 mm, deeply 4-valved; valves ellipsoid, ca. 1 mm in diam. Seeds brown, subglobose, ca. 0.6 mm in diam., narrowly and irregularly parallel striate.

• Plateaus; ca. 4400 m. S Xizang.

No specimens have been seen by the present authors; the above description is based on literature and a photograph of the type.

63. *Arenaria littledalei* Hemsley, Bull. Misc. Inform. Kew 1896: 209. 1896.

古临无心菜 gu lin wu xin cai

Goeringia littledalei (Hemsley) F. N. Williams.

Herbs small. Stems violet, 4–5 cm, glabrous, with numerous slender branches. Leaf blade semiterete, to 8.5 × 0.2 mm, fleshy, base membranous, connate into a short sheath. Flowers axillary or pseudoterminal, small. Pedicel elongating to 1.6 cm in fruit, glabrous. Sepals 4, narrowly lanceolate, ca. 2 mm, fleshy, base connate, margin membranous, apex acute. Petals absent. Floral disc cupular, with inconspicuous glands. Stamens 2 or 3. Ovary narrowly ovoid. Styles 2. Capsule globose-ovoid, flattened on sides, deeply 4-lobed; fruiting pedicel long, glabrous. Seeds small, ca. 0.5 mm in diam. Fl. and fr. Jul–Sep.

• Valleys; 5000–5300 m. C Xizang.

64. *Arenaria saginoides* Maximowicz, Fl. Tangut. 87. 1889.

漆姑无心菜 qi gu wu xin cai

Herbs annual. Roots slender. Stems erect, dichotomously branched at base, 2–4 cm, glabrous, rarely sparsely glandular pubescent proximally on inflorescence. Leaf blade linear-saccate, 4–5 × 1–2 mm, midvein inconspicuous, base narrowed, apex obtuse. Flowers terminal, or axillary in trichotomous cymes;

bracts similar to leaves but smaller, 2–3 × ca. 1 mm, base narrowed, apex acute. Pedicel shorter than bracts at anthesis, longer than them in fruit. Sepals 4, rarely 5 (when 2 sepals wider), narrowly ovate, 2–2.5 × 1–1.5 mm, sparsely glandular villous, 1-veined, base thickened, saccate, margin membranous, apex obtuse. Petals 4(or 5), only 2 or 3 fully developed, white, narrowly saccate or obovate, 2–2.5 × ca. 1 mm, apex emarginate or irregularly dentate. Floral disc saucer-shaped, with 4 green glands. Stamens 8, sometimes 5, 2/3–3/4 as long as sepals; anthers ochre-colored. Ovary ellipsoid, ca. 1.5 mm; ovules 6. Styles 2, ca. 1 mm; stigma ellipsoid. Capsule ovoid-conic, longer than persistent sepals, 2-valved; valves 2-cleft at apex. Seeds 6, flat, ca. 1 mm in diam. Fl. and fr. Jul–Sep.

• SW Qinghai, W Sichuan, SW Xinjiang, E and N Xizang.

65. *Arenaria melanandra* (Maximowicz) Mattfeld ex Handel-Mazzetti, Symb. Sin. 7: 202. 1929.

黑蕊无心菜 hei rui wu xin cai

Cerastium melanandrum Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 3, 26: 429. 1880.

Herbs annual. Roots slender. Stems inclined proximally, simple or dichotomously branched at base, brown, 6–10 cm, glandular pubescent, with sterile, axillary branches. Proximal cauline leaves shortly petiolate; distal cauline leaves sessile; leaf blade orbicular-lanceolate or orbicular, 1–1.8 cm × 3–5 mm, midvein impressed, base narrowed, margin sparsely ciliate, apex obtuse. Cymes 1–3-flowered; flowers erect; bracts ovate-lanceolate, 6–10 × 2–3 mm, base narrowed, margin ciliate, apex acute. Pedicel 0.5–2 cm, densely glandular villous. Sepals 5, green abaxially, elliptic, 5–6 × ca. 2 mm, sparsely dark violet glandular villous, 1-veined, base broadened, margin narrowly membranous, ciliate, apex obtuse. Petals 5, white, broadly ovate, 1–1.2 cm × 5–6 mm, base narrowly clawed, apex emarginate. Floral disc saucer-shaped, with 5 elliptic glands. Stamens 10; filaments usually longer than sepals; anthers dark violet. Ovary ovoid, ca. 3 mm. Styles 2 or 3, ca. 3 mm; stigma clavate. Capsule stipitate, globose-ovoid, 4–5 mm, slightly shorter than persistent sepals, 4–6-valved. Seeds gray-brown, ovoid, ca. 1 mm, with curls on surface. Fl. Jul, fr. Aug.

• Alpine meadows, shifting screens; 3700–5000 m. Gansu, Qinghai, SW Sichuan, Xizang [?Nepal, ?Sikkim].

This species is used medicinally.

66. *Arenaria pseudostellaria* C. Y. Wu, Lihua Zhou & W. L. Wagner, **nom. nov.**

线叶无心菜 xian ye wu xin cai

Replaced synonym: *Arenaria linearifolia* Franchet, Pl. Delavay. 97. 1889, not Poiret (1804), nor Desvaux (1816); *A. leptophylla* C. Y. Wu ex L. H. Zhou (1987), not Chamisso & Schlechtendal (1830); *Moehringella*

linearifolia Neumayer; *Moehringia linearifolia* F. N. Williams.

Herbs annual. Roots solitary, spinose or conic. Stems branched at base, violet, slender, 10–12 cm, pubescent. Leaf blade linear-lanceolate, 0.5–1.5 cm × 1–2 mm, both surfaces tuberculate, base cuneate, margin sparsely ciliate, apex acute. Cymes few flowered (sometimes a small, female flower arising from stem base); bracts similar to leaves but smaller. Pedicel 1–1.5 cm, shortly glandular hairy. Sepals 5, lanceolate, 4–5 × 1–1.5 mm, sparsely shortly glandular hairy abaxially (with nodose hairs in female flower from stem base), base broadened, margin membranous, apex acute. Petals 5, white, obovate, 8–9 mm, apex entire (equaling sepals and denticulate in female flower from stem base). Stamens 10, slightly shorter than sepals. Ovary ellipsoid (ovoid in female flower from stem base). Styles 3 (or 4 in female flower from stem base), linear. Fl. Jul–Aug.

• Rock crevices at forest margins; 3000–3700 m. SW Sichuan, NW Yunnan.

67. *Arenaria euodonta* W. W. Smith, Notes Roy. Bot Gard. Edinburgh 11: 195. 1920.

