

57. PEDICULARIS Linnaeus, Sp. Pl. 2: 607. 1753.

马先蒿属 *ma xian hao shu*

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Herbs perennial or annual, rarely biennial, hemiparasitic. Leaves alternate, opposite, or whorled, usually pinnatifid to 1- or 2-pinnatisect, rarely entire or dentate; lower leaves usually long petiolate; upper leaves often ± sessile. Inflorescences terminal or flowers axillary; bracts usually leaflike. Calyx tubular to campanulate, often ± bilabiate, usually deeply cleft anteriorly, (2–)5-lobed. Corolla purple, red, yellow, or white, strongly bilabiate; upper lip (galea) hooded, enclosing anthers, laterally compressed, rounded or truncate, or terminating in teeth or in a beak; lower lip 3-lobed, usually spreading, external to upper lip in bud. Stamens 4, didynamous; filaments glabrous or pubescent; anthers mucronate or not. Stigma capitate. Capsule moderately compressed or not, loculicidal. Seeds numerous, reticulate or costate.

About 600 species: best represented in the mountains of SW China and widespread in the frigid and alpine zones of the northern hemisphere; 352 species (271 endemic) in China.

From the limited available data, the species of *Pedicularis* in China are pollinated by bumblebees gathering nectar and/or pollen on nectariferous non-beaked species, and pollen only, by scraping or vibrating, on beaked species including those with long corolla tubes (Macior, L. W. 1988. *Plant Species Biol.* 3: 61–66.; Macior, L. W. & S. K. Sood. 1991. *Plant Species Biol.* 6: 75–81.; Macior, L. W., pers. comm.).

The rank of series has been traditionally used in *Pedicularis* since the time of Prain's work (*Ann. Bot. Gard. (Calcutta)* 3: 1–196. 1890). Sections (and subgenera) have also been used (e.g., by Bunge in Walpers, *Repert. Bot. Syst.* 3: 409–433. 1844; Li, H. L. *Proc. Acad. Nat. Sci. Philadelphia* 101: 1–214. 1949; Yamazaki, T. 1988. A revision of the genus *Pedicularis* in Nepal. in: Ohba, H. & Malla, S.B. (eds.), *The Himalayan Plants* 1: 91–161, and others). Because series names have been used widely (e.g., Tsoong, P. C., 1955, *Acta Phytotax. Sin.* 4: 103–147; Tsoong, P.C., 1963, *Fl. Reipubl. Popularis Sin.* 68) but sectional names only in revisions covering limited areas (e.g., Yamazaki, T. 1988) and since not all species have been assigned to sections yet, the rank of series is used here.

1a. Leaves opposite or whorled (or in ser. 26, 84, 86, 87 alternate apically).

2a. Leaves opposite or occasionally alternate.

3a. Corolla galea beakless.

4a. Corolla galea toothless.

5a. Leaves lanceolate to linear.

6a. Leaves entire or obscurely crenate 50. *Salicifoliae*

6b. Leaves pinnatipartite to pinnatisect 102. *Flammeae*

5b. Leaves ± ovate.

7a. Corolla 3–3.5 cm; roots glabrous 21. *Salviiflorae*

7b. Corolla less than 2 cm; roots densely yellow-brown pubescent 26. *Aloenses*

4b. Corolla galea toothed.

8a. Leaves mostly basal, stem leaves often only in 1 pair; flowers in a densely capitate spike or flowers only 2 or 3.

9a. Plants 2–4 cm tall; flowers few; galea without a protuberance at middle of margin on each side

87. *Collatae*

9b. Plants usually more than 10 cm tall; galea with a protuberance at middle of margin on each side 89. *Cernuae*

8b. Leaves mostly on stem, basal leaves few; flowers not in a dense capitulum, more than 2 or 3.

10a. Corolla galea at least as long as lower lip.

11a. Corolla apex with several teeth on each side of margin 76. *Lyratae*

11b. Corolla apex obscurely 2-toothed 36. *Pteridifoliae*

10b. Corolla galea shorter, only ca. 1/2 as long as lower lip, apex with only 1 tooth on each side of margin.

12a. Calyx relatively large, with dense reticulate veins, teeth triangular, entire 38. *Pentagonae*

12b. Calyx relatively small, without dense reticulate veins, teeth leaflike, serrate 84. *Atroviridae*

3b. Corolla galea beaked.

13a. Corolla tube ± elongated, more than 2 × as long as calyx.

14a. Stems usually flexuous, ascending, more than 40 cm tall.

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- 15a. Corolla beak bending downward 28. *Flexuosae*
 15b. Corolla beak bending upward 33. *Omiianae*
- 14b. Stems diffuse or if erect then more than 10 cm tall.
 16a. Plants low; stems short or sometimes nearly absent.
 17a. Stems short, erect, ± woody; leaf segments few; corolla beak slightly recurved 75. *Urceolatae*
 17b. Stems often trailing or plants ± stemless, not woody; leaves pinnatisect; corolla beak straight 31. *Axillares*
- 16b. Stems ± elongated, diffuse.
 18a. Stems herbaceous; calyx lobes shorter than calyx tube; galea not dilated apically, toothless at margin 86. *Sikkimenses*
 18b. Stems ± woody; calyx lobes longer than calyx tube; galea dilated apically, toothed on lower margin 34. *Batangenses*
- 13b. Corolla tube not elongated, less than 2 × as long as calyx.
 19a. Stems repent basally.
 20a. Plants annual; leaves on stem, not fernlike 77. *Reptantes*
 20b. Plants perennial; leaves basal, fernlike 30. *Vagantes*
- 19b. Stems erect, not repent if diffuse.
 21a. Beak of galea slender, usually S-shaped; leaves narrowly lanceolate to linear-lanceolate 80. *Integrifoliae*
 21b. Beak of galea short, straight or curved, not S-shaped; leaves wider.
 22a. Corolla with 2 colors 73. *Binariae*
 22b. Corolla with only 1 color.
 23a. Leaves alternate, often pseudo-opposite throughout; flowers long pedicellate.
 24a. Galea not crested, beak usually straight; calyx not or slightly cleft anteriorly.
 25a. Plants 5–9 cm tall; stems 2–4; Xizang 96. *Mychophilae*
 25b. Plants 30–70 cm tall; stems single; not in Xizang 45. *Racemosae*
 24b. Galea usually crested, sometimes inconspicuously; calyx deeply cleft anteriorly.
 26a. Beak curved; calyx 2- or 3-lobed 97. *Franchetianae*
 26b. Beak straight or falcate; calyx 3–5-lobed 67. *Strobilaceae*
- 23b. Leaves opposite throughout; flowers not long pedicellate.
 27a. Stem leaves long petiolate; inflorescences long spicate; calyx large, with dense reticulate veins, lobes entire 39. *Dichotomae*
 27b. Stem leaves short petiolate; inflorescences short; calyx small, without reticulate veins, lobes serrate.
 28a. Galea margin 1-auricled, apex of beak erose-denticulate 88. *Pseudoasplenifoliae*
 28b. Galea margin not auricled, apex of beak not erose-denticulate.
 29a. Galea marginally 2-toothed; leaves small, broadly ovate 85. *Remotilobae*
 29b. Galea not marginally 2-toothed; leaves larger, narrower 79. *Debiles*
- 2b. Leaves usually in whorls of 3 or 4.
 30a. Corolla galea beakless (short beaked in ser. 52, 22, 61, 59).
 31a. Corolla galea toothed.
 32a. Bases of whorled petioles of leaves or at least bracts connate, cupular 40. *Reges*
 32b. Bases of petioles of leaves and bracts not connate or cupular.
 33a. Corolla tube strongly decurved in calyx, corolla ± S-shaped 55. *Microchilae*
 33b. Corolla tube not strongly decurved in calyx, corolla not S-shaped.
 34a. Calyx lobes 2, calyx tube deeply cleft anteriorly 52. *Ikomanae*
 34b. Calyx lobes 5, calyx tube slightly cleft anteriorly.
 35a. Calyx lobes triangular or lanceolate, entire 51. *Rigidae*
 35b. Calyx lobes ± leaflike, serrate 22. *Melampyriflorae*
- 31b. Corolla galea toothless.
 36a. Bases of petioles of leaves and bracts connate, cupular 40. *Reges*
 36b. Bases of petioles of leaves and bracts not connate or cupular.
 37a. Corolla tube decurved basally.
 38a. Corolla yellow, galea plicate; anthers apiculate at apex 53. *Plicatae*
 38b. Corolla usually purple, red, white, or rarely yellow, galea not plicate; anthers not apiculate at

- apex 54. *Verticillatae*
- 37b. Corolla tube erect or decurved apically.
 - 39a. Corolla tube \pm erect.
 - 40a. Plants annual; leaf segments 5–7 pairs 61. *Simae*
 - 40b. Plants perennial; leaf segments 7–17 pairs 1. *Gloriosae*
 - 39b. Corolla tube decurved.
 - 41a. Inflorescences and calyx densely tomentose 81. *Pilostachyae*
 - 41b. Inflorescences and calyx glabrous or sparsely pubescent.
 - 42a. Corolla tube \pm decurved at middle.
 - 43a. Plants annual; stems (15–)30–80 cm tall, often branched apically; corolla 7–9 mm ... 58. *Molles*
 - 43b. Plants perennial; stems 5–12 cm tall, simple; corolla 22–30 mm 57. *Caucasicae*
 - 42b. Corolla tube slightly curved, expanded, or bent forward apically.
 - 44a. Leaves pinnatifid to pinnatisect; leaves whorled 60. *Abrotanifoliae*
 - 44b. Leaves pinnatilobate to pinnatifid; leaves opposite or whorled 59. *Denudatae*
- 30b. Corolla galea beaked.
 - 45a. Corolla tube ca. 2.5–3 \times as long as calyx 43. *Cyathophyllae*
 - 45b. Corolla tube less than 3 \times as long as calyx.
 - 46a. Bases of petioles of leaves and bracts connate, cupular.
 - 47a. Galea navicular; beak indistinct 41. *Cyathophylloides*
 - 47b. Galea not navicular; beak long, distinct 42. *Superbae*
 - 46b. Bases of petioles of leaves and bracts not connate or cupular.
 - 48a. Flowers scarcely 6 mm, in a dense capitate raceme 25. *Coniferae*
 - 48b. Flowers more than 10 mm.
 - 49a. Beak of galea shorter than anther-containing part.
 - 50a. Stems with curved branches 23. *Longicaules*
 - 50b. Stems unbranched, or with erect straight branches.
 - 51a. Corolla tube decurved in calyx tube 56. *Cheilanthifoliae*
 - 51b. Corolla tube not decurved in calyx tube.
 - 52a. Corolla tube decurved in throat of calyx tube 23. *Longicaules*
 - 52b. Corolla tube not decurved or decurved outside calyx lobes.
 - 53a. Anther-containing part of galea red, goosehead-shaped; stem leaves in 1 or 2 pairs 90. *Tatsienenses*
 - 53b. Anther-containing part of galea not red, not goosehead-shaped; stem leaves numerous 62. *Myriophyllae*
 - 49b. Beak of galea longer than anther-containing part.
 - 54a. Beak of galea coiled or twisted.
 - 55a. Corolla tube bent at a right angle apically 83. *Meteororhynchae*
 - 55b. Corolla tube not bent at a right angle apically.
 - 56a. Corolla yellow or purplish, with yellowish tube apically and lower lip basally 74. *Pectinatiformes*
 - 56b. Corolla purplish red or yellow, or yellow with purple galea.
 - 57a. Calyx often less than 6 mm, lobes \pm serrate; bracts narrower, serrate or pinnatilobate 63. *Semitortae*
 - 57b. Calyx often ca. 10 mm, lobes \pm entire; bracts at least ovate and entire apically . 64. *Pectinatae*
- 54b. Beak of galea straight or slightly falcate-curved.
 - 58a. Stems branched apically.
 - 59a. Branches in whorls of 4–6, often woody; beak of galea slightly falcate-curved; calyx lobes ovate; capsule ca. 1/2 exceeding calyx 24. *Graciles*
 - 59b. Branches opposite or in whorls of 4, herbaceous; beak of galea bent upward; calyx lobes triangular; capsule ca. 4/5 exceeding calyx 27. *Moupinenses*
 - 58b. Stems unbranched apically.
 - 60a. Corolla tube decurved in calyx 56. *Cheilanthifoliae*
 - 60b. Corolla tube not decurved.
 - 61a. Basal leaves large, persistent, \pm lanceolate or narrowly oblong, pinnatifid, with many segments; stem leaves in whorls of 3 82. *Tantalorhynchae*

- 61b. Basal leaves smaller or not persistent, ± elliptic to ovate, with few segments; stem leaves
sometimes opposite 78. *Brevifoliae*
- 1b. Leaves alternate or at least alternate apically (or in ser. 1, 30, 31, 33, 34, 36, 37, 45, 67, 102 rarely with pseudo-opposite or opposite leaves).
- 62a. Corolla slightly beaked or beakless (beak not longer than wide).
- 63a. Galea with marginal teeth near apex.
- 64a. Galea with several marginal teeth on each side near apex 105. *Rhynchodontae*
- 64b. Galea usually with a distinct marginal tooth on each side of apex.
- 65a. Lower corolla lip usually erect or slightly spreading, corolla tube usually not decurved.
- 66a. Plants branched 44. *Pedicularis*
- 66b. Plants usually unbranched.
- 67a. Basal leaves to 28 cm, with 5–9 pairs of segments 36. *Pteridifoliae*
- 67b. Basal leaves less than 12 cm, with more segments.
- 68a. Plants reddish or reddish brown hirtellous; basal leaves persistent 20. *Hirtellae*
- 68b. Plants not hirtellous; basal leaves not persistent 16. *Striatae*
- 65b. Lower corolla lip spreading, corolla tube usually decurved.
- 69a. Leaves opposite or sometimes alternate apically; stems ascending 84. *Atrovirides*
- 69b. Leaves alternate; stems erect.
- 70a. Plants usually less than 15 cm tall.
- 71a. Plants without persistent marcescent leaves at base; inflorescences more than 1/2 total height
of plants, centrifugal 104. *Pseudo-oederianae*
- 71b. Plants with persistent marcescent leaves at base; inflorescences short spicate or capitate 92. *Merrillianae*
- 70b. Plants usually more than 15 cm tall.
- 72a. Leaves usually 2-pinnatifid, 1-pinnatisect, 2-pinnatisect, or pinnatipartite 66. *Comosae*
- 72b. Leaves usually 1-pinnatisect, with linear-lanceolate, dentate segments 65. *Sudeticae*
- 63b. Galea without marginal teeth.
- 73a. Corolla tube decurved apically, lower lip spreading; capsule oblique.
- 74a. Plants usually caespitose or procumbent to ascending.
- 75a. Inflorescences terminal and basilar, usually distinctly centrifugal 103. *Corydaloides*
- 75b. Flowers few, axillary 87. *Collatae*
- 74b. Plants erect; flowers in a spike, or few and basilar, long pedicellate.
- 76a. Inflorescences short, capitate or flowers few, not distinctly centrifugal 91. *Roseae*
- 76b. Inflorescences elongated, spicate, with dense flowers 102. *Flammeae*
- 73b. Corolla tube usually erect or occasionally decurved basally, lower lip not spreading; capsule not oblique.
- 77a. Flowers axillary.
- 78a. Plants usually stemless 29. *Acaules*
- 78b. Plants with distinct stems 26. *Aloenses*
- 77b. Flowers usually in terminal inflorescences; plants with distinct erect stems.
- 79a. Apex of galea acute 2. *Grandiflorae*
- 79b. Apex of galea usually rounded or obtuse.
- 80a. Throat of corolla expanded, lower lip long stipitate basally 3. *Tsekouenses*
- 80b. Throat of corolla not expanded, lower lip not stipitate.
- 81a. Stem leaves usually few; plants not drying black 1. *Gloriosae*
- 81b. Stem leaves usually numerous; plants drying black or not.
- 82a. Leaves linear to linear-lanceolate, pinnatipartite; plants to 1 m tall 4. *Tristes*
- 82b. Leaves ovate to elliptic-oblong, dentate to pinnatilobate; plants less than 40 cm tall.
- 83a. Plants drying black; rhizomes distinct, rootstock developed, roots glabrous; leaves alternate; corolla large, galea falcate apically 5. *Galeatae*
- 83b. Plants not drying black; without rhizomes, roots densely yellowish brown pubescent; leaves mostly opposite; corolla ca. 1.3 cm, galea ± straight 26. *Aloenses*
- 62b. Corolla beaked.
- 84a. Corolla tube at least 2 × as long as calyx (except *P. bicolor* of ser. *Wilsoniae*).
- 85a. Plants usually diffuse; calyx lobes usually 5.

- 86a. Plants ± woody; leaves with linear segments; galea usually abruptly constricted into a straight beak 34. *Batangenses*
- 86b. Plants herbaceous; leaves with ovate to oblong segments; galea usually gradually constricted into a beak.
- 87a. Beak of galea bent upward 33. *Omiianae*
- 87b. Beak of galea not bent upward, usually straight or twisted 35. *Muscicolae*
- 85b. Plants erect or ± stemless; if stems diffuse, calyx lobes 2 or 3, not 5.
- 88a. Plants more than 10 cm tall, if smaller, corolla often yellow, or corolla red-purple and less than 1.5 cm.
- 89a. Inflorescences short, racemose, centripetal; galea 1-toothed on each side 71. *Amplitubae*
- 89b. Inflorescences usually longer, centrifugal; galea toothless at margin.
- 90a. Lower corolla lip spreading, not enveloping galea 111. *Longiflorae*
- 90b. Lower corolla lip not spreading, usually enveloping galea, only slender beak projecting 112. *Megalanthae*
- 88b. Plants less than 10 cm tall; corolla ± red-purple.
- 91a. Pedicel to 1–4 cm; galea circinate-incurved basally 101. *Neolatitubae*
- 91b. Pedicel shorter; galea not incurved basally.
- 92a. Corolla tube expanded apically 100. *Wilsoniae*
- 92b. Corolla tube not expanded apically.
- 93a. Corolla with lower lip less than 2 cm wide; corolla tube slender, usually less than 0.75 mm wide 99. *Albiflorae*
- 93b. Corolla with lower lip more than 2 cm wide; corolla tube usually more than 1 mm wide.
- 94a. Leaves pinnatifid; beak of galea usually downward uncinately 108. *Robustae*
- 94b. Leaves ± entire or only pinnatifid; beak of galea not downward uncinately 110. *Pumiliones*
- 84b. Corolla tube less than 2 × as long as calyx.
- 95a. Galea usually marginally long ciliate.
- 96a. Galea navicular.
- 97a. Leaves linear to linear-lanceolate or oblong-lanceolate, pinnatilobate or dentate 8. *Craspedotrichae*
- 97b. Leaves not linear, shorter and wider, segmented.
- 98a. Leaves pinnatisect, with linear-lanceolate segments 17. *Proboscideae*
- 98b. Leaves double dentate to pinnatipartite, with shorter and wider segments.
- 99a. Leaves ± lanceolate-oblong, less than 3.5 × as long as wide 7. *Dolichocymbae*
- 99b. Leaves not linear to linear-lanceolate, more than 4 × as long as wide 6. *Rudes*
- 96b. Galea not navicular.
- 100a. Beak of galea nearly as long as lower corolla lip.
- 101a. Leaves mostly basal, pinnatisect with lanceolate segments; beak of galea with apical tuft of hairs 18. *Lachnoglossae*
- 101b. Leaves mostly on stem, not pinnatisect; beak of galea without apical tuft of hairs.
- 102a. Lobes of lower corolla lip long stipitate basally, galea ± abruptly constricted into a slender beak 11. *Lasiophrydes*
- 102b. Lobes of lower corolla lip not stipitate, galea gradually constricted into a beak.
- 103a. Plants usually more than 30 cm tall, to 80 cm; galea less than 3 mm wide, sparsely pubescent 9. *Imbricatae*
- 103b. Plants usually less than 30 cm tall; galea 4–5 mm wide, densely pubescent ... 10. *Trichoglossae*
- 100b. Beak of galea longer than lower corolla lip.
- 104a. Leaves linear or linear-lanceolate.
- 105a. Plants usually more than 30 cm tall, to 1 m; beak of galea not twisted; lobes of lower corolla lip narrowly lanceolate 12. *Kongboenses*
- 105b. Plants less than 30 cm tall; beak of galea S-shaped; lobes of lower corolla lip short, wide 15. *Kialenses*
- 104b. Leaves not narrowly linear.
- 106a. Leaves ± ovate, usually more than 3.5 cm wide 14. *Excelsae*
- 106b. Leaves linear-lanceolate to lanceolate-oblong, usually less than 3.5 cm wide (except *P. angustilabris* to 5.5 cm wide).

- 107a. Galea not twisted, densely villous at base and at margin; lobes of lower corolla lip not square-shaped 19. *Recurvae*
- 107b. Galea strongly twisted, glabrous or villous on lower margin and beak; lobes of lower corolla lip nearly square-shaped 15. *Kialenses*
- 95b. Galea not marginally long ciliate.
- 108a. Inflorescences distinctly centrifugal.
- 109a. Beak of galea more than 3 × as long as lower corolla lip 107. *Macrorhynchae*
- 109b. Beak of galea shorter or slightly longer than lower corolla lip.
- 110a. Lower corolla lip less than 1.2 cm wide 106. *Filiculae*
- 110b. Lower corolla lip usually more than 1.5 cm wide 109. *Macranthae*
- 108b. Inflorescences distinctly centripetal or indistinctly centrifugal.
- 111a. Stems weak, slender, usually diffuse; flowers usually axillary.
- 112a. Flowers usually in clusters at base of stems 30. *Vagantes*
- 112b. Flowers not in clusters at base of stems, solitary.
- 113a. Galea with pairs of marginal teeth 94. *Odontophorae*
- 113b. Galea without marginal teeth.
- 114a. Leaves without distinct reticulate veins abaxially; calyx tube without reticulate veins 31. *Axillares*
- 114b. Leaves with distinct reticulate veins abaxially; calyx tube with reticulate veins apically 32. *Infirmae*
- 111b. Stems erect or ± ascending, or ± stemless; flowers arising from a stock.
- 115a. Inflorescences usually elongated, not interrupted.
- 116a. Stems to 80 cm tall; leaves relatively large; corolla relatively small, beak of galea bent upward, lower lip 1/4 to 1/3 as long as galea 13. *Subsurrectae*
- 116b. Stems shorter; leaves relatively small; corolla relatively large, beak of galea bent downward only, lower lip longer 69. *Oxycarpae*
- 115b. Inflorescences usually subcapitate, few flowered, or ± elongated and interrupted basally.
- 117a. Plants less than 10 cm tall, without a distinct main stem.
- 118a. Leaves numerous, persistent, with several narrow segments 93. *Asplenifoliae*
- 118b. Leaves few, not persistent, with fewer wider segments.
- 119a. Lower corolla lip more than 2 cm wide, galea usually robust, apex of beak 2-cleft 108. *Robustae*
- 119b. Lower corolla lip narrower, galea narrower, apex of beak not 2-cleft.
- 120a. Stems rigid; leaves alternate; roots numerous 95. *Paucifoliae*
- 120b. Stems usually weak, flexuous; leaves usually pseudo-opposite; roots few 96. *Mychophilae*
- 117b. Plants more than 10 cm tall.
- 121a. Pedicel to 3–11.5 cm; galea not twisted 97. *Franchetianae*
- 121b. Pedicel less than 3 cm; galea strongly twisted laterally.
- 122a. Flowers ± in a capitulum.
- 123a. Corolla more than 3 cm; lower lip relatively wide, often completely enveloping galea 98. *Pseudomacranthae*
- 123b. Corolla usually less than 2.5 cm; lower lip relatively narrow, often spreading, not enveloping galea.
- 124a. Leaves to 2.5–13 × 14 cm, stem leaves often ovate-elliptic 37. *Phaceliifoliae*
- 124b. Leaves smaller, ± oblong or lanceolate.
- 125a. Plants usually branched basally and at middle 67. *Strobilaceae*
- 125b. Plants unbranched or only branched basally.
- 126a. Corolla to 2.8 cm; beak of galea very long, S-shaped or semicircular 72. *Rhinanthoides*
- 126b. Corolla smaller; beak of galea shorter, not S-shaped or semicircular.
- 127a. Leaves pinnatifid or pinnatipartite 95. *Paucifoliae*
- 127b. Leaves pinnatisect or pinnatipartite 68. *Oliganthae*
- 122b. Flowers ± in a raceme.
- 128a. Galea strongly twisted laterally at base 70. *Dissectae*
- 128b. Galea not strongly twisted laterally at base.

- 129a. Leaves often ovate or elliptic, with few segments 49. *Furfurac*
 - 129b. Leaves oblong to linear, with numerous segments, some merely crenate.
 - 130a. Basal leaves cespitose; plants herbaceous; bracts petiolate 95. *Paucifoliatae*
 - 130b. Basal leaves not cespitose; plants ± woody; bracts sessile.
 - 131a. Leaves only double dentate or entire.
 - 132a. Beak of galea distinct 45. *Racemosae*
 - 132b. Beak of galea indistinct 46. *Carnosae*
 - 131b. Leaves pinnatifid to pinnatisect.
 - 133a. Pedicel relatively short; beak of galea short or obscure 47. *Microphyllae*
 - 133b. Pedicel relatively long, distinct; beak of galea slender 48. *Polyphyllatae*
1. **Ser. Gloriosae** Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 92. 1890.

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Herbs tall, not drying black. Stems often single, erect. Leaves alternate or in pseudo-whorls, pinnatifid to pinnatisect. Stem leaves usually few. Inflorescences long spicate. Calyx 5-lobed. Corolla large; tube erect, 2–3 × as long as calyx; galea toothless, marginally villous.

About six species: Europe to N Asia; two species in China.

- 1a. Plants with basal leaves; calyx lobes serrate; corolla pubescent only along galea margin, middle lobe of lower lip without 2 teeth at base 1. *P. sceptrum-carolinum*
- 1b. Plants without basal leaves; calyx lobes often entire; corolla pubescent throughout, middle lobe of lower lip with 2 teeth at base 2. *P. odontochila*

1. **Pedicularis sceptrum-carolinum** Linnaeus, Sp. Pl. 2: 608. 1753.

旌节马先蒿 jing jie ma xian hao

Herbs perennial, to 60 cm tall, glabrous or sparsely ciliate. Stems often single. Basal leaves in a rosette; petiole to 12 cm; leaf blade oblanceolate to linear-oblong, to 30 × 4 cm, pinnatifid to pinnatisect; segments 7–17 pairs, ovate to oblong, pinnatilobate, incised-double dentate, teeth white and callose. Stem leaves few, alternate or in pseudo-whorls of 3, similar to basal leaves but smaller. Inflorescences to more than 20 cm. Flowers often pseudo-opposite or in pseudo-whorls, lax; bracts broadly ovate. Calyx 1–1.5 cm; lobes serrate. Corolla yellow, sometimes purple-red at apex of lower lip and galea, to 3.8 cm, glabrous except on galea; tube ca. 1.5 cm; lips connivent; galea falcate, densely bearded along margin (corolla otherwise glabrous); lower lip with middle lobe entire. Filaments glabrous apically. Capsule globose, ca. 2 cm, short mucronate. Fl. Jun–Aug, fr. Aug–Sep. 2n = 32.

Swampy woods, moist banks, marshy meadows; 400–500 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Kazakstan, Korea, Mongolia, Russia; C and N Europe].

It is not known to which subspecies the Nei Mongol plants belong.

- 1a. Stems and leaves subglabrous 1a. subsp. *sceptrum-carolinum*
- 1b. Stems and leaves pubescent .. 1b. subsp. *pubescens*

1a. **Pedicularis sceptrum-carolinum** subsp. **sceptrum-carolinum**

旌节马先蒿(原亚种) jing jie ma xian hao (yuan ya zhong)

Pedicularis sceptrum-carolinum var. *glabra* Bunge.

Stems and leaves subglabrous.

Swampy woods, moist banks, marshy meadows; 400–500 m. Heilongjiang, Jilin, Liaoning [Japan, Kazakstan, Mongolia, Russia; C and N Europe].

1b. **Pedicularis sceptrum-carolinum** subsp. **pubescens** (Bunge) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 37. 1963.

有毛旌节马先蒿 you mao jing jie ma xian hao

Pedicularis sceptrum-carolinum Linnaeus var. *pubescens* Bunge in Ledebour, Fl. Ross. 3: 303. 1847; *P. sceptrum-carolinum* f. *pubescens* (Bunge) Kitagawa; *P. pubescens* (Bunge) Pai.

Stems and leaves pubescent.

Heilongjiang, Jilin, Liaoning [Korea, Russia].

2. **Pedicularis odontochila** Diels, Bot. Jahrb. Syst. 36, Beibl. 82: 97. 1905.

齿唇马先蒿 chi chun ma xian hao

Herbs to 40–50 cm tall, gray-white silky pubescent throughout. Stems single. Leaves on stem, not forming basal rosette, alternate, sessile, oblong, 5–8 × 2–3 cm, pinnatifid; segments dentate. Inflorescences spicate; bracts leaflike, small. Calyx ca. 1 cm; lobes equal, often entire. Corolla 4–4.5 cm, pubescent throughout; lips connivent; galea erect, 1.5–1.8 cm, marginally bearded; lower lip slightly shorter than galea, 3–4 × 5–6 mm, middle lobe with 2 teeth at base. Filaments glabrous. Fl. Jul.

• Shaanxi (Qinling).

Known from the original collection only. No specimens seen.

2. **Ser. Grandiflorae** Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 93. 1890.

野苏子系 *ye su zi xi*

Herbs tall, drying black. Stems often many branched. Leaves alternate, large, 2- or 3-pinnatisect. Inflorescences long racemose, centripetal. Corolla large; galea toothless, apex acute. Anthers apiculate.

One species: China and Russia (Far East).

3. *Pedicularis grandiflora* Fischer, Mém. Soc. Imp. Naturalistes Moscou 3: 60. 1812.

野苏子马先蒿 *ye su zi ma xian hao*

Herbs perennial, to more than 1 m tall, often many branched. Roots fascicled, ± fleshy. Stems stout, hollow, ribbed, densely and minutely appressed puberulent.

Basal leaves withering early; petiole to 7 cm; leaf blade ovate-oblong, to 23 cm, 2-pinnatisect; segments lanceolate, pinnatipartite to pinnatisect, dentate, teeth white and callose. Inflorescences long racemose,

centripetal, lax; bracts subtriangular, inconspicuous. Calyx ca. 8 mm; lobes 5, equal, triangular, serrate. Corolla purple, 2.5–3.5 cm; lips ± connivent; galea falcate, marginally densely bearded; lower lip slightly shorter than galea. Filaments glabrous. Capsule ovoid, ca. 1.3 cm × 9 mm, apiculate. Fl. Jul–Aug, fr. Aug–Sep.

Swampy meadows; 300–400 m. Jilin, Nei Mongol [Russia].

3. Ser. *Tsekouenses* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 8. 1949.

茨口系 *ci kou xi*

Herbs not drying black. Stems many branched basally. Leaves alternate; basal leaves numerous, long petiolate, pinnatifid to pinnatipartite. Inflorescences often capitate, few flowered. Corolla often purple spotted, large, throat expanded; galea falcate, rounded or obtuse apically, toothless; lower lip long stipitate basally.

One species: China and N Myanmar.

4. *Pedicularis tsekouensis* Bonati, Bull. Soc. Bot. France 54: 373. 1907.

茨口马先蒿 *ci kou ma xian hao*

Herbs, perennial, 10–60 cm tall, pubescent throughout. Roots fascicled, slender. Basal leaves in a rosette; petiole (1–)2–10 cm; leaf blade lanceolate-oblong to ovate-elliptic, 2–8 cm; segments 4–10 pairs, oblique ovate to triangular, pubescent, margin double dentate. Stem leaves absent or few, similar

to basal leaves but with shorter petioles and smaller. Inflorescences capitate or racemose, elongating to more than 25 cm, lax; bracts leaflike. Pedicel ca. 9 mm. Calyx ca. 1 cm; lobes 5, unequal. Corolla pale yellow to rose, often purple spotted, to 3 cm; tube slightly longer than calyx; galea densely pubescent apically. Filaments 2 pubescent, 2 glabrous; anthers apiculate. Fl. Jun–Sep, fr. Aug–Oct.

Dry stony pastures among *Pinus* and *Rhododendron* scrubs; 3000–4500 m. SW Sichuan, NW Yunnan [N Myanmar].

4. Ser. *Tristes* Benth in A. de Candolle, Prodr. 10: 579. 1846.

阴郁系 *yin yu xi*

Herbs to 1 m tall, drying black. Roots single, somewhat fleshy, with a tuft of fibrous roots near top. Stems unbranched. Stem leaves usually numerous. Leaves alternate, sessile, linear to linear-lanceolate, pinnatipartite or pinnatifid. Inflorescences racemose. Corolla yellow or pale yellow; galea falcate, toothless, apex acute or obtuse, beakless; lower lip not spreading.

Three species: China, Russia (Siberia); all three in China.

1a. Galea not densely pubescent at margin; bracts longer than flowers 7. *P. shansiensis*

1b. Galea densely pubescent at margin; bracts shorter than flowers.

2a. Corolla 2.6–3 cm; galea 4–5 mm wide; calyx lobes entire or obscurely serrate; filaments glabrous 5. *P. tristis*

2b. Corolla 4–4.5 cm; galea 6–8 mm wide; calyx lobes distinctly serrate; filaments sparsely pubescent 6. *P. paiana*

5. *Pedicularis tristis* Linnaeus, Sp. Pl. 2: 608. 1753.

阴郁马先蒿 *yin yu ma xian hao*

Herbs perennial, 15–50 cm tall. Stems hollow, with lines of hairs. Leaves linear to linear-lanceolate, to 8 × 2 cm, abaxially with long hairs along midvein, adaxially white pubescent, pinnatipartite; segments triangular to ovate, incised-double dentate. Inflorescences to 20 cm, often interrupted basally;

bracts triangular-ovate, shorter than flowers, pubescent. Calyx to 1.5 cm, densely pubescent to subglabrous; lobes 5, ± equal, linear-lanceolate, entire or obscurely serrate. Corolla yellow, 2.6–3 cm; tube barely

exceeding calyx lobes, pubescent; galea 4–5 mm wide, margin densely pubescent, apex obtuse or acute. Filaments glabrous. Fl. Jun–Aug, fr. Jul–Sep. 2n = 16.

Alpine and subalpine wet meadows, shrubby grassland; 2700–3200 m. Gansu, Shanxi [Mongolia, Russia (Siberia, Far East)].

6. *Pedicularis paiana* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 61. 1949.

白氏马先蒿 *bai shi ma xian hao*

Pedicularis tristis Linnaeus var. *macrantha* Maximowicz.

Herbs perennial, to 35 cm tall. Stems erect, pubescent, longitudinally striate. Leaves mostly on stem, lanceolate-oblong, to 8 × 2 cm, sparsely pubescent, pinnatifid; segments 10–15 pairs, dentate. Bracts leaflike, longer than calyx, shorter than flowers. Calyx pubescent; tube to 1.5 cm; lobes 5, ± equal, lanceolate-oblong, distinctly serrate. Corolla yellow, 4–4.5 cm, pubescent; tube ca. as long as galea; galea 6–8 mm wide, margin densely ciliate, apex acute; lower lip ca. as long as galea, lobes ± equal. Filaments sparsely pubescent. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows, *Picea* forests; 2800–3000 m. Gansu, W Sichuan.

7. *Pedicularis shansiensis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 397. 1963.

山西马先蒿 *shan xi ma xian hao*

Herbs perennial, to 70 cm tall. Stems hollow, with lines of hairs. Leaves lanceolate-linear, 5–12 × 0.8–4.5 cm, with sparse, long, white hairs, pinnatifid; segments 9–15 pairs, triangular-ovate to lanceolate-oblong, pinnatifid, margin dentate-incised, teeth callose. Inflorescences to 18 cm, interrupted basally; bracts leaflike, longer than flowers. Calyx ca. 1.4 cm, slightly cleft anteriorly; lobes 5, unequal, posterior lobe smaller than lateral ones. Corolla pale yellow, ca. 4.5 cm, densely glandular pubescent throughout; tube to 2.5 cm; galea margin not densely pubescent, apex obtuse. Filaments glabrous. Capsule oblong-ovoid, slightly compressed, ca. 2 cm × 9 mm, apex acute. Seeds triangular, ca. 4 × 2 mm. Fl. Jun–Aug, fr. Jul–Sep.

• Alpine grassy slopes, thickets; 1200–2400 m. Henan, Shaanxi, Shanxi.

5. Ser. *Galeatae* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 244. 1995.

显盔系 *xian kui xi*

Herbs drying black. Rhizomes distinct; rootstock developed, roots glabrous. Stems erect, unbranched. Stem leaves alternate, sessile, ovate to elliptic-oblong, margin double dentate. Flowers few, large; galea red, falcate apically, toothless, margin not long bearded, apex obtuse.

• One species: endemic to China.

8. *Pedicularis galeata* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 130. 1921.

显盔马先蒿 *xian kui ma xian hao*

Herbs perennial, 15–35 cm tall. Stems hollow, with lines of hairs. Leaves alternate, sessile, lanceolate-oblong to ovate-elliptic. Middle leaves larger than basal and apical leaves, to 4 × 2.2 cm, abaxially sparsely villous along midvein, adaxially brown pubescent along midvein, base broadly cuneate to rounded, apex obtuse to acute. Inflorescences lax racemes, capitata at anthesis,

elongating in fruit, ± sessile; bracts leaflike. Calyx ca. 1.1 cm, sparsely villous along midvein; lobes 5, unequal. Corolla purple, 2–2.2 cm; tube barely exceeding calyx, sparsely pubescent; galea ca. 5 mm wide; lower lip ca. 1.3 cm, ciliate. Filaments glabrous; anthers apiculate. Capsule broadly ovoid, compressed, ca. 1.5 × 1 cm, apex acute. Fl. Aug, fr. Sep.

• Grassy slopes; 3500–4400 m. NW Yunnan.

6. Ser. *Rudes* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 83. 1890.

粗野系 *cu ye xi*

Herbs tall, drying black. Stems unbranched or sometimes branched apically. Leaves alternate, sessile, ± linear to linear-lanceolate, more than 4 × as long as wide, pinnatifid or pinnatisect. Inflorescences racemose or conical. Corolla navicular or falcate, slightly beaked.

Six species: China, N Myanmar; five species in China.

1a. Lower corolla lip stipitate basally; galea margin not bearded 13. *P. prainiana*

1b. Lower corolla lip ± sessile; galea margin densely bearded.

2a. Corolla tube glabrous or sparsely pubescent externally; calyx glabrous 11. *P. princeps*

2b. Corolla tube pubescent externally; calyx glandular pubescent.

3a. Calyx 3–4 mm, lobes ± entire; corolla tube ca. 3 × as long as calyx 10. *P. decora*

3b. Calyx 5–7 mm, lobes serrate; corolla tube ca. 2 × as long as calyx.

4a. Leaf segments to 24 pairs; calyx 5–6.5 mm; capsule ca. 13 × 8 mm 9. *P. rudis*

4b. Leaf segments to 15 pairs; calyx to 7 mm; capsule ca. 17 × 9 mm 12. *P. dunniana*

9. *Pedicularis rudis* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 67. 1877.

粗野马先蒿 *cu ye ma xian hao*

Herbs perennial, to more than 1 m, usually branched apically, pubescent. Stems hollow. Stem leaves clasping, lanceolate-linear, 3–15 × 0.8–2.2 cm, pinnatifid; segments to 24 pairs, oblong to lanceolate, pubescent, margin double dentate.

Inflorescences long spicate, more than 30 cm, glandular pubescent; bracts leaflike below, ovate above, longer than calyx. Calyx 5–6.5 mm, densely white glandular pubescent; lobes 5, ± equal, serrate. Corolla white, 2–2.2 cm; tube ca. 1.2 cm, pubescent externally; galea purple-red apically, front yellow, navicular, margin densely bearded, apex mucronulate, bent slightly upward; lower lip ± sessile, ca. as long as galea, ciliate.

Filaments glabrous. Capsule broadly ovoid, compressed, ca. 1.3 cm × 8 mm, apex acute. Fl. Jul–Aug, fr. Aug–Sep.

• Grassy slopes, *Picea* forests, *Betula* forests; 2200–3400 m. W Gansu, Nei Mongol, Qinghai, Shaanxi, N Sichuan, E Xizang.

10. *Pedicularis decora* Franchet, Bull. Soc. Bot. France 47: 28. 1900.

美观马先蒿 *mei guan ma xian hao*

Pedicularis lasiantha H. L. Li.

Herbs perennial, to 1 m tall, pubescent. Stems branched apically or unbranched, sparsely white villous. Leaves narrowly lanceolate, to 10 × 2.5 cm, pinnatipartite; segments 20 pairs, oblong-lanceolate, margin double dentate. Inflorescences long spicate, interrupted basally, densely glandular pubescent; bracts leaflike below. Calyx 3–4 mm, densely glandular pubescent; lobes 5, triangular, ± entire. Corolla yellow; tube ca. 1.2 cm, ca. 3 × as long as calyx, pubescent outside; galea navicular, ca. as long as lower lip, margin densely bearded; lower lip ± sessile. Capsule ovoid, compressed, ca. 1.4 cm × 8 mm, apex short acuminate. Fl. Jun–Jul, fr. Aug.

• Grassy slopes, *Picea* forests, *Betula* forests; 2200–2800 m. S Gansu, W Hubei, S Shaanxi, NE Sichuan.

11. *Pedicularis princeps* Bureau & Franchet, J. Bot. (Morot) 5: 129. 1891.

高超马先蒿 *gao chao ma xian hao*

Herbs perennial, more than 1 m tall. Stems branched apically or unbranched, usually shiny black, pubescent. Leaves clasping, lanceolate, 2.5–8 × 0.5–2.4 cm, abaxially sparsely white pubescent, adaxially brown pubescent along midvein, pinnatipartite; segments 18 pairs, lanceolate-oblong, margin double dentate. Inflorescences long racemose, to more than 20 cm, interrupted basally; bracts leaflike. Pedicel to 3 mm, glabrous. Calyx 5–6 mm, glabrous; lobes 5, triangular, entire. Corolla pale yellow, to 1.5 cm; tube ca. 1.1 cm, glabrous or sparsely pubescent on outside; galea usually falcate, margin densely bearded; lower lip ± sessile, ca.

as long as galea, ciliate. Filaments pubescent. Fl. Jun–Jul, fr. Aug–Sep.

• Grassy slopes, thickets, forests; 2800–3500 m. W Sichuan, NW Yunnan.

12. *Pedicularis dunniana* Bonati, Notes Roy. Bot. Gard. Edinburgh 8: 44. 1913.

邓氏马先蒿 *deng shi ma xian hao*

Pedicularis aequibarbis Handel-Mazzetti.

Herbs perennial, to 1.6 m tall, brown pubescent throughout. Stems 1 to several, sturdy, hollow, sometimes branched apically. Leaves clasping, linear-lanceolate. Middle leaves largest, sparsely pubescent, pinnatipartite; segments to 15 pairs, lanceolate-oblong, margin lobed or double dentate. Inflorescences to 20 cm, elongating to 26 cm in fruit, glandular pubescent; upper bracts slightly longer than calyx. Calyx to 7 mm, densely glandular pubescent or not; lobes 5, serrate. Corolla yellow, to 2 cm; tube ca. 1.2 cm, pubescent; galea navicular, margin densely bearded; lower lip ± sessile; nearly as long as galea. Capsule ovoid-oblong, ca. 1.7 cm × 9 mm, apex acute. Seeds ca. 3 × 1.2 mm, reticulate. Fl. Jul, fr. Aug–Sep.

• Grassy slopes, forests; 3300–3800 m. W Sichuan, NW Yunnan.

13. *Pedicularis prainiana* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 567. 1888.

帕兰氏马先蒿 *pa lan shi ma xian hao*

Herbs perennial. Stems single, to 45 cm tall, erect, rigid, hollow, striate, leafy. Leaves linear-oblong, 7–10 × 1.5–2 cm, base auriculate, pinnatisect; segments 15–25 pairs, ovate-oblong, margin acute-dentate. Inflorescences erect, dense; bracts linear-oblong, basal ones longer than flowers, upper ones shorter than calyx. Pedicel 2–3 mm. Calyx ca. 1.6 cm × 5 mm, membranous, hirtellous; lobes 5, unequal. Corolla tube ca. 1.7 cm, slightly longer than calyx; galea navicular, margin not bearded, sparsely pubescent abaxially; lower lip stipitate basally, ciliate. Filaments glabrous. Fl. Jul, fr. Aug.

Scrubby slopes; 3000–3700 m. S Xizang [N Bhutan].

7. Ser. *Dolichocymbae* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 244. 1995.

长舟系 *chang zhou xi*

Herbs drying black. Stems erect, not or rarely branched. Leaves ± lanceolate-oblong, less than 3.5 × as long as wide, margin lobed or double dentate. Corolla galea navicular; beak short.

• One species: endemic in China.

14. *Pedicularis dolichocymba* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 102. 1920.

长舟马先蒿 *chang zhou ma xian hao*

Pedicularis macrocalyx Bonati.

Herbs perennial, 13–40 cm tall. Stems rarely branched, longitudinally grooved, with lines of brown hairs.

Leaves alternate, sessile; basal leaves scalelike; stem leaves ovate-oblong to lanceolate-oblong, 2.5–6 × 0.3–2 cm, middle leaves largest, abaxially sparsely villous along midvein, adaxially densely brown pubescent along midvein, margin lobed or double dentate. Inflorescences capitate and 3- or 4-flowered to short racemose and more than 10-flowered, elongating to 12 cm in fruit; bracts leaflike. Calyx ca. 9 mm; lobes 5,

ovate, serrate. Corolla deep rose to blackish purple, 2.3–2.8 cm; tube ca. 1.5 × as long as calyx, glabrous; galea sparsely pubescent, margin densely bearded; lower lip much shorter than galea. Filaments glabrous.

Capsule compressed, ovoid, to 2 cm × 9 mm, apex acute. Fl. Aug, fr. Aug–Sep.

• Alpine meadows, rocky slopes, among boulders; 3500–4300 m. W Sichuan, E Xizang, NW Yunnan.

8. Ser. Craspedotrichae H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 8. 1949.

缘毛系 yuan mao xi

Herbs tall. Stems erect or ascending, rarely branched. Leaves alternate, linear to linear-lanceolate or oblong-lanceolate, pinnatifid or dentate. Corolla galea often navicular; beak short.

About 14 species: Bhutan, China, E Nepal, Sikkim; ten species in China.

- 1a. Galea conspicuously navicular, much enlarged, bent upward.
 - 2a. Lobes of lower corolla lip narrow, lanceolate 18. *P. angustiloba*
 - 2b. Lobes of lower corolla lip wider, ± rounded.
 - 3a. Galea much longer than lower corolla lip, ca. 1.6 cm; lower lip ca. 8 × 11 mm ... 15. *P. pseudosteingeri*
 - 3b. Galea nearly as long as or slightly longer than lower corolla lip, ca. 1.4 cm; lower lip ca. 1.1 × 1.2 cm.
 - 4a. Corolla tube short, nearly as long as calyx; 2 filaments pubescent, 2 completely glabrous including extreme apex 16. *P. trichomata*
 - 4b. Corolla tube longer, ca. 1.5 × as long as calyx; 2 filaments densely hirsute, 2 glabrous except sparsely hairy at anther insertion 17. *P. lophotricha*
- 1b. Galea inconspicuously navicular, slightly enlarged, pointing forward or bent downward.
 - 5a. Plants less than 30 cm tall; leaves to 3 cm; corolla rose, beak of galea long 24. *P. craspedotricha*
 - 5b. Plants usually more than 30 cm tall; leaves to over 8 cm; corolla ± yellow, beak of galea indistinct.
 - 6a. Calyx densely pubescent, lobes distinctly serrulate 19. *P. ingens*
 - 6b. Calyx glabrous or sometimes sparsely pubescent, lobes entire or rarely serrulate.
 - 7a. Corolla tube ca. as long as to slightly longer than calyx; leaves with 50 or more teeth on each side.
 - 8a. Calyx ca. 1.1 cm, lobes ± entire 20. *P. steingeri*
 - 8b. Calyx to 1.3 cm, lobes distinctly serrulate 21. *P. pseudoingens*
 - 7b. Corolla tube 1.5–2 × as long as calyx; leaves with less than 50 teeth on each side.
 - 9a. Leaves incised-dentate; 2 filaments pubescent, 2 glabrous 22. *P. trichocymba*
 - 9b. Leaves incised-lobed, ca. 1/3 distance from margin to midvein; all filaments glabrous 23. *P. tongolensis*

15. *Pedicularis pseudosteingeri* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 157. 1926.

假司氏马先蒿 jia si shi ma xian hao

Herbs perennial, drying black. Stems more than 40 cm tall, erect, grayish brown pubescent. Stem leaves clasping, sessile, linear-lanceolate, to 6 cm × 6 mm; middle leaves largest, margin incised-double dentate, teeth to 20 pairs. Inflorescences to 15 cm, dense; bracts leaflike, slightly longer than calyx. Calyx to 1.6 cm, glabrous; lobes 5, triangular-ovate, ca. 4 mm. Corolla purple; tube ca. 1.2 cm; galea conspicuously navicular, to 1.6 cm × 5 mm, margin densely long pubescent; lower lip much shorter than galea, ca. 8 mm × 1.1 cm, lobes ± rounded. Filaments 2 pubescent, 2 glabrous. Fl. Jun–Aug, fr. Aug–Sep.

• Open stone meadows, forest margins, *Picea* forests; 3000–4300 m. SW Sichuan, Yunnan.

16. *Pedicularis trichomata* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 70. 1949.

须毛马先蒿 xu mao ma xian hao

Herbs perennial, drying black. Stems to 40 cm tall, erect, unbranched, densely grayish brown pubescent, with few ovate scales at base. Leaves ± clasping, sessile, linear-lanceolate, 3.5–4.5 cm × 5–6 mm, base auriculate, margin incised-double dentate, apex acute.

Inflorescences racemose, to 15 cm, dense; bracts leaflike. Pedicel 1–1.5 mm. Calyx oblong-ovate, to 1.2 cm; lobes 5, triangular, ± entire. Corolla yellow; tube ca. 1.1 cm; galea conspicuously navicular, ca. 1.5 cm × 4.5 mm, margin densely long pubescent; lower lip ca. 1.1 × 1.2 cm, lobes ± rounded, denticulate. Filaments 2 pubescent, 2 completely glabrous including extreme apex. Ovary ca. 4 mm.

• NW Yunnan.

17. *Pedicularis lophotricha* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 71. 1949.

盔须马先蒿 kui xu ma xian hao

Herbs perennial. Stems 35–40 cm tall, erect, unbranched, hispid. Leaves sessile, linear-lanceolate, 5–6.5 cm × 6–8 mm, adaxially glabrous except for

pubescent midvein, base broadly auriculate, margin crenate, apex acute. Inflorescences long racemose, 10–17 cm, ± dense; bracts leaflike, upper ones ca. 2/3 longer than corolla. Pedicel 1–2 mm. Calyx oblong-ovate, ca. 1.2 cm; lobes 5, ± equal, ciliate, ± entire. Corolla yellow, ca. 3 cm; tube erect, ca. 1.5 × as long as calyx; galea ca. 1.4 cm, margin densely long pubescent; beak 2–4 mm, apex cleft; lower lip nearly as long as galea, lobes ± rounded. Upper filament pair densely hirsute in distal half, lower pair glabrous except for few hairs just below anther. Fl. Jun, fr. Jul.

• In *Salix* scrubs; 4300–4700 m. W Sichuan.

18. *Pedicularis angustiloba* P. C. Tsoong, Acta Phytotax. Sin. 3: 303. 1955.

狭裂马先蒿 *xia lie ma xian hao*

Herbs perennial, drying black. Stems to 70 cm tall, erect, unbranched, subglabrous, leafy throughout. Basal leaves early deciduous. Stem leaves clasping, lanceolate-linear, ca. 7 cm × 7 mm, adaxially shiny; segments 27–40 pairs, margin double dentate. Inflorescences 10–25 cm, pubescent; bracts leaflike, longer than flowers. Calyx ca. 1 cm; tube ca. 6 mm, white villous; lobes 5, ± equal, ± entire. Corolla yellow; tube ca. 9 mm, slightly shorter than calyx; galea purple spotted, conspicuously navicular, margin pilose, apex slightly curved; beak decurved, ca. 1.5 mm; lower lip ca. 1.4 cm × 8–9 mm, ± ciliate, lobes lanceolate, denticulate. Filaments pubescent. Fl. Jun–Aug, fr. Aug.

• Loose moraine screes, dry places in forests; 3400–4500 m. E Xizang.

19. *Pedicularis ingens* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 565. 1888.

硕大马先蒿 *shuo da ma xian hao*

Herbs perennial, drying black. Stems more than 60 cm tall, erect, hollow, pubescent, with oblong scales at base. Basal leaves withering early; stem leaves clasping, sessile, oblong-linear, to 9 × 1.2 cm, base auriculate, margin incised-double dentate, teeth more than 40 pairs, apex acute. Inflorescences to 20 cm; bracts leaflike. Calyx to 1.2 cm, densely pubescent; lobes 5, serrulate. Corolla yellow, ca. 2.5 cm; tube slender, ca. 1.4 cm; galea inconspicuously navicular, margin long pubescent; beak short, indistinct, apex 2-cleft; lower lip ca. 8 mm × 1 cm, lobes denticulate. Filaments 2 pubescent, 2 glabrous. Fl. Jul–Sep, fr. Sep.

• High weedy slopes, grassy and scrubby slopes; 3000–4200 m. Gansu, E Qinghai, N Sichuan.

20. *Pedicularis steingeri* Bonati, Bull. Soc. Bot. France 55: 311. 1908.

司氏马先蒿 *si shi ma xian hao*

Herbs perennial, drying black. Stems more than 70 cm tall, erect, hollow, pilosulous. Basal leaves scalelike; stem leaves clasping, linear, to 7 cm × 7 mm, base hastate, margin incised-double dentate, teeth more than 60 pairs. Inflorescences to 20 cm; bracts ovate-lanceolate, ciliate. Calyx ca. 1.1 cm; lobes 5, triangular-

ovate, ciliate, ± entire. Corolla yellow; tube ca. 1.2 cm; galea falcate, inconspicuously navicular, margin bearded; beak short, indistinct, decurved; lower lip ca. 7 mm × 1 cm. Filaments 2 pubescent, 2 glabrous. Fl. Aug, fr. Sep.

• Amidst grass in shrubbery; ca. 3900 m. W Sichuan.

21. *Pedicularis pseudoingens* Bonati, Notes Roy. Bot. Gard. Edinburgh 8: 135. 1913.

假硕大马先蒿 *jia shuo da ma xian hao*

Herbs perennial, drying black. Stems to 1 m tall, erect, hollow, glabrescent, striate. Basal leaves small, scalelike; stem leaves linear, base hastate; segments more than 50 pairs, glabrous, margin incised-double dentate. Inflorescences to 30 cm, lax basally; bracts leaflike. Calyx to 1.3 cm, glabrous; lobes 5, triangular-lanceolate, to 5 mm, distinctly serrulate. Corolla yellowish green; tube 1.2–1.5 cm, glabrous; galea falcate apically, inconspicuously navicular, margin long bearded; lower lip ca. 9 mm × 1 cm. Filaments 2 pubescent, 2 glabrous. Capsule obliquely ellipsoid-ovoid, slightly compressed, ca. 1.6 cm × 6.5 mm, rarely exceeding calyx, long apiculate. Fl. Jul–Aug, fr. Sep.

• Scrubs, grassy slopes; 3000–4300 m. NW Yunnan.

22. *Pedicularis trichocymba* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 72. 1949.

毛舟马先蒿 *mao zhou ma xian hao*

Herbs perennial. Stems to 60 cm tall, erect, sturdy, unbranched, glabrous, striate, leafy throughout. Leaves sessile, linear-lanceolate, 6.5–7.5 cm × 7–10 mm, glabrous, base auriculate, margin incised-dentate. Inflorescences racemose, ca. 15 cm, interrupted basally; bracts leaflike, exceeding flowers. Pedicel 1–1.5 mm. Calyx 8–10 mm, glabrous; lobes 5, equal. Corolla yellow, 2.4–2.6 cm; tube erect, ca. 2 × as long as calyx; galea curved apically, inconspicuously navicular, 8–10 mm; beak scarcely 2 mm; lower lip ca. as long as galea. Filaments 2 pubescent, 2 glabrous. Fl. May–Jun, fr. Jul.

• 2700–4700 m. W Sichuan.

23. *Pedicularis tongolensis* Franchet, Bull. Soc. Bot. France 47: 29. 1900.

东俄洛马先蒿 *dong e luo ma xian hao*

Herbs perennial. Stems 30–60 cm tall, erect, unbranched, long pubescent, leafy throughout. Leaves sessile, lanceolate-linear, 5–7 cm; lobes densely incised. Inflorescences spicate, more than 15 cm, loose. Calyx membranous, sparsely pubescent; lobes 5, ovate-lanceolate, ca. 3 × shorter than tube, long ciliate, entire. Corolla yellow; tube ca. 2 × longer than calyx; galea curved, inconspicuously navicular, margin densely red pubescent; beak curved; lower lip scarcely shorter than galea. Filaments glabrous.

• W Sichuan.

24. *Pedicularis craspedotricha* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 564. 1888.

缘毛马先蒿 *yuan mao ma xian hao*

Herbs perennial. Stems erect or ascending, to 26 cm tall, glabrous except for 2 lines of hairs, striate. Basal leaves scalelike; stem leaves ± clasping, sessile, linear-lanceolate, to 3 cm × 4.5 mm, crenate-double dentate. Inflorescences capitate or loosely racemose, 2–10-flowered; bracts leaflike. Pedicel 0.5–1.5 cm. Calyx ca. 7 mm; lobes 5, triangular, entire, ca. 1/2 as long as tube.

Corolla rose; tube scarcely longer than calyx; galea inconspicuously navicular, bearded along margin; beak slender, erose apically; lower lip shorter than galea. Filaments glabrous.

• Alpine meadows, forests; 3400–4500 m. Gansu, NW Sichuan.

9. Ser. *Imbricatae* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 244. 1995.

覆瓦系 fu wa xi

Herbs usually 30 cm to 1 m tall, drying black. Stems erect, rarely branched. Leaves alternate, mostly on stem, sessile, linear to linear-oblong, pinnatifid. Inflorescences racemose. Corolla galea crescent-shaped, less than 3 mm wide, sparsely pubescent; beak distinct.

Four species: China, Bhutan, India, Nepal, and Sikkim; one species in China.

25. *Pedicularis clarkei* J. D. Hooker, Fl. Brit. India 4: 310. 1884.

克氏马先蒿 ke shi ma xian hao

Herbs perennial, hirtellous. Rhizomes fleshy. Stems to 50–80 cm tall, rigid, hollow, unbranched, striate. Basal leaves withering early; stem leaves clasping, linear-oblong, 4–6 cm × 7.5–12.5 mm, base auriform; segments 15–25 pairs, ovate-oblong, incised-dentate. Inflorescences rigid, dense; bracts leaflike. Pedicel 2–3

mm. Calyx ca. 1.5 cm, pubescent, 5-lobed. Corolla purple; tube 1.6–1.8 cm; beak of galea ca. 5 mm, less than 3 mm wide, sparsely pubescent, apex 2-lobed; lower lip ciliate. Filaments glabrous. Capsule ovoid, ca. 1.6 cm, apiculate. Fl. Jul–Sep, fr. Aug–Sep. 2n = 16.

Among dwarf scrubs, steep banks below cliffs; 3700–4500 m. S Xizang [Bhutan, India, Nepal, Sikkim].

10. Ser. *Trichoglossae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 8. 1949.

毛盔系 mao kui xi

Herbs usually less than 30 cm tall, drying black. Stems erect, unbranched. Stem leaves alternate, lanceolate-linear to lanceolate-oblong, pinnatifid to pinnatisect. Inflorescences capitate to racemose. Corolla purple-red or blackish purple, large; tube shorter or slightly longer than calyx; galea strongly curved, 4–5 mm wide, densely long pubescent at margin and back; beak cylindric, long, bent downward.

Two species: SW China, Bhutan, India, N Myanmar, Nepal, Sikkim; both species in China.

1a. Leaves 2–7 × 0.3–1.5 cm, with 20–25 pairs of segments; corolla tube bent basally, beak of galea very long,

lower lip glabrous 26. *P. trichoglossa*

1b. Leaves ca. 4.8 × 2 cm, with 8–12 pairs of segments; corolla tube erect, bent slightly apically, beak of galea

shorter, lower lip ciliate 27. *P. rhodotricha*

26. *Pedicularis trichoglossa* J. D. Hooker, Fl. Brit. India 4: 310. 1884.

毛盔马先蒿 mao kui ma xian hao

Herbs perennial, 13–60 cm tall. Stems with 2 lines of hairs, striate. Leaves clasping, sessile, linear-lanceolate, 2–7 cm × 3–15 mm, pinnatifid to pinnatipartite; segments 20–25 pairs, subglabrous except for pubescent midvein, margin double dentate.

Inflorescences racemose, 6–18 cm; axis densely pubescent; bracts linear, inconspicuous, densely pubescent. Pedicel to 3 mm, pubescent. Calyx 1.2–1.6 cm, densely blackish purple villous, 5-lobed; tube 8–10 mm. Corolla blackish purple; tube bent basally; galea densely long pubescent apically, with purple-red hairs; beak slender, incurved, glabrous; lower lip glabrous; lobes broadly rounded. Capsule broadly ovoid, 1.2–1.5 cm × ca. 9 mm, slightly exceeding calyx. Fl. Jul–Aug, fr. Aug–Sep.

Open stony meadows in forests, amidst boulder screes; 3500–5000 m. Qinghai, W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, India (Uttar Pradesh), N Myanmar, Nepal, Sikkim].

27. *Pedicularis rhodotricha* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 566. 1888.

红毛马先蒿 hong mao ma xian hao

Pedicularis ramalana Britten.

Herbs perennial, 8–35 cm tall. Stems with 2 lines of hairs. Leaves short petiolate or ± clasping; leaf blade linear-lanceolate, to 4.8 × 2 cm, subglabrous, pinnatipartite to pinnatisect; segments 8–12 pairs, oblong to ovate, margin double dentate. Inflorescences capitate to racemose, to 7 cm, usually dense; bracts leaflike. Calyx purplish red, to 1 cm; lobes 5, triangular-ovate, ciliate. Corolla purple red; tube erect, slightly bent apically, ca. as long as calyx; galea 1/2 moon-shaped, densely long pubescent apically, with pale red hairs; beak bent downward only, 4–5 mm; lower lip ciliate. Fl. Jun–Aug, fr. Aug–Sep.

- Stony alpine meadows, screes; 2600–4000 m. W Sichuan, NW Yunnan.

11. Ser. Lasiophrydes H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 8. 1949.

毛须系 mao ke xi

Herbs low or medium sized, drying black. Stems erect, usually unbranched. Leaves on stem or basal, alternate, lanceolate-linear, pinnatifid. Inflorescences capitate to spicate, often few flowered. Corolla tube less than 2 × as long as calyx; galea bent at middle, margin densely pubescent; beak horizontal, ± straight, nearly as long as lower lip; lower lip 3-parted nearly to base, lobes stipitate basally.

- Two species: endemic to China.

- 1a. Corolla yellow, galea pubescent abaxially at apex, except on beak 28. *P. lasiophrys*
 1b. Corolla whitish rose, galea glabrous abaxially 29. *P. cinerascens*

28. *Pedicularis lasiophrys* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 68. 1877.

毛须马先蒿 mao ke ma xian hao

Herbs perennial. Stems usually unbranched, with 2 lines of hairs, striate. Leaves mostly basal, sometimes pseudo-rosulate, short petiolate or sessile to ± clasping; leaf blade lanceolate-linear, to 4 × 1.1 cm, abaxially brown pubescent, adaxially whitish pilosulous when young, crenate-pinnatifid, dentate. Inflorescences capitate to short racemose; bracts leaflike, densely brown glandular pubescent. Calyx 6–8 mm, tomentose, 5-lobed. Corolla yellow; tube slightly longer than calyx, glabrous or pubescent; galea densely yellow pubescent except for glabrous beak; lower lip deeply 3-parted to base. Filaments glabrous. Capsule to 1 cm × 5 mm. Fl. Jul–Aug, fr. Aug–Sep.

- Alpine meadows, *Picea* forests; 2900–5000 m. Gansu, Qinghai, N Sichuan.

- 1a. Corolla tube glabrous, lower lip glabrous 28a. var. *lasiophrys*
 1b. Corolla tube pubescent, lower lip ciliate 28b. var. *sinica*

28a. *Pedicularis lasiophrys* var. *lasiophrys*

毛须马先蒿(原变种) mao ke ma xian hao (yuan bian zhong)

Corolla tube glabrous; lower lip glabrous.

- Alpine meadows, *Picea* forests; 3700–5000 m. Gansu, Qinghai.

28b. *Pedicularis lasiophrys* var. *sinica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 564. 1888.

毛被毛须马先蒿 mao bei mao ke ma xian hao

Corolla tube pubescent; lower lip ciliate.

- Alpine meadows; ca. 2900 m. E Gansu, N Sichuan.

29. *Pedicularis cinerascens* Franchet, Bull. Soc. Bot. France 47: 30. 1900.

灰色马先蒿 hui se ma xian hao

Herbs perennial, 10–28 cm tall. Stems grayish brown pubescent, striate. Leaves short petiolate to sessile or ± clasping; leaf blade narrowly lanceolate, to 4.5 × 1 cm; leaves dense and small basally, abaxially glabrous, adaxially pubescent, crenate-pinnatifid to pinnatifid; segments double dentate. Inflorescences capitate to laxly racemose, to 14 cm, with more than 20 flowers; bracts ovate-oblong, densely tomentose. Calyx to 1 cm, pubescent, 5-lobed. Corolla whitish rose; tube ca. 1.2 cm, glabrous; galea glabrous except for long-bearded margin, with purple hairs; lower lip deeply 3-parted nearly to base. Filaments glabrous. Capsule ca. 1.3 cm × 5 mm. Fl. Jul, fr. Jul–Aug.

- Grassy slopes; 4000–4400 m. W Sichuan.

12. Ser. Kongboenses P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 245. 1995.

宫布系 gong bu xi

Herbs usually more than 30 cm to 1 m tall, drying black. Stems erect, stout. Leaves alternate, sessile, linear or linear-lanceolate, pinnatifid. Inflorescences spicate. Corolla small; tube slightly longer than calyx; galea very narrow, slightly curved, marginally pubescent; beak bent upward, relatively long, slender; lobes of lower lip narrowly lanceolate.

- Two species: endemic to China.

- 1a. Calyx 10–13 mm; corolla tube 11–15 mm; beak of galea 7–8 mm, bent upward 30. *P. kongboensis*
 1b. Calyx 8–10 mm; corolla tube ca. 9 mm; beak of galea shorter, bent slightly upward 31. *P. retingensis*

30. *Pedicularis kongboensis* P. C. Tsoong, Acta Phytotax. Sin. 3: 304. 1955.

宫布马先蒿 gong bu ma xian hao

Herbs perennial, pubescent. Stems 30–110 cm tall, branched or not. Leaves linear or linear-lanceolate, 3–12 cm × 2.5–13 mm; segments ca. 30 pairs, ovate,

margin double dentate. Inflorescences 10–50 cm, often interrupted basally, pubescent. Calyx 1–1.3 cm, pubescent; lobes 5, triangular, ± entire. Corolla tube 1.1–1.5 cm, glabrous; galea margin densely long pubescent; beak 7–8 mm; lower lip shorter than galea, 1–1.3 cm × ca. 8 mm, ciliate. Filaments 2 pubescent, 2 glabrous. Fl. Jul, fr. Aug.

• Grasslands at hilltops, open very steep hillsides; ca. 4100 m. SE Xizang.

1a. Calyx tube with conspicuous reticulate veins; lobes of lower corolla lip narrow 30a. var. *kongboensis*

1b. Calyx tube without conspicuous reticulate veins; lobes of lower corolla lip slightly wide and obtuse

..... 30b. var. *obtusata*

30a. *Pedicularis kongboensis* var. *kongboensis*

宫布马先蒿(原变种) gong bu ma xian hao (yuan bian zhong)

Calyx tube with conspicuous reticulate veins. Lobes of lower corolla lip narrow.

• Grasslands at hilltops, open very steep hillsides; ca. 4100 m. SE Xizang.

30b. *Pedicularis kongboensis* var. *obtusata* P. C. Tsoong, Acta Phytotax. Sin. 3: 305. 1955.

钝裂宫布马先蒿 dun lie gong bu ma xian hao
Calyx tube without conspicuous reticulate veins. Lobes of lower corolla lip slightly wide and obtuse.

• SE Xizang.

31. *Pedicularis retingensis* P. C. Tsoong, Acta Phytotax. Sin. 3: 305. 1955.

雷丁马先蒿 lei ding ma xian hao

Herbs perennial. Stems 30–80 cm tall, unbranched, hirsute. Leaves clasping, linear or linear-lanceolate, 5–8 cm × 5–8 mm, base truncate or cordate, subglabrous; segments ca. 30 pairs, triangular-ovate to ovate, margin incised-dentate. Inflorescences 10–30 cm; bracts leaflike, longer than flowers. Calyx 8–10 mm, glabrous; lobes 5, triangular or triangular-lanceolate, entire. Corolla tube ca. 9 mm, glabrous; galea margin densely long pubescent; lower lip shorter than galea, ca. 1 cm × 8 mm. Filaments 2 pubescent, 2 glabrous. Fl. Jul–Aug, fr. Aug–Sep.

• Dry stony hillsides, amidst boulder screes; ca. 4100 m. SC Xizang.

13. Ser. *Subsurrectae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 80. 1890.

亚举喙系 ya ju hui xi

Herbs tall, not drying black. Stems branched apically or unbranched. Stem leaves alternate, long petiolate, ovate-lanceolate, large, pinnatifid to pinnatisect; rachis winged; segments remote. Inflorescences long racemose, lax. Corolla small; galea inflated-convex, 3–4 × longer than lower lip, beak curved upward.

One species: China, N Myanmar.

32. *Pedicularis vialii* Franchet ex F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 219. 1890.

维氏马先蒿 wei shi ma xian hao

Stems to 80 cm tall, ascending, subglabrous. Leaf petiole 2–5 cm, slender, pilose; leaf blade lanceolate-oblong, to 10 × 6 cm, pilose, pinnatisect; segments lanceolate-oblong, dentate. Inflorescences elongating in fruit, to 30 cm, interrupted basally; bracts linear, distal ones shorter than calyx. Calyx 5–6 mm, glabrous; lobes

5, triangular, entire. Corolla whitish, with rose to purple galea, ca. 1 cm; beak of galea ca. 5 mm, slender, curved upward; lower lip ca. 5 mm, not spreading. Filaments glabrous. Capsule lanceolate, ca. 11 × 4.5 mm. Fl. May–Aug, fr. Jul–Sep.

Grassy slopes, coniferous forests; 2700–4300 m. W Sichuan, SE Xizang, NW Yunnan [N Myanmar].

14. Ser. *Excelsae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 523. 1888.

卓越系 zhuo yue xi

Herbs tall, not drying black. Stems branched. Leaves alternate, ± ovate, large, usually more than 3.5 cm wide, 3-pinnatifid to pinnatisect. Inflorescences long racemose. Calyx deeply cleft anteriorly. Corolla small; galea with a widened anther case, margin long bearded; beak semicircular, sinistrorse, slender.

• Two species: Bhutan, China, Nepal, Sikkim; one species in China.

33. *Pedicularis excelsa* J. D. Hooker, Fl. Brit. India 4: 311. 1884.

卓越马先蒿 zhuo yue ma xian hao

Herbs perennial, 0.9–1.6 m tall. Stems hollow, striate. Leaves withering early basally; petiole 2–6 cm; leaf blade ovate, to 16 × 10 cm, 3-pinnatifid to pinnatisect; segments ovate-lanceolate, margin incised-dentate, apex acute. Inflorescences 6–20 cm; bracts leaflike, ca. 9 mm, shorter than flowers. Pedicel short. Calyx ca. 5

mm; lobes 5, obtuse triangular, less than 1 mm, margin entire. Corolla tube slightly exceeding calyx; beak of galea ca. 1 cm; lower lip ca. 1.8 cm, ciliate. Filaments glabrous. Capsule ovoid-oblong, ca. 4 × as long as calyx, apex obtuse. Fl. Aug, fr. Aug–Sep.