真齿无心菜 *zhen chi wu xin cai*

Herbs perennial. Principal root branched, conic, robust. Stems erect or diffuse, branched at base, slender, 10–35 cm, sparsely villous. Petiole short; leaf blade linear or linear-lanceolate, 1–2.5 cm × 1–2 mm, margin hairy or not, apex subobtuse; proximal cauline leaf blade often lanceolate or narrowly orbicular, leaf axils usually with sterile branches at anthesis. Flower solitary or cymes 3–5-flowered; bracts similar to leaves but smaller. Pedicel 2–3(–6) cm, glandular pubescent. Sepals 5, lanceolate or orbicular-lanceolate, 8–11 mm, sparsely black villous below middle abaxially, margin membranous, ciliate, apex acute. Petals 5, white or pink, oblanceolate or obovate, 2–2.5 × as long as sepals, base shortly clawed, apex 2- or 3-toothed. Stamens 10; equaling or slightly longer than sepals; anthers red, ca. 1 mm. Ovary globose, 3–4 mm. Styles 2, linear, ca. 4 mm. Fl. Jul–Aug.

• Alpine meadows; 3000–4200 m. NW Yunnan.

68. *Arenaria dsharaensis* Pax & K. Hoffmann in Pax, Repert. Spec. Nov. Regni Veg. Beih. 12: 366. 1922.

察龙无心菜 *cha long wu xin cai*

Herbs perennial. Stems diffuse, 3–6 cm, basally glabrous, with withered leaves, distally slightly villous, with congested leaves; internodes elongate. Leaf blade lanceolate or saccate-orbicular, 5–14 mm, base narrowed, margin hairy, apex acute. Flower solitary. Pedicel ca. 5 mm. Sepals ovate, ca. 4 mm, villous abaxially, margin membranous. Petals 5, white, obovate,

6–7 mm, base clawed, apex emarginate or obtuse. Styles 2, equaling sepals.

• Alpine streamsides; ca. 4700 m. W Sichuan.

69. *Arenaria melandryoides* Edgeworth in J. D. Hooker, Fl. Brit. India 1: 241. 1874.

桃色无心菜 *tao se wu xin cai*

Herbs perennial. Roots slender. Stems sparsely clustered or solitary, branched at base, 5–10 cm, white glandular villous. Leaves sessile, dark green or violet, ovate- or orbicular-lanceolate or orbicular-elliptic, 0.8–1.5 cm × 1.5–3 mm, leathery, glandular pubescent or both surfaces glabrous, 1-veined, base cuneate, apex obtuse. Flower solitary, terminal, rarely lateral. Pedicel recurved, 1–3 cm, white glandular pubescent. Sepals 5, erect or reflexed, ovate-lanceolate, 4–8 mm, sparsely glandular pubescent or glabrous, veins inconspicuous abaxially, margin blue-brown, not membranous, ciliate, apex acute. Petals 5, white or pink, narrowly obovate, ca. 2 × as long as sepals, apex entire. Stamens 10, slightly longer than sepals. Ovary ovoid. Styles 2(or 3). Capsule 2-valved; valves 2-cleft at apex. Seeds brown, with a ± thin, membranous wing. Fl. Jun–Jul, fr. Jul–Aug.

Alpine meadows; (3700–)4300–4800(–5000) m. E and S Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

70. *Arenaria rockii* Diels, Notizbl. Bot. Gart. Berlin-Dahlem 9: 1027. 1926.

紫红无心菜 *zi hong wu xin cai*

Herbs perennial. Stems branched at base, 4–10 cm; underground part white, with small, white scales; aerial part violet, pubescent and violet glandular villous, with axillary, sterile branches. Leaves sessile, lanceolate or narrowly elliptic, 0.5–1.5 cm × 1–2 mm, thick, glabrous except sparsely glandular pubescent abaxially and at margin, 1-veined or vein inconspicuous, base cuneate, apex obtuse. Flower solitary, terminal. Sepals 5, green or violet, orbicular, 5–8 × 1–2 mm, 3-veined, base saccate, margin broadly membranous, apex obtuse. Petals 5, violet or white, broadly obovate, ca. 1.5 cm × 6–7 mm, base attenuate, apex emarginate. Stamens 10; filaments equaling sepals. Styles 2. Fl. Jul–Aug.

• Mountains; 3800–4700 m. NW Yunnan.

71. *Arenaria roseiflora* Sprague, Bull. Misc. Inform. Kew 1916: 33. 1916.

粉花无心菜 *fen hua wu xin cai*

Arenaria atuntziensis C. Y. Wu ex L. H. Zhou var. *stenopetala* Y. W. Tsui ex L. H. Zhou; *A. roseiflora* f. *albiflora* C. Y. Wu; *Moehringella roseiflora* (Sprague) Neumayer.

Herbs perennial. Stems violet, 10–25 cm, distally with recurved, brown, short hairs and long, glandular hairs.

Basal leaves attenuate into a petiole at base; leaf blade saccate, 1–2 cm × 3–5 mm, apex obtuse. Cauline leaves sessile, lanceolate or elliptic, 0.7–1.5 cm × 2–5 mm, midvein raised abaxially, violet, base rounded, margin ciliate from middle to apex, apex obtuse. Flower solitary, terminal. Pedicel recurved pubescent or long capitate glandular. Sepals 5, violet, lanceolate, 5–10 × 2–3 mm, violet glandular hairy abaxially, base cuneate, apex obtuse. Petals 5, pink or white, obovate, ca. 2 × as long as sepals, apex shallowly 2-cleft; lobes very narrow, irregularly 2- or 3-toothed. Stamens 10, shorter to slightly longer than sepals; anthers violet. Ovary ovoid, ca. 1/2 as long as sepals. Styles 2, linear. Fl. Jun–Jul.

• Mountains, alpine meadows, shifting screes, barrens; (2700–) 3300–4100(–4500) m. NW Yunnan.

72. *Arenaria melandryiformis* F. N. Williams, J. Linn. Soc., Bot. 38. 399. 1909.

女娄无心菜 nu lou wu xin cai

Herbs perennial. Roots branched, slender; lateral roots pale brown. Stems 10–20 cm, white glandular pubescent. Basal leaves shortly petiolate; leaf blade linear-saccate or saccate, 1–2 cm × 3–5 mm, glabrous, base cuneate, apex obtuse. Cauline leaf blade linear-lanceolate or lanceolate, base cuneate, margin ± ciliate, apex acute. Flower solitary, terminal. Pedicel 1–5 mm, robust, glandular hairy. Sepals 5, green or violet, lanceolate, 4–5 mm, ± glandular hairy abaxially, inconspicuously 3-veined, margin narrowly membranous, apex obtuse. Petals 5, white, obovate, ca. 2 × as long as sepals, apex entire. Stamens 10; filaments slightly longer than sepals; anthers yellow. Ovary ovoid. Styles 2, linear. Fl. Jun–Jul.

• Shifting screes, barrens; 4000–4900 m. Xizang.

73. *Arenaria inornata* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 196. 1920.

无饰无心菜 wu shi wu xin cai

Herbs perennial. Roots conic, or numerous, spinose, and fleshy; primary one lepidote. Stems 1–3, erect or suberect, to 4 cm, white, yellow, or black villous. Proximal cauline leaves imbricate, lepidote; distal cauline leaf blade lanceolate or elliptic-lanceolate, 1–1.3 cm × 3–4 mm, both surfaces glabrous, tuberculate, base attenuate into petiole, margin ciliate or glabrous, apex subobtusate or acute. Flower solitary or cymes ca. 3-flowered; bracts leaflike, small. Pedicel ca. 1 cm, densely black nodose hairy. Sepals 5, orbicular-lanceolate, ca. 5 × 1–1.5 mm, margin membranous, ciliate, apex obtuse. Petals 5, white, obovate, ca. 1 cm, apex emarginate, often few toothed. Stamens 10, longer than sepals. Ovary ca. 2 mm. Styles 2, ca. 4 mm. Fl. Jul.

• Mountains; 4000–4200 m. NW Yunnan.

74. *Arenaria monantha* F. N. Williams, J. Linn. Soc., Bot. 38: 401. 1909.

山地无心菜 shan di wu xin cai

Herbs perennial. Stems sparsely clustered, 5–6 cm, proximally hairy in 2 lines, distally retrorsely hairy. Leaf blade elliptic-linear, ca. 8 mm, villous abaxially, glabrous adaxially, veins inconspicuous, margin ciliate, apex acute. Flower solitary, erect; bracts in 2 pairs at base of pedicel. Pedicel slender, ± hairy. Sepals 5, elliptic, villous abaxially, veins inconspicuous, base connate, margin membranous, apex acute. Petals 5, white, ovate, ca. 1.5 × as long as sepals, veins impressed, base shortly clawed, apex entire. Floral disc with raised, yellow-green glands. Fl. Aug.

• Mountains. S Xizang (near Lhasa Shi).

No specimens have been seen by the present authors; the above description is based on the protologue.

75. *Arenaria longistyla* Franchet, Bull. Soc. Bot. France 33: 433. 1886.

长柱无心菜 chang zhu wu xin cai

Herbs small. Roots slender, with numerous branches. Stems slender, 4–10 cm, villous in 2 lines, or brown glandular villous. Leaves aggregated at stem apex; leaf blade broadly linear or linear-lanceolate, 0.5–2 cm × to 2 mm, base connate into a sheath, margin sparsely hairy, apex mucronate. Flowers axillary. Pedicel 0.6–5 mm, glandular pubescent. Sepals 5, lanceolate, 5–10 × 1–1.5 mm, glabrous or glandular pubescent abaxially, base saccate after anthesis, margin broadly white membranous, apex acute, mucronate. Petals 5, white, obovate-orbicular, 5–10 mm, apex obtuse. Stamens 10, slightly shorter than petals; anthers yellow. Ovary subglobose, ca. 2 mm. Styles 2, subulate, 5–7 mm. Fl. Jun–Jul.

• Forest margins, alpine meadows, mountain grasslands, shifting screes; 2800–5000 m. W Sichuan, S Xizang, NW Yunnan.

Three weakly distinguished varieties have been recognized. The distinguishing characters seem to be only a matter of degree, and the variation pattern should be studied in the field. Perhaps this variation (at least for the first two varieties) should not be the basis for formal recognition of taxa.

1a. Leaf blade less than 1 mm wide 75b. var. *eugonophylla*

1b. Leaf blade 1–2 mm wide.

2a. Pedicel 2–5 cm 75a. var. *longistyla*

2b. Pedicel 0.6–0.7 mm . 75c. var. *pleurogynoides*

75a. *Arenaria longistyla* var. *longistyla*

长柱无心菜(原变种) chang zhu wu xin cai (yuan bian zhong)

Stems 4–5 cm. Leaf blade 0.5–1.5 cm × 1–2 mm. Pedicel 2–5 cm. Petals 5–6 mm. Styles 6–7 mm.

• Forest margins, alpine meadows; 3600–5000 m. W Sichuan, SE Xizang, NW Yunnan.

75b. *Arenaria longistyla* var. *eugonophylla* Fernald, Rhodora 21: 5. 1919.

棱长柱无心菜 *leng chang zhu wu xin cai*

Leaf blade slender, less than 1 mm wide. Pedicel very slender, 2–4 cm.

• Mountain grasslands; 2800–4500 m. SW Sichuan, NW Yunnan.

75c. *Arenaria longistyla* var. ***pleurogynoides*** Diels, Notes Roy. Bot. Gard. Edinburgh 5: 182. 1912.

侧长柱无心菜 *ce chang zhu wu xin cai*

Stems 7.5–10 cm. Leaf blade 1.2–2 cm × 1–2 mm.

Pedicel 0.6–0.7 cm. Sepals 6–7 mm. Petals to 10 mm.

Styles 5–6 mm.

• Alpine meadows, shifting screes; (3200–)3900–4800(–5000) m. SW Xizang, NW Yunnan.

76. *Arenaria ionandra* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 182. 1912.

紫蕊无心菜 *zi rui wu xin cai*

Herbs small. Roots branched, conic. Stems branched at base, yellow or violet, 4–10 cm, densely glandular hairy in 2 lines or glabrous. Petiole short; leaf blade saccate or ovate, 3–7 × 1–3 mm, thick, both surfaces glabrous, base attenuate, apex obtuse. Flower solitary, terminal; bracts similar to leaves but smaller. Pedicel 1–2.5 mm, glandular villous. Sepals 5, dark violet at base abaxially, orbicular-lanceolate or orbicular, 3–5 × 1.5–2.5 mm, glabrous or black glandular hairy, base broadened, margin broadly membranous, apex obtuse. Petals 5, white or partly violet, broadly ovate or obovate-elliptic, ca. 2 × as long as sepals, base shortly clawed, apex 2-cleft. Stamens 10; filaments ca. 4 mm; anthers violet or dark violet. Ovary subglobose, ca. 1.5 mm in diam. Styles 2, ca. 1.5 mm. Fl. Jul–Aug.

• Mountains, alpine shifting screes; 3600–5300 m. SW Sichuan, NW Yunnan.

1a. Sepals glabrous; petals white 76a. var. *ionandra*

1b. Sepals black glandular hairy; petals partly violet 76b. var. *melanotricha*

76a. *Arenaria ionandra* var. ***ionandra***

紫蕊无心菜(原变种) *zi rui wu xin cai* (*yuan bian zhong*)

Sepals glabrous. Petals white.

• Mountains; 3600–5300 m. SW Sichuan, NW Yunnan.

76b. *Arenaria ionandra* var. ***melanotricha*** H. F. Comber, Notes Roy. Bot. Gard. Edinburgh 18: 229. 1934.