Deep wet humus in shade of broad-leaved forests in lower temperate zone, swamps, dense *Rhododendron* and *Abies* forests; 3200–3600 m. S Xizang [Bhutan, C Nepal, Sikkim].

15. Ser. *Kialenses* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 9. 1949.

甲拉系 *jia la xi*

Herbs medium sized, less than 30 cm tall. Stems often many together, erect, unbranched. Leaves alternate, mostly basal, long petiolate, linear to lanceolate or lanceolate-ovate, pinnatifid to pinnatisect. Inflorescences racemose, lax. Calyx cylindrical; lobes 3 or 5, unequal. Corolla tube slightly longer than calyx; galea strongly twisted; beak S-shaped, longer than lower lip, slender; galea margin and beak long villous or glabrous; lobes of lower lip short and wide, ± square.

• Two species: endemic to China.

- 1a. Galea margin bearded; leaf blade pinnatisect; calyx ca. 8 mm, pubescent, 5-lobed 34. *P. kialensis*
- 1b. Galea margin not bearded; leaf blade pinnatifid; calyx ca. 11 mm, sparsely pubescent or subglabrous, 3-lobed 35. *P. streptorhyncha*

34. *Pedicularis kialensis* Franchet, Bull. Soc. Bot. France 47: 22. 1900.

甲拉马先蒿 *jia la ma xian hao*

Herbs perennial, to 20 cm tall. Roots slender. Stems often many together, slightly pubescent. Leaves alternate; petiole to 6 cm; leaf blade lanceolate, 14–20 cm, pinnatisect; segments 8–16 pairs, ovate-lanceolate to lanceolate, incised-dentate. Inflorescences interrupted, pubescent; bracts leaflike. Pedicel to 3 mm. Calyx cylindrical, ca. 8 mm, deeply cleft anteriorly, pubescent, 5-lobed. Corolla red; tube slightly longer than calyx, glabrous; galea purple, margin bearded; beak bent upward apically, ca. 1 cm; lower lip ciliate. Filaments 2 pubescent, 2 glabrous. Capsule triangular-lanceolate, ca. 1.5 cm. Fl. Jun–Jul, fr. Sep.

• Banks, forests; 3000–4900 m. S Sichuan.

35. *Pedicularis streptorhyncha* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 397. 1963.

扭喙马先蒿 *niu hui ma xian hao*

Herbs perennial, 15–30 cm tall, drying black. Rootstock to 30 cm, ± fleshy. Stems 1 to several and clustered, slightly pubescent. Basal leaf petiole to 5.5 cm; leaf blade linear-lanceolate, 2.5–18 × 0.3–2 cm, pinnatilobate; segments 9–28 pairs, triangular-ovate, glabrous except adaxially hispidulous along midvein, margin double dentate. Stem leaves few or absent. Inflorescences to 20 cm; bracts leaflike. Calyx cylindrical, ca. 1.1 cm, sparsely pubescent or subglabrous, deeply cleft anteriorly, 3-lobed; posterior lobe smaller, subulate, entire, others larger and serrate. Corolla tube 1.3–1.5 cm, subglabrous; galea margin glabrous; beak to 1.7 cm; lower lip to 1.8 × 2.3 cm. Filaments 2 pubescent, 2 glabrous. Capsule triangular-lanceolate, to 2 cm. Fl. Jul–Aug. fr. Aug.

• Alpine *Quercus* scrubs, mossy *Rhododendron* scrubs; 3900–4000 m. NW Sichuan.

16. Ser. *Striatae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 81. 1877.

红纹系 *hong wen xi*

Herbs low or tall, drying black or slightly black. Stems erect or ascending, unbranched above. Leaves alternate; basal leaves often numerous, but withering early. Inflorescences racemose or spicate. Flowers medium sized. Corolla tube ± straight; galea 2-toothed near apex, beakless; lower lip erect or slightly spreading.

Four species: North America, NE Asia; two species in China.

- 1a. Inflorescences dense, long; bracts small, ± entire; calyx lobes ovate-triangular, ± entire; corolla yellow with reddish purple stripes 36. *P. striata*
- 1b. Inflorescences lax, shorter; bracts longer, leaflike; calyx lobes leaflike; corolla yellow, not reddish purple striped 37. *P. mandshurica*

36. *Pedicularis striata* Pallas, Reise Russ. Reich. 3: 737. 1776.

红纹马先蒿 *hong wen ma xian hao*

Herbs perennial, to 1 m tall. Roots stout. Stems erect, branched basally or unbranched, becoming woody when old, initially tomentose, glabrescent. Basal leaves in a rosette; stem leaves many; petiole 1–10 cm; leaf blade lanceolate, to 10 × 3–4 cm, pinnatifid to

pinnatisect; segments linear, serrulate. Inflorescences dense, spicate, 6–22 cm; rachis densely pubescent; bracts shorter than flowers, glabrous or ciliate, ± entire. Calyx 1–1.3 cm, sparsely pubescent; lobes 5, unequal, ovate-triangular, ± entire. Corolla yellow with reddish purple stripes, 2.5–3.3 cm; galea falcate, with a distinct tooth on one side of margin; lower lip slightly shorter than galea. Filaments 2 pubescent, 2 glabrous. Capsule

ovoid, 0.9–1.6 cm × 3–6 mm, apex mucronulate. Fl. Jun–Jul, fr. Jul–Aug.

Grassy slopes, *Betula* forests, meadows; 1300–2700 m. S Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [Mongolia, Russia (Siberia, Far East)].

- 1a. Rachis of inflorescences, bracts, and calyx not arachnoid-lanate 36a. subsp. *striata*
- 1b. Rachis of inflorescences, bracts, and calyx arachnoid-lanate 36b. subsp. *arachnoidea*

36a. *Pedicularis striata* subsp. *striata*

红纹马先蒿(原亚种) hong wen ma xian hao (yuan ya zhong)

Rachis of inflorescences, bracts, and calyx not arachnoid-lanate.

Grassy slopes, *Betula* forests, meadows; 300–2700 m. Hebei, Liaoning, Ningxia, Shaanxi, Shanxi [Mongolia, Russia (Siberia, Far East)].

36b. *Pedicularis striata* subsp. *arachnoidea* (Franchet) P. C.

Tsoong, Fl. Reipubl. Popularis Sin. 68: 65. 1963.

蛛丝红纹马先蒿 zhu si hong wen ma xian hao

Pedicularis striata var. *arachnoidea* Franchet, Nouv.

Arch. Mus. Hist. Nat., Sér. 2, 6: 106. 1883; *P. striata*

var. *poliocalyx* Diels.

Rachis of inflorescences, bracts, and calyx arachnoid-lanate.

• S Gansu, Nei Mongol, W Ningxia.

37. *Pedicularis mandshurica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 79. 1877.

鸡冠子花马先蒿 ji guan zi hua ma xian hao

Herbs perennial, 25–35 cm, drying black. Roots fleshy. Stems erect or ascending, hollow, unbranched, sparsely pubescent, glabrescent when old. Basal leaves numerous; petiole to 6.5 cm; leaf blade ovate-lanceolate to lanceolate, ca. 12 × 2.5–3.5 cm, pinnatipartite to pinnatisect; segments linear-lanceolate, margin double dentate to pinnatipartite or dentate. Inflorescences racemose, lax; rachis densely pubescent; bracts leaflike, white tomentose, proximal ones much longer than flowers. Calyx 1.1–1.5 cm, initially tomentose, later glabrescent; lobes 5, leaflike, unequal. Corolla yellow, 2.2–3 cm; galea falcate, beaklike apically, 2-toothed and inconspicuously denticulate; lower lip ca. as long as galea, ciliate. Filaments 2 pubescent, 2 glabrous. Capsule cylindric-lanceolate, 1.2–1.8 cm. Fl. May–Jul, fr. Jul–Aug.

Dry grassy slopes, moist places; ca. 1000 m. Hebei, C and SE Liaoning [Korea].

17. Ser. Proboscideae Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 65. 1877.

鼻喙系 bi hui xi

Herbs tall, not drying black. Stems erect, unbranched. Leaves alternate, ± lanceolate, pectinate-pinnatisect; segments linear-lanceolate. Inflorescences long. Calyx lobes short, entire. Corolla tube less than 2 × as long as calyx; galea ± navicular, margin bearded or not; beak short.

Two species: China, Kazakstan, Mongolia, Russia (W Siberia); one species in China.

38. *Pedicularis proboscidea* Steven, Mém. Soc. Imp. Naturalistes Moscou 6: 33. 1823.

鼻喙马先蒿 bi hui ma xian hao

Herbs perennial, 45–80 cm, glabrous except for arachnoid-lanate rachis and bracts of inflorescences.

Roots short, fibrous. Stems erect, stout. Basal leaves long petiolate, lanceolate, longer than petiole, pinnatisect; segments linear-lanceolate, pinnatipartite, serrulate. Inflorescences to 20 cm, dense; bracts linear.

Calyx ovate, 5–6 mm, deeply cleft anteriorly; lobes 5, triangular-lanceolate. Corolla yellow, 1.6–1.7 cm; galea margin long bearded; beak straight; lower lip ca. 9 mm × 1.5 cm. 2 filaments glabrous, 2 pubescent. Capsule obliquely ovoid, 9–10 mm. Fl. Jun–Jul, fr. Jul–Aug. 2n = 16.

Alpine and subalpine meadows. Xinjiang [Kazakstan, Mongolia, Russia (W Siberia)].

18. Ser. Lachnoglossae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 81. 1890.

绒舌系 rong she xi

Herbs drying black. Stems erect, unbranched. Leaves mostly basal, pinnatisect with lanceolate segments; stem leaves few, alternate, pinnatisect, segments linear. Inflorescences elongated, ± lax basally. Corolla tube less than 2 × as long as calyx; galea pubescent abaxially and at margin; beak well developed, straight, nearly as long as lower lip, slender, with a tuft of hairs at apex.

One species: Bhutan, China, E Nepal, Sikkim.

39. *Pedicularis lachnoglossa* J. D. Hooker, Fl. Brit. India 4: 311. 1884.

绒舌马先蒿 rong she ma xian hao

Pedicularis lachnoglossa var. *macrantha* Bonati; *P. macrantha* (Bonati) H. Léveillé.

Herbs perennial, 20–50 cm tall. Stems usually 2–5, sometimes to 8, brown pubescent, base with petiolar remnants from preceding years. Leaves clustered at base; petiole 3.5–8 cm; leaf blade lanceolate-linear, to 16 × 1–2.6 cm, pinnatisect; segments 20–40 pairs, lanceolate, pinnatipartite or double dentate. Inflorescences racemose, to 20 cm, usually interrupted;

bracts linear, shorter than flowers. Pedicel short. Calyx cylindrical-oblong, ca. 1 cm, cleft more deeply anteriorly; lobes 5, ± entire. Corolla purple-rose, ca. 1.6 cm; galea densely red-brown pubescent abaxially and at margin; beak ca. 4 mm; lower lip densely red-brown ciliate.

Filaments glabrous. Capsule long ovoid, to 1.4 cm × 6 mm. Fl. Jun–Jul, fr. Aug.

Alpine meadows, *Abies* forests, among small shrubs on hillsides; 2500–5400 m. W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, E Nepal, Sikkim].

19. Ser. *Recurvae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 9. 1949.

反曲系 fan qu xi

Herbs medium sized, not drying black. Stems erect or ascending, unbranched. Leaves alternate, long petiolate basally; leaf blades lanceolate-oblong. Inflorescences racemose or spicate. Calyx lobes entire, triangular, ciliate. Corolla red to purple-red; tube barely exceeding calyx; galea strongly bent or falcate, densely villous at base and at margin; beak well developed, bent upward, long; lower lip narrow.

• Three species: endemic to China.

1a. Leaves glabrous; distal bracts linear-lanceolate; calyx ca. 2.5 mm 40. *P. recurva*

1b. Leaves densely pubescent abaxially; distal bracts ovate; calyx 3–6 mm.

2a. Leaf petiole ca. 8 cm; leaf blade 2–7 × ca. 3 cm; calyx ca. 3 mm; lobes of lower corolla lip obtuse at apex

..... 41. *P. kangtingensis*

2b. Leaf petiole ca. 12 cm; leaf blade to 13 × 5.5 cm; calyx ca. 6 mm; lobes of lower corolla lip acute at apex

..... 42. *P. angustilabris*

40. *Pedicularis recurva* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 563. 1888.

反曲马先蒿 fan qu ma xian hao

Herbs perennial. Roots clustered, fibrous. Stems ascending, 38–80 cm tall, glabrous and purple tinted basally. Basal leaves withering early. Stem leaves alternate; petiole to 5 cm, distal ones shorter; leaf blade oblong-lanceolate, 3.5–8 × ca. 3 cm, glabrous, pinnatisect; segments 9–11 pairs, ovate to lanceolate, lobulate or double dentate. Inflorescences 5–27 cm, lax; bracts linear-lanceolate, ciliate. Calyx ca. 2.5 × 2 mm, slightly cleft anteriorly; lobes 5, triangular, ± equal, densely ciliate, entire. Corolla pale red; tube ca. 3.5 mm, exceeding calyx; galea strongly bent, apex with several dark purple spots; lobes of lower lip unequal, apex ± acute. Capsule ovoid, ca. 9 × 6.5 mm. Fl. Aug, fr. Aug–Sep.

• Boulders, rock walls; 3300–3400 m. SW Gansu, W Sichuan.

41. *Pedicularis kangtingensis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 398. 1963.

康定马先蒿 kang ding ma xian hao

Herbs perennial, 19–39 cm tall. Stems single or sometimes several together, erect, straw colored, tinted with purple to dark purple, glabrous basally. Petiole to 8 cm basally; leaf blade lanceolate-oblong, 2–7 × ca. 3 cm, abaxially densely pale yellow pubescent, pinnatipartite to pinnatisect; segments pinnatipartite or

incised-dentate. Inflorescences racemose, 5.5–11 cm, lax; bracts becoming narrowly ovate upward, margin white villous. Calyx purple-red, ca. 3 mm; lobes 5, triangular, ciliate, entire. Corolla purple-red; tube ca. 3 mm; galea strongly bent, apex with several dark purple spots; lobes of lower lip obtuse at apex. Fl. Jul–Aug, fr. Sep.

• Alpine meadows; ca. 3600 m. W Sichuan.

42. *Pedicularis angustilabris* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 82. 1949.

狭唇马先蒿 xia chun ma xian hao

Herbs perennial, 60–70 cm tall. Stems usually several together, glabrous basally. Leaves alternate; petiole ca. 12 cm, distal ones shorter, glabrous; leaf blade oblong to oblong-lanceolate, to 13 × 5.5 cm, abaxially densely pubescent, apex acute, pinnatisect; segments 15–18 pairs, linear-lanceolate to oblong-lanceolate, pinnatifid, dentate. Inflorescences spicate, to 18 cm, ± lax, many flowered; bracts ca. 6 mm, ovate, apex acute. Calyx cylindrical-ovate, ca. 6 mm, slightly cleft anteriorly; lobes 5, triangular, ± equal, densely ciliate. Corolla purple-red, ca. 1.5 cm; tube barely exceeding calyx, glabrous; galea strongly bent, apex with several dark purple spots; lobes of lower lip acute at apex. Fl. Jul, fr. Aug–Sep.

• Alpine meadows; 3000–4000 m. W Sichuan, NW Yunnan.

20. Ser. *Hirtellae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 89. 1890.

粗毛系 cu mao xi

Herbs reddish or reddish brown hirtellous, drying black. Stems single, unbranched. Basal leaves persistent; stem leaves alternate, short petiolate, less than 12 cm, pinnatifid. Inflorescences spicate. Corolla tube straight, erect; galea pubescent abaxially, 2-toothed at apex; lower lip not spreading.

• One species: endemic to China.

43. *Pedicularis hirtella* Franchet ex F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 209. 1890.

粗毛马先蒿 cu mao ma xian hao

Herbs biennial, 20–50 cm tall, reddish brown hirtellous, sometimes glandular pubescent. Stems erect, rigid, unbranched, with 1 or 2 lines of dense glandular hairs. Basal leaves large; petiole 4–10 mm; leaf blade ovate-oblong to lanceolate-oblong, to 5 × 2–2.5 cm, abaxially densely long pubescent along veins, adaxially long pubescent; segments 9–15 pairs, ovate to ovate-lanceolate, dentate. Stem leaves smaller than basal

leaves, ± sessile. Inflorescences spicate, 7–14 cm, often interrupted basally; bracts leaflike. Calyx cylindric, ca. 1 cm, glandular pubescent; lobes 5, linear-oblong, ± equal. Corolla white to rose, to 3 cm, glandular pubescent; tube ca. 2 × as long as calyx; galea ca. 1–1.1 cm, falcate, distinctly subulate-dentate at apex; lower lip shorter than galea, lobes rounded, ± equal, ciliate. Filaments glabrous. Fl. Aug–Sep, fr. Sep–Oct.

• Open stony pastures, thickets; 2800–3700 m. NW Yunnan.

21. Ser. *Salviiflorae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 97. 1890.

丹参花系 dan shen hua xi

Herbs tall. Roots glabrous. Stems many branched; branches and leaves opposite. Leaves ± ovate, pinnatifid to pinnatisect. Inflorescences racemose, lax. Corolla 3–3.5 cm; galea falcate or slightly falcate, beakless, toothless; lower lip ca. as long as galea.

• One species: endemic to China.

44. *Pedicularis salviiflora* Franchet ex F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 215. 1890.

丹参花马先蒿 dan shen hua ma xian hao

Herbs perennial, to 1.3 m tall, not drying black. Stems erect, often woody basally; branches spreading, slender, often somewhat repent, pubescent. Petiole to 1.5 cm; leaf blade ovate to oblong-lanceolate, to 7 × 3.5 cm, densely pubescent, pinnatifid to pinnatisect; segments 10–14 pairs, ovate-lanceolate to oblong, serrate. Inflorescences to 25 cm. Pedicel slender, pubescent. Calyx 1–1.5 cm, cleft anteriorly to 2/5 length, densely glandular pubescent; lobes 5, ± equal, serrate. Corolla rose to red, 3.3–5 cm, sparsely pubescent; tube 1.4–2.4 cm; galea ca. as long as lower lip, falcate, villous near apex; lower lip 1.5–2 cm, lobes rounded. Filaments glabrous. Capsule ovoid, 1.2–1.5

cm, densely pubescent or glabrous, apiculate. Fl. Aug–Sep, fr. Oct–Nov.

• Grassy slopes, forests; 2000–3900 m. Sichuan, NW Yunnan.

1a. Capsule densely pubescent 44a. var. *salviiflora*

1b. Capsule glabrous 44b. var. *leiocarpa*

44a. *Pedicularis salviiflora* var. *salviiflora*

丹参花马先蒿(原变种) dan shen hua ma xian hao (yuan bian zhong)

Capsule densely pubescent.

• Grassy slopes, forests; 2000–3900 m. W Sichuan, NW Yunnan.

44b. *Pedicularis salviiflora* var. *leiocarpa* H. P. Yang, Acta Phytotax. Sin. 28: 136. 1990.

滑果丹参马先蒿 hua guo dan shen ma xian hao

Capsule glabrous.

• *Picea asperata* forests, slopes; ca. 3300 m. Sichuan.

22. Ser. *Melampyriflorae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 86. 1890.

山萝花系 shan luo hua xi

Herbs annual, robust. Stems rigid, erect, usually branched apically. Leaves whorled, pinnatisect. Inflorescences racemose. Calyx lobes 5, ± leaflike, serrate. Corolla tube slightly curved; galea with a very short beak at apex and 1 tooth on each side of margin.

• Three species: endemic to China.

1a. Corolla 2.1–2.6 cm; middle lobe of lower lip ovate 45. *P. floribunda*

1b. Corolla to 2.1 cm; middle lobe of lower lip rounded.

2a. Galea slightly bowed, ca. as long as tube, crested; corolla 1.8–2.1 cm; lower lip 9–11.5 mm wide;

filaments 2 pubescent 46. *P. pseudomelampyriflora*

2b. Galea straight, ca. 1/2 as long as tube, not crested; corolla ca. 1.6 cm; lower lip barely 7.5 mm wide; filaments glabrous 47. *P. melampyriflora*

45. *Pedicularis floribunda* Franchet, Bull. Soc. Bot. France 47: 31. 1900.

多花马先蒿 *duo hua ma xian hao*

Herbs annual, to 50–70 cm tall, not drying black. Stems branched apically, with 3 or 4 lines of hairs. Leaves in whorls of 3–6; petiole to 1.2 cm; leaf blade lanceolate-oblong, 2–5 × 0.8–1.5 cm, sparsely pubescent, pinnatisect; segments 10–18 pairs, ovate to lanceolate, pinnatipartite, incised-dentate. Inflorescences to 20 cm, lax; bracts leaflike. Pedicel 4–5 mm. Calyx 4.5–6.5 mm, densely villous along 5 veins; lobes 5, unequal, serrate. Corolla rose, 2.1–2.6 cm; tube 1.1–1.5 cm, ± straight in calyx; galea falcate, crested; lower lip 1.2–1.4 × 0.9–1.15 cm, middle lobe ovate, projecting. Filaments pubescent. Fl. Jul, fr. Aug–Sep.

• Rocky slopes; 2300–2700 m. W Sichuan.

46. *Pedicularis pseudomelampyriflora* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 155. 1926.

假山萝花马先蒿 *jia shan luo hua ma xian hao*

Herbs annual, to more than 60 cm tall, drying black. Stems single, ± woody when old, many branched apically; branches in whorls of 3 or 4, slender, with lines of hairs. Leaves in whorls of 3–6; petiole short; leaf blade ovate-oblong to lanceolate-oblong, 2.5–4.5 × ca. 1.5 cm, abaxially pubescent along midvein, pinnatipartite to pinnatisect; segments linear, serrate. Inflorescences with flowers in whorls in ± interrupted racemes; bracts leaflike, shorter than flowers, densely white villous. Pedicel short. Calyx ca. 4 mm, sparsely

villous; lobes 5, unequal, serrate. Corolla rose, 1.8–2.1 cm; tube nearly as long as galea, strongly curved in calyx; galea falcate, ca. as long as tube, crested; lower lip 0.9–1.2 × 0.9–1.2 cm, middle lobe rounded. Filaments 2 pubescent, 2 glabrous. Fl. Jun–Aug, fr. Sep–Oct.

• Open moist areas, thicket margins; 3000–3800 m. NW Sichuan, SE Xizang, NW Yunnan.

47. *Pedicularis melampyriflora* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 603. 1888.

山萝花马先蒿 *shan luo hua ma xian hao*

Herbs annual, to 1 m tall, drying black. Stems woody when old, many branched; branches in whorls of 3–6, with lines of hairs. Leaves in whorls of 3–6; petiole to 1.2 cm; leaf blade lanceolate-oblong, to 8 cm, pinnatisect; segments 7–11 pairs, lanceolate to narrowly lanceolate, abaxially subglabrous, adaxially sparsely pubescent, pinnatipartite or incised-double dentate. Inflorescences to 20 cm, lax, interrupted; bracts leaflike, longer than flowers or distal ones ca. as long as flowers. Pedicel ca. 3 mm. Calyx ca. 6 mm; lobes 5, unequal, pubescent. Corolla rose to purple, barely 1.6 cm; tube ca. 1 cm, strongly curved in calyx; galea straight, ca. 1/2 as long as tube, not crested; lower lip ca. 6 × 7.5 mm, middle lobe rounded. Filaments glabrous. Fl. Jul–Aug, fr. Sep–Oct.

• Slopes, open forests; 2700–3600 m. SW Sichuan, NW Yunnan.

23. Ser. *Longicaules* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 85. 1890.

长茎系 *chang jing xi*

Stems soft, long, ± diffuse, branches many, long, curved, whorled. Stem leaves in whorls of 3 or 4, pinnatisect or pinnatipartite. Flowers axillary or racemose. Calyx lobes 5, dentate. Corolla small; tube decurved in throat of calyx tube; galea beak distinct, shorter than anther-containing part of galea; middle lobe of lower lip smaller than lateral lobes, apex hoodlike, acute or acuminate.

• Two species: endemic to China.

1a. Corolla yellow, ca. 1.5 cm; beak of galea short, scarcely 1.5 mm 48. *P. dielsiana*

1b. Corolla purple-red, 1.8–2.2 cm; beak of galea 2.5–3.5 mm 49. *P. longicaulis*

48. *Pedicularis dielsiana* Bonati, Bull. Soc. Bot. France 54: 186. 1907.

第氏马先蒿 *di shi ma xian hao*

Herbs annual, to 90 cm tall, not drying black. Stems single, purplish black, rigid; branches in whorls of 4, slender, with 4 lines of hairs. Leaves often in whorls of 4; petiole ca. 5 mm; leaf blade oblong to ovate-oblong, 2–3.5 × 1–1.5 cm, abaxially subglabrous, adaxially sparsely pubescent, pinnatisect to pinnatipartite; segments linear to oblong, incised-double dentate. Pedicel short. Calyx 7–8 mm, glabrous; lobes 5,

unequal, posterior lobe triangular and ± entire; lateral lobes larger, ovate, serrate. Corolla yellow, ca. 1.5 cm; tube slightly longer than galea; galea falcate apically; beak 1–1.5 mm; lower lip ca. as long as galea, apex of middle lobe acuminate. Filaments glabrous. Fl. Aug, fr. Sep–Oct.

• Meadows, grassy slopes; 2000–2500 m. W Hubei, C Sichuan.

49. *Pedicularis longicaulis* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 577. 1888.

长茎马先蒿 *chang jing ma xian hao*

Herbs annual or perennial, to more than 1 m tall, drying black. Stems hollow, striate, with lines of hairs; branches in whorls of 3 or 4, soft, curved. Leaves opposite or in whorls of usually 3 or 4; petiole short, villous; leaf blade oblong-lanceolate, 2–4 × 1–2 cm, adaxially glandular pubescent, pinnatifid to pinnatisect; segments 10–14 pairs, linear, incised-double dentate, teeth callose. Inflorescences long racemose, terminal, to 20 cm, interrupted; bracts

leaflike. Pedicel short. Calyx 8–9 mm, villous; lobes 5, unequal, serrate. Corolla purple-red, 1.8–2.2 cm; tube ca. 7 mm, slightly curved in calyx; galea strongly bent at apex; beak straight, 2.5–3.5 mm; lower lip longer than galea, to 1.1–1.2 × ca. 1 cm, middle lobe lanceolate, apex acute. Filaments glabrous. Fl. Aug–Sep, fr. Sep–Oct.

- 3700–3900 m. N Yunnan.

24. Ser. Graciles Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 52. 1877, not Prain (1890).

纤细系 xian xi xi

Stems often rigid, woody; branches often in whorls of 4–6 and rigid. Leaves whorled or sometimes opposite. Calyx lobes 5, ovate. Corolla small; beak slightly falcate, slender. Capsule ca. 1/2 exceeding calyx or enclosed in accrescent calyx.

Five species: Afghanistan, Bhutan, China, India (Himachal Pradesh), Kashmir, Nepal, Pakistan, Sikkim; two species in China.

- 1a. Calyx ca. 3 mm; corolla tube ca. 6 mm, galea crested, middle lobe of lower lip hoodlike 50. *P. ramosissima*
- 1b. Calyx 5–7 mm; corolla tube 7–8 mm, galea not crested, middle lobe of lower lip not hoodlike 51. *P. gracilis*

50. Pedicularis ramosissima Bonati, Bull. Soc. Bot. France 55: 246. 1908.

多枝马先蒿 duo zhi ma xian hao

Herbs annual, to 50 cm tall, mostly branched; branches slender, opposite basally, in whorls of 3 apically. Leaf blade oblong-lanceolate, glabrous, pinnatisect; segments pinnatifid, margin double dentate. Flowers opposite or in whorls of 3, interrupted; bracts leaflike. Calyx ca. 3 mm, rounded, membranous; lobes 5, unequal. Corolla purple; tube ca. 6 mm; galea ± falcate, crested; beak bent downward, slightly bowed, ca. 4 mm; lower lip ca. 6 × 8 mm, middle lobe smaller than lateral lobes, ligulate, apex hoodlike. Filaments glabrous. Capsule enclosed by accrescent calyx, compressed, ovoid, ca. 9 × 6.5 mm, apex acuminate. Seeds ca. 2.2 mm. Fl. Aug.

- SW Sichuan.

51. Pedicularis gracilis Wallich ex Benth, Scroph. Ind. 52. 1835.

纤细马先蒿 xian xi ma xian hao

Herbs annual, more than 1 m tall, drying black. Stems with 3 or 4 lines of hairs, many branched; branches in whorls of 4–6. Basal leaves withering early; stem leaves in whorls of 3 or 4, ± sessile; leaf blade ovate-oblong, 2.5–3.5 × 1–1.5 cm, abaxially glabrescent, adaxially pubescent along midvein, pinnatisect; segments 6–9 pairs, oblong, incised-dentate. Inflorescences racemose, interrupted; bracts leaflike. Calyx cylindrical, 5–7 × 1–2 mm, pubescent along midvein; lobes 5, entire or serrate. Corolla purplish pink, 1.2–1.5 cm; tube straight, 7–8 mm; galea bent at a right angle apically, not crested; beak 4–5.5 mm; lower lip 7–10 mm wide, glabrous, middle lobe not hoodlike.

25. Ser. Coniferae Maximowicz ex F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 207. 1890.

结球系 jie qiu xi

Filaments glabrous. Capsule broadly ovoid, apiculate. Fl. Aug–Sep, fr. Sep–Oct. 2n = 16.

Alpine meadows on mountain slopes, grassy slopes; 2000–4000 m. W Sichuan, S Xizang, NW Yunnan [Afghanistan, Bhutan, India, Nepal, Pakistan, Sikkim].

- 1a. Calyx lobes entire 51a. subsp. *gracilis*
- 1b. Calyx lobes serrate.
 - 2a. Capsule to 11 mm 51b. subsp. *macrocarpa*
 - 2b. Capsule barely 8 mm 51c. subsp. *sinensis*

51a. Pedicularis gracilis subsp. *gracilis* (Wallich) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 78. 1963.

纤细马先蒿(原亚种) xian xi ma xian hao (yuan ya zhong)

Calyx lobes entire. Fl. Aug.

Alpine meadows on mountain slopes; 2200–3800 m. S Xizang [Afghanistan, Bhutan, Nepal, Pakistan, Sikkim].

51b. Pedicularis gracilis subsp. *macrocarpa* (Prain) P. C. Tsoong, Acta Phytotax. Sin. 3: 307. 1955.

大果纤细马先蒿 da guo xian xi ma xian hao

Pedicularis gracilis var. *macrocarpa* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 138. 1890; *P. brunoniana* Wallich ex Pennell subsp. *typica* Pennell, nom. inval.

Calyx lobes serrate. Capsule to 1.1 cm. Fl. Jul–Aug. 3000–3300 m. S Xizang [India].

51c. Pedicularis gracilis subsp. *sinensis* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 79. 1963.

中国纤细马先蒿 zhong guo xian xi ma xian hao

Pedicularis gracilis var. *sinensis* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 279. 1948.

Calyx lobes serrate. Capsule barely 8 mm. Fl. Aug–Sep.

- Alpine meadows, grassy slopes; 2000–4000 m. W Sichuan, NW Yunnan.

Herbs tall. Stems branched apically; branches short, ascending; branches and leaves often in whorls of 3–5. Leaves small, pinnatisect. Inflorescences compact racemes. Flowers scarcely 6 mm. Corolla small; tube ca. as long as calyx; beak slender; middle lobe of lower lip hoodlike at apex.

• One species: endemic to China.

52. *Pedicularis conifera* Maximowicz ex F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 206. 1890.

结球马先蒿 *jie qiu ma xian hao*

Herbs annual, to more than 60 cm tall, drying black. Branches whorled, short, slender. Leaves in whorls of 4 or 5; petiole short; leaf blade ± oblong, ca. 2.5 × 1 cm, pinnatisect; segments more than 10 pairs, oblong-linear, pinnatilobate, incised-double dentate. Bracts linear. Calyx tubular, ca. 4.5 mm; lobes 5, ± equal, serrate,

glabrous. Corolla purple, ca. 6 mm, glabrous; tube erect, barely as long as calyx; galea bent at a right angle, prolonged into a beak apically; beak straight, ca. 5.5 mm, slender; lower lip ca. 3.5 × 3 mm, middle lobe smaller than lateral lobes, narrowly ovate. Filaments glabrous.

• W Hubei.

26. Ser. *Aloenses* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 147. 1949.

阿洛系 *a luo xi*

Herbs not or slightly drying black. Rhizomes absent; roots densely yellowish brown pubescent. Stems and branches slender. Branches and leaves opposite or occasionally alternate. Stem leaves ovate, rarely ovate-lanceolate. Calyx lobes 5, entire. Corolla less than 2 cm; galea ± straight to falcate, toothless, beakless; lower lip much shorter than to nearly as long as galea. Anthers acuminate.

Seven species: China, Myanmar, Sikkim; five species in China.

1a. Corolla tube more than 2 × as long as galea; stems strongly woody, densely pubescent 57. *P. petelotii*

1b. Corolla tube ca. as long as galea; stems herbaceous or becoming woody when old, striate, subglabrous.

2a. Corolla rose; lower lip nearly as long as galea 56. *P. legendrei*

2b. Corolla ± yellow; lower lip much shorter than galea.

3a. Corolla tube ca. 2 mm in diam.; filaments glabrous 55. *P. wardii*

3b. Corolla tube ca. 4 mm in diam.; filaments slightly pubescent.

4a. Leaves ca. 7 cm, segments 5–7 pairs; lower corolla lip 3–5 mm 53. *P. aurata*

4b. Leaves ca. 5 cm, segments 4 or 5 pairs; lower corolla lip ca. 2.5 mm 54. *P. aloensis*

53. *Pedicularis aurata* (Bonati) H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 152. 1949.

金黄马先蒿 *jin huang ma xian hao*

Phtheirospermum auratum Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 105. 1921.

Herbs perennial, to 30 cm tall, not drying black. Stems often branched apically, herbaceous, striate, glabrescent. Leaves opposite or occasionally alternate; petiole to 4 cm; leaf blade ovate to ovate-lanceolate, ca. 7 cm, glabrous, pinnatisect; segments 5–7 pairs, oblong-lanceolate to ovate, pinnatipartite, incised-dentate. Flowers axillary, scattered; bracts leaflike. Pedicel short. Calyx usually tinged with red, 3.5–4 mm; lobes 5, triangular. Corolla yellow, ca. 1.3 cm, nearly 2 × as long as calyx; tube ca. as long as galea, ca. 4 mm in diam.; galea ± straight or slightly falcate, apex entire; lower lip 3–5 mm, much shorter than galea, middle lobe obovate, apex emarginate. Filaments slightly pubescent. Capsule obliquely triangular-lanceolate, to 0.9–1.1 cm, short apiculate. Fl. Jul, fr. Jul–Aug.

• Bamboo thickets, *Pinus* forests; 3300–3900 m. SE Xizang, NW Yunnan.

54. *Pedicularis aloensis* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 60: 99. 1923.

阿洛马先蒿 *a luo ma xian hao*

Herbs perennial, 15–40 cm tall, not drying black. Root-stock stout, with thick stringy roots. Stems numerous, delicate, branched apically, glabrous or with 2 lines of hairs. Stem leaves opposite; petiole ca. as long as leaf blade, shorter apically; leaf blade triangular-ovate, to 5 cm, pinnatisect; segments 4 or 5 pairs, ovate-elliptic, pinnatipartite, margin double dentate. Flowers axillary, scattered; bracts leaflike. Pedicel ca. 2 mm. Calyx ca. 3.5 mm, sometimes sparsely pubescent; lobes 5, triangular, sparsely ciliate. Corolla yellow, 1.4–1.6 cm, sparsely pubescent apically; tube ca. as long as galea, ca. 4 mm in diam.; galea ± straight or slightly falcate, apex entire; lower lip ca. 2.5 mm, much shorter than galea, middle lobe rounded, apex entire. Filaments slightly pubescent. Capsule obliquely triangular-lanceolate, ca. 1 cm, short apiculate. Fl. Jul, fr. Jul–Aug.

• Bamboo thickets, forests; 3000–4000 m. NW Yunnan.

55. *Pedicularis wardii* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 133. 1921.

华氏马先蒿 *hua shi ma xian hao*

Herbs perennial. Stems numerous, ascending, 6–10 cm tall, ± branched apically, glabrous, ± woody basally. Leaves opposite; proximal petioles 1–2 cm, distal ones 5–10 mm; leaf blade ovate, glabrous or sparsely ciliate, pinnatisect; segments 5 or 6 pairs, ovate-oblong,

pinnatifid, incised-dentate. Flowers axillary, scattered; bracts linear. Pedicel 1–2 mm, glabrous. Calyx membranous, ca. 4 mm, slightly cleft anteriorly; lobes 5, lanceolate-linear, ca. 1 mm, ciliate. Corolla yellowish white; tube erect, much exceeding calyx, ca. 8 mm, ca. 2 mm in diam.; galea falcate, ca. as long as tube, apex entire, obtuse; lower lip 2–2.5 mm, much shorter than galea, ciliate, middle lobe rounded, apex emarginate. Filaments glabrous. Fl. Jul, fr. Aug.

• *Picea* forests; ca. 3000 m. SE Xizang, Yunnan.

56. *Pedicularis legendrei* Bonati, Bull. Soc. Bot. France 57 (Sess. Extraord.): 60. 1911.

勒氏马先蒿 *le shi ma xian hao*

Herbs annual to biennial, to more than 40 cm tall, ± drying black. Stems many branched, glabrous, slightly woody when old. Leaves opposite; petiole ca. 2.5 cm; leaf blade ovate-oblong, to 5.5 cm, abaxially glabrous, adaxially sparsely hispidulous, pinnatisect to pinnatipartite; segments 4–9 pairs, pinnatifid to double dentate, incised-dentate. Flowers axillary, scattered. Pedicel very short. Calyx 2.5–3 mm; lobes 5, very short, unequal. Corolla rose, ca. 1.7 cm; tube ca. 9 mm, expanded apically, glandular pubescent; galea 8.5–9 mm, slightly falcate, densely pubescent abaxially,

margin densely long pubescent near apex, apex entire; lower lip nearly as long as galea, long ciliate. Filaments 2 pubescent, 2 glabrous. Fl. Aug, fr. Sep.

• Open rocky slopes; ca. 2200 m. C and E Sichuan.

57. *Pedicularis petelotii* P. C. Tsoong, Acta Phytotax. Sin. 3: 308. 1955.

裴氏马先蒿 *pei shi ma xian hao*

Herbs annual, stout, drying black. Stems many branched, strongly woody, densely brown tomentose. Leaves opposite; petiole ca. 3 cm, sparsely long pubescent; leaf blade broadly ovate, ca. 3 × 3 cm, pinnatisect; segments 2–5 pairs, elliptic to oblong-lanceolate, pinnatisect, linear-oblong, pinnatilobate or incised-dentate. Flowers solitary in distal leaf axils. Pedicel ca. 3 mm. Calyx ca. 5.5 mm, distinctly cleft anteriorly; lobes 5, triangular, small. Corolla tube to 1.7 cm, more than 2 × as long as galea, glabrous; galea slightly falcate; lower lip ca. 6 mm, long ciliate. Filaments 2 pubescent, 2 glabrous. Capsule triangular-lanceolate, ca. 1 cm × 2.5 mm, apex acute. Fl. Jul, fr. Jul-Aug.

• About 1800 m. S Yunnan.

27. Ser. *Moupinenses* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 245. 1995.

穆坪系 *mu ping xi*

Stems herbaceous, erect, many branched; branches opposite or in whorls of 4, slender. Leaves lanceolate to oblong-lanceolate, pinnatipartite to pinnatisect. Inflorescences racemose. Calyx cleft anteriorly; lobes 5, triangular, often entire. Corolla purple; beak longer than anther-containing part of galea, bent upward, slender. Capsule 4/5 exceeding calyx.

• One species: endemic to China.

58. *Pedicularis moupinensis* Franchet, Nouv. Arch. Mus. Hist. Nat., Sér. 2, 10: 67. 1888.

穆坪马先蒿 *mu ping ma xian hao*

Herbs perennial, to 60 cm tall or more, drying black. Stems 1 to several, hollow, pubescent, shallowly striate; branches often in whorls of 4. Petiole of basal leaves to 9 cm, subglabrous; leaf blade to 12 × 5.5 cm, membranous; segments 8–20 pairs, ovate to linear-oblong, margin double dentate, apex acute. Stem leaves smaller than basal leaves, shorter petiolate or ± sessile,

lanceolate-elliptic. Inflorescences 6–16 cm, ± interrupted; bracts leaflike, longer than calyx. Calyx ca. 5.5 mm; lobes 5, narrowly triangular, often entire. Corolla purple; tube longer than calyx; galea bent at a right angle apically; beak ca. 7 mm; lower lip ca. 1.4 cm, ciliate. Filaments pubescent. Capsule ovoid-lanceolate, ca. 9 × 3.5 cm. Fl. Aug, fr. Aug–Sep.

• E Gansu, W Sichuan.

28. Ser. *Flexuosae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 73. 1890.

曲茎系 *qu jing xi*

Stems numerous, more than 40 cm tall, usually flexuous and ascending, branched basally or unbranched; branches and leaves opposite. Leaves ovate-lanceolate or oblong, pinnatipartite. Flowers axillary. Calyx 1/3 cleft anteriorly. Corolla tube more than 2 × as long as calyx; beak of galea robust.

About five species: Bhutan, China, Japan, C and E Nepal, Russia, Sikkim; one species in China.

59. *Pedicularis flexuosa* J. D. Hooker, Fl. Brit. India 4: 308. 1884.

曲茎马先蒿 *qu jing ma xian hao*

Herbs perennial, low or to 40 cm tall, pubescent. Stems flexuous, striate apically. Leaves opposite; petiole 1.5–6 cm, pubescent; leaf blade ovate-oblong, to 5 × 2.5 cm; segments 8–14 pairs, oblong, pinnatilobate to

pinnatisect, dentate, teeth callose. Flowers interrupted basally; bracts leaflike. Calyx cylindric-campanulate, 8–9 mm, villous; lobes 5, unequal, posterior one triangular and entire, lateral ones larger, serrate. Corolla tube 1.8–2.2 cm, pilose; galea falcate; beak bent downward, straight; lower lip ovate-rounded, middle lobe much smaller than lateral lobes. Filaments 2

pubescent, 2 glabrous. Capsule lanceolate, 0.9–1.2 cm, apex acute. Seeds ovoid. Fl. Jun–Aug, fr. Jul–Sep.

Forests, moist stream beds; 2800–4000 m. S Xizang [Bhutan, C and E Nepal, Sikkim].

29. Ser. *Acaules* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 91. 1890.

无茎系 wu jing xi

Herbs low, ± stemless. Leaves alternate; petiole long; lanceolate to oblong-lanceolate, pinnatisect. Flowers axillary; pedicel long. Corolla large; galea falcate, lacking marginal teeth, apex usually acute, beakless.

Three species: N Asia, Europe; one species in China.

60. *Pedicularis artselaeri* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 84. 1877.

埃氏马先蒿 ai shi ma xian hao

Herbs perennial, 3–6 cm tall, drying slightly black. Roots fleshy. Stems 1 to several together, delicate, enveloped in lanceolate to ovate, membranous scales and marcescent petioles, pubescent. Petiole 5.5–9 cm, delicate, diffuse, densely tomentose; leaf blade oblong-lanceolate, 7–10 × 2–2.5 cm, abaxially rust colored hispidulous along veins, adaxially sparsely long pubescent; segments 8–14 pairs, ovate, pinnatipartite, incised-dentate. Pedicel to 10 cm, slender, curved, villous. Calyx 1.2–1.8 cm; lobes 5, ± equal, leaflike. Corolla purple, 3–4 cm; tube erect, slightly longer than to 1.5 × as long as calyx; galea ca. 1.3 cm, apex acute or obtuse; lower lip slightly longer than galea, lobes rounded, ± equal. Filaments pubescent. Capsule completely enclosed by calyx, ovoid, ca. 1.3 cm. Fl. May, fr. Jul–Aug.

• Moist places, rocky slopes, forests; 1000–2800 m. Hebei, Hubei, Shaanxi, Shanxi, NE Sichuan.

1a. Apex of galea acute; lobes of lower corolla lip not sinuate; pedicel to 6.5 cm 60a. var. *artselaeri*

1b. Apex of galea obtuse; lobes of lower corolla lip sinuate; pedicel to 10 cm ... 60b. var. *wutaiensis*

60a. *Pedicularis artselaeri* var. *artselaeri*

埃氏马先蒿(原变种) ai shi ma xian hao (yuan bian zhong)

Pedicel to 6.5 cm. Apex of galea acute; lobes of lower corolla lip not sinuate.

• Moist places, rocky slopes, forests; 1000–2800 m. Hebei, Hubei, Shaanxi, Shanxi, NE Sichuan.

60b. *Pedicularis artselaeri* var. *wutaiensis* Hurusawa, J. Jap. Bot. 22: 71. 1948.

五台埃氏马先蒿 wu tai ai shi ma xian hao

Pedicel to 10 cm. Apex of galea obtuse; lobes of lower corolla lip sinuate.

• Shanxi.

30. Ser. *Vagantes* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 81. 1890.

蔓生系 man sheng xi

Stems numerous, prostrate, repent to climbing, long, slender, sometimes plants stemless. Basal leaves long petiolate, fernlike, very large, pinnatisect to pinnatipartite. Stem leaves often pseudo-opposite, small. Flowers axillary, often in clusters, at base of stem. Corolla tube less than 2 × as long as calyx; galea beaked.

• Two species: endemic to China.

1a. Stems prostrate, repent to climbing; leaf blade 15–30 cm; corolla ca. 2.5 cm 61. *P. vagans*

1b. Stems barely 1 cm tall, or stemless; leaf blade 10–14 cm; corolla ca. 4 cm 62. *P. daochengensis*

61. *Pedicularis vagans* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 218. 1890.

蔓生马先蒿 man sheng ma xian hao

Herbs perennial, drying black. Stems numerous, more than 40 cm, prostrate, repent to climbing, glabrous. Basal leaves fernlike; petiole to 25 cm; leaf blade oblong-lanceolate, 15–30 × 5–10 cm, pinnatisect to pinnatipartite; segments 10–17 pairs, linear-lanceolate to oblong, incised-dentate. Stem leaves alternate to ± opposite, ± ovate or ± orbicular, abaxially subglabrous, adaxially sparsely bristly; segments 2–5 pairs. Flowers often in dense clusters, axillary; bracts leaflike. Pedicel short. Calyx tubular, ca. 1.1 cm, glabrous, cleft more deeply anteriorly; lobes 5, unequal, serrate. Corolla pink, ca. 2.5 cm; tube erect, longer than calyx; galea falcate; beak conical, 3–4 mm; lower lip to 1.7 cm, spreading. Filaments subglabrous. Fl. Jul–Aug, fr. Sep–Oct.

• Forest understories, shaded wet paths, thickets; 900–2200 m. Sichuan.

62. *Pedicularis daochengensis* H. P. Yang, Bull. Bot. Res., Harbin 10(1): 29. 1990.

稻城马先蒿 dao cheng ma xian hao

Herbs perennial, ca. 15 cm tall, drying black. Stems usually 3–5 together, scarcely 1 cm, or plants stemless. Leaves nearly all basal, numerous; petiole 5–7 cm, sparsely villous; leaf blade oblong to lanceolate-oblong, 10–14 cm, abaxially white tomentose along veins, adaxially subglabrous, pinnatisect; segments 12–15 pairs, oblong, margin double dentate. Flowers nearly all basal. Pedicel 2–3 cm, slender. Calyx cylindrical, ca. 2 cm, cleft anteriorly to 1/3 of tube; lobes 5, distinctly unequal. Corolla pink, ca. 4 cm; tube ca. 2.2 cm, slightly expanded apically; galea slightly falcate; beak 2–3 mm, slender; lower lip ca. 1.8 × 2–2.5 cm, ciliate. Filaments glabrous. Capsule completely enclosed by

calyx, obliquely narrowly ovoid, ca. 2 cm, short mucronate. Fl. Jul, fr. Jul–Aug.

• *Abies fabri* forests, slopes; 3900–4200 m. Sichuan.

31. Ser. *Axillares* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 523. 1888.

腋花系 ye hua xi

Ser. *Filicifolia* Prain; ser. *Longipedes* Prain.

Herbs low. Stems very slender, often repent. Leaves ± opposite or alternate, pinnatisect. Flowers several, axillary, scattered, usually long pedicellate. Corolla tube from shorter than calyx to more than 2 × as long; beak straight.

• Seven species: endemic to China.

1a. Calyx deeply cleft anteriorly to or about middle.

2a. Calyx slightly less deeply cleft anteriorly; pedicel 0.8–1.5 cm; corolla tube longer than calyx; middle lobe

of lower corolla lip acute; filaments glabrous 68. *P. membranacea*

2b. Calyx distinctly deeply cleft anteriorly to about middle; pedicel ca. 2 cm; corolla tube shorter than calyx;

middle lobe of lower corolla lip rounded; filaments villous 69. *P. aquilina*

1b. Calyx not as deeply cleft anteriorly.

3a. Plants barely 10 cm tall, without repent stems; pedicel 1.5–6 cm 63. *P. longipedes*

3b. Plants more than 15 cm tall, often with repent stems; pedicel 0.5–2.5 cm.

4a. Plants drying black; leaf segments pinnatipartite to pinnatifid 64. *P. axillaris*

4b. Plants not drying black; leaf segments pinnatifid.

5a. Leaf segments 6–12 pairs, middle lobe of lower corolla lip hoodlike at apex 65. *P. laxiflora*

5b. Leaf segments 2–7 pairs; middle lobe of lower corolla lip not hoodlike at apex.

6a. Middle lobe of lower corolla lip acute at apex; filaments 2 pubescent 66. *P. nasturtiifolia*

6b. Middle lobe of lower corolla lip rounded at apex; filaments glabrous 67. *P. filicifolia*

63. *Pedicularis longipes* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 554. 1888.

长梗马先蒿 chang geng ma xian hao

Herbs perennial, low, barely 10 cm tall, ± stemless, delicate, not drying black. Stems 3–4 cm, leafy, occasionally few branched. Leaves alternate; petiole to 3–6 cm; leaf blade oblong to oblong-lanceolate, to 7 × 2.5 cm, pinnatisect; segments 4–9 pairs, oblong-lanceolate, pinnatisect, incised-dentate. Flowers few. Pedicel curved, 1.5–6 cm, slender. Calyx turbinate-campanulate, ca. 6.5 mm, slightly cleft anteriorly; lobes 5, lanceolate-linear, ± entire to obscurely dentate. Corolla rose, ca. 1.6 cm; tube more than 2 × as long as calyx; galea ca. 9 mm, ± bent at a right angle; beak straight, slender; lower lip ca. 1.1 × 1.4 cm, middle lobe rounded, smaller than lateral lobes, ciliate. Filaments glabrous. Fl. Jul–Aug, fr. Sep.

• Moist *Abies* forests; 3400–4100 m. NW and W Sichuan.

64. *Pedicularis axillaris* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 555. 1888.

腋花马先蒿 ye hua ma xian hao

Pedicularis heterophylla Bonati; *P. lacerata* Bonati. Herbs perennial, weak, often procumbent, drying black. Stems 2 or more together, usually branched basally; branches very slender, repent or ascending, sparsely pubescent. Leaves mostly opposite; petiole to 2.5 cm; leaf blade elliptic-lanceolate, to 8 × 3 cm, pinnatisect; segments 5–12 pairs, pinnatipartite to pinnatifid, incised-dentate. Pedicel erect at anthesis, later elongating to 2.5 cm, becoming curved. Calyx turbinate-cylindric, ca. 6 mm, slightly cleft anteriorly; lobes 5,

incised-dentate. Corolla purple or greenish white; tube erect, ca. 2 × as long as calyx, glabrous; galea bent at a right angle; beak bent slightly downward, slender; lower lip ca. 8 mm, ciliate. Filaments glabrous. Capsule compressed, ovoid, ca. 8 × 6.5 mm, apex acuminate. Fl. Jun–Aug, fr. Jul–Sep.

• Moist and open pastures, shaded damp places in forests and thickets, open rock crevices; 2700–4000 m. SW Sichuan, SE Xizang, NW Yunnan.

1a. Plants tall; petiole short; corolla purple

..... 64a. subsp. *axillaris*

1b. Plants smaller; petiole long; corolla

greenish

white 64b. subsp. *balfouriana*

64a. *Pedicularis axillaris* subsp. *axillaris*

腋花马先蒿(原亚种) ye hua ma xian hao (yuan ya zhong)

Plants tall. Petiole short. Corolla purple.

• Moist pastures, shaded damp places in forests and thickets, open rock crevices; 3000–4000 m. SW Sichuan, SE Xizang, NW Yunnan.

64b. *Pedicularis axillaris* subsp. *balfouriana* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 90. 1963.

巴氏腋花马先蒿 ba shi ye hua ma xian hao

Pedicularis balfouriana Bonati, Notes Roy. Bot. Gard. Edinburgh 5: 82. 1911; *P. axillaris* var. *balfouriana* (Bonati) H. L. Li.

Plants small. Petiole long. Corolla greenish white.

• Open pastures; 2700–3400 m. NW Yunnan.

65. *Pedicularis laxiflora* Franchet, Bull. Soc. Bot. France 47: 27. 1900.

疏花马先蒿 *shu hua ma xian hao*

Herbs perennial, not drying black. Stems few, ± flexuously ascending, unbranched, or sometimes with long repent branches. Leaves mostly alternate, glabrous; petiole to 2.8 cm; leaf blade oblong-lanceolate to oblong, to 10 × 2–3.5 cm, abaxially subglabrous, adaxially slightly pubescent along midvein, pinnatisect; segments 6–12 pairs, often pinnatipartite, ovate-oblong to ovate-lanceolate, incised-dentate. Pedicel 1–1.5 cm. Calyx tube 4–4.5 mm, slightly cleft anteriorly; lobes 5, unequal, serrate. Corolla pink; tube ca. 8 mm; galea strongly curved, scarcely 5 mm; beak bent slightly downward, ca. 3 mm, slender; lower lip to 1.3 cm, nearly 2 × as long as galea, middle lobe broadly ovate, apex hoodlike. Filaments 2 pubescent, 2 glabrous. Capsule ovoid, compressed, mucronate. Fl. Jun–Jul, fr. Jul–Aug.

• Moist places; 2500–3300 m. E Sichuan.

66. *Pedicularis nasturtiifolia* Franchet, Bull. Soc. Bot. France 47: 28. 1900.

焊菜叶马先蒿 *han cai ye ma xian hao*

Herbs perennial, not drying black. Stems usually single, dichotomously branched or unbranched, weak, repent, subglabrous. Leaves ± opposite; petiole 1–5 cm, slightly long pubescent; leaf blade ovate to oblong, to 9 × 3–5 cm, membranous, abaxially subglabrous, adaxially slightly hirtellous, pinnatisect; segments 2–7 pairs, broadly ovate, ± pinnatifid, margin double dentate. Pedicel slender, 8–20 cm, subglabrous. Calyx cylindrical-obconical, ca. 7 mm, slightly cleft anteriorly; lobes 5, slightly unequal, leaflike, glabrous apically, sparsely white villous along midvein at base. Corolla rose; tube less than 2 × as long as calyx, ca. 1.2 cm; lower lip large, slightly ciliate, middle lobe narrowly ovate, apex acute. Filaments 2 pubescent, 2 glabrous. Fl. Jun–Jul, fr. Jul–Aug.

• Moist places, forests; ca. 2000 m. W Hubei, Shaanxi, E Sichuan.

67. *Pedicularis filicifolia* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 208. 1890.

羊齿叶马先蒿 *yang chi ye ma xian hao*

Herbs perennial, not drying black. Stems several together, to 50 cm, weak, repent, ± woody at base with age, internodes to 4–7 cm, with 2 lines of hairs. Leaves nearly all opposite; petiole to 3.5 cm, glabrous; leaf blade elliptic, 4–5 × 2.5–3 cm, abaxially glabrous, adaxially slightly pubescent, pinnatisect; segments 3–5 pairs, ovate to ovate-oblong, incised-double dentate.

32. Ser. *Infirmæ* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 148. 1949.

孱弱系 *chan ruo xi*

Roots fascicled, slender. Stems soft, fleshy, ± erect, flexuous or procumbent. Leaves alternate or subopposite. Basal leaves few, long petiolate; stem leaves alternate or pseudo-opposite, smaller than basal leaves, with distinct reticulate veins abaxially, pinnatipartite to pinnatisect. Calyx tube with distinct reticulate veins apically. Flowers several, axillary, widely spaced. Corolla tube less than 2 × as long as calyx; galea beaked.

• One species: endemic to China.

70. *Pedicularis infirma* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 161. 1949.

Pedicel slender, ca. 1.5 cm, glabrous. Calyx tube 6–7.5 mm, subglabrous, slightly cleft anteriorly; lobes 5, distinctly unequal, posterior one smallest. Corolla purple-red, 1.8–2.4 cm; tube erect, 0.8–1.4 cm; galea ca. 1 cm; beak bent upward, to 5 mm, slender; lower lip longer than galea, ca. 1.2 cm × 8 mm, middle lobe rounded. Filaments glabrous. Fl. Jul–Aug, fr. Aug–Sep.

• Forests; 1400–1500 m. W Hubei.

68. *Pedicularis membranacea* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 168. 1949.

膜叶马先蒿 *mo ye ma xian hao*

Herbs perennial, not drying black. Stems often several together, more than 60 cm, repent, densely gray-brown pubescent basally. Leaves alternate or ± opposite at branches; petiole to 7.5 cm; leaf blade ovate-elliptic to lanceolate-oblong, 1.5–10 × ca. 4.5 cm, membranous, abaxially glabrous, adaxially slightly hirtellous, pinnatisect; segments 4–8 pairs, ovate to ovate-oblong, pinnatifid or incised-double dentate. Pedicel 0.8–1.5 cm. Calyx 5–8 mm, slightly cleft anteriorly; lobes 5, equal or unequal. Corolla purple, to 1.5 cm; tube erect, nearly 1.5 × as long as calyx; galea bent at a right angle apically; beak straight, ca. 4 mm, slender; lower lip to 1.2 cm, middle lobe acute at apex. Filaments glabrous. Capsule enclosed by calyx, compressed, ovoid, to 7 × 5 mm, very oblique, mucronate. Fl. Aug, fr. Aug–Sep.

• Forests, rocky slopes; 2200–2400 m. WC Sichuan.

69. *Pedicularis aquilina* Bonati, Bull. Soc. Bot. France 55: 245. 1908.

鹰嘴马先蒿 *ying zui ma xian hao*

Herbs perennial. Stems numerous, 20–30 cm, procumbent, slightly branched or unbranched, subglabrous, leafy. Stem leaves alternate; petiole ca. 1 cm, glabrous; leaf blade ovate-elliptic, 1–3 cm, slightly hispid, pinnatisect; segments 6–8 pairs, lanceolate, pinnatifid, apex acute. Flowers remotely arranged; bracts leaflike, nearly as long as flowers. Pedicel ± curved, slender, ca. 2 cm. Calyx ± spathe-like, cleft to middle of tube anteriorly; tube ca. 5 mm, membranous; lobes 5, equal, apex flabellate, 3–6 mm. Corolla purple, small; tube shorter than calyx; galea erect, strongly curved apically, longer than tube, with a pair of teeth at throat; beak horizontal, 5–6 mm, slender; lower lip ca. as long as galea, ca. 7 mm × 1.5 cm, middle lobe rounded. Filaments villous.

• Yunnan.

孱弱马先蒿 *chan ruo ma xian hao*

Herbs perennial, to 11 cm tall. Roots fleshy. Stems numerous, weak, flexuous ascending, or ± procumbent, pubescent. Leaves alternate or ± opposite. Petiole of basal leaves to 7 cm, glabrous; leaf blade ovate-oblong, 5.5–13 × ca. 2.5 cm, pinnatisect; segments 6 or 7 pairs, ovate to oblong, pinnatifid to pinnatisect, membranous, glabrous, dentate. Stem leaves similar to basal leaves, but smaller and shorter petiolate. Inflorescences racemose, 8–9 cm, interrupted basally; bracts leaflike, proximal ones longer than flowers,

distal ones ca. as long as flowers. Pedicel erect, ca. 1.3 cm, pubescent. Calyx 1–1.2 cm, villous, slightly cleft anteriorly; lobes 5, unequal, leaflike. Corolla purple, ca. 2 cm; tube erect, longer than calyx, slightly pubescent; galea falcate; beak straight, conical, ca. 3 mm; lower lip slightly longer than galea, ciliate. Filaments villous. Capsule enclosed by accrescent calyx, compressed, ovoid, to 1 cm × 7–8 mm, apex acute. Fl. and fr. Sep.

• Open and sandy places; ca. 3000 m. NW Yunnan.

33. Ser. Omiiana H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 148. 1949.

峨眉系 e mei xi

Plants herbaceous. Stems often ascending to decumbent. Basal leaves long petiolate, lanceolate to elliptic, pinnatisect; segments ovate to oblong; stem leaves often pseudo-opposite. Flowers axillary, pedicellate. Calyx lobes 5. Corolla tube more than 4 × as long as calyx; beak bent upward, slender.

• One species: endemic to China.

71. *Pedicularis omiiana* Bonati, Bull. Soc. Bot. France 54: 184, 375. 1907.

峨眉马先蒿 e mei ma xian hao

Herbs perennial, drying black. Stems usually several together, erect, ascending to decumbent or procumbent, densely pubescent. Basal leaves numerous; petiole to 9 cm, slightly puberulent to villous; leaf blade ovate-oblong to oblong-lanceolate, 6–11 × 2–3 cm, pinnatisect; segments 11–15 pairs, ovate to ovate-oblong, margin double dentate. Stem leaves alternate or often ± opposite, similar to basal leaves but smaller. Pedicel ca. 1 cm, pubescent. Calyx narrowly campanulate, ca. 8 mm, subglabrous or slightly villous; lobes 5, ± equal, entire to serrate. Corolla purple; tube erect, slender, to 3–4.5 cm, slightly pubescent; galea erect, obtusely curved; beak cylindrical, to 7 mm; lower lip deeply lobed, lobes rounded, margin glabrous. Filaments glabrous. Capsule obliquely long ovoid, ca. 1.3 cm, apiculate. Fl. Jun–Jul, fr. Jul–Sep.

• Damp places in forests, thickets; 2300–3200 m. W and WC Sichuan.

1a. Stems erect to decumbent; calyx lobes narrow, ± entire 71a. subsp. *omiiana*

1b. Stems procumbent; calyx lobes wide, serrate 71b. subsp. *diffusa*

71a. *Pedicularis omiiana* subsp. *omiiana*

峨眉马先蒿(原亚种) e mei ma xian hao (yuan ya zhong)

Stems erect to decumbent. Petiole puberulent. Calyx lobes narrow, ± entire.

• Damp places in forests, thickets; 2300–3200 m. WC Sichuan.

71b. *Pedicularis omiiana* subsp. *diffusa* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 97. 1963.

铺散峨眉马先蒿 pu san e mei ma xian hao

Pedicularis omiiana var. *diffusa* Bonati, Bull. Soc. Bot. France 54: 185, 376. 1907.

Stems procumbent. Petiole and midvein abaxially villous. Calyx lobes wide, serrate. Fl. May–Jul.

• W Sichuan.

34. Ser. Batangensis H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 148. 1949.

巴塘系 ba tang xi

Plants usually diffuse. Stems slender, ± woody, many branched basally; branches long, decumbent. Leaves opposite or pseudo-opposite, oblong-lanceolate, pinnatisect; segments linear. Flowers axillary, pedicellate. Calyx lobes usually 5, longer than calyx tube. Corolla tube more than 2 × as long as calyx, slender; galea much dilated apically with 2 teeth at margin, usually abruptly constricted into a beak; beak straight, slender.

• One species: endemic to China.

72. *Pedicularis batangensis* Bureau & Franchet, J. Bot. (Morot) 5: 106. 1891.

巴塘马先蒿 ba tang ma xian hao

Herbs perennial, 10–20 cm tall, drying black. Stems many, clustered, sometimes repent, only ascending apically; branches opposite, to 30 cm, with 2 lines of hairs. Leaves ± opposite, ± leathery; petiole 1–2 cm, pubescent; leaf blade oblong to ovate-oblong, 2–3 × 1–2 cm, pubescent; segments linear to linear-lanceolate, dentate or lobed. Flowers scattered. Pedicel ca. 1 cm,

pubescent. Calyx ca. 1 cm; tube obconical; lobes 5, lanceolate, posterior one ± entire, lateral lobes larger, leaflike. Corolla pink to rose, erect, 1.7–3 cm, densely pubescent; galea bent at a right angle, abruptly constricted into a beak apically; beak ca. 5.5 mm, slender, straight; lower lip 1.5–1.8 cm wide, ciliate. Filaments glabrous. Capsule ovoid, slightly compressed, apiculate. Fl. Jun–Aug, fr. Aug–Sep.

• Open rocky slopes; 2500–3100 m. NW and W Sichuan.

35. Ser. *Muscicolae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 523. 1888.

藓生系 xian sheng xi

Stems many, slender, procumbent and repent, usually branched. Leaves elliptic to lanceolate, pinnatifid to pinnatisect. Flowers axillary. Corolla long tubular; tube at least 2 × as long as calyx; galea twisted or not; beak straight or S-shaped, not bent upward, slender.

• Ten species: endemic to China.

1a. Calyx slightly cleft anteriorly.

2a. Corolla tube 1.4–2.5 cm; beak of galea 3–4 mm; filaments ± pubescent.

3a. Calyx ca. 10 mm; corolla tube ca. 2.5 cm; lower lip ca. 1.2 × 1.5 cm; pedicel to 3.5 cm 73. *P. nanchuanensis*

3b. Calyx ca. 3.5 mm; corolla tube 1.4–1.8 cm; lower lip ca. 1.1 × 1.1 cm; pedicel 0.8–1.4(–1.7) cm 74. *P. chengxianensis*

2b. Corolla tube 4–7.5 cm; beak of galea 5–10 mm; filaments glabrous.

4a. Leaves 2.5–3.5 cm, segments 4–6 pairs 77. *P. gracilituba*

4b. Leaves to 5–10 cm, segments 4–12 pairs.

5a. Calyx lobes unequal; corolla tube glabrous; lower lip ca. 1.4 cm wide; beak of galea shorter,

not

S-shaped 79. *P. macrosiphon*

5b. Calyx lobes ± equal; corolla tube pubescent; lower lip to 2 cm wide; beak of galea ca. 1 cm,

S-shaped 80. *P. muscicola*

1b. Calyx deeply cleft anteriorly.

6a. Beak of corolla to 10 cm.

7a. Stems 5–10 cm, glabrous; corolla 4–5 cm; lower lip not ciliate; filaments glabrous 81. *P. pseudomuscicola*

7b. Stems to 25 cm, slightly pubescent; corolla 6–9 cm; lower lip ciliate; filaments 2 pubescent, 2 glabrous 82. *P. ruoergaiensis*

6b. Beak of corolla barely 1 cm.

8a. Calyx 5-lobed 78. *P. geosiphon*

8b. Calyx 2–4-lobed.

9a. Corolla tube to 9.5 cm; beak of galea not curved; stems to 20 cm; petiole to 4.5 cm ... 75. *P. sorbifolia*

9b. Corolla tube 2–2.6 cm; beak of galea curved; stems to 40 cm; petiole to 2 cm 76. *P. quxiangensis*

73. *Pedicularis nanchuanensis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 399. 1963.

南川马先蒿 nan chuan ma xian hao

Herbs perennial, 15–25 cm tall. Roots fleshy. Stems erect, 4–7 cm, many branched; branches ascending or procumbent basally, densely white villous. Leaves alternate or sometimes ± opposite at branches; petiole to 5 cm, but barely 1.5–2 cm on branches, slightly villous; leaf blade oblong-lanceolate to ovate-oblong, 6–11 × 2.5–5 cm, slightly pubescent, pinnatisect; segments 7–12 pairs, ovate to lanceolate, pinnatifid, incised-dentate. Flowers widely spaced. Pedicel to 3.5 mm. Calyx ca. 1 cm, slightly cleft anteriorly, densely villous along 5 veins; lobes 5, ± equal, leaflike. Corolla red, ca. 3 cm; tube erect, ca. 2.5 cm, slender, pubescent; galea glabrous, ± bent at a right angle apically; beak straight, barely 3–4 mm; lower lip longer than galea, ca. 1.2 × 1.5 cm. Filaments 2 pubescent, 2 glabrous. Fl. May–Jun, fr. Jul–Aug.

• Margins of bamboo groves; 2100–2300 m. SE Sichuan.

74. *Pedicularis chengxianensis* Z. G. Ma & Z. Z. Ma, Bull. Bot. Res., Harbin 13: 63. 1993.

成县马先蒿 cheng xian ma xian hao

Herbs perennial, drying black. Roots cylindrical, fleshy; rhizomes slender, with narrowly triangular,

membranous scales. Stems erect, ca. 4 cm tall; lateral branches sharply ascending, to 40 cm, slender, pubescent. Leaves alternate; petiole ca. 8 cm (ca. 1.5 cm on lateral branches), long pubescent; leaf blade narrowly elliptic or ovate, 5.5–12 × 2.2–3.5 cm (leaves of lateral branches smaller), pinnatisect; segments 4–16 pairs, ca. 1 cm × 4 mm, ovate, white scurfy, double serrate or pinnatifid. Pedicel 0.8–1.4(–1.7) cm, with long hairs. Flowers solitary, axillary, few. Calyx tubular, ca. 3.5 mm, slightly cleft anteriorly, pilose, short pubescent; lobes 5, equal, linear to linear-lanceolate, ca. 2.5 mm. Corolla wine red; tube 1.4–1.8 cm, moderately long pubescent; galea erect, ca. 4.5 mm, inner margin ca. 3 mm, each side with 1 obtuse tooth; anther-bearing part bent at a right angle to erect part, beak ca. 3 mm, slender, 2-lobed at apex; lower lip whitish rose, ca. 1.1 × 1.1 cm, margin often ciliate, middle lobe exserted, broadly ovate or triangular-ovate, small. Filaments sometimes loosely short pilose at apex. Capsule enclosed at base by persistent calyx, apex obliquely bent, short beaked. Seeds compressed, obovoid, white striate. Fl. and fr. May–Jun.

• Steep slopes, shrubs; 1600–1700 m. Gansu (Chengxian, Jishan).

75. *Pedicularis sorbifolia* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 400. 1963.

花楸叶马先蒿 *hua qiu ye ma xian hao*

Herbs perennial, slightly pubescent. Stems curved, to 20 cm, slender. Basal leaves large, alternate or opposite; petiole to 4.5 cm; leaf blade lanceolate-obovate, pinnatisect; segments 6–13 pairs, ovate to oblong, to 1.8 cm × 8 mm, incised-double dentate, apex acute.

Stem leaves similar to basal ones but smaller. Pedicel 3–8 mm. Calyx scarcely 1 cm, cleft anteriorly to middle of tube, 2–4-lobed. Corolla tube to 9.5 cm, pubescent; galea ± bent at a right angle apically; beak straight, short, inconspicuous; lower lip longer than galea, middle lobe smaller than lateral lobes, narrowly ovate, projecting. Filaments glabrous. Fl. Aug, fr. Sep.

• Mossy places in old growth *Abies* forests; ca. 3300 m. W Sichuan.

76. *Pedicularis quxiangensis* H. P. Yang, Bull. Bot. Res., Harbin 2(4): 137. 1982.

曲乡马先蒿 *qu xiang ma xian hao*

Herbs perennial, subglabrous, drying black. Stems ascending or diffuse, often to 40 cm. Leaves opposite near base, distal ones alternate; petiole slender, to 2 cm; leaf blade ovate to elliptic, 1–2 cm, pinnatisect; segments 4 or 5 pairs, ovate to oblong, glabrous, margin double dentate. Flowers widely spaced. Pedicel 5–10 mm. Calyx cylindric, 8–9 mm, cleft anteriorly to middle of tube, slightly pubescent; lobes 3, unequal. Corolla red, 3–3.5 cm; tube 2–2.6 cm, slightly pubescent; galea ± bent at a right angle apically; beak semicircular, ca. 7 mm; lower lip ca. 9 mm × 1.3 cm, ciliate, middle lobe smaller than lateral lobes, apex emarginate. Filaments glabrous. Capsule enclosed by accrescent calyx, ovoid, slightly compressed, ca. 1.2 cm. Fl. and fr. Aug–Sep.

• In tufts of grass on hillsides; ca. 3400 m. S Xizang.

77. *Pedicularis gracilituba* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 173. 1949.

细管马先蒿 *xi guan ma xian hao*

Herbs perennial, 4–6 cm, rarely to 15 cm tall, glabrous or pubescent, drying black. Stems densely clustered or few, slender, soft, leafy. Leaves alternate, basal and stem ones similar; petiole 0.2–4 cm, often longer than leaf blade, slender, subglabrous to conspicuously pubescent; leaf blade lanceolate-oblong, membranous, glabrous or adaxially sparsely hispidulous, 2.5–3.5 × 0.7–2 cm, pinnatisect; segments 4–6 pairs, ovate to ovate-oblong, deeply incised-dentate. Flowers widely spaced. Pedicel slender, to 1 cm. Calyx 7–10 mm, slightly cleft anteriorly, pubescent; lobes 5, ± equal. Corolla purple, ca. 7 cm; tube to 6.5 cm, slender, pubescent; galea bent at a right angle apically; beak falcate, inconspicuous; lower lip ca. 1 × 1.3 cm, not ciliate. Filaments glabrous. Fl. Jun–Jul, fr. Aug.

• Alpine meadows, forests; 3300–4000 m. SW Sichuan, NW Yunnan.

1a. Stems many; petiole and pedicel often ± glabrous; leaves sparsely hispidulous adaxially

..... 77a. subsp. *gracilituba*

1b. Stems few; petiole and pedicel conspicuously pubescent; leaves densely bristly adaxially

..... 77b. subsp. *setosa*

77a. *Pedicularis gracilituba* subsp. *gracilituba*

细管马先蒿(原亚种) *xi guan ma xian hao* (*yuan ya zhong*)

Stems many. Petiole and pedicel often ± glabrous. Leaves sparsely hispidulous adaxially.

• Alpine meadows, forests; 3600–4000 m. SW Sichuan.

77b. *Pedicularis gracilituba* subsp. *setosa* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 101. 1963.

刺毛细管马先蒿 *ci mao xi guan ma xian hao*

Pedicularis gracilituba var. *setosa* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 174. 1949.

Stems few. Petiole and pedicel conspicuously pubescent. Leaves densely bristly adaxially. Fl. Jul.

• Forests; ca. 3300 m. NW Yunnan.

78. *Pedicularis geosiphon* H. Smith & P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 400. 1963.

地管马先蒿 *di guan ma xian hao*

Herbs perennial, sparsely pubescent, not drying black. Rootstock filiform, to 10 cm. Stems often 2–4, widely spaced, black, glabrous, with 5 or 6 leaves. Leaves alternate; petiole to 3 cm, subglabrous; leaf blade linear-oblong, more than 4 × 1.5 cm, abaxially glabrous, adaxially sparsely pubescent, pinnatisect; segments ca. 4 or 5 pairs, oblique ovate, incised-dentate.

Inflorescences 1–3-flowered. Pedicel to 1.5 cm, glabrous. Calyx cylindric; tube ca. 7 mm, cleft anteriorly to middle of tube, sparsely villous; lobes 5,

unequal. Corolla tube 4.5–6.5 cm, pubescent; galea ± bent at a right angle apically, with 1 marginal tooth on each side near apex; beak straight, ca. 4 mm; lower lip ca. 2 × 2 cm, longer than galea. Filaments glabrous. Fl. Jul, fr. Aug.

• Mossy places in old growth coniferous forests; 3500–3900 m. S Gansu, N Sichuan.

79. *Pedicularis macrosiphon* Franchet, Nouv. Arch. Mus. Hist. Nat., Sér. 2, 10: 66. 1888.

大管马先蒿 *da guan ma xian hao*

Pedicularis lucifuga Bonati; *P. macrosiphon* var. *tribuloides* (Bonati) H. L. Li; *P. tribuloides* Bonati.

Herbs perennial, usually densely tufted, drying black. Stems slender, flexuous, ascending or repent, to 40 cm. Proximal leaves usually ± opposite, distal ones alternate; petiole to 6 cm, pubescent; leaf blade ovate-lanceolate to linear-oblong, to 10 cm, abaxially villous along midvein, adaxially sparsely pubescent, pinnatisect; segments 7–12 pairs, ovate to oblong, spinescent double dentate. Flowers widely spaced. Pedicel to 1 cm. Calyx ca. 1 cm, slightly cleft anteriorly, villous along veins; lobes 5, unequal. Corolla pale purple to rose, 4.5–6 cm or sometimes to 7–8 cm; tube erect, 4–5 cm, glabrous; galea bent at a right angle apically; beak straight, short; lower lip longer than galea, ca. 1.5 × 1.4

cm. Filaments glabrous. Capsule completely enclosed by calyx, oblong to obovoid, compressed, 1–1.2 cm, apex acute. Fl. May–Aug, fr. Jul–Sep.

• Moist shaded forests, ravines; 1200–3500 m. NW Sichuan, NW Yunnan.

80. *Pedicularis muscicola* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 54. 1877.

藓生马先蒿 xian sheng ma xian hao

Herbs perennial, pubescent, drying black. Stems cespitose, usually densely tufted, central stems erect, outer stems usually flexuous, ascending or procumbent, to 25 cm. Leaves alternate; petiole to 1.5 cm, sparsely villous; leaf blade elliptic to lanceolate, to 5 cm, abaxially subglabrous, adaxially sparsely pubescent, densely ciliolate along midvein, pinnatisect; segments 4–9 pairs, ovate to lanceolate, spinescent-double dentate. Pedicel to 1.5 cm, densely white villous to subglabrous. Calyx cylindric, to 1.1 cm, slightly cleft anteriorly, villous along veins; lobes 5, ± equal. Corolla rose; tube 4–7.5 cm, pubescent; galea twisted; beak S-shaped, ca. 1 cm, slender; lower lip ca. 2 × 2 cm. Filaments glabrous. Capsule enclosed by calyx, compressed, ovoid, ca. 1 cm × 7 mm. Fl. May–Jul, fr. Aug.

• Shaded damp places in *Picea* forests, under shrubs, near water in valleys; 1700–2700 m. Gansu, Hebei, W Hubei, Nei Mongol, Qinghai, Shaanxi, Shanxi.

81. *Pedicularis pseudomuscicola* Bonati, Bull. Soc. Bot. France 54: 371. 1907.

假藓生马先蒿 jia xian sheng ma xian hao

Herbs perennial, diffuse. Stems cespitose, spreading or procumbent, ± black, 5–10 cm, glabrous, shiny. Leaves

alternate; petiole of basal leaves 5–7 cm; leaf blade linear-oblong, ca. 3.5 cm, glabrous, adaxially shiny, pinnatisect; segments 10–20 pairs, ovate-oblong, margin lobed, spinescent dentate. Stem leaves similar to basal ones but smaller. Pedicel 5–8 mm, slender, curved. Calyx cylindric; tube ca. as long as pedicel, shallowly cleft anteriorly; lobes 5, ± equal. Corolla purple, 4–5 cm; tube slender, 3.5–4.5 cm, white pubescent apically, glabrous basally; galea twisted basally; beak semi-circular, 6–10 mm, slender; lower lip ca. 1 × 1.5–2 cm, glabrous. Filaments glabrous. Fl. Aug–Sep, fr. Sep–Oct.

• 2800–3700 m. W Sichuan.

82. *Pedicularis ruergaiensis* H. P. Yang, Acta Phytotax. Sin. 27: 222. 1989.

若尔盖马先蒿 ruo er gai ma xian hao

Herbs perennial, slightly pubescent, drying black. Stems curved, to 25 cm, slender. Leaves pseudo-opposite, distal ones often alternate; petiole to 2 cm; leaf blade linear-oblong, 4–6 cm, abaxially glabrous, adaxially pubescent, pinnatisect; segments oblique-ovate, very widely spaced, incised-dentate. Pedicel to 5–10 mm. Calyx cylindric, 1–1.5 cm, shallowly cleft anteriorly; lobes 5, equal, slightly enlarged and serrate apically. Corolla purple-red, 6–9 cm; tube 5–8 cm, villous; galea bent at a right angle apically; beak evenly deflexed, ± curved, ca. 1 cm, slender; lower lip 1.6–1.8 × 1.8–2.2 cm, ciliate, middle lobe smaller than lateral ones, rounded. Filaments 2 pubescent, 2 glabrous. Fl. Jun, fr. Jul–Aug.

• *Tsuga chinensis* forests; 2700–2800 m. N Sichuan.

36. Ser. *Pteridifoliae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 147. 1949.

蕨叶系 jue ye xi

Stems to 28 cm, unbranched. Basal leaves long petiolate, large, pinnatisect; segments 5–9 pairs. Stem leaves few, alternate, small. Inflorescences short spicate. Calyx 5-lobed. Corolla yellow; tube straight, 2–3 × as long as calyx; galea obscurely 2-toothed, beakless; lower lip shorter than galea.

• One species: endemic to China.

83. *Pedicularis pteridifolia* Bonati, Bull. Misc. Inform. Kew 1908: 252. 1908.

蕨叶马先蒿 jue ye ma xian hao

Herbs perennial, to 40–60 cm tall, flexuously ascending, drying black. Stems single, striate, glabrous. Leaves alternate; petiole to 5–9 cm, glabrous; leaf blade oblong-ovate to broadly ovate, to 15–28 cm, abaxially subglabrous along midvein, adaxially sparsely glandular pubescent, densely ciliolate along midvein, pinnatipartite to pinnatisect; segments 5–9 pairs, ovate-oblong to narrowly lanceolate, pinnatifid, margin

double dentate. Inflorescences, spicate, 4.5–7 cm; bracts leaflike basally. Pedicel short. Calyx glabrous; tube 5–6 mm; lobes 5, equal, triangular, entire. Corolla 2–2.8 cm; tube erect, glabrous; galea erect, slightly pubescent along margin, rounded in front, apex bent downward; lower lip ciliate, middle lobe emarginate. Filaments 2 pubescent, 2 glabrous. Capsule compressed, lanceolate, ca. 1.3 cm × 4 mm, apex acute. Fl. and fr. Sep–Oct.

• Forests; 800–1600 m. Sichuan.

37. Ser. *Phaceliifoliae* Bonati, Bull. Soc. Bot. France 57, Mém. 18: 14. 1910.

法且利亚叶系 fa qie li ya ye xi

Stems 1 to several together, short branched apically or unbranched. Basal leaves long petiolate, large, pinnatisect. Stem leaves alternate or ± opposite. Leaves often ovate-elliptic, to 15 × 14 cm. Inflorescences ± compact, capitate. Corolla red or white; tube straight, ca. 2 × as long as calyx; galea twisted laterally; beak ± curved downward.

• Two species: endemic to China.

- 1a. Corolla tube scarcely longer than calyx; beak curved downward, parallel to proximal part of galea; leaf blade to 15 cm, leathery 84. *P. phaceliifolia*
 1b. Corolla tube ca. 2 × as long as calyx; beak ± straight, curved only apically, pointing forward, perpendicular to basal part of galea; leaf blade 5–6 cm, membranous 85. *P. fargesii*

84. *Pedicularis phaceliifolia* Franchet, Bull. Soc. Bot. France 47: 27. 1900.

法且利亚叶马先蒿 fa qie li ya ye ma xian hao
 Herbs annual or biennial, to 60 cm tall, glabrous, not drying black. Stems ± flexuous ascending. Basal leaf petiole to 20 cm; leaf blade ovate-oblong to oblong-lanceolate, 10–15 × 7–13 cm, pinnatisect to pinnatifid; segments 7–10 pairs, ovate to oblong, leathery, pinnatifid, dentate. Stem leaves often opposite, only alternate apically, smaller than basal leaves. Inflorescences ± capitate; bracts leaflike, shorter than flowers. Calyx ca. 7 mm, slightly cleft anteriorly; lobes 5, unequal. Corolla white; tube scarcely longer than calyx; galea semicircular apically; beak parallel to basal part of galea, curved downward, 1.5–2.5 mm; lower lip ca. as long as galea. Filaments villous. Capsule obliquely lanceolate, ca. 1.7 cm, apex acute. Fl. Jun–Aug, fr. Sep–Oct.

• Grassy slopes, shaded places, *Abies* forests, under shrubs; 1500–3400 m. W Sichuan, NW Yunnan.

85. *Pedicularis fargesii* Franchet, Bull. Soc. Bot. France 47: 26. 1900.

法氏马先蒿 fa shi ma xian hao

Herbs annual or biennial, to 20–40 cm tall, subglabrous, not drying black. Petiole of basal leaves 4–7 cm; leaf blade ovate-oblong to elliptic-oblong, 5–6 × 2.5–3.5 cm, membranous, pinnatisect to pinnatifid; segments 5–8 pairs, ovate-oblong, incised-double dentate, abaxially sparsely white pubescent along veins, adaxially glabrous. Stem leaves often only 2 or absent, ± opposite. Inflorescences capitate, 5- or 6-flowered; bracts leaflike. Calyx ca. 1 cm, slightly cleft anteriorly; lobes 5, ± equal, serrate. Corolla white, ca. 2 cm; tube slender, ca. 2 × as long as calyx; galea crescent-shaped apically; beak pointing forward, perpendicular to basal part of galea, ± straight, curved only apically; lower lip slightly shorter than galea, ciliate. Filaments villous. Fl. Jun–Jul, fr. Aug–Sep.

• *Pinus* and *Abies* forests, grassy slopes; 1400–1800 m. S Gansu, W Hubei, Hunan, E Sichuan.

38. Ser. *Pentagonae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 257. 1948.

五角系 wu jiao xi

Herbs drying black. Roots much thickened, fascicled. Stems erect. Leaves mostly on stem, opposite, lanceolate, pinnatisect. Inflorescences spicate. Calyx inflated, strongly 5-angled, with dense reticulate veins; lobes 5, triangular, entire. Corolla tube slightly bent distally; galea shorter than lower lip, 1-toothed on each side, beakless; lower lip spreading.

• One species: endemic to China.

86. *Pedicularis pentagona* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 347. 1948.

五角马先蒿 wu jiao ma xian hao

Herbs perennial, to 20 cm tall. Roots fleshy. Stems erect, branched apically or unbranched, pubescent. Leaves opposite; petiole ca. 1.3 cm, winged; leaf blade lanceolate, ca. 2 × 1.5 cm, glabrous, sometimes ciliate, pinnatisect; segments widely spaced, linear, deeply dentate. Inflorescences to 9 cm. Flowers opposite; bracts leaflike basally, long ovate apically, ciliate. Ca-

lyx long ovate, membranous, to 1.5 cm, ciliate along veins; lobes 5, unequal, triangular, entire. Corolla pink to purple, to 2.5 cm; tube ca. 2 × as long as calyx tube; galea erect, rounded apically, beakless; margin of lower lip fimbriate. Filaments pubescent. Capsule enclosed by accrescent calyx tube, ovoid, compressed, apiculate. Fl. Jul–Aug, fr. Aug–Sep.

• Dry slopes, moist shaded banks in valleys; 2800–3300 m. SW Sichuan, E Xizang, NW Yunnan.

39. Ser. *Dichotomae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 258. 1948.

二歧系 er qi xi

Stems dichotomously branched or unbranched. Leaves opposite, ovate to lanceolate, pinnatisect. Stem leaves long petiolate. Inflorescences spicate. Flowers opposite. Calyx large, strongly 5-angled, with dense reticulate veins; lobes 5, entire. Corolla tube slightly exceeding calyx; galea 1-toothed on each side; beak often straight, slender.

• One species: endemic to China.

87. *Pedicularis dichotoma* Bonati, Bull. Soc. Bot. France 55: 247. 1908.

二歧马先蒿 er qi ma xian hao

Pedicularis dichotoma var. *wardiana* Bonati.

Herbs perennial, to 30 cm tall, not drying black. Roots not fleshy. Stems dichotomously branched or unbranched, pubescent. Leaves opposite; petiole ca. 3 cm, winged; leaf blade ovate-oblong to oblong-lanceolate, ca. 4 cm, pinnatisect; segments 5–7 pairs, widely spaced, linear, pinnatifid or dentate. Inflorescences 5–12 cm. Flowers opposite, 2–18 pairs;

bracts ovate, ciliate, apex often pinnatisect. Calyx long ovate, membranous, ca. 1.3 cm, strongly 5-veined, ciliate along veins; lobes 5, unequal, triangular, posterior one smallest. Corolla pink, ca. 2 cm; galea ± bent at a right angle apically; beak horizontal, straight, slender; lower lip glabrous at margin, middle lobe

smaller than prominent lateral lobes. Filaments pubescent. Capsule enclosed by accrescent calyx, ovoid, apiculate. Fl. Jul–Sep, fr. Aug–Sep.

• Open alpine pastures, open forests; 2700–4300 m. SW Sichuan, E Xizang, NW Yunnan.

40. Ser. Reges H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 257. 1948.
大王系 dai wang xi

Stems branched or not. Leaves in whorls of 3 or 4, sometimes opposite; bases of whorled petioles or at least bracts connate, dilated, cupular. Calyx deeply cleft anteriorly, 2-lobed; lobes entire. Galea rounded, much expanded apically, 1-toothed on each side or toothless, beakless.

Two species: China, India, Myanmar; both species in China.

- 1a. Leaves mostly in whorls of 4, sometimes in 3's; most petiole and bract bases enlarged and connate 88. *P. rex*
- 1b. Leaves mostly in whorls of 3, sometimes opposite or rarely in 4's; bases of bracts enlarged and connate, but petiole bases usually not enlarged and connate 89. *P. thamnophila*

88. *Pedicularis rex* C. B. Clarke ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 589. 1888.

大王马先蒿 dai wang ma xian hao

Herbs perennial, 10–90 cm tall, not drying black. Stems erect, pubescent or subglabrous, branched or not; branches whorled. Leaves in whorls of (3 or)4; most petiole bases enlarged, connate, cupular, to 0.5–1.5 cm; leaf blade linear-oblong to lanceolate-oblong, 3.5–12 × 1–4 cm, pinnatisect to pinnatipartite; segments 10–14 pairs, linear-oblong to oblong, dentate. Inflorescences spicate, interrupted basally; bracts leaflike, longer than flowers, base enlarged, connate, cupular. Calyx 1–1.2 cm, membranous, glabrous; lobes 2 or 3, rounded. Corolla yellow, purple-red, or white, erect, ca. 3 cm; tube 2–2.5 cm; galea sparsely pubescent, apex bent downward, truncate, marginal teeth 2 or none; lower lip shorter than galea, ciliate; middle lobe very small. Filaments at least 2 pubescent. Capsule ovoid, 1–1.5 cm, apex acute. Seeds ca. 3 mm. Fl. May–Aug, fr. Aug–Sep.

Open pastures, slopes, coniferous forests, alpine *Pinus* forests; 2500–4300 m. SC Guizhou, W Hubei, SW and W Sichuan, SE Xizang, C, NE, and NW Yunnan [N India, N Myanmar]

- 1a. Corolla purple-red or white.
 - 2a. Corolla purple-red; filaments sparsely pubescent 88c. subsp. *lipskyana*
 - 2b. Corolla white with purplish galea; 2 filaments densely pubescent 88d. subsp. *zayuensis*
- 1b. Corolla yellow.
 - 3a. Plants barely 20 cm tall; calyx 2- or 3-lobed 88b. subsp. *parva*
 - 3b. Plants often more than 20 cm tall; calyx 2-lobed.
 - 4a. Galea sometimes toothless; corolla 1.5–3 cm; basal leaves long petiolate, caducous 88a. subsp. *rex*

- 4b. Galea teeth subulate; corolla 2–2.5 cm; basal leaves short petiolate, persistent 88e. subsp. *pseudocyathus*

88a. *Pedicularis rex* subsp. *rex*

大王马先蒿(原亚种) dai wang ma xian hao (yuan ya zhong)

Plants often more than 20 cm tall. Calyx 2-lobed. Corolla yellow, 1.5–3 cm; galea sometimes lacking marginal teeth.

Open pastures, slopes, coniferous forests; 2500–4300 m. SW Sichuan, C, NE, and NW Yunnan [N India, N Myanmar]

This subspecies includes two varieties: var. *rex* with a corolla 3 cm and var. *rockii* (Bonati) H. L. Li with a corolla 1.5–2.2 cm.

88b. *Pedicularis rex* subsp. *parva* (Bonati) P. C. Tsoung, Fl. Reipubl. Popularis Sin. 68: 111. 1963.

矮小大王马先蒿 ai xiao dai wang ma xian hao

Pedicularis rex var. *parva* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 151. 1926.

Plants barely 20 cm tall. Calyx 2- or 3-lobed. Corolla yellow, ca. 3 cm. Fl. May–Jul.

• NW Yunnan.

88c. *Pedicularis rex* subsp. *lipskyana* (Bonati) P. C. Tsoung, Fl. Reipubl. Popularis Sin. 68: 111. 1963.

立氏大王马先蒿 li shi dai wang ma xian hao

Pedicularis lipskyana Bonati, Bull. Soc. Bot. France 57 (Sess. Extraord.): 58. 1911; *P. lamarum* H. Limpricht; *P. rex* var. *purpurea* Bonati.

Plants 10–90 cm tall. Calyx 2-lobed. Corolla purple-red, ca. 3 cm. Filaments sparsely pubescent. Fl. May–Jul.

• W Hubei, W Sichuan.

88d. *Pedicularis rex* subsp. *zayuensis* H. P. Yang, Acta Phytotax. Sin. 28: 136. 1990.

察隅大王马先蒿 cha yu dai wang ma xian hao

Plants 50–60 cm tall. Calyx 2-lobed. Corolla white, ca. 3 cm; galea purplish. Filaments 2 densely pubescent, 2 glabrous. Fl. Jun–Jul.

• Alpine *Pinus* forests; ca. 3200 m. SE Xizang (Zayu).

88e. *Pedicularis rex* subsp. ***pseudocyathus*** (Vaniot ex Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 111. 1963.

假斗大王马先蒿 *ja dou dai wang ma xian hao*
Pedicularis rex var. *pseudocyathus* Vaniot ex Bonati, Bull. Acad. Int. Géogr. Bot. 13: 240. 1904.
Plants often more than 20 cm tall. Basal leaves short petiolate. Calyx 2-toothed. Corolla yellow, 2–2.5 cm; galea teeth subulate. Fl. May.

• SC Guizhou.

89. *Pedicularis thamnophila* (Handel-Mazzetti) H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 339. 1948.

灌丛马先蒿 *guan cong ma xian hao*
Pedicularis rex C. B. Clarke ex Maximowicz var. *thamnophila* Handel-Mazzetti, Symb. Sin. 7: 854. 1936.
Herbs perennial, to 20–60 cm tall, drying black. Roots ± fleshy. Stems long branched throughout entire length or near base only; branches opposite or in whorls of 3, with 4 lines of glandular hairs. Leaves mostly in whorls of 3, sometimes opposite or rarely in 4's; petiole to 3.5 cm, pubescent, usually not enlarged and connate; leaf blade oblong or linear-oblong, ca. 1 cm × 2–5 mm, pinnatisect; segments 9–12 pairs, narrowly lanceolate, pinnatipartite, incised-dentate. Inflorescences spicate; bracts leaflike, bases enlarged, connate, cupular, 1–1.5 cm high. Calyx 7–8 mm, membranous, glabrous, cleft anteriorly to 1/2 as long as tube; lobes rounded. Corolla yellow, 2–2.5 cm, pubescent; tube ca. 2 × as long as calyx; galea erect, bowed apically, ca. as long as tube,

with 2 marginal teeth; lower lip 7–8 mm, ciliate. Filaments pubescent. Fl. Jun–Jul, fr. Aug.

• *Picea* forests, alpine meadows, meadows of canopy gaps in *Abies* forests; 3200–4000 m. SW and W Sichuan, SE Xizang, NW Yunnan.

- 1a. Plants more than 20 cm tall; stems long branched throughout entire length; leaves ca. 5 cm wide 89a. subsp. *thamnophila*
- 1b. Plants barely 15 cm tall; stems long branched near base only; leaves barely 2 cm wide 89b. subsp. *cupuliformis*

89a. *Pedicularis thamnophila* subsp. ***thamnophila***
灌丛马先蒿(原亚种) *guan cong ma xian hao* (yuan ya zhong)

Plants more than 20 cm tall. Stems long branched throughout entire length. Leaves ca. 5 cm wide. Fl. Jun–Jul.

• *Picea* forests, alpine meadows; 3200–3500 m. SW Sichuan, SE Xizang, NW Yunnan

89b. *Pedicularis thamnophila* subsp. ***cupuliformis*** (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 113. 1963.

杯状灌丛马先蒿 *bei zhuang guan cong ma xian hao*
Pedicularis cupuliformis H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 340. 1948.

Plants low, barely 15 cm tall. Stems long branched near base only. Leaves barely 2 cm wide. Fl. Jul.

• Meadows of canopy gaps in *Abies* forests; ca. 4000 m. W Sichuan.

41. Ser. *Cyathophylloides* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 257. 1948.

拟斗叶系 *ni dou ye xi*

Stems erect, branched basally or unbranched. Leaves in whorls of 3 or 4, pinnatisect; bases of petioles and bracts connate, greatly dilated, cupular. Calyx slightly cleft anteriorly; lobes 2, serrate. Corolla tube ca. 2 × as long as calyx; galea navicular, expanded apically, indistinctly beaked, apex toothless to very obscurely 1-toothed.

• One species: endemic to China.

90. *Pedicularis cyathophylloides* H. Limpricht, Repert. Spec. Nov. Regni Veg. 18: 243. 1922.

拟斗叶马先蒿 *ni dou ye ma xian hao*

Herbs perennial. Stems erect, pubescent. Leaves in whorls of 3 or 4; petiole bases enlarged, connate, cupular; leaf blade long ovate or broadly lanceolate, sparsely pubescent, abaxially ciliate along midvein, pinnatisect; segments 10 pairs, linear, incised-dentate. Flower whorls few, lax; bracts leaflike, base enlarged, connate. Calyx cylindrical, ca. 1.1 cm, pubescent; lobes 2,

ovate-lanceolate, serrate. Corolla pink to rose, ca. 3 cm; tube slender; galea erect basally, rounded and expanded apically, finely pubescent, apex slightly protruding, pointing outward, obscurely 2-toothed, truncate; lower lip slightly longer than galea. Filaments villous. Capsule compressed, ovoid, ca. 2.2 cm, apex acute. Seeds long ovoid, ca. 3 mm. Fl. and fr. Jul–Aug.

• *Picea* forests, *Betula* woodlands; 3500–3900 m. NW Sichuan, NE Xizang.

42. Ser. *Superbae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 524. 1888.

华丽系 *hua li xi*

Stems erect, branched or not, robust. Leaves in whorls of 3 or 4, pinnatisect; bases of petioles and bracts connate, greatly dilated, cupular. Calyx 2- or 5-lobed, double serrate. Corolla large; tube as long as to slightly longer than calyx; galea ± falcate, ending in a prominent beak; lower lip wide.

• Two species: endemic to China.

- 1a. Calyx less than 1/3 cleft anteriorly, 5-lobed; corolla purplish red to red; beak of galea 2–4 mm, straight 91. *P. superba*
- 1b. Calyx 1/3 cleft anteriorly, 2-lobed; corolla yellow; beak of galea 5–6 mm, bent downward 92. *P. connata*

91. *Pedicularis superba* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 588. 1888.

华丽马先蒿 hua li ma xian hao

Herbs perennial, 30–90 cm tall. Roots thickened, fascicled. Stems hollow, unbranched, with 4–10 cm internodes, sparsely pubescent or glabrous. Leaves in whorls of 3 or 4; bases of distal petioles and bracts greatly dilated, connate; leaf blade long elliptic, proximal 1 or 2 whorls largest, 9–13 cm, pinnatisect; segments 12–15 pairs, lanceolate or linear-lanceolate, incised-dentate. Inflorescences spicate, to 20 cm; bracts leaflike. Calyx 2.2–2.5 cm, slightly cleft anteriorly; lobes 5, unequal. Corolla purplish red to red, 3.7–5 cm; tube 1.5–3 cm, slightly enlarged and curved apically; galea erect, glabrous; beak straight, triangular, 2–4 mm; lower lip ca. as long as galea, 1.7–2 × 2.7–3.5 cm, ciliate. Filaments pubescent. Capsule compressed, ovoid, 2–2.5 × 1–1.2 cm. Fl. Jun–Aug, fr. Jul–Aug.

• Alpine meadows, open stony pastures, shaded places near forest margins; 2800–4000 m. SW Sichuan, NW Yunnan.

92. *Pedicularis connata* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 342. 1948.

连叶马先蒿 lian ye ma xian hao

Herbs perennial, 30–40 cm tall. Stems usually branched basally, pubescent or glabrescent. Leaves in whorls of 4, proximal ones sometimes opposite; petiole 4–5 cm, slender, bases often dilated, connate; leaf blade oblong-lanceolate, 9–10 × 2.5–3 cm, membranous, glabrous or glabrescent, pinnatisect; segments 8–11 pairs oblong-lanceolate, margin double dentate or lobed. Flowers axillary; bracts leaflike. Pedicel 1–2 mm. Calyx ca. 1.5 cm, 1/3 cleft anteriorly; lobes 2, lanceolate-oblong, 7–8 mm. Corolla yellow; tube erect, 1.7–2 cm; galea erect basally, ca. 1 cm; beak bent downward, 5–6 mm, slender; lower lip 1.3–1.8 cm; lobes 3, rounded, middle lobe smallest. 2 filaments sparsely villous and 2 glabrous or all pubescent. Fl. Jul–Aug, fr. Aug–Sep.

• Forests in valleys; 4000–4300 m. SW Sichuan, NW Yunnan.

43. Ser. *Cyathophyllae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 257. 1948.

斗叶系 dou ye xi

Stems erect, unbranched. Leaves in whorls of 3 or 4, pinnatisect. Bases of petioles and bracts greatly dilated, connate. Calyx 2–5-lobed. Corolla tube ca. 3 × as long as calyx; galea strongly deflexed; beak curved, slender.

• Two species: endemic to China.

1a. Galea not crested; middle lobe of lower corolla lip entire; calyx 2-lobed 93. *P. cyathophylla*

1b. Galea crested; middle lobe of lower corolla lip emarginate apically; calyx 3–5-lobed 94. *P. xiangchengensis*

93. *Pedicularis cyathophylla* Franchet, Bull. Soc. Bot. France 47: 25. 1900.

斗叶马先蒿 dou ye ma xian hao

Herbs perennial, 15–55 cm tall. Roots conical, with a tuft of fibrous roots near apex. Stems pubescent. Leaves in whorls of 3 or 4, petioles and bract bases greatly dilated, connate, cupular, to 5 cm high; leaf blade long elliptic, to 14 × 4 cm, abaxially sparsely ciliate along veins, pinnatisect; segments incised-dentate.

Inflorescences spicate; bracts leaflike apically, pinnatilobate, pubescent. Calyx ca. 1.5 cm, long pubescent, deeply cleft anteriorly; lobes 2, oblong-lanceolate, 2–3 mm, incised-serrate to entire. Corolla purple-red, 5–6 cm; tube bent at a right angle apically, 3.5–5(–6) cm × 2–2.5 mm, slender; galea strongly bent, not crested; beak curved inward, ca. 7 mm; lower lip wider than long, ± enveloping galea, middle lobe entire. Filaments pubescent throughout. Fl. May–Jul, fr. Jul–Aug.

• Alpine meadows; ca. 4700 m. SW Sichuan, NW Yunnan.

94. *Pedicularis xiangchengensis* H. P. Yang, Acta Phytotax. Sin. 28: 137. 1990.

乡城马先蒿 xiang cheng ma xian hao

Herbs perennial, 30–50 cm tall, ± drying black. Roots stout, woody. Stems 1–3, glabrescent. Basal leaves numerous, persistent; petiole 3–4 cm; leaf blade oblong to lanceolate-oblong, 8–10 cm, glabrescent, pinnatisect; segments 10–15 pairs, oblong, margin double dentate. Stem leaves in whorls of 4, similar to basal leaves but with much dilated and connate petioles. Inflorescences racemose, to 20–30 cm, interrupted; bracts leaflike, petioles strongly connate, cupular, to 2 cm high. Pedicel ca. 1 mm. Calyx oblong, ca. 1.5 cm, glabrescent, ca. 1/2 cleft anteriorly; lobes 3–5, small. Corolla purple-red, 3.5–4 cm; tube 2.5–3 cm, glabrous externally; galea nearly falcate apically, crested; beak slightly S-shaped, 6–7 mm; lower lip ca. 1.3 × 1.2 cm, ciliate, middle lobe emarginate apically. Filaments pubescent throughout. Capsule enclosed by accrescent calyx, ellipsoid-ovoid, slightly compressed, ca. 2 cm. Fl. Jul–Aug, fr. Aug–Sep.

• Gullies, forests on mountain slopes; 4100–4300 m. W Sichuan.

44. Ser. *Pedicularis*

沼生系 zhao sheng xi

Ser. *Palustres* Maximowicz.

Herbs not drying black. Stems 1 to several together, usually many branched apically. Stem leaves alternate or opposite, linear-lanceolate to ovate, pinnatifid to pinnatisect. Flowers loosely racemose. Calyx 2- or 3-lobed. Corolla tube slightly exceeding calyx; galea 1-toothed on each side at apex; lower lip ca. as long as galea.

Twelve species: arctic and subarctic regions of both hemispheres; three species in China.

This series was formerly treated as ser. *Palustres* Maximowicz that included the type of the genus *Pedicularis*, *P. sylvatica* Linnaeus.

1a. Leaves pinnatisect; calyx lobes serrate 95. *P. palustris*

1b. Leaves pinnatifid to pinnatipartite; calyx lobes entire.

2a. Leaves linear-lanceolate, segments serrate or double dentate apically 96. *P. labradorica*

2b. Leaves ovate to lanceolate-oblong, segments lobed or double dentate 97. *P. kiangsiensis*

95. *Pedicularis palustris* Linnaeus, Sp. Pl. 2: 607. 1753.

沼生马先蒿 zhao sheng ma xian hao

Herbs biennial, sometimes annual, 30–60 cm tall, subglabrous. Stems erect, usually many branched; branches rigid, alternate, rarely pseudo-opposite or pseudo-whorled. Leaves alternate or opposite, rarely whorled, short petiolate or sessile; leaf blade triangular-lanceolate to linear, subglabrous, pinnatisect; segments linear to lanceolate, pinnatifid to dentate. Inflorescences racemose; bracts leaflike. Pedicel 1–2 mm. Calyx 7–8 mm; lobes 2, crenate-serrate. Corolla purple, 1.3–2.5 cm; tube erect, nearly 2 × as long as calyx, glabrous; galea erect, with 1 subulate marginal tooth on each side at apex; lower lip slightly longer than galea, ciliate. Filaments glabrous. Capsule obliquely ovoid, apiculate. Fl. Aug, fr. Sep. 2n = 16.

Marshy places, swampy meadows, flat bogs, ditches; ca. 400 m. NW Heilongjiang, NE Nei Mongol, N Xinjiang [Kazakhstan, N Mongolia, Russia; C and N Europe].

1a. Corolla 1.8–2.5 cm; plants biennial

..... 95a. subsp. *palustris*

1b. Corolla 1.3–1.6 cm; plants annual 95b. subsp. *karoi*

95a. *Pedicularis palustris* subsp. *palustris*

沼生马先蒿(原亚种) zhao sheng ma xian hao (yuan ya zhong)

Pedicularis erecta Gilibert.

Plants biennial. Corolla 1.8–2.5 cm.

Marshy places. N Xinjiang [Kazakhstan, N Mongolia, Russia (European part); C and N Europe].

95b. *Pedicularis palustris* subsp. *karoi* (Freyn) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 117. 1963.

卡氏沼生马先蒿 ka shi zhao sheng ma xian hao

Pedicularis karoi Freyn, Oesterr. Bot. Z. 46: 26. 1896.

Plants annual. Corolla 1.3–1.6 cm.

Swampy meadows, flat bogs, watery ditches; ca. 400 m. NW Heilongjiang, NE Nei Mongol [Mongolia, Russia].

96. *Pedicularis labradorica* Wirsing, Eclog. Bot. 2: t. 10. 1778.

拉巴拉多马先蒿 la ba la duo ma xian hao

Pedicularis euphrasioides Stephan ex Willdenow; *P.*

euphrasioides var. *labradorica* (Houttuyn) Willdenow;

P. labradorica Houttuyn, not Wirsing; *P. labradorica* Wirsing var. *simplex* Hultén.

Herbs biennial, 10–30 cm tall. Stems erect, rigid, pubescent, many branched; branches alternate, rarely opposite. Leaves alternate or ± opposite; petiole 2–10 mm; leaf blade linear-lanceolate, 1.5–6 cm, abaxially glandular pubescent, adaxially glabrous, pinnatifid or only double dentate apically; segments serrate or distal ones double dentate. Inflorescences racemose; bracts leaflike. Pedicel ca. 1 mm. Calyx 6–7 mm, ± leathery, glabrous or sparsely pubescent, deeply cleft anteriorly; lobes 3, unequal, entire. Corolla yellow, sometimes galea tinged with red or purple, 1.8–2 cm; tube ca. 1/2 as long as calyx, glabrous; galea slightly curved apically, with 1 lanceolate marginal tooth on each side at apex; lower lip nearly as long as galea, ciliate. Filaments 2 pubescent, 2 glabrous. Capsule broadly lanceolate, apex acute. Fl. Aug, fr. Sep. 2n = 16.

Mossy and lichenous luxuriant heath and tundra; 300–900 m. NE Nei Mongol [Arctic and subarctic Asia, Europe, and North America].

97. *Pedicularis kiangsiensis* P. C. Tsoong & S. H. Cheng, Fl. Reipubl. Popularis Sin. 68: 119. 1963.

江西马先蒿 jiang xi ma xian hao

Herbs perennial, 70–80 cm tall. Stems erect, branched or not, with 2 lines of hairs. Leaves pseudo-opposite, often alternate apically; petiole 1–2.5 cm; leaf blade long ovate to lanceolate-oblong, 2–4 cm, abaxially subglabrous, adaxially sparsely pubescent, pinnatifid to pinnatipartite; segments 4–9 pairs, oblong to obliquely triangular-ovate, margin lobed or double dentate. Inflorescences racemose, short; bracts leaflike, shorter than flowers. Pedicel ± curved, densely pubescent. Calyx ca. 7 mm, glandular pubescent, deeply cleft anteriorly; lobes 2, equal, entire, apex acute. Corolla 2–2.2 cm; tube ca. 1.2 cm; galea falcate, 8–9 mm, with 1 fine marginal tooth on each side at apex; lower lip ca. 8 × 7 mm, ciliate. Filaments glabrous. Fl. Aug–Sep, fr. Sep–Oct.

•Rocks of sunny slopes, among shrubs on mountain summits; 1500–1700 m. Jiangxi (Wukung Shan), Zhejiang.

Ser. *Compactae* Maximowicz.

Plants ± woody. Stems usually many branched apically. Leaves alternate or sometimes opposite basally, ovate to linear-lanceolate, margin crenate and double dentate. Inflorescences racemose or flowers axillary; bracts sessile. Calyx deeply cleft anteriorly, 2-lobed. Corolla large; tube ca. 2 × as long as calyx or shorter; beak distinct.

Six species: North America, Asia, Europe; one species in China.

98. *Pedicularis resupinata* Linnaeus, Sp. Pl. 2: 608. 1753.

返顾马先蒿 fan gu ma xian hao

Herbs perennial, 30–70 cm tall, not drying black. Roots fascicled, fibrous. Stems often single, erect, many branched apically, sparsely pubescent or subglabrous. Stem leaves numerous, petiolate or uppermost sometimes sessile; petiole to 12 mm, glabrous or pubescent; leaf blade ovate to oblong-lanceolate, 2.5–5.5 × 1–2 cm, membranous to papery, glabrous or sparsely pubescent, base broadly cuneate to rounded, margin crenate or serrate, apex acuminate. Flowers axillary. Pedicel short or absent. Calyx 6–9 mm, glabrescent; lobes 2, broad, entire. Corolla pink to purple or yellowish, 2–2.5 cm; tube straight, 1.2–1.5 cm; galea falcate; beak conical, ca. 3 mm; lower lip slightly longer than galea, ciliate. Filaments 2 pubescent, 2 glabrous. Capsule obliquely oblong-lanceolate, 1.1–1.6 cm, slightly longer than calyx. Fl. Jun–Aug, fr. Jul–Sep. 2n = 16, 32.

Grassy slopes, open forests; 300–2000 m. Anhui, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Kazakstan, Korea, Mongolia, Russia].

- 1a. Plants sparsely pubescent to glabrous.
 - 2a. Corolla pink to purple; capsule obliquely oblong-lanceolate, slightly longer than calyx 98a. subsp. *resupinata*
 - 2b. Corolla yellowish; capsule obliquely linear-lanceolate, ca. 2 × as long as calyx or more 98b. subsp. *galeobdolon*
- 1b. Plants ± densely pubescent.
 - 3a. Leaves 2.5–3.5 cm; beak of corolla short, truncate 98c. subsp. *crassicaulis*
 - 3b. Leaves 4–5.5 cm; beak of corolla longer, conical 98d. subsp. *lasiophylla*

98a. *Pedicularis resupinata* subsp. *resupinata*

返顾马先蒿(原亚种) fan gu ma xian hao (yuan ya zhong)

Plants sparsely pubescent to glabrous. Corolla pink to purple. Capsule obliquely oblong-lanceolate, slightly longer than calyx.

Grassy slopes, open forests; 300–2000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Kazakstan, Korea, Mongolia, Russia].

98b. *Pedicularis resupinata* subsp. *galeobdolon* (Diels) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 121. 1963.

鼬臭返顾马先蒿 you xiu fan gu ma xian hao
Pedicularis galeobdolon Diels, Bot. Jahrb. Syst. 36 (Beibl. 82): 96. 1905; *P. resupinata* var. *galeobdolon* (Diels) H. Limpricht.

Plants glabrous. Leaves 3–5 cm. Corolla yellowish, beak ca. 2 mm. Capsule obliquely linear-lanceolate, ca. 2 × as long as calyx or more. Fl. May–Jul.

• W Hubei, S Shaanxi, E Sichuan.

98c. *Pedicularis resupinata* subsp. *crassicaulis* (Vaniot ex Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 121. 1963.

粗茎返顾马先蒿 cu jing fan gu ma xian hao

Pedicularis crassicaulis Vaniot ex Bonati, Bull. Acad. Int. Géogr. Bot. 13: 241. 1904; *P. resupinata* var. *crassicaulis* (Vaniot ex Bonati) H. Limpricht.

Plants densely pubescent. Leaves short, 2.5–3.5 cm. Corolla pink to purple; beak short, truncate. Capsule ovoid, ca. 1.2 cm. Fl. May–Jun.

• Guangxi, Guizhou, Hubei, Sichuan.

98d. *Pedicularis resupinata* subsp. *lasiophylla* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 402. 1963.

毛叶返顾马先蒿 mao ye fan gu ma xian hao

Plants densely pubescent. Leaves long, 4–5.5 cm. Corolla pink to purple; beak conical, long. Capsule obliquely oblong-lanceolate, 1.1–1.6 cm. Fl. Jul–Aug.

• Shaanxi.

46. Ser. *Carnosae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 77. 1890.

肉质系 rou zhi xi

Plants ± woody. Stems many branched apically or unbranched. Leaves alternate, ovate to linear-oblong, shallowly to deeply crenate. Inflorescences spicate, racemose, or axillary, usually short and compact; bracts sessile. Calyx 2-lobed or sometimes 4- or 5-lobed. Corolla tube less than 2 × as long as calyx; galea recurved apically; beak short, indistinct.

About 12 species: Bhutan, China, India, Nepal, Sri Lanka, Thailand; nine species in China.

1a. Calyx glabrous, lobes entire; leaves linear-lanceolate 99. *P. nigra*

1b. Calyx pubescent, lobes serrulate, serrate, or lobed; leaves ± ovate or oblong .

2a. Corolla 3.5–4.5 cm, tube ca. 2 cm.

3a. Calyx lobes ca. 1/2 as long as calyx tube; lower corolla lip longer than galea; leaves petiolate 100. *P. lunglingensis*

3b. Calyx lobes ca. 1/3 as long as calyx tube or less; lower corolla lip shorter than galea; leaves ± sessile

..... 101. *P. gagnepainiana*

2b. Corolla 2.5–3.5 cm, tube to 1.8 cm.

4a. Leaves to 10 × 2.5 cm, petiole distinct; calyx deeply cleft anteriorly, lobes narrow ... 102. *P. veronicifolia*

4b. Leaves to 6 × 1.5 cm, petiole short or absent; calyx scarcely cleft anteriorly, lobes wider.

5a. Lower corolla lip wider than long or nearly equal; beak of galea 2–3 mm.

6a. Calyx lobes 4; filaments 2 pubescent; beak of galea ca. 2 mm 106. *P. crenata*

6b. Calyx lobes 5; filaments glabrous; beak of galea ca. 3 mm 107. *P. gyirongensis*

5b. Lower corolla lip longer than wide; beak of galea 1–1.5 mm.

7a. Corolla tube 0.8–1.1 cm, slightly exceeding calyx; filaments glabrous 103. *P. koueytchensis*

7b. Corolla tube ca. 1.8 cm, 1.5–2 × as long as calyx; filaments pubescent.

8a. Leaves ca. 4 cm × 12 mm, ca. 10-crenate on each side 104. *P. crenularis*

8b. Leaves 2–3.5 cm × 6–9 mm, 12- or 13-crenate on each side 105. *P. tsiangii*

99. *Pedicularis nigra* (Bonati) Vaniot ex Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 130. 1904.

黑马先蒿 *hei ma xian hao*

Pedicularis collettii Prain var. *nigra* Bonati, Bull. Acad. Int. Géogr. Bot. 13: 240. 1904; *P. tongchouanensis* Bonati.

Herbs perennial, to 70 cm tall, glabrous, drying black. Rootstock fleshy. Stems erect, rigid, branched or not. Leaves alternate, occasionally pseudo-opposite; petiole to 10 cm; leaf blade often linear-lanceolate, to 7 cm × 9 mm, abaxially sparsely pubescent, adaxially densely hispidulous, long attenuate at both ends, finely double dentate. Inflorescences spicate; bracts leaflike. Calyx 1–1.5 cm, 1/2 cleft anteriorly, glabrous; lobes 2, triangular, ± entire. Corolla violet-red, 2.8–3.5 cm, sparsely fine pubescent; tube straight, to 2.2 cm; galea falcate, to 1.5 cm; beak scarcely conspicuous; lower lip to 1.4 × 1.1 cm, erose-serrulate. Filaments sparsely pubescent. Capsule obliquely lanceolate, ca. 1.4 cm × 4.5 mm, slightly longer than calyx, apex acute. Seeds black, triangular-ovoid, ca. 1.2 mm. Fl. Jul–Oct, fr. Aug–Nov. • Grassy slopes; 1100–2300 m. Guizhou, E and S Yunnan [N Thailand].

100. *Pedicularis lunglingensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 160. 1926.

龙陵马先蒿 *long ling ma xian hao*

Herbs perennial, 10–15 cm tall, hirsute throughout. Stems erect or ascending, often branched; branches slender, 5–7 cm. Leaf petiole 5–7 mm; leaf blade ovate-oblong to narrowly oblong, 2–3 × 0.6–1.5 cm, fleshy, base broadly cuneate, pinnatifid; segments elliptic, crenate. Flowers axillary, sessile; bracts leaflike, longer than calyx. Calyx 1–1.2 cm, cleft anteriorly, densely villous; lobes 2, ca. 1/2 as long as tube, incised-serrulate. Corolla red or purple, 3.5–4 cm, glabrous; tube straight, ca. 2 cm; galea falcate, 1–1.5 cm; beak ca. 1 mm, truncate; lower lip longer than galea, to 1.6 cm,

glabrous. Filaments sparsely long pubescent to subglabrous. Fl. Sep–Oct, fr. Oct–Nov.

• Grassy slopes; 1200–1500 m. S Yunnan.

101. *Pedicularis gagnepainiana* Bonati, Arch. Bot. Bull. Mens. 1: 218. 1927.

嘎氏马先蒿 *ga shi ma xian hao*

Herbs perennial, to 30 cm tall. Stems many branched at middle, densely red-brown pubescent. Leaves ± sessile, ovate-oblong, 2–4 × 1–1.5 cm, fleshy, long pubescent along midvein, entire or incised-serrulate, apex obtuse. Cymes corymbose; bracts sessile, triangular, shorter than flowers, pubescent. Calyx to 1.5 cm, fleshy, ciliate, nearly 1/2 cleft anteriorly; lobes 2, ca. 1/3 as long as tube or less, broadly ovate to rounded, double serrulate. Corolla rose, 4–4.5 cm, glabrous; tube ca. 2 cm; galea falcate, more than 2 cm; beak short; lower lip slightly shorter than galea, glabrous. Filaments sparsely pubescent. Fl. Oct, fr. Nov.

• W Guizhou.

102. *Pedicularis veronicifolia* Franchet, Bull. Soc. Bot. France 47: 30. 1900.

地黄叶马先蒿 *di huang ye ma xian hao*

Herbs perennial, to 60 cm tall. Rootstock fleshy. Stems erect, many branched or unbranched, finely pubescent or glabrescent. Leaves petiolate; leaf blade obovate to rhomboid-lanceolate, 4–10 × 1–2.5 cm, hispid on both surfaces, base long attenuate, pinnatifid or double crenate, apex rounded to attenuate. Inflorescences racemose, more than 10 cm, interrupted basally; bracts broadly ovate to oblong-ovate. Calyx ca. 1.2 cm, densely hispidulous, long pubescent along veins, deeply cleft anteriorly; lobes 2(or 3), narrow, distinctly serrulate. Corolla pale rose, 2.4–3 cm; tube 1.4–1.5 cm, glabrous; galea falcate, 1.1–1.4 cm; beak to 2 mm, truncate; lower lip ca. 1 cm. Filaments villous. Capsule obliquely lanceolate-ovoid, 1.1–1.3 cm, apex acute. Fl. Aug–Oct, fr. Sep–Nov.

• Grassy slopes, forests; 1000–2600 m. NW and SW Sichuan, E and S Yunnan.

103. *Pedicularis koueytchensis* Bonati, Arch. Bot. Bull. Mens. 1: 217. 1927.

滇东马先蒿 dian dong ma xian hao

Herbs perennial, 10–30 cm tall, not drying black. Rootstock fleshy. Stems single, erect, branched apically or unbranched, densely woolly pubescent. Proximal leaves petiolate, distal ones sessile; petiole to 1 cm; leaf blade ovate-oblong, 2–2.5 × 0.8–1.2 cm, fleshy, densely pubescent on both surfaces, pinnatifid; segments 7–9 pairs, dentate, teeth callose. Inflorescences short racemose or spicate, 6–10-flowered; bracts 1–1.4 cm × 5–7 mm, pubescent. Pedicel short or ± absent. Calyx 1–1.1 cm, membranous, villous; lobes 2, rounded, ca. 1/4 as long as tube, serrulate. Corolla purple-red, 2–2.5 cm; tube 8–11 mm, slightly exceeding calyx; galea falcate, 1.3–1.5 cm; beak ca. 1.5 mm, erose, truncate; lower lip longer than galea, 1.3–1.4 × 1.1–1.3 cm. Filaments glabrous. Fl. Jul–Oct, fr. Sep–Oct.

• Stony mountain pastures; 2700–3400 m. E Yunnan.

104. *Pedicularis crenularis* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 48. 1949.

细波齿马先蒿 xi bo chi ma xian hao

Herbs ca. 30 cm tall. Stems single, branched apically, densely pubescent. Leaves ± sessile, linear-oblong, ca. 4 × 1.2 cm, ± fleshy, abaxially densely villous, adaxially tomentose, base rounded or subcordate, pinnatilobate; segments rounded, 10-crenate on each side, apex acute. Inflorescences spicate, 3.5–5 cm; bracts leaflike, ca. 1.5 cm × 4–6 mm, densely pubescent on both surfaces. Flowers ± dense. Calyx cylindrical, densely pubescent, deeply cleft anteriorly; lobes 2, flabellate, serrate. Corolla rose, ca. 3 cm, glabrous; tube erect, ca. 1.8 cm; galea falcate apically, ca. 1.2 cm; beak conical, barely 1 mm, apex truncate; lower lip ca. as long as galea, glabrous. Filaments sparsely long pubescent. Capsule obliquely lanceolate, ca. 1.3 cm × 4.5 mm. Fl. and fr. Oct.

• W Yunnan.

105. *Pedicularis tsiangii* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 47. 1949.

蒋氏马先蒿 jiang shi ma xian hao

Herbs ca. 35 cm tall. Stems erect, branched basally, densely pubescent. Leaves ± sessile, linear-oblong, 2–3.5 cm × 6–9 mm, ± fleshy, pubescent on both surfaces, base rounded or subcordate, 12- or 13-crenate on each side, apex acute. Inflorescences spicate, to 8 cm; bracts ovate-oblong, ca. 2 cm × 6 mm, pubescent on both surfaces, crenate. Flowers ± dense. Calyx cylindrical, ca. 1.2 cm × 3 mm, membranous, pubescent, deeply cleft anteriorly; lobes 2, flabellate, serrate. Corolla rose, ca. 3.5 cm, glabrous; tube erect, ca. 1.8 cm; galea straight basally, strongly falcate apically, ca. 1.7 cm; beak barely 1 mm, apex truncate; lower lip ca. as long as galea, glabrous. Filaments sparsely pubescent. Fl. Oct, fr. Nov.

• Open hillsides; ca. 500 m. SW Guizhou.

106. *Pedicularis crenata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 559. 1888.

波齿马先蒿 bo chi ma xian hao

Herbs perennial, 20–35 cm tall, base ± woody, densely gray pubescent, not drying black. Stems erect, leafy, not or sometimes 2- or 3-branched; branches forked or ascending. Leaves short petiolate (barely 1 mm) to ± sessile; leaf blade linear-oblong, sometimes ovate-elliptic basally, 2–6 × 0.3–1.8 cm, ± fleshy, densely tomentose on both surfaces, base attenuate to subcordate-clasping, double crenate, teeth callose, apex obtuse. Inflorescences short racemose, many flowered, interrupted basally; bracts leaflike, ovate, longer than calyx. Pedicel 1.5–2 mm, hispid. Calyx ca. 1.1 cm; tube to 1.8 cm, membranous, densely villous, scarcely cleft anteriorly; lobes 2(or 4), serrate. Corolla red or purple, 2.2–2.4 cm; tube erect, exceeding calyx; galea recurved apically; beak ca. 2 mm, apex truncate; lower lip 0.9–1 × 1.1–1.4 cm, slightly longer than galea, ciliate. Filaments 2 sparsely pubescent, 2 glabrous. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine meadows, grassy slopes, among limestone rocks; 2600–3400 m. NW Yunnan.

1a. Leaves 2–6 × 0.3–1.8 cm, base attenuate to rounded 106a. subsp. *crenata*

1b. Leaves ca. 2 × 0.7–0.8 cm, base subcordate-clasping or rarely broadly cuneate 106b. subsp. *crenatiformis*

106a. *Pedicularis crenata* subsp. *crenata*

波齿马先蒿(原亚种) bo chi ma xian hao (yuan ya zhong)

Leaves 2–6 × 0.3–1.8 cm, base attenuate to rounded. Fl. Aug–Sep, fr. Oct.

• Alpine meadows, grassy slopes; 2600–3000 m. NW Yunnan.

106b. *Pedicularis crenata* subsp. *crenatiformis* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 129. 1963.

全裂波齿马先蒿 quan lie bo chi ma xian hao

Pedicularis crenata var. *crenatiformis* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 159. 1926.

Leaves ca. 2 cm × 7–8 mm, base subcordate-clasping or rarely broadly cuneate. Fl. Aug, fr. Sep.

• Among limestone rocks; 3300–3400 m. NW Yunnan.

107. *Pedicularis gyirongensis* H. P. Yang, Bull. Bot. Res., Harbin 2(4): 138. 1982.

吉隆马先蒿 ji long ma xian hao

Herbs perennial, 20–30 cm tall, white villous, drying black. Stems erect, many branched; branches slender, ascending. Leaves few; petiole 1–7 mm; leaf blade obovate-oblong to elliptic-oblong, 1–4 cm, fleshy, densely villous on both surfaces, base cuneate or rounded, margin double dentate, apex obtuse.

Inflorescences racemose, elongating in fruit, many flowered; bracts leaflike, longer than calyx. Pedicel barely 4 mm, slender. Calyx cylindric, ca. 7 mm, membranous, distinctly villous, 1/3 cleft anteriorly; lobes 5, unequal, serrate. Corolla red, ca. 1.8 cm; tube erect, exceeding calyx; galea nearly bent at a right angle

apically, front very elevated, densely pubescent; beak ca. 3 mm, slender; lower lip ca. 1.2 × 1.8 cm, ciliate. Filaments glabrous. Capsule narrowly ovoid, ca. 1 cm, short apiculate. Fl. and fr. Aug–Sep.

- Mixed forests on hillsides; ca. 2400 m. S Xizang (Gyirong).

47. Ser. Microphyllae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 76. 1890.

小叶系 xiao ye xi

Stems erect or branches diffuse basally, many branched or unbranched. Leaves alternate, lanceolate-oblong, pinnatifid to pinnatisect. Inflorescences racemose or subcapitate. Pedicel short. Calyx deeply cleft anteriorly; lobes (3 or)5, equal, serrate. Corolla tube ca. 2 × as long as calyx; galea curved; beak short or obscure.

Five species: China, India, Laos, Vietnam; three species in China.

1a. Leaves 1- or 2-pinnatisect, segments pinnatifid, lanceolate-oblong to linear-lanceolate; galea long, apex with

an obscure beak; pedicels barely 1 mm 108. *P. tenuisecta*

1b. Leaves 1-pinnatisect or pinnatifid, segments ovate to oblong, crenate to pinnatifid; galea shorter, apex with a

conspicuous beak; pedicels 3–6 mm.

2a. Corolla 1.8–2.5 cm; beak of galea ca. 1.5 mm; lower lip glabrous 109. *P. henryi*

2b. Corolla 2.5–3 cm; beak of galea ca. 3 mm; lower lip sparsely ciliate 110. *P. labordei*

108. *Pedicularis tenuisecta* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 558. 1888.

纤裂马先蒿 xian lie ma xian hao

Herbs perennial, 30–60 cm tall, drying black. Stems 1 to several, erect, rigid, leafy, sometimes many branched, densely pubescent. Leaves sessile, ovate-elliptic to lanceolate-oblong, 1–3 cm × 3–15 mm, pubescent on both surfaces, 1- or 2-pinnatisect; segments ca. 10 pairs, lanceolate-oblong to linear-lanceolate, pinnatifid. Inflorescences racemose, to 20 cm, many flowered; bracts leaflike, longer than calyx, shorter than flowers. Pedicel barely 1 mm. Calyx ovoid, 6–9 mm, deeply cleft anteriorly, sparsely pubescent; lobes 5, serrate. Corolla purple-red, 1.5–2.4 cm; tube slightly bent basally, ca. 2 × as long as calyx tube, expanded apically; galea curved at middle, apex obtuse or truncate; beak obscure; lower lip shorter than galea, to 1.1 cm. Filaments sparsely villous. Capsule obliquely lanceolate-ovoid, ca. 1.1 cm × 4.5 mm. Fl. Aug–Sep, fr. Sep–Nov.

Alpine meadows in coniferous forests; 1500–3700 m. W Guizhou, SW Sichuan, NW Yunnan [Laos].

109. *Pedicularis henryi* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 560. 1888.

亨氏马先蒿 heng shi ma xian hao

Herbs perennial, 16–35 cm tall, drying black. Stems ascending, often several, ± diffuse at base, leafy, densely rust colored pubescent. Leaf petiole 0.5–1.5 cm, slender, pubescent; leaf blade oblong-lanceolate to linear-oblong, 1.5–3.4 cm × 5–8 mm, papery, pubescent on both surfaces, 1-pinnatisect; segments 6–12 pairs, oblong to ovate, dentate, teeth white and callose. Inflorescences racemose, to 20 cm, often interrupted

basally. Pedicel 3–5 mm, slender, densely pubescent. Calyx to 8 mm, 1/2–2/3 cleft anteriorly; lobes (3 or)5, unequal, pubescent, serrate. Corolla purplish red, 1.8–2.5 cm; tube straight, 0.9–1.3 cm; galea curved apically; beak ca. 1.5 mm, apex shallowly 2-cleft; lower lip ca. as long as or slightly longer than galea, glabrous. Filaments densely villous. Capsule obliquely lanceolate-ovoid, to 1.6 cm × 4.5 mm, short apiculate. Fl. May–Sep, fr. Aug–Nov.

• Open mountain slopes, meadows, open forests; 400–1400 m. N Guangdong, NW Guangxi, W Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Yunnan, Zhejiang [Laos, Vietnam].

110. *Pedicularis labordei* Vaniot ex Bonati, Bull. Acad. Int. Géogr. Bot. 13: 242. 1904.

拉氏马先蒿 la shi ma xian hao

Pedicularis stapfii Bonati.

Herbs perennial. Stems procumbent to ascending, numerous, many branched, pubescent. Leaves alternate, sometimes ± opposite; petiole 5–10 mm, densely long white pubescent; leaf blade oblong, 2–4.5 cm, pubescent on both surfaces, pinnatifid or sometimes 1-pinnatisect; segments 5–8 pairs, ovate-lanceolate to triangular-ovate, pinnatifid or incised-double dentate. Inflorescences subcapitate, 2.5–3 cm; bracts leaflike, shorter than flowers. Pedicel 5–6 mm, slender, long pubescent. Calyx 1–1.2 cm, 1/2 cleft anteriorly, densely villous along veins; lobes 5, unequal to ± equal, flabellate, serrate. Corolla purple-red, 2.5–3 cm; tube slightly curved at middle, ca. 1.5 cm, expanded apically; galea nearly rectangularly bent apically, front elevated; beak ca. 3 mm; lower lip ca. 1 × 1.4 cm, sparsely ciliate. Filaments long pubescent. Capsule obliquely narrowly ovoid, ca. 1.1 cm × 5 mm, slightly exceeding calyx, apiculate. Fl. Jul–Sep, fr. Aug–Oct.

- Alpine meadows; 2800–3500 m. NW Guizhou, SW Sichuan, E and NW Yunnan.

48. Ser. Polyphyllatae Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 121. 1921.

多叶系 duo ye xi

Stems erect or somewhat prostrate, usually many branched. Stem leaves alternate or sometimes opposite, many, short petiolate, ovate to oblong, pinnatifid to pinnatisect. Inflorescences short racemose or capitate. Pedicel well developed. Calyx deeply cleft anteriorly, (3 or)5-lobed. Corolla tube ca. as long as or slightly longer than calyx, straight; galea often dentate; beak slender.

- Five species: endemic to China.

1a. Corolla tube 1.5–1.7 cm.

2a. Galea not marginally toothed; calyx more than 1/2 cleft anteriorly; filaments glabrous . 114. *P. limprichtiana*

2b. Galea marginally 2-toothed; calyx shallowly cleft anteriorly; filaments pubescent 115. *P. kariensis*

1b. Corolla tube less than 1 cm.

3a. Beak of galea bent upward; middle lobe of lower corolla lip rounded, apex not emarginate; leaves pinnatifid

..... 111. *P. pinetorum*

3b. Beak of galea straight or bent downward; middle lobe of lower corolla lip often ovate, apex emarginate;

leaves pinnatipartite to pinnatifid.

4a. Leaf segments 5–11 pairs; filaments villous 112. *P. gruina*

4b. Leaf segments 4 or 5 pairs; filaments 2 densely pubescent 113. *P. stadlmanniana*

111. *Pedicularis pinetorum* Handel-Mazzetti, Symb. Sin. 7: 861. 1936.

松林马先蒿 song lin ma xian hao

Herbs perennial, 21–35 cm tall. Roots fascicled, fleshy. Stems single, long white pubescent. Leaves alternate, ± forming a basal rosette; petiole to 1.3 cm, distal ones ± sessile; leaf blade elliptic or oblong, 2–5.5 cm × 5–14 mm, sparsely long pubescent on both surfaces, pinnatifid; segments 6–9 pairs, callose-serrate. Inflorescences racemose, to 18 cm, interrupted basally; bracts leaflike, more than 1 cm apically. Pedicel barely 5 mm, slender. Calyx campanulate, ca. 1 cm; lobes 5, unequal, serrate. Corolla red, 1.6–1.8 cm; tube ca. as long as calyx, glabrous; galea slightly falcate, glandular; beak bent upward, ca. 5 mm, marginally 2-toothed; lower lip ca. 1 × 2 cm, middle lobe rounded, apex not emarginate. Filaments sparsely pubescent apically. Fl. Aug, fr. Sep–Oct.

- *Pinus* forests; 2500–2800 m. NW Yunnan.

112. *Pedicularis gruina* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 536. 1888.

鹤首马先蒿 he shou ma xian hao

Herbs perennial, 15–40 cm tall, drying black, sparsely to densely pubescent. Stems often several, usually many branched; branches erect or procumbent basally, sparsely pubescent. Leaves alternate; petiole short; leaf blade ± ovate-oblong, to 2 cm × 8 mm, pubescent on both surfaces, pinnatipartite to pinnatifid; segments 5–11 pairs, oblong, incised-double dentate, teeth callose. Inflorescences short racemose or subcapitate to long racemose. Pedicel 0.5–1.6 cm, slender, pubescent. Calyx 7–10 mm, 1/3–1/2 cleft anteriorly; lobes 5, unequal, densely rust colored pubescent, serrate. Corolla red to purplish red, 1.5–2 cm; tube erect, 7–10 mm; galea bent at a right angle apically, shaped like ibis head, dentate or protuberant on each side of margin;

beak filiform, ca. 5 mm; lower lip longer than galea, ca. 1 × 1.6 cm, middle lobe smaller than lateral lobes, apex emarginate. Filaments densely villous. Capsule ovoid, 1–1.2 cm × 5–6 mm, apex acute. Fl. Jul–Oct, fr. Sep–Oct.

- Alpine meadows, mixed forests, damp soil by gully margins, mountainsides; 2600–3000 m. NW Yunnan.

1a. Leaves and flowers densely arranged; inflorescence longer, racemose 112c. subsp. *polyphylla*

1b. Leaves and flowers ± laxly arranged; inflorescences short racemose or subcapitate.

2a. Plants sparsely pubescent; leaves to 2 × 0.8 cm, pinnatipartite to pinnatisect 112a. subsp. *gruina*

2b. Plants densely pubescent; leaves to 10 × 3.3 cm, pinnatifid 112b. subsp. *pilosa*

112a. *Pedicularis gruina* subsp. *gruina*

鹤首马先蒿(原亚种) he shou ma xian hao (yuan ya zhong)

Pedicularis gruina var. *laxiflora* Franchet.

Plants sparsely pubescent. Leaves ± laxly arranged, to 2 cm × 8 mm, pinnatipartite to pinnatisect. Inflorescences short racemose or subcapitate, ± laxly arranged.

- Alpine meadows, mixed forests, damp soil by gully margins; 2600–3000 m. NW Yunnan.

112b. *Pedicularis gruina* subsp. *pilosa* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 136. 1963.

多毛鹤首马先蒿 duo mao he shou ma xian hao

Pedicularis polyphylla Franchet ex Maximowicz var. *pilosa* Bonati, Notes Roy. Bot. Gard. Edinburgh 5: 80. 1911; *P. gruina* var. *cinerascens* Franchet ex H. L. Li; *P. margaritae* Bonati; *P. polyphylloides* Bonati.

Plants densely pubescent. Leaves ± laxly arranged, to 10 × 3.3 cm, pinnatifid. Inflorescences short racemose or subcapitate, ± laxly arranged. Fl. Sep–Oct.

• Mountainsides; ca. 2600 m. NW Yunnan.

112c. *Pedicularis gruina* subsp. ***polyphylla*** (Franchet ex Maximowicz) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 136. 1963.

多叶鹤首马先蒿 *duo ye he shou ma xian hao*

Pedicularis polyphylla Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 543. 1888; *P. gruina* var. *polyphylla* (Franchet ex Maximowicz) H. L. Li.

Plants sparsely pubescent. Leaves densely arranged. Inflorescences densely arranged, long racemose, to 24 cm. Fl. Jul.

• Alpine meadows; 2800–3000 m. NW Yunnan.

Holmgren suggests that the differences between the three infra-specific taxa may be due to normal variation.

113. *Pedicularis stadlmanniana* Bonati, Notes Roy. Bot. Gard. Edinburgh 5: 87. 1911.

施氏马先蒿 *shi shi ma xian hao*

Herbs low, 6–10 cm tall. Roots fibrous. Stems prostrate, several, branching basally. Leaves alternate; petiole 1–1.5 cm, densely reddish ciliate; leaf blade broadly ovate, 1.5–2 × 1.5–2 cm, pinnatifid; segments 4 or 5 pairs, anterior linear, posterior triangular, apex obtuse, incised-dentate. Flowers alternate; bracts leaflike. Pedicel erect, 0.5–2 cm. Calyx campanulate, 1/2 cleft anteriorly; tube membranous, white villous; lobes 5, unequal, leaflike. Corolla pale rose, ca. 1.8 cm; tube 7–8 mm, slightly exceeding calyx; galea curved apically, pubescent abaxially, marginally 2-toothed; beak filiform, ca. 7 mm; lower lip longer than galea, ciliate; middle lobe emarginate. Filaments pubescent, anterior pair more densely so. Fl. Jul, fr. Aug–Sep.

• Grassy openings in *Pinus* forests; 2400–3100 m. C and NW Yunnan.

114. *Pedicularis limprichtiana* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 62: 239. 1925.

林氏马先蒿 *lin shi ma xian hao*

49. Ser. *Furfuraceae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 75. 1890.

糠秕系 *kang bi xi*

Ser. *Talienses* H. L. Li.

Stems branched basally or unbranched, not drying black. Leaves mostly on stem, alternate, long petiolate; leaf blade often ovate or elliptic, large, pinnatifid to pinnatisect; segments few. Inflorescences laxly racemose or axillary. Calyx deeply to shallowly cleft anteriorly, (2–)5-lobed. Corolla tube ca. as long as to 2 × as long as calyx; beak of galea slender.

Five species: Bhutan, China, India, Myanmar, Nepal, Sikkim; all five in China.

1a. Leaves ± ovate or orbicular, pinnatifid to pinnatipartite.

2a. Middle lobe of lower corolla lip not emarginate apically; calyx slightly cleft anteriorly, lobes large 119. *P. pantlingii*

2b. Middle lobe of lower corolla lip emarginate apically; calyx usually deeply cleft anteriorly, lobes smaller

..... 120. *P. furfuracea*

1b. Leaves ± oblong to lanceolate, pinnatisect to pinnatipartite.

3a. Leaf segments 3–5 pairs; filaments sparsely pubescent 116. *P. taliensis*

3b. Leaf segments 5–10 pairs; all filaments glabrous or 2 pubescent.

Herbs perennial, 8–20 cm tall. Stems 1 to several, central stem erect, outer stems usually procumbent to ascending, longer, often long branched, white pubescent. Leaves alternate or sometimes proximal ones opposite; petiole 3–8 mm, pubescent; leaf blade oblong, 1.5–5 cm × 4–8 mm, abaxially densely pubescent along veins, adaxially sparsely pubescent, pinnatipartite; segments 8–12 pairs, oblong, incised-dentate. Inflorescences subcapitate, remotely axillary; bracts leaflike. Pedicel ca. 8 mm, slender. Calyx tube ca. 8 mm, more than 1/2 cleft anteriorly; lobes (3 or)5, leaflike. Corolla rose, glabrous; tube ca. 1.5 cm, expanded apically; galea ca. 5 mm, curved at 40°, lacking marginal teeth; beak bent downward, filiform, ca. 4 mm; lower lip ca. 8 mm × 1.5 cm, sparsely ciliate, middle lobe apex emarginate. Filaments glabrous. Capsule narrowly ovoid, ca. as long as calyx, apex acuminate. Fl. Aug–Sep, fr. Sep–Oct.

• Stony meadows, margins of bamboo groves; 2100–3400 m. SW Sichuan, NE Yunnan.