黑毛无心菜 *hei mao wu xin cai*

Sepals black glandular hairy. Petals partly violet.

• Alpine shifting screes; 3600–4200 m. NW Yunnan.

77. *Arenaria longiseta* C. Y. Wu in C. Y. Wu et al., Fl. Yunnan. 6: 835. 1995.

长刚毛无心菜 *chang gang mao wu xin cai*

Herbs. Stems violet, ca. 10 cm, densely glandular pubescent and long nodose bristly. Petiole short; leaf blade obovate, 5–8 mm, both surfaces violet nodose bristly, base attenuate, margin densely ciliate, apex obtuse, Cymes 2- or 3-flowered or flower solitary, terminal; rachis and pedicel densely long bristly; bracts ovate, 3–5 mm, long nodose bristly, base rounded, apex obtuse.

Sepals 5, violet, ovate, 4–6 × 1–2 mm, densely nodose bristly abaxially, base broadened, margin narrowly membranous, apex obtuse. Petals 5, white, obovate, ca. 1 cm, apex 2-cleft. Stamens 10; filaments opposite

sepals with a gland at base. Ovary globose. Fl. Jul–Aug.

• Alpine meadows; 3800–3900 m. NW Yunnan.

78. *Arenaria chamdoensis* C. Y. Wu ex L. H. Zhou in S. W.

Liu, Fl. Qinghai. 1: 506. 1997.

昌都无心菜 *chang du wu xin cai*

Herbs. Roots gray, conic, with slender branches at base.

Stems whitish proximally, violet distally, 4–7 cm,

densely violet glandular pubescent. Petiole short; leaf

blade violet, obsaccate, both surfaces pubescent, base

attenuate, margin ciliate, apex rounded; axils of

proximal cauline leaves with reduced flowers. Cymes

conic; rachis and pedicels densely glandular pubescent.

Pedicel 0.5–2 mm. Sepals 5, green, ovate, 2–3 mm,

black glandular villous abaxially, margin membranous,

ciliate, apex obtuse. Petals 5, white, obovate, 6–8 mm.

Stamens 10; anthers yellow. Ovary obovoid. Styles 2.

Fl. Jul–Aug.

• Shifting screes; 4500–4700 m. SE Qinghai (Nangqên Xian), W

Sichuan, E Xizang (Qamdo Xian).

79. *Arenaria szechuensis* F. N. Williams, J. Linn. Soc., Bot.

34: 437. 1899.

四川无心菜 *si chuan wu xin cai*

Herbs perennial. Stems clustered, diffuse or erect, 3–8

cm, glandular pubescent. Leaves sessile, linear-

lanceolate, 1–2 cm, base broadened, clasping, margin

sparsely hairy, apex obtuse. Cymes 3- or 4-flowered.

Pedicel 2–3 cm, ± glandular pubescent. Sepals 5,

lanceolate, 5–6 × 1–1.5 mm, glandular pubescent

abaxially, base broadened, margin narrowly

membranous. Petals 5, white, ovate, 1.5–2.5 × as long

as sepals, apex emarginate. Stamens 10; filaments

equaling sepals. Ovary ovoid. Styles 3, subulate, longer

than sepals; stigmas recurved. Fl. Jun–Jul.

• Scrub meadows, alpine meadows; (3000–)4000–4700 m. Sichuan.

80. *Arenaria quadridentata* (Maximowicz) F. N. Williams,

J. Linn. Soc., Bot. 33: 432. 1898.

四齿无心菜 *si chi wu xin cai*

Lepyrodiclis quadridentata Maximowicz, Fl. Tangut.

84. 1889.

Herbs. Roots spinose. Stems clustered, yellow, slender,

10–40 cm, glabrous or glandular hairy in 2 lines.

Proximal cauline leaf blade saccate or orbicular-saccate;

distal cauline leaf blade ovate-elliptic or lanceolate, 1–2

cm × 3–5 mm, base attenuate, apex acute. Cymes few

flowered; bracts similar to leaves but smaller. Pedicel

1–2 cm. Sepals 5, lanceolate or orbicular, 4–5 × ca. 1.5

mm, glandular pubescent abaxially, base broadened,

margin narrowly membranous, ciliate, apex obtuse.

Petals 5, white, narrowly elliptic or obovate, apex 4-

toothed. Stamens 10; filaments longer than sepals, those

opposite sepals wider than others. Ovary ovoid; ovules

4 or 5. Styles 2, linear. Capsule globose, apex 4-lobed.

Seeds orbicular, flat, obtusely tuberculate. Fl. and fr. Jul–Sep.

• 3000–3500 m. Gansu, N Sichuan.

81. *Arenaria giraldii* (Diels) Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 336. 1932.

秦岭无心菜 qin ling wu xin cai

Lepyrodiclis giraldii Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 38. 1905.

Herbs soft. Roots spinose. Stems lustrous yellowish or violet, 20–25 cm. Leaves sessile, narrowly elliptic, elliptic-lanceolate, or ovate, 0.5–2 cm × 2–5 mm, thin, base broadened, margin membranous, apex obtuse or acute. Cymes few to many flowered; bracts similar to leaves but smaller. Pedicel slender, 1–2.5 cm. Sepals 5, lanceolate or narrowly so, 4–5 mm, glandular villous abaxially, base broadened, margin membranous, apex obtuse. Petals 5, white, cuneate or obovate, ca. 2 × as long as sepals, base attenuate, apex 4-toothed. Stamens 10, shorter than petals. Ovary ovoid, 2–2.5 mm. Styles 2, to 5 mm. Capsule globose, apex 4-valved. Seeds brown, ovoid, with curls. Fl. and fr. Jul–Sep.

• Scrub meadow margins, mountain grasslands; 2500–3800 m. SE Gansu, Shaanxi.

82. *Arenaria trichophylla* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 27. 1987.

毛叶无心菜 mao ye wu xin cai

Herbs perennial. Roots spinose or conic. Stems sparsely clustered, lustrous yellow or violet, 8–12 cm, nodose hairy and long hairy. Leaf blade ovate, 4–6 × 2–3 mm, both surfaces glandular pubescent, base cuneate, apex obtuse. Cymes few flowered; bracts lanceolate, 3–4 × ca. 1 mm, sparsely glandular pubescent along veins, base broadened, margin ciliate, apex obtuse. Pedicel 5–10 mm, densely glandular pubescent. Sepals 5, lanceolate, 4–5 × ca. 1.5 mm, glandular pubescent abaxially, base broadened, margin narrowly membranous, apex acute. Petals 5, white, obovate, 8–10 mm, apex weakly toothed. Stamens 10, longer than sepals; anthers yellowish. Ovary ovoid, ca. 3 mm. Styles 2, linear, ca. 3.5 mm. Fl. Jul–Aug.