115. *Pedicularis kariensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 120. 1921.

卡里马先蒿 *ka li ma xian hao*

Herbs perennial, 7–8 cm tall. Roots clavate, very elongated. Stems flexuous, stout, angled, woolly, branched. Basal leaves withering early. Stem leaves few, alternate; petiole ca. 1 mm, villous; leaf blade ovate-oblong, 2.5–3 × ca. 1.5 cm, 2-pinnatipartite; segments 3 or 4 pairs, alternate, incised-dentate. Inflorescences capitate, axillary. Pedicel 1–2 mm. Calyx cylindric, shallowly cleft anteriorly, membranous; lobes 5, 3–4 mm, unequal, posterior one sublinear and entire, lateral lobes flabellate, deeply serrate. Corolla deep rose, ca. 2.5 cm; tube curved, 1.5–1.7 cm, expanded apically, externally glabrous; galea falcate, marginally 1-toothed on each side, glabrous abaxially; beak straight; lower lip ca. 2 × 2.5 cm, ciliate. Filaments long pubescent. Fl. Aug, fr. Sep.

• Open moist stony pastures; 3900–4100 m. NW Yunnan.

- 4a. Calyx 1/2–1/3 cleft anteriorly; lower corolla lip ciliate; galea without auriculate protuberance on each side of margin; all filaments glabrous 117. *P. microcalyx*
 4b. Calyx slightly cleft anteriorly; lower corolla lip not ciliate; galea with auriculate protuberance on each side of margin; filaments 2 pubescent 118. *P. hemsleyana*

116. *Pedicularis taliensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 5: 87. 1911.
 大理马先蒿 da li ma xian hao

Herbs perennial, 15–20 cm tall. Main root stout. Stems soft, erect or ascending, single to several, glabrous or with lines of hairs. Basal leaves withering early. Stem leaves alternate, glabrous; petiole 4–10 mm; leaf blade ovate-oblong, ca. 2 × 1.5 cm, pinnatisect; segments 3–5 pairs, widely spaced, linear-oblong, pinnatifid, dentate, teeth callose. Flowers solitary in leaf axils, widely spaced. Pedicel erect, ca. 2 mm. Calyx campanulate, 3–4 mm, villous, not reticulate, slightly cleft anteriorly; lobes 5–7, triangular, small, sometimes obscure, entire, or the posterior lobe 2- or 3-toothed. Corolla pale rose, ca. 1 cm; tube erect, slightly longer than calyx, expanded apically; galea bent at a right angle apically, pubescent abaxially; beak ± bent downward, ca. 3 mm; lower lip ca. as long as galea, long ciliate, middle lobe hoodlike apically. Filaments sparsely pubescent. Capsule prism-shaped, 2–2.5 × as long as calyx. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows, margins of *Pinus* forests; 2700–3400 m. NW Yunnan.

117. *Pedicularis microcalyx* J. D. Hooker, Fl. Brit. India 4: 315. 1884.
 小萼马先蒿 xiao e ma xian hao

Herbs perennial, 10–40 cm tall. Stems slender and flexuous, glabrous or with 2 lines of hairs, branched basally or unbranched. Basal leaves few, withering early; petiole 6–8 cm. Stem leaves few, alternate; petiole 1.5–3 cm; leaf blade lanceolate, 2.5–6 × 1–1.5 cm, abaxially scurfy, adaxially glabrous, pinnatipartite and pinnatisect basally; segments 8–10 pairs, oblong-lanceolate, pinnatifid and dentate. Inflorescences racemose; bracts leaflike. Pedicel 1–10 mm. Calyx campanulate, ca. 5.5 mm, membranous, 1/3–1/2 cleft anteriorly; lobes 5, unequal. Corolla purplish red; tube 6–9 mm, ca. 2 × as long as calyx; galea bent at a right angle apically, lacking auriculate protuberance at margin; beak bent slightly downward, ca. 5.5 mm; lower lip ciliate. Filaments glabrous. Capsule lanceolate, more than 2 × as long as calyx, apex acute. Fl. Jun–Aug, fr. Jul–Aug.

3700–4500 m. S Xizang [Bhutan, India, Nepal, Sikkim].

118. *Pedicularis hemsleyana* Prain, Hooker's Icon. Pl. 23: t. 2210. 1892.

汉姆氏马先蒿 han mu shi ma xian hao

Herbs perennial, ca. 45 cm tall, glabrous. Stems erect or ± ascending. Leaves few; basal leaves withering early. Stem leaves alternate; petiole 1.5–3 cm; leaf blade ovate-oblong, 6–8 cm, abaxially scurfy, adaxially glabrous, pinnatipartite to pinnatisect; segments 5–8 pairs, oblong, margin double dentate. Inflorescences racemose, lax; bracts leaflike. Pedicel ca. 3 mm. Calyx narrowly campanulate, ca. 4.5 × 2.25 mm, membranous, slightly cleft anteriorly; lobes 5, unequal. Corolla purplish red; tube erect, 5–6 mm, ca. 2 × as long as calyx tube, expanded apically; galea bent at a right angle apically, with auriculate protuberance on each side of margin; beak straight or sometimes decurved, ca. 4 mm; lower lip ca. 7 × 7.5 mm, not ciliate. Filaments 2 pubescent, 2 glabrous.

• 2900–4000 m. W Sichuan.

119. *Pedicularis pantlingii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 273. 1889.

潘氏马先蒿 pan shi ma xian hao

Herbs perennial, to 30–60 cm tall. Stems often several, densely pubescent apically, branched apically or unbranched; branches slender, pubescent. Leaves alternate; petiole 1–6 cm, pubescent; leaf blade ovate or triangular-ovate, sometimes orbicular, 2.5–5 × 1.5–3 cm, abaxially white scurfy, adaxially sparsely pubescent, pinnatifid to pinnatipartite; segments 3–5 pairs, ovate to triangular-ovate, dentate. Inflorescences racemose, interrupted basally; bracts leaflike. Pedicel 1.5–3 mm, elongating in fruit. Calyx campanulate, 6–8 mm, slightly cleft anteriorly, yellow pubescent; lobes 5, unequal or ± equal in size, large. Corolla pale purple or pink, to ca. 1.7 cm; tube ca. 8 mm, ca. as long as or longer than calyx, slightly expanded apically; galea bent at a right angle apically; beak 5–6 mm; lower lip ciliate or glabrous, middle lobe rounded or triangular. Filaments 2 sparsely pubescent, 2 glabrous. Capsule triangular-lanceolate, 1.5–2 cm. Seeds ovoid, ca. 1.5 mm. Fl. Jul–Aug, fr. Aug–Sep.

Wet boggy places, wet banks in dense mixed forests, alpine meadows; 3500–4200 m. S and SE Xizang, NW Yunnan [Bhutan, India (Darjeeling), Myanmar, Nepal, Sikkim].

- 1a. Plants to 30–60 cm tall; leaves 2.5–5 cm; corolla ca. 1.7 cm; calyx lobes unequal; lower corolla lip ciliate, middle lobe rounded 119a. subsp. *pantlingii*
 1b. Plants barely 30–35 cm tall; leaves ca. 2 cm; corolla barely 1.2 cm; calyx lobes ± equal;

lower corolla lip not ciliate, middle lobe triangular 119b. subsp. *chimiliensis*

119a. *Pedicularis pantlingii* subsp. *pantlingii*
潘氏马先蒿(原亚种) pan shi ma xian hao (yuan ya zhong)
Pedicularis furfuracea Wallich var. *integrifolia* J. D. Hooker.
Plants to 30–60 cm tall. Leaves 2.5–5 cm, abaxially white scurfy, adaxially pubescent. Calyx lobes unequal. Corolla ca. 1.7 cm; lower lip ciliate, middle lobe rounded. Capsule triangular-lanceolate, 1.8–2 cm. Wet boggy places, wet banks in dense mixed forests; 3500–4200 m. S and SE Xizang, NW Yunnan [Bhutan, India (Darjeeling), Nepal, Sikkim].

Plants apparently identical to subsp. *pantlingii* but with capsules ca. 1.5 cm and leaves ± glabrous have been referred to as *Pedicularis pantlingii* subsp. *brachycarpa* P. C. Tsoong (Fl. Reipubl. Popularis Sin. 68: 143. 1963); however, the name is invalid because it lacks a Latin description. Since the minor differences in capsular length and indumentum may be related to growing conditions, further study is required.

119b. *Pedicularis pantlingii* subsp. *chimiliensis* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 142. 1963.
缅甸潘氏马先蒿 mian dian pan shi ma xian hao
Pedicularis pantlingii var. *chimiliensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 125. 1921.
Plants 30–35 cm tall. Leaves ca. 2 cm. Calyx lobes ± equal. Corolla barely 1.2 cm; lower lip not ciliate, middle lobe triangular.

50. Ser. *Salicifoliae* Bonati, Bull. Soc. Bot. Genève, Sér. 2, 15: 112. 1923.

柳叶系 liu ye xi

Stems erect, branched or not. Leaves opposite, lanceolate to linear, margin entire or obscurely crenate. Inflorescences spicate. Calyx lobes 5, ± equal or sometimes unequal, entire. Corolla tube slightly longer than calyx; galea short, toothless, beakless.

• One species: endemic to China.

121. *Pedicularis salicifolia* Bonati, Bull. Soc. Bot. Genève, Sér. 2, 15: 112. 1923.

柳叶马先蒿 liu ye ma xian hao

Herbs annual, 40–60 cm tall, drying black. Roots fibrous, fascicled. Stems erect, many branched or sometimes unbranched, glabrescent. Leaves sessile, lanceolate to linear, 2–5 cm × 3–10 mm, fleshy, shiny, sparsely long ciliate basally, ± entire, apex acute. Inflorescences 4–10 cm; bracts ciliate, proximal ones linear, longer than flowers, middle and distal ones ovate,

NW Yunnan [Myanmar].

120. *Pedicularis furfuracea* Wallich ex Benth, Scroph. Ind. 53. 1835.

康砒马先蒿 kang bi ma xian hao

Herbs perennial, 6–45 cm tall. Stems branched at base; branches widely spaced, ascending, long, pubescent. Leaves alternate, few; petiole 1.5–4 cm, slender, pubescent; leaf blade oblong-ovate to ovate, 2.5–6 × 1.5–4 cm, abaxially sparsely pubescent and densely white scurfy, adaxially sparsely pubescent or subglabrous, sometimes white scurfy, pinnatipartite; segments 4–6 pairs, ovate to lanceolate, dentate. Inflorescences laxly racemose; bracts leaflike, longer than flowers. Pedicel 1–3 mm, subglabrous. Calyx oblique ovate, 6–7 mm, membranous, 2/3 cleft anteriorly, densely white pubescent; lobes 5, 0.3–1.5 mm. Corolla purplish red; tube ca. 6 mm, glabrous, expanded apically; galea bent at a right angle apically; beak ca. 5 mm; lower lip longer than galea, middle lobe oblong, apex emarginate. Filaments 2 sparsely pubescent, 2 glabrous. Capsule lanceolate, 1–1.5 cm. Seeds ovoid, ca. 2 mm. Fl. Jun–Jul, fr. Jul–Aug. 2n = 16.

Damp stony ground, moist stream beds; 3500–4000 m. S Xizang [Bhutan, India (Darjeeling), C and E Nepal, Sikkim].

shorter than flowers. Calyx 1–1.2 cm, membranous, woolly pubescent; lobes 5, unequal, triangular-lanceolate to triangular, entire, posterior one smallest. Corolla dark rose, 2.2–2.4 cm, glabrous; tube erect, 1.5–1.6 cm; galea 7–8 mm, apex truncate; lower lip 8–10 mm, middle lobe elliptic-ovate, ca. 4 mm, smaller than lateral pair. Filaments villous toward both ends; anthers apiculate. Capsule enclosed by calyx, ovoid, apex acuminate. Fl. and fr. Jul–Sep.

• Open stony pastures, forest margins; 900–3500 m. NW Yunnan.

51. Ser. *Rigidae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 86. 1890.

坚挺系 jian ting xi

Ser. *Platyrrhynchae* Maximowicz.

Herbs drying black. Stems erect, rigid, usually branched apically. Leaves in whorls of 3 or 4, lanceolate to linear or oblong, pinnatifid to pinnatisect. Inflorescences racemose or spicate. Calyx lobes 5, triangular or lanceolate, entire. Corolla tube 2–3 × as long as calyx; galea beakless, with 1 marginal tooth on each side; beak short.

Six species: China, Myanmar, Thailand; four species in China.

1a. Leaves pinnatisect, segments linear 125. *P. rigidiformis*
1b. Leaves pinnatifid, to nearly entire, segments wider than long.

- 2a. Corolla tube ca. 3 × as long as calyx; posterior filaments sparsely pubescent 122. *P. comptoniifolia*
2b. Corolla tube ca. 2 × as long as calyx; all or 2 filaments glabrous.
3a. Flowers short pedicellate; inflorescences ± compactly arranged racemes 123. *P. rigida*
3b. Flowers sessile; inflorescences ± interrupted spikes 124. *P. mairei*

122. *Pedicularis comptoniifolia* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 586. 1888.

康泊东叶马先蒿 kang bo dong ye ma xian hao
Herbs perennial, to 60 cm tall, drying black. Stems glabrous or slightly pubescent, usually branched apically, branches in whorls of 3 or 4. Leaves in whorls of 4; petiole ca. 3 mm; leaf blade linear, to 5 cm × 7 mm, leathery, pinnatifid; segments rounded, wider than long, margin double dentate. Inflorescences racemose, many flowered, usually interrupted; bracts leaflike, longer than calyx. Calyx campanulate, ca. 6 mm; lobes 5, triangular, short, long ciliate, entire. Corolla dark red, ca. 2 cm; tube slightly bent basally, ca. 3 × as long as calyx, expanded apically; galea terminating in a short and wide beaklike apex, with 1 short marginal tooth on each side; lower lip slightly longer than galea, middle lobe slightly obovate, much smaller than lateral pair, ± projecting. Posterior 2 filaments sparsely pubescent. Fl. Jul–Sep, fr. Sep–Dec.

Open dry pastures, meadows; 2400–3000 m. SW Sichuan, N, NW, and S Yunnan [Myanmar].

123. *Pedicularis rigida* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 587. 1888.

坚挺马先蒿 jian ting ma xian hao
Herbs perennial, to 60 cm tall, drying slightly black. Stems densely pubescent, short branched apically. Leaves usually in whorls of 4; petiole ca. 3 mm; leaf blade linear-oblong to narrowly lanceolate, to 4.5 cm × 8 mm, leathery, pinnatifid; segments wider than long, serrulate, teeth callose. Inflorescences racemose, many flowered, dense; bracts leaflike, longer than calyx. Pedicel short. Calyx campanulate, ca. 5 mm, membranous; lobes 5, triangular, long ciliate, entire. Corolla purplish red, ca. 1.8 cm; tube slightly decurved near calyx lobes, ca. 2 × as long as throat of calyx; galea slightly curved apically, with 1 subulate marginal tooth on each side; lower lip ca. as long as galea, middle lobe much smaller than lateral lobes, ovate, all lobes serrulate. Filaments glabrous. Capsule partly enclosed by calyx, oblong, ca. 7 mm. Fl. Aug–Dec, fr. Sep–Dec.

52. Ser. *Ikomanae* Hurusawa, J. Jap. Bot. 22: 76. 1948.

生驹氏系 sheng ju shi xi

Stems unbranched. Leaves in whorls of 4, pinnatisect or pinnatipartite. Calyx deeply cleft anteriorly; lobes 2, leaflike, large. Galea terminating in a short beak, with 1 marginal tooth on each side.

• One species: endemic to China.

126. *Pedicularis ikomai* Sasaki, Trans. Nat. Hist. Soc. Taiwan 20: 164. 1930.

生驹氏马先蒿 sheng ju shi ma xian hao

• Alpine pastures, shaded stony areas; 2500–3000 m. NW Yunnan.

124. *Pedicularis mairei* Bonati, Bull. Soc. Bot. France 57(Sess. Extraord.): 59. 1911.

梅氏马先蒿 mei shi ma xian hao

Herbs perennial, more than 60 cm tall, drying dark black. Stems many branched, glabrous or glabrescent except for 4 lines of hairs. Leaves in whorls of 3 or 4, opposite apically; petiole 0.5–2 cm; leaf blade linear-oblong to oblong, leathery, pinnatisect; segments 3–12 pairs, linear, ca. 1.2 cm × 1 mm, serrate. Inflorescences spicate, ± interrupted; bracts leaflike. Calyx cylindrical, 5–6 mm, membranous, glabrous, deeply cleft anteriorly; lobes 5, unequal, posterior one triangular, smaller than lateral pair, ciliate, entire. Corolla purple, 2–3 cm; tube decurved at throat of calyx, 8–10(–16) mm; galea ca. as long as tube, slightly crested, with 1 small marginal tooth on each side; beak short, ca. 1 mm; lower lip slightly longer than galea, middle lobe hoodlike, smaller than lateral pair, serrulate. Filaments glabrous. Fl. Jul–Sep, fr. Sep–Dec.

• Dry areas, pastures on mountainsides; 2500–2600 m. NE Yunnan.

125. *Pedicularis rigidiformis* Bonati, Arch. Bot. Bull. Mens. 1: 219. 1927.

拟坚挺马先蒿 ni jian ting ma xian hao

Stems tall, villous, few branched; branches erect, short, or barely spreading. Leaves in whorls of 4, mostly pubescent; petiole 5–10 mm, winged; basal leaves scalelike; stem leaves ovate, 1.5–2 × ca. 1 cm, pinnatisect; segments linear, crenate. Inflorescences spicate, elongated, interrupted; flowers in whorls of 4, sessile; bracts leaflike, mostly pubescent. Calyx ca. 5 mm, villous; lobes 5, lanceolate, ciliate. Corolla tube cylindrical, glabrous, slightly curved basally; galea bent at a right angle with a marginal tooth on each side; beak filiform; lower lip glabrous, middle lobe projecting, 2-cleft, serrulate, lateral lobes ovate-oblong, margin entire. 2 filaments villous, 2 glabrous. Capsule barely exceeding calyx. Seeds black, ca. 1 mm.

• Guizhou.

ca. 2 mm. Calyx ± saccate, ca. 1.2 cm; lobes 2, navicular, ca. 8 × 5 mm, slightly fine pubescent along veins. Corolla purple, cylindric, ca. 3.1 × 1.2 cm; galea short beaked; lower lip rounded; middle lobe smaller than lateral lobes, barely 3 mm wide, lateral lobes rounded, large. Stamens (4 or)5; filaments densely pubescent. Fl. Aug.

• Rocky mountain slopes, near summit; ca. 3500 m. NE Taiwan.

Five stamens are an unusual number in the Scrophulariaceae.

Pedicularis nanfutashanensis T. Yamazaki (J. Jap. Bot. 37: 269. 1962) was described from Taiwan as being similar to this species; however, it is not treated here since material was not seen.

53. Ser. *Plicatae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 95. 1890.

皱褶系 zhou zhe xi

Herbs low. Stems unbranched. Basal leaves long petiolate, persistent. Stem leaves in whorls of 4 or lowermost opposite, 1- or 2-pinnatisect. Inflorescences densely spicate. Calyx 1/2 cleft anteriorly, 4- or 5-lobed. Corolla yellow, large; tube decurved near base; galea rounded in front, plicate, toothless, beakless. Anthers apiculate at apex.

• Three species: endemic to China.

1a. Corolla 1.3–1.4 cm; calyx lobes ± equal, ± entire 129. *P. longistipitata*

1b. Corolla 1.6–2.6 cm; calyx lobes unequal, serrate.

2a. Calyx 9–13 mm; galea 5.5–9 mm 127. *P. plicata*

2b. Calyx ca. 8 mm; galea 11–12 mm 128. *P. giraldiana*

127. *Pedicularis plicata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 598. 1888.

皱褶马先蒿 zhou zhe ma xian hao

Herbs perennial, more than 20 cm tall, drying slightly black. Roots fleshy. Stems 1–6, cespitose, central stem erect, outer stems ascending, black, with lines of hairs. Basal leaves persistent; petiole more than 3 cm, longer than leaf blade, usually whitish pubescent; leaf blade linear-lanceolate, 1–3 cm, abaxially glabrescent, adaxially finely pubescent along midvein, pinnatifid or barely pinnatisect; segments 6–12 pairs, ovate-oblong or ovate, pinnatifid or dentate. Stem leaves usually in whorls of 4, similar to basal ones but smaller and shorter petiolate. Inflorescences 3–7 cm, interrupted basally; bracts leaflike, ca. as long as flowers basally, lanceolate and shorter than flowers apically, sparsely to densely whitish long pubescent. Calyx 0.9–1.3 cm, barely 1/2 cleft anteriorly; lobes 5, unequal, serrate. Corolla yellow, 1.6–2.6 cm; tube decurved through anterior slit of calyx; galea slightly falcate, 5.5–9 × 2.5–3.5 mm, obscurely to conspicuously serrate crested, plicate; lower lip 7–9 mm; middle lobe rounded, producing a stipe. Filaments glabrous; anthers apiculate. Fl. Jul–Aug.

• Alpine regions, among limestone rocks, moist slopes, moist stony pastures; 2900–5000 m. Gansu, Qinghai, N Sichuan, SE Xizang, NW Yunnan.

1a. Inflorescences densely villous; leaves relatively wide 127b. subsp. *luteola*

1b. Inflorescences sparsely villous; leaves relatively narrow.

2a. Corolla 1.6–2.3 cm; galea obscurely serrate crested, slightly plicate 127a. subsp. *plicata*

2b. Corolla to 2.6 cm; galea conspicuously serrate crested, distinctly plicate 127c. subsp. *apiculata*

127a. *Pedicularis plicata* subsp. *plicata*

皱褶马先蒿(原亚种) zhou zhe ma xian hao (yuan ya zhong)

Leaves narrow. Inflorescences sparsely villous. Corolla 1.6–2.6 cm; galea obscurely serrate crested, slightly plicate.

• Alpine regions, among limestone rocks, moist slopes; 2900–5000 m. Gansu, Qinghai, N Sichuan.

127b. *Pedicularis plicata* subsp. *luteola* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 150. 1963.

浅黄皱褶马先蒿 qian huang zhou zhe ma xian hao

Pedicularis luteola H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 331. 1948.

Leaves wide. Inflorescences densely villous. Corolla ca. 2 cm; galea narrower, truncate at apex.

• Moist stony pastures; ca. 3700 m. NW Yunnan.

127c. *Pedicularis plicata* subsp. *apiculata* (P. C. Tsoong) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 150. 1963.

凸尖皱褶马先蒿 tu jian zhou zhe ma xian hao

Pedicularis plicata var. *apiculata* P. C. Tsoong, Acta Phytotax. Sin. 3: 309. 1954 (1955).

Leaves narrow. Inflorescences sparsely villous. Corolla to 2.6 cm; galea conspicuously serrate crested, distinctly plicate.

• 3500–4300 m. SE Xizang.

128. *Pedicularis giraldiana* Diels ex Bonati, Bull. Soc. Bot. France 57(Sess. Extraord.): 60. 1911.

奇氏马先蒿 qi shi ma xian hao.

Pedicularis plicata Maximowicz var. *giraldiana* (Diels) H. Limpricht.

Herbs perennial, to 25 cm tall, ± drying black. Roots ± fleshy. Stems cespitose; outer stems slender, long whitish pubescent. Leaves in whorls of 4. Basal leaf petiole long, to 3.5 cm; leaf blade to 3 cm × 9 mm, pinnatisect; segments to 9 pairs, widely spaced, linear-lanceolate, pinnatifid, incised-dentate. Stem leaves in 1 or 2 whorls, similar to basal leaves but shorter petiolate,

glabrous except adaxially pubescent along midvein. Inflorescences to 7 cm, interrupted basally; bracts leaflike basally, linear-lanceolate apically, shorter than flowers, margin double dentate. Calyx ca. 8 mm, 1/2 cleft anteriorly; lobes 4 or 5, unequal, serrate, densely long whitish pubescent along veins. Corolla yellow, 1.6–2.6 cm; tube decurved through anterior slit of calyx, ca. 1.4 cm; galea 1.1–1.2 cm, narrow, less rounded at apex, obscurely crested; lower lip ca. 1 cm, middle lobe fully projecting and stiped. Anthers apiculate. Fl. Aug, fr. Sep.

• 2900–3000 m. S Shaanxi.

129. *Pedicularis longistipitata* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 402. 1963.

长把马先蒿 *chang ba ma xian hao*

Herbs perennial, to 20 cm tall, drying slightly black. Roots ± fleshy. Stems few, usually cespitose, central stem erect, outer stems ascending, with 4 lines of hairs.

Leaves in whorls of 4. Basal leaves densely cespitose, persistent; petiole to 3 cm, slender, sparsely pubescent; leaf blade linear-oblong, to 3.5 cm × 6–12 mm, abaxially pubescent, adaxially glabrous, pinnatisect; midvein winged; segments 9–12 pairs, ovate, pinnatifid, incised-dentate. Stem leaves in 1 whorl, similar to basal leaves but shorter petiolate. Inflorescences to 9 cm in fruit; proximal bracts leaflike, lanceolate, distal ones shorter than flowers. Pedicel to 4 mm in fruit. Calyx barely 6 mm, 1/2 cleft anteriorly, long whitish pubescent; lobes 5, slightly unequal, triangular, ± entire. Corolla 1.3–1.4 cm; tube decurved through anterior slit of calyx; galea slightly curved midway, 7–7.5 mm, slightly narrow crested; lower lip ca. 1 × 1 cm, middle lobe ovate, long stiped. Filaments glabrous; anthers apiculate. Capsule triangular-lanceolate, ca. 2 cm. Fl. Jul–Aug, fr. Aug–Sep.

• Moist slopes, river banks; 3600–3900 m. SE Xizang.

54. Ser. *Verticillatae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 524, 590. 1888.

轮叶系 *lun ye xi*

Ser. *Amoena* Prain; ser. *Pygmaea* Prain.

Herbs annual or perennial, low or tall, sometimes woody. Leaves in whorls of 3 or 4, some opposite proximally, elliptic to lanceolate, pinnatisect or rarely pinnatifid. Inflorescences spicate to racemose. Calyx lobes 5 or sometimes by fusion appearing 3. Corolla usually purple, red, or white, rarely yellow; tube decurved basally; galea toothless, beakless.

About 37 species: Europe, Asia, NW North America; 30 species in China.

1a. Galea of corolla ca. 1/2 as long as lower lip.

2a. Calyx lobes by fusion appearing 3.

3a. Leaf segments 6–9 pairs, linear-oblong to triangular-ovate; capsule triangular-lanceolate, ca. 12 × 4 mm

..... 149. *P. holocalyx*

3b. Leaf segments 9 or 10 pairs, ovate to oblong; capsule obliquely ovoid, 6–7 × 4 mm 150. *P. spicata*

2b. Calyx lobes distinctly 5.

4a. Leaves pinnatifid 159. *P. lineata*

4b. Leaves pinnatipartite to pinnatisect.

5a. Filaments glabrous.

6a. Roots single, not fleshy; calyx lobes triangular, ± entire or obscurely serrate 156. *P. brachycrania*

6b. Roots usually several, fleshy; calyx lobes ovate to oblong, pinnatifid 131. *P. roylei*

5b. Filaments 2 pubescent.

7a. Plants with clustered fibrous roots; calyx lobes linear-lanceolate 133. *P. likiangensis*

7b. Plants with a main root; calyx lobes wider, ± ovate or wider than long.

8a. Crown not scaly; calyx lobes unequal, posterior one triangular, entire 154. *P. diffusa*

8b. Crown ovate scaly; calyx lobes ± equal, serrate 155. *P. nyalamensis*

1b. Galea of corolla ca. as long as lower lip.

9a. Calyx deeply cleft anteriorly.

10a. Median or sometimes distal bracts subpalmatifid, usually with 3(–5) lobules.

11a. Plants 8 cm tall or more; calyx lobes slender, 2/7–2/5 as long as calyx tube, serrulate; corolla tube decurved at middle; apex of galea not mucronulate 134. *P. violascens*

11b. Plants barely 3 cm tall; calyx lobes triangular, short, barely as long as 1/5 calyx tube, entire; corolla tube decurved ± basally; apex of galea mucronulate 137. *P. pygmaea*

10b. Bracts pinnatifid or only serrate.

12a. Calyx with obscurely reticulate veins, lobes prominent.

- 13a. Plants usually woody, many branched apically 136. *P. chingii*
- 13b. Plants herbaceous, unbranched apically.
 - 14a. Roots fleshy; calyx lobes distinctly lobulate 130. *P. rupicola*
 - 14b. Roots not fleshy; calyx lobes without lobules.
 - 15a. Leaves 2.5–4 × as long as wide, with 6–10 pairs of segments; corolla more than 10 mm; calyx lobes grouped posteriorly; anterior filaments pubescent 135. *P. verticillata*
 - 15b. Leaves less than 2 × as long as wide, with 3 or 4 pairs of segments; corolla 9–10 mm; calyx lobes not grouped posteriorly; all filaments glabrous 158. *P. minutilabris*
- 12b. Calyx with distinct reticulate veins, lobes obscure.
 - 16a. Proximal segments of leaf blade becoming leafletlike; corolla tube ca. 2.5 mm wide, strongly decurved basally 148. *P. confluens*
 - 16b. Proximal segments of leaf blade not becoming leafletlike; corolla tube 0.8–1.5 mm wide, slightly decurved basally.
 - 17a. Leaf segments oblong-triangular; calyx 5-lobed, tube 4.5–5.5 mm, 1/2 cleft anteriorly; filaments 2 sparsely pubescent 146. *P. transmorrisonensis*
 - 17b. Leaf segments linear-lanceolate; calyx 3-lobed, tube ca. 3.5 mm, ca. 1/3 cleft anteriorly; filaments 2 villous 147. *P. ganpinensis*
- 9b. Calyx not or slightly cleft anteriorly.
 - 18a. Plants less than 3 cm tall; calyx lobes distinctly 3-divided 143. *P. minima*
 - 18b. Plants more than 3 cm tall; calyx lobes not distinctly 3-lobed.
 - 19a. Corolla tube ca. 3 × as long as galea; apex of galea ovate, acute 145. *P. altifrontalis*
 - 19b. Corolla tube ca. 2 × as long as galea; apex of galea rounded or truncate.
 - 20a. Leaves pinnatifid.
 - 21a. Lower corolla lip ciliate; calyx lobes ± triangular.
 - 22a. Stems usually numerous, cespitose; lobes of lower corolla lip not rounded 152. *P. triangularidens*
 - 22b. Stems single; lobes of lower corolla lip rounded 153. *P. dolichostachya*
 - 21b. Lower corolla lip not ciliate; calyx lobes oblong to lanceolate.
 - 23a. Stems rigid, usually unbranched; calyx ca. 4 mm, lobes ± serrate; plants pubescent 151. *P. szetschuanica*
 - 23b. Stems many branched, branches slender and weak; calyx 2–5 cm, lobes entire; plants glabrous 157. *P. flaccida*
 - 20b. Leaves ± pinnatisect.
 - 24a. Median and distal bracts subpalmatifid, 3–5-lobulate, slender, fingerlike.
 - 25a. Roots ± fleshy; leaves with linear, dentate segments; calyx lobes equal, ± entire 138. *P. anthemifolia*
 - 25b. Roots ± woody; leaves with lanceolate, pinnatifid segments; calyx lobes unequal, serrate 139. *P. kansuensis*
 - 24b. Bracts pinnatifid or slightly palmatifid, lobes short and rounded.
 - 26a. Filaments 2 or all 4 pubescent.
 - 27a. Bracts broadly ovate; middle lobe of lower corolla lip ca. 3.5 mm wide 144. *P. tenera*
 - 27b. Bracts linear-lanceolate; middle lobe of lower corolla lip ca. 2.5 mm wide.
 - 28a. Calyx glabrous; galea not crested; lower corolla lip glabrous, apex of lobes not apiculate 140. *P. glabrescens*
 - 28b. Calyx long ciliate; galea narrowly crested; lower corolla lip ciliate, apex of lobes apiculate 141. *P. zayuensis*
 - 26b. Filaments glabrous.

- 29a. Calyx lobes ca. as long as calyx tube, ± pinnatisect apically, divisions slender 142. *P. daucifolia*
- 29b. Calyx lobes much shorter than calyx tube, barely serrate or entire.
 - 30a. Calyx densely whitish villous, lobes ca. 1/3 as long as calyx, unequal, ± ovate-oblong, serrate; galea 5–8 mm 131. *P. roylei*
 - 30b. Calyx glabrous, lobes ca. 1/5 as long as calyx, ± equal, triangular, ± entire; galea ca. 4 mm 132. *P. bomiensis*

130. *Pedicularis rupicola* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 599. 1888.

岩居马先蒿 *yan ju ma xian hao*

Herbs perennial, (4–)7–17(–22) cm tall, usually drying black. Roots thick, fleshy. Stems numerous, central stem erect, lateral branches erect to ascending, with lines of dense hairs. Leaves in whorls of 4. Basal leaves usually persistent; petiole to 2 cm. Stem leaf petiole short, to less than 5 mm; leaf blade ovate-oblong or oblong-lanceolate, 3–4(–7) cm × 5(–10) mm, villous, pinnatisect; segments 6–9 pairs, ± ovate, pinnatifid, dentate. Inflorescences spicate, 3–8(–12) cm, compact to lax; bracts leaflike, long ciliate. Calyx obliquely ovate, ca. 9 mm, membranous, deeply cleft anteriorly, densely hirsute or only villous along veins and apices; lobes 5, unequal, broadly ovate, distinctly lobulate and serrate. Corolla purple-red, 1.6–2 cm; tube ± bent at a right angle near base; galea slightly falcate, 4.5–6 mm, apex rounded; lower lip 5–7.5 × 7.5–10 mm, middle lobe ca. 1/2 as long as lateral lobes. Filaments glabrous. Capsule ca. 1/2 enclosed by accrescent calyx, 1.5–2.1 cm × 4.8–9 mm, apex acute to acuminate. Seeds ca. 3 mm. Fl. May–Jun, fr. Jul–Aug.

• Alpine meadows, rocky slopes; 2700–4800 m. SW Sichuan, SE Xizang, NW Yunnan.

- 1a. Plants to 4–20 cm tall; lateral branches usually ascending; inflorescences 3–8 cm, fascicles few, more compactly arranged; bracts and calyx ± densely hirsute; capsule obliquely lanceolate-ovate, 1.5–2 cm × 4.8–9 mm, apex acute 130a. subsp. *rupicola*
- 1b. Plants to 20(–22) cm tall; branches erect; inflorescences to 12 cm, fascicles numerous, widely spaced below; bracts and calyx usually glabrous except ciliate margins and apices; capsule long and narrow, ca. 2.1 cm × 6 mm, apex acuminate 130b. subsp. *zambalensis*

130a. *Pedicularis rupicola* subsp. *rupicola*

岩居马先蒿(原亚种) *yan ju ma xian hao (yuan ya zhong)*

Plants to 4–20 cm tall. Lateral branches usually ascending. Inflorescences 3–8 cm; fascicles few, compactly arranged; bracts and calyx ± densely hirsute. Corolla purple-red. Capsule obliquely lanceolate-ovoid, 1.5–2 cm × 4.8–9 mm, apex acute. Fl. May–Jun.

• Alpine meadows, rocky slopes; 2700–4800 m. SW Sichuan, SE Xizang, NW Yunnan.

This subspecies includes two forms: *f. rupicola* with a purple-red corolla and *f. flavescens* P. C. Tsoong with a yellowish white corolla.

130b. *Pedicularis rupicola* subsp. *zambalensis* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 157. 1963.

川西岩居马先蒿 *chuan xi yan ju ma xian hao*

Pedicularis rupicola var. *zambalensis* Bonati, Bull. Soc. Bot. France 55: 313. 1908.

Plants to 20(–22) cm tall. Branches erect.

Inflorescences to 12 cm, fascicles numerous, widely spaced below; bracts and calyx usually glabrous except for ciliate margins and apices. Capsule long, narrow, ca. 2.1 cm × 6 mm, apex acuminate. Fl. May–Sep.

• Alpine meadows. SW Sichuan, NW Yunnan.

131. *Pedicularis roylei* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 517. 1881.

罗氏马先蒿 *luo shi ma xian hao*

Herbs perennial, (4–)7–15 cm tall, ± drying black, pubescent throughout. Roots fleshy, to 4–8 mm in diam. Stems 1 to several, erect or outer ones ascending, with lines of white hairs. Leaves in whorls of 3 or 4. Basal leaves cespitose and persistent; petiole to 3–6 cm. Stem leaves petiole short, barely 2–2.5 cm; leaf blade lanceolate-oblong to ovate-oblong, 2.5–4 cm, pinnatipartite; segments 7–12 pairs, lanceolate to oblong, incised-dentate. Inflorescences racemose, to 6 cm, usually interrupted basally; axis densely villous; bracts leaflike, proximal ones slightly longer than flowers. Pedicel ca. 2 mm. Calyx campanulate, 8–9 mm, densely white or deep purple villous, slightly cleft anteriorly; lobes 5, unequal, ± ovate-oblong, ca. 1/3 as long as calyx, serrate or pinnatifid. Corolla purple-red, 1.7–1.9(–2.5) cm; tube decurved basally, 1–1.1 cm, expanded apically; galea slightly falcate, 5–8 mm, rounded in front, margin entire; lower lip 8–9 mm, glabrous. Filaments glabrous. Capsule ovoid-lanceolate, ca. 1.2 cm, short apiculate. Seeds 1.2–1.5 mm. Fl. Jul–Aug, fr. Aug–Sep.

Moist alpine meadows, among small *Rhododendron*; 3400–5500 m. SW Sichuan, E and SE Xizang, NW Yunnan [Afghanistan, Bhutan, India, Kashmir].

- 1a. Inflorescence axis, bracts, and calyx villous with dense deep purple hairs; corolla to 2.5 cm, galea to 8 mm 131b. subsp. *megalantha*

- 1b. Inflorescence axis, bracts, and calyx without deep purple hairs; corolla 1.7–1.9 cm, galea 5–6 mm.
- 2a. Roots less than 4 mm in diam.; plants not gray pubescent throughout; basal leaves 2.5–4 cm, segments lanceolate to oblong
..... 131a. subsp. *roylei*
- 2b. Roots to 8 mm wide; plants usually gray pubescent throughout; basal leaves ca. 2 cm, segments ovate to oblong 131c. subsp. *shawii*

131a. *Pedicularis roylei* subsp. *roylei*

罗氏马先蒿(原亚种) *luo shi ma xian hao (yuan ya zhong)*

Plants not gray pubescent throughout. Roots slender, less than 4 mm in diam. Basal leaves 2.5–4 cm; segments lanceolate to oblong. Inflorescence axis, bracts, and calyx without deep purple hairs. Corolla 1.7–1.9 cm; galea 5–6 mm.

Moist alpine meadows, forests; 3400–5500 m. SW Sichuan, SE Xizang, NW Yunnan [Afghanistan, Bhutan, India, Kashmir].

This subspecies includes two varieties: var. *brevigaleata* P. C. Tsoong with a shorter galea ca. 1/2 as long as lower corolla lip, and var. *roylei* with a longer galea, slightly shorter than to ca. as long as lower lip.

131b. *Pedicularis roylei* subsp. *megalantha* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 402. 1963.

大花罗氏马先蒿 *da hua luo shi ma xian hao*
Inflorescence axis, bracts, and calyx densely deep purple villous. Corolla to 2.5 cm; galea, slightly shorter than to as long as lower lip, to 8 mm.

• Alpine meadows; 4800–5000 m. E Xizang.

131c. *Pedicularis roylei* subsp. *shawii* (P. C. Tsoong) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 159. 1963.

萧氏罗氏马先蒿 *xiao shi luo shi ma xian hao*
Pedicularis shawii P. C. Tsoong, Acta Phytotax. Sin. 3: 309. 1955; *P. roylei* var. *cinerascens* Marquand.

Plants usually gray pubescent throughout. Roots thickened, to 10 × 0.8 cm in diam. Basal leaves ca. 2 cm × 8 mm; segments ovate to oblong. Inflorescence axis, bracts, and calyx without deep purple hairs. Corolla 1.7–1.9 cm; galea slightly shorter than to as long as lower lip, 5–6 mm.

• Among small *Rhododendron*, alpine meadows; 4200–4800 m. E Xizang.

132. *Pedicularis bomiensis* H. P. Yang, Acta Phytotax. Sin. 18: 241. 1980.

波密马先蒿 *bo mi ma xian hao*

Herbs perennial, 30–40 cm tall, ± drying black. Roots slightly woody. Stems single, erect, dark purple, often many branched at middle. Leaves in whorls of 4; petiole 5–10 mm; leaf blade ovate to ovate-oblong, to 8 × 4.5 cm, pinnatisect; segments 5–8 pairs, ovate-oblong,

pinnatifid to pinnatipartite, incised-dentate, glabrous. Inflorescences racemose, to 12 cm, lax, pubescent; proximal bracts leaflike, distal ones linear. Pedicel 1–3 mm. Calyx campanulate, ca. 5 mm, membranous, slightly cleft anteriorly, glabrous; lobes 5, ± equal, triangular, ca. 1/5 as long as calyx, ± entire. Corolla purplish rose, 1.2–1.4 cm; tube decurved near base, expanded apically; galea slightly falcate, ca. 4 mm; lower lip longer than galea, 8–9 mm wide; lobes retuse, erose, unequal, middle lobe smallest. Filaments glabrous. Capsule slightly exceeding calyx, obliquely ovoid, 6–7 mm. Fl. and fr. Jul–Aug.

• Thickets; ca. 3200 m. E Xizang.

133. *Pedicularis likiangensis* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 597. 1888.

丽江马先蒿 *li jiang ma xian hao*

Herbs perennial, (3–)9–18 cm tall, ± drying black. Roots fibrous, clustered. Stems 1 to several, central erect, outer ascending, with 4 lines of hairs. Leaves in whorls of 4. Basal leaves numerous, persistent; petiole ca. 3 cm, broadly winged, sparsely ciliate; leaf blade ovate-oblong, to elliptic-oblong, 6–12 × 3–8 mm, pinnatipartite to pinnatisect; segments 4–6 pairs, ovate, pinnate, margin double dentate. Stem leaves 1 or 2 whorls, similar to basal leaves, but shorter petiolate; petiole 8–10 mm; leaf blade 0.8–2 cm × 4–10 mm. Inflorescences racemose, to 8 cm, interrupted; bracts leaflike, becoming shorter than flowers apically. Pedicel 1–2 mm. Calyx slightly cleft anteriorly, rust colored villous along veins; lobes 5, ± equal, linear-lanceolate. Corolla pink or red to pale purple-red, 1.4–1.6(–2.5) cm, tube ± bent at a right angle basally; galea 3–4 (–5.5) mm, rounded in front; lower lip ca. 8–10 mm, not ciliate but erose. Filaments 2 villous, 2 glabrous. Capsule ovoid-lanceolate, to 1.4 cm, short apiculate. Fl. Jun–Aug, fr. Sep.

• Alpine meadows, forest margins, grassy slopes; 3200–4600 m. SW Sichuan, E Xizang, NW Yunnan.

- 1a. Plants (4–)9–18 cm tall; corolla 1.4–1.6 cm, galea 3–4 mm, lower lip ca. 8 mm 133a. subsp. *likiangensis*
- 1b. Plants 3(–6) cm tall; corolla to 2.5 cm, galea ca. 5.5 mm, lower lip ca. 10 mm 133b. subsp. *pulchra*

133a. *Pedicularis likiangensis* subsp. *likiangensis*

丽江马先蒿(原亚种) *li jiang ma xian hao (yuan ya zhong)*

Pedicularis lineata Franchet ex Maximowicz var. *dissecta* Bonati.

Plants (4–)9–18 cm tall. Corolla 1.4–1.6 cm; galea 3–4 mm; lower lip ca. 8 mm.

• Alpine meadows, forest margins; 3200–4600 m. SW Sichuan, E Xizang, NW Yunnan.

133b. *Pedicularis likiangensis* subsp. *pulchra* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 403. 1963.

美丽丽江马先蒿 *mei li li jiang ma xian hao*

Plants barely 3(–6) cm tall. Corolla to 2.5 cm; galea ca. 5.5 mm; lower lip ca. 1 cm.

• Grassy slopes; 3800–4100 m. NW Yunnan.

134. *Pedicularis violascens* Schrenk ex Fischer & C. Meyer, Enum. Pl. Nov. 2: 22. 1842.

堇色马先蒿 jin se ma xian hao

Pedicularis tenuicalyx P. C. Tsoong.

Herbs perennial, 8–10(–30) cm tall, drying slightly black. Roots ± fleshy and fusiform. Stems 1–10, unbranched, with lines of hairs. Leaves opposite or in whorls of 3 proximally, in whorls of 4 distally. Basal leaves usually persistent; petiole 1–5 cm, narrowly winged; leaf blade lanceolate to linear-oblong, 2.4–4.4 cm × 1.4–14 mm, pinnatisect; segments 6–9 pairs, ovate, pinnatipartite, incised-double dentate. Stem leaves similar to basal leaves but shorter petiolate. Inflorescences 2–6 cm, interrupted basally; bracts broadly rhomboid-ovate, palmately 3–5-lobed, margin double dentate. Calyx 6–7 mm, membranous, 2/5 cleft anteriorly; lobes 5, unequal, 2/7–2/5 as long as calyx tube, slender, serrulate. Corolla purple-red, ca. 1.7 cm; tube decurved at middle, ca. 1.1 cm; galea ± falcate, rounded in front, longer than lower lip; lower lip barely 4 mm, middle lobe smallest, projecting. Anterior filament pair slightly pubescent. Capsule compressed, lanceolate-ovate, ca. 1.4 cm × 4 mm, obliquely apiculate. Seeds ca. 1.5 × 0.7 mm. Fl. Jul–Aug, fr. Aug–Sep.

Rocky mountain slopes, near summits; 4000–4300 m. N Xinjiang [Kazakstan, Kyrgyzstan].

135. *Pedicularis verticillata* Linnaeus, Sp. Pl. 2: 608. 1753.

轮叶马先蒿 lun ye ma xian hao

Herbs perennial, (5–)15–35 cm tall, not drying black. Roots ± fusiform. Stems 1 to more than 7, central erect, outer ascending, with 4 lines of hairs. Leaves usually in whorls of 4. Basal leaves numerous, persistent; petiole to ca. 3 cm, white villous; leaf blade oblong to linear-lanceolate, 2.5–3 × 1–1.2 (–1.8) cm, adaxially slightly pubescent, pinnatifid to pinnatisect; segments 6–10 pairs, linear-oblong to triangular-ovate, ± incised-dentate, teeth white and callose. Stem leaves similar to basal leaves but shorter petiolate or ± sessile and leaf blade smaller. Inflorescences racemose, usually dense; bracts leaflike, much longer than flowers basally, white pubescent. Calyx usually red, ovoid, ca. 6 mm, membranous, densely villous, deeply cleft anteriorly; lobes 3–5, unequal, when 3-lobed grouped posteriorly, serrate. Corolla purple, ca. 1.3 cm; tube bent at a right angle basally; galea slightly falcate, ca. 5 mm, rounded in front; lower lip ca. as long as galea, middle lobe much smaller than lateral pair, rounded. Anterior filament pair pubescent. Capsule lanceolate, 1–1.5 cm × 4–5 mm, apiculate. Seeds ca. 1.8 mm. Fl. Jun–Aug, fr. Jul–Sep. $2n = 12 + 0 - 2f$.

Mossy and lichenous tundra, alpine pastures, damp places; 2100–4400 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol,

Qinghai, Shaanxi, Shanxi, Sichuan, E Xizang [Japan, Russia; arctic highlands, Europe, NW North America].

1a. Plants pubescent throughout; corolla large; capsule wide; calyx lobes usually 5 135c. subsp. *tangutica*

1b. Plants at least partly glabrous; corolla small; capsule narrow; calyx lobes usually 3.

2a. Leaves 1–1.2 cm wide, pinnatipartite to pinnatisect, segments 1–2 mm wide 135a. subsp. *verticillata*

2b. Leaves 1.2–1.8 cm wide, less deeply pinnatifid, segments 3–4 mm wide 135b. subsp. *latisecta*

135a. *Pedicularis verticillata* subsp. *verticillata*

轮叶马先蒿(原亚种) lun ye ma xian hao (yuan ya zhong)

Pedicularis calosantha H. L. Li; *P. menziesii* Bentham; *P. sikangensis* H. L. Li; *P. stevenii* Bunge.

Plants at least partly glabrous. Leaves 1–1.2 cm wide, pinnatipartite to pinnatisect; segments 1–2 mm wide. Leaves and calyx lobes ± white, serrulate-denticulate, teeth callose. Calyx lobes usually 3. Corolla small. Capsule narrow.

Mossy and lichenous tundra, alpine pastures, damp places; 2100–4400 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, N and W Sichuan, E Xizang [Japan, Russia; arctic highlands, C and S Europe, NW North America].

135b. *Pedicularis verticillata* subsp. *latisecta* (Hultén) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 163. 1963.

宽裂轮叶马先蒿 kuan lie lun ye ma xian hao

Pedicularis verticillata var. *latisecta* Hultén, Kongl.

Svenska Vetenskapsakad. Handl. 8: 125. 1930.

Plants at least partly glabrous; Leaves 1.2–1.8 cm wide, less deeply pinnatifid; segments 3–4 mm wide. Leaves and calyx lobes ± white, serrulate-denticulate, teeth callose. Calyx lobes usually 3. Corolla small. Capsule narrow.

NE Shanxi [Europe].

135c. *Pedicularis verticillata* subsp. *tangutica* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 163. 1963.

唐古特轮叶马先蒿 tang gu te lun ye ma xian hao

Pedicularis tangutica Bonati, Bull. Soc. Bot. Genève 2: 328. 1912; *P. bonatiana* H. L. Li.

Plants pubescent throughout. Leaves and calyx lobes usually white, serrulate-denticulate, teeth callose. Calyx lobes usually 5. Corolla large. Capsule wide.

• Gansu, Nei Mongol, Qinghai, Shaanxi, Shanxi, NW Sichuan.

136. *Pedicularis chingii* Bonati, Arch. Bot. Bull. Mens. 1: 4. 1927.

秦氏马先蒿 qin shi ma xian hao

Herbs perennial, diffuse, puberulent when young, glabrescent. Stems woody basally, many branched; branches in whorls of 4, 10–20 cm, ascending. Leaves in whorls of 4; petiole ca. 3 cm basally, whitish, pubescent; leaf blade glabrous on both surfaces, pinnatisect; segments 5 or 6 pairs, linear, pinnatifid, incised-dentate. Flowers in whorls of 4; bracts linear.

Pedicel filiform, 1–4 mm. Calyx white, ovate, ca. 5 mm, membranous, pubescent, deeply cleft anteriorly; lobes 5, unequal, posterior one linear, lateral lobes triangular, ciliate. Corolla purple; tube decurved at middle, 4–5 mm; galea erect, 5–8 mm, apex truncate; lower lip longer than galea, 1–1.2 × ca. 1 cm, ciliate; lobes ovate. Filaments 2 pubescent, 2 glabrous. Capsule ca. 2 × as long as calyx, apiculate. Seeds dark, 1–2 × ca. 0.5 mm. Fl. Aug, fr. Aug–Sep.

• Woodlands; 3000–4200 m. S Gansu.

137. *Pedicularis pygmaea* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 595. 1888.

侏儒马先蒿 zhu ru ma xian hao

Herbs annual, to 3 cm tall, not drying black. Main root enlarged fusiform, to 2 mm in diam. Stems erect, unbranched, with 4 lines of hairs. Leaves in whorls of 4; petiole of basal leaves 5–7 mm, slender, membranous; leaf blade linear-oblong, ca. 1.5 cm, abaxially sparsely white pubescent, pinnatipartite to pinnatisect; segments 6–8 pairs, triangular-ovate, incised-double dentate, teeth white and callose. Inflorescences capitate, dense; bracts leaflike, villous. Calyx ovoid, ca. 4 mm, membranous, densely yellow villous along veins, relatively deeply cleft anteriorly; lobes 5, unequal, triangular, barely 1/5 as long as calyx tube, entire. Corolla purple, 9–10 mm; tube decurved near base, only slightly longer than calyx; galea slightly falcate, ca. 5.5 mm, apex mucronulate; lower lip ca. 4 × 6 mm, middle lobe rounded, smaller than lateral lobes. Filaments glabrous. Fl. Jul, fr. Aug.

• Grassy slopes, river banks; ca. 4000 m. NW Qinghai.

138. *Pedicularis anthemifolia* Fischer ex Colla, Herb. Pedan. 4: 370. 1835.

春黄菊叶马先蒿 chun huang ju ye ma xian hao

Herbs perennial, 8–30(–50) cm tall, not drying black. Roots numerous, ± fleshy. Stems 1 to several, erect, unbranched apically, glabrous or with 2–4 lines of hairs. Leaves in whorls of 4. Basal leaf petiole 3–4 cm, slender. Stem leaf petiole 3–5 mm; ± glabrescent; leaf blade ovate-oblong to oblong-lanceolate, 2.5–4 × 1–1.5 cm, glabrescent, pinnatipartite; segments 8–12 pairs, widely spaced, linear, dentate; rachis narrowly winged. Inflorescences racemose, 2–8 cm, interrupted basally; proximal bracts leaflike, shorter than flowers, other bracts 3–5-subpalmatifid-lobed. Pedicel 1–2 mm. Calyx cupular, 3–4 mm, membranous, glabrescent, slightly cleft anteriorly; lobes 5, equal, triangular-lanceolate, 2–3 mm, ± entire. Corolla purple-red, ca. 1.5 cm, tube ± decurved at middle, expanded apically, ca. 1 cm; galea slightly falcate, ca. 5 mm, rounded in front; lower lip ca. as long as galea, glabrous; lobes rounded, middle lobe smallest, apex slightly truncate or emarginate. Posterior filaments

pubescent apically; anthers acuminate at base. Fl. May–Jul, fr. Jul–Aug. $2n = 16$.

Subalpine grassy slopes; 2000–2500 m. N and W Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (European part, Siberia)].

- 1a. Plants 8–30 cm tall; corolla relatively small 138a. subsp. *anthemifolia*
1b. Plants to 50 cm tall; corolla relatively large 138b. subsp. *elatior*

138a. *Pedicularis anthemifolia* subsp. *anthemifolia*

春黄菊叶马先蒿(原亚种) chun huang ju ye ma xian hao (yuan ya zhong)

Pedicularis amoena Adams ex Steven; *P. hulteniana* H. L. Li.

Plants 8–30 cm tall. Corolla small.

Subalpine grassy slopes; 2000–2500 m. N Xinjiang [Mongolia, Russia (European part, Siberia)].

138b. *Pedicularis anthemifolia* subsp. *elatior* (Regel) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 167. 1963.

高升春黄菊叶马先蒿 gao sheng chun huang ju ye ma xian hao

Pedicularis amoena Adams var. *elatior* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 348. 1880; *P.*

macrochila Vvedensky.

Plants to 50 cm tall. Corolla large.

W Xinjiang [Kazakhstan, Kyrgyzstan].

139. *Pedicularis kansuensis* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 516. 1881.

甘肃马先蒿 gan su ma xian hao

Herbs annual or biennial, 20–40(–45) cm tall, pubescent throughout, not drying black. Roots single, ± woody. Stems usually several, with 4 lines of hairs. Basal leaves persistent; petiole to 2.5 cm, densely pubescent. Stem leaves in whorls of 4, shorter petiolate; leaf blade oblong, sometimes ovate, to 3 × 1.4(–2) cm, pinnatisect; segments ca. 10 pairs, lanceolate, pinnatipartite, dentate, teeth callose. Inflorescences to 25(–30) cm, with many whorls, compact to interrupted; proximal bracts leaflike, other bracts 3-palmate. Pedicel short. Calyx ovoid, membranous, slightly cleft anteriorly; lobes 5, unequal, triangular, serrate. Corolla purple-pink to purple-red, sometimes white, ca. 1.5 cm; tube decurved near base, ca. 2 × as long as calyx, expanded apically; galea ± falcate, ca. 6 mm, usually crenulate-crested, apex slightly acute; lower lip slightly longer than galea, lobes rounded, middle lobe smallest, ± emarginate. Filaments 2 pubescent, 2 glabrous. Capsule slightly exceeding calyx, obliquely ovoid, apiculate. Fl. Jun–Aug, fr. Jul–Sep.

• Gravelly ground and grassy slopes in subalpine zone, damp grassy areas along field margins, damp slopes, valleys; 1800–4600 m. S and SW Gansu, Qinghai, W Sichuan, E, N, and NE Xizang, Yunnan.

- 1a. Plants densely white villous throughout 139d. subsp. *villosa*
1b. Plants sparsely white villous throughout.

- 2a. Plants usually less than 20 cm tall; lobes of lower corolla lip distinctly emarginate; basal leaves many; inflorescences dense
..... 139c. subsp. *kokonorica*
- 2b. Plants usually 20–40(–45) cm tall; lobes of lower corolla lip indistinctly emarginate; basal leaves fewer; inflorescences interrupted.
- 3a. Plants usually 20–40 cm tall; capsule small 139a. subsp. *kansuensis*
- 3b. Plants usually taller; capsule larger
..... 139b. subsp. *yargongensis*

139a. *Pedicularis kansuensis* subsp. *kansuensis*

甘肃马先蒿(原亚种) gan su ma xian hao (yuan ya zhong)

Pedicularis futtereri Diels ex Fütterer; *P. goniantha* Bureau & Franchet; *P. szetschuanica* Maximowicz var. *longispicata* Bonati ex H. Limpricht; *P. verticillata* Linnaeus var. *chinensis* Maximowicz.

Plants usually 20–40 cm tall, not densely villous throughout. Basal leaves few. Inflorescences interrupted. Lobes of lower corolla lip indistinctly emarginate. Capsule small.

• Gravelly ground and grassy slopes in subalpine zone, damp grassy areas along field margins, damp slopes; 1800–4600 m. S and SW Gansu, Qinghai, W Sichuan, E and NE Xizang.

This subspecies includes two forms: f. *kansuensis* with a purple-pink to purple-red corolla, and f. *albiflora* H. L. Li with a white corolla.

139b. *Pedicularis kansuensis* subsp. *yargongensis* (Bonati)

P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 168. 1963. 雅江甘肃马先蒿 ya jiang gan su ma xian hao *Pedicularis yargongensis* Bonati, Bull. Soc. Bot. France 55: 312. 1908; *P. yargongensis* var. *longibracteata* Bonati.

Plants 20–40(–45) cm tall, not densely villous. Basal leaves few. Inflorescences interrupted. Lobes of lower corolla lip indistinctly emarginate. Capsule to 2 cm.

• W Sichuan, Yunnan.

139c. *Pedicularis kansuensis* subsp. *kokonorica* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 403. 1963.

青海甘肃马先蒿 qing hai gan su ma xian hao Plants usually less than 20 cm tall, not densely villous. Basal leaves many. Inflorescences dense. Lobes of lower corolla lip distinctly emarginate. Fl. Jul.

• W Qinghai, N Xizang.

139d. *Pedicularis kansuensis* subsp. *villosa* P. C. Tsoong, Acta Phytotax. Sin. 3: 311. 1955.

厚毛甘肃马先蒿 hou mao gan su ma xian hao Plants densely white villous throughout. Fl. and fr. Jul–Aug.

• Valleys; 3500–4400 m. E Xizang.

140. *Pedicularis glabrescens* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 317. 1948.

退毛马先蒿 tui mao ma xian hao

Herbs perennial, 10–25 cm tall, glabrescent, ± drying black. Roots slightly conical, ± woody. Stems several, ± ascending, unbranched, glabrescent. Proximal leaves opposite or in whorls of 3, distal ones in whorls of 4; petiole to 1.5 cm; leaf blade oblong-lanceolate, 2–3 × 1–1.5 cm, pinnatisect; segments 6–8 pairs, ovate to lanceolate-oblong, widely spaced and 1–3 pairs deeply cut basally, dentate; rachis winged. Inflorescences spicate, 4–9 cm, interrupted; bracts linear-lanceolate, leaflike, proximal ones longer than flowers. Pedicel erect, 2–5 mm, slender, glabrous. Calyx obliquely broadly ovate, membranous, glabrous, slightly cleft anteriorly; lobes 5, unequal, broadly ovate, serrate. Corolla purple, ca. 1.3 cm; tube decurved basally, 8–9 mm, expanded apically; galea slightly falcate apically, not crested, truncate in front; lower lip ca. 5 × 6 mm, glabrous, middle lobe rounded, ca. 1/2 as large as lateral lobes, ca. 2.5 mm wide. Filaments 2 pubescent, 2 glabrous. Fl. Jul, fr. Aug.

• Damp slopes; ca. 3500 m. NW Yunnan.

141. *Pedicularis zayuensis* H. P. Yang, Acta Phytotax. Sin. 18: 240. 1980.

察隅马先蒿 cha yu ma xian hao

Herbs perennial, 20–60 cm tall, ± drying black. Roots woody. Stems numerous, central stem erect, outer ones ± ascending, with 4 lines of hairs. Leaves in whorls of 4. Basal leaves densely clustered, persistent; petiole to 3 cm. Stem leaf petiole 0.5–1.5 cm; leaf blade lanceolate-oblong to ovate-oblong, 1.5–4 cm, abaxially white scurfy, adaxially glabrous, pinnatisect; segments 8–10 pairs, ovate-oblong, reflexed dentate. Inflorescences racemose, elongated to 25 cm; bracts linear-lanceolate. Pedicel 1–7 mm. Calyx ovate-oblong, ca. 6 mm, membranous, villous-ciliate, slightly cleft anteriorly; lobes 5, unequal. Corolla pale red, ca. 1.6 cm; tube decurved basally, ca. 1.1 cm, expanded apically; galea erect, narrowly crested, slightly rounded in front; lower lip longer than galea, ca. 7 mm, middle lobe rounded, smaller than lateral lobes, ca. 2.5 mm wide, lobes finely ciliate, erose, apex often apiculate. Anterior filaments pilose. Capsule slightly oblique, ovoid, apiculate. Fl. Jul, fr. Jul–Sep.

• Thickets; ca. 3300 m. SE Xizang.

142. *Pedicularis daucifolia* Bonati, Bull. Soc. Bot. France 55: 313. 1908.

胡萝卜叶马先蒿 hu luo bu ye ma xian hao

Herbs perennial, 2–25 cm tall, not drying black. Roots obconical. Stems numerous, flexuous, ascending, slightly branched basally or unbranched, villous. Leaves in whorls of 4; petiole 3–5 mm; leaf blade ovate, 1–2 cm, glabrous, pinnatisect; segments 10–14 pairs, widely spaced, oblong, pinnatipartite to pinnatisect, linear. Inflorescences spicate, interrupted; bracts leaflike. Calyx membranous, glabrous, slightly cleft anteriorly; tube 2.5–3 mm; lobes 5, equal, ovate, ca. 2.5

mm, subpinnatisect apically. Corolla tube ca. 2 × as long as calyx, ± bent at a right angle at middle, expanded apically; galea falcate apically, slightly rounded in front, apex slightly angle shaped; lower lip slightly shorter than galea, ca. 4 × 6.5 mm, middle lobe ca. 2 × 3 mm, ca. 2/3 × size of lateral lobes. Filaments glabrous. Capsule narrowly ovoid, 1–1.5 × as long as calyx, apiculate. Seeds nearly dark, 1–1.5 mm.

• W Sichuan.

143. *Pedicularis minima* P. C. Tsoong & S. H. Cheng, Fl. Reipubl. Popularis Sin. 68: 403. 1963.

细小马先蒿 xi xiao ma xian hao

Herbs annual, less than 2.6 cm tall, ± drying black. Roots filiform, slender. Stems 1–3, with 3 or 4 pairs of ovate to lanceolate scales at base, with 4 lines of hairs. Basal leaf petiole ca. 3 × 0.5 mm, glabrous; leaf blade rounded, membranous; segments 2 or 3 pairs, irregularly dentate. Stem leaves in whorls of 3 or 4; petiole to 6 mm, narrowly winged; leaf blade ovate to ovate-oblong, 4–7 cm, abaxially white scurfy, adaxially glabrous, pinnatipartite to pinnatisect; segments ca. 5 pairs, ovate, margin lobed. Inflorescences to 2 cm; bracts leaflike, shorter than flowers. Calyx ca. 3 mm, membranous, slightly cleft anteriorly; lobes 5, unequal; posterior one subulate, lateral lobes leaflike, 3-divided. Corolla ca. 1.1 cm; tube decurved ± at middle, ca. 6 mm, slightly expanded apically; galea slightly falcate, rounded in front, apex slightly truncate; lower lip ca. 3.5 × 5 mm, middle lobe rounded, slightly smaller than lateral lobes. Filaments glabrous. Fl. Jul–Aug, fr. Sep.

• NW Sichuan.

144. *Pedicularis tenera* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 320. 1948.

细茎马先蒿 xi jing ma xian hao

Herbs perennial, ca. 10 cm tall, slightly pubescent throughout, not drying black. Roots slender, woody. Stems several, dark purple, central stem usually erect or procumbent and ascending, with 4 lines of hairs. Leaves glabrous throughout. Basal leaves few; petiole to 1.8 cm. Stem leaves in whorls of 3 or 4; petiole 5–13 mm; leaf blade lanceolate-oblong to ovate-oblong, 1–2.3 cm × 4–7 mm, pinnatipartite to pinnatisect; segments 4–7 pairs, ovate, incised-dentate. Inflorescences 0.2–8.5 cm, interrupted basally; proximal bracts leaflike, distal ones shorter than flowers, broadly ovate, glabrous. Pedicel dark purple, 1.5–10 mm, glabrous. Calyx usually tinged with purple-red, ca. 4 mm, membranous, slightly cleft anteriorly; tube ca. 3 mm; lobes 5, unequal, sparsely purple villous along veins and margins. Corolla purple; tube 9–10 mm, strongly decurved basally, expanded apically; galea falcate, ca. 6 mm; lower lip 6–7 mm, middle lobe ca. 3.5 mm wide, wider than long, lobes ± rounded. Filaments 2 pubescent, 2 glabrous. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows, screes of limestone mountains; 4400–4600 m. W Sichuan.

145. *Pedicularis altifrontalis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 404. 1963.

高萼马先蒿 gao e ma xian hao

Herbs perennial, to 20 cm tall, ± drying black. Roots fleshy. Stems often numerous, outer ones usually ascending, with 4 lines of dense hairs. Leaves in whorls of 4. Basal leaves persisting at anthesis; petiole to 2.5 cm, membranous, sparsely long white ciliate; leaf blade ca. as long as petiole, ovate-oblong to oblong; segments ca. 5 pairs, ovate-oblong, glabrous on both surfaces, incised-dentate. Stem leaves few, similar to basal leaves but smaller; segments ca. 4 pairs. Inflorescences 2.5–3.5 cm; bracts leaflike, shorter than flowers. Calyx ca. 4 mm, membranous, slightly cleft anteriorly; tube ca. 3 mm; lobes 5, unequal. Corolla pale rose, with white throat, 1.3–1.5 cm; tube ± bent at a right angle basally, ca. 3 × as long as galea, slender; galea ca. 4 mm, apex ovate, acute; lower lip ca. 5 × 6.5 mm, middle lobe broadly ovate, smaller than lateral lobes. Filaments glabrous. Fl. May–Jun, fr. Jul–Aug.

• Swampy meadows; 3800–4600 m. SE Xizang.

146. *Pedicularis transmorrisonensis* Hayata, Icon. Pl. Formosan. 5: 126. 1915.

台湾马先蒿 tai wan ma xian hao

Pedicularis refracta (Maximowicz) Maximowicz var. *transmorrisonensis* (Hayata) Hurusawa.

Herbs annual, 25–30(–40) cm tall, ± woody at base. Stems unbranched, internodes to 8 cm, with 4 lines of hairs. Leaves in whorls of 4; petiole ca. 3 mm; leaf blade ovate-oblong to lanceolate-oblong, to 2 × 1 cm, abaxially pubescent and slightly scurfy, adaxially sparsely pubescent, pinnatipartite to nearly pinnatisect; segments 5–7 pairs, oblong-triangular, cuspidate-dentate, teeth callose. Inflorescences racemose, interrupted basally; bracts leaflike. Pedicel 1–2 mm, glabrous. Calyx 1/2 cleft anteriorly, white villous; tube 4.5–5.5 × ca. 2.5 mm; lobes 5, unequal, ca. 0.5 mm, posterior one triangular, lateral lobes obscure. Corolla red; tube slightly decurved basally, 7–9 mm, slightly expanded apically; galea erect, 5–6 mm, front nearly truncate; lower lip spreading, margin erose, middle lobe ovate, much smaller than lateral lobes. Filaments 2 sparsely pubescent at base, 2 glabrous. Capsule 3/5 enclosed by accrescent calyx, short lanceolate-triangular, ca. 1 cm. Seeds dark, ca. 1 × 0.7 mm.

• Taiwan.

147. *Pedicularis ganpinensis* Vaniot ex Bonati, Bull. Acad. Int. Géogr. Bot. 13: 245. 1904.

平坝马先蒿 ping ba ma xian hao

Herbs annual or biennial, to 30 cm tall, not drying black. Stems with 4 lines of hairs, internodes to 10 cm basally. Basal leaves withering early; petiole to 1.8 cm, sparsely pubescent. Stem leaves in whorls of 4, short petiolate to sessile, elliptic-lanceolate to oblong-lanceolate, 1.5–2.5 cm × 5–10 mm, abaxially pubescent and white scurfy, adaxially densely white villous, pinnatipartite; segments

5–7 pairs, linear-lanceolate, incised-dentate, teeth callose. Inflorescences spicate, interrupted basally; proximal bracts leaflike, pubescent. Calyx ca. 3.5 mm, 1/3 cleft anteriorly, veins reticulate; lobes 3, unequal, barely 1 mm, posterior one triangular, white villous along veins and ciliate. Corolla purple-red, ca. 1.5 cm; tube slightly decurved basally, expanded apically; galea slightly falcate, rounded in front; lower lip ca. 5.8 × 7 mm, middle lobe much smaller than lateral pair. Filaments 2 villous, 2 glabrous. Capsule obliquely ovoid. Fl. Jun, fr. Jun–Jul.

• Grassy slopes; ca. 1300 m. WC Guizhou.

148. *Pedicularis confluens* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 404. 1963.

连齿马先蒿 *lian chi ma xian hao*

Herbs perennial, 20–50 cm tall, drying black. Roots clustered, fibrous. Stems 1–4, often short branched apically, with 4 lines of hairs. Leaves in whorls of 4. Basal leaf petiole to 5 cm. Distal stem leaves ± sessile, ovate-oblong to oblong-lanceolate, 2–5 × 1–1.5 cm, abaxially sparsely villous along veins and often white scurfy, adaxially sparsely pubescent, densely so along midvein, pinnatifid to pinnatisect; segments 4–7 pairs, ovate to oblong-lanceolate or linear-oblong, winged, lobed or incised-dentate, proximal segments becoming leafletlike. Inflorescences spicate, to 6 cm; bracts leaflike, proximal ones slightly longer than flowers. Calyx ca. 5.5 mm, membranous, 2/5 cleft anteriorly; lobes 3, unequal, posterior one triangular, ca. 1.5 mm; lateral lobes obscure. Corolla red; tube 8–9 × ca. 2.5 mm, basal 2.5 mm strongly decurved, enlarged; galea ca. 5 mm; lower lip longer than galea, 7–8 mm × 1–1.1 cm, middle lobe rounded, smaller than lateral pair. Filaments glabrous. Fl. May, fr. Jun–Jul.

• Bamboo groves; ca. 1300 m. WC Guizhou.

149. *Pedicularis holocalyx* Handel-Mazzetti, Symb. Sin. 7: 849. 1936.

全萼马先蒿 *quan e ma xian hao*

Pedicularis spicata Pallas var. *australis* Bonati; *P. szetschuanica* Maximowicz var. *elata* Bonati.

Herbs annual, more than 50 cm tall, sparsely pubescent, not drying black. Stems single, erect, often many branched apically, with 4 lines of hairs. Leaves in whorls of 3 or 4; proximal petioles to 1 cm, winged; leaf blade oblong-lanceolate, 2–5 cm × 0.8–2.3 mm, abaxially glabrous, adaxially sparsely pubescent, pinnatifid; segments 6–9 pairs, linear-oblong to triangular-ovate, incised-dentate. Inflorescences spicate, 2–4(–6) cm; bracts leaflike, proximal ones longer than flowers, distal ones triangular-ovate, long ciliate. Flowers small. Calyx ovoid, ca. 4 mm, membranous; lobes by fusion appearing 3, unequal, posterior one triangular, ca. 0.8 mm, villous along midvein and ciliate. Corolla purplish red; tube strongly bent in calyx, deflexed, ca. 5 mm, straight and gradually expanded apically; galea ca. 2.5–3 mm,

margin entire, rounded in front; lower lip spreading, longer than galea, ca. 7 mm, middle lobe rounded, much smaller than lateral lobes. Filaments 2 villous, 2 glabrous. Capsule triangular-lanceolate, ca. 1.2 cm × 4 mm, 1/2 exceeding calyx, short apiculate. Fl. Jun, fr. Jun–Jul.

• Grassy slopes; ca. 2000 m. W Hubei, E Sichuan.

150. *Pedicularis spicata* Pallas, Reise Russ. Reich. 3: 738. 1776.

穗花马先蒿 *sui hua ma xian hao*

Herbs annual, 20–30(–40) cm tall, drying black or not. Roots conical, woody. Stems 1 to several, outer ones procumbent or ascending, unbranched or often branched apically, with 4 lines of hairs. Leaves often in whorls of 4. Basal leaves ± in a rosette, smaller than stem leaves, deciduous by anthesis. Stem leaf petiole to 1 cm, narrowly winged, pubescent; leaf blade oblong-lanceolate to linear-narrowly lanceolate, to 7 × 1.3 cm, abaxially white villous along veins, adaxially sparsely white pubescent, pinnatifid to pinnatifid; segments 9 or 10 pairs, ovate to oblong, dentate or incised-dentate, teeth callose. Inflorescences spicate, to 12 cm, interrupted basally; proximal bracts leaflike, distal ones rhomboid-ovate or flabellate, white villous. Flowers small. Calyx campanulate, 3–4 mm, slightly cleft anteriorly, membranous; lobes by fusion appearing 3, unequal, posterior one triangular, smaller than lateral pair. Corolla red; tube bent at a right angle basally, 1.2–1.8 cm; galea 3–4 mm, ± acute in front; lower lip 6–10 mm, middle lobe obovate, smaller than lateral lobes. Filaments 2 pubescent, 2 glabrous. Capsule obliquely ovoid to lanceolate-ovoid, 6–10 × ca. 4 mm, apex acute to apiculate. Fl. Jun–Sep, fr. Aug–Oct.

Wet or swampy meadows, thickets; 1500–2600 m. S Gansu, Hebei, Heilongjiang, N Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, N Sichuan [Japan, N Korea, Mongolia, Russia (E Siberia, Far East)].

1a. Capsule narrow, lanceolate-ovoid, 8–10 mm,

long apiculate 150c. subsp. *stenocarpa*

1b. Capsule narrowly ovoid, 6–7 mm, acute.

2a. Distal bracts leaflike or rhomboid-ovate;

filaments 2 densely villous 150a. subsp. *spicata*

2b. Distal bracts strongly enlarged,

becoming flabellate; filaments 2

pilose 150b. subsp. *bracteata*

150a. *Pedicularis spicata* subsp. *spicata*

穗花马先蒿(原亚种) *sui hua ma xian hao* (yuan ya zhong)

Pedicularis spicata Pallas var. *sensinowii* Bonati.

Distal bracts leaflike or rhomboid-ovate. Filaments 2 densely villous, 2 glabrous. Capsule narrowly ovoid, 6–7 mm, apex acute.

Wet or swampy meadows, thickets; 1500–2600 m. S Gansu, Hebei, Heilongjiang, N Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, N Sichuan [Japan, N Korea, Mongolia, Russia (E Siberia, Far East)].

150b. *Pedicularis spicata* subsp. *bracteata* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 405. 1963.

显苞穗花马先蒿 xian bao sui hua ma xian hao
Distal bracts strongly enlarged, becoming flabellate, to
10 × 8 mm. Filaments 2 pilose, 2 glabrous. Capsule
narrowly ovoid, 6–7 mm, apex acute. Fl. Jun.

• W Hebei.

150c. *Pedicularis spicata* subsp. *stenocarpa* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 405. 1963.

狭果穗花马先蒿 xia guo sui hua ma xian hao
Bracts leaflike or rhomboid-ovate apically. Filaments 2
densely villous. Capsule lanceolate-ovoid, 8–10 mm,
long apiculate. Fr. Sep.

• W Hebei.

151. *Pedicularis szetschuanica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 601. 1888.

四川马先蒿 si chuan ma xian hao

Herbs annual, often (10–)20(–30) cm tall, pubescent to
glabrescent, not drying black. Roots single, woody
when old. Stems 1–8, rigid, outer stems ± ascending,
often unbranched, with 4 lines of hairs. Leaves in
whorls of 4; petiole of proximal leaves 0.7–3.5 cm, of
distal leaves shorter or ± sessile, white villous; leaf
blade ovate to oblong-lanceolate, 0.4–3 cm × 2.5–10(–
13) mm, pinnatifid; segments 5–11 pairs, ovate to
obovate, dentate, teeth white and callose, ± white
pubescent or glabrescent on both surfaces.

Inflorescences spicate, dense or interrupted basally;
proximal bracts leaflike, distal ones triangular-ovate,
white villous, tinged with red apically. Calyx often
tinged with purplish red, ca. 4 mm, membranous,
sometimes with red dots, slightly cleft anteriorly; lobes
5, unequal, ± serrate, posterior one triangular, smaller
than lateral lobes. Corolla purple-red, 1.4–1.7 cm; tube
ca. 2 × as long as galea, strongly decurved basally,
expanded apically; galea barely falcate, ca. 5 mm,
slightly rounded in front; lower lip 7–8 mm × ca. 1 cm,
middle lobe ovate, slightly smaller than lateral pair,
margin entire or erose-serrulate. Filaments glabrous. Fl.
Jun–Aug, fr. Aug–Sep.

• Alpine meadows, grassy slopes, ravines; 3400–4600 m. SW Gansu,
SE Qinghai, N and W Sichuan, E Xizang.

1a. Plants barely 10 cm tall, ± woody; calyx
with reticulate veins nearly throughout;
margin of lower corolla lip erose-serrulate
..... 151c. subsp. *anastomosans*

1b. Plants (10–)20(–30) cm tall, not woody;
calyx without reticulate veins throughout;
margin of lower corolla lip entire.

2a. Plants pubescent; leaf blade long ovate
to ovate-oblong or oblong-lanceolate,
0.4–3 cm × 2.5–10 mm 151a. subsp. *szetschuanica*

2b. Plants glabrescent; leaf blade oblong to
ovate, to 2.7 cm × 13 mm 151b. subsp. *latifolia*

151a. *Pedicularis szetschuanica* subsp. *szetschuanica*

四川马先蒿(原亚种) si chuan ma xian hao (yuan ya
zhong)

Pedicularis szetschuanica var. *angustifolia* Bonati.

Plants (10–)20(–30) cm tall, not woody, pubescent.
Leaf blade long ovate to ovate-oblong or oblong-
lanceolate, 0.4–3 cm × 2.5–10 mm. Calyx without
reticulate veins throughout. Margin of lower corolla lip
entire.

• Alpine meadows, grassy slopes, ravines; 3400–4600 m. SW Gansu,
SE Qinghai, N and W Sichuan, E Xizang.

151b. *Pedicularis szetschuanica* subsp. *latifolia* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 405. 1963.

宽叶四川马先蒿 kuan ye si chuan ma xian hao
Plants (10–)20(–30) cm tall, not woody, glabrescent.
Leaf blade oblong to ovate, to 2.7 × 1.3 cm. Calyx
without reticulate veins throughout. Margin of lower
corolla lip entire.

• N and W Sichuan.

151c. *Pedicularis szetschuanica* subsp. *anastomosans* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 405. 1963.

网脉四川马先蒿 wang mai si chuan ma xian hao
Plants to 10 cm tall, ± woody. Calyx with reticulate
veins almost throughout. Margin of lower corolla lip
erose-serrulate. Fl. Aug.

• 3800–3900 m. E Xizang.

152. *Pedicularis triangularidens* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 406. 1963.

三角齿马先蒿 san jiao chi ma xian hao
Herbs annual, (6–)40 cm tall, not drying black. Roots ±
woody. Stems usually numerous, cespitose, unbranched
to many branched basally and unbranched apically,
densely pubescent to glabrescent. Leaves in whorls of 4.
Basal leaf petiole to 2.5 cm, sparsely pubescent. Stem
leaf petiole barely 0.5–1.5 cm; leaf blade ovate to
linear-oblong or ovate-oblong, 2–3.5 × 0.7–1.8 cm,
abaxially long pilose along midvein, adaxially sparsely
appressed pubescent, pinnatifid; segments 3–9 pairs,
rounded, margin double dentate. Inflorescences spicate,
2–8(–20) cm, interrupted basally; proximal bracts
leaflike, rhomboid-lanceolate or ± flabellate, white
villous. Calyx (3.5–)4–5.5 mm, membranous, slightly
cleft anteriorly; lobes 5, unequal, villous along veins,
ciliate. Corolla pale purple-red, (0.9–)1.3–1.7 cm; tube
7–8 mm, ± bent at a right angle basally, expanded
apically; galea nearly straight, 3.5–5.5 mm, slightly
rounded in front, apex truncate; lower lip 6–9 × 7.5–
10.5 mm, lobes ± obovate; middle lobe narrowly
obovate, smaller than lateral pair, finely glandular
ciliate. Filaments glabrous. Capsule triangular-
lanceolate, 1–1.5 cm, apex acute. Fl. May–Jul, fr. Jul–
Aug.

• Forests, grassy slopes, river banks, moss-covered forest floor,
coniferous forests; 2600–3800 m. C, N, and NW Sichuan.

1a. Plants to 40 cm tall; corolla 1.3–1.7 cm;
calyx 4–5.5 mm; leaf segments 3–9 pairs
..... 152a. subsp. *triangularidens*

1b. Plants ca. 10 cm tall; corolla scarcely 9
mm; calyx only ca. 3.5 mm; leaf
segments 3 or 4 pairs 152b. subsp. *chrysosplenoides*

152a. *Pedicularis triangularidens* subsp. *triangularidens*
三角齿马先蒿(原亚种) san jiao chi ma xian hao (yuan ya zhong)

Pedicularis szetschuanica Maximowicz var. *ovatifolia*
H. L. Li.

Plants to 40 cm tall. Leaf blade with 3–9 pairs of segments. Calyx 4–5.5 mm. Corolla 1.3–1.7 cm.

• Forests, grassy slopes, river banks, moss-covered forest floor; 2600–3800 m. C and N Sichuan.

This subspecies has two varieties: var. *triangularidens* with a wider corolla and middle lobe of lower lip narrowly obovate, and var. *angustiloba* P. C. Tsoong with a narrower corolla and middle lobe of lower lip ligulate.

152b. *Pedicularis triangularidens* subsp. *chrysosplenioides*
P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 407. 1963.

猫眼草三角齿马先蒿 mao yan cao san jiao chi ma xian hao

Plants ca. 10 cm tall. Leaf blade with 3 or 4 pairs of segments. Calyx to 3.5 mm. Corolla to 9 mm. Fl. Jul–Aug.

• Coniferous forests; ca. 3600 m. NW Sichuan.

153. *Pedicularis dolichostachya* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 313. 1948.

长穗马先蒿 chang sui ma xian hao

Herbs more than 20 cm tall. Stems single, erect, unbranched, slightly pubescent or glabrescent. Leaves in whorls of 4; petiole 3–4 mm apically, villous; leaf blade ovate-oblong or linear-oblong, ca. 2.8 × 1 cm, sparsely hirsute, pinnatifid; segments 6–8 pairs, ovate, margin ± entire, apex acute. Inflorescences to 10–15 cm, interrupted basally; bracts leaflike, ca. as long as calyx, pinnatifid. Pedicel erect, 1–3 mm. Calyx broadly ovate, 5–6 mm, membranous, without reticulate veins, sparsely hirsute, scarcely cleft anteriorly; lobes 5, ± equal, triangular, sparsely ciliate, ± entire, apex acute. Corolla purple, ca. 1.3 cm; tube slightly curved in calyx, 7–8 mm, expanded apically; galea slightly curved, ca. 5 mm, rounded in front, margin entire, apex acute; lower lip slightly longer than galea; lobes rounded, middle lobe smaller than lateral pair, projecting, sparsely ciliate. Filaments glabrous. Capsule oblong, ca. 1.8 cm × 4–5 mm, 1/2 exceeding calyx, apiculate. Fl. and fr. Aug.

• Grassland; ca. 3700 m. W Sichuan.

154. *Pedicularis diffusa* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 62(1): 7. 1893.

铺散马先蒿 pu san ma xian hao

Herbs to 40–60 cm tall. Roots slender, main root present; crown not scaly. Stems 1 to several, erect or diffuse and ascending, with 4 lines of hairs. Leaves in whorls of 4; petiole 0.5–1.5 cm, white pilose; leaf blade ovate-oblong, 2–2.5(–4.5) × 0.75–1.3 cm, pinnatifid to pinnatisect; segments 5–8 pairs, oblong to linear-oblong, incised-dentate. Inflorescences capitate or to 15–18 cm, interrupted basally. Calyx campanulate, 5–6(–10) × ca. 3.5 mm, membranous, with sparse reticulate

veins throughout, scarcely cleft anteriorly; lobes 5, unequal, posterior one triangular and entire, lateral lobes ovate and incised-serrate. Corolla rose, 1.5–2 cm; tube decurved basally; galea slightly curved, 4–5 mm, rounded in front; lower lip ca. 8 mm, middle lobe obovate, ca. 1/2 as large as lateral lobes, erose-serrulate. Anterior filaments pubescent apically. Capsule lanceolate, apex acute. Fl. and fr. May–Jul.

Riversides, stony surfaces; ca. 3800 m. S and SE Xizang [Bhutan, C and E Nepal, Sikkim].

1a. Leaves 2–2.5 cm; calyx 5–6 mm; corolla ca.

1.5 cm, galea ca. 5 mm, more than 1.2 as

long as lower lip 154a. subsp. *diffusa*

1b. Leaves to 4–4.5 cm; calyx to 7–10 mm;

corolla 1.7–2 cm, galea barely 4 mm, ca.

1/2 as long as lower lip 154b. subsp. *elatior*

154a. *Pedicularis diffusa* subsp. *diffusa*

铺散马先蒿(原亚种) pu san ma xian hao (yuan ya zhong)

Leaves 2–2.5 cm. Calyx 5–6 mm. Corolla ca. 1.5 cm;

galea ca. 5 mm, more than 1/2 as long as lower lip.

S Xizang [Bhutan, C and E Nepal, Sikkim].

154b. *Pedicularis diffusa* subsp. *elatior* P. C. Tsoong, Acta Phytotax. Sin. 3: 312. 1955.

高升铺散马先蒿 gao sheng pu san ma xian hao

Leaves to 4–4.5 cm. Calyx to 7–10 mm. Corolla 1.7–2 cm; galea barely 4 mm, ca. 1/2 as long as lower lip. Fl.

Jun.

• Riversides, stony surfaces; ca. 3800 m. SE Xizang.

155. *Pedicularis nyalamensis* H. P. Yang, Acta Phytotax. Sin. 18: 241. 1980.

聂拉木马先蒿 nie la mu ma xian hao

Herbs perennial, 15–30 cm tall, pubescent, drying black.

Roots stout, woody, main root present; crown with ovate scales. Stems often numerous, purplish black, central stem erect or all stems procumbent and flexuous or ascending. Leaves in whorls of 4. Basal leaves

numerous, persistent; petiole slender, 1–3 cm,

pubescent. Stem leaf petiole to 1 cm; leaf blade oblong-

lanceolate to oblong, 1.5–3.5 cm, pinnatisect; segments

7–10 pairs, oblong, pinnatifid, dentate, teeth callose.

Inflorescences racemose, to 10 cm, interrupted basally;

bracts leaflike, shorter than flowers. Pedicel 1–2 mm.

Calyx campanulate, 6–8 mm, membranous, densely

white pilose; lobes 5, ± equal, serrate, ca. 2/5 as long as

calyx. Corolla red or purplish red, with white or pale

red throat, ca. 1.3 cm; tube ca. 9–10 mm, ± bent at a

right angle medially, expanded apically; galea slightly

falcate, 3–4 mm; lower lip longer than galea, ca. 8 mm

× 1 cm, middle lobe rounded, smaller than lateral pair,

projecting, slightly retuse. Anterior filaments pilose. Fl.

Jun–Jul, fr. Aug.

• Shaded slopes; ca. 3700 m. S Xizang.

156. *Pedicularis brachycrania* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 307. 1948.

短盔马先蒿 duan kui ma xian hao

Herbs biennial or perennial, to 30 cm tall. Roots single, small, not fleshy, slightly robust. Stems numerous, erect, slender, unbranched, glabrous or pilose, internode to 12 cm. Basal leaf petiole 1.5–2 cm. Stem leaves in whorls of 3 or 4; petiole 2–7 mm; leaf blade ovate-oblong, ca. 2.5 × 1.3 cm, membranous, glabrous, pinnatisect or -partite; segments 5 or 6 pairs, ovate-oblong, pinnatifid. Inflorescences racemose, to 10 cm, interrupted basally; bracts ovate-oblong or oblong-lanceolate, pinnatisect or pinnatifid. Pedicel 2–3 mm. Calyx broadly ovate, ca. 4 mm, slightly cleft anteriorly, pilose; lobes 5, ± equal, triangular, barely 1 mm, entire or obscurely serrate. Corolla purple, ca. 1.6 cm, glabrous throughout; tube decurved in calyx, erect apically, 8–9 mm; galea ± erect, 3.5–4 mm, rounded in front, margin entire, apex truncate; lower lip 7–8 mm, lobes rounded, margin entire, middle lobe smaller than lateral pair, placed apically. Filaments glabrous. Fl. May.

• Near glacial lakes. SW Sichuan, NW Yunnan.

157. *Pedicularis flaccida* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 62(1): 8. 1893.

软弱马先蒿 ruan ruo ma xian hao

Herbs annual, 20–25 cm tall, glabrous. Roots ca. 2 cm. Stems ± ascending, slender, many branched basally and at middle; branches slender, weak. Basal leaves withering early. Stem leaves in whorls of 3 or 4; petiole ca. 5 mm; leaf blade ovate-oblong to ovate, 1–1.8 cm × 7–9 mm, pinnatifid; segments 5 or 6 pairs, incised-dentate. Inflorescences spicate, 2–4-flowered, fascicled, lax; bracts leaflike, proximal ones ca. as long as flowers, distal ones longer than calyx and shorter than corolla. Calyx campanulate, only 2.5 mm, glabrous throughout, slightly cleft anteriorly, with sparse reticulate veins; lobes 5, oblong, barely 1 mm, membranous, entire. Corolla 1.4–1.8 cm; tube ± bent at a right angle basally, slightly ascending at junction of tube and galea, 1–1.1 cm, expanded apically; galea ± falcate, 4–5 mm, not projecting in front; lower lip barely 5.5–7 mm, middle lobe obovate, ca. 1/2 as large as lateral lobes. Filaments glabrous.

• W Sichuan.

158. *Pedicularis minutilabris* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 407. 1963.

微唇马先蒿 wei chun ma xian hao

Herbs annual, (6–)25–30 cm tall, glabrous throughout, not drying black. Roots conical. Stems 1–8, erect or slightly ascending. Proximal leaves opposite, distal

ones whorled; petiole ca. 2 cm; leaf blade ovate to elliptic-ovate, ca. 1.5 × 1 cm, pinnatipartite; segments 3 or 4 pairs, obovate to oblong, incised-double dentate. Inflorescences nearly 2/3 height of stems, lax; proximal bracts leaflike, distal ones slender petiolate. Pedicel ca. 1 mm. Calyx ovate-campanulate, barely 3 mm, membranous, 2/5 cleft anteriorly; lobes 5, triangular, unequal, posterior one barely 0.7 mm, lateral lobes ca. 1 mm, serrate. Corolla barely 9–10 mm; tube decurved basally, ca. 6 mm; galea ca. 4 mm, ± narrow, apex truncate; lower lip shorter than galea, 2.5–3 mm, lobes emarginate, middle lobe obovate, smaller than lateral pair, projecting. Filaments glabrous. Capsule enclosed by calyx basally, compressed, triangular-ovoid, barely 8–9 mm, apex acute. Seeds oblong, ca. 3 mm. Fl. Jun–Jul, fr. Jul–Aug.

• *Abies* forests; 3300–3900 m. NW Sichuan.

159. *Pedicularis lineata* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 597. 1888.

条纹马先蒿 tiao wen ma xian hao

Pedicularis sparsissima P. C. Tsoong.

Herbs perennial, 20–35(–60) cm tall, not drying black. Roots often caespitose, ± conical, slender. Stems 1 to several, erect, with 2–4 lines of hairs to glabrescent, unbranched basally but branched apically; branches slender, opposite or whorled. Leaves in whorls of 4. Basal leaves withering early; petiole to 15 cm; leaf blade ovate, barely 7 mm, pinnatifid; segments ca. 3 pairs, dentate. Stem leaf petiole ca. 6 mm to ± absent; leaf blade elliptic-oblong to linear-oblong or ovate, 0.7–6 × 0.6–2.5 cm, abaxially sparsely white villous along veins, adaxially sparsely glandular pubescent, pinnatifid; segments 5–8 pairs, ovate to oblong-ovate, margin double dentate, teeth callose. Inflorescences lax, to 18 cm; bracts often leaflike. Calyx ovate, 4–5.5 mm, membranous, slightly cleft anteriorly, villous along veins; lobes 5, unequal, serrate. Corolla purple-red, 1.5–1.8 cm; tube decurved, slender, expanded apically; galea 3–4 mm, 1.2–1.5 mm wide apically, ± rounded in front, apex slightly convex; lower lip 6–8 × 8–10 mm, middle lobe obovate, slightly smaller than lateral pair, glabrous. Filaments glabrous. Capsule triangular-lanceolate, 1–1.3 cm, apex acute. Seeds elliptic, ca. 1 mm. Fl. Apr–Jul, fr. Jul–Sep.

Forests, alpine meadows; 1900–4600 m. Gansu, S Shaanxi, Sichuan, NW Yunnan [N Myanmar].

55. Ser. *Microchilae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 93. 1890.

后生轮叶系 hou sheng lun ye xi

Ser. *Metaverticillatae* P. C. Tsoong ex H. P. Yang.

Herbs annual or perennial. Leaves in whorls of 3 or 4, elliptic to lanceolate, pinnatisect to pinnatifid. Inflorescence spicate to capitate. Calyx lobes 5. Corolla ± S-shaped; tube deflexed in calyx; galea truncate or toothed at apex.

• Six species: endemic to China.

1a. Leaves pinnatipartite to pinnatisect.

2a. Leaves densely pubescent abaxially; apex of galea not toothed; 2 filaments pubescent 160. *P. stenotheca*

- 2b. Leaves not pubescent abaxially; apex of galea toothed; all 4 filaments pubescent apically 165. *P. lingelshheimiana*
- 1b. Leaves pinnatifid or occasionally pinnatipartite, not pinnatisect.
- 3a. Galea much longer than lower corolla lip; corolla strongly ascending at junction of tube and galea 164. *P. microchilae*
- 3b. Galea ca. as long as to shorter than lower corolla lip; corolla not strongly ascending at junction of tube and galea, ± straight or slightly curved apically.
- 4a. Apex of galea toothed 163. *P. metaszetschuanica*
- 4b. Apex of galea not toothed.
- 5a. Herbs annual; roots conical; basal leaves often withering early; inflorescences not purplish red pilose 161. *P. angularis*
- 5b. Herbs perennial; roots fascicled, filiform; basal leaves persistent; inflorescences purplish red pilose 162. *P. fragarioides*

160. *Pedicularis stenotheca* P. C. Tsoong, Acta Phytotax. Sin. 3: 312. 1955.

狭室马先蒿 xia shi ma xian hao

Herbs perennial, to 20 cm tall, drying slightly black. Roots ± woody. Stems 1 to several, with 4 lines of hairs. Leaves in whorls of 4. Basal leaf petiole ca. 2.5 cm, white villous. Stem leaves in 2 or 3 whorls; petiole 0.5–1.5 cm; leaf blade oblong-lanceolate to ovate-lanceolate, 1.8–2.2 cm × 8–10 mm, abaxially densely white scurfy and white pilose along veins, adaxially hoary along midvein, pinnatipartite to pinnatisect; segments 3–9 pairs, ovate to linear-lanceolate, pinnatifid or incised-double dentate. Inflorescences ± capitate, 1–2 cm, white pilose; bracts leaflike, proximal longer than flowers, distal shorter than flowers. Calyx ca. 5 mm, barely cleft anteriorly; lobes 5, unequal, posterior one smaller than lateral lobes, triangular and entire, lateral lobes ovate, serrate. Corolla 1.1–1.2 cm; tube slightly decurved basally, slightly expanded apically; galea barely 3 mm, only ca. 1/2 as long as lower lip, rounded in front, truncate at apex, not toothed; lower lip ca. 6 × 8 mm, lobes retuse and erose, middle lobe rounded, ca. 1/2 as large as lateral pair. 2 filaments pubescent, 2 glabrous. Capsule narrowly triangular-lanceolate, ca. 1.5 cm, apiculate. Fl. and fr. Jun–Jul.

• Grassy banks in coniferous forests; ca. 3900 m. C and E Xizang.

161. *Pedicularis angularis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 408. 1963.

角盔马先蒿 jiao kui ma xian hao

Herbs annual, 15(–40) cm tall, not drying black. Roots conical, small, ± woody. Stems single and erect, but several and ascending, often densely white or pale brown villous. Leaves in whorls of 4. Basal leaves often withering early; petiole 0.7–2 cm, densely villous. Stem leaves in 2(or 3) whorls, shorter petiolate; leaf blade ovate to ovate-oblong or narrowly oblong, 0.7–2 cm × 4–10 mm, abaxially densely strigose, adaxially densely villous along veins, pinnatifid; segments 6–10 pairs, margin lobed and double dentate. Inflorescences spicate, to 4 cm, interrupted basally; axis densely villous; proximal bracts leaflike. Calyx 4–5 mm, densely villous

along veins; lobes 5, unequal, posterior one smallest, triangular; lateral lobes long ovate, ca. 1.5 mm. Corolla pale red, ca. 1.5 cm; tube strongly decurved basally, expanded apically; galea barely 3.5–4 mm, shorter than lower lip, apex rounded, angulate in front, not toothed; lower lip ca. 6 × 8.5 mm, lobes obovate and retuse, middle lobe smallest. Filaments glabrous. Fl. Jun–Jul, fr. Aug.

• Slopes; ca. 3800 m. NW Sichuan.

162. *Pedicularis fragarioides* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 409. 1963.

草莓状马先蒿 cao mei zhuang ma xian hao

Herbs perennial, usually less than 10 cm tall, ± drying black. Roots fascicled, filiform, fleshy. Stems usually decumbent or ascending, often many branched basally and at middle, densely pale brown pilose. Basal leaves purple-black, persistent; petiole filiform, to 3 cm, 3–4 × as long as leaf blade; leaf blade broadly ovate-cordate to elliptic-cordate, pinnatifid; segments 3–6 pairs, broadly ovate, margin lobed or double dentate. Stem leaves often opposite or occasionally in whorls of 4, shorter petiolate; leaf blade narrow, abaxially white hirsute along veins, adaxially sparsely appressed pilose; segments ca. 5 pairs. Inflorescences capitate, densely purplish red pilose; bracts purplish red, much shorter than flowers, purplish villous. Calyx ca. 6 mm, membranous, 2.5–3 mm, scarcely cleft anteriorly, tinged with red, purplish villous; lobes 5, 1.7–2 mm, unequal. Corolla purplish red, 1.5–1.6 cm; tube decurved basally; galea ca. 4.5 mm, apex truncate, not toothed; lower lip ca. 6 mm × 1.1 cm, lobes ovate, ± equal, praemorse-serrate. Filaments glabrous. Fl. Aug–Sep, fr. Sep.

• Stony slopes; ca. 4700 m. NW Sichuan.

163. *Pedicularis metaszetschuanica* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 410. 1963.

后生四川马先蒿 hou sheng si chuan ma xian hao

Herbs annual, to 25 cm tall, ± drying black. Roots conical, woody. Stems 1–7, outer stems ± ascending,

white villous. Basal leaves \pm persistent; petiole 1–1.5 cm, slender, white villous; leaf blade oblong to lanceolate, to 1 cm \times 2.5–4 mm, pinnatifid; segments 4–6 pairs. Stem leaves in whorls of 4, shorter petiolate; leaf blade slightly larger than basal leaves, abaxially white villous along veins, adaxially appressed white crispate-pilose; segments ca. 6 pairs. Inflorescences spicate, 3–6 cm, interrupted basally; proximal bracts leaflike, densely villous. Calyx 4–6 mm, membranous, slightly cleft anteriorly; lobes 5, triangular, short, \pm unequal. Corolla red-purple, ca. 1.5 cm; tube decurved basally, expanded apically; galea 5.5–6.5 mm, apex rounded, with 1 marginal filiform tooth on each side; lower lip ca. 6 \times 7–9 mm, middle lobe broadly ovate, slightly smaller than lateral pair. Filaments glabrous. Fl. Jul–Aug, fr. Sep–Oct.

• Open meadows; 3200–3400 m. N Sichuan.

164. *Pedicularis microchilae* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 595. 1888.

小唇马先蒿 xiao chun ma xian hao

Herbs annual, to 40 cm tall, not drying black. Roots slender. Stems 1–5, erect or outer stems slightly ascending, weak, glabrescent. Leaves few; basal leaves withering early. Proximal stem leaves opposite; petiole to 2 cm, middle and distal ones in whorls of 4, short petiolate to sessile; leaf blade oblong to elliptic or ovate, 1–2(–3.5) cm, glabrous on both surfaces, pinnatifid; segments 6–10 pairs, ovate, incised-lobed or double dentate. Inflorescences spicate, interrupted; bracts

leaflike to ovate-flabellate, short petiolate. Calyx ca. 4.5 mm, slightly cleft anteriorly; lobes 5, \pm equal, triangular-ovate, obscurely serrate, pilose along veins and serrate. Corolla strongly ascending at junction of tube and galea, pale red, with purple galea, ca. 2 cm; galea slightly falcate, 9–10 mm, much longer than lower lip, apex toothed or not; lower lip ca. 7 mm.

Filaments glabrous. Capsule narrowly ovoid-triangular, to 1.4 cm, ca. 1/2 exceeding calyx, apiculate. Fl. Jun–Aug, fr. Jul–Sep.

• Alpine meadows, thicket margins by streams; 2800–4000 m. SW Sichuan, NW Yunnan.

165. *Pedicularis lingelsheimiana* H. Limpricht, Repert. Spec. Nov. Regni Veg. 18: 244. 1922.

凌氏马先蒿 ling shi ma xian hao

Herbs less than 30 cm tall, pilose. Stems branched apically, sparsely pilose. Proximal leaves in whorls of 3, middle and distal ones opposite or whorled, long petiolate; leaf blade lanceolate or elliptic, pinnatisect; segments ovate, pinnatifid, incised-dentate.

Inflorescences spicate; bracts pinnatisect. Calyx campanulate; lobes 5, unequal, 2 lobes larger than others, rounded, incised-serrate. Corolla rose; tube decurved in calyx, ca. 3 \times as long as calyx; galea slightly falcate, apex rounded, with 1 marginal subulate tooth on each side; lower lip slightly longer than galea, lobes oblate, middle lobe placed slightly apically.

Filaments pubescent apically.

• Mountains; 3800–3900 m. W Sichuan.

56. Ser. *Cheilanthifoliae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 524. 1888.

碎米蕨叶系 sui mi jue ye xi

Ser. *Ophiocephalae* Prain.

Herbs perennial. Roots \pm fleshy. Stems unbranched or with erect rigid branches. Basal leaves usually cespitose, persistent. Stem leaves in whorls of 4, pinnatisect. Inflorescences subcapitate to spicate or racemose. Calyx deeply cleft anteriorly, 3- or 5-lobed. Corolla yellow, white, or red; tube ca. as long as calyx or shorter, decurved in calyx; beak short.

Five species: Afghanistan, China, India, Kazakstan, Kyrgyzstan, Mongolia, Nepal, Sikkim, Tajikistan; all five in China.

1a. Beak of corolla 0.6–1 mm 170. *P. anas*

1b. Beak of corolla relatively very short.

2a. Leaf segments 6–8(–13) pairs; calyx 1/2–2/3 cleft anteriorly; beak of galea to 1.8 mm wide 168. *P. latirostris*

2b. Leaf segments 8–18 pairs; calyx 1/3 cleft anteriorly; beak of galea less than 1 mm wide.

3a. Galea distinctly serrate crested in front 169. *P. globifera*

3b. Galea not serrate crested in front.

4a. Calyx distinctly 5-lobed, densely pilose along veins; lower corolla lip 8–10 mm \times 1–1.2 cm; leaf segments incised-dentate or double dentate 166. *P. cheilanthifolia*

4b. Calyx often obscurely 3-lobed, sparsely white pilose; lower corolla lip ca. 10 mm \times 1.3 cm; leaf segments shallowly crenate-dentate 167. *P. kawaguchii*

166. *Pedicularis cheilanthifolia* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 2, 1: 79. 1843.

碎米蕨叶马先蒿 sui mi jue ye ma xian hao

Herbs perennial, 5–30 cm tall, drying slightly black. Roots fusiform. Stems single and erect or more than 10, unbranched, with 4 lines of hairs. Basal leaf petiole to 3–4 cm. Stem leaves in whorls of 4; petiole 0.5–2 cm; leaf blade linear-lanceolate, 0.7–4 cm \times 2.5–8 mm,

pinnatisect; segments 8–12 pairs, ovate-lanceolate to linear-lanceolate, pinnatifid, double dentate or incised-dentate. Inflorescences subcapitate or spicate and elongated to 10 cm, sometimes interrupted basally; bracts leaflike, ca. as long as flowers basally. Pedicel \pm sessile. Calyx 8–9 mm, ca. 1/3 cleft anteriorly, densely pilose along veins; lobes 5, unequal, posterior one triangular, entire, lateral lobes larger, serrate. Corolla purple-red to

white, sometimes yellow; tube almost erect when young, becoming bent at a right angle basally, to 1.1–1.4 cm; galea falcate, ca. 1 cm, apex with a short conical beak or beakless; lower lip 8–10 mm × 1–1.2 cm, lobes rounded. Filaments sparsely pubescent basally, glabrous apically. Capsule lanceolate-triangular, ca. 1.6 cm × 5.5 mm, ca. 1/2 exceeding calyx. Seeds ca. 2 mm. Fl. Jun–Aug, fr. Jul–Sep.

Stony and gravelly slopes near summits, grassy slopes and banks, damp sandy areas along streams, *Betula* forests; 2100–5200 m. E, SW, and W Gansu, Qinghai, Xinjiang, N and W Xizang [Afghanistan, India, Kazakstan, Kyrgyzstan, Mongolia, Tajikistan].

- 1a. Leaves with narrow segments; calyx lobes short; corolla limb without purplish dots
..... 166a. subsp. *cheilanthifolia*
- 1b. Leaves with wide segments; calyx lobes long; corolla limb often with purplish dots
..... 166b. subsp. *svenhedinii*

166a. *Pedicularis cheilanthifolia* subsp. *cheilanthifolia*
碎米蕨叶马先蒿(原亚种) sui mi jue ye ma xian hao
(yuan ya zhong)

Leaves with narrow segments. Calyx lobes short. Corolla purple-red to white or yellow; lower lip without purplish dots, ca. 8–10 mm × 1–1.2 cm, slightly shorter than galea.

Stony and gravelly slopes near summits, grassy slopes and banks, damp sandy areas along streams, *Betula* forests; 2100–4900 m. E, SW, and W Gansu, Qinghai, Xinjiang, N Xizang [Afghanistan, India, Kazakstan, Kyrgyzstan, Mongolia, Tajikistan].

This subspecies includes var. *isochila* Maximowicz with a yellow corolla, lower lip ca. 1 × 1.2 cm, ca. as long as galea.

166b. *Pedicularis cheilanthifolia* subsp. *svenhedinii*
(Paulsen) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 197. 1963.

斯文氏碎米蕨叶马先蒿 si wen shi sui mi jue ye ma xian hao

Pedicularis svenhedinii Paulsen in Hedin, S. Tibet 6: 44. 1921.

Leaves with wide segments. Calyx lobes long. Corolla purple-red to white; limb often with purplish dots; lower lip ca. 8 mm × 1 cm, slightly shorter than galea. 4500–5200 m. W Xizang [India].

167. *Pedicularis kawaguchii* T. Yamazaki, J. Jap. Bot. 55(10): 289. 1980.

喀瓦谷池马先蒿 ka wa gu chi ma xian hao
Herbs 20–30 cm tall. Stems erect, unbranched, with 4 lines of hairs. Leaves in whorls of 4; petiole 1–2 cm; leaf blade oblong-lanceolate, 2.5–4.5 cm × 5–10 mm, glabrous on both surfaces except adaxially short pubescent along midvein, pinnatisect; segments 10–15 pairs, oblong, shallowly crenate-dentate. Racemes 7–9 × 3–4 cm, many flowered; proximal bracts leaflike, distal ones lanceolate or linear, ca. as long as calyx, sparsely white pilose. Pedicel ca. 1.5 mm, sparsely pilose. Calyx tubular, ca. 7 × 3 mm, 1/3 cleft anteriorly, sparsely white pilose; lobes 3, unequal, 1.5–2 mm, posterior one oblanceolate, lateral pair larger, broadly

flabellate, apex 2-cleft, serrate. Corolla ca. 2 cm; tube decurved in calyx, expanded apically, ca. 2 × as long as calyx; galea incurved, ca. 8 mm, beak less than 1 mm wide; lower lip ca. 1 × 1.3 cm, middle lobe oblate, slightly smaller than lateral lobes. Filaments glabrous. Fl. Jun.

• S Xizang.

168. *Pedicularis latirostris* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 411. 1963.

宽喙马先蒿 kuan hui ma xian hao

Herbs perennial, 12–24 cm tall. Roots fusiform. Stems often single, with 4 lines of hairs. Basal leaf petiole ca. 2.5 cm. Stem leaves in whorls of 4; petiole to 1.3 cm, sparsely pilose or glabrous; leaf blade narrowly oblong to linear-oblong, 1–1.5 cm, pinnatisect; segments 6–8(–13) pairs, ovate to lanceolate, pinnatifid to incised-dentate. Inflorescences capitate to short spicate, 2–5 cm; bracts leaflike basally. Calyx ca. 8 mm, 1/2–2/3 cleft anteriorly; lobes 5, unequal, densely pilose along veins and ciliate. Corolla yellow, ca. 2 cm; tube slightly decurved at middle, ca. 1 cm; galea strongly falcate apically, ca. 1 cm; beak slightly truncate and rounded, to 1.8 mm wide; lower lip ca. 6 mm × 1.2 cm, middle lobe ovate-triangular, smaller than lateral pair. Filaments 2 sparsely pubescent near apex, 2 glabrous throughout; anthers apiculate. Fl. Jul, fr. Aug.

• Moist grassy meadows; ca. 3800 m. S Gansu.

169. *Pedicularis globifera* J. D. Hooker, Fl. Brit. India 4: 308. 1848.

球花马先蒿 qiu hua ma xian hao

Herbs perennial, ca. 10(–25) cm tall. Stems cespitose, to more than 10, central stem ± erect, outer stems strongly procumbent to ascending, with 4 lines of hairs. Basal leaf petiole 2–5 cm. Stem leaves in whorls of 4, short petiolate; leaf blade linear-lanceolate, smaller than basal leaves, to 3 × 1 cm, pinnatisect; segments 10–18 pairs, widely spaced, lanceolate to linear, lobed or dentate, teeth callose. Inflorescences often densely spicate, to 6 cm. Calyx oblong-campanulate, 8–9 mm, 1/3 cleft anteriorly, densely pilose along veins; lobes 5, unequal, posterior one triangular, entire, lateral lobes larger, serrate. Corolla red to white; tube ca. 1.2 cm; galea ± falcate or erect, 8–9 mm, rounded in front, distinctly serrate crested; beak short, apex truncate, less than 1 mm wide. Filaments glabrous. Capsule ovoid-lanceolate, ca. 1.4 cm × 5 mm, apiculate. Fl. and fr. Jun–Oct.

Swampy alpine *Kobresia* meadows, boggy places along rivers and streams, grassy areas, grass of parks and gardens; 3600–5400 m. S and SE Xizang [Nepal, Sikkim].

170. *Pedicularis anas* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 578. 1888.

鸭首马先蒿 ya shou ma xian hao

Herbs perennial, (4.5–)10–30(–40) cm tall, slightly pilose, drying black. Stems 1 to several, dark purple, usually unbranched, or occasionally branched distally,

with 4 lines of hairs. Basal leaves glabrous; petiole 1.5–2.5 cm. Stem leaves in whorls of 4, short petiolate or sessile; leaf blade oblong-ovate to linear-lanceolate, glabrous on both surfaces, pinnatisect; segments 7–11 pairs, pinnatifid, spinescent-dentate. Inflorescences capitate to spicate; proximal bracts leaflike. Calyx often with purplish dots or tinged with purple, glabrous or villous; lobes 5, unequal, posterior one 3-serrate apically, lateral lobes larger, serrate, densely downy-ciliate. Corolla purple, yellow, or purple with pale yellow lower lip and dark purplish red galea; tube ca. 7 mm, decurved through anterior slit of calyx, ascending distally near junction of limb, expanded apically; galea falcate, ca. 6 mm; beak ca. 1 × 0.6–1 mm, slender; lower lip ca. 7.5 mm × 1 cm, middle lobe rounded, slightly smaller than lateral pair. Filaments glabrous. Capsule 2/5 enclosed by calyx, triangular-lanceolate, to 1.8 cm, apiculate. Seeds oblong, ca. 2 mm. Fl. Jul–Sep, fr. Aug–Oct.

• Alpine meadows; 3000–4400 m. S and SW Gansu, N and W Sichuan, E Xizang.

1a. Corolla yellow 170c. var. *xanthantha*

1b. Corolla purple or with pale yellow lower lip and dark purple-red galea.

2a. Lower corolla lip large; beak of galea short 170a. var. *anas*

2b. Lower corolla lip smaller; beak of galea longer 170b. var. *tibetica*

170a. *Pedicularis anas* var. *anas*

鸭首马先蒿(原变种) ya shou ma xian hao (yuan bian zhong)

Corolla purple with dark purple-red galea and pale yellow lower lip; beak short; lower lip large. Fl. Jul–Sep, fr. Aug–Oct.

• Alpine meadows; 3000–4300 m. S Gansu, N and W Sichuan.

170b. *Pedicularis anas* var. *tibetica* Bonati, Bull. Herb. Boissier, Sér. 2, 7: 544. 1907.

西藏鸭首马先蒿 xi zang ya shou ma xian hao
Corolla purple with dark purple-red galea and pale yellow lower lip; beak long; lower lip small. Fl. and fr. Jul–Sep.

• 3600–4400 m. W Sichuan, E Xizang.

170c. *Pedicularis anas* var. *xanthantha* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 200. 1963.

黄花鸭首马先蒿 huang hua ya shou ma xian hao
Pedicularis xanthantha H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 332. 1948.

Corolla yellow; lower lip ca. 9 mm; beak to 2 mm. Fl. Jul–Aug.

• Alpine meadows; 3300–3700 m. SW Gansu.

57. Ser. *Caucasicae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 65. 1877.

高加索系 gao jia suo xi

Herbs low. Stem leaves few, opposite or whorled. Inflorescences elongated to capitate, densely flowered. Calyx large, 5-lobed. Corolla tube strongly curved apically; galea toothless or beaked. Anthers acuminate.

About eight species: Afghanistan, China, India, Kazakstan, Kyrgyzstan, Pakistan, Russia; one species in China.

171. *Pedicularis semenowii* Regel, Bull. Soc. Imp. Naturalistes Moscou 41: 108. 1868.

赛氏马先蒿 sai shi ma xian hao

Pedicularis pycnantha Boissier var. *semenowii* (Regel) Prain.

Herbs perennial, 2–5(–10) cm tall. Roots fleshy. Stems single to few, unbranched, sparsely lanulose. Proximal leaves opposite, with petiole longer than leaf blade, distal ones whorled, ± sessile, sparsely lanulose; leaf blade linear-lanceolate, pinnatisect; segments oblong, pinnatisect, serrulate-dentate. Inflorescences capitate;

proximal bracts leaflike, shorter than flowers. Pedicel ca. 1.5 cm. Calyx campanulate, inflated in fruit, 1–1.7 cm; lobes 5, lanceolate-linear, serrulate. Corolla purplish rose or white and rose, 2.2–3 cm; galea slightly S-shaped apically; lower lip ca. as long as galea, 7–10 mm, middle lobe rounded, slightly smaller than lateral pair. Filaments 2 sparsely pubescent, 2 glabrous. Capsule obliquely ovoid, 1.2–1.5 cm. Fl. May–Jun, fr. Jun–Jul.

Steppes, stony and rocky slopes; 2700–4500 m. Xinjiang, Xizang [Afghanistan, India, Kazakstan, Kyrgyzstan].

58. Ser. *Molles* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 245. 1995.

柔毛系 rou mao xi

Stems several together, erect or ascending, often branched apically. Leaves in whorls of 3–5, pinnatisect. Stem leaves numerous. Inflorescences long spicate, interrupted. Calyx lobes 5. Corolla small; tube slightly curved at middle; galea toothless or beaked.

One species: Bhutan, China, Nepal, Sikkim.

172. *Pedicularis mollis* Wallich ex Benth, Scroph. Ind. 53. 1835.

柔毛马先蒿 rou mao ma xian hao

Herbs annual, (15–)30–80 cm tall, villous, not drying black. Stems erect, leafy. Stem leaves in whorls of 3 or

4; proximal petioles short; leaf blade linear-lanceolate, 3–5 cm × 7.5–10 mm, pinnatisect; segments 10–15 pairs, lanceolate, pinnatifid, with ovate divisions, dentate. Inflorescences often interrupted basally; bracts leaflike. Pedicel short. Calyx campanulate, ca. 6 mm,

tomentose; lobes 5, lanceolate, serrulate. Corolla red, 7–9 mm; tube ca. 5 mm, pubescent; galea erect, slender, apex acute but beakless; lower lip shorter than galea, spreading, ca. 5.5 mm wide, lobes rounded, equal, ciliate. Filaments glabrous. Capsule ovoid-lanceolate,

ca. 1.2 cm × 5.5 mm, ca. 2 × as long as calyx, obliquely apiculate. Fl. and fr. Jul–Sep. $2n = 16$.

Sand dunes along beaches, field margins, dry ground; 3000–4500 m. S Xizang [Bhutan, Nepal, Sikkim].

59. Ser. Denudatae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 96. 1890.

秃裸系 tu luo xi

Herbs low. Stems flexuous or diffuse, slender. Stem leaves opposite or whorled, ovate-lanceolate to ovate-oblong, pinnatilobate to pinnatifid. Inflorescences lax. Calyx lobes 5, unequal. Corolla small, tube slightly longer than calyx, decurved apically; galea lacking marginal teeth, forming a very short obtuse beak apically.

Two species: Bhutan, China, Sikkim; one species in China.

173. Pedicularis polygaloides J. D. Hooker, Fl. Brit. India 4: 317. 1884.

远志状马先蒿 yuan zhi zhuang ma xian hao

Herbs 2–8 cm tall, drying slightly black. Roots filiform. Stems with 2 lines of hairs. Basal leaves clustered, withering early; petiole 5–10 mm. Stem leaves opposite or occasionally in whorls of 3 or 4; petiole 2.5–5 mm or sometimes sessile; leaf blade ovate to ovate-oblong, 7.5–10 × ca. 2.5 mm, pinnatifid to incised-dentate.

Flowers axillary, proximal ones lax, distal ones dense;

distal bracts pinnatifid. Pedicel to 8 mm. Calyx oblong-campanulate, tomentose; posterior one entire, lateral pair larger. Corolla small; tube longer than calyx, slightly curved, expanded apically; galea erect, wider than tube, apex rounded; beak short, 2-cleft apically; lower lip wider than long, spreading, base with colored dots. Filaments glabrous. Capsule narrowly ovoid, ca. 1/3 exceeding calyx, obliquely apiculate.

About 4000 m. S Xizang [Bhutan, Sikkim].

60. Ser. Abrotanifoliae H. Limpricht, Repert. Spec. Nov. Regni Veg. 20: 209. 1924.

蒿叶系 hao ye xi

Stems branched or not. Leaves whorled, proximal ones sometimes opposite, oblong to lanceolate, pinnatipartite to pinnatisect. Flowers laxly or compactly arranged in spikes. Calyx lobes 5. Corolla tube bent forward apically; galea ± truncate at apex, lacking marginal teeth, beakless to short beaked.

About six species: China, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; five species in China.

1a. Corolla tube bent in calyx tube, 12–14 mm 177. *P. brevilabris*

1b. Corolla tube bent forward apically, above calyx lobes, 6–8(–14) mm.

2a. Corolla tube much longer than galea.

3a. Corolla tube slightly longer than calyx; filaments glabrous; galea slightly protracted at apex, ± square short beaked 174. *P. abrotanifolia*

3b. Corolla tube more than 2 × as long as calyx; 2 filaments pubescent; galea conical, short beaked 178. *P. ludwigii*

2b. Corolla tube ca. as long as or slightly longer than galea.

4a. Lower corolla lip ciliate; filaments 2 pubescent 175. *P. densispica*

4b. Lower corolla lip not ciliate; filaments glabrous 176. *P. obscura*

174. Pedicularis abrotanifolia M. Bieberstein ex Steven, Mém. Soc. Imp. Naturalistes Moscou 6: 22. 1823.

蒿叶马先蒿 hao ye ma xian hao

Herbs perennial, to 40 cm tall, not drying black. Stems several, erect, unbranched, with 4 lines of hairs. Basal leaves withering early; petiole to 1.5 cm. Stem leaves in whorls of 4, short petiolate, narrowly oblong to oblong-lanceolate, to 5 × 1.8 cm, pinnatisect; segments 7–12 pairs, linear, pinnatifid to incised-dentate.

Inflorescences spicate, usually interrupted; proximal bracts leaflike, narrowly ovate, white long ciliate, distal ones entire. Pedicel short. Calyx to 1 cm, membranous, slightly cleft anteriorly; lobes 5, unequal, triangular, white villous ciliate. Corolla yellow; tube strongly curved apically, 1.2–1.4 cm; galea erect, slightly short beaked apically; lower lip ca. as long as galea, not ciliate. Filaments glabrous. Fl. Jul–Aug, fr. Sep–Oct.

Dry rocky slopes, grassy slopes, sometimes in moist meadows. Xinjiang [Kazakstan, Mongolia, Russia (W Siberia)].

175. Pedicularis densispica Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 594. 1888.

密穗马先蒿 mi sui ma xian hao

Herbs annual, erect, 15–60 cm tall, not drying black. Stems many branched basally or unbranched, with 4 lines of hairs. Leaves opposite or distal ones in whorls of 3 or 4, sessile or petiole to 5 mm, villous; leaf blade long ovate to ovate-oblong, 2–5 × 0.7–1.5 cm, pubescent on both surfaces, pinnatipartite to pinnatisect; segments 6–10 pairs, linear to linear-oblong, incised-dentate. Inflorescences spicate, very dense, to 6.5 cm, sometimes interrupted basally; proximal bracts leaflike, distal ones long ovate, shorter than to 1–3 × as long as flowers, entire. Calyx 5–8 mm, shallowly cleft anteriorly, membranous, densely pubescent along veins; lobes 5, unequal, densely pub-

escent; posterior one smallest, entire, others serrate. Corolla rose to pale purple, 1.3–1.6 cm; tube erect basally, slightly curved apically, 6–8 mm; galea sometimes yellowish green, 8–9 mm, apex acute; lower lip 6–10 mm, spreading, ciliate, middle lobe smaller than lateral pair, ovate. Anterior filament pair densely pubescent. Capsule ovoid, ± compressed, 0.8–1.2 cm, obliquely short apiculate. Fl. Apr–Sep, fr. Aug–Oct.

• Swampy or alpine meadows, forests; 1900–4400 m. W Sichuan, S and SE Xizang, NW Yunnan.

- 1a. Plants 15–40 cm tall; bracts shorter than flowers, ca. 8 mm; lower corolla lip ca. as long as galea
..... 175a. subsp. *densispica*
- 1b. Plants to 60 cm tall; bracts 2–3 × as long as flowers; lower corolla lip slightly longer than galea.
- 2a. Plants ± pubescent; corolla galea rose to purple 175b. subsp. *schneideri*
- 2b. Plants usually glabrous; corolla galea yellowish green 175c. subsp. *viridescens*

175a. *Pedicularis densispica* subsp. *densispica*

密穗马先蒿(原亚种) mi sui ma xian hao (yuan ya zhong)

Plants 15–40 cm tall. Bracts shorter than flowers, ca. 8 mm. Lower lip ca. as long as galea. Fl. Apr–Jul.

• Swampy meadows, forests; 1900–4400 m. W Sichuan, SE Xizang, NW Yunnan.

175b. *Pedicularis densispica* subsp. *schneideri* (Bonati) P. C. Tsoong, Acta Phytotax. Sin. 3: 297. 1955.

许氏密穗马先蒿 xu shi mi sui ma xian hao
Pedicularis densispica var. *schneideri* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 133. 1921.

Plants to 60 cm tall, ± pubescent. Bracts 2–3 × as long as flowers. Corolla 1.3–1.6 cm; galea rose to purple; lower lip slightly longer than galea. Fl. Jun–Aug.

• Alpine meadows; 2700–4300 m. W Sichuan, S and SE Xizang, NW Yunnan.

175c. *Pedicularis densispica* subsp. *viridescens* P. C. Tsoong, Acta Phytotax. Sin. 3: 297. 1955.

绿盔密穗马先蒿 lü kui mi sui ma xian hao
Plants to 60 cm tall, usually glabrous. Bracts 2–3 × as long as flowers. Corolla ca. 1.6 cm; galea yellowish green; lower lip slightly longer than galea. Fl. Jun–Jul.

• SE Xizang.

176. *Pedicularis obscura* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 149. 1926.

暗昧马先蒿 an mei ma xian hao
Herbs perennial, pubescent. Stems erect or ascending to repent, many branched; branches diffuse, 0.8–1.4 cm, with 2–4 lines of villous hairs or pubescent over entire surface. Basal leaves withering early. Proximal stem leaves opposite, distal ones in whorls of 4; petiole 0.5–2

cm, distal ones winged; leaf blade broadly elliptic-oblong, 2–3 cm × 5–8 mm, pinnatisect; segments broadly elliptic-oblong, pinnatifid, lobes 3–5 × ca. 1 mm. Inflorescences spicate, dense; bracts leaflike, 1.5–2.5 cm, longer than flowers, villous. Calyx 7–8 mm, deeply cleft anteriorly, densely pubescent; lobes 5, unequal, posterior one lanceolate and entire, lateral lobes broadly ovate and serrate. Corolla red; tube bent at a right angle forward apically, ca. as long as or slightly longer than calyx; galea erect, truncate at apex, beakless, glabrous; lower lip slightly longer than galea, glabrous. Filaments glabrous; anthers apiculate. Fl. Jun, fr. Jul–Aug.

• Alpine meadows; 3800–4100 m. NW Yunnan.

177. *Pedicularis brevilabris* Franchet, Bull. Soc. Bot. France 47: 33. 1900.

短唇马先蒿 duan chun ma xian hao

Herbs annual, 25–45 cm tall, not drying black. Stems single or 4 or 5 cespitose, erect or outer stems ascending, branched basally or unbranched, sparsely pubescent or with lines of white hairs. Proximal leaves opposite, distal ones in whorls of 4; petiole of proximal leaves slender, to 2.5–3 cm, distal leaves sessile or short petiolate; leaf blade long ovate to elliptic-oblong, 1.5–3 × 1.4–2 cm, pinnatifid; segments 4–8 pairs, ovate-oblong, incised-dentate. Inflorescences capitate or spicate, elongated to 8 cm, interrupted basally; proximal bracts leaflike, longer than flowers, distal ones ca. as long as to shorter than flowers. Calyx campanulate, slightly cleft anteriorly, white villous; tube 7–8 mm; lobes 5, unequal, triangular to ovate-oblong, entire to dentate. Corolla pale red, 1.5–2 cm; tube bent within calyx tube, 6–8 mm; galea ± falcate, 0.9–1.2 cm, apex with a short truncate beaklike tip; lower lip shorter than galea, 6–8 × 6–9 mm, finely ciliate. Filaments glabrous. Fl. Jul, fr. Aug.

• Alpine meadows, thickets; 2700–3500 m. SW Gansu, NW and W Sichuan.

178. *Pedicularis ludwigii* Regel, Bull. Soc. Imp. Naturalistes Moscou 41(1): 107. 1868.

小根马先蒿 xiao gen ma xian hao

Pedicularis leptorhiza F. Ruprecht.

Herbs annual, to 12 cm tall. Roots fusiform, slender. Stems single or 3–6 cespitose, erect, unbranched, with lines of hairs. Leaves opposite or in whorls of 3(–5); petiole 3–8 mm; leaf blade lanceolate to oblong-lanceolate, 1.5–2.2 cm × 3–5 mm, pinnatisect; segments 6 or 7 pairs, widely spaced, pinnatifid or incised-dentate. Inflorescences spicate, 1.8–3 cm, dense initially, becoming lax; proximal bracts leaflike, distal ones ca. as long as calyx apically, narrowly ovate. Calyx turgid campanulate, ca. 7.5 mm, membranous, hispidulous along veins; lobes 5, unequal, posterior one triangular and entire, lateral lobes serrate. Corolla purple, ca. 2 cm; tube erect basally, curved and expanded apically, more

than 2 × as long as calyx; galea with a broadly conical and truncate beaklike tip; lower lip shorter than galea, spreading, wider than long, serrulate, lobes rounded, middle lobe smaller than lateral pair and projecting.

Filaments 2 pubescent, 2 glabrous; anthers apiculate. Fl. Jul–Aug.

Subalpine regions. Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan, Uzbekistan].

61. Ser. Simae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 97. 1890.

砒镁系 xi mei xi

Herbs not drying black, pubescent. Stems branched basally or unbranched. Leaves opposite or in whorls of 3, petiolate, oblong, pinnatipartite. Inflorescences spicate. Calyx lobes 5, unequal. Corolla tube ± erect; galea longer than lower lip, terminating in a very short obtuse beak, marginal teeth lacking.

• One species: endemic to China.

179. Pedicularis sima Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 514. 1881.

砒镁马先蒿 xi mei ma xian hao

Herbs annual, to 30 cm tall. Roots slender. Stems with 4 lines of hairs. Proximal leaves opposite, distal ones in whorls of 3; petiole to 1.5 cm; leaf blade oblong, 1.5–2.5 × ca. 1 cm; segments 5–7 pairs, ovate to oblong-ovate, dentate, both surfaces densely lanulose.

Inflorescences interrupted basally, long pubescent; bracts leaflike basally, rhomboidal apically. Calyx short

cylindric, densely villous along veins; posterior lobe triangular, entire, lateral lobes larger, ovate, serrate. Corolla rose; tube shorter than calyx tube and galea; galea slightly falcate; lower lip shorter than galea, ciliate, middle lobe rounded, smaller than lateral pair. Filaments glabrous. Fl. Aug, fr. Sep.

• Alpine meadows, forests; 3500–4000 m. E and W Gansu, N Sichuan, E Xizang.

62. Ser. Myriophyllae Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 58. 1877.

万叶系 wan ye xi

Herbs slightly drying black or not. Stems erect or ascending. Leaves whorled, pinnatisect. Stem leaves numerous. Inflorescences racemose or spicate. Calyx lobes 5. Corolla tube erect; galea bent apically, apex producing a beak.

Nine species: North America (Alaska), China, Japan, Mongolia, Russia (Siberia); eight species in China.

1a. Beak of corolla less than 1 mm; corolla only 1.4 cm, rose; lateral calyx lobes ± entire 180. *P. myriophylla*

1b. Beak of corolla 2–3(–5) mm; corolla 1.5–2.5 cm; lateral calyx lobes serrate, pinnatifid, or entire.

2a. Corolla tube erect; galea distinctly crested.

3a. Calyx lobes narrowly triangular-lanceolate; middle lobe of lower corolla lip not hoodlike apically 186. *P. cristatella*

3b. Calyx lobes ± flabellate; middle lobe of lower corolla lip hoodlike apically 187. *P. deqinensis*

2b. Corolla tube ± decurved; galea indistinctly crested.

4a. Corolla purplish red 184. *P. tatarinowii*

4b. Corolla yellow.

5a. At least proximal bracts distinct, longer than flowers; all filaments glabrous or 2 pubescent.

6a. Corolla 2–2.5 cm; anterior filaments villous 181. *P. alaschanica*

6b. Corolla ca. 1.5 cm; filaments glabrous or pubescent 185. *P. scolopax*

5b. All bracts shorter than flowers; filaments pubescent.

7a. Basal leaves persistent; stems herbaceous, unbranched apically; calyx at least 1/2 cleft anteriorly, densely brown ciliate 182. *P. pseudocurvituba*

7b. Basal leaves not persistent; stems ± woody, short branched throughout; calyx barely 1/3 cleft anteriorly, slightly ciliate 183. *P. curvituba*

180. Pedicularis myriophylla Pallas, Reise Russ. Reich. 3: 737. 1776.

万叶马先蒿 wan ye ma xian hao

Herbs annual, to 40 cm tall, not drying black. Roots conical, slender. Stems usually single, branched throughout, with 4 lines of hairs. Basal leaves withering early. Stem leaves in whorls of (3 or)4, rarely opposite; petiole to 1 cm; leaf blade lanceolate-oblong, ca. 3 × 1 cm, both surfaces glabrous, pinnatisect; segments 10–13 pairs, linear-lanceolate, pinnatipartite, few toothed. Inflorescences racemose, sometimes interrupted basally;

proximal bracts leaflike. Pedicel elongating to 2.5 mm in fruit. Calyx to 7 mm, glabrous, ca. 1/3 cleft anteriorly; lobes 5, slightly unequal, triangular, ± entire, ciliate. Corolla rose or purple, ca. 1.4 cm; tube equal to or longer than calyx, erect basally, slightly bent and expanded apically; galea barely bent apically, much wider than tube; beak pointing outward, not prominent, less than 1 mm; lower lip ca. 5 × 5 mm. Anterior filament pair villous, posterior pair glabrescent. Capsule lanceolate-ovoid, ca. 1.5 cm, apex acuminate. Fl. Jun–Jul, fr. Jul–Aug.

Forest clearings, meadows. NW Hebei, Xinjiang [Mongolia, Russia (Siberia)].

- 1a. Corolla rose, tube ca. as long as or slightly exceeding calyx 180a. var. *myriophylla*
1b. Corolla purple, tube slightly longer, exceeding calyx 180b. var. *purpurea*

180a. *Pedicularis myriophylla* var. *myriophylla*

万叶马先蒿(原变种) wan ye ma xian hao (yuan bian zhong)

Corolla rose; tube ca. as long as or slightly exceeding calyx.

Xinjiang [Mongolia, Russia (Siberia)].

180b. *Pedicularis myriophylla* var. *purpurea* Bunge in Walpers, Repert. Bot. Syst. 3: 410. 1844.

紫色万叶马先蒿 zi se wan ye ma xian hao

Corolla purple; tube slightly longer, exceeding calyx.

NW Hebei [Mongolia].

181. *Pedicularis alaschanica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 59. 1877.

阿拉善马先蒿 a la shan ma xian hao

Herbs perennial, to 35 cm tall, drying slightly black.

Roots short, stout. Stems usually numerous and branched basally, unbranched apically, densely rust colored tomentose. Basal leaves withering early. Proximal stem leaves opposite, distal ones in whorls of 3 or 4, sometimes all opposite; petiole to 3 cm, strongly winged, tomentose; leaf blade lanceolate-oblong to ovate-oblong, 2.5–3 × 1–1.5 cm, glabrescent on both surfaces, pinnatipartite; segments 7–9 pairs, widely spaced, linear, serrulate. Inflorescences spicate, to more than 2 cm, usually interrupted basally; bracts leaflike, proximal ones longer than flowers. Calyx oblong, to 1.3 cm, membranous, deeply cleft anteriorly, densely pubescent, some only villous along veins; lobes 5, unequal, posterior one triangular and entire, lateral lobes triangular-lanceolate, entire to obscurely serrate. Corolla yellow, 2–2.5 cm; tube slightly bent apically, ca. as long as calyx; galea slightly bent apically, indistinctly crested; beak ± horizontal, 2–3 mm; lower lip ca. as long as or slightly longer than galea, middle lobe smaller than lateral pair. Anterior filament pair villous apically, posterior pair glabrous. Fl. Jun–Aug, fr. Sep.

• Dry rocky slopes in river valleys, rocky grassy slopes, among stones of valley beds, open hillsides, thickets; 3900–5100 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xizang.

- 1a. Leaves in whorls of 3 or 4 apically; calyx villous only along veins, lobes obscurely serrate to ± entire; beak of galea long 181a. subsp. *alaschanica*
1b. Leaves usually opposite; calyx densely pubescent throughout, lobes entire; beak of galea shorter 181b. subsp. *tibetica*

181a. *Pedicularis alaschanica* subsp. *alaschanica*

阿拉善马先蒿(原亚种) a la shan ma xian hao (yuan ya zhong)

Leaves of upper stem in whorls of 3 or 4. Calyx villous only along veins; lobes obscurely serrate to ± entire. Beak of galea long.

• Dry rocky slopes in river valleys, among stones of valley beds, open hillsides, thickets; 3900–5100 m. Gansu, Nei Mongol, Ningxia, Qinghai, NE and SE Xizang.

181b. *Pedicularis alaschanica* subsp. *tibetica* (Maximowicz) P. C. Tsoong, Acta Phytotax. Sin. 3: 298. 1954 (1955).

西藏阿拉善马先蒿 xi zang a la shan ma xian hao

Pedicularis alaschanica var. *tibetica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 578. 1888. Leaves usually opposite. Calyx densely pubescent throughout; lobes entire. Beak of galea short. Fl. Jul–Aug.

• Rocky grassy slopes; 4000–4700 m. S and SW Xizang.

182. *Pedicularis pseudocurvituba* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 412. 1963.

假弯管马先蒿 jia wan guan ma xian hao

Pedicularis curvituba Maximowicz, p.p.

Herbs perennial, (8–)15(–30) cm tall, not drying black. Roots stout. Stems often several, central stem erect, outer ones usually procumbent to ascending, unbranched apically, herbaceous, with 4 lines of hairs. Basal leaves persistent; petiole to 2 cm, narrowly winged. Stem leaves in whorls of 4; petiole only ca. 5 mm on distal leaves; leaf blade oblong-lanceolate to linear, to 4 × 1.2 cm, pinnatisect; segments 5–9 pairs, widely spaced, linear to lanceolate, pinnatifid, few toothed. Inflorescences spicate, dense, sometimes in 1 or 2 slightly disjunct fascicles; proximal bracts leaflike, shorter than flowers. Calyx to 1 cm, often ca. 1/2 cleft anteriorly; lobes 5, unequal, densely brown ciliate, serrate. Corolla yellow, ca. 1.7 cm; tube decurved through anterior calyx cleft, stout, expanded apically; galea slightly bent apically, indistinctly crested; beak bent ± downward, ca. 3 mm; lower lip longer than galea. Filaments pubescent. Capsule obliquely ovoid, ca. 1.8 cm × 8 mm, ca. 1/3 exceeding calyx. Fl. Jul, fr. Jul–Aug.

• River banks, sandy soil; ca. 4300 m. Qinghai.

183. *Pedicularis curvituba* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 60. 1877.

弯管马先蒿 wan guan ma xian hao

Herbs annual, 30(–50) cm tall, not drying black. Roots ± woody. Stems several, short branched throughout, ± woody at anthesis, with 4 lines of hairs. Basal leaves withering. Stem leaves in whorls of 4, proximal ones to 1.5 cm, distal ones only 1.5–4 mm; leaf blade oblong-lanceolate to ovate-oblong or linear, to 2–4.5 × 0.9–1.7 cm, glabrescent on both surfaces, pinnatisect; segments 6–10 pairs, widely spaced, ovate-lanceolate to linear-lanceolate, incised-dentate. Flowers in ± interrupted

racemes, to 20 cm; bracts shorter than flowers, proximal ones leaflike. Pedicel short. Calyx ca. 1.1 cm, barely 1/3 cleft anteriorly; lobes 5, unequal, slightly ciliate, pinnatifid to serrate. Corolla yellow or white, ca. 2 cm; tube strongly bent in calyx, expanded apically; galea slightly bent apically, indistinctly crested; beak slightly bent downward, 2.5–3 mm; lower lip ca. 8 mm × 1.3 cm. Filaments pubescent. Fl. Jun–Jul, fr. Jul–Aug.

• Open slopes; ca. 1600 m. N, SE, and SW Gansu, N Hebei, E Nei Mongol, N Shaanxi.

1a. Corolla yellow, usually small; stems ± woody at base; leaf segments ovate-lanceolate to linear-lanceolate 183a. subsp. *curvituba*

1b. Corolla white, large; stems much woody; leaf segments linear 183b. subsp. *provitii*

183a. *Pedicularis curvituba* subsp. *curvituba*

弯管马先蒿(原亚种) wan guan ma xian hao (yuan ya zhong)

Stems ± woody at base. Leaf segments ovate-lanceolate to linear-lanceolate. Corolla yellow, usually small. Fl. Jun–Jul.

• N and SW Gansu.

183b. *Pedicularis curvituba* subsp. *provotii* (Franchet) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 215. 1963.

洛氏弯管马先蒿 luo shi wan guan ma xian hao

Pedicularis provotii Franchet, J. Bot. (Morot) 4: 318. 1890; *P. borodowskii* Palibin.

Stems woody. Leaf segments linear. Corolla white, large. Fl. Jun.

• Open slopes; ca. 1600 m. SE Gansu, N Hebei, E Nei Mongol, N Shaanxi.

184. *Pedicularis tatarinowii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 60. 1877.

塔氏马先蒿 ta shi ma xian hao

Pedicularis myriophylla Pallas var. *tatarinowii* (Maximowicz) Hurusawa.

Herbs annual, to 50 cm tall, usually ± woody, not drying black. Roots to 10 cm, woody. Stems 1 to several, erect or outer ones ± ascending or procumbent, often reddish purple, rigid, many branched apically, with 4 lines of hairs. Basal leaves withering early. Stem leaves in whorls of (3 or)4, rarely opposite, short petiolate; leaf blade ovate-oblong to oblong-lanceolate, 2–3.5(–7) × 0.8–1.5(–3) cm, pinnatisect; segments 5–10(–15) pairs, lanceolate, pinnatifid to pinnatipartite, dentate. Inflorescences racemose; bracts leaflike, shorter than flowers. Calyx ca. 8 mm, membranous, slightly cleft anteriorly; lobes 5, narrowly lanceolate, serrate. Corolla purplish red; tube slightly bent apically, slightly longer than calyx; galea strongly bent apically, indistinctly crested; beak bent downward, ca. 2 mm; lower lip longer than galea. Filaments pubescent or posterior pair glabrescent. Capsule obliquely ovoid, ca. 1.6 cm × 7.5 mm, slightly exceeding calyx. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows; 2000–2300 m. N Hebei, S Nei Mongol, N Shanxi.

185. *Pedicularis scolopax* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 513. 1881.

鹞形马先蒿 yu xing ma xian hao

Herbs perennial, to more than 30 cm tall, not drying black. Roots fusiform, fleshy. Stems branched at base, central stem ± erect, outer stems procumbent to ascending, densely pubescent. Basal leaves few, withering early. Proximal stem leaves opposite or in whorls of 3, other ones in 4's; petiole to 2 cm, villous; leaf blade linear-oblong to oblong-lanceolate, 1.5–3 cm × 6–10 mm, glabrescent on both surfaces, pinnatipartite; segments 6–8 pairs, widely spaced, linear, pinnatifid, serrulate. Inflorescences spicate, to 11 cm, flowers in whorls of 4–6, interrupted basally; proximal bracts longer than flowers, distal ones shorter than flowers, ciliate. Calyx 9–10 mm, membranous, slightly cleft anteriorly, pubescent along veins; lobes 5, unequal, serrate and ± entire. Corolla yellow, ca. 1.5 cm; tube slightly bent apically, ca. 1 cm, slender; galea slightly bent apically, indistinctly serrate; beak bent downward, ca. 3 mm; lower lip ca. 4 × 6.5 mm, glabrous. Filaments glabrous. Fl. Jun–Jul, fr. Aug.