• Mountain grasslands; ca. 3900 m. SW Sichuan.

83. *Arenaria pogonantha* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 198. 1920.

须花无心菜 xu hua wu xin cai

Herbs perennial. Roots spinose or long conic. Stems clustered, erect or suberect, 7–15 cm, long nodose villous and black glandular villous. Proximal cauline leaves with petiole 1–2 mm; distal cauline leaves sessile; leaf blade ovate or ovate-lanceolate, 5–10 × 3–7 mm, both surfaces villous, base cuneate, apex obtuse. Cymes terminal, few flowered, or flower solitary; bracts leaflike, smaller than leaves. Pedicel 0.5–2.5 cm, densely glandular pubescent. Sepals 5, lanceolate or ovate, 4–5 × ca. 1.5 mm, densely glandular pubescent abaxially, margin membranous, apex obtuse. Petals 5, white, broadly obovate, 5–8 mm, apex weakly toothed. Stamens 10, slightly longer than sepals; anthers violet

to yellow-brown. Ovary ovoid, ca. 3 mm. Styles 2, ca. 2.5 mm. Fl. Jun–Jul.

• Alpine meadows, rock crevices; (3000–)3300–4200(–4400) m. W Sichuan, NW Yunnan, E Xizang.

84. *Arenaria dimorphitricha* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 28. 1987.

滇蜀无心菜 dian shu wu xin cai

Herbs annual or biennial. Roots spinose. Stems sparingly branched, erect, brown or violet, 15–30 cm, long hairy proximally, nodose hairy and sparsely villous distally. Leaves opposite, sometimes in whorls of 3; petiole 2–4 mm; leaf blade narrowly elliptic, orbicular-lanceolate, or ovate-orbicular, rarely elliptic, 1–2.5 cm × 5–12 mm, both surfaces villous, base attenuate, apex obtuse. Cymes many flowered; bracts ovate, 5–10 mm, both surfaces villous, base broadened. Pedicel 0.5–2.5 cm, glandular pubescent. Sepals 5, lanceolate, 5–6 × ca. 2 mm, glandular pubescent abaxially, margin membranous, apex acute. Petals 5, white, obovate, ca. 1.5 × as long as sepals, apex irregularly toothed. Stamens 10; filaments slightly longer than sepals; anthers blue-green to yellow. Ovary ovoid; ovules few. Styles 2, linear. Capsule ovoid, slightly shorter than persistent sepals, apex 4-lobed. Seeds 3 or 4, black, flat, with curls. Fl. and fr. Aug–Sep.

• Subalpine forests, scrub, mountain grasslands; 2800–3900 m. SW Sichuan, NW Yunnan.

85. *Arenaria fridericae* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 142. 1920.

玉龙山无心菜 yu long shan wu xin cai

Herbs perennial, villous and glandular hairy. Roots conic or spinose. Stems usually dichotomously branched, 4-angled, 10–20 cm, soft; internodes 1–2.5 cm. Petiole short or absent; leaf blade ovate or ovate-orbicular, 0.8–1.7 cm × 4–8 mm, both surfaces hairy, densely so on midvein and margin abaxially, base rounded. Cymes monochasial, few flowered, or flower solitary; bracts leaflike, smaller than leaves. Pedicel recurved, 1–2 cm, hairy. Sepals 5, orbicular-lanceolate or orbicular-ovate, 5–6 × ca. 2 mm, herbaceous, hairy abaxially, midvein broadened at base, margin narrowly membranous, apex acute. Petals 5, white, broadly obovate, ca. 1.5 × as long as sepals, 5–6 mm wide, apex dentate lobed or lacerate. Floral disc with 5 glands; glands 2-cleft. Stamens 10; anthers yellow-brown. Ovary ovoid. Styles 2 or 3, ca. 3 mm. Fl. Jun–Jul.

• Scrub, shifting screes, rock crevices on cliffs; 2800–4000 (–4700) m. SE Xizang, NW Yunnan.

86. *Arenaria longicaulis* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 38. 1987.

长茎无心菜 chang jing wu xin cai

Herbs annual. Roots fibrous. Stems prostrate, yellowish, slender, 10–30 cm, brown glandular villous. Petiole 2–5 mm; leaf blade elliptic or ovate, 5–10 × 3–5 mm, thin, both surfaces tuberculate, midvein raised, base cuneate,

margin sparsely hairy, apex acute. Cymes few flowered; bracts narrowly ovate, 3–5 × 1–3 mm, base cuneate, apex acute. Pedicel slender, 0.5–1.5 cm, glandular pubescent. Sepals 5, lanceolate, 1–3 × ca. 1 mm, nodose glandular pubescent abaxially, base broadened, margin narrowly membranous, ciliate, apex acute. Petals 5, white, obovate, equaling or slightly longer than sepals, apex dentate lobed. Stamens 10; anthers yellow. Ovary subglobose, ca. 1.5 mm in diam. Styles 3, ca. 4 mm. Fl. Jul–Aug.

• NW Yunnan.

87. *Arenaria longipetiolata* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 29. 1987.

长柄无心菜 chang bing wu xin cai

Herbs. Roots conic, fleshy. Stems branched proximally, yellow, 30–35 cm, soft, glabrous or subglabrous. Petiole 1–3 mm; leaf blade saccate, 1–1.5 cm × 5–8 mm, both surfaces glabrous or sparsely pubescent, apex acute. Cymes conic, many flowered; bracts lanceolate or ovate, 3–5 × 1–3 mm, margin ciliate, apex acute. Pedicel linear, 1–2.5 cm, densely glandular hairy. Sepals 5, lanceolate, 4–5 mm, sparsely pubescent abaxially, base broadened, margin membranous, ciliate, apex acuminate. Petals 5, white, saccate, 1.5–2 × as long as sepals, apex toothed. Stamens shorter than sepals; anthers yellow-green. Ovary ovoid. Styles 2, linear, equaling sepals. Fl. Jul–Aug.

• Forests; ca. 2800 m. SW Sichuan.

88. *Arenaria leucasteria* Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 334. 1932.

毛萼无心菜 mao e wu xin cai

Herbs perennial. Roots conic, robust. Stems sparsely branched, 4–7 cm, villous, hairs shorter and sparser proximally. Proximal cauline leaves shortly petiolate; distal leaves sessile; leaf blade elliptic or obovate-elliptic, 4–14 × 2–6 mm, both surfaces sparsely villous, 3-veined, midvein raised, lateral veins impressed, apex acute. Cymes few flowered. Sepals 5, lanceolate or ovate-lanceolate, 5–6 × ca. 2 mm, villous abaxially, 3-veined, margin membranous. Petals 5, white, obovate or obovate-flabellate, 7–11 × 5–7 mm, apex irregularly toothed or lobed; teeth 0.2–0.8 mm. Stamens 10; filaments ca. 6 mm, those opposite sepals with a globose gland at base; anthers violet. Ovary ovoid, ca. 2 × 1.5 mm. Styles 2, ca. 3.5 mm, papillose. Fl. Jul–Aug.