• Alpine shrubby grasslands; 3500–4100 m. N Gansu, NE Qinghai.

186. *Pedicularis cristatella* Pennell & H. L. Li in H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 291. 1948.

具冠马先蒿 ju guan ma xian hao

Pedicularis cristata Maximowicz (1888), not Vitmann (1789).

Herbs annual, to 50 cm tall, woody basally, not drying black. Roots woody. Stems 1–6, erect or outer ones ascending, branched apically or unbranched, with 4 dense yellow lines of hairs. Leaves opposite or in whorls of 5; petiole to 1 cm, densely yellow villous; leaf blade oblong-lanceolate to narrowly lanceolate, 2–3 × 0.7–1.5 cm, abaxially villous along veins, adaxially short bristly, pinnatisect; segments 6–12 pairs, lanceolate, pinnatifid, serrate. Inflorescences long spicate, to 20 cm, with flowers in whorls of 3 or 4, often interrupted; proximal bracts leaflike. Calyx white, membranous, slightly cleft anteriorly; lobes 5, ± equal, narrowly triangular-lanceolate, entire. Corolla reddish purple; tube erect, 8–9 mm; galea bent apically, ca. 1 cm, distinctly crested; beak bent downward, ca. 6.5 mm; lower lip ca. 1.1 × 1.3 cm, middle lobe not hoodlike. Anterior filament pair densely pubescent. Capsule compressed, ovoid, ca. 1.4 cm × 6 mm, obliquely apiculate. Fl. Jun–Jul, fr. Jul.

• Cliffs, meadows in valleys, open or shrubby grasslands; 1900–3000 m. SW Gansu, N Sichuan.

187. *Pedicularis deqinensis* H. P. Yang, Acta Phytotax. Sin. 28: 137. 1990.

德钦马先蒿 de qin ma xian hao

Herbs annual, 20–35 cm tall, drying slightly black. Stems 1 to several, erect or outer stems ascending, with 4 lines of hairs, often branched apically, branches 2–4 per node, dark purple. Stem leaves often in whorls of 4; petiole 5–10 mm; leaf blade oblong to elliptic-oblong, 2.5–5 × 0.8–2.5 cm, abaxially sparsely pubescent, adaxially glabrescent, pinnatisect; segments 5–12 pairs, oblong-lanceolate, pinnatifid, dentate. Inflorescences racemose, to 18 cm, with whorled flowers, interrupted; bracts leaflike. Calyx cylindrical-campanulate, ca. 5 mm, slightly cleft anteriorly, glabrous; lobes 5, ± flabellate,

3- or 4-cleft, often reflexed, densely villous-ciliate. Corolla pale purple, with purple galea, 1.5–1.8 cm; tube erect; galea bent at a right angle apically, conspicuously crested; beak ca. 5 mm; lower lip ca. 8 mm × 1.2 cm, middle lobe hoodlike apically. Filaments glabrous. Capsule ovoid, ca. 1 cm, apex short acuminate. Fl. Jul–Aug, fr. Aug–Sep.

• *Quercus semecarpifolia* forests, river valleys; 2900–3400 m. NW Yunnan.

63. Ser. Semitortae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 70. 1890.

半扭卷系 ban niu juan xi

Ser. *Gyrorhynchae* Prain.

Herbs slightly drying black or not. Stems usually branched. Leaves opposite or in whorls of 3 or 4, pinnatipartite to pinnatisect. Inflorescences long spicate, interrupted basally; bracts usually narrow and serrate or pinnatifid. Calyx lobes 5, unequal or sometimes ± equal, ± serrate. Corolla tube erect; galea bent apically; beak long, coiled or twisted apically.

• Six species: endemic to China.

1a. Corolla purple-red; plants perennial.

2a. Calyx densely white villous, 1/2 cleft anteriorly; galea crested; filaments glabrous 192. *P. fetisowii*

2b. Calyx glabrous, slightly cleft anteriorly; galea not crested; filaments densely villous 193. *P. oliveriana*

1b. Corolla yellow; plants annual.

3a. Bracts usually ± palmately cleft apically; lower corolla lip not ciliate, middle lobe not hoodlike; calyx more than 1/2 cleft anteriorly.

4a. Beak of galea very long, twisted laterally into a circle; filaments 2 villous 191. *P. semitorta*

4b. Beak of galea slightly bent or coiled at apex, not twisted laterally; filaments glabrous 188. *P. roborowskii*

3b. Bracts not palmately cleft apically; lower corolla lip ciliate, middle lobe hoodlike; calyx slightly cleft anteriorly.

5a. Lateral calyx lobes ovate, distinctly serrate 189. *P. gyrorhyncha*

5b. Lateral calyx lobes lanceolate-linear, obscurely serrate 190. *P. duclouxii*

188. *Pedicularis roborowskii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 512. 1881.

劳氏马先蒿 lao shi ma xian hao

Herbs annual, to 50 cm tall, drying slightly black. Stems several, ± woody at base, with 4 lines of hairs. Basal leaves opposite; petiole to 2 cm. Stem leaves in whorls of 4; petiole to 3–5 mm; leaf blade broadly oblong to ovate-oblong, to 4 × 2 cm, pinnatisect; segments 5–7 pairs, lanceolate to linear, pinnatifid, dentate. Inflorescences usually long racemose, to 18 cm, interrupted; proximal bracts leaflike, longer than flowers, distal ones slightly enlarged at base, ± palmately 3–5-cleft, glabrescent. Pedicel short. Calyx 8–10 mm, more than 1/2 cleft anteriorly; lobes 5, ± equal, grouped posteriorly, slender. Corolla yellow, barely 1.3 cm; tube decurved through anterior calyx cleft; galea with deltoid marginal teeth; beak slightly bent or coiled at apex, ca. 5 mm; lower lip ca. 8 × 9 mm, glabrous, middle lobe subrounded. Filaments glabrous. Capsule triangular-ovoid, ca. 1.8 cm.

• *Picea* and *Betula* forests. W Gansu, E Qinghai, N Sichuan.

189. *Pedicularis gyrorhyncha* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 545. 1888.

旋喙马先蒿 xuan hui ma xian hao

Herbs annual, 23–110 cm tall, not drying black. Stems often many branched apically; branches slender, 1–4 per node. Basal leaves opposite. Stem leaves in whorls of 3 or 4; petiole to 3 cm basally; leaf blade ovate-oblong to lanceolate-oblong, 2–6 × 0.8–2.5 cm, abaxially sparsely long pubescent to glabrescent, adaxially sparsely pubescent, pinnatipartite to pinnatifid; segments 4–10 pairs, ovate to linear-oblong, incised-dentate. Inflorescences spicate, interrupted; proximal bracts leaflike, often longer than flowers. Calyx ca. 8 mm, scarcely cleft anteriorly, sparsely pubescent along veins; lobes 5, unequal, posterior one triangular, entire, lateral teeth larger, ovate, serrate. Corolla pale yellow, 0.9–1.7 cm; tube ca. 8 mm; beak semicircular, 8–9 mm; lower lip ca. 7 mm × 1.3 cm, ciliate, middle lobe subrounded, hoodlike. Filaments pubescent. Capsule enclosed by accrescent calyx, to 2 cm. Fl. Jul–Aug, fr. Aug–Sep.

• Moist ground, forest clearings; 2700–4000 m. NW Yunnan.

190. *Pedicularis duclouxii* Bonati, Bull. Soc. Bot. France 55: 245. 1908.

杜氏马先蒿 *du shi ma xian hao*

Pedicularis muliensis Handel-Mazzetti; *P. wangii* H. L. Li.

Herbs annual, 30–50(–70) cm tall, slightly woody basally, not drying black. Roots conical, slender. Stems single, branched or not, with 4 lines of hairs. Basal leaves withering early. Stem leaves opposite or in whorls of 3 or 4; petiole to 2 cm; leaf blade oblong-lanceolate, 1.3–8 × 0.5–3 cm, abaxially pubescent along veins, adaxially sparsely pubescent or glabrescent, pinnatifid to pinnatisect; segments 5–11 pairs, widely spaced, oblong-lanceolate, often not symmetrical, margin double dentate or pinnatifid. Inflorescences spicate, interrupted; proximal bracts leaflike, distal ones ovate. Pedicel short. Calyx scarcely cleft anteriorly, membranous; lobes 5, unequal, posterior one triangular, entire, lateral teeth larger, lanceolate-linear, obscurely serrate, ciliate. Corolla yellow, 1.3–1.5 cm; tube slightly bent apically, 6–8 mm; galea ± twisted; beak dark colored, semicircular, slender; lower lip ca. 7.5 mm × 1.1 cm, densely ciliate, middle lobe hoodlike. Filaments pubescent or 2 glabrous. Capsule compressed, ovoid, ca. 1.5 cm × 8 mm, obliquely apiculate. Fl. Aug–Sep, fr. Sep–Oct.

• Forests, alpine meadows, grassy slopes; 3400–4300 m. SW Sichuan, NW Yunnan.

191. *Pedicularis semitorta* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 546. 1888.

半扭卷马先蒿 *ban niu juan ma xian hao*

Herbs annual, to 60 cm tall, ± drying black. Roots conical, slender. Stems 1–5, unbranched or branched apically; branches slender, often 3–5 per node. Basal leaves withering early; petiole to 3 cm. Stem leaves in whorls of 3–5; petiole 1–3 cm, distal ones much shorter; leaf blade ovate-oblong to linear-oblong, 3.5(–10) cm × 1.5(–5) mm, abaxially glabrescent, adaxially sparsely pubescent or glabrescent, pinnatisect; segments 8–10 pairs, linear, pinnatifid, dentate. Inflorescences spicate, more than 20 cm, interrupted basally; bracts shorter than flowers, proximal ones leaflike, distal ones usually ± palmately cleft. Calyx 9–10 mm; more than 1/2 cleft anteriorly, glabrous; lobes 5, grouped posteriorly, linear. Corolla yellow, 1.4–1.8 cm; tube slightly enlarged and curved apically, 1–1.1 cm; beak twisted laterally usually into a circle, 5–7 mm; lower lip ca. 1.1 × 1.4–1.7 cm, glabrous. Filaments 2 villous, 2 glabrous. Capsule 3/4 enclosed by accrescent calyx, compressed, ovoid, ca. 1.7 cm × 6 mm, obliquely apiculate. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine meadows; 2500–3900 m. C and SW Gansu, E Qinghai, N Sichuan.

192. *Pedicularis fetisowii* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 349. 1879.

费氏马先蒿 *fei shi ma xian hao*

Herbs perennial, 14–40 cm tall, not drying black. Roots densely fascicled, ± fleshy. Stems dark purplish, pubescent to glabrescent. Basal leaves withering early. Proximal stem leaves opposite, distal ones in whorls of 4; petiole of proximal leaves ca. 3.5 cm, distal ones to 2–3 mm; leaf blade oblong-lanceolate to linear-lanceolate, with narrowly winged and dentate midvein, 0.8–4.5 × 0.2–2.8 cm, abaxially sparsely white pubescent or glabrescent, adaxially glabrous, pinnatifid; segments 11 pairs, pinnatifid, few toothed. Inflorescences capitate to short spicate, to 12 cm, interrupted; bracts linear-lanceolate, shorter than flowers. Calyx 6–7 mm, membranous, densely white villous, ca. 1/2 cleft anteriorly; lobes 5, unequal, posterior one triangular, entire, lateral teeth larger, obscurely serrate. Corolla purple-red; tube 0.8–1.2 cm, slightly expanded near apex, finely pubescent; galea crested, marginally long ciliate; beak S-shaped, ca. 8 mm; lower lip 7–9.5 × 7–12 mm, lobes ± equal. Filaments glabrous. Fl. Jun, fr. Jul–Aug.

• Valleys; ca. 2000 m. E Xinjiang.

193. *Pedicularis oliveriana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 257. 1889.

奥氏马先蒿 *ao shi ma xian hao*

Pedicularis oliveriana Prain subsp. *lasiantha* P. C. Tsong.

Herbs perennial, to 50 cm tall, ± drying black. Roots fascicled, fleshy. Stems several, dark, with 4 lines of sparse hairs. Basal leaves withering early. Stem leaves opposite or in whorls of 3 or 4, ± sessile to short petiolate; leaf blade oblong-lanceolate, to 4.5 × 1.5 cm, pinnatifid; segments 5–8 pairs, ovate to lanceolate, pinnatifid, ovate-triangular, incised-dentate. Inflorescences to 20 cm, interrupted; bracts leaflike, ca. as long as flowers. Calyx 5–6 mm, barely cleft anteriorly, glabrous; lobes 5, unequal, posterior one triangular and entire, lateral lobes serrate, ciliate. Corolla dark reddish purple, 1.4–1.6 cm; tube 6–7 mm; galea marginally ciliate, ± comose on abaxial suture; beak usually S-shaped, slender; lower lip 8.5–9.5 mm, ciliate. Filaments densely villous. Capsule compressed, oblong, ca. 1.1 cm × 3 mm, obliquely apiculate. Fl. Jun–Aug, fr. Jul–Sep.

• Dry rocky places, sand dunes along rivers, open grassy meadows; 3400–4000 m. E, S, and SE Xizang.

64. Ser. Pectinatae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 71. 1890.

籠齒系 *bi chi xi*

Herbs often drying black. Stems erect, often branched apically. Leaves in whorls of 4 or 5, ovate-lanceolate, 2-pinnatipartite. Inflorescences long spicate; bracts ovate and entire, at least distal ones. Calyx large, ca. 1 cm, 1/3 cleft anteriorly; lobes 5, entire. Corolla tube erect, shorter than calyx; beak semicircular or S-shaped, slender.

About six species: China, Himalayas; one species in China.

194. *Pedicularis rhynchotricha* P. C. Tsoong, Acta Phytotax. Sin. 3: 299. 1955.

喙毛马先蒿 hui mao ma xian hao

Herbs perennial to 60 cm tall, ± drying black. Roots ± fusiform, fleshy. Stems 1 to several, unbranched, glabrous basally, with 4 or 5 lines of hairs apically. Basal leaves withering early. Stem leaves in whorls of 4 or 5; ± sessile to short petiolate, glabrous; leaf blade lanceolate-oblong, to 7 × 3 cm, pinnatifid; segments 6–10 pairs, linear, adaxially pubescent along midvein, incised-dentate. Inflorescences centripetal, elongated, with 8–12 fascicles, interrupted; bracts linear, longer

65. Ser. *Sudeticae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 75. 1878.

苏台德系 su tai de xi

Ser. *Elatae* Prain.

Herbs erect. Roots fascicled, fibrous. Stems unbranched. Leaves alternate. Basal leaves often persistent, pinnatipartite to 1- or 2-pinnatisect or pinnatifid; segments lanceolate, only dentate. Inflorescences spicate, dense, elongated. Calyx lobes 5, equal. Corolla tube longer than calyx; galea marginally 2-toothed, sometimes slightly short beaked.

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

1a. Plants 30–60 cm tall; leaves mostly on stem, leaf blade to more than 12 cm; inflorescences long spicate, to 20 cm;

calyx to 5–6 mm, teeth triangular; corolla pale rose, galea much longer than lower lip; filaments pubescent 195. *P. elata*

1b. Plants 10–25 cm tall; leaves mostly basal, leaf blade to 5 cm; inflorescences short spicate, to 6 cm; calyx to

14 mm, teeth linear-lanceolate; corolla pale yellow, galea slightly longer than lower lip; filaments glabrous 196. *P. songarica*

195. *Pedicularis elata* Willdenow, Sp. Pl. 3: 210. 1800.

高升马先蒿 gao sheng ma xian hao

Herbs perennial, 30–60 cm tall, herbage subglabrous, not drying black. Stems erect, unbranched, with brown, lanceolate to linear-lanceolate scales at base. Basal leaves withering early; petiole to 5 cm. Stem leaves alternate; petiole 2.5 cm to barely sessile; leaf blade ovate-oblong, to 12 × 5.5 cm, pinnatipartite; segments 10–18 pairs, narrowly lanceolate, pinnatifid to dentate. Inflorescences long spicate, to 20 cm, bracts and calyces woolly; bracts 3–5-palmatisect. Calyx 5–6 mm, membranous, slightly cleft anteriorly; teeth triangular, entire. Corolla pale rose, 2.1–2.5 cm; tube ca. 1 cm; galea falcate, ca. 2 × as long as lower lip, apex very short beaked; lower lip sparsely ciliate and erose, middle lobe emarginate apically. Filaments pubescent. Fl. Jun, fr. Jul.

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

196. *Pedicularis songarica* Schrenk ex Fischer & C. Meyer, Enum. Pl. Nov. 2: 25. 1842.

准噶尔马先蒿 zhun ga er ma xian hao

than flowers. Calyx cylindrical, ca. 9 × 2.5 mm; lobes 5, unequal, posterior one smaller and narrower than lateral lobes, lateral lobes lanceolate, slightly serrate, densely ciliate. Corolla purple-red; tube ca. 9 mm, glabrous; galea bent apically, margin ciliate; beak S-shaped, to 1 cm, densely brown lanulose at middle; lower lip ciliate. Filaments glabrescent. Capsule 2/3 enclosed by accrescent calyx, long ovoid, ca. 1.2 cm. Fl. and fr. Jun–Aug.

• Moist ground; *Picea* woodlands, margins of burned forests, forest clearings; 2700–3700 m. SE Xizang.

Herbs perennial, 10–25 cm tall, subglabrous, drying black. Roots fascicled, ± fusiform, fleshy. Stems often single. Leaves mostly basal; petiole to 4 cm; leaf blade ± lanceolate, to 5 × 1.3 cm, glabrous on both surfaces, pinnatisect; segments 15–30 pairs, ovate-lanceolate to linear-lanceolate, pinnatifid or double dentate. Stem leaves few, similar to basal leaves but smaller and shorter petiolate. Inflorescences short spicate, to 6 cm, often dense; bracts longer than flowers basally, narrowly lanceolate to linear-lanceolate. Calyx tubular, to 1.4 cm; lobes 5, unequal, linear-lanceolate, ciliate, serrulate. Corolla pale yellow; tube ca. 1.6 cm, glabrous; galea slightly falcate, ca. 9 mm, apex short beaked; lower lip shorter than galea. Filaments glabrous. Capsule lanceolate-oblong, 1.5–1.6 cm. Fl. Jun–Jul, fr. Jul–Aug.

Xinjiang [Kazakhstan].

T. N. Popova and L. I. Ivanina (pers. comm.) suggest that the occurrence of this species in China is questionable, and that the plants described here may belong to *Pedicularis pubiflora* Vvedensky.

66. Ser. Comosae Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 85. 1877.

多毛系 duo mao xi

Ser. Dolichorrhizae Prain.

Herbs comose, usually more than 15 cm tall. Roots fascicled, fibrous. Leaves basal and on stem, alternate, oblong-lanceolate, usually 2-pinnatifid, sometimes 1-pinnatisect or pinnatifid. Inflorescences densely spicate and elongated, racemose, or subcapitate. Calyx slightly cleft anteriorly, 5-lobed. Corolla tube erect; galea 2-toothed, beakless or short beaked; lower lip spreading.

About 30 species: Asia, Europe; 11 species in China.

- 1a. Corolla ca. 1.4 cm 197. *P. breviflora*
- 1b. Corolla ca. 1.8 cm or more, if less, then yellow.
 - 2a. Flowers purple, rose, or white.
 - 3a. Leaves 2- or 3-pinnatisect; calyx with 2 pairs of lateral lobes connivent; corolla ca. 2.7 cm 202. *P. rubens*
 - 3b. Leaves 1-pinnatisect or pinnatifid; calyx lobes not connivent; corolla 2–2.5 cm.
 - 4a. Calyx 5–6 mm, lobes lanceolate, entire; capsule ovoid, 8–10 mm 198. *P. dasystachys*
 - 4b. Calyx 10–14 mm, lobes triangular-lanceolate, dentate; capsule oblong-lanceolate, 10–20 mm 200. *P. uliginosa*
 - 2b. Flowers yellow.
 - 5a. Calyx lobes narrowly triangular to lanceolate, longer than wide.
 - 6a. Lower corolla lip ca. as long as galea; inflorescences 4–15 cm; calyx to 1.4 cm 201. *P. flava*
 - 6b. Lower corolla lip shorter than galea; inflorescences to 25 cm; calyx ca. 1 cm 203. *P. achilleifolia*
 - 5b. Calyx lobes ± triangular (except *P. mariae*), wider than long (except *P. dolichorrhiza*).
 - 7a. Calyx lobes not connivent.
 - 8a. Corolla 2.6–3.5 cm; calyx 1.6–2 cm; filaments glabrous 199. *P. physocalyx*
 - 8b. Corolla 2–2.5 cm; calyx 8–10 mm; filaments 2 pubescent, 2 glabrous 204. *P. venusta*
 - 7b. Calyx lobes connivent in 2 lateral pairs.
 - 9a. Beak of galea distinct, longer than wide 207. *P. dolichorrhiza*
 - 9b. Beak of galea very short or ± absent, wider than long.
 - 10a. Capsule oblong, ca. 1 cm 205. *P. altaica*
 - 10b. Capsule obliquely oblong, 1.3–1.5 cm 206. *P. mariae*

197. *Pedicularis breviflora* Regel & C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 352. 1879.

短花马先蒿 duan hua ma xian hao

Herbs perennial, ca. 30 cm tall. Stems erect, unbranched, finely pubescent. Basal leaves long petiolate. Stem leaves alternate, short petiolate; leaf blade oblong-lanceolate, abaxially densely pubescent, adaxially sparsely minutely pubescent, pinnatisect; segments narrowly lanceolate, pinnatisect, dentate, teeth callose. Inflorescences spicate, densely gray pubescent; bracts longer than calyx. Calyx campanulate-tubular, 1–1.1 cm, pubescent; lobes 5, unequal, triangular, short, apex acute. Corolla purple, to 1.4 cm, glabrous; tube shorter than galea, broadly expanded apically. Galea falcate; beak short, apex truncate; lower lip ca. as long as galea. Filaments 2 pubescent, 2 glabrous; anthers apiculate. 1300–1800 m. Xinjiang [Kazakhstan, ?Kyrgyzstan].

198. *Pedicularis dasystachys* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg, Sér. 2, 2: 195. 1844.

毛穗马先蒿 mao sui ma xian hao

Herbs perennial, 10–30 cm tall. Roots clustered, thickened. Stems 1 to several, erect, unbranched, glabrous or sparsely pubescent. Basal leaf petiole shorter than blade;

leaf blade elliptic-lanceolate, glabrous except for pubescent midvein, pinnatifid, dentate, teeth callose. Stem leaves alternate, short petiolate or distal ones sessile; leaf blade ovate-elliptic; segments incised-dentate. Inflorescences subcapitate, compact, elongating in fruit, to 15 cm, whitish lanate; bracts linear, longer than calyx. Calyx 5–6 mm; lobes 5, unequal, lanceolate, less than 1/2 as long as tube, entire. Corolla bright rose or white, 2.2–2.5 cm, glabrous; tube erect, slightly longer than lower lip; galea slightly falcate, beakless; lower lip glabrous, lobes denticulate. Filaments glabrous. Capsule ovoid, 8–10 mm, mucronate. Fl. May, fr. Jun. Alkaline swampy meadows. Xinjiang [Kazakhstan, Mongolia, Russia (European part, W Siberia)].

T. N. Popova and L. I. Ivanina (pers. comm.) suggest that the occurrence of this species in China is questionable.

199. *Pedicularis physocalyx* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 8: 251. 1841.

瓣萼马先蒿 gu e ma xian hao

Pedicularis fedschenkoi Bonati; *P. flava* Pallas var. *altaica* Bunge; *P. flava* var. *conica* Bunge.

Herbs perennial, 16–20 cm tall, not drying black. Roots filiform, fleshy. Stems ± ascending, few branched or unbranched, densely brown pubescent. Leaves basal

and on stem; petiole ca. 1/2 as long as leaf blade, brown pubescent; leaf blade lanceolate, pinnatipartite; segments oblong, pinnatilobate, dentate, subglabrous. Stem leaves shorter petiolate, pinnatifid. Inflorescences initially dense, oblong, elongating in fruit, pubescent; proximal bracts leaflike, 3-lobed at middle. Pedicel short. Calyx 1.6–2 cm, pubescent; lobes 5, triangular, wider than long. Corolla yellow, 2.6–3.5 cm, glabrous externally; tube erect, ca. as long as galea; galea 2-uncinate-toothed, beakless; lower lip slightly shorter than galea, long stipitate basally, glabrous. Filaments glabrous. Fl. May–Jun, fr. Jun–Jul.

Xinjiang [Kazakstan, Russia (European part, W Siberia)].

200. *Pedicularis uliginosa* Bunge, Del. Sem. Hort. Dorpat. 8. 1839.

水泽马先蒿 *shui ze ma xian hao*

Herbs perennial, 5–35 cm tall. Roots clustered, slightly thickened. Stems single, rigid, erect or ascending, with membranous scales at base. Basal leaf petiole slightly shorter than to 1/2 as long as leaf blade; leaf blade glabrous or abaxially floccose-pubescent along veins, pinnatisect; segments lanceolate, pinnatifid, dentate, teeth callose, apex acute. Stem leaves similar to basal leaves but shorter petiolate. Flowers initially in a dense raceme, later elongating to 17 cm in fruit; proximal bracts leaflike, distal ones linear. Pedicel ca. 1 cm basally. Calyx 1–1.4 cm, villous, densely reticulate-veined; lobes 5, unequal, triangular-lanceolate, ca. 1/3 as long as tube. Corolla purple-red, 2–2.5 cm; tube ca. 1.5 × longer than galea; galea ± falcate, beakless, apex marginally 2-uncinate toothed; lower lip shorter than galea. Filaments 2 pubescent and 2 glabrous or all 4 glabrous. Capsule oblong-lanceolate, 1–2 cm. Fl. Jul–Aug, fr. Aug–Sep.

Shaded glades in forests, shaded damp meadows along streams, summits of hills. Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].

T. N. Popova and L. I. Ivanina (pers. comm.) suggest that the occurrence of this species in China is questionable.

201. *Pedicularis flava* Pallas, Reise Russ. Reich. 3: 736. 1776.

黄花马先蒿 *huang hua ma xian hao*

Herbs perennial, 8–25 cm tall, not drying black. Rootstock stout. Stems 1 to several, longitudinally striate or grooved, pubescent, with numerous persistent scales at base. Leaves basal and on stem, numerous, dense; petiole to 4.5 cm, pubescent; leaf blade lanceolate-oblong to linear-oblong, to 9 × 3 cm, abaxially whitish pubescent along midvein, adaxially sparsely lanulose, pinnatisect; segments 6–12 pairs, narrowly ovate to lanceolate or triangular, pinnatipartite, double dentate, teeth callose. Inflorescences compact spikes, 4–15 cm, densely whitish villous; proximal bracts leaflike, distal ones 3-lobed, whitish pubescent. Calyx to 1.4 cm, without reticulate venation, densely whitish villous; lobes 5, unequal, longer than wide.

Corolla yellow, 1.4–1.8 cm; tube erect; galea falcate, ca. as long as tube; beak short, apex truncate; lower lip ca. as long as galea. Filaments pubescent. Capsule long ovoid, compressed, ca. 1.5 cm × 7 mm, long apiculate. Fl. Jun–Jul, fr. Jul–Aug.

Rocky grassy slopes, slightly alkaline meadows; ca. 1500 m. N Nei Mongol [Mongolia, Russia (E Siberia)].

202. *Pedicularis rubens* Stephan ex Willdenow, Sp. Pl. 3: 219. 1800.

红色马先蒿 *hong se ma xian hao*

Herbs perennial, 10–35 cm tall, drying black or not. Roots clustered, linear, to 8 cm. Stems single, sulcate, with lines of whitish hairs, with ± persistent remnant scales at base. Leaves mostly basal; petiole to 7 cm, whitish pubescent; leaf blade narrowly oblong to oblong-lanceolate, to more than 10 × 3 cm, 2- or 3-pinnatisect; segments linear, incised-dentate, teeth callose. Inflorescences racemose, more than 10 cm; bracts leaflike, densely whitish villous. Calyx to 1.3 cm, densely whitish villous, with dense reticulate venation; lobes 5, unequal, 2 pairs of lateral lobes connivent, entire, apex 2-cleft. Corolla rose, ca. 2.7 cm; tube ca. 1.4 cm, glabrous; galea ± falcate apically, ca. as long as tube; beak short, apex obliquely truncate, marginally 2-subulate-toothed and with several small teeth; lower lip slightly shorter than galea. Filaments sparsely pubescent. Fl. Jun–Jul, fr. Jul–Aug. *2n* = 16.

Steppes, thinly wooded slopes. N Hebei, Heilongjiang, Jilin, Liaoning, NE Nei Mongol [Mongolia, Russia (E Siberia)].

203. *Pedicularis achilleifolia* Stephan ex Willdenow, Sp. Pl. 3: 219. 1800.

著草叶马先蒿 *shi cao ye ma xian hao*

Herbs perennial, 10–40 cm tall, drying ± black. Roots numerous, fascicled. Stems often single, striate, often with persistent scales and old petioles at base, whitish woolly. Leaves mostly basal, clustered; petiole to 5 cm, whitish woolly; leaf blade lanceolate-oblong, to 6 × 1.5 cm, pubescent on both surfaces, 2-pinnatisect; segments dentate, teeth callose. Stem leaves similar to basal ones but smaller. Inflorescences to 25 cm; axis whitish woolly; bracts linear, shorter than flowers, dentate. Calyx ca. 1 cm, whitish pubescent along midvein and lobes; tube membranous; lobes 5, unequal, 2 pairs of lateral lobes connivent. Corolla yellow, to 2.3 cm; tube ca. 1.3 cm, glabrous externally; galea falcate apically, slightly shorter than tube; beak very short, obliquely truncate apically, marginally 2-subulate-toothed; lower lip much shorter than galea, distinctly stipitate basally. Filaments 2 pubescent, 2 glabrous. Fl. Jun–Jul, fr. Jul–Aug. *2n* = 16.

Steppes, rocky gravelled slopes; 1000–2500 m. NE Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia (Siberia)].

204. *Pedicularis venusta* Schangin ex Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 8: 251. 1841.

秀丽马先蒿 *xiu li ma xian hao*

Herbs perennial, 10–40 cm tall. Stems usually single, erect, unbranched, often slender, long woolly. Basal leaf petiole ca. 1/2 to as long as leaf blade, pubescent; leaf blade lanceolate, pinnatisect; segments oblong, pinnatipartite, dentate, teeth callose. Stem leaves similar to basal ones but smaller, distal ones shorter petiolate. Inflorescences oblong, dense or elongated spikes, often scabrously long woolly; proximal bracts ca. as long as calyx, leaflike, middle ones pinnately 3–5-lobed. Pedicel ± absent. Calyx campanulate, 8–10 mm, ± leathery; lobes 5, broadly triangular, wider than long. Corolla yellow, 2–2.5 cm; tube erect, falcate apically, shorter than galea; galea short, beakless; lower lip slightly shorter than galea, not ciliate. Filaments 2 pubescent, 2 glabrous. Capsule compressed, obliquely oblong, 1–1.2 cm, apiculate. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Meadows, frequently in alkaline places. Heilongjiang, Nei Mongol, Xinjiang [Mongolia, Russia (Siberia, Far East)].

205. *Pedicularis altaica* Stephan ex Steven, Mém. Soc. Imp. Naturalistes Moscou 6: 48. 1823.

阿尔泰马先蒿 a er tai ma xian hao

Herbs perennial, 20–40 cm tall. Stems usually single, often ascending, slender, sparsely long woolly, often shiny. Basal leaves few; petiole ca. 1/2 as long as leaf blade, glabrous; leaf blade linear-lanceolate, pinnatisect; segments oblong-lanceolate or lanceolate, dentate, teeth callose. Stem leaves smaller than basal leaves, shorter petiolate to sessile; leaf blade pinnatipartite at base; lobes pectinate anteriorly. Inflorescences long, with laxly arranged flowers; bracts 3-lobed, proximal ones sometimes longer than calyx, middle ones shorter. Pedicel short. Calyx narrowly campanulate, 1–1.2 cm, ± leathery, tinged purple punctate, glabrous or sometimes gray pubescent; lobes 5, triangular, very short, wider than long, 2 pairs of lateral lobes connivent. Corolla yellow, 2.5–2.7 cm; tube erect; galea falcate apically, ca. as long as tube; beak very short or ± absent; lower lip ca. as long as galea, long stipitate basally, ± ciliate. Filaments 2 pubescent, 2 glabrous. Capsule oblong, ca. 1 cm, mucronulate. Fl. Jun–Jul, fr. Jul–Aug.

Alkaline meadows, *Salix* thickets. Xinjiang [Kazakstan, Mongolia, Russia].

67. Ser. Strobilaceae P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 246. 1995.

球状系 qiu zhuang xi

Stems usually branched basally and at middle; branches alternate or sometimes pseudo-opposite. Leaves alternate or proximal ones often ± opposite, ± elliptic, pinnatipartite. Inflorescences capitate or racemose, short. Calyx deeply cleft anteriorly, 3–5-lobed. Corolla tube longer than calyx, some 2 × longer, galea often crested, twisted laterally; beak slender.

Five species: China, N Myanmar; all five in China.

1a. Middle lobe of lower corolla lip elliptic to oblong, to 7 mm; galea prominently crested 212. *P. pseudocephalantha*

206. *Pedicularis mariae* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 351. 1880.

玛丽马先蒿 ma li ma xian hao

Herbs perennial, ca. 20 cm tall. Stems erect, unbranched, sparsely pubescent. Leaves alternate, glabrous; basal and proximal stem leaves petiolate; leaf blade oblong, pinnatisect; segments ovate or oblong, pinnatilobate or pectinate-dentate. Inflorescences racemose, dense initially, becoming lax; bracts ovate basally, 3–5-lobed, long pubescent, serrate or entire, distal ones obovate-cuneate to oblong-cuneate; lobes 3, entire. Calyx tube 5-angular; lobes 5, unequal, lanceolate, less than 1/2 as long as tube, 2 pairs of lateral lobes connivent; entire or serrate. Corolla yellow, ca. 2 × as long as calyx; galea ± erect; beakless, apex rounded; lower lip ca. as long as galea, ciliate. Filaments glabrous. Capsule obliquely oblong, 1.3–1.5 cm. Fl. May–Aug, fr. Jun–Sep.

Xinjiang [Kazakstan].

207. *Pedicularis dolichorrhiza* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg, Sér. 2, 1: 80. 1843.

长根马先蒿 chang gen ma xian hao

Herbs perennial, 20–100 cm tall, sparsely pubescent, not drying black. Roots ± fleshy, fusiform. Stems 1 to several, erect, unbranched, hollow, with lines of whitish hairs. Basal leaves clustered, withering in fruit, 10–45 cm; petiole to 27 cm; leaf blade narrowly lanceolate, to 25 × 6 cm, pinnatisect; segments to 25 pairs, lanceolate, pinnatipartite, dentate, teeth callose. Stem leaves smaller than basal leaves, distal ones shorter petiolate. Inflorescences long spicate, more than 20 cm; proximal bracts leaflike, distal ones 3-lobed. Calyx campanulate, to 1.3 cm, sparsely long pubescent, slightly cleft anteriorly; lobes 5, triangular, wider than long, 2 pairs of lateral lobes connected, ± triangular, ciliate. Corolla yellow; tube 1.3–1.6 cm; galea falcate apically, to 1.4 cm; beak distinct, ca. 3 mm, longer than wide, apex 2-cleft, lobes toothlike; lower lip ca. as long as galea, erose-dentate. Filaments pubescent. Capsule 1–1.5 cm. Seeds long ovoid. Fl. Jun–Jul, fr. Jul–Aug.

About 2000 m. NW Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, Tajikistan].

- 1b. Middle lobe of lower corolla lip obovate or obovate-rounded, not more than 5 mm; galea inconspicuously crested or not crested.
- 2a. Corolla 1.7–1.8 cm; calyx 5–6.5 mm.
- 3a. Lower corolla lip not ciliate; all filaments villous apically; calyx 1/2 cleft anteriorly 208. *P. gracilicaulis*
- 3b. Lower corolla lip ciliate; filaments 2 glabrous, 2 pubescent; calyx 2/3 cleft anteriorly 210. *P. strobilacea*
- 2b. Corolla 2–2.2 cm; calyx 9–12 mm.
- 4a. Leaf blade 1.5–3 cm, segments 6–9 pairs; calyx 1/2 cleft anteriorly; lower corolla lip shorter than galea, middle lobe not emarginate 209. *P. dichrocephala*
- 4b. Leaf blade 3–8 cm, segments 10–18 pairs; calyx 1/3 cleft anteriorly; lower corolla lip ca. as long as galea, middle lobe emarginate 211. *P. lanpingensis*

208. *Pedicularis gracilicaulis* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 32. 1949.

细瘦马先蒿 xi shou ma xian hao

Herbs annual, 20–40 cm tall. Stems several, often ascending, usually branched basally and at middle, sparsely pubescent or glabrescent. Leaves alternate; petiole to 3.5 cm, slender; leaf blade oblong, ca. 3 × 1 cm, villous on both surfaces, pinnatifid; segments 5 or 6 pairs, ovate or ovate-oblong, pinnatifid or dentate. Inflorescences subcapitate, dense with few flowers; bracts leaflike. Calyx oblong-ovate, 5–6.5 mm, pubescent, 1/2 cleft anteriorly; lobes 5, unequal, flabellate, 3-cleft. Corolla purple, 1.7–1.8 cm; tube ca. 1.5 cm; galea falcate near middle, inconspicuously crested; beak ca. 5 mm, slightly 2-cleft at apex; lobes of lower lip not ciliate, middle lobe slightly smaller than lateral pair and slightly projecting, obovate, emarginate. Filaments villous apically. Capsule compressed, ovoid, ca. 1.2 cm, apiculate. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows; 3000–3300 m. NW Yunnan.

209. *Pedicularis dichrocephala* Handel-Mazzetti, Symb. Sin. 7: 863. 1936.

重头马先蒿 chong tou ma xian hao

Herbs annual, 20–60 cm tall. Stems unbranched at base, with 2–4 lines of whitish hairs. Leaves alternate; petiole 0.5–3 cm, sparsely whitish villous; leaf blade ± lanceolate-oblong, 1.5–3 cm, whitish pubescent and scurfy on both surfaces, pinnatifid; segments 6–9 pairs, oblong, margin double dentate. Inflorescences racemose, densely capitate; bracts leaflike, proximal ones petiolate and shorter than flowers, distal ones ± sessile, whitish scurfy and sparsely pubescent. Pedicel barely 1 mm. Calyx 9–10 mm, sparsely whitish pubescent, 1/2 cleft anteriorly; lobes 5, unequal, ± leaflike, barely 1 mm. Corolla purplish red, 2–2.2 cm; tube erect, bent at a right angle apically, ca. 1.5 cm, sparsely villous and yellow glandular punctate, villous abaxially; beak falcate, ca. 3 mm, bent downward; lower lip yellowish white, shorter than galea, ca. 8 mm, sparsely ciliate, middle lobe obovate, not emarginate. Filaments villous. Fl. Aug, fr. Sep.

• Alpine meadows; 3300–3500 m. NW Yunnan.

210. *Pedicularis strobilacea* Franchet ex F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 216. 1890.

球状马先蒿 qiu zhuang ma xian hao

Herbs annual, to 33 cm tall. Stems erect, often branching basally, sometimes branched at middle and apically; branches alternate or sometimes pseudo-opposite, whitish pubescent. Basal leaves withering early. Stem leaves alternate, widely spaced; petiole to more than 3 cm basally; leaf blade oblong to ovate-oblong, usually longer than petiole, to 4 × 2.2 cm, sparsely whitish pubescent and scurfy on both surfaces, pinnatifid to pinnatisect; segments 5–9 pairs, oblong or triangular-ovate to obliquely triangular-ovate, triangular-dentate. Inflorescences subcapitate-racemose; proximal bracts leaflike. Pedicel 3–4 mm, pubescent. Calyx obliquely funnel-form-campanulate, whitish villous, ca. 2/3 cleft anteriorly; tube 5–6 mm; lobes 5, leaflike, whitish pubescent internally. Corolla whitish yellow, with purple galea, ca. 1.8 cm; tube erect, longer than calyx; galea falcate, whitish villous, inconspicuously crested; beak filiform, ca. 5 mm, bent downward; lower lip ca. 8 mm × 1.2 cm, ciliate, middle lobe obovate. Filaments 2 pubescent, 2 glabrous. Capsule obliquely ovoid, apiculate. Fl. Jul–Aug, fr. Aug–Sep. Alpine meadows; ca. 3500 m. NW Yunnan [Myanmar].

211. *Pedicularis lanpingensis* H. P. Yang, Acta Bot. Yunnan. 6: 278. 1984.

兰坪马先蒿 lan ping ma xian hao

Herbs perennial, ca. 20 cm tall, drying ± black. Roots several, fusiform, fleshy. Stems single, erect, unbranched, with 2–6 lines of hairs. Leaves mostly basal; petiole 4–10 cm; leaf blade oblong to lanceolate-oblong, 3–8 cm, abaxially sparsely pubescent and whitish scurfy, adaxially glabrescent, pinnatifid to pinnatisect; segments 10–18 pairs, oblong, margin double dentate. Stem leaves few, 2–4, alternate.

Inflorescences capitate, many flowered; proximal bracts

leaflike, longer than flowers. Pedicel 4–10 mm, slender. Calyx campanulate, ca. 1.2 cm, densely pubescent, 1/3 cleft anteriorly; lobes 5, unequal, to 2 mm. Corolla pale red, with purplish red galea, ca. 2 cm; tube erect, longer than calyx; galea bent at a right angle apically, narrowly crested; beak falcate, 4–5 mm; lower lip ca. as long as galea, ca. 1 cm, ciliate, middle lobe obovate, emarginate. Filaments densely pubescent. Fl. Jun–Jul, fr. Aug.

• Alpine meadows; ca. 3800 m. NW Yunnan.

212. *Pedicularis pseudocephalantha* Bonati, Bull. Soc. Bot. Genève, Sér. 2, 5: 314. 1913.

假头花马先蒿 *jia tou hua ma xian hao*

Pedicularis strobilacea Franchet ex F. B. Forbes & Hemsley var. *riparia* Bonati.

Herbs annual, 25–40 cm tall. Stems erect, usually many branched, sparsely pubescent. Leaves alternate; petiole to more than 5 cm, sparsely pubescent; leaf blade

oblong or ovate-oblong, to 6 × 2.7 cm, abaxially densely whitish scurfy, adaxially sparsely pubescent, pinnatifid; segments 6–9 pairs, obliquely triangular or oblong, margin double dentate. Inflorescences subcapitate-racemose; proximal bracts leaflike. Pedicel 2–3 mm, ± elongating in fruit. Calyx obliquely campanulate, ca. 8 mm, 1/3 cleft anteriorly, densely whitish villous; lobes 5, unequal, barely 1–1.5 mm.

Corolla yellowish white, with purplish red galea, ca. 2.2 cm; tube erect, ca. 1.2 cm, sparsely villous and glandular punctate; galea bent at a right angle apically, conspicuously crested, densely whitish villous, yellowish glandular punctate; beak filiform, ca. 5 mm, horizontal; lower lip long ciliate, middle lobe elliptic to oblong, to 7 mm. Filaments pubescent. Capsule broadly ovoid, 1.3–1.5 cm. Fl. Jul–Aug, fr. Sep.

• Alpine meadows; 3000–3800 m. NW Yunnan.

68. Ser. *Oliganthae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 75. 1890.

少花系 *shao hua xi*

Stems usually many branched at base. Leaves basal and on stem, alternate, sometimes proximal ones ± opposite, long petiolate, oblong to lanceolate, pinnatisect or pinnatifid. Inflorescences short spicate, capitate, or racemose, few flowered. Calyx deeply cleft anteriorly, 2–5-lobed. Corolla purple or yellowish white; tube less than 2 × as long as calyx; galea purple, strongly twisted laterally, commonly with 1 or 2 reflexed marginal teeth; beak slender.

• Seven species: endemic to China.

1a. Stem leaves to 10 × 3.5 cm; filaments glabrous; corolla yellow 218. *P. oligantha*

1b. Stem leaves less than 4 × 1.5 cm; filaments 2 or 4 pubescent; corolla ± reddish purple or rose.

2a. Basal leaves many, linear-lanceolate, segments 15–24 pairs; galea 2-auricled at margin ... 219. *P. tachanensis*

2b. Basal leaves few or withering early, segments less than 15 pairs; galea not 2-auricled at margin.

3a. Leaf segments of main leaves 10–15 pairs; calyx lobes 2 or 5.

4a. Stems 12–20 cm; stem leaves 2–4; galea glandular pubescent abaxially 213. *P. cephalantha*

4b. Stems 25–70 cm; stem leaves 7–16; galea not glandular pubescent 214. *P. longipetiolata*

3b. Leaf segments of main leaves 5–7 pairs; calyx lobes (2 or)3.

5a. Beak of galea deeply 2-cleft at apex 215. *P. tahaiensis*

5b. Beak of galea slightly cleft at apex.

6a. Leaves mostly basal; galea conspicuously crested 216. *P. dissectifolia*

6b. Leaves mostly on stem; galea inconspicuously crested 217. *P. fengii*

213. *Pedicularis cephalantha* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 540. 1888.

头花马先蒿 *tou hua ma xian hao*

Herbs perennial, 12–20 cm tall, drying ± black. Stems single, sometimes to 6, central stem often ± ascending, outer stems usually procumbent at base, often branched basally, glabrous or sometimes with lines of hairs.

Leaves mostly basal; petiole 2–4 cm, glabrescent; leaf blade elliptic-oblong to lanceolate-oblong, 6–8 × 1.7–2 cm, abaxially sparsely whitish villous along midvein, adaxially glabrous, pinnatisect; segments 7–11 pairs, ovate to ovate-lanceolate, pinnatifid, spinescent-dentate. Stem leaves few, often only 1 or 2, similar to basal leaves but smaller; segments 5 pairs. Inflorescences subcapitate, few flowered; bracts leaflike. Pedicel ca. 4 mm. Calyx 8–10 mm, 2/3 cleft anteriorly, sparsely pubescent; lobes 2 or 5, unequal or when 2, equal, small. Corolla deep red, purple, or purplish red, 1.8–2.3 cm;

tube erect, ca. 1.4 cm, glabrous externally; galea falcate apically, glandular pubescent abaxially, with 1 distinct reflexed marginal tooth on one side; beak 5–6 mm; lower lip ca. 1.2 × 1.5–1.8 cm. Filaments 2 pubescent, 2 glabrous. Capsule long ovoid. Fl. Jun, fr. Aug.

• Alpine meadows, *Picea* forests; 2800–4900 m. S Sichuan, NW Yunnan.

1a. Calyx lobes 5, unequal, 2 larger lobes oblanceolate, dentate to pinnatifid, other 3 lobes

acicular, entire 213a. var. *cephalantha*

1b. Calyx lobes 2, equal, lanceolate, acute, dentate or pinnatifid 213b. var. *szetchuanica*

213a. *Pedicularis cephalantha* var. *cephalantha*

头花马先蒿(原变种) *tou hua ma xian hao* (yuan bian zhong)

Calyx lobes 5, unequal; 2 larger lobes oblanceolate, dentate to pinnatifid; other 3 lobes acicular, entire.

• Alpine meadows, *Picea* forests; 4000–4900 m. NW Yunnan.

213b. *Pedicularis cephalantha* var. *szetchuanica* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 118. 1921.

四川头花马先蒿 *si chuan tou hua ma xian hao*

Calyx lobes 2, equal, lanceolate, dentate or pinnatifid, apex acute. Fl. Jun–Jul.

• Alpine meadows; 2800–4500 m. S Sichuan, Yunnan.

214. *Pedicularis longipetiolata* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 541. 1888.

长柄马先蒿 *chang bing ma xian hao*

Herbs perennial, (25–)40–50(–70) cm tall. Roots fusiform, ± fleshy. Stems 1 to several, erect or branches ± ascending, often branched basally, unbranched apically, glabrous. Basal leaves often withering early; petiole to 10 cm. Stem leaves many, 7–16, alternate; proximal petioles to 3 cm, glabrescent; leaf blade lanceolate-oblong, 3–10 × 2–2.5 cm, glabrous on both surfaces, pinnatisect; segments 7–14 pairs, ovate-lanceolate, pinnatifid, spinescent-dentate. Inflorescences capitate; bracts leaflike. Pedicel 1–2 mm. Calyx 7.5–10 mm, deeply cleft anteriorly; lobes 5, unequal. Corolla purple, 2.3–3 cm, erect; tube ca. as long as calyx; galea ± bent at a right angle apically, eglandular pubescent, with 1 lanceolate reflexed marginal tooth on one side; beak ca. 6 mm; lower lip longer than galea, 1.1–1.4 × ca. 2 cm, sparsely ciliate. Filaments 2 densely villous, 2 glabrous. Capsule long ovoid, ca. 1.1 cm × 4.5 mm. Fl. Jul–Sep, fr. Aug–Oct.

• Swampy meadows; 2800–3600 m. SW Sichuan, NW Yunnan.

215. *Pedicularis tahaiensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 114. 1921.

大海马先蒿 *da hai ma xian hao*

Herbs annual, to 30 cm tall, drying black. Stems slender, branched basally or unbranched, with lines of hairs. Leaves pseudo-opposite, glabrescent; proximal petioles 0.8–2.5 cm, distal ones ± sessile; leaf blade ovate, 1.5–2 cm × 8–11 mm, abaxially whitish scurfy, pinnatifid to subpinnatisect; segments 5–7 pairs, ovate to ± oblong, pinnatifid or deeply dentate. Inflorescences short racemose. Calyx 4.5–5 mm, deeply cleft anteriorly, densely whitish long pubescent; lobes 3, unequal, posterior one smallest. Corolla rose, 1.7–2 cm; tube erect, 1.1–1.5 cm, villous exteriorly; galea ± bent at a right angle apically, with 1 reflexed marginal tooth on one side; beak 4–4.5 mm, deeply 2-cleft at apex; lower lip ca. 7 × 9 mm, sparsely ciliate, middle lobe emarginate apically. Filaments 2 villous, 2 glabrous. Fl. Jul–Aug, fr. Sep.

• Alpine meadows; ca. 3200 m. NE Yunnan.

216. *Pedicularis dissectifolia* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 119. 1949.

细裂叶马先蒿 *xi lie ye ma xian hao*

Herbs perennial, 20–25 cm tall, drying black. Stems several, branched near base; branches erect or ascending, slender, glabrous or sparsely pubescent. Leaves mostly basal, alternate or proximal ones often pseudo-opposite. Petiole of basal leaves 5–9 cm, sparsely villous; leaf blade oblong-lanceolate to ovate-oblong, 3–7 × 1–1.8 cm, glabrous on both surfaces, sparsely whitish scurfy, pinnatisect; segments 5–7 pairs, ± oblong, pinnatifid, spinescent-dentate. Stem leaves few, smaller than basal leaves, shorter petiolate. Inflorescences subcapitate, 3–5-flowered; bracts leaflike. Pedicel barely 1 mm. Calyx to 7 mm, 1/2 cleft anteriorly; lobes 2 or 3, unequal, posterior one, when present, smallest. Corolla purplish red, 1.7–2.1 cm; tube erect, longer than calyx, glabrous; galea falcate, conspicuously crested, with 1 reflexed marginal tooth on one side; beak ca. 5 mm, slightly cleft at apex, ± horizontal; lower lip slightly longer than galea, sparsely pubescent. Filaments 2 pubescent, 2 glabrous.

• NW Yunnan.

217. *Pedicularis fengii* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 120. 1949.

国楣马先蒿 *guo mei ma xian hao*

Herbs 20–30 cm tall. Stems erect or ascending, often branched basally, glabrous. Leaves mostly on stem, alternate or sometimes pseudo-opposite; petiole to 3.5 cm, slender; leaf blade ovate or oblong-ovate, 4–5.5 × 1.5–3.2 cm, pinnatifid; segments 5–7 pairs, widely spaced, ovate, pinnatifid, crenate-dentate.

Inflorescences short compact racemes; bracts leaflike, to 2.5 cm. Pedicel to 5 mm. Calyx ca. 6 mm, glabrous, 1/2 cleft anteriorly; lobes 3, unequal, lateral pair flabellate, longer than posterior one. Corolla rose, ca. 1.7 cm; tube erect, longer than calyx; galea falcate, inconspicuously crested, with 1 reflexed marginal tooth on one or both sides; beak bent obliquely downward, ca. 6 mm, slender, slightly cleft at apex; lower lip nearly as long as galea, glabrous. Filaments 2 sparsely villous, 2 glabrous. Capsule barely completely enclosed by accrescent calyx, oblong-ovoid, compressed, ca. 1.2 cm × 6 mm, apex acute. Fl. Aug, fr. Sep.

• Open hillsides, alpine meadows. NW Yunnan.

218. *Pedicularis oligantha* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 542. 1888.

少花马先蒿 *shao hua ma xian hao*

Herbs perennial, 40–50 cm tall. Stems several, erect or ascending, many branched, glabrous. Basal leaves withering early. Stem leaves numerous, to 8–10, alternate; petiole to 3.5 cm, glabrous; leaf blade ovate-oblong to oblong-lanceolate, to 10 × 3.5 cm, glabrous on both surfaces, abaxially sparsely whitish scurfy, pinnatifid to pinnatisect; segments to 14 pairs, ovate-lanceolate to ± oblong, pinnatifid, spinescent double dentate. Inflorescences short racemose; bracts leaflike. Calyx ca. 8 mm; 1/2 cleft anteriorly; tube ca. 6

mm; lobes 3, unequal, posterior lobe smallest, lateral pair flabellate. Corolla yellow; tube erect, ca. as long as calyx; galea ± bent at a right angle apically, not crested, with 1 triangular reflexed marginal tooth on one side; lower lip ca. 6 × 7 mm, ciliate. Filaments glabrous. Fl. Jul, fr. Aug.

•NW Yunnan.

219. *Pedicularis tachanensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 116. 1921.

大山马先蒿 da shan ma xian hao

Herbs perennial, 20–32 cm, drying black. Roots ± fusiform, fleshy. Stems often single, erect, unbranched, pubescent apically. Leaves many, mostly basal; petiole to 3–7 cm; leaf blade linear-lanceolate, 5–9 × 1–1.3 cm,

pinnatisect to pinnatipartite; segments 15–24 pairs, ± ovate, incised-double dentate. Stem leaves few, often 3–5, smaller than basal leaves. Inflorescences subcapitate; bracts leaflike. Pedicel 2–3 mm. Calyx ca. 6 mm, slightly cleft anteriorly; lobes 3, unequal, posterior one smallest. Corolla rose, ca. 2 cm; tube erect, 1.2–1.4 cm, villous; galea ± bent at a right angle, prominently crested, with 1 linear reflexed marginal tooth on one or both sides; beak to 6 mm; lower lip ca. 9 × 10 mm. Filaments pubescent. Capsule oblong, 1–1.5 cm. Seeds ovoid, ca. 2 mm. Fl. Aug, fr. Aug–Sep.

•Swampy places; ca. 2200 m. E Yunnan.

69. Ser. Oxycarpae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 74. 1890.

尖果系 jian guo xi

Stems erect, branched near base or unbranched, rarely branched apically. Leaves basal and on stem, alternate or pseudo-opposite, oblong to lanceolate, often pinnatisect. Inflorescences racemose or spicate, usually elongated. Calyx lobes 3–5. Corolla tube longer than but less than 2 × as long as calyx; galea twisted or not; beak sometimes twisted, long, bent downward.

•Nine species: endemic to China.

1a. Beak of corolla straight or slightly bent, ± horizontal; galea not twisted.

2a. Leaf segments 5–7 pairs; corolla 1.1–1.3 cm; filaments glabrous 220. *P. macilentia*

2b. Leaf segments 7 or 8 pairs; corolla 1.4–2.2 cm; filaments pubescent.

3a. Leaves pinnatisect; stems simple or branched basally; calyx 4–5 mm, lobes equal, entire, glabrescent; corolla white, with purple beak, 1.4–1.8 cm 221. *P. oxycarpa*

3b. Leaves pinnatifid to pinnatipartite; stems single, unbranched; calyx 6–8 mm, lobes unequal, lateral lobes dentate, sparsely pubescent; corolla white to purple-red throughout, 1.8–2.2 cm 222. *P. monbeigiana*

1b. Beak of corolla semicircular or S-shaped; galea twisted.

4a. Plants 5–8 cm tall; filaments glabrous.

5a. Stems single, densely glandular pubescent; calyx short, tube barely 4 mm, 3-lobed .. 226. *P. subulatidens*

5b. Stems usually several, not glandular pubescent; calyx long, tube to 8 mm, 5-lobed 227. *P. longicalyx*

4b. Plants 15–40(–70) cm tall; filaments pubescent.

6a. Leaf segments 5–7 pairs; inflorescences elongated to only 5 cm; stems single 223. *P. stewardii*

6b. Leaf segments 9–16 pairs; inflorescences elongated to 10–18 cm; stems usually several.

7a. Corolla ca. 1 cm, beak of galea semicircular; flowers reddish, with white spots on lower lip 225. *P. tibetica*

7b. Corolla 1.2–2 cm, beak of galea often S-shaped; flowers without white spots.

8a. Flowers yellow, with purplish beak, 1.6–2 cm; calyx 6–7 mm, pubescent 224. *P. torta*

8b. Flowers purplish red or red throughout, 1.2–1.6 mm; calyx 3–6 mm, glabrescent ... 228. *P. davidii*

220. *Pedicularis macilentia* Franchet ex F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 212. 1890.

瘠瘦马先蒿 ji shou ma xian hao

Herbs annual or biennial, 20–30 cm tall, glabrescent, scarcely drying black. Stems 6–12, ascending, often short branched apically, with lines of hairs. Leaves mostly on stem, alternate or pseudo-opposite; petiole to 1 cm or distal ones ± sessile, glabrescent; leaf blade ovate-elliptic to narrowly oblong, 3–5 × 1–1.5 cm, glabrous on both surfaces, abaxially sparsely whitish scurfy, pinnatisect; segments 5–7 pairs, ovate to lanceolate-oblong, incised-pinnatifid or double dentate. Inflorescences racemose, to 10 cm; bracts leaflike. Pedicel ca. 2 mm. Calyx 6–7 mm, glabrous, 1/3 cleft

anteriorly; lobes 3, unequal, posterior one acicular, lateral pair larger, toothed. Corolla white, with reddish beak, 1.1–1.3 cm; tube erect, ca. 2 × as long as calyx; galea ± falcate, slightly crested, not twisted; beak straight, ca. 4 mm, slightly 2-cleft at apex, not ciliate; lower lip nearly as long as galea. Filaments glabrous. Capsule ovoid, ca. 1 cm × 5–6 mm. Seeds narrowly ovoid, ca. 2 mm. Fl. Jun–Jul, fr. Jul–Sep.

•Grassy slopes; ca. 2900 m. Sichuan, NW Yunnan.

221. *Pedicularis oxycarpa* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 540. 1888.

尖果马先蒿 jian guo ma xian hao

Herbs perennial, 20–40 cm tall, erect, sparsely pubescent, drying black. Roots fleshy. Stems 1 or 5–10, branched basally or unbranched, with lines of hairs.

Leaves alternate. Basal leaves withering early, petiolate or distal ones \pm sessile; petiole to 2 cm; leaf blade linear-oblong or lanceolate-oblong, 4–7(–10) \times 0.8–2 cm, abaxially glabrous and whitish scurfy, adaxially sparsely pubescent or glabrescent, pinnatisect; segments 7–15 pairs, linear-lanceolate, pinnate-double dentate. Inflorescences racemose, to 13.5 cm, lax; bracts leaflike. Proximal pedicels to 6 mm, slender. Calyx 4–5 mm, ca. 1/2 cleft anteriorly, glabrescent; lobes 3, equal, entire. Corolla white, with purplish beak, 1.4–1.8 cm; tube erect, ca. 2 \times as long as calyx, sparsely pubescent; galea bent at a right angle apically, distinctly crested, recurved; beak falcate, to 7 mm, slender, clearly crested; lower lip long ciliate. Filaments pubescent. Capsule lanceolate-oblong, ca. 1.3 cm \times 5 mm. Fl. May–Aug, fr. Aug–Oct.

• Alpine meadows; 2800–4400 m. SW Sichuan, NW Yunnan.

222. *Pedicularis monbeigiana* Bonati, Bull. Soc. Bot. Genève, Sér. 2, 5: 112. 1913.

蒙氏马先蒿 meng shi ma xian hao

Herbs perennial, 50–70(–90) cm tall, erect, pubescent, drying black. Roots \pm fleshy. Stems single, unbranched. Basal leaf petiole 5–10 mm; leaf blade oblong-lanceolate to linear-lanceolate, 8–14(–20) \times 2–4 cm, sparsely pubescent along veins on both surfaces, pinnatifid to pinnatipartite; segments 14–18 pairs, triangular-ovate to lanceolate, margin double dentate. Stem leaves 4–6, alternate, similar to basal leaves but smaller. Inflorescences racemose, to 35 cm, many flowered; bracts leaflike, proximal ones longer than flowers. Pedicel 1–3.5(–4) cm, elongating in fruit, slender, densely pubescent. Calyx 6–8 mm, sparsely long pubescent, 1/2 cleft anteriorly; lobes 3, unequal, ca. 1/4 as long as tube, posterior lobe small, entire, lateral lobes dentate, sparsely pubescent. Corolla white to purple-red, 1.8–2.2 cm; tube erect, 1.2–1.4 cm; galea \pm bent at a right angle apically, clearly crested; beak pointing forward and bent downward near apex; lower lip long ciliate. Filaments pubescent. Capsule oblique-ovoid, 8–10 mm. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows; 2500–4200 m. SW Sichuan, NW Yunnan.

223. *Pedicularis stewardii* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 139. 1949.

斯氏马先蒿 si shi ma xian hao

Herbs ca. 30(–50) cm tall. Stems single, rigid, freely long branched apically, pubescent. Stem leaves alternate; petiole 1–1.5 cm, slender, sparsely pubescent; leaf blade ovate or ovate-oblong, ca. 2.5 \times 1.3 cm, abaxially glabrous, adaxially sparsely pubescent or glabrous, pinnatisect; segments 5–7 pairs, linear-oblong or lanceolate, pinnatifid, dentate. Inflorescences racemose, 2–3(–5) cm, 6- or 7(–10)-flowered; bracts 6–7 \times 5–6 mm, often deeply 3-cleft. Pedicel 1–2 mm, slender. Calyx 4–5 mm, 1/2 cleft anteriorly; lobes 3, unequal, ca. 1/2 as long as tube, posterior lobe triangular, entire,

lateral pair larger, palmately 3-lobed. Corolla rose, ca. 1 cm; tube erect, ca. 2 \times as long as calyx; galea twisted; beak often semicircular, ca. 4 mm; lower lip long ciliate. Filaments pubescent apically. Capsule oblong, ca. 1 cm. Fl. Jul, fr. Aug–Oct.

• Exposed moss-covered rocky slopes; 2200–2900 m. NE Guizhou.

224. *Pedicularis torta* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 538. 1888.

扭旋马先蒿 niu xuan ma xian hao

Herbs perennial, 20–40(–70) cm tall, not drying black. Roots \pm fleshy. Stems 1 or 3(–7), erect, unbranched apically, sparsely pubescent apically. Basal leaves numerous, often withering early. Stem leaves alternate or pseudo-opposite; proximal petioles to 5 cm, distal ones ca. 5 mm; leaf blade oblong-lanceolate to linear-oblong, 2–9.5 \times 0.7–2.5 cm, glabrous on both surfaces, pinnatisect; segments 9–16 pairs, lanceolate to linear-oblong, dentate. Inflorescences racemose, to 18 cm, many flowered; bracts leaflike, proximal ones longer than calyx. Pedicel 1–2.5 mm, slender, pubescent. Calyx 6–7 mm, 1/2 cleft anteriorly, pubescent; lobes 3, unequal, posterior one \pm entire, lateral pair larger, flabellate, dentate. Corolla yellow, with purple or purple-red galea, 1.6–2 cm; tube erect, ca. as long as calyx, pubescent; galea twisted; beak S-shaped, slender; lower lip ca. 1 \times 1.3 cm, long ciliate. Filaments pubescent. Capsule ovoid, 1.2–1.6 cm \times 4–6 mm. Fl. Jun–Aug, fr. Aug–Sep.

• Alpine meadows; 2500–4000 m. S Gansu, W Hubei, Shaanxi, E and N Sichuan.

225. *Pedicularis tibetica* Franchet, Bull. Soc. Bot. France 47: 24. 1900.

西藏马先蒿 xi zang ma xian hao

Pedicularis dielsiana H. Limpricht, not Bonati; *P. limprichtii* Fedde; *P. ludovicii* H. Limpricht.

Herbs perennial, to 25 cm tall, drying slightly black. Roots ca. 6 cm, \pm fleshy. Stems usually 4–10(–15), central stem erect, outer ones often procumbent to ascending, densely gray pubescent. Basal leaves few or withering early; petiole to 4 cm; leaf blade oblong-oblong to linear-oblong, 3–5 cm \times 7–12 mm, abaxially long pubescent along veins, adaxially sparsely long pubescent, pinnatipartite to pinnatisect; segments 9–13 pairs, ovate or long ovate, dentate. Stem leaves often pseudo-opposite, alternate apically, similar to basal leaves but smaller. Inflorescences racemose, 2–4(–10) cm; bracts leaflike, proximal ones shorter than pedicel. Pedicel to 1 cm, slender, densely pubescent. Calyx 6–7 mm, densely pubescent, 1/2 cleft anteriorly; lobes 3, \pm equal. Corolla reddish, with white spots on lower lip, ca. 1 cm; tube erect, ca. as long as calyx; galea twisted; beak semicircular, 5–6 mm; lower lip not ciliate. Filaments pubescent. Capsule ca. 8 mm. Seeds ca. 3.6 mm. Fl. Jun–Jul, fr. Aug.

• Alpine meadows; ca. 4600 m. W Sichuan, E Xizang.

226. *Pedicularis subulatidens* P. C. Tsoong, Acta Phytotax. Sin. 3: 296. 1955.

针齿马先蒿 zhen chi ma xian hao

Herbs perennial, low, less than 7 cm tall. Roots many, to 6 cm. Stems single, densely glandular pubescent. Basal leaf petiole to 2 cm, sparsely pubescent; leaf blade oblong-lanceolate, ca. 1.7 cm × 7 mm, abaxially whitish scurfy, adaxially glabrous, pinnatisect; segments 7 or 8 pairs, ovate-oblong to ovate, incised-dentate. Stem leaves 1 or absent. Inflorescences subcapitate, 5–8-flowered, pedicellate or distal flowers sessile. Pedicel to 7 mm. Calyx ca. 6 mm, 1/2 cleft anteriorly; tube barely 4 mm; lobes 3, unequal, posterior one entire and acuminate, lateral pair dentate. Corolla tube 1.1–1.4 cm, pubescent externally; galea twisted; beak semicircular or S-shaped, ca. 6 mm; lower lip ca. 1.1 × 1.3 cm. Filaments glabrous. Fl. Jul, fr. Aug.

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

227. *Pedicularis longicalyx* H. P. Yang, Acta Phytotax. Sin. 18: 243. 1980.

长萼马先蒿 chang e ma xian hao

Herbs perennial, ca. 8 cm tall, drying slightly black. Roots fusiform, fleshy. Stems usually numerous, outer ones often procumbent to ascending. Basal leaves numerous, fascicled; petiole 2–4 cm, glabrescent; leaf blade ovate-oblong, 1–2.5 cm, pinnatisect; segments 5–7 pairs, ovate to orbicular, incised-toothed. Stem leaves few, 1 or 2. Inflorescences capitate, 6–10-flowered; bracts leaflike. Pedicel 1–2 mm. Calyx oblong, 1/2 cleft anteriorly, glabrous, usually purplish spotted; tube to 8 mm; lobes 5, unequal. Corolla pale red, ca. 2 cm; tube barely exceeding calyx, sparsely villous; galea twisted; beak slightly S-shaped, ca. 7 mm, slender; lower lip ca. 1 × 1.3 cm. Filaments glabrous. Fl. Jul–Aug, fr. Sep.

• Alpine meadows; ca. 4200 m. E Xizang.

228. *Pedicularis davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., Sér. 2, 10: 67. 1888.

大卫氏马先蒿 da wei shi ma xian hao

Herbs perennial, 15–30(–50) cm tall, densely pubescent, drying slightly black. Roots fleshy. Stems single or usually 3 or 4, erect, few branched basally, densely rust colored pubescent. Basal leaves usually withering early.

70. Ser. Dissectae H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 10. 1949.

细裂系 xi lie xi

Stems branching basally or above. Leaves alternate or proximal ones pseudo-opposite, petiolate, ovate-oblong, pinnatisect. Inflorescence racemose. Flowers often long pedicellate. Calyx deeply cleft anteriorly, 3–5-lobed. Corolla often yellowish white; galea strongly twisted laterally at base; beak bent upward, S-shaped or semicircular, slender.

• Four species: endemic to China.

1a. Calyx lobes 5; middle lobe of lower corolla lip ca. 2 × 1.5 mm, neither prominently projecting nor stipitate at base

..... 229. *P. souliei*

Proximal stem leaves pseudo-opposite, distal ones alternate; proximal petioles to 5 cm; leaf blade ovate-oblong to lanceolate-oblong, 7(–13) × 2(–3.5) cm, abaxially whitish scurfy, adaxially glabrous or pubescent along veins, pinnatisect; segments 9–14 pairs, linear-oblong or ovate-oblong, pinnatifid, margin double dentate. Inflorescences racemose, 13(–19) cm, lax; bracts leaflike. Pedicel 1.5–3 mm, slender, densely pubescent. Calyx 5–6 mm, glabrescent, 1/2 cleft anteriorly; lobes 3 or 5, unequal, entire or dentate. Corolla purple or red, 1.2–1.6 cm; tube erect, ca. 2 × as long as calyx, sparsely pubescent externally; galea twisted; beak semicircular or slightly S-shaped apically, slender; lower lip 8–11 mm × 1.1–1.3 cm, ciliate. Filaments pubescent. Capsule ca. 1 cm × 4–5 mm. Fl. Jul–Aug, fr. Aug–Sep.

• Grassy slopes and flats, thickets, woods, along streams, alpine meadows, roadsides; 1400–4400 m. SW Gansu, SW Shaanxi, Sichuan.

1a. Calyx lobes 5 228b. var. *pentodon*

1b. Calyx lobes 3.

2a. Calyx lobes longer than wide, entire

..... 228a. var. *davidii*

2b. Calyx lobes wider than long, distinctly

dentate 228c. var. *platyodon*

228a. *Pedicularis davidii* var. *davidii*

大卫氏马先蒿(原变种) da wei shi ma xian hao (yuan bian zhong)

Calyx lobes 3, longer than wide, margin entire.

• Grassy slopes and flats, thickets, woods, along streams; 1700–3500 m. SW Gansu, SW Shaanxi, Sichuan.

228b. *Pedicularis davidii* var. *pentodon* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 413. 1963.

五齿大卫氏马先蒿 wu chi da wei shi ma xian hao

Calyx lobes 5, longer than wide, margin entire.

• Alpine meadows; 3200–4400 m. NW Sichuan.

228c. *Pedicularis davidii* var. *platyodon* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 413. 1963.

宽齿大卫氏马先蒿 kuan chi da wei shi ma xian hao

Calyx lobes 3, wider than long, margin distinctly dentate.

• Roadsides; 1400–2300 m. E Sichuan.

- 1b. Calyx lobes 3; middle lobe of lower corolla lip ca. 5×4 mm, prominently projecting and narrowed to a stipitate base.
- 2a. Beak of corolla long, S-shaped; capsule ca. 10 mm 232. *P. petitmenginii*
- 2b. Beak of corolla shorter, semicircular; capsule 4–5 mm.
- 3a. Corolla purple-red, galea with a 2-auriculate protuberance; calyx lobes palmatipartite; pedicel to 1.4 cm 230. *P. honanensis*
- 3b. Corolla yellow, galea without a 2-auriculate protuberance; calyx lobes unequal, posterior lobe usually linear and entire; pedicel to 2.5 cm 231. *P. dissecta*

229. *Pedicularis souliei* Franchet, Bull. Soc. Bot. France 47: 23. 1900.

苏氏马先蒿 *su shi ma xian hao*

Herbs annual or biennial, 20–30 cm tall, drying slightly black. Stems usually branched basally; branches 6–10, weak, often ascending, sparsely pubescent. Proximal leaves pseudo-opposite, distal ones alternate; petiole 15–25 cm; leaf blade lanceolate-oblong or ovate-oblong, $3-4 \times 1-1.5$ cm, abaxially sparsely pubescent along midvein or glabrous, adaxially sparsely pubescent, pinnatisect; segments 9–11 pairs, long ovate or ovate-lanceolate, pinnatifid to pinnatipartite, incised-dentate. Inflorescences racemose, $1/3-1/2$ as long as branches, lax; bracts leaflike. Pedicel 1–2 cm, weak, densely pubescent. Calyx 3–5 mm, glabrous or pubescent along veins, $1/2$ cleft anteriorly; lobes 5, unequal, posterior one entire, lateral lobes larger, entire. Corolla reddish or whitish, ca. 1 cm; tube erect, longer than calyx; galea twisted; beak pointed upward, S-shaped, ca. 7 mm; lower lip ciliate, middle lobe ca. 2×1.5 mm. Filaments pubescent. Capsule ca. 5 mm.

• Swampy places. W Sichuan.

230. *Pedicularis honanensis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 413. 1963.

河南马先蒿 *he nan ma xian hao*

Herbs perennial, 20–26 cm tall, glabrescent, drying ± black. Roots fleshy. Stems single or 3 or 4, many branched; branches slender, pubescent. Basal leaves usually withering early; petiole ca. 2 cm. Stem leaves alternate; petiole 6–10 mm; leaf blade long ovate or ovate-oblong, $3-5 \times 1.5-1.7$ cm, glabrous on both surfaces, pinnatisect; segments 7–9 pairs, widely spaced, lanceolate-oblong to linear-lanceolate, pinnate-dentate. Inflorescences racemose, more than $1/3$ as long as stems or branches, lax; bracts leaflike. Pedicel to 1.4 cm. Calyx 4–5 mm, densely downy, $1/2$ cleft anteriorly; lobes 3, ± equal, palmatipartite. Corolla purple-red, ca. 1 cm; tube 4–5 mm; galea falcate, with a 2-auriculate protuberance; beak semicircular, 5–6 mm; lower lip ca. 7×9 mm, ciliate, middle lobe ca. 5×4 mm, prominently projecting and narrowed to a stipitate base. Filaments villous. Capsule ca. 5 mm. Fl. Jul–Aug, fr. Aug.

• Thickets, margins of woods; ca. 1400 m. W Henan.

231. *Pedicularis dissecta* (Bonati) Pennell & H. L. Li in H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 142. 1949.

全裂马先蒿 *quan lie ma xian hao*

Pedicularis petitmenginii Bonati var. *dissecta* Bonati, Bull. Soc. Bot. France 55: 245. 1908; *P. davidii* Franchet var. *flaccida* Diels ex Bonati.

Herbs perennial, 20–35 cm tall, pubescent or glabrous, drying black. Roots fleshy. Stems usually 4–10, sometimes single, central stem erect, outer stems usually procumbent to ascending, branched or not, slender. Basal leaves withering early; petiole 3–3.5 cm, usually persistent. Stem leaves alternate; petiole 1.5–2 mm; leaf blade ovate-oblong, $3-3.5 \times 1.2-1.6$ cm, glabrous on both surfaces, pinnatisect; segments 6–9 pairs, widely spaced, ovate to linear-lanceolate, pinnatifid or incised-double dentate. Inflorescences racemose, to $1/2$ as long as branches, lax; bracts leaflike. Pedicel to 2.5 cm, slender, elongating and curving in fruit, densely pubescent. Calyx 4–6 mm, glabrous, $1/2$ cleft anteriorly; lobes 3, unequal, posterior one linear, entire, lateral pair palmatipartite. Corolla yellow, 1–1.2 cm; tube erect, slightly longer than calyx; galea bent at a right angle, lacking auriculate protuberance; beak semicircular, apex bent upward, ca. 6 mm; lower lip ciliate, middle lobe ca. 5×4 mm, prominently projecting and narrowed to a stipitate base. Filaments villous. Capsule 4–5 mm. Fl. Jun–Aug, fr. Aug.

• Rocks; ca. 3000 m. SW Shaanxi.

232. *Pedicularis petitmenginii* Bonati, Bull. Herb. Boissier, Sér. 2, 7: 542. 1907.

伯氏马先蒿 *bai shi ma xian hao*

Herbs perennial, 15–40(–60) cm tall, pubescent or glabrescent, drying black. Stems usually 4–6, branching basally or above. Basal leaves withering early. Proximal stem leaves pseudo-opposite, distal ones alternate; petiole 1.5–2.5 cm; leaf blade ovate-oblong to linear-oblong, $3-5.5 \times 1-1.7$ cm, abaxially villous along veins, adaxially sparsely pubescent or glabrescent, pinnatisect; segments 8–12 pairs, linear-lanceolate to narrowly oblong, pinnatifid, serrate. Inflorescences racemose, $1/2$ or $1/3$ as long as stems and branches; bracts leaflike. Pedicel 2–3 cm, slender, densely pubescent. Calyx 4–5 mm, white villous externally, $1/2$ cleft anteriorly; lobes 3, unequal, posterior lobe sub-entire, narrow, lateral pair larger, palmatilobate. Corolla whitish or yellowish with purple or purple-red galea, 1.1–1.5 cm; tube erect, 6–7 mm; galea bent at a right angle apically, twisted; beak linear, S-shaped pointing upward, 5–6 mm; lower lip ciliate, middle lobe ca. $5 \times$

4 mm, prominently projecting, narrowed to a stipitate base. Filaments villous. Capsule ca. 1 cm × 8 mm. Fl. May–Aug, fr. Jul–Sep.

• Forest understories, forest margins, meadows; 3100–3900 m. NW and W Sichuan.

71. Ser. Amplitubae H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 10. 1949.

丰管系 feng guan xi

Herbs erect, more than 10 cm tall, villous. Stems single, rigid or flexuous. Basal leaves numerous, long petiolate. Stem leaves few, alternate or ± opposite, smaller than basal leaves, linear-oblong, pinnatifid. Inflorescences short racemose, centripetal. Calyx deeply cleft anteriorly, 5-lobed. Corolla purple; tube ca. 2.5 × as long as calyx; galea falcate, marginally 2-toothed; beak straight.

• One species: endemic to China.

233. Pedicularis amplituba H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 129. 1949.

丰管马先蒿 feng guan ma xian hao

Herbs perennial, to 20 cm tall. Roots fascicled, filiform. Stems unbranched. Basal leaves numerous; petiole to 6 cm; leaf blade linear-oblong to 7 × 1.7 cm, abaxially villous along midvein, adaxially glabrous, pinnatisect; segments 12–16 pairs, oblong, crenately pinnatifid, denticulate. Stem leaves usually 2 or 4, similar to basal leaves but smaller and shorter petiolate. Inflorescences

to 6 cm, lax basally; bracts leaflike. Pedicel to 1 cm, villous. Calyx ca. 1.2 cm, slightly pubescent; lobes 5, unequal, posterior smallest, posterior-lateral pair largest, palmately incised-dentate. Corolla purple, ca. 3.5 cm; tube erect, ca. 2.8 cm, slightly pubescent; galea with 1 distinct reflexed marginal tooth on one side; beak ± filiform, straight, ca. 4 mm; lower lip ciliate. Filaments pubescent apically. Fl. Jul, fr. Aug.

• Rocky slopes; ca. 3500 m. NW Yunnan.

72. Ser. Rhinanthoides Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 67. 1890.

拟鼻花系 ni bi hua xi

Stems erect or spreading, branched basally or unbranched. Leaves basal and on stem. Basal leaves long petiolate, linear-oblong, pinnatisect. Stem leaves few, alternate. Inflorescences slightly capitate or racemose. Calyx lobes 5. Corolla purple, rose, or crimson, to 2.8 cm; tube ca. as long as calyx; galea bent at a right angle apically; beak semicircular or S-shaped, very long, slender.

Two species: China, India, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; both species in China.

1a. Calyx 1/2 cleft anteriorly, usually with purplish dots, posterior lobe entire, lateral lobes ovate, serrate; galea

± erect basally 234. *P. rhinanthoides*

1b. Calyx slightly cleft anteriorly, without purplish dots, lobes all serrate; galea curving from its base 235. *P. cyclorhyncha*

234. Pedicularis rhinanthoides Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 22. 1841.

拟鼻花马先蒿 ni bi hua ma xian hao

Herbs perennial, 4–30(–40) cm tall, drying slightly black. Roots ± fusiform, fascicled, fleshy. Stems 1 to numerous, erect or flexuous, unbranched, glabrescent, shiny. Basal leaves usually densely fascicled; petiole 2–5 cm; leaf blade linear-oblong, pinnatisect; segments 9–12 pairs, ovate, glabrescent, dentate, teeth callose. Stem leaves few, shorter petiolate than basal leaves. Inflorescences short racemose, sometimes to 8 cm; bracts leaflike. Pedicel to 1(–1.5) cm, glabrous. Calyx long ovate, 1.2–1.5 cm, 1/2 cleft anteriorly, often with purplish dots; lobes 5, unequal, posterior one lanceolate and ± entire, lateral lobes ovate and serrate. Corolla rose to violet-purple, to 1.7–2.5(–3) cm, to ca. 2 × longer than calyx, pubescent; tube erect; galea erect basally, ± bent at a right angle apically; beak S-shaped to semicircular, 7–10 mm; lower lip 1.4–2.8 cm, wide, ciliate or not. Filaments 2 pubescent, 2 glabrous.

Capsule lanceolate-ovoid, ca. 1.9 cm × 6 mm. Seeds ca. 2 mm. Fl. May–Jul, fr. Jul–Sep. 2n = 16.

Moist alpine meadows, boggy places along streams, among small *Rhododendron* and other shrubs in moist locations on open hillsides; 2300–5000 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].

1a. Beak of corolla to 7 mm, usually semicircular; lower lip 1.4–1.7 cm wide 234a. subsp. *rhinanthoides*

1b. Beak of corolla to 8–10 mm, usually S-shaped; lower lip 2.5–2.8 cm wide.

2a Bracts and upper petioles glabrous to slightly villous; lower corolla lip not ciliate 234b. subsp. *labellata*

2b. Bracts and upper petioles villous; lower corolla lip ciliate 234c. subsp. *tibetica*

234a. Pedicularis rhinanthoides subsp. *rhinanthoides*

拟鼻花马先蒿(原亚种) ni bi hua ma xian hao (yuan ya zhong)

Bracts and upper petioles glabrous to slightly ciliate. Corolla beak usually semicircular, to 7 mm; lower lip 1.4–1.7 cm wide, ± ciliate.

Moist meadows; 3000–5000 m. Xinjiang [India, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].

234b. *Pedicularis rhinanthoides* subsp. *labellata* (Jacquemont) Pennell, *Monogr. Acad. Nat. Sci. Philadelphia* 5: 152. 1943.

大唇拟鼻花马先蒿 da chun ni bi hua ma xian hao

Pedicularis labellata Jacquemont, *Voy. Inde* 118. 1844; *P. biondiana* Diels; *P. rhinanthoides* subsp. *labellata* (Jacquemont) P. C. Tsoong; *P. rhinanthoides* var. *labellata* (Jacquemont) Prain.

Bracts and upper petioles glabrous to slightly villous. Corolla beak usually S-shaped, to 8–10 mm; lower lip 2.5–2.8 cm wide, not ciliate. Fl. Jul–Sep.

• Alpine moist meadows and boggy places along streams, among small *Rhododendron* and other shrubs in moist locations on open hillsides; 3000–4500 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [India].

234c. *Pedicularis rhinanthoides* subsp. *tibetica* (Bonati) P. C. Tsoong, *Fl. Reipubl. Popularis Sin.* 68: 263. 1963.

西藏拟鼻花马先蒿 xi zang ni bi hua ma xian hao
Pedicularis rhinanthoides var. *tibetica* Bonati, *Bull. Soc. Bot. Genève, Sér.* 2, 5: 113. 1913.

73. Ser. Binariae P. C. Tsoong ex H. B. Yang, *Acta Phytotax. Sin.* 33: 246. 1995.

双生系 shuang sheng xi

Herbs low. Stems 1 to several, erect or ascending, unbranched. Leaves opposite, oblong-lanceolate, pinnatipartite. Inflorescences short racemose. Calyx lobes 5. Corolla purplish red with yellow galea; tube ca. 2 × as long as calyx; galea falcate; beak short, slender, usually S-shaped; middle lobe of lower lip hoodlike at apex.

• One species: endemic to China.

236. *Pedicularis binaria* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 32: 579. 1888.

双生马先蒿 shuang sheng ma xian hao

Herbs annual, to 15 cm tall, not drying black. Stems woody, whitish pubescent. Leaves 1–3 pairs, opposite; petiole to 1.5 cm basally, whitish long pubescent; leaf blade 1–1.8 cm × 5–8 mm, pinnatipartite; segments 5–8 pairs, narrowly oblong, incised-dentate. Inflorescences 3–6-flowered; bracts leaflike. Pedicel ca. 2 mm. Calyx tube 5–8 mm, membranous, whitish villous along veins;

Bracts and upper petioles villous. Corolla beak usually S-shaped, to 8–10 mm; lower lip 2.5–2.8 cm wide, ciliate. Fl. May–Jul, fr. Aug–Sep.

• Alpine meadows; 3000–4000 m. SW Sichuan, NW Yunnan.

235. *Pedicularis cyclorhyncha* H. L. Li, *Proc. Acad. Nat. Sci. Philadelphia* 101: 128. 1949.

环喙马先蒿 huan hui ma xian hao

Herbs to 40 cm tall, glabrescent except for inflorescences, drying black. Stems single, erect or slightly flexuous, usually branched basally. Leaves alternate, mostly basal, short petiolate or sessile; proximal petioles to 7 cm, slender; leaf blade linear-lanceolate, 2–6 cm × 7–9 mm, pinnatisect; segments 10–14 pairs, ovate, pinnatifid and incised-double dentate. Inflorescences racemose, to 10 cm, lax basally; bracts leaflike, longer than calyx. Pedicel erect, ca. 5 mm. Calyx to 1.2 cm, sparsely pubescent, shallowly cleft anteriorly; lobes 5, unequal, all serrate, lateral ones often deeply divided. Corolla crimson, 2.5–2.8 cm; tube erect, ca. as long as calyx, sparsely pubescent; galea curving from base ± in a circle; beak linear, ca. 8 mm, curved, forming a complete circle with galea; lower lip ca. 1 × 2 cm, slightly ciliate. Filaments 2 pubescent apically, 2 glabrous throughout. Fl. Jun–Jul, fr. Aug.

• Moist meadows. NW Yunnan.

teeth unequal, ciliate. Corolla purplish red, with ± yellow galea basally; tube straight, ca. 1.4 cm, to more than 2 × as long as calyx tube, pubescent; galea falcate, nearly as long as tube; beak ca. 3.5 mm; lower lip ca. 1.1 × 1.8 cm, ciliate, middle lobe broadly ovate, hoodlike at apex. Filaments 2 villous, 2 glabrous. Fl. Aug, fr. Sep.

• Alpine meadows; ca. 4000 m. N Sichuan.

74. Ser. Pectinatiformes P. C. Tsoong ex H. B. Yang, *Acta Phytotax. Sin.* 33: 246. 1995.

拟篋齿系 ni bi chi xi

Stems branched or not. Leaves in whorls of 4; leaf blade ovate-lanceolate to linear-oblong, pinnatipartite to pinnatisect. Inflorescences racemose. Calyx lobes 5. Corolla tube as long as or slightly exceeding calyx; galea bent apically; beak semicircular or S-shaped, long; lower lip with hoodlike middle lobe.

Three species: China, C Asia; two species in China.

1a. Plants to 40 cm tall; calyx lobes linear, ± entire; corolla purplish red; filaments glabrous . 237. *P. pectinatiformis*

1b. Plants barely 20 cm tall; calyx lobes 1 entire and other 4 flabellate, serrate; corolla yellow; filaments

densely pubescent 238. *P. weixiensis*

237. *Pedicularis pectinatiformis* Bonati, *Bull. Soc. Bot. France* 54: 372. 1907.

拟篋齿马先蒿 ni bi chi ma xian hao

Herbs perennial, to 40 cm tall, scarcely drying black. Stems 1 to several, erect or ± ascending, branched

basally or unbranched; branches whorled, short, slender, with lines of hairs. Leaves in whorls of 4; petioles to 4 cm, winged, pubescent; leaf blade ovate-lanceolate to linear-oblong, ca. 5 cm, glabrescent on both surfaces, pinnatisect; segments 6–8 pairs, pinnatipartite, dentate. Inflorescences interrupted; bracts leaflike basally, broadly ovate apically. Pedicel barely 1–2 mm. Calyx to 1 cm, membranous, slightly cleft anteriorly, whitish villous along veins; lobes 5, unequal, linear, ± entire, posterior one smaller than lateral lobes. Corolla purplish red, with yellowish tube apex and lower lip base; tube erect, ca. 1 cm; galea bent at a right angle; beak semicircular or S-shaped, ca. 1 cm, slender; lower lip ca. 1.1 × 1.4 cm, ciliate, middle lobe smaller than lateral lobes, hoodlike. Filaments glabrous. Fl. Aug, fr. Sep.

• W Sichuan.

238. *Pedicularis weixiensis* H. P. Yang, Acta Phytotax. Sin. 28: 139. 1990.

维西马先蒿 wei xi ma xian hao

Herbs perennial, 20 cm tall, not drying black. Stems usually single, branched basally, pubescent, with 3 or 4 internodes. Leaves in whorls of 4, petiolate or distal leaves often sessile; petiole ca. 5 mm; leaf blade narrowly oblong to linear-oblong, 1–1.5 cm, abaxially whitish scurfy, adaxially pubescent, pinnatipartite to pinnatisect; segments 6–8 pairs, ovate, dentate, teeth callose. Inflorescence racemose; bracts leaflike. Calyx ca. 1 cm, 1/2 cleft anteriorly, whitish pubescent; lobes 5, unequal, posterior one smallest and entire, lateral lobes flabellate and serrate. Corolla yellow, ca. 1.6 cm; tube erect, slightly exceeding calyx; galea bent at a right angle distally, beak slightly S-shaped, ca. 8 mm, slender; lower lip ca. 1 × 1.5 cm, ciliate, middle lobe smaller than lateral pair, apex strongly hoodlike. Filaments densely pubescent. Fl. Jul, fr. Aug.

• Subalpine meadows on ridges; ca. 3600 m. NW Yunnan (Weixi).

75. Ser. Urceolatae P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 247. 1995.

坛萼系 tan e xi

Herbs low, ± woody. Stems short, erect. Leaves opposite, pinnatifid to pinnatipartite; segments few. Calyx urceolate-ovate. Corolla rose-red, with yellow at tube apex and galea base; tube 3–4 × as long as calyx; beak slightly recurved, slender; middle lobe of lower lip slightly hoodlike at apex.

Two species: Bhutan, China; one species in China.

239. *Pedicularis urceolata* P. C. Tsoong, Fl. Reipubl. Popul. Sin. 68: 414. 1963.

坛萼马先蒿 tan e ma xian hao

Herbs annual, 10–20 cm tall, ± woody at base when old, not drying black. Stems numerous, fascicled, central stem erect, outer ones ascending, unbranched, with 2 lines of hairs. Basal leaves few, withering early; petiole to 2.5 cm. Stem leaves often only 1 pair or absent; petiole 0.6–1.5 cm; leaf blade elliptic-oblong to lanceolate-oblong, 0.7–1.8 cm × 2–8 mm, glabrescent on both surfaces, pinnatipartite, segments ca. 5 pairs, ovate, incised-dentate. Inflorescences to 9 cm, with 1–6 flower pairs; bracts leaflike. Pedicel ca. 6 mm,

elongated to 1.1 cm in fruit, glabrescent. Calyx urceolate-ovate, ca. 1 cm × 3.5–4 mm, sparsely whitish pubescent along veins; lobes 5, unequal. Corolla rose-red, with yellow at tube apex and galea base; tube 2.7–3 cm, pubescent; galea falcate apically, shorter than tube; beak 5–6 mm, slightly recurved, slender; lower lip 8–9 mm × ca. 1.4 cm, ciliate, middle lobe smaller than lateral pair, hoodlike. Filaments glabrous. Capsule ca. 1.3 cm × 6.5 mm, slightly exceeding calyx, apex acuminate. Fl. Jul, fr. Jul–Aug.

• Alpine meadows; ca. 3800 m. W Sichuan.

76. Ser. Lyratae Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 524, 603. 1888.

琴盔系 qin kui xi

Stems ± procumbent or erect, branched or not. Leaves usually opposite, occasionally in whorls of 3 or 4; leaf blade often ovate-oblong, pinnatifid. Calyx 5-lobed. Corolla tube erect; galea often bent apically, longer than lower lip, beakless, with 1 or several marginal teeth near apex, beakless.

Eleven species: China, Sikkim; all 11 species in China.

1a. Galea with several distinct marginal teeth on each side; lower corolla lip margin serrulate.

2a. Galea acute or pointed at apex; lateral calyx lobes elliptic or broadly ovate, distinctly serrate.

3a. Stems usually fascicled, many branched apically; inflorescences compact; corolla pale yellow;

calyx

slightly cleft anteriorly; leaves 20–50 × 11–22 mm 247. *P. lutescens*

3b. Stems single, unbranched; inflorescences interrupted; corolla purplish red; calyx slightly cleft anteriorly;

leaves 8–11 × 4–6 mm 248. *P. laxispica*

2b. Galea rounded at apex, not pointed or acute; lateral calyx lobes narrowly long, obscurely serrate.

- 4a. Plants (6–)10–20 cm tall; inflorescences to 9.5 cm; corolla 2.2–2.5 cm; filaments pubescent basally 249. *P. polyodonta*
- 4b. Plants 2–6 cm tall; inflorescences 2–2.5 cm; corolla 1.9–2 cm; filaments glabrous 250. *P. lyrata*
- 1b. Galea with 1 marginal tooth or sometimes additionally obscurely denticulate on each side; lower corolla lip margin entire or slightly praemorse.
- 5a. Corolla with dark colored spots; lower lip margin entire.
- 6a. Plants (10–)20–30(–50) cm tall; roots few, fusiform, fleshy; leaves in whorls of 3 or 4 240. *P. stenocorys*
- 6b. Plants less than 7 cm tall; roots numerous, slender; leaves opposite 241. *P. dolichoglossa*
- 5b. Corolla without spots; lower lip margin ± praemorse.
- 7a. Stems and branches glabrous or barely with 2 lines of hairs.
- 8a. Leaves to 12 × 10 mm; stems 4–15 cm tall; middle lobe of lower corolla lip ca. as long as lateral lobes 242. *P. cymbalaria*
- 8b. Leaves 2–6 × 1.5–4 mm; stems 3.5–4.5 cm tall; middle lobe of lower corolla lip ca. 2 × as long as lateral lobes 243. *P. inaequilobata*
- 7b. Stems and branches densely pubescent.
- 9a. Corolla yellow; lobes of lower lip nearly equal 244. *P. tomentosa*
- 9b. Corolla red to rose; lobes of lower lip unequal, middle lobe distinctly largest.
- 10a. Leaves ovate to oblong-ovate, 1.5–2.5 cm × 8–12 mm, crenate-dentate; filaments glabrous 245. *P. rizhaoensis*
- 10b. Leaves triangular or triangular-ovate, 0.8–1.2 cm × 6–8 mm, pinnatifid; filaments sparsely pubescent basally 246. *P. deltoidea*

240. *Pedicularis stenocorys* Franchet, Bull. Soc. Bot. France 47: 32. 1900.

狭盔马先蒿 xia kui ma xian hao

Herbs perennial, (10–)20–30(–50) cm tall, not drying black. Roots few, fusiform, fleshy. Stems 1 to several, erect, branched basally or unbranched, pubescent, with 4 lines of hairs. Leaves in whorls of 3 or 4; petiole to 2–2.8 cm, slender, sparsely pubescent; leaf blade oblong-lanceolate to ovate-oblong, 0.5–6 × 0.6–2 cm, abaxially whitish scurfy, adaxially glabrescent, pinnatisect to pinnatipartite; segments 4–14 pairs, ovate to oblong-ovate, few incised-dentate. Inflorescences spicate, 4–10 cm, sometimes interrupted basally; bracts leaflike, whitish long ciliate. Calyx obovate, ca. 1 cm, slightly cleft anteriorly, whitish villous; lobes 5, unequal, posterior one smallest, triangular, entire, others ovate and serrate. Corolla pink to rose, usually with dark colored spots, 2–2.5(–3) cm; tube erect, slightly longer than calyx; galea slightly bent at middle, to 1.4–1.7(–1.9) cm × 1.8–3 mm, slender, sometimes with 1 marginal tooth or obscurely denticulate on each side; lower lip shorter than galea, densely long ciliate, entire. Filaments glabrous or 2 pubescent. Capsule obliquely lanceolate-ovoid, 1/4–1/3 exceeding calyx. Fl. and fr. Jul–Aug.

• Alpine meadows, slopes; 3300–4400 m. N and W Sichuan.

1a. Plants to 50 cm tall; stems sparsely pubescent; leaf blade oblong-lanceolate to

ovate-oblong, 3–4(–6) cm, segments 10–14 pairs 240a. subsp. *stenocorys*

1b. Plants barely 10 cm tall; stems pubescent with long blackish rust colored hairs; leaf blade ovate, 5–16 mm, segments 4–8 pairs 240b. subsp. *melanotricha*

240a. *Pedicularis stenocorys* subsp. *stenocorys*

狭盔马先蒿(原亚种) xia kui ma xian hao (yuan ya zhong)

Pedicularis porphyrantha H. L. Li; *P. pseudostenocorys* Bonati.

Plants to 50 cm. Stems sparsely pubescent. Leaf blade oblong-lanceolate to ovate-oblong, 3–4(–6) cm; segments 10–14 pairs.

• Alpine meadows, slopes; 3300–4400 m. N and W Sichuan.

This subspecies includes two varieties: var. *stenocorys* with galea 1.4–1.7 cm × ca. 3 mm, and var. *angustissima* P. C. Tsoong with galea ca. 1.9 cm × 1.8 mm.

240b. *Pedicularis stenocorys* subsp. *melanotricha* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 415. 1963.

黑毛狭盔马先蒿 hei mao xia kui ma xian hao

Plants low, barely 10 cm. Stems pubescent with long, blackish, rust colored hairs. Leaf blade ovate, 0.5–1.6 cm; segments 4–8 pairs.

• Alpine meadows; ca. 3900 m. W Sichuan.

241. *Pedicularis dolichoglossa* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 356. 1948.

长舌马先蒿 chang she ma xian hao

Herbs perennial, to 7 cm tall, drying \pm black. Roots numerous, slender. Stems single, black, with 2–4 internodes, long pubescent with dark brown hairs. Leaves few, opposite; petiole 1.5–3 cm, rust colored pubescent; leaf blade elliptic-ovate, (0.4–)1.5 cm \times ca. 8 mm, abaxially whitish scurfy, adaxially glabrous, pinnatipartite; segments 2–4 pairs, few segments incised-dentate. Inflorescences to 4 cm, subcapitate, many flowered; bracts leaflike, proximal ones to 1.3 cm. Calyx ca. 1 cm; lobes 5, unequal, posterior lobe triangular, entire, others larger, dentate. Corolla yellow, with dull colored spots, 2.3–2.5 cm; tube erect, exceeding calyx; galea falcate apically, to 2 cm, with 1 marginal tooth or margin obscurely denticulate on each side; lower lip to 4.5 \times 8 mm, long ciliate, entire, middle lobe rounded, smaller than lateral lobes, projecting. Filaments pubescent basally.

• NW Yunnan.

242. *Pedicularis cymbalaria* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 136. 1921.

舟型马先蒿 zhou xing ma xian hao

Herbs annual or biennial, 4–15 cm tall, drying \pm black. Stems several, diffuse or procumbent, many branched basally; branches opposite, glabrous or with 2 lines of hairs. Leaves opposite; petiole 4–6(–20) mm, sparsely long pubescent; leaf blade reniform to cordate-ovate, sometimes orbicular, to 1.2 \times 1 cm, abaxially whitish scurfy, adaxially densely glandular pubescent, pinnate to palmately lobed or parted; segments 6–10 pairs, ovate-oblong, crenate-dentate. Flowers axillary, opposite, widely spaced. Pedicel 5–10(–20) mm, slender. Calyx 0.9–1.2 cm, densely pubescent, slightly cleft anteriorly; lobes 5, unequal, posterior lobe smallest, entire, lateral lobes dentate. Corolla yellowish white to rose, 2–2.5 cm; tube erect, to 1.2 cm; galea falcate apically, margin 2-toothed, apex navicular; lower lip shorter than galea, margin \pm praemorse, middle lobe ca. as long as lateral lobes. Filaments glabrous or pubescent basally. Capsule obliquely lanceolate-oblong, 1.2–1.3 cm, ca. 1/3 exceeding calyx. Fl. Aug, fr. Sep.

• Alpine meadows, rocky soils, shaded banks; 3400–4000 m. SW Sichuan, NW Yunnan.

243. *Pedicularis inaequilobata* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 415. 1963.

不等裂马先蒿 bu deng lie ma xian hao

Herbs annual, 3.5–4.5 cm tall, diffuse, not drying black. Stems slender, many branched, with 1 or 2 internodes and with 2 lines of hairs; branches opposite. Basal leaves withering early. Stem leaves few, opposite; petiole 4–9 mm; leaf blade ovate to oblong-ovate, 2–6

\times 1.5–4 mm, abaxially sparsely whitish scurfy, adaxially densely glandular pubescent, pinnatipartite; segments 3 or 4 pairs, broadly ovate, incised-dentate. Inflorescences with only 1 or 2 flower pairs. Pedicel to 6 mm, slender, sparsely pubescent. Calyx ca. 8 mm, whitish long pubescent; lobes 5, unequal. Corolla yellow; tube erect, 9–10 mm; galea falcate apically, margin 2-toothed, ca. 1.4 cm; lower lip shorter than galea, margin \pm praemorse, middle lobe ca. 2 \times as long as lateral lobes, with ca. 1.5 mm stipitate base. Filaments pubescent basally.

• NW Yunnan.

244. *Pedicularis tomentosa* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 357. 1948.

绒毛马先蒿 rong mao ma xian hao

Herbs annual, to 12 cm tall, tomentose throughout, not drying black. Stems usually 2–6, erect, slender, sometimes short branched apically. Leaves opposite or in whorls of 4, sessile, oblong-ovate to triangular-ovate, 1–1.3 cm \times 5–7 mm, densely tomentose on both surfaces; segments 5–9 pairs, crenate-dentate or lobulate. Inflorescences short racemose, to 4 cm; bracts leaflike. Pedicel barely 1–2 mm. Calyx ca. 6 mm, membranous, tomentose; lobes 5, unequal, posterior lobe smallest, dentate. Corolla yellow, 2.2–2.5 cm; tube erect, slightly longer than calyx; galea falcate apically, 1.2–1.3 cm, with 1 marginal tooth on each side; lower lip ca. as long as galea, middle lobe nearly as long as lateral lobes, emarginate. Filaments glabrous.

• NW Yunnan.

245. *Pedicularis rizhaoensis* H. P. Yang, Acta Phytotax. Sin. 28: 141. 1990.

日照马先蒿 ri zhao ma xian hao

Herbs perennial, barely 6 cm tall. Stems single or few, erect, unbranched, slightly pubescent with lines of dense rust colored hairs. Leaves sparse, opposite; petiole 5–10 mm, pubescent; leaf blade ovate to oblong-ovate, 1.5–2.5 \times 0.8–1.2 cm, abaxially sparsely whitish scurfy, adaxially densely rust colored villous, crenate-dentate. Inflorescences racemose, 2–4-flowered; bracts leaflike. Pedicel ca. 3 mm. Calyx ca. 1 cm, slightly cleft anteriorly, densely villous; lobes 5, unequal, posterior one subulate, lateral lobes rounded and serrate. Corolla reddish, 2.4–2.7 cm; tube erect, slightly longer than calyx; galea falcate, with 1 marginal tooth on each side; lower lip 1.3–1.5 \times 0.9–1.1 cm, \pm praemorse, lobes rounded, middle lobe larger than lateral pair, erose-denticulate. Filaments glabrous. Fl. Aug, fr. Sep.

• Grass on hillsides; ca. 4200 m. SW Sichuan.

246. *Pedicularis deltoidea* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 604. 1888.

三角叶马先蒿 san jiao ye ma xian hao

Herbs annual or biennial, 8–20 cm tall, densely gray pubescent throughout, drying \pm black. Stems erect,

single or many branched basally, sometimes branched apically; branches slender, rigid, hollow. Leaves opposite or in whorls of 3 or 4, petiolate or distal ones sessile; petiole to 5 mm, villous; leaf blade triangular or triangular-ovate, 0.8–1.2 cm × 6–8 mm, abaxially rust colored and gray scurfy, adaxially glabrescent, pinnatifid; segments 4 or 5 pairs, broadly ovate, margin double dentate. Inflorescences racemose, to 9 cm, many flowered; bracts leaflike, ca. as long as calyx. Pedicel 3–4 mm, slender, villous. Calyx 8–10 mm, pubescent; lobes 5, unequal. Corolla rose, 1.7–2.2(–2.4) cm; tube erect, ca. as long as calyx; galea falcate apically, with 1 marginal tooth on each side; lower lip shorter than galea, slightly praemorse, middle lobe larger than lateral pair. Filaments sparsely pubescent basally. Capsule obliquely lanceolate, ca. 1.2 cm. Fl. Aug–Sep, fr. Sep–Oct.

•Grassy slopes; 2600–3500 m. SW Sichuan, NW Yunnan.

247. *Pedicularis lutescens* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 605. 1888.

浅黄马先蒿 qian huang ma xian hao

Herbs perennial, 10–40 cm tall, pubescent, ± drying black. Stems usually 3–10-clustered, erect, many branched apically, with 4 lines of hairs. Basal leaves often withering early; petiole 1.2–1.5 cm. Stem leaves usually in whorls of 4, sessile or petiole to 2.2 cm, densely villous; leaf blade long ovate or ovate-oblong, 2–5 × 1.1–2.2 cm, abaxially whitish scurfy, adaxially sparsely pubescent, pinnatifid; segments triangular-ovate to long ovate, dentate. Inflorescences racemose, 3–6 cm, compact; proximal bracts leaflike, longer than calyx. Pedicel ca. 1 mm. Calyx 8–10 mm, slightly cleft anteriorly, membranous, villous; lobes 5, unequal, lateral lobes elliptic, serrate. Corolla pale yellow, usually with purplish dots on lower lip, 2.1–2.5 cm; tube erect, nearly as long as calyx; galea slightly falcate, with 4–10 marginal teeth near apex on each side, apex acute; lower lip ca. 1/2 as long as galea, serrulate. Filaments glabrous or pubescent basally. Capsule oblique-lanceolate, to 1.4 cm × 4 mm. Fl. Jul–Aug, fr. Aug–Sep.

•Thickets, alpine meadows; 3000–4000 m. SW and W Sichuan, E, NW, and SW Yunnan.

- 1a. Plants 20–40 cm tall; leaves 2–5 cm.
2a. Leaves distinctly petiolate, petiole 1–2.2 cm; galea with 4–6 marginal teeth on each side 247a. subsp. *lutescens*
2b. Leaves ± sessile or petiole to 2–3 mm; galea with 8–10 marginal teeth on each side 247b. subsp. *tongtchuanensis*
1b. Plants 10–20(–30) cm tall; leaves ca. 2 cm.
3a. Branches of stems slender; leaves long petiolate, petiole to 2–2.5 cm 247e. subsp. *longipetiolata*

- 3b. Branches of stems stout and rigid; leaves ± sessile or petiole 1–5 mm.
4a. Stems few branched basally or unbranched; leaves ± sessile or petiole to 1–2 mm 247c. subsp. *brevifolia*
4b. Stems many branched basally; petiole of leaves to ca. 5 mm 247d. subsp. *ramosa*

247a. *Pedicularis lutescens* subsp. *lutescens*

浅黄马先蒿(原亚种) qian huang ma xian hao (yuan ya zhong)

Pedicularis truchetii Bonati.

Plants 20–40 cm. Leaf petiole 1–2.2 cm; leaf blade 2–5 cm. Galea with 4–6 marginal teeth on each side.

•Thickets, alpine meadows; 3000–4000 m. NW Yunnan.

247b. *Pedicularis lutescens* subsp. *tongtchuanensis* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 276. 1963.

东川浅黄马先蒿 dong chuan qian huang ma xian hao

Pedicularis lutescens var. *tongtchuanensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 135. 1921.

Plants 20–40 cm, simple or few branched. Leaves ± sessile or petiole to 2–3 mm; leaf blade 2–5 cm. Galea with 8–10 marginal teeth on each side.

•E Yunnan.

247c. *Pedicularis lutescens* subsp. *brevifolia* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 277. 1963.

短叶浅黄马先蒿 duan ye qian huang ma xian hao

Pedicularis lutescens var. *brevifolia* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 135. 1921.

Plants 10–20(–30) cm. Stems few branched basally or unbranched; branches rigid, stout. Leaves ± sessile or petiole to 1–2 mm; leaf blade ca. 2 cm. Galea with 4–6 marginal teeth on each side.

•NW Yunnan.

247d. *Pedicularis lutescens* subsp. *ramosa* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 277. 1963.

多枝浅黄马先蒿 duo zhi qian huang ma xian hao

Pedicularis lutescens var. *ramosa* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 135. 1921.

Plants low, 10–20(–30) cm. Stems many branched basally; branches rigid, stout. Leaves ± sessile or petiole to ca. 5 mm; leaf blade ca. 2 cm. Galea with 4–6 marginal teeth on each side.

•SW Sichuan, NW Yunnan.

247e. *Pedicularis lutescens* subsp. *longipetiolata* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 277. 1963.

长柄浅黄马先蒿 chang bing qian huang ma xian hao

Pedicularis lutescens var. *longipetiolata* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 361. 1948.

Plants low, 10–20(–30) cm. Stem simple or branched; branches slender. Leaf petiole to 2–2.5 cm; leaf blade ca. 2 cm. Galea with 4–6 marginal teeth on each side.

• W Sichuan.

248. *Pedicularis laxispica* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 362. 1948.

疏穗马先蒿 *shu sui ma xian hao*

Herbs annual, 7–15 cm tall, pubescent, drying ± black. Stems single, erect, unbranched, slender, with 4 lines of hairs. Basal leaves often withering early; petiole to 1 cm. Stem leaves few, in whorls of 4, sometimes opposite; petiole ca. 5 mm, villous; leaf blade ovate-oblong, 8–11 × 4–6 mm, pubescent on both surfaces, abaxially sparsely scurfy, pinnatifid; segments 6 or 7 pairs, oblong, margin ± entire. Inflorescences spicate, 3–6 cm, 5–11-flowered, flowers opposite, interrupted; bracts leaflike, slightly longer than calyx. Pedicel ca. 2 mm. Calyx 8–10 mm, membranous, slightly cleft anteriorly; lobes 5, unequal, posterior lobe triangular, entire, others ovate, dentate. Corolla purplish red, ca. 2.5 cm; tube erect, slightly exceeding calyx; galea falcate apically, ca. as long as tube, with 3 or 4 marginal teeth on each side near acute apex; lower lip shorter than galea, margin serrulate, middle lobe emarginate. Filaments glabrous.

• NW Yunnan.

249. *Pedicularis polyodonta* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 358. 1948.

多齿马先蒿 *duo chi ma xian hao*

Pedicularis lyrata Prain ex Maximowicz var. *cordifolia* Franchet.

Herbs annual, (6–)10–20 cm tall, densely pubescent throughout, not drying black. Stems erect. Leaves opposite, distal ones sometimes in whorls of 3; petiole

77. Ser. Reptantes P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 247. 1995.

爬行系 *pa xing xi*

Herbs low, repent. Stem leaves opposite, petiolate, rounded, small; segments 3 or 4 pairs. Flowers axillary. Calyx lobes 5. Corolla tube ± elongated, ca. 2 × as long as calyx; beak straight, short.

• One species: endemic to China.

251. *Pedicularis reptans* P. C. Tsoong, Acta Phytotax. Sin. 3: 290. 1955.

爬行马先蒿 *pa xing ma xian hao*

Herbs annual, slender, soft. Stems numerous, repent, ca. 20 cm, densely hirsute. Leaves opposite; petiole 1.5–10 mm, hirsute; leaf blade rounded, elliptic or elliptic-oblong, to 8 × 7(–8) mm, base truncate or slightly cordate, pinnatifid to pinnatipartite; segments 3 or 4 pairs, margin double dentate. Flowers

of basal leaves to 1.7 cm, densely whitish villous. Stem leaves ± sessile or petiole ca. 5 mm; leaf blade ovate to ovate-lanceolate, sometimes long triangular-ovate, 1–3 cm × 5–11 mm, pubescent on both surfaces, pinnatifid; segments ovate or orbicular, crenate dentate.

Inflorescences spicate, to 9.5 cm, many flowered; bracts leaflike. Calyx 1.2–1.5 cm, densely pubescent, slightly cleft anteriorly; lobes 5, unequal, posterior lobe shortest, entire, others obscurely dentate. Corolla yellow, 2.2–2.5 cm; tube erect, 1–1.2 cm; galea falcate apically, with 3–6 marginal teeth on each side near rounded apex; lower lip shorter than galea, middle lobe larger than lateral pair. Filaments pubescent basally. Capsule triangular to narrowly ovoid, to 1.4 cm. Fl. Jun–Aug, fr. Aug–Sep.

• Alpine meadows, open forests; 2700–4200 m. NW and W Sichuan.

250. *Pedicularis lyrata* Prain ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 606. 1888.

琴盔马先蒿 *qin kui ma xian hao*

Herbs annual, 2–6 cm tall, densely pubescent, ± drying black. Stems single, erect, unbranched. Leaves opposite. Petiole of basal leaves 0.7–1.5 cm, sparsely pubescent. Stem leaves ± sessile or petiole 2–3 mm; leaf blade oblong-lanceolate or ovate-oblong, 0.5–1.5 cm × 2–6 mm, pubescent on both surfaces, widely spaced crenate-dentate. Inflorescences racemose, 2–2.5 cm, few flowered; bracts leaflike, ± sessile. Pedicel 1–2 mm. Calyx 7–10 mm, slightly cleft anteriorly, densely villous; lobes 5, unequal, posterior lobe entire, others narrowly elliptic, obscurely serrate. Corolla yellow, 1.9–2 cm; tube erect, ca. as long as calyx; galea ± falcate at middle, ca. 1.1 cm, with 3–5 marginal teeth on each side near rounded apex; lower lip ca. 1/2 as long as galea, middle lobe largest. Filaments glabrous. Capsule obliquely lanceolate-ovoid. Fl. Jul–Aug, fr. Sep.

Alpine meadows; 3600–4200 m. Qinghai, W Sichuan, Xizang [Sikkim].

solitary in axils. Pedicel ca. 5 mm. Calyx cylindrical, ca. 5.5 × 2 mm, densely pubescent, slightly cleft anteriorly; lobes 5, ± equal, with long stipitate bases, dentate.

Corolla 2–2.3 cm; tube ca. 1.6 cm; galea bent at a right angle apically; beak slightly 2-cleft at apex; lower lip ca. 6.5 × 7.5 mm, glabrous. Fl. May–Jun, fr. Jul–Aug.

• Swampy meadows; ca. 2300 m. E Xizang.

短叶系 duan ye xi

Ser. *Alopecuroides* H. L. Li.

Herbs usually low. Stems several or single, unbranched. Basal leaves small or not persistent, ± elliptic to ovate; segments few. Stem leaves in whorls of 3 or 4 or sometimes opposite, long petiolate or some sessile; leaf blade ± oblong, pinnatifid to pinnatipartite. Inflorescences short or elongated. Calyx lobes 5, posterior one smallest. Corolla tube slightly longer than 2 × as long as calyx; galea with a long beak.

About six species: China, India (Himachal Pradesh), Kashmir, Nepal, Pakistan, Sikkim; four species in China.

1a. Lower corolla lip ciliate.

2a. Herbs perennial, 20–50 cm tall; calyx 5–8 mm; middle lobe of lower corolla lip not hoodlike; leaf segments

4–6 pairs 252. *P. verbenifolia*

2b. Herbs annual, 55–70 cm tall; ca. 10 mm; middle lobe of lower corolla lip ± hoodlike; leaf segments

6–8 pairs 254. *P. tsaii*

1b. Lower corolla lip glabrous.

3a. Leaves petiolate, ovate-oblong to lanceolate-oblong or ovate, to 12 × 3(–4) cm, segments 6–10 pairs

253. *P. smithiana*

3b. Leaves sessile, linear-lanceolate to lanceolate, to 5.5 × 1.4 cm, segments 12–14 pairs 255. *P. alopecuros*

252. *Pedicularis verbenifolia* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 549. 1888.

马鞭草叶马先蒿 ma bian cao ye ma xian hao

Herbs perennial, 20–50 cm tall, sparsely pubescent, drying black. Lateral roots 4–8, fleshy. Stems 1–7, erect, often unbranched, with 4 lines of hairs. Basal leaves often withering early, petiole to 4 cm. Stem leaves opposite or in whorls of 3(or 4); petiole 0.5–1.5(–3) cm; leaf blade ovate or ovate-oblong, 2–4(–6) × 1–1.5 cm, adaxially sparsely pubescent along midvein, pinnatifid; segments 4 or 6 pairs, ovate-oblong to triangular-ovate, dentate. Inflorescences spicate, 3–9(–17) cm; proximal bracts leaflike, distal ones lanceolate. Calyx 5–8 mm, slightly cleft anteriorly, villous along veins; lobes 5, unequal. Corolla purple, 1.6–2 cm; tube erect, ca. 2 × as long as calyx, glabrous; galea bent at a right angle; beak 5–6 mm, slender; lower lip ca. as long as or slightly longer than galea, ciliate, middle lobe not hoodlike. Filaments glabrous. Capsule narrowly ovoid, 1.4–1.8 cm × 5–7 mm. Fl. Jul–Sep, fr. Aug–Oct.

• Alpine meadows, shrubs, cliff faces; 3100–4000 m. S Sichuan, NW Yunnan.

253. *Pedicularis smithiana* Bonati, Notes Roy. Bot. Gard. Edinburgh 5: 83. 1911.

史氏马先蒿 shi shi ma xian hao

Pedicularis praealta Bonati.

Herbs perennial, 25–50(–100) cm, glabrescent, ± drying black. Lateral roots 5–15, fleshy. Stems single or 2–4, erect, unbranched apically, with lines of hairs. Basal leaves withering early. Stem leaves in whorls of 3 or 4; petiole 1.3–3 cm; leaf blade ovate-oblong to lanceolate-oblong or ovate, to 12 × 3(–4) cm, adaxially sparsely pubescent and densely ciliate along midvein, pinnatifid to pinnatipartite; segments 6–10 pairs, tri-

angular-ovate to lanceolate-oblong, margin double dentate. Inflorescences spicate, 4–13 cm; bracts sessile, proximal ones leaflike, longer than flowers. Calyx 6–9 mm, villous, slightly cleft anteriorly; lobes 5, unequal. Corolla pale yellow, with purple galea and beak, 1.8–2.1 cm; tube erect, 8–10 mm; galea bent at a right angle apically; beak ca. 4 mm, slender; lower lip ca. as long as galea, glabrous. Filaments glabrous. Capsule obliquely oblong, ca. 1.3 cm. Fl. May–Aug, fr. Jul–Aug.

• Alpine meadows, shrubs; 3000–4000 m. SW Sichuan, N Yunnan.

254. *Pedicularis tsaii* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 299. 1948.

蔡氏马先蒿 cai shi ma xian hao

Herbs annual, 55–70 cm tall, glabrescent, ± drying black. Stems single or few, erect, stout. Basal leaves withering early. Stem leaves in whorls of 4; petiole 4–10 mm, glabrous; leaf blade ovate-oblong, ca. 4.5 × 3 cm, glabrous on both surfaces, pinnatifid to pinnatipartite; segments 6–8 pairs, ovate or oblong, deeply dentate. Inflorescences spicate, 6–8 cm; proximal bracts leaflike, distal ones ovate. Calyx ca. 1 cm, slightly cleft anteriorly, villous along veins; lobes 5, unequal. Corolla rose to purple throughout, ca. 2 cm; tube erect, ca. 1.5 × as long as calyx; galea bent at a right angle; beak decurved, ca. 6 mm, slender; lower lip 6–7 mm, ciliate, middle lobe ± hoodlike. Filaments glabrous. Capsule compressed, ovoid, 1.2–1.4 cm × 5–6 mm. Seeds 1.5–1.8 × ca. 0.8 mm. Fl. Aug, fr. Aug–Sep.

• Alpine meadows; 4000–4300 m. NW Yunnan.

255. *Pedicularis alopecuros* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 548. 1888.

狐尾马先蒿 hu wei ma xian hao

Herbs annual, 50–80 cm tall, stout, pubescent, not drying black. Roots ± fleshy. Stems single or few, erect,

often branched; branches opposite, slender. Stem leaves opposite or in whorls of 4, sessile; leaf blade lanceolate to linear-lanceolate, to 5.5 × 1–1.4 cm, both surfaces woolly, abaxially densely whitish scurfy, pinnatifid to pinnatipartite; segments 12–14 pairs, triangular to linear-oblong, crenate-dentate.

Inflorescences spicate; proximal bracts longer than calyx, short petiolate, ovate-lanceolate. Calyx 8–10 mm, densely villous, deeply cleft anteriorly; lobes 5, unequal. Corolla yellow, with purple-red galea, 1.8–2 cm; tube erect, to 2 × as long as calyx; galea bent at a right angle apically, slender; beak slender; lower lip shorter than galea, glabrous, apex of middle lobe hoodlike. Filaments glabrous or pubescent apically. Capsule barely enclosed by accrescent calyx, obliquely long ovoid, ca. 1 cm. Fl. May–Aug, fr. Aug–Sep.

• Alpine meadows; 2300–4000 m. Sichuan, N Yunnan.

- 1a. Filaments glabrous 255a. var. *alopeucuros*
1b. Filaments pubescent apically . 255b. var. *lasiandra*

255a. *Pedicularis alopecuros* var. *alopeucuros*

狐尾马先蒿(原变种) hu wei ma xian hao (yuan bian zhong)

Filaments glabrous.

• Alpine meadows; 2300–4000 m. SW Sichuan, N Yunnan.

255b. *Pedicularis alopecuros* var. *lasiandra* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 416. 1963.

毛药狐尾马先蒿 mao yao hu wei ma xian hao

Filaments pubescent apically.

• Sichuan.

79. Ser. *Debiles* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 72. 1890.

弱小系 ruo xiao xi

Ser. *Parvifoliae* H. Limpricht.

Herbs usually low. Stems erect, branched basally or unbranched. Leaves basal and on stem, opposite, rarely in whorls of 3, lanceolate to ovate, pinnatifid to pinnatisect. Inflorescences often capitate. Calyx lobes 5, posterior lobe smallest. Corolla tube longer than calyx but not exceeding 2 ×; beak straight or bent downward, long; galea margin toothless.

About 15 species: Bhutan, China, Myanmar, Nepal, Sikkim; nine species in China.

1a. Leaves lanceolate to linear-lanceolate, segments (7–)16–20 pairs 260. *P. pheulpinii*
1b. Leaves ovate to oblong or orbicular, sometimes lanceolate in *P. maxonii*, segments usually less than 10 pairs.

2a. Leaves on stem, ± sessile.

3a. Plants with short internodes, usually less than 3 cm; lower corolla lip ciliate, middle lobe hoodlike 261. *P. maxonii*

3b. Plants with long internodes, to 8 cm; lower corolla lip glabrous, middle lobe not hoodlike.

4a. Leaf blade broadly ovate or triangular-ovate, segments 3 or 4 pairs; calyx ca. 8 mm 262. *P. lamioides*

4b. Leaf blade orbicular, segments 8–10 pairs; calyx 4–5 mm 263. *P. rotundifolia*

2b. Leaves both basal and on stem, usually petiolate or stem leaves sometimes ± sessile.

5a. Corolla tube ca. 3 × as long as calyx 264. *P. chumbica*

5b. Corolla tube less than 2 × as long as calyx.

6a. Galea with auriculate marginal protuberance on one side 257. *P. sphaerantha*

6b. Galea without auriculate marginal protuberance.

7a. Middle lobe of lower corolla lip not hoodlike 259. *P. tenuicaulis*

7b. Middle lobe of lower corolla lip hoodlike.

8a. Lateral calyx lobes 3-parted 258. *P. confertiflora*

8b. Lateral calyx lobes ± entire or 1–3-toothed 256. *P. debilis*

256. *Pedicularis debilis* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 549. 1888.

弱小马先蒿 ruo xiao ma xian hao

Herbs annual, to 20 cm, some only 5–8 cm, finely pubescent, drying black. Roots fascicled, fibrous. Stems single, unbranched, with 2 lines of hairs. Leaves opposite, both basal and on stem; petiole slender, proximal ones 2–4.5 cm and wider, distal ones to 1–1.7 cm; leaf blade orbicular or ovate to oblong, 1.4–2.2 × 0.8–1.5 cm, abaxially glabrous, adaxially glabrescent,

pinnatifid to pinnatipartite; segments 3–7 pairs, broadly ovate to lanceolate-ovate, pinnatifid or incised-double dentate. Inflorescences subcapitate; proximal bracts leaflike, distal ones triangular-ovate. Pedicel 4–8 mm. Calyx usually tinged with purplish red, 5.5–7 mm, sparsely pubescent, membranous; lobes 5, unequal, lateral lobes ± entire or 1–3-toothed. Corolla red, with dark purplish red galea; tube ca. 8.5 mm; galea bent at a right angle apically; beak horizontal, ± straight, 5.5–6.5 mm, slender; lower lip ca. 1 × 1–1.4 cm, long ciliate or

glabrous, ± erose, middle lobe hoodlike. Filaments glabrous throughout.

Forest margins; ca. 4000 m. NW Yunnan.

- 1a. Plants to 20 cm tall; leaf blade ovate to oblong, usually pinnatipartite; lower corolla lip long ciliate 256a. subsp. *debilis*
1b. Plants scarcely 5–8 cm tall; leaf blade orbicular, usually pinnatifid; lower corolla lip glabrous 256b. subsp. *debilior*

256a. *Pedicularis debilis* subsp. *debilis*

弱小马先蒿(原亚种) ruo xiao ma xian hao (yuan ya zhong)

Plants to 20 cm tall. Leaf blade ovate to oblong, usually pinnatipartite. Lower corolla lip long ciliate.

• Forest margins; ca. 4000 m. NW Yunnan.

256b. *Pedicularis debilis* subsp. *debilior* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 416. 1963.

极弱弱小马先蒿 ji ruo ruo xiao ma xian hao

Pedicularis liana Pennell ex H. L. Li.

Plants scarcely 5–8 cm tall. Leaf blade orbicular, usually pinnatifid. Lower corolla lip glabrous.

• NW Yunnan.

257. *Pedicularis sphaerantha* P. C. Tsoong, Acta Phytotax. Sin. 3: 291. 1955.

团花马先蒿 tuan hua ma xian hao

Herbs perennial, 4–10 cm, densely long pubescent.

Roots fibrous. Stems 1 to several, central stem erect, outer stems usually ascending. Basal leaf petiole long, to 1 cm, sparsely pubescent; leaf blade elliptic to oblong, 1–2 cm × 5–8 mm, pinnatisect; segments 5–7 pairs, oblong, pinnatifid, dentate. Stem leaves in whorls of 3 or 4, widely spaced; leaf blade similar to basal leaves but shorter petiolate. Inflorescences compact, globose; proximal bracts strongly inflated, distal ones palmately lobed. Calyx ca. 6 mm, membranous; lobes 5, unequal, posterior one triangular-lanceolate and entire, lateral lobes leaflike and serrate. Corolla red, with dark red galea; tube erect, ca. 7.5 mm, glabrous; galea bent at a right angle apically, with an auriculate marginal protuberance on one side; beak ± bent downward, ca. 8 mm, slender; lower lip long ciliate, middle lobe hoodlike apically, ca. less than 2 × as long as lateral lobes. Anterior filaments sparsely pubescent. Fl. Jul–Aug, fr. Sep.

• Swampy meadows, grassy slopes; 3900–4800 m. E Xizang.

258. *Pedicularis confertiflora* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 258. 1889.

聚花马先蒿 ju hua ma xian hao

Herbs annual, 1–18(–25) cm tall, ± villous, not drying black. Roots woody. Stems single or numerous, ± dark purplish, sometimes branched basally, pubescent; central stem erect, outer stems procumbent to ascending. Basal leaves clustered, withering early; petiole to 3 cm. Stem leaves absent or 1 or 2(–4) pairs, opposite, ±

sessile; leaf blade ovate-oblong, usually less than 3 cm, pinnatisect; segments 5–7 pairs, ovate, incised-dentate. Flowers opposite or in whorls of 4 apically; bracts ± leaflike. Pedicel short. Calyx to 6 mm, membranous, usually tinged with red, hispid; lobes 5, unequal, posterior lobe entire, lateral lobes 3-parted. Corolla rose to purplish red; tube ca. 2 × as long as calyx; galea bent at a right angle apically; beak bent slightly downward, straight, ca. 7 mm, slender; lower lip ca. as long as galea, glabrous or minutely ciliate, middle lobe hoodlike. Anterior filaments densely pubescent, other filaments sparsely pubescent or glabrous. Capsule obliquely ovoid, ca. 1/2 exceeding calyx, apiculate. Fl. Jul–Sep, fr. Aug–Oct.

Open stony pastures, grassy slopes; 2700–4900 m. SW Sichuan, S Xizang, Yunnan [Bhutan, Nepal, Sikkim].

- 1a. Plants 5–18(–25) cm tall, ± densely villous; stems branched basally or unbranched; leaf blade ca. 10 mm 258a. subsp. *confertiflora*
1b. Plants 1–2(–6) cm tall, glabrescent throughout; stems usually unbranched; leaf blade scarcely 5–6 mm 258b. subsp. *parvifolia*

258a. *Pedicularis confertiflora* subsp. *confertiflora*

聚花马先蒿(原亚种) ju hua ma xian hao (yuan ya zhong)

Pedicularis handel-mazzettii Bonati; *P. villosula* Franchet ex F. B. Forbes & Hemsley.

Plants 5–18 cm, sometimes to 25 cm tall, ± densely villous. Stems branched basally or unbranched. Leaf blade 1–3 cm.

Open stony pastures, grassy slopes; 2700–4400 m. SW Sichuan, S Xizang, Yunnan [Bhutan, Nepal, Sikkim].

258b. *Pedicularis confertiflora* subsp. *parvifolia* (Handel-Mazzetti) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 290. 1963.

小叶聚花马先蒿 xiao ye ju hua ma xian hao

Pedicularis parvifolia Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 88. 1920; *P. subacaulis* Bonati; *P. villosula* Franchet var. *parvifolia* (Handel-Mazzetti) Handel-Mazzetti.

Plants 1–2(–6) cm tall, glabrescent throughout. Stems usually unbranched. Leaf blade scarcely 5–6 mm.

• 3800–4900 m. NW Yunnan.

259. *Pedicularis tenuicaulis* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 259. 1889.

纤茎马先蒿 xian jing ma xian hao

Herbs 5–30 cm tall, glabrous. Roots fibrous or fusiform, fleshy. Stems clustered, unbranched, slender, flexuous. Basal leaves cespitose, petiole to 8 cm. Stem leaves opposite; petiole 2–4 cm; leaf blade ovate-oblong, 2–3 × ca. 1 cm, pinnatisect; segments 6–8 pairs, ovate-lanceolate, pinnatifid, dentate. Flowers axillary. Pedicel 4–6 mm. Calyx campanulate, glabrous, 1/3 cleft anteriorly, ca. 7.5 × 3 mm; lobes 5, entire, posterior one subulate, lateral lobes lanceolate or ovate. Corolla tube slightly longer than calyx, 8–9 mm; galea bent at a right

angle apically; beak bent \pm downward, straight, to 5 mm, slender; lower lip ca. 1.1 cm wide, glabrous, lobes rounded, middle one ca. 1/2 as long as lateral pair, not hoodlike. Anterior filament pair long pubescent. Capsule lanceolate, 1–1.3 cm \times ca. 4 mm, apex acute. Seeds ovoid, ca. 1.5 \times 0.75 mm. Fl. Jul–Aug, fr. Aug–Sep.

About 4000 m. S Xizang [Bhutan, Nepal, Sikkim].

260. *Pedicularis pheulpinii* Bonati, Bull. Soc. Bot. France 55: 247. 1908.

费尔氏马先蒿 fei er shi ma xian hao

Herbs annual, 5–20 cm tall. Stems single, erect, densely long pubescent. Leaves opposite or whorled; proximal ones long petiolate and distal ones sessile, ciliate; leaf blade lanceolate to linear-lanceolate, 1–2 cm, glabrous or glabrescent, pinnatifid to pinnatisect; segments 7–20 pairs, rounded, margin entire. Inflorescences spicate, few flowered, interrupted basally; bracts palmatilobate, ciliate. Proximal pedicels ca. 2 mm, distal flowers sessile. Calyx ovate-cylindric, ca. 7 mm; lobes 5, unequal, posterior one subulate, very small, lateral lobes \pm narrowly ovate, whitish long pubescent, serrate. Corolla red-purple, with dark purple galea; tube ca. as long as calyx; galea bent at a right angle apically; beak bent \pm downward, straight, ca. 5 mm, slender; lower lip shorter than galea, ca. 5–7 \times 4–10 mm, middle lobe broadly triangular-ovate, much projecting, slightly hoodlike apically. Filaments glabrous throughout. Fl. Jul–Aug.

• Alpine or swampy meadows, damp soil by stream and gully margins, *Picea* woodlands. NE Qinghai, W Sichuan.

- 1a. Plants 10–20 cm tall; leaf segments 16–20 pairs; lower corolla lip ca. 5 \times 4 mm
..... 260a. subsp. *pheulpinii*
1b. Plants 5–15 cm tall; leaf segments 7–14 pairs; lower corolla lip ca. 7 \times 10 mm
..... 260b. subsp. *chilienensis*

260a. *Pedicularis pheulpinii* subsp. *pheulpinii*

费尔氏马先蒿(原亚种) fei er shi ma xian hao (yuan ya zhong)

Plants 10–20 cm tall. Leaf segments 16–20 pairs.

Lower corolla lip ca. 5 \times 4 mm.

• W Sichuan.

260b. *Pedicularis pheulpinii* subsp. *chilienensis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 416. 1963.

祁连费尔氏马先蒿 qi lian fei er shi ma xian hao

Plants 5–15 cm tall. Leaf segments 7–14 pairs. Lower corolla lip ca. 7 mm \times 1 cm. Fl. Jul–Aug.

• Alpine or swampy meadows, damp soil by stream and gully margins, *Picea* woodlands. NE Qinghai.

261. *Pedicularis maxonii* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 166. 1926.

马克逊马先蒿 ma ke xun ma xian hao

Pedicularis sabaensis Bonati; *P. trigonophylla* Handel-Mazzetti.

Herbs annual, 12–16 cm tall. Stems erect, many branched, with short internodes usually less than 3 cm, glabrous except for inflorescences. Stem leaves opposite, \pm sessile throughout, glabrous; leaf blade ovate to lanceolate, 6–8 \times 5–6 mm, pinnatifid; segments linear, incised-dentate. Inflorescences spicate, usually many flowered, dense; bracts triangular or flabellate, palmatilobate. Calyx 5–6 mm, pubescent; lobes 5, unequal, posterior one lanceolate and shorter, lateral lobes deeply serrate lobed. Corolla purple; tube ca. 1 cm, glabrous or finely pubescent; galea bent at a right angle apically; beak linear, 8–10 mm; lower lip ca. as long as galea, long ciliate, middle lobe ovate, much projecting, hoodlike apically. Filaments glabrous throughout. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine meadows; ca. 3000 m. NW Yunnan.

262. *Pedicularis lamioides* Handel-Mazzetti, Symb. Sin. 7: 869. 1936.

元宝草马先蒿 yuan bao cao ma xian hao

Herbs annual, 7–15 cm tall. Stems 1 to several, erect or outer stems ascending, with 2 lines of hairs. Basal leaves few, small. Stem leaves barely 1 pair, sessile or petiolate; petiole 2–5 mm, whitish long pubescent; leaf blade broadly ovate or triangular-ovate, 0.7–3 \times 0.5–2.5 cm, adaxially tinged with purple, pinnatifid; segments 3 or 4 pairs, rounded, crenulate. Inflorescences racemose, short, dense, to 10-flowered; bracts leaflike, much inflated. Pedicel 2–5 mm. Calyx campanulate, ca. 8 mm, long pubescent along veins; lobes 5, unequal, posterior one acute, lateral lobes rounded, shallowly crenate. Corolla dark rose, 1.8–2.2 cm; tube ca. 2 \times as long as calyx, slender; galea bent at a right angle apically; beak bent slightly downward, 5–7 mm, slender; lower lip ca. as long as galea, middle lobe hoodlike, others rounded, glabrous. Filaments glabrous throughout. Capsule slightly exceeding calyx, wide, apex short acuminate. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine meadows, forests, among *Rhododendron*; 3400–4200 m. NW Yunnan.

263. *Pedicularis rotundifolia* C. Fischer, Bull. Misc. Inform. Kew 1940: 190. 1940.

圆叶马先蒿 yuan ye ma xian hao

Herbs annual, 10–15 cm tall, not drying black. Roots fusiform. Stems several, woody, with 2 lines of fine hairs. Stem leaves opposite, short petiolate or sessile, barely 2 pairs; leaf blade orbicular, 4–7 mm wide, scurfy-pubescent on both surfaces; segments 8–10 pairs, pinnatifid, oblong or flabellate, few lobulate. Inflorescences capitate, usually dense; bracts leaflike. Pedicel short. Calyx tubular, 4–5 mm, slightly cleft anteriorly, long pubescent, pubescent on both surfaces; lobes 5, unequal, posterior one ensiform, lateral lobes rounded, serrate. Corolla red; tube 1.1–1.3 cm, slender, sparsely pubescent; galea \pm bent at a right angle apically; beak bent slightly downward or horizontal, 6.2–7.2 mm, slender; lower lip ca. 7.5 \times 6.7 mm, gla-

brous, middle lobe oblong, ca. 3.5 mm. Filaments glabrous throughout. Fl. Jul, fr. Aug.

Alpine meadows, pastures; ca. 3300 m. SE Xizang [Myanmar].

264. *Pedicularis chumbica* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 259. 1889.

春丕马先蒿 *chun pi ma xian hao*

Herbs perennial, 4–6 cm tall, glabrous. Roots fascicled, fusiform, fibrous. Stems numerous, cespitose, slender. Basal leaves in a dense rosette; petiole to 1.5 cm. Stem leaves only 1 pair or absent, petiole ca. 5 mm; leaf blade ca. 1 cm × 3.5 mm, pinnatisect; segments 8–10 pairs, ovate, dentate. Inflorescence few flowered;

flowers fascicled; bracts leaflike. Pedicel 4–6 mm.

Calyx cylindrical-campanulate, ca. 6 × 3 mm, 1/3 cleft anteriorly, glabrous; lobes 5, unequal, posterior one linear and entire, lateral lobes lanceolate, serrate.

Corolla tube ca. 3 × as long as calyx; galea falcate; beak bent downward, ca. 6.5 mm, slender; lower lip ca. 1.4 cm wide, lobes rounded, middle lobe slightly smaller than lateral pair. Filaments glabrous throughout.

Capsule lanceolate, ca. 2 × as long as calyx, apiculate. Seeds few, ovoid. Fl. and fr. Jul.

S Xizang [Sikkim].

80. Ser. *Integrifoliae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 70. 1890.

全叶系 *quan ye xi*

Herbs low. Roots fleshy. Stems erect. Basal leaves in a rosette. Stem leaves few, opposite, narrowly lanceolate to linear-lanceolate. Flowers few, opposite. Calyx 1/3 cleft anteriorly, 5-lobed. Corolla tube more than 2 × as long as calyx; galea longer than lower lip; beak S-shaped, slender.

One species: Bhutan, China, Nepal, Sikkim.

265. *Pedicularis integrifolia* J. D. Hooker, Fl. Brit. India 4: 308. 1884.

全叶马先蒿 *quan ye ma xian hao*

Herbs perennial, 4–7 cm tall, drying black. Roots fusiform, fleshy. Stems 1 to several, ascending. Basal leaves in a rosette; petiole 3–5 cm; leaf blade narrowly lanceolate to linear-lanceolate, 3–5 cm × ca. 5 mm.

Stem leaves 2–4 pairs, sessile, narrowly oblong, 1.3–1.5 cm × 7.5–10 mm, ± entire to crenate or serrate.

Inflorescences spicate, 1–3-fascicled, sometimes interrupted basally; bracts leaflike, longer than or ca. as long as calyx. Calyx cylindrical-campanulate, ca. 1.2 cm, glandular pubescent, 1/3 cleft anteriorly; lobes 5, unequal, posterior one smallest, lateral lobes oblong, crenate. Corolla dark purple; tube erect, ca. 2 cm, slender; galea bent at a right angle apically; beak S-shaped, ca. 1.5 cm, slender; lower lip ca. 1.8 cm wide, glabrous, middle lobe rounded, ca. 1/2 as long as lateral pair. Filaments pubescent throughout. Capsule enclosed by persistent calyx, compressed, ovoid, ca. 1.5 cm × 7 mm. Fl. Jun–Jul, fr. Jul–Sep.

Alpine rocky meadows, *Picea* forests; 2700–5100 m. W Qinghai, SW and W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

1a. Plants relatively low; leaves crenate

..... 265a. subsp. *integrifolia*

1b. Plants to 7 cm; leaves serrulate to ±

entire 265b. subsp. *integerrima*

265a. *Pedicularis integrifolia* subsp. *integrifolia*

全叶马先蒿(原亚种) *quan ye ma xian hao* (*yuan ya zhong*)

Plants low. Leaf blade narrowly oblong, crenate.

• Alpine rocky meadows; 2700–5100 m. W Qinghai, SE Xizang [Bhutan, Nepal, Sikkim].

265b. *Pedicularis integrifolia* subsp. *integerrima* (Pennell & H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 296. 1963.

全缘全叶马先蒿 *quan yuan quan ye ma xian hao*

Pedicularis integerrima Pennell & H. L. Li in H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 351. 1948.

Plants to 7 cm tall. Leaf blade linear-lanceolate, serrulate to ± entire.

• *Picea* forests, alpine meadows; 2700–4200 m. SW and W Sichuan, SE Xizang, NW Yunnan.

81. Ser. *Pilostachyae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 95. 1890.

绵穗系 *mian sui xi*

Leaves opposite or in whorls of 3 or 4. Basal leaves numerous, persistent, long petiolate, lanceolate, pinnatipartite to pinnatisect. Inflorescences tomentose. Calyx 5-lobed. Corolla tube decurved apically; galea without marginal teeth near apex, beakless.

• Two species: endemic to China.

1a. Plants 12–20 cm tall; stem leaves opposite or in whorls of 3, ± sessile; flowers compactly arranged in a densely whitish tomentose spike; calyx lobes short

..... 266. *P. pilostachya*

1b. Plants often 30–50 cm tall; stem leaves in whorls of 3 or 4, petiole 1–1.6 cm; flowers ± laxly arranged,

grayish tomentose; calyx lobes longer 267. *P. ternata*

266. *Pedicularis pilostachya* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 64. 1877.

绵穗马先蒿 *mian sui ma xian hao*

Herbs perennial, cespitose, 12–20 cm tall, pubescent.