• Mountains; 4000–5400 m. W Sichuan.

89. *Arenaria nivalomontana* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 29. 1987.

大雪山无心菜 da xue shan wu xin cai

Herbs. Roots conic, slender. Stems erect or ascending, many branched, slender, 10–15 cm, nodose glandular villous. Petiole short; leaf blade elliptic to broadly elliptic-saccate, 5–10 mm, both surfaces tuberculate, margin nodose ciliate, apex obtuse. Cymes few

flowered; bracts ovate, 2–4 × 1–2 mm, margin ciliate, apex acute. Pedicel 0.5–2 cm, densely glandular pubescent. Sepals 5, lanceolate, 4–5 × 1–2 mm, sparsely glandular pubescent abaxially, base broadened, margin membranous, apex obtuse. Petals 5, obovate, ca. 1 cm, apex irregularly shortly toothed. Stamens 10, longer than sepals; anthers dark yellow. Ovary ovoid, ca. 2 mm. Styles 2. Fl. Jul–Aug.

• Mountains; ca. 2900 m. W Yunnan.

90. *Arenaria omeiensis* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 30. 1987.

峨眉无心菜 e mei wu xin cai

Herbs. Roots conic, slender. Stems erect, 15–20 cm, nodose glandular hairy and nodose villous. Leaf blade ovate, 5–10 × 4–6 mm, glabrous or glandular hairy, midvein raised, base broadened, apex obtuse. Cymes few flowered; bracts narrowly ovate, 4–5 × 1–2 mm, both surfaces sparsely glandular villous, base broadened, apex acute. Pedicel 1–2 cm, densely glandular pubescent. Sepals 5, narrowly ovate, sparsely glandular pubescent abaxially, base broadened, margin membranous, apex obtuse. Petals 5, white, obovate, 8–9 mm, base long clawed, apex dentate lobed. Stamens 10, longer than sepals; anthers dark. Ovary ovoid, ca. 1.5 mm. Styles 2, linear, ca. 2 × as long as ovary. Fl. Aug.

• Forests, scrub; ca. 3100 m. C Sichuan.

91. *Arenaria auricoma* Y. W. Tsui ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 31. 1987.

黄毛无心菜 huang mao wu xin cai

Herbs perennial, yellowish hairy. Roots conic, robust. Stems densely clustered, ca. 8 cm, villous. Leaf blade ovate, 4–6 × 3–5 mm, thick, both surfaces densely yellowish villous, base rounded or broadly cuneate, apex obtuse; 2 pairs of leaves aggregated at stem apex below cyme. Cymes few to many flowered; bracts leaflike. Pedicel 3–10 mm, densely yellowish hairy. Sepals 5, orbicular-lanceolate, ca. 4 × 1.5 mm, weakly yellowish hairy abaxially, base broadened, margin membranous, apex obtuse. Petals 5, white, obovate, slightly longer than sepals, apex 2-cleft; lobes 3-toothed at apex. Stamens 10, 5 long and 5 short; anthers yellow. Ovary ovoid. Styles 2, linear. Fl. Jul–Aug.

• Mountain sands; 4200–4800 m. NW Yunnan.

92. *Arenaria salweenensis* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 194. 1920.

怒江无心菜 nu jiang wu xin cai

Herbs perennial. Roots long, spinose. Stems densely dichotomously branched at base, suberect, 12–20 cm, yellow or black nodose villous. Petiole short or absent; leaf blade orbicular-lanceolate, 3–5 cm × 5–7 mm, glabrous, surface raised and coarse adaxially, midvein impressed, lateral veins inconspicuous, base attenuate,

margin narrowly membranous, apex acute. Cymes dichotomously branched, many flowered; bracts leaflike, smaller than leaves. Pedicel 1–1.5 cm, densely black long nodose villous. Sepals 5, black-red, orbicular, ca. 5 × 1.5 mm, margin membranous, black ciliate, apex obtuse. Petals 5, white or pinkish, obovate, ca. 1 cm, apex somewhat weakly toothed. Stamens 10, equalling sepals. Ovary ca. 2 mm. Styles 2, ca. 2 mm. Fl. Aug.

• Grasslands. W Yunnan (Tengchong Xian).

93. *Arenaria trichophora* Franchet, Bull. Soc. Bot. France 33: 431. 1886.

具毛无心菜 ju mao wu xin cai

Arenaria yunnanensis Franchet var. *trichophora* (Franchet) F. N. Williams.

Herbs perennial. Roots conic or spinose. Stems clustered, simple or branched at base, prostrate or erect, 10–30 cm, long hard hispid and glandular pubescent. Proximal cauline leaves sessile; middle and distal cauline leaves shortly petiolate; leaf blade green abaxially, ovate or orbicular-elliptic, 0.8–2 cm × 3–10 mm, thick, midvein raised, base narrowed, apex obtuse. Cymes few to many flowered; bracts leaflike, very small. Pedicel 0.8–2 cm, densely stiffly hairy and glandular pubescent, hairs erect or recurved. Sepals 5, lanceolate, 5–6 mm, glandular pubescent abaxially, base broadened, margin white membranous, apex acute. Petals 5, white, obovate, ca. 2 × as long as sepals, apex fimbriate. Stamens 10; anthers black or yellow-brown, globose. Ovary ovoid; ovules numerous. Styles 2. Fl. Jul–Sep.

• Alpine scrub, grasslands, shifting screes, sands; 2500–4700 m. SW Sichuan, SE Xizang, N Yunnan.

94. *Arenaria yulongshanensis* L. H. Zhou ex C. Y. Wu in W. T. Wang et al., Vasc. Pl. Hengduan Mount. 1: 410. 1993.

狭叶无心菜 xia ye wu xin cai

Arenaria trichophora Franchet var. *angustifolia* Franchet, Bull. Soc. Bot. France 33: 431. 1886, not *A. angustifolia* McNeill (1961).

Herbs perennial. Roots conic or spinose. Stems branched at base, procumbent or erect, 10–20 cm, glandular pubescent. Leaf blade usually broadly lanceolate, 1–2 cm × 2–4 mm, base attenuate, apex acute. Cymes few to many flowered; bracts leaflike, small. Pedicel 0.5–1.5 cm, densely glandular hairy. Sepals 5, lanceolate, 5–6 mm, glandular hairy abaxially, base broadened, margin white membranous, apex acute. Petals 5, white, obovate, ca. 2 × as long as sepals, apex fimbriate. Stamens 10; anthers violet or black. Ovary ovoid; ovules numerous. Styles 2. Capsule shorter than persistent sepals, 2-valved; valves 2-cleft at apex. Seeds flat, narrowly winged. Fl. and fr. Jul–Oct.

• Alpine meadows; 4000–4500 m. NW Yunnan.

95. *Arenaria iochanensis* C. Y. Wu in C. L. Tang, Fl. Reipubl. Popularis Sin. 26: 241. 1996.

药山无心菜 yao shan wu xin cai

Cerastium mairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 341. 1914, not *Arenaria mairei* Emberger (1933); *A. yunnanensis* Franchet var. *linearifolia* C. Y. Wu ex L. H. Zhou; *Drymaria mairei* H. Léveillé.

Herbs. Roots spinose. Stems branched proximally, often diffuse, violet, 10–15 cm, densely violet glandular pubescent in 1 line. Leaf blade narrowly lanceolate, 1–2 cm × 1–3 mm, both surfaces glabrous, midvein raised abaxially, base cuneate, apex obtuse or acute. Flower solitary, terminal, or cymes 2–5-flowered; rachis densely violet glandular pubescent; bracts ovate-lanceolate, midvein raised abaxially, base rounded, margin ciliate, apex obtuse. Pedicel 0.5–2 cm, densely violet glandular pubescent. Sepals 5, lanceolate, 4–5 × 1–2 mm, glandular pubescent abaxially, base broadened, apex obtuse. Petals 5, obovate, apex toothed. Stamens 10; anthers yellow. Ovary ovoid. Styles 2. Seeds flat, narrowly winged. Fl. Jul–Aug.

• Alpine scrub, meadows; 3200–3400 m. NE Yunnan.

96. *Arenaria barbata* Franchet, Bull. Soc. Bot. France 33: 430. 1886.

髯毛无心菜 ran mao wu xin cai

Herbs perennial, long nodose hairy and shortly glandular hairy. Roots clustered, spinose or conic. Stems usually solitary, branched below middle, 10–30 cm, densely glandular hairy. Leaf blade pale green abaxially, greenish adaxially, orbicular-obovate or orbicular, 0.5–1.5 cm × 3–10 mm, both surfaces glandular pubescent, base attenuate, margin long white ciliate, apex obtuse or acute. Cymes dichotomously branched, few to many flowered; bracts leaflike, small. Pedicel 1–2.5 cm, densely glandular pubescent. Sepals 5, lanceolate, 4–5 mm, densely glandular pubescent abaxially, 3-veined. Petals 5, white or pink, more than 2 × as long as sepals, apex fimbriate. Stamens 10; 5 filaments inflated at base; anthers dark violet or yellow-brown. Ovary ovoid; ovules numerous. Styles 2, linear. Capsule 4-valved. Seeds 2–4. Fl. and fr. Jul–Sep.

• Scrub, alpine meadows, grasslands, shifting screes; 2400–4800 m. SW Sichuan, NW Yunnan.

Two varieties have been recognized. The distinguishing characters seem to be only a matter of degree, and the variation pattern should be studied in the field. Perhaps this variation should not be the basis for formal recognition of taxa.

- 1a. Stems, leaves, bracts, and sepals white nodose hairy and shortly glandular hairy 96a. var. *barbata*
- 1b. Stems, leaves, bracts, and sepals densely white nodose hairy 96b. var. *hirsutissima*

96a. *Arenaria barbata* var. *barbata*

髯毛无心菜(原变种) ran mao wu xin cai (yuan bian zhong)

Stems, leaves, bracts, and sepals white nodose hairy and shortly glandular hairy.

• Scrub, alpine meadows, grasslands, shifting screes; 2400–4800 m. SW Sichuan, NW Yunnan.

96b. *Arenaria barbata* var. *hirsutissima* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 195. 1920.

硬毛无心菜 ying mao wu xin cai

Stems, leaves, bracts, and sepals densely white nodose hairy.

• Alpine meadows, shifting screes; (2600–)2800–3200 m. NW Yunnan.

97. *Arenaria fimbriata* Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 335. 1932.

沸瓣无心菜 sui ban wu xin cai

Cerastium fimbriatum E. Pritzl, Bot. Jahrb. Syst. 29: 320. 1900, not Ledebour (1815).

Herbs. Roots spinose. Stems simple or sometimes branched at base, often violet, 10–25 cm, white villous or black glandular lanate. Proximal cauline leaves shortly petiolate; leaf blade narrowly elliptic, slightly fleshy. Distal cauline leaf blade orbicular-lanceolate or orbicular-elliptic, 0.8–2 cm × 2–7 mm, slightly fleshy, sparsely white villous, base cuneate, apex acute. Cymes 3–5-flowered; bracts herbaceous. Pedicel 1.5–4.5 cm, villous or glandular hairy. Sepals 5, white, lanceolate, 5–7 mm, villous or glandular hairy, margin narrowly membranous, apex excurved, acute. Petals 5, white, obovate-elliptic, ca. 2 × as long as sepals, apex fimbriate toothed. Stamens 10; filaments ca. 6 mm; anthers yellow. Ovary ovoid; ovules numerous. Styles 2, linear. Capsule equaling or longer than persistent sepals, apex 4-toothed. Seeds brown, depressed triangular-globose, ca. 2 mm, smooth or with curls. Fl. Jul–Aug.

• Forests, mountain grasslands; 3000–4000 m. SE Gansu, Shaanxi.

98. *Arenaria debilis* J. D. Hooker, Fl. Brit. India 1: 242. 1874.

柔软无心菜 rou ruan wu xin cai

Arenaria aureocaulis C. Y. Wu ex L. H. Zhou; *A. benthamii* Edgeworth (1874), not Fenzl ex Torrey & A. Gray (1840); *A. glandulosa* (Bentham ex G. Don) F. N. Williams (1895), not Jacquin (1798); *A. sikkimensis* Majumdar; *A. stellarioides* C. Y. Wu ex L. H. Zhou (1987), not Persoon (1805), nor Willdenow ex D. F. K. Schlechtendal (1816); *A. yunnanensis* Franchet f. *angustifolia* F. N. Williams; *Lepyrodiclis debilis* H. Ohba; *L. glandulosa* H. Ohba; *Odontostemma glandulosum* Bentham ex G. Don.

Herbs annual or biennial, violet multicellular glandular hairy. Roots spinose or conic. Stems sparsely clustered or solitary, yellow, 30–60 cm. Proximal cauline leaves shortly petiolate; distal cauline leaves sessile; leaf blade elliptic or ovate-elliptic, 1–4 cm × (0.5–)1–2 mm, both surfaces sparsely glandular hairy, midvein raised abaxially, base cuneate, apex acute.

Cymes dichotomously branched, few flowered; bracts ovate-lanceolate, 3–5 mm, glandular hairy. Pedicel 1–2(–3) cm, densely glandular hairy. Sepals 5, lanceolate, 5–6 mm, densely glandular pubescent abaxially, margin narrowly membranous, apex acute. Petals 5, white, obovate or obovate-saccate, 7–8 mm, apex fimbriate. Stamens 10, slightly longer than sepals; anthers yellowish. Ovary ovoid. Styles 2, linear. Capsule ovoid, slightly shorter than or equaling persistent sepals, apex 4-valved. Seeds 2 or 3, flat, ca. 2 mm in diam., weakly striate. Fl. Jul–Aug, fr. Aug–Sep.

Scrub, alpine meadows, mountain grasslands; (2500–)3200–4500 m. SE Xizang, NW Yunnan [Bhutan, India, Nepal, Sikkim].

99. *Arenaria polysperma* C. Y. Wu ex L. H. Zhou, Acta Biol. Plateau Sin. 6: 33. 1987.

多子无心菜 duo zi wu xin cai

Herbs perennial. Roots brown, spinose or conic. Stems sparsely clustered or solitary, yellow or violet, 10–40 cm, glandular pubescent. Leaf blade elliptic-ovate, 1–1.5 cm × 4–6 mm, thin, both surfaces tuberculate, base cuneate, apex obtuse. Cymes few flowered; bracts leaflike, small. Pedicel 1–3 cm, soft, glandular pubescent. Sepals 5, lanceolate, 5–6 × 1.5–2 mm, sparsely glandular pubescent abaxially, base broadened, margin narrowly membranous, apex obtuse. Petals 5, white, obovate, 1.5–2 × as long as sepals, apex lacerate. Stamens 10, longer than sepals; anthers yellow, rarely green. Ovary ovoid. Styles 2, linear. Capsule shorter than or equaling persistent sepals. Seeds 11 or 12. Fl. and fr. Jul–Sep.

• Mountain grasslands; 3000–4000 m. NW Yunnan.

100. *Arenaria monilifera* Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 334. 1932.

念珠无心菜 nian zhu wu xin cai

Herbs perennial. Roots moniliform. Stems dichotomously branched, ca. 20 cm, white villous proximally, curled red hairy distally; internodes ca. 5 cm. Proximal cauline leaves with petiole ca. 5 mm; distal cauline leaves sessile; leaf blade broadly elliptic or obovate-elliptic, rarely ovate-elliptic, 1–1.8 cm × 6–9 mm, hirsutulous (on distally cauline leaves), midvein robust, lateral veins inconspicuous. Pedicel erect at anthesis, curved in fruit, 1–4 cm. Sepals 5, elliptic or ovate-lanceolate, 4–5 × ca. 2 mm, densely curved white or red long hairy, also glandular hairy, 3-veined, surface raised abaxially, minutely pitted adaxially, margin broadly membranous, apex obtuse or acute. Petals 5, white, obovate, 5.5–7 × 2.5–4 mm, base cuneate, apex lacerate; lobes 0.8–1 mm. Floral disc

funneliform, with 5 globose, septate glands. Ovary ovoid, ca. 2 × 1.8 mm; ovules numerous. Styles 2, relatively long, papillate above middle. Fl. Jun–Jul.

• Mountains; 3000–4000 m. W Sichuan, E Xizang.

101. *Arenaria delavayi* Franchet, Bull. Soc. Bot. France 33: 432. 1886.

大理无心菜 da li wu xin cai

Herbs perennial. Roots branched at base, gray-brown, conic, robust, fleshy. Stems clustered, solitary or branched at base, often violet, slender, 10–20 cm, sparsely glandular pubescent. Proximal cauline leaves shortly petiolate, larger; distal cauline leaves sessile, smaller; leaf blade gray abaxially, ovate-lanceolate, ovate, elliptic, saccate, or orbicular, 0.5–1.5 cm × 2–10 mm, thick, ± papillate adaxially, ± villous, midvein raised, pale brown. Cymes 3–5-flowered; bracts lanceolate, small, herbaceous, margin membranous, apex excurved, acute. Pedicel slender, 1–2.5 cm, densely violet glandular pubescent. Sepals 5, lanceolate or ovate-lanceolate, 4–10 mm, glandular pubescent abaxially, margin membranous, apex acute or acuminate. Petals 5, white, obovate, slightly longer than sepals, apex ciliate. Stamens 10; anthers violet-black, yellow, or yellowish. Ovary ovoid; ovules numerous. Styles 2, linear. Capsule equaling persistent sepals, apex 4-lobed. Seeds 10, brown. Fl. and fr. Jul–Sep.

• Mountains; 3600–4000 m. E Xizang, NW Yunnan.

102. *Arenaria yunnanensis* Franchet, Bull. Soc. Bot. France 33: 431. 1886.

云南无心菜 yun nan wu xin cai

Herbs. Roots spinose, nodose. Stems diffuse, many branched, slender, 15–30 cm, glabrous at base, violet nodose glandular hairy in 1 line distally. Proximal cauline leaves shortly petiolate; distal cauline leaves sessile; leaf blade linear-lanceolate to orbicular, 1–3 cm × 5–6 mm, adaxially coarse, granular, hairy along veins, base attenuate, margin ciliate, apex obtuse, mucronate. Cymes conic, many flowered; bracts similar to leaves but smaller. Pedicel slender, glandular hairy. Sepals 5, lanceolate, 3–6 mm, glandular pubescent abaxially, apex acuminate. Petals 5, white, obovate or orbicular, 6–10 mm, apex fimbriate. Stamens 10; anthers yellow-green. Ovary ovoid; ovules numerous. Styles 2. Capsule slightly shorter than persistent sepals, apex 4-valved. Seeds 3 or 4, reniform. Fl. and fr. Jul–Sep.

• Alpine forest margins, subalpine meadows, mountain grasslands; 2900–3800 m. SW Sichuan, NW Yunnan.

Two varieties have been recognized. The distinguishing characters seem to be only a matter of degree, and the variation pattern should be studied in the field. Perhaps this variation should not be the basis for formal recognition of taxa.

1a. Leaves lanceolate to orbicular 102a. var. *yunnanensis*

1b. Leaves linear-lanceolate 102b. var. *caespitosa*

102a. *Arenaria yunnanensis* var. *yunnanensis*

云南无心菜(原变种) yun nan wu xin cai (yuan bian zhong)

Arenaria yunnanensis f. *robusta* C. Y. Wu ex L. H. Zhou.

Leaves lanceolate to orbicular.

• Alpine forest margins, mountain grasslands; 2900–3800 m. SW Sichuan, NW Yunnan.

102b. *Arenaria yunnanensis* var. *caespitosa* C. Y. Wu in C. Y. Wu et al., Fl. Yunnan. 6: 835. 1995.

簇生无心菜 cu sheng wu xin cai

Leaves linear-lanceolate.

• Subalpine meadows; ca. 3500 m. NW Yunnan.