Rootstock fleshy. Basal leaves in a rosette; petiole 1–4 cm; leaf blade lanceolate-oblong, abaxially tomentose,

pinnatipartite; segments to 15 pairs, pinnatifid, serrulate. Stem leaves in only 2 whorls, proximal ones opposite, distal ones in whorls of 3, ± sessile. Inflorescences spicate, compactly arranged, with dense whitish tomentum, ca. 15-flowered; bracts ovate or lanceolate, distal ones smaller, abaxially densely tomentose. Calyx 1.1–1.7 cm, densely whitish tomentose; lobes 5, unequal, short, entire, triangular. Corolla deep carmine; tube slightly longer than calyx, straight in calyx, bent at a right angle apically; galea rounded, truncate at apex; lower lip ca. as long as galea. Filaments glabrous. Fl. Jun–Jul, fr. Jul–Aug.

• Gravelly slopes on mountain summits; 4700–5100 m. W Gansu, E Qinghai.

267. *Pedicularis ternata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 64. 1877.

三叶马先蒿 san ye ma xian hao

Herbs perennial, 30–50 cm tall, pubescent, drying ± black. Rootstock stout, fleshy. Stems often several, erect or ± curved. Basal leaves in a rosette; petiole to 7 cm, glabrous; leaf blade ± lanceolate, to 9 cm, glabrous on both surfaces, pinnatipartite to pinnatisect; segments to 14 pairs, incised-dentate. Stem leaves in 2 or 3 or 4 whorls, smaller than basal leaves; petiole 1–1.6 cm. Flowers laxly arranged in spikes, only 1–3 whorls, grayish tomentose; bracts leaflike, proximal ones longer than flowers, sparsely pubescent. Calyx arachnoid; lobes 5, unequal, posterior lobe smallest, all oblong-triangular, entire. Corolla violet, small; tube slightly longer than calyx, bent forward apically near calyx lobes; galea truncate at apex; lower lip ca. as long as galea. Filaments glabrous. Capsule compressed, ovoid, to 2 × 1 cm, apex acute. Seeds to 3.5 mm. Fl. Jul, fr. Jul–Aug.

• Thickets; 3200–4600 m. W Gansu, Nei Mongol, Qinghai.

82. Ser. Tantalorhynchae P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 247. 1995.

颤喙系 chan hui xi

Herbs low. Stems single or numerous, unbranched. Basal leaves persistent, long petiolate, ± lanceolate or narrowly oblong, large, pinnatifid, with many segments. Stem leaves in whorls of 3. Inflorescences spicate. Corolla tube erect, ca. as long as calyx; beak of galea long, horizontal or slightly decurved.

• One species: endemic to China.

268. *Pedicularis tantalorhyncha* Franchet ex Bonati, Bull. Soc. Bot. France 56: 466. 1909.

颤喙马先蒿 chan hui ma xian hao

Herbs annual, 4–15 cm tall. Stems numerous, erect or flexuous, unbranched, pubescent. Basal leaf petiole 2–5 cm, pubescent; leaf blade lanceolate, 3–5 × 1–1.4 cm, fleshy, pinnatifid; segments 15–20 pairs, ovate, pinnatifid, dentate. Stem leaves only in 1 or 2 whorls, similar to basal leaves but smaller. Inflorescences spicate, interrupted basally, flowers in whorls of 3;

bracts leaflike, longer than calyx. Calyx ca. 1 cm, slightly cleft anteriorly, pubescent; lobes 5, unequal, ca. as long as tube, posterior lobe smallest, posterior-lateral pair largest. Corolla purple; tube ca. 1 cm, glabrous; galea ± bent at a right angle, 5–6 mm, crested; beak horizontal or slightly decurved, 4–6 mm, slender; lower lip 7–8 mm, minutely ciliate. Filaments glabrous. Capsule cylindrical, ca. 1 cm. Fl. Jun–Jul, fr. Jul–Aug.

• Shaded areas, valleys; 3000–4000 m. ?SE Xizang, NW Yunnan.

83. Ser. Meteororhynchae H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 258. 1948.

翘喙系 qiao hui xi

Stems single. Basal leaves numerous, long petiolate, often lanceolate. Stem leaves few, opposite or in whorls of 4. Inflorescences long spicate, interrupted. Corolla tube bent at a right angle apically, ca. 1.5 × as long as calyx; galea often twisted; beak S-shaped, long.

• One species: endemic to China.

269. *Pedicularis meteororhyncha* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 376. 1948.

翘喙马先蒿 qiao hui ma xian hao

Herbs perennial, to 40 cm tall, drying ± black. Roots fleshy. Stems erect, unbranched, sparsely pubescent. Basal leaf petiole 7–9 cm, glabrescent; leaf blade linear-oblong to linear-lanceolate, 8–12 × 1.5–2.2 cm, abaxially sparsely pubescent along veins, adaxially sparsely pubescent, pinnatipartite to pinnatisect; segments 18–22 pairs, ovate-oblong to ovate-lanceolate, pinnatifid, margin double dentate. Stem leaves few, similar to basal leaves but smaller and shorter petiolate.

Inflorescences 15–20 cm; bracts 1–1.5 cm × ca. 6 mm, sparsely pubescent. Flowers in whorls of 4. Calyx cylindrical, ca. 1.2 cm, 1/3 cleft anteriorly; lobes 5, unequal, posterior lobe smallest, glabrescent or pubescent along veins, serrate. Corolla purplish red, glandular pubescent; tube ca. 1.8 cm, bent at a right angle apically; galea often twisted; beak to 1.5 cm, slender, S-shaped; lower lip shorter than galea, middle lobe prominent. Filaments villous. Fl. Jul–Aug, fr. Sep.

• Alpine meadows; 4000–4200 m. NW Yunnan.

84. Ser. Atrovirides P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 247. 1995.

深绿系 shen lü xi

Herbs low. Stems often several, ascending or diffuse, usually weak. Basal leaves persistent, often oblong. Stem leaves often opposite. Inflorescences often few flowered. Calyx lobes leaflike, serrate. Corolla tube decurved apically; galea with 1 marginal tooth on each side, beakless; lower lip spreading.

• Two species: endemic to China.

1a. Corolla tube sparsely pubescent; leaves large, petiole of basal leaves to 4 cm, leaf blade to 3 × 1.6 cm; corolla

ca. 2.5 cm 270. *P. sherriffii*

1b. Corolla tube densely long white pubescent; leaves smaller, petiole of basal leaves to 2.3 cm, leaf blade

ca. 12 × 8 mm; corolla ca. 1.9 cm 271. *P. atroviridis*

270. *Pedicularis sherriffii* P. C. Tsoong, Acta Phytotax. Sin. 3: 286. 1955.

休氏马先蒿 xiu shi ma xian hao

Herbs perennial, barely to 9 cm tall, drying black. Stems several, often ascending, pubescent. Basal leaves numerous; petiole to 4 cm; leaf blade oblong-elliptic to elliptic, ca. 3 × 1.6 cm, pinnatisect; segments 4 or 5 pairs, ovate-elliptic, incised-dentate. Stem leaves opposite, similar to basal leaves but smaller and shorter petiolate. Inflorescences short or ± elongated, often interrupted basally, few flowered. Calyx 0.9–1.1 cm, sparsely long pubescent; tube ca. as long as lobes; lobes 5, unequal, leaflike. Corolla purple-red, with dark purple galea, ca. 2.5 cm; tube falcate apically, ca. 1.6 cm, sparsely pubescent; galea barely straight, ca. 9 mm, apex rounded, marginally 2-toothed; lower lip slightly longer than galea, ca. 1.1 × 1.1 cm. Filaments 2 pubescent, 2 glabrous. Fl. Jun.

• Open earthy slopes; 4100–4300 m. SE Xizang.

271. *Pedicularis atroviridis* P. C. Tsoong, Acta Phytotax. Sin. 3: 287. 1955.

深绿马先蒿 shen lü ma xian hao

Herbs perennial, barely 7 cm tall, drying black. Stems clustered, often diffuse or ascending, slender, densely brown long pubescent. Basal leaf petiole to 2.3 cm, glabrous; leaf blade ovate to ovate-elliptic, ca. 1.2 cm × 8 mm, pinnatisect; segments ca. 4 pairs, irregularly pinnatifid, incised-dentate. Stem leaves few, opposite or sometimes ± alternate; petiole ca. 6 mm; leaf blade ovate or rounded, glabrous on both surfaces, 3–5-lobed. Inflorescences sometimes interrupted basally, 2–6-flowered. Calyx glabrous; tube ca. 4.5 mm, densely long white pubescent; lobes 5, unequal, leaflike. Corolla bright purple-red, with paler throat, ca. 1.9 cm; tube falcate apically, ca. 1.2 cm, densely white long pubescent; galea barely straight, ca. 6.5 mm, apex protruding, marginally 2-toothed; lower lip longer than galea, ca. 1 × 1 cm, margin erose. Filaments 2 pubescent, 2 glabrous. Fl. Jul, fr. Aug–Sep.

• Open moss-covered slopes; ca. 4100 m. SE Xizang.

85. Ser. Remotilobae P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 248. 1995.

疏裂系 shu lie xi

Herbs low. Stems often several, ascending or procumbent, unbranched. Leaves mostly basal, long petiolate, small, rounded. Stem leaves opposite. Corolla tube ca. 2 × as long as calyx; galea marginally 2-toothed; beak slender.

• One species: endemic to China.

272. *Pedicularis remotiloba* Handel-Mazzetti, Symb. Sin. 7: 868. 1936.

疏裂马先蒿 shu lie ma xian hao

Herbs low, 6–7 cm, sometimes barely 1.5 cm tall, drying black. Stems often several, ascending or procumbent, slender, ciliolate or glabrescent. Leaves mostly in a basal rosette; petiole to 2 cm, glabrous; leaf blade ovate-elliptic to ovate-oblong, 1–3 cm × ca. 8 mm, glabrous on both surfaces, pinnatisect; segments 2–5 pairs, ovate to orbicular, incised-double dentate. Stem leaves few or absent, similar to basal leaves but smaller

and shorter petiolate. Inflorescences short racemose; bracts leaflike. Calyx cylindrical, 3–4 mm, membranous; lobes 5, ± equal, triangular, entire. Corolla rose; tube erect, ca. 2 × as long as calyx; galea strongly bent apically, marginally 2-toothed below curve; beak ± horizontal, straight, 3–3.5 mm; lower lip ca. 6 × 9 mm, glabrous, lobes rounded. Filaments glabrous. Fl. Aug, fr. Sep.

• Grassy slopes in alpine regions; 3700–4200 m. NW Yunnan.

86. Ser. Sikkimenses P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 248. 1995.

锡金系 xi jin xi

Stems often several, herbaceous, weak, ascending. Leaves opposite or in whorls of 4, pinnatisect. Calyx lobes shorter than calyx tube. Corolla tube 2–2.5 × as long as calyx; galea without marginal teeth; beak ± straight.

• Two species: endemic to China.

1a. Corolla tube 7–8 mm; lower lip ciliate, middle lobe ± hoodlike at apex; filaments glabrous ... 273. *P. atuntsiensis*

1b. Corolla tube to 25 mm; lower lip not ciliate, middle lobe rounded, not hoodlike; filaments 2 pubescent,

2 glabrous 274. *P. elliotii*

273. *Pedicularis atuntsiensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 8: 135. 1913.

阿墩子马先蒿 a dun zi ma xian hao

Herbs perennial, 10–20 cm tall, drying black. Roots fibrous, fascicled. Stems glabrescent. Leaves in whorls of 4 or sometimes proximal ones opposite, petiolate or distal ones ± sessile; petiole 2.5–4.5 cm; leaf blade ovate-oblong or ovate, 1.5–2.5 cm, pinnatisect; segments 9–13 pairs, ovate, pinnatifid, incised-dentate. Flowers in whorls of 4; bracts leaflike basally. Pedicel ca. 2 mm. Calyx tube ca. 3.5 mm, membranous; lobes 5, unequal, posterior one entire, lateral lobes larger, serrate. Corolla purple; tube erect, 7–8 mm; galea strongly bent apically; beak horizontal, ± straight, ca. 5 mm, slender; lower lip ca. 7 × 9 mm, ciliate, middle lobe smaller than lateral pair. Filaments glabrous. Fl. Jul, fr. Aug.

• 4300–4500 m. NW Yunnan.

274. *Pedicularis elliotii* P. C. Tsoong, Acta Phytotax. Sin. 3: 287. 1955.

爱氏马先蒿 ai shi ma xian hao

Herbs perennial, less than 15 cm tall, drying black. Roots few, fascicled, ± fleshy. Stems many branched; branches diffuse basally. Leaves opposite; petiole to 4.5 cm; leaf blade linear-oblong to elliptic-oblong, to 5 × 2 cm, pinnatisect; segments 2–4 pairs, pinnatisect, dentate. Flowers axillary. Pedicel ca. 8 mm, sparsely long pubescent. Calyx ca. 1 cm, slightly cleft anteriorly; lobes 5, unequal, posterior tooth linear and entire, lateral lobes larger, ovate, serrate. Corolla light purple with whitish purple tube; tube to 2.5 cm, slender, glabrous; galea bent at a right angle apically; beak straight, ca. 3.5 mm; lower lip not ciliate, middle lobe rounded, not hoodlike. Filaments 2 pubescent, 2 glabrous. Fl. Jun.

• Riversides, damp places; ca. 4000 m. E Xizang.

87. Ser. *Collatae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 97. 1890.

铺地系 pu di xi

Plants less than 10 cm tall. Stems low, cespitose. Leaves mostly basal; petiole 3–4 × as long as leaf blade; leaf blade oblong to ovate, pinnatipartite. Flowers few. Galea with 2 marginal teeth near apex, beakless.

Two species: Bhutan, China, Nepal, Sikkim; one species in China.

275. *Pedicularis bietii* Franchet, Bull. Soc. Bot. France 47: 34. 1900.

皮氏马先蒿 pi shi ma xian hao

Herbs low, 2–4 cm tall, not drying black. Stems glabrous. Leaves mostly basal; petiole to more than 2 cm; leaf blade ovate-elliptic, less than 1 cm, sparsely pubescent; segments 3–5 pairs, crenate. Stem leaves often only 1 pair, shorter petiolate. Flowers axillary, few. Pedicel to 6 mm, glabrous. Calyx ca. 8 mm,

membranous, sparsely pubescent along midvein; lobes 5, unequal, ± leaflike. Corolla rose, 2.5–3 cm, glabrous; tube slightly bent at middle, ca. 1.5 cm, slightly expanded apically; galea slightly falcate, ca. 1.1 cm, apex truncate; lower lip large, slightly longer than galea. Filaments glabrous.

• Alpine regions. W Sichuan, SE Xizang.

88. Ser. *Pseudoasplenifoliae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 84. 1890.

假铁角蕨叶系 jia tie jiao jue ye xi

Ser. *Pseudorostratae* H. Limpricht.

Herbs low. Stems unbranched. Leaves mostly basal, in a rosette, long petiolate; leaf blades lanceolate, pinnatipartite or pinnatisect. Stem leaves few or absent. Inflorescences short, few flowered. Calyx lobes 5, unequal, serrate. Corolla tube longer than calyx but less than 2 × as long; galea with 1 auricle on each margin; beak straight, erose-denticulate at apex.

One species: Bhutan, China, E Nepal, Sikkim.

276. *Pedicularis schizorrhyncha* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 260. 1889.

裂喙马先蒿 lie hui ma xian hao

Herbs perennial, 3–5 cm tall, glabrous, drying black or not. Stems numerous, slender, soft. Leaves mostly basal; petiole to 2 cm; leaf blade ca. $9 \times 3\text{--}4$ mm, pinnatisect; segments 6–8 pairs, ovate, dentate. Stem leaves few or absent, long petiolate. Inflorescences racemose, 3- or 4-flowered; bracts leaflike. Pedicel 2–3 mm. Calyx oblong, ca. 9 mm, slightly cleft anteriorly, pubescent

89. Ser. *Cernuae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 258. 1948.

俯垂系 fu chui xi

Herbs low, usually more than 10 cm tall. Stems unbranched, robust, often several. Leaves mostly basal, long petiolate. Stem leaves few, opposite, \pm elliptic, pinnatipartite to pinnatisect. Inflorescences short racemose. Calyx unequally 5-lobed. Corolla tube slightly longer than calyx; galea falcate, with or without marginal protuberances.

Three species: Bhutan, China; two species in China.

1a. Calyx lobes unequal, posterior one entire, lateral lobes serrate; galea with 1 distinct marginal protuberance on each side; lower corolla lip sinuate-crenulate 277. *P. cernua*

1b. Calyx lobes unequal, but all serrate; galea without marginal protuberance on each side, but apex denticulate; lower corolla lip not sinuate-crenulate 278. *P. gongshanensis*

277. *Pedicularis cernua* Bonati, Bull. Soc. Bot. France 54: 373. 1907.

俯垂马先蒿 fu chui ma xian hao

Herbs perennial, 4.5–22 cm tall, glabrous, drying black. Stems fleshy, unbranched. Basal leaves in a rosette; petiole 3–12 cm, slender, glabrous; leaf blade ovate-oblong, $4\text{--}5.5 \times 2\text{--}4.5$ cm, pinnatisect to pinnatipartite; segments 5–9 pairs, linear-lanceolate to oblong-lanceolate, pinnatifid, serrulate. Stem leaves opposite, shorter petiolate, pinnatifid. Inflorescences centrifugal, 4–7 cm, many flowered; bracts leaflike, shorter than flowers. Calyx ca. 1 cm, slightly cleft anteriorly; lobes 5, unequal, posterior one linear, entire, lateral lobes larger, serrate. Corolla red; tube slightly longer than calyx, ca. 1.3 cm; galea erect basally, with a central marginal protuberance on each side, apex truncate, 1-toothed on each side, these sometimes inconspicuous; lower lip to 1.4 cm, ciliate, sinuate-crenulate, middle lobe smallest. Filaments villous. Capsule long ovoid, $1.2\text{--}1.5 \text{ cm} \times 5\text{--}7$ mm, oblique, short apiculate. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows and grasslands; 3800–4200 m. SW Sichuan, Yunnan.

1a. Leaves ovate-oblong, $4\text{--}5.5 \times 2\text{--}4.5$ cm, pinnatisect to pinnatipartite, segments 5–9 pairs, linear-lanceolate to oblong-lanceolate, pinnatifid, serrulate 277a. subsp. *cernua*

1b. Leaves broadly ovate, $3\text{--}4 \times 2.5\text{--}3.5$ cm, pinnatifid, segments 3–5 pairs, ovate, sinuate-dentate 277b. subsp. *latifolia*

277a. *Pedicularis cernua* subsp. *cernua*

俯垂马先蒿(原亚种) fu chui ma xian hao (yuan ya zhong)

along veins; lobes 5, unequal, serrate. Corolla tube 1.6–1.8 cm; galea falcate, ca. 1.5 cm, dilated; beak straight, ca. 3 mm, apex truncate; lower lip slightly longer than galea, ciliate. Filaments 2 long pubescent, 2 glabrous. Capsule ovoid, ca. $1.1 \text{ cm} \times 6$ mm, slightly exceeding calyx, short apiculate. Fl. Aug–Sep, fr. Sep.

Humus-clad boulders of forest understories, open hillsides; ca. 3800 m. S Xizang [Bhutan, E Nepal, Sikkim].

Leaves ovate-oblong, $4\text{--}5.5 \times 2\text{--}4.5$ cm, pinnatisect to pinnatipartite; segments 5–9 pairs, linear-lanceolate to oblong-lanceolate, pinnatifid, serrulate. Galea with distinct teeth. Fl. Jul–Aug.

• Alpine meadows; 3800–4000 m. SW Sichuan, NW Yunnan.

277b. *Pedicularis cernua* subsp. *latifolia* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 306. 1963.

宽叶俯垂马先蒿 kuan ye fu chui ma xian hao
Pedicularis cernua Bonati var. *latifolia* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 100: 373. 1948.

Leaves broadly ovate, $3\text{--}4 \times 2.5\text{--}3.5$ cm, pinnatifid; segments 3–5 pairs, ovate, sinuate-dentate. Galea with inconspicuous teeth. Fl. Aug.

• Alpine grasslands; ca. 4200 m. Yunnan (upper Kiukiang Valley).

278. *Pedicularis gongshanensis* H. P. Yang, Acta Phytotax. Sin. 28: 143. 1990.

贡山马先蒿 gong shan ma xian hao

Herbs perennial, to 30 cm tall, drying \pm black. Stems clustered, basally with remnants of previous year's stems and scales. Basal leaf petiole to 10 cm, sparsely pubescent; leaf blade oblong, 4–8 cm, pinnatisect; segments 7–12 pairs, oblong, sparsely pubescent on both surfaces, dentate. Stem leaves few, opposite or in whorls of 4, smaller than basal leaves. Inflorescences 16–24-flowered; bracts leaflike. Pedicel ca. 3 mm, slender. Calyx ca. 1.5 cm, 1/3 cleft anteriorly, sparsely whitish pubescent; lobes 5, unequal, serrate. Corolla red, 3–4 cm; tube ca. 1.5 cm, glabrous; galea without marginal protuberance, but subapically toothed; lower lip shorter than galea, 1–1.2 cm, ciliate, entire. Filaments pubescent. Capsule ovoid-oblong, slightly compressed, $1.5\text{--}2$ cm, mucronate. Fl. Jul–Jun, fr. Jun–Aug.

• Shrubby grass of hillsides; ca. 3600 m. NW Yunnan (Gongshan).

90. Ser. *Tatsienenses* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 248. 1995.

打箭系 da jian xi

Herbs low. Stems often single or 2 or 3, unbranched. Leaves in whorls of 3 or opposite, small. Stem leaves in 1 or 2 whorls, sometimes opposite. Inflorescences short, often capitate. Calyx 5-lobed. Corolla tube erect, slightly longer than calyx; galea resembling goose head, short beaked.

• Two species: endemic to China.

1a. Corolla ca. 2.8 cm; beak of galea scarcely 1.5 mm 279. *P. chenocephala*

1b. Corolla ca. 2.5 cm; beak of galea ca. 2.5 mm 280. *P. tatsienensis*

279. *Pedicularis chenocephala* Diels, Notizbl. Bot. Gart.

Berlin-Dahlem 10: 892. 1930.

鹅首马先蒿 e shou ma xian hao

Herbs perennial, 7–13 cm tall, not drying black. Roots sparsely fascicled, ± fleshy. Stems pubescent or glabrescent. Leaves opposite or whorled; petiole to 5 cm basally, glabrous; leaf blade linear-oblong, to 3 cm × 8 mm, pinnatisect; segments 4–10 pairs, ovate-oblong, pinnatifid, dentate. Inflorescences capitate, 3–4 cm; bracts leaflike. Pedicel to 6 mm wide, long ciliate, sparsely pubescent. Calyx to 9 mm, membranous, without reticulate veins; lobes 5, unequal, serrate. Corolla rose, ca. 2.8 cm; tube nearly straight, ca. 1 cm; galea deep purple, slightly falcate apically, longer than tube; beak scarcely 1.5 mm; lower lip ca. as long as galea, lobes slightly acute at apex, ciliate, praemorse. Filaments 2 sparsely pubescent, 2 glabrous. Fl. Jul, fr. Aug.

• Swampy alpine meadows; 3600–4300 m. SW Gansu, N Sichuan.

280. *Pedicularis tatsienensis* Bureau & Franchet, J. Bot.

(Morot) 5: 108. 1891.

打箭马先蒿 da jian ma xian hao

Herbs perennial, 10–27 cm tall, glabrescent, not drying black. Stems purplish black, shiny, erect or ± bent, with 1–3 internodes. Leaves mostly basal, in a rosette; petiole 2.5–7 cm, slender; leaf blade ovate-oblong to linear-oblong, to 3 × 1.4 cm, pinnatisect; segments 2–4 pairs, ovate to oblong, pinnatifid, margin double dentate. Stem leaves smaller than basal leaves, shorter petiolate; leaf blade 5–10 mm. Inflorescences capitate, 2–3.5 cm, many flowered; bracts leaflike. Calyx tube 6–7 mm; lobes 5, unequal. Corolla purplish red, with nearly blackish purple galea, ca. 2.5 cm; tube ca. 1.2 cm; galea falcate apically; beak straight, ca. 2.5 mm, slender; lower lip ca. 1 cm × 3.5 mm, slightly shorter than galea. 2 filaments sparsely long pubescent, 2 glabrous. Fl. May–Jun, fr. Jul–Aug.

• Alpine meadows; 4100–4400 m. W Sichuan, NW Yunnan.

91. Ser. *Roseae* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 525, 617. 1888.

玫瑰系 mei gui xi

Herbs low, ± scapose. Leaves alternate. Inflorescences short and capitate, or flowers few, not distinctly centrifugal. Calyx slightly cleft anteriorly, 5-lobed. Corolla tube bent apically, toothless; galea beakless; lower lip spreading. Capsule oblique.

Three species: China, Europe; one species in China.

281. *Pedicularis muscoides* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 91. 1949.

瓣状马先蒿 xian zhuang ma xian hao

Herbs low, less than 4 cm tall, drying black. Roots fascicled, fleshy. Stems scapelike, erect, usually to 1 cm. Basal leaf petiole 1–1.5 cm, slender, pubescent; leaf blade oblong-lanceolate, ca. 1 cm × 2–3 mm, pinnatisect or pinnatifid; segments 8–10 pairs, ovate, glabrescent, dentate. Flowers 2 or 3; bracts leaflike, ca. 1 cm. Pedicel 2–3 mm. Calyx oblong-ovate, ca. 8 × 3–4 mm, pubescent; lobes 5, subequal, narrowly triangular, 2–2.5 mm, ± entire or dentate. Corolla cream colored or bright rose, 1.2–2.3 cm; tube slightly bent and expanded apically, ca. 1.1 cm; galea ± bent, ca. 1.2 cm, apex ± acute; lower lip ca. 9 mm, lobes rounded, middle one projecting. 2 filaments pubescent apically, 2 glabrous throughout. Capsule oblong-ovoid,

compressed, ca. 1.1 cm × 4 mm, slightly oblique, apex acute. Fl. Jun–Aug, fr. Jul–Sep.

• Moist alpine meadows; 3900–5300 m. W Sichuan, SE Xizang, NW Yunnan.

1a. Corolla cream colored, ca. 2.3 cm 281a. var. *muscoides*

1b. Corolla bright rose, 1.2–1.8 cm 281b. var. *rosea*

281a. *Pedicularis muscoides* var. *muscoides*

瓣状马先蒿(原变种) xian zhuang ma xian hao (yuan bian zhong)

Corolla cream colored, ca. 2.3 cm. Fl. Jun.

• 3900–5300 m. W Sichuan, SE Xizang.

281b. *Pedicularis muscoides* var. *rosea* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 92. 1949.

玫瑰色瓣状马先蒿 mei gui se xian zhuang ma xian hao

Corolla bright rose, 1.2–1.8 cm. Fl. Jul.

• Moist alpine meadows; 4300–4600 m. NW Yunnan.

92. Ser. *Merrillianae* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 248. 1995.

迈氏系 mai shi xi

Herbs low, ± stemless. Leaves alternate, mostly basal, in a rosette, old withered leaf bases persistent. Inflorescences short spicate or capitate, few flowered. Calyx 5-lobed. Corolla large; tube erect; galea with 1 marginal tooth on each side, with a beaklike apex.

Two species: Bhutan, China, SW Asia; one species in China.

282. *Pedicularis merrilliana* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 96. 1949.

迈氏马先蒿 mai shi ma xian hao

Herbs perennial ca. 4(–8) cm tall, drying black. Roots ± fleshy. Stems 1–5, unbranched, shiny, with membranous scales at base. Leaves mostly basal; petiole 1.5–3 cm, slender, glabrescent; leaf blade oblong, 1–1.7 cm × 3–5 mm, abaxially rust colored pubescent, adaxially glabrous, pinnatisect; segments 8–12 pairs, oblong to ovate-oblong, dentate. Inflorescences ca. 3-flowered; bracts leaflike, 0.8–1.5

cm. Pedicel 2–4(–7) mm, slender, sparsely villous. Calyx ca. 1 cm × 2.5–3 mm, slightly cleft anteriorly, pubescent; lobes 5, unequal, serrate. Corolla purple-red, ca. 2.3 cm; tube ± erect, 1–1.2 cm; galea slightly falcate, with a short, wide beaklike apex, truncate, with 1 distinct subapical, marginal tooth on each side; lower lip ca. 7 mm, glabrous. Filaments glabrous. Capsule oblong-ovoid, 1.1–1.3 cm, slightly oblique, apex acute. Fl. Jun–Jul, fr. Jul–Aug.

Alpine meadows; 3200–4900 m. SW Gansu, NW Sichuan [?Bhutan].

93. Ser. *Asplenifoliae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 79. 1890.

铁角蕨叶系 tie jiao jue ye xi

Herbs low, without a distinct main stem. Leaves alternate, numerous, almost all basal, persistent. Inflorescences short spicate or subcapitate, few flowered, long pedicellate. Calyx 5-lobed. Corolla tube less than 2 × as long as calyx; beak straight or bent slightly downward.

About seven species: Bhutan, China, Europe, Nepal, North America, Sikkim; three species in China.

1a. Stems glabrescent; leaf segments 4 or 5 pairs; corolla 1.8–2 cm, tube ca. 2 × as long as calyx 285. *P. yui*

1b. Stems with lines of rust colored hairs; leaf segments 5–12 pairs; corolla 1.2–1.8 cm, tube slightly longer than calyx.

2a. Corolla 1.5–1.8 cm, lower lip glabrous; all filaments glabrous 283. *P. mayana*

2b. Corolla 1.2–1.5 cm, lower lip long ciliate; filaments 2 sparsely pubescent, 2 glabrous 284. *P. tenacifolia*

283. *Pedicularis mayana* Handel-Mazzetti, Symb. Sin. 7: 858. 1936.

迈亚马先蒿 mai ya ma xian hao

Herbs perennial, 4–9 cm tall, marcescent leaves with petioles and scales persistent at base, drying black. Stems usually 3–7, erect or ascending, slender, with lines of rust colored hairs. Leaves alternate; basal leaves in a rosette; petiole 4–5 cm, slender, sparsely villous; leaf blade ovate-lanceolate to ovate-oblong, 0.8–1.5 cm × 4–5 mm, abaxially sparsely pubescent, scurfy, adaxially glabrous, pinnatisect; segments 6–12 pairs, lanceolate, crenate. Inflorescences subcapitate, usually 4–8-flowered; bracts leaflike. Calyx 7–9 mm, slightly cleft anteriorly, rust colored villous; lobes 5, unequal, oblanceolate, crenate. Corolla purple, 1.5–1.8 cm; tube erect, 0.9–1.2 cm, glabrous; galea falcate apically, usually slightly crested; beak 3–4 mm, slender; lower lip 6–9 mm, distinctly praemorse, glabrous. Filaments glabrous. Capsule lanceolate-oblong, 1.3–1.4 cm × ca. 5 mm, slightly oblique, apex acute. Fl. May–Aug, fr. Aug–Sep.

• Alpine meadows; 3700–4600 m. NW Yunnan.

284. *Pedicularis tenacifolia* P. C. Tsoong, Fl. Reipubl. Popul. Sin. 68: 416. 1963.

宿叶马先蒿 su ye ma xian hao

Herbs perennial, 5–7 cm tall, marcescent stems and leaves of preceding year persistent at base, drying black. Stems 3–5, unbranched, stout, sparsely pubescent, with densely rust colored villous lines. Leaves mostly basal; petiole 2–3 cm, margin densely villous; leaf blade ovate-oblong or long ovate, 1–1.5 cm × 5–6 mm, sparsely rust colored pubescent on both surfaces, pinnatisect; segments 5 or 6 pairs, broadly ovate, minutely crenulate. Inflorescences subcapitate, 3–5-flowered; bracts ca. as long as calyx. Pedicel 2–3 mm, pubescent. Calyx ca. 7 mm, slightly cleft anteriorly, long pubescent; lobes 5, unequal. Corolla purple-red, 1.2–1.5 cm; tube erect, slightly exceeding calyx; galea ± falcate apically; beak bent slightly downward, straight, ca. 5 mm; lower lip ca. 1 cm, long ciliate. 2 filaments sparsely pubescent, 2 glabrous. Fl. Jun–Aug, fr. Aug–Sep.

• Alpine meadows; 4500–4900 m. SE Xizang.

285. *Pedicularis yui* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 102. 1949.

季川马先蒿 ji chuan ma xian hao

Herbs 6–7 cm tall, glabrescent, drying black. Stems usually single, erect, unbranched, slender, marcescent leaves and petioles of preceding year and lanceolate scales persistent at base. Leaves alternate, mostly basal; petiole 1.5–3 cm; leaf blade long ovate to ovate-oblong, 5–10 × 3–5 mm, abaxially usually white villous along

midvein, adaxially glabrous, pinnatisect; segments 4 or 5 pairs, short ovate, minutely crenulate. Inflorescences racemose or subcapitate, 4–6-flowered; bracts leaflike. Pedicel 3–6(–11) mm, filiform. Calyx 8–10 mm, sparsely long pubescent or glabrous, slightly cleft anteriorly; lobes 5, unequal, ovate, serrate. Corolla purple, 1.8–2 cm; tube erect, ca. 2 × longer than calyx; galea bent at a right angle apically; beak bent slightly downward, straight, 4–5 mm; lower lip ca. 1.1 cm, glabrous or ciliate, minutely crenulate. Filaments glabrous or 2 pubescent. Fl. Jun–Jul, fr. Jul.

• Alpine swamps; ca. 4100 m. NW Yunnan.

1a. Lower corolla lip not ciliate; all filaments glabrous 285a. var. *yui*

94. Ser. Odontophorae P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 249. 1995.
具齿系 *ju chi xi*

Herbs perennial, low. Leaves few, alternate, pinnatipartite or pinnatisect. Flowers few, axillary. Calyx 5-lobed. Corolla tube ca. 2 × as long as calyx; galea falcate, with marginal teeth, beaked.

One species: China, Sikkim.

286. *Pedicularis odontophora* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 275. 1889.

具齿马先蒿 *ju chi ma xian hao*

Herbs 2.5–6 cm tall. Rhizomes creeping, 5–7 cm. Stems minutely pubescent. Basal leaves withering early; petiole 2.5–3 cm. Stem leaf petiole 5–10 mm; leaf blade ovate, 2–3 × 2–2.5 cm, pinnatipartite or pinnatisect; segments 3–5 pairs, pinnatifid, dentate. Flowers axillary. Pedicel 2–4 mm. Calyx cylindrical-campanulate, ca. 7

1b. Lower corolla lip ciliate; filaments 2 pubescent, 2 glabrous 285b. var. *ciliata*

285a. *Pedicularis yui* var. *yui*

季川马先蒿(原变种) *ji chuan ma xian hao* (*yuan bian zhong*)

Lower corolla lip not ciliate. Filaments glabrous.

• Alpine swamps; ca. 4100 m. NW Yunnan.

285b. *Pedicularis yui* var. *ciliata* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 417. 1963.

缘毛季川马先蒿 *yuan mao ji chuan ma xian hao*

Lower corolla lip ciliate. Filaments 2 pubescent, 2 glabrous.

• Alpine swamps; ca. 4100 m. NW Yunnan.

• Alpine swamps; ca. 4100 m. NW Yunnan.

Acta Phytotax. Sin. 33: 249. 1995.

具齿系 *ju chi xi*

mm, slightly cleft anteriorly; lobes 5, unequal, entire. Corolla tube ca. 1.3 cm, slightly expanded apically; galea falcate, ca. 1 cm, with 1 pair of triangular marginal teeth; beak straight, ca. 3.5 mm, slender; lower lip ca. 1.1 cm, wide, lobes ovate, middle lobe ca. 1/2 as long as lateral lobes. Filaments pubescent, anterior filaments more densely so.

S Xizang [Sikkim].

95. Ser. Paucifoliae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 80. 1890.

少叶系 *shao ye xi*

Herbs low to moderately tall, without a distinct main stem. Roots numerous. Stems rigid, mostly unbranched. Leaves basal or basal and on stem, persistent, alternate, pinnatifid to pinnatipartite. Inflorescences short racemose or capitate; bracts petiolate. Calyx slightly cleft anteriorly or not, 5-lobed. Corolla tube ca. as long as or longer than calyx; beak slender.

• Six species: endemic to China.

1a. Leaves almost all basal; leaf blade pinnatipartite to pinnatisect.

2a. Corolla tube ca. 12 mm; filaments glabrous; plants 9–22 cm tall 290. *P. tsarungensis*

2b. Corolla tube 8–9 mm; filaments pubescent; plants to 4–13(–19) cm tall.

3a. Leaf blade ovate-elliptic to oblong-lanceolate, 1.5–2.2 cm, segments 5–7 pairs; 2 filaments pubescent,

2 glabrous; lower corolla lip ca. 10 × 8 mm 287. *P. umbelliformis*

3b. Leaf blade lanceolate to linear-lanceolate, 1–6 cm, segments 7–14 pairs; filaments densely pubescent;

lower corolla lip 8–10 × 12–15 mm 289. *P. praeruptorum*

1b. Leaves basal and on stem; leaf blade pinnatifid to pinnatipartite.

4a. Flowers axillary, lax or in a lax raceme to 20 cm; calyx lobes equal, flabellate, all dentate 292. *P. forrestiana*

4b. Inflorescences short racemose; calyx lobes unequal, neither flabellate nor all dentate.

5a. Leaf blade pinnatipartite; calyx 1/3 cleft anteriorly; roots fusiform 288. *P. yunnanensis*

5b. Leaf blade pinnatifid; calyx slightly cleft anteriorly; roots filiform 291. *P. micrantha*

287. *Pedicularis umbelliformis* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 100. 1949.

伞花马先蒿 *san hua ma xian hao*

Herbs perennial, 6–13 cm tall, ± drying black. Roots linear. Stems 2 or 3(–6), unbranched, minutely

pubescent. Leaves almost all basal, 5 or 6(–8); petiole to 2.5 cm, slender, pubescent; leaf blade ovate-elliptic to oblong-lanceolate, 1.5–2.2 cm × 7–8 mm, abaxially sparsely pubescent, scurfy, adaxially glabrous, pinnatisect or pinnatipartite; segments 5–7 pairs, ovate, pinnatifid, dentate. Inflorescences short racemose or umbelliform, 5–10-flowered; bracts leaflike, ca. as long as calyx. Pedicel 2–3 mm. Calyx ca. 6 mm, sparsely pubescent; lobes 5, ± equal, dentate. Corolla red-purple, ca. 1.6 cm; tube erect, ca. 8 mm; galea bent at a right angle apically; beak ca. 5 mm; lower lip ca. 1 cm × 8 mm, sparsely ciliate, middle lobe smaller than lateral pair, lateral lobes nearly fully projecting. Filaments 2 pubescent, 2 glabrous.

• Grassy slopes; ca. 3400 m. NW Yunnan.

288. *Pedicularis yunnanensis* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 572. 1888.

云南马先蒿 *yun nan ma xian hao*

Herbs perennial, to 25 cm tall, not drying black. Roots fascicled, fusiform. Stems erect, glabrous except for lines of hairs. Leaves mostly basal; petiole 4–7 cm, glabrous; leaf blade ovate-oblong to oblong-lanceolate, 2–4.5 cm, abaxially sparsely pubescent along veins, adaxially glabrous, pinnatipartite; segments 5–12 pairs, triangular-ovate to ovate-oblong, pinnatifid or incised-dentate. Inflorescences short racemose; bracts leaflike, proximal ones longer than flowers. Pedicel 5–10 mm. Calyx 7–8 mm, 1/3 cleft anteriorly; tube ca. 5 mm; lobes 5, unequal, posterior one smallest, entire, others serrate. Corolla red, 1.8–2 cm; tube slightly longer than calyx; galea ± bent at a right angle apically, slightly crested; beak bent downward, ca. 4.5 mm; lower lip ca. 9 mm × 1.4 cm, lobes ± equal, rounded, ciliate. Filaments sparsely pubescent. Capsule ovoid-lanceolate, ca. 1.2 cm, short apiculate. Fl. Jun–Aug, fr. Jul–Sep.

• Alpine meadows; 3000–4000 m. W Yunnan.

289. *Pedicularis praeruptorum* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 126. 1921.

悬崖马先蒿 *xuan yan ma xian hao*

Pedicularis aphyllorcaulis Handel-Mazzetti.

Herbs perennial, (4–)10(–19) cm tall, drying black. Roots fascicled, fusiform. Stems erect, densely glandular pubescent. Leaves almost all basal; petiole 1–6.5 cm; leaf blade lanceolate to linear-lanceolate, 1–6 cm, abaxially white pubescent along veins, adaxially glabrous, pinnatipartite to pinnatisect; segments 7–14 pairs, ovate to lanceolate, pinnatifid or double dentate. Inflorescences short racemose; bracts leaflike. Pedicel 2–6 mm, densely pubescent. Calyx to 8 mm, 1/3–1/2 cleft anteriorly, with long hairs along midvein; lobes 5, unequal, posterior lobe smallest, ± entire, others dentate. Corolla purple, ca. 1.6 cm; tube ca. 9 mm, glabrous; galea bent at a right angle apically, densely minutely pubescent; beak straight or bent slightly downward, 4–5 mm; lower lip 8–10 mm × 1.2–1.5 cm, ciliate. Filaments densely pubescent. Fl. Jun–Aug, fr. Sep–Oct.

• On rocks, alpine meadows; 3600–4200 m. NW Yunnan.

290. *Pedicularis tsarungensis* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 100. 1949.

察郎马先蒿 *cha lang ma xian hao*

Herbs, 9–22 cm tall. Roots fascicled, filiform. Stems 1 to numerous, erect, woolly-villous. Leaves almost all basal; petiole 2–5 cm, slender, sparsely pubescent; leaf blade ovate-oblong, 2–3 × 1–1.2 cm, long pubescent on both surfaces, pinnatisect or pinnatipartite; segments 6 or 7 pairs, widely spaced, oblong-ovate or oblong, pinnatifid or dentate. Inflorescences 2–3 cm, 6–8-flowered; bracts leaflike. Calyx cylindrical, sparsely pubescent; lobes 5, ± equal, dentate. Corolla purplish red, ca. 1.8 cm; tube erect, slightly expanded apically, ca. 1.2 cm; galea ± bent at a right angle; beak straight or bent slightly downward, 4–5 mm; lower lip ca. as long as galea, sparsely ciliate, lobes ± equal, rounded. Filaments glabrous. Fl. May–Jun, fr. Jul–Aug.

• Alpine meadows; ca. 4000 m. SE Xizang, Yunnan.

291. *Pedicularis micrantha* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 106. 1949.

小花马先蒿 *xiao hua ma xian hao*

Herbs perennial, ca. 20 cm tall, glabrous. Roots filiform. Stems single, erect, unbranched, rigid. Basal leaves numerous; petiole 7(–15) cm, slender; leaf blade oblong-ovate, 6–7.5 × 2–2.7 cm, pinnatifid; segments 6–8 pairs, ovate, crenate-pinnatifid, dentate. Stem leaves 1 or 2, alternate, widely spaced, similar to basal leaves but smaller. Inflorescences short racemose, less than 3 cm, lax basally, many flowered; bracts leaflike, shorter than flowers. Pedicel erect, ca. 3 mm. Calyx ca. 7 mm, sparsely pubescent, slightly cleft anteriorly; lobes 5, unequal. Corolla pink, barely 1.2 cm; tube erect, slightly longer than calyx, expanded apically; galea falcate; beak straight or bent slightly downward, linear, to 5 mm; lower lip ca. as long as galea, ciliate. Filaments long pubescent apically. Fl. Jul, fr. Aug.

• Thicket margins; ca. 3100 m. W Yunnan.

292. *Pedicularis forrestiana* Bonati, Notes Roy. Bot. Gard. Edinburgh 5: 86. 1911.

福氏马先蒿 *fu shi ma xian hao*

Herbs perennial, 15–20 cm tall or more, drying black. Roots fleshy. Stems numerous, ascending or erect, unbranched, minutely pubescent. Basal leaves numerous; petiole 5–6 cm, ciliate; leaf blade linear-oblong, 3–5 × 1–2 cm, pinnatifid; segments 8–10 pairs, 4–6 × 2–4 mm, ± incised-dentate. Stem leaves and bracts similar to basal leaves but shorter petiolate. Flowers axillary and lax or in lax racemes to 20 cm; bracts flabellate to linear-oblong, petiolate. Pedicel erect, 5–8 mm, slender. Calyx tube 7–8 mm, glabrous; lobes 5, 1–2 mm, equal, flabellate and incised-dentate. Corolla rose, 1.6–2 cm; tube nearly 2 × as long as calyx; galea ± bent at a right angle; beak falcate, ca. 5 mm; lower lip ca. as long as galea, 7–10 mm × 1–1.4 cm,

middle lobe emarginate, slightly hoodlike. Filaments pubescent. Fl. Jul–Aug, fr. Sep.

• Alpine meadows, open areas, thick grass and scrubs; 3300–4000 m. NW Yunnan.

1a. Flowers axillary, lax; bracts linear-oblong, short petiolate 292a. subsp. *forrestiana*

1b. Flowers in lax racemes, to 20 cm; bracts flabellate, long petiolate .. 292b. subsp. *flabellifera*

292a. *Pedicularis forrestiana* subsp. *forrestiana*

福氏马先蒿(原亚种) fu shi ma xian hao (yuan ya zhong)

Flowers axillary, lax; bracts linear-oblong, short petiolate.

• Alpine meadows, open areas; 3300–4000 m. NW Yunnan.

292b. *Pedicularis forrestiana* subsp. *flabellifera* P. C. Tsoong, Bull. Misc. Inform. Kew 1954: 449. 1954.

扇苞福氏马先蒿 shan bao fu shi ma xian hao

Flowers in lax racemes, to 20 cm; bracts flabellate, long petiolate.

• Thick grass and scrubs. NW Yunnan.

96. Ser. *Mychophilae* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 249. 1995.

菌生系 jun sheng xi

Herbs ± stemless. Roots few. Stems weak, flexuous. Leaves mostly or all basal. Stem leaves when present, few, alternate or often pseudo-opposite throughout. Flowers few, often pseudo-opposite; long pedicellate. Calyx slightly cleft anteriorly or not, 5-lobed. Corolla tube slightly longer than calyx; beak usually straight, slender.

• One species: endemic to China.

293. *Pedicularis mychophila* Marquand & Shaw, J. Linn. Soc., Bot. 48: 212. 1929.

菌生马先蒿 jun sheng ma xian hao

Herbs perennial, 5–9 cm tall, densely gray tomentose, drying ± black. Roots 1–5, fusiform, fleshy. Stems usually 2–4, slender, ascending, glandular pubescent, with brown hairs. Leaves mostly or all basal; petiole 2–5.5 cm, densely rust colored pubescent; leaf blade ovate-oblong to lanceolate-oblong, 0.7–3.5 cm × 3–13 mm, densely pubescent on both surfaces, pinnatisect; segments 5–13 pairs, triangular-ovate to oblong, incised-crenate. Stem leaves few if any. Flowers axillary or pseudo-opposite; proximal bracts leaflike,

others very small, densely tomentose. Pedicel usually curved, to 1.3 cm, densely tomentose. Calyx ca. 1 cm, slightly cleft anteriorly or not, densely tomentose; lobes 5, unequal, short. Corolla purplish red, ca. 2.5 cm; tube erect, 1.1–1.3 cm, glabrous; galea bent at a right angle apically; beak straight or ± curved downward, ca. 5 mm; lower lip ca. 1.5 × 2 cm, glabrous but praemorse-dentate. Filaments 2 slightly pubescent, 2 glabrous. Capsule ovoid, ca. 1 cm × 4–5 mm, short mucronate. Fl. Jun–Jul, fr. Jul–Aug.

• Moss-covered rocks; 4200–4500 m. SE Xizang.

97. Ser. *Franchetianae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 70. 1890.

佛氏系 fo shi xi

Herbs low. Leaves alternate or often pseudo-opposite throughout, large. Pedicel to 2.5–8 cm. Flowers axillary. Calyx deeply cleft anteriorly, 2- or 3(–5)-lobed. Corolla tube slightly longer than calyx or not; galea usually crested; beak curved, slender.

• Two species: endemic to China.

1a. Stems branched; calyx lobes 2, 3-cleft and incised-dentate; beak of corolla pendant, parallel to calyx, curved apically

..... 294. *P. franchetiana*

1b. Stems unbranched; calyx lobes 2 or 3(–5), posterior one much smaller or absent, entire or dentate, lateral

lobes incised-dentate; beak of corolla semicircular 295. *P. mussotii*

294. *Pedicularis franchetiana* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 553. 1888.

佛氏马先蒿 fo shi ma xian hao

Stems branched, sparsely long pubescent. Leaves opposite; petiole to 2.5 cm; leaf blade ca. 2 cm × 5 mm, pinnatipartite; segments ovate, dentate. Pedicel to 4 cm, exceeding leaves. Flowers axillary. Calyx ca. 6 mm, membranous, sparsely scabrous pubescent, reticulate near apex, 2-lobed, 3-cleft and incised-dentate. Corolla purple, ca. 1 cm; tube not exceeding calyx and shorter

than galea, pubescent; galea falcate, usually crested; beak pendant, parallel to calyx, curved apically; lower lip ca. 1.2 × 1.6 cm, long ciliate, lobes ± equal, middle lobe rounded, scarcely exerted. Filaments 2 long pubescent, 2 glabrous.

• W Sichuan.

295. *Pedicularis mussotii* Franchet, Bull. Soc. Bot. France 47: 24. 1900.

谬氏马先蒿 miu shi ma xian hao

Herbs perennial, to 15 cm tall, drying slightly black. Roots slender, several, fusiform, ± fleshy. Stems usually 4 or 5, often procumbent or ascending, unbranched, densely fine pubescent and striate. Leaves mostly basal; petiole 2.5–10 cm, narrowly winged, sparsely pubescent; leaf blade 2–10.5 × 0.5–2.5 cm, abaxially sparsely pubescent along veins, adaxially glabrous or sparsely pubescent and finely pubescent along midvein, pinnatipartite to nearly pinnatisect; segments 6–13 pairs, triangular-ovate to ovate, margin double dentate or pinnatifid. Stem leaves usually nearly opposite, distal ones alternate, similar to basal leaves but smaller, shorter petiolate. Pedicel 3–11.5 cm, usually curved, finely pubescent. Flowers axillary. Calyx tube 5.5–10 mm, 2- or 3(-5)-lobed; posterior one smallest, entire or dentate, sometimes absent, lateral lobes incised-dentate. Corolla red; tube 7–10 mm, pubescent externally; galea ± bent at a right angle, with or without auriculate protrusion (crest); beak semi-circular, 7–11 mm; lower lip 0.8–1.5 × 1.6–2.6 cm, long ciliate, middle lobe emarginate. Filaments pubescent. Capsule semi-globose, ca. 1.2 cm × 6.5 mm. Fl. Jul–Aug, fr. Aug.

- Alpine meadows; 3600–4900 m. SW and W Sichuan, NW Yunnan.
- 1a. Calyx lobes 5, posterior one small, lateral lobes leaflike 295c. var. *mutata*
- 1b. Calyx lobes 2 or 3, posterior one small or absent, lateral pair leaflike.
 - 2a. Galea not crested in front .. 295a. var. *mussotii*

98. Ser. Pseudomacranthae P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 249. 1995.
假大花系 jia da hua xi

Herbs ± stemless or stems scapelike. Leaves mostly basal, persistent, often pinnatisect. Stem leaves alternate or pseudo-opposite. Inflorescences capitata or short racemose. Calyx lobes 2–5. Corolla more than 3 cm; tube usually not exceeding calyx; beak wide; lower lip often enveloping galea.

Four species: Bhutan, China, N Myanmar, Nepal, Sikkim; all four in China.

- 1a. Inflorescences corymbiform; corolla yellow, 4–5 cm 299. *P. corymbifera*
- 1b. Inflorescences racemose; corolla purple or white, 2–3 cm.
 - 2a. Lower corolla lip long ciliate, middle lobe reniform and cordate basally 296. *P. elwesii*
 - 2b. Lower corolla lip glabrous, middle lobe oblong and not cordate basally.
 - 3a. Beak of galea entire, not 2-cleft 297. *P. aschistorrhyncha*
 - 3b. Beak of galea deeply 2-cleft 298. *P. fletcheri*

296. *Pedicularis elwesii* J. D. Hooker, Fl. Brit. India 4: 312. 1884.

哀氏马先蒿 ai shi ma xian hao

Herbs perennial, 1.5–32 cm tall, densely pubescent, drying nearly black. Roots 2 or 3, ± fusiform, fleshy. Stems 1–4, erect or slightly spreading at base, unbranched, densely pubescent. Basal leaves sparsely cespitose; petiole 2–12 cm, densely tomentose; leaf blade ovate-oblong to lanceolate-oblong, 3.5–9.5(-18) × 1–2.5 cm, abaxially glabrous except for finely tomentose midvein, abaxially densely tomentose, pinnatipartite; segments 10–20(-30) pairs, ovate to ovate-oblong, pinnatifid, margin double dentate. Stem leaves few, alternate or sometimes ± opposite, smaller

- 2b. Galea prominently crested in front 295b. var. *lophocentra*

295a. *Pedicularis mussotii* var. *mussotii*

缪氏马先蒿(原变种) miu shi ma xian hao (yuan bian zhong)

Calyx lobes 2 or 3, posterior one small or absent, lateral pair leaflike, dentate. Galea not crested in front.

- W Sichuan, NW Yunnan.

295b. *Pedicularis mussotii* var. *lophocentra* (Handel-Mazzetti) H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 180. 1949.

刺冠缪氏马先蒿 ci guan miu shi ma xian hao

Pedicularis lophocentra Handel-Mazzetti, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 59: 251. 1922.

Calyx lobes 2 or 3, posterior one small or absent, lateral pair leaflike, profoundly dentate. Galea prominently crested in front, appendage long filiform, spinescent.

- Alpine meadows; 3600–4900 m. SW and W Sichuan, NW Yunnan.

295c. *Pedicularis mussotii* var. *mutata* Bonati, Bull. Soc. Bot. France 54: 375. 1907.

变形缪氏马先蒿 bian xing miu shi ma xian hao

Calyx lobes 5, posterior one small, lateral lobes leaflike, dentate.

- W Sichuan, NW Yunnan.

than basal leaves, shorter petiolate. Racemes 5–8(-15) cm; bracts leaflike. Pedicel 0.7–1.5 cm. Calyx 1–1.2 cm, 1/2 cleft anteriorly; lobes 3 or 5, unequal, posterior lobe smallest, all dentate. Corolla purple to purplish red, 2.6–3 cm; tube erect, 8–10 mm; galea strongly curved; beak uncinat, 5–6 mm, 2-cleft or entire; lower lip completely enveloping galea, ca. 1.7–2 × 2–2.3 cm, long ciliate, middle lobe reniform and cordate basally. Filaments long pubescent. Capsule oblong-lanceolate, 1.7–2 cm × 5–6 mm. Fl. Jun–Aug, fr. Aug–Sep.

Alpine meadows; 3200–4600 m. E, S, and SE Xizang, NW Yunnan [Bhutan, N Myanmar, Nepal, Sikkim].

- 1a. Plants scarcely 1.5 cm tall; calyx lobes 5 296b. subsp. *minor*
- 1b. Plants 8–32 cm tall; calyx lobes 3.

- 2a. Stems slightly spreading basally, 8–20 cm tall; petiole of basal leaves to 5 cm; racemes 5–8 cm, usually compactly flowered 296a. subsp. *elwesii*
- 2b. Stems erect, to 32 cm tall; petiole of basal leaves to 12 cm; racemes to 15 cm, flowers lax basally 296c. subsp. *major*

296a. *Pedicularis elwesii* subsp. *elwesii*

哀氏马先蒿(原亚种) ai shi ma xian hao (yuan ya zhong)

Plants 8–20 cm tall. Stems slightly spreading basally. Petiole of basal leaves to 5 cm. Racemes usually compactly flowered, 5–8 cm. Calyx lobes 3.

Alpine meadows; 3200–4600 m. S and SE Xizang, NW Yunnan [Bhutan, N Myanmar, Nepal, Sikkim].

296b. *Pedicularis elwesii* subsp. *minor* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 324. 1963.

矮小哀氏马先蒿 ai xiao ai shi ma xian hao

Pedicularis elwesii var. *minor* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 145. 1949.

Plants scarcely 1.5 cm tall. Stems strongly spreading at base. Calyx lobes 5.

• Alpine meadows; ca. 3800 m. E Xizang.

296c. *Pedicularis elwesii* subsp. *major* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 324. 1963.

高大哀氏马先蒿 gao da ai shi ma xian hao

Pedicularis elwesii var. *major* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 145. 1949.

Plants to 32 cm tall. Stems erect. Petiole of basal leaves to 12 cm. Racemes laxly flowered basally, long, to 15 cm. Calyx lobes 3.

• SE Xizang, NW Yunnan.

297. *Pedicularis aschistorrhyncha* Marquand & Shaw, J. Linn. Soc., Bot. 48: 210. 1929.

全喙马先蒿 quan hui ma xian hao

Herbs ca. 17 cm tall. Stems erect, glabrous. Basal leaves few, to 12 cm; petiole long, narrowly winged; leaf blade ovate, abaxially sparsely scabrous pubescent, adaxially glabrous, pinnatifid; segments incised-dentate. Stem leaves few, alternate, similar to basal leaves but smaller. Inflorescences short racemose, 10–12-flowered; bracts leaflike, to 1 cm, glabrous. Calyx 1/2 cleft anteriorly, sparsely scabrous pubescent; tube cylindrical, 2-lobed, 6–8 mm, leaflike, pinnatifid. Corolla white, with purple galea, large; tube slender, to 2 cm, not exceeding calyx; galea ± falcate, 3–4 mm wide; beak decurved, relatively short, entire; lower lip not ciliate,

middle lobe oblong. Filaments 2 pubescent, 2 glabrous. Fl. Jul.

• Marshy meadows; 3400–3600 m. SE Xizang.

298. *Pedicularis fletcheri* P. C. Tsoong, Acta Phytotax. Sin. 3: 294. 1955.

阜莱氏马先蒿 fu lai shi ma xian hao

Pedicularis fletcheriana P. C. Tsoong.

Herbs annual, to 40 cm tall, not drying black. Stems single or to 10, erect, outer stems usually ascending, glabrous. Basal leaves few, usually withering early. Stem leaves only 1 or 2, alternate or sometimes pseudo-opposite; petiole to 2.5 cm, long glandular ciliate; leaf blade oblong-lanceolate, to 5 × 2 cm, glabrous on both surfaces, pinnatisect; segments ca. 7 pairs, ovate-oblong, incised-dentate. Inflorescences racemose, to 15 cm; bracts leaflike, proximal ones larger than leaves.

Pedicel to 1.5 cm. Calyx ca. 2.3 cm, 1/4 cleft anteriorly, long pubescent; lobes 2 or 4, unequal, leaflike. Corolla white, with red-tinged center to lower lip, ca. 2.8 cm; tube ca. 2.2 cm, glabrous; galea slightly falcate, to 2.5 mm wide; beak bent downward, ca. 3 mm, 2-cleft; lower lip completely enveloping galea, ca. 1.6 × 2 cm, finely ciliate or glabrous, middle lobe emarginate.

Filaments 2 pubescent, 2 glabrous. Capsule to 1.5 cm × 9 mm. Seeds ca. 2.3 × 1.2 mm. Fl. Jul.

Alpine meadows; 3500–4200 m. SE Xizang [Bhutan].

299. *Pedicularis corymbifera* H. P. Yang, Acta Phytotax. Sin. 18: 244. 1980.

伞房马先蒿 san fang ma xian hao

Herbs perennial, 10–20 cm tall, drying black. Roots conical, fleshy, to 12 cm. Stems usually numerous, procumbent or ascending. Basal leaves laxly cespitose; petiole to 7 cm, broadly winged, densely pubescent; leaf blade ovate to ovate-oblong, 4–7 × 1–3 cm, pinnatipartite to pinnatisect; segments 7–12 pairs, ovate to rounded, dentate. Stem leaves few. Inflorescences corymbiform, 5–8-flowered; bracts leaflike. Calyx oblong, 18–20 cm, pilose, 1/2 cleft anteriorly; lobes 3, unequal. Corolla yellow with red beak, 4–5 cm; tube erect, slightly longer than calyx; galea slightly falcate, ± twisted; beak bent downward, 3–4 mm, 2-cleft; lower lip usually enveloping galea, ciliate, middle lobe emarginate. Anterior filaments densely pubescent. Fl. Jul, fr. Aug.

• Open rocky slopes, open forests; ca. 3400 m. E Xizang.

99. Ser. *Albiflorae* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 249. 1995.

白花系 bai hua xi

Herbs low or some stemless. Leaves basal. Flowers few, often capitate. Pedicel long. Calyx (3–)5-lobed. Corolla ± red-purple; tube long, often more than 2 × as long as calyx; beak slender; lower lip less than 2 cm wide.

About four species: China, Nepal; three species in China.

- 1a. Corolla tube ca. 1 cm; glabrous; filaments 2 pubescent, 2 glabrous 300. *P. rhizomatosa*
 1b. Corolla tube 2.2–2.5 cm, sparsely pubescent; all filaments pubescent.
 2a. Galea not 2-auriculate protuberant, beak 5–5.5 mm; plants drying dark black 301. *P. tayloriana*
 2b. Galea 2-auriculate protuberant, beak ca. 4 mm; plants not drying black 302. *P. tapaoensis*

300. *Pedicularis rhizomatosa* P. C. Tsoong, Acta Phytotax. Sin. 3: 281. 1955.

根茎马先蒿 gen jing ma xian hao

Herbs perennial, less than 7 cm tall, not drying black. Rootstock slender. Stems 1, 3, or 4, sparsely pubescent. Leaves basal; petiole to 3 cm, glabrous; leaf blade ovate-oblong, 6–11 × 3–5 mm, pinnatipartite to pinnatisect; segments 3 or 4 pairs, ovate, pinnatifid to coarsely dentate. Inflorescences capitate, ± umbel; bracts leaflike, sparsely long white pubescent. Calyx ca. 6–7 mm; tube ca. 4 mm, lobes 5, unequal. Corolla tube ca. 1 cm, glabrous; galea falcate apically; beak straight or bent slightly downward, 5–6 mm; lower lip triangular, ca. 8 × 7 mm, glandular ciliate, middle lobe broadly ovate, ca. 2.5 × 3.5–4 mm, ± hoodlike. Anterior filaments minutely pubescent. Fl. Jun, fr. Jul.

• Avalanche-disturbed slopes; ca. 3900 m. SE Xizang.

301. *Pedicularis tayloriana* P. C. Tsoong, Acta Phytotax. Sin. 3: 283. 1955.

泰氏马先蒿 tai shi ma xian hao

Pedicularis taylorii P. C. Tsoong.

Herbs perennial, less than 7 cm tall, shiny, barely glabrous throughout, drying dark black. Rootstock short. Stems usually 2–4. Leaves almost all basal; petiole 1–1.5 cm, membranously winged; leaf blade 5–10 × 2.5–4.5 mm, pinnatipartite to pinnatisect; segments 5 or 6 pairs, ovate, incised-dentate. Flowers 1–4, single or pseudo-opposite; bracts leaflike, small. Pedicel to 4–10 mm, with 2 lines of hairs. Calyx ca. 7 mm, usually glandular pubescent basally, more than 1/2 cleft

100. Ser. *Wilsoniae* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 148. 1949.

魏氏系 wei shi xi

Herbs low, ± stemless. Leaves long petiolate, shallowly crenate lobed to pinnatipartite. Flowers axillary. Calyx deeply cleft anteriorly, 2- or 3-lobed. Corolla tube longer than calyx, mostly more than 2 × as long, expanded apically; beak long; lower lip large.

• Four species: endemic to China.

- 1a. Leaves shallowly crenate lobed; corolla with purple galea and yellowish lower lip; calyx 2-lobed; beak of galea S-shaped 306. *P. bicolor*
 1b. Leaves pinnatipartite or pinnatisect; corolla red throughout or red with a purple-red galea; calyx 3- or 5-lobed; beak of galea not S-shaped.
 2a. Calyx 5-lobed; petiole of basal leaves to 3 cm 305. *P. dulongensis*
 2b. Calyx 3-lobed; petiole of basal leaves to 2 cm.
 3a. Calyx 2/3 cleft anteriorly; corolla red throughout, tube 3–4 cm; beak of galea ca. 4 mm; lower lip 1.5–2 × 2.5–3 cm 303. *P. wilsonii*

anteriorly; lobes 3–5, unequal, posterior one small, linear and entire, sometimes absent, lateral lobes distinctly serrate apically. Corolla red, with white dots on throat; tube ca. 2.2 cm, pubescent; galea bent at a right angle; beak 5–5.5 mm; lower lip ca. 9 mm × 1.4 cm, ciliate. Filaments pubescent. Fl. Jun.

• Open grassy hillsides. E Xizang.

302. *Pedicularis tapaoensis* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 417. 1963.

大炮马先蒿 da pao ma xian hao

Herbs perennial, to 6 cm tall, not drying black. Rootstock short. Stems cespitose, less than 1 cm or barely stemless. Leaves many, densely tufted; petiole 0.8–2.2 cm, broadly winged, glabrous; leaf blade elliptic-ovate to oblong, ca. 1 cm × 4.5–7 mm, glabrous on both surfaces, pinnatisect; segments 4–6 pairs, ovate, pinnatifid or coarsely dentate. Flowers solitary in leaf axils. Pedicel to 1 cm. Calyx ca. 7–9 mm, subglabrous, ciliate, tube ca. 5 mm, more than 1/3 cleft anteriorly; lobes 5, unequal, serrate. Corolla purple-red; tube ca. 2.5 cm, sparsely pubescent; galea ± bent at a right angle, with 2-auriculate protuberances; beak straight or bent slightly downward, ca. 4 mm. Filaments pubescent. Fl. Jul–Aug, fr. Aug–Sep.

• Open alpine meadows; ca. 4700 m. W Sichuan.

- 3b. Calyx 1/3 cleft anteriorly; corolla red with purple-red galea, tube ca. 5 cm; beak of galea 5.5–7 mm;
lower lip ca. 1 × 1.5 cm 304. *P. yanyuanensis*

303. *Pedicularis wilsonii* Bonati, Bull. Soc. Bot. France 54: 184, 376. 1907.

魏氏马先蒿 *wei shi ma xian hao*

Herbs perennial, to 9 cm tall, drying ± black. Roots fusiform, ± fleshy. Stems 2 or 3, 2–3 cm, or ± absent, pubescent. Basal leaves few; petiole 1.5–2 cm; leaf blade elliptic to oblong-ovate, to 9 cm, glabrous on both surfaces, pinnatifid; segments ca. 13 pairs, ovate-oblong. Stem leaves usually pseudo-opposite, smaller than basal leaves. Flowers few. Pedicel 1–2.5 cm, glabrescent. Calyx 1–1.5 cm, 2/3 cleft anteriorly, pubescent; lobes 3, unequal, posterior one linear, entire, lateral lobes larger, leaflike. Corolla red throughout; tube 3–4 cm, slender; galea falcate apically; beak bent downward, straight or cylindrical, ca. 4 mm; lower lip 1.5–2 × 2.5–3 cm, middle lobe ca. 1/2 size of lateral lobes, sparsely ciliate. Filaments glabrous or pubescent.

• Sichuan.

304. *Pedicularis yanyuanensis* H. P. Yang, Acta Phytotax. Sin. 27: 224. 1989.

盐源马先蒿 *yan yuan ma xian hao*

Herbs perennial, 5–8 cm tall, pubescent, drying slightly black. Roots fleshy. Stems usually 3–5, short or ± absent, spreading to ascending. Leaves mostly basal; petiole to 2 cm, pubescent; leaf blade lanceolate-oblong, 1–3 cm, pubescent along veins, pinnatisect; segments 5–8 pairs, ovate to oblong, margin double dentate. Stem leaves usually pseudo-opposite, smaller than basal leaves. Pedicel 1–2 mm. Calyx oblong, 1/3 cleft anteriorly, densely white villous; lobes 3, unequal. Corolla red, with purple-red galea, ca. 6 cm; tube ca. 5 cm, villous with multicellular hairs; galea nearly falcate, much expanded, ca. 5 mm; beak ± incurved, 5.5–7 mm; lower lip ca. 1 × 1.5 cm, ciliate, middle lobe smaller than lateral lobes, emarginate. Anterior filaments pubescent. Fl. Aug, fr. Sep.

• *Abies fabri* forests on slopes; ca. 3900 m. SW Sichuan.

101. Ser. *Neolatitubae* P. C. Tsoong ex H. B. Yang, Acta Phytotax. Sin. 33: 249. 1995.

新粗管系 *xin cu guan xi*

Herbs less than 10 cm tall. Stems scarcely present, weak, curved. Leaves mostly basal. Pedicel to 4 cm. Flowers axillary. Calyx deeply cleft anteriorly, 3-lobed. Corolla ± red-purple; tube 5–6 × as long as calyx; galea circinate-incurved basally; beak semicircular; lower lip large.

• One species: endemic to China.

307. *Pedicularis neolatituba* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 418. 1963.

新粗管马先蒿 *xin cu guan ma xian hao*

Herbs perennial, usually less than 10 cm tall, drying ± black. Roots fleshy. Stems scarcely present to 2–4 cm, glabrous. Basal leaves numerous; petiole to 2.3 cm; leaf blade lanceolate-oblong to narrowly lanceolate, 1–2 cm × 3.5–7 mm, long pubescent along midvein when young, glabrescent, pinnatisect; segments 6–8 pairs, ovate to oblong, margin double dentate. Stem leaves

305. *Pedicularis dulongensis* H. P. Yang, Acta Phytotax. Sin. 28: 143. 1990.

独龙马先蒿 *du long ma xian hao*

Herbs perennial, to 10 cm tall, drying ± black. Stems ca. 1 cm tall or ± absent. Basal and stem leaves densely clustered; petiole 1–3 cm, slender, glabrous; leaf blade elliptic-oblong to oblong, ca. 3 cm, abaxially pubescent, adaxially glabrous, pinnatisect; segments 5–9 pairs, ovate, pinnatifid or coarsely serrate. Pedicel 1–1.5 cm. Calyx cylindrical-campanulate, ca. 1.8 cm, 2/3 cleft anteriorly, densely white villous with multicellular hairs; lobes 5, unequal, leaflike, posterior one smaller than lateral lobes. Corolla red, obscure, 6–7 cm; tube erect, 4–5 cm, villous with multicellular hairs; galea nearly falcate, very enlarged; beak incurved, 5–6 mm; lower lip 1.2–1.4 × 3–3.5 cm, middle lobe smaller than lateral pair. Filaments pubescent. Capsule ovoid-oblong, 1–1.5 cm. Fl. Jul, fr. Jul–Aug.

• Moist meadows on mountain slopes; 3500–3600 m. NW Yunnan.

306. *Pedicularis bicolor* Diels, Bot. Jahrb. Syst. 29: 570. 1900.

二色马先蒿 *er se ma xian hao*

Herbs 5–6 cm tall, pubescent. Stems ± absent. Leaves nearly all basal; petiole 1–1.5 cm; leaf blade elliptic, 1–1.5 cm × 5–6 mm, shallowly crenate lobed; segments ± crenulate. Pedicel 1–1.5 cm. Calyx cylindrical; tube ca. 1.2 cm × 4 mm, 1/3 cleft anteriorly; lobes 2, ca. 5 mm, leaflike, dentate. Corolla with purple galea and yellowish lower lip, 2–2.4 cm; tube ca. 1.5 × as long as calyx, sparsely pubescent; galea erect basally, bent apically, ca. 8 mm; beak S-shaped, 4–5 mm; lower lip ca. 1.5 cm wide, glabrous, middle lobe much smaller than lateral pair, 5–6 × ca. 5 mm, emarginate. Filaments pubescent. Fl. Jul.

• SE Shaanxi.

usually pseudo-opposite, slightly smaller than basal leaves. Flowers few, axillary, pseudo-opposite or from basal leaves. Pedicel black, to 4 cm, glandular pubescent. Calyx 7–9 mm, 3/4 cleft anteriorly; lobes 3, unequal, posterior one spinescent and entire, lateral pair larger, incised-serrate. Corolla reddish purple; tube to 5 cm, pale purple pubescent; galea with auriculate protuberance near margin; beak semicircular, 6–7 mm; lower lip ca. 2 × 2.4 cm. Filaments pubescent. Fl. Jul–Aug, fr. Sep.

• Alpine meadows; ca. 4700 m. N Sichuan.

102. Ser. **Flammeae** Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 100. 1890.

火焰系 huó yán xì

Herbs low. Roots fusiform, fleshy. Leaves long, ± narrow, pinnatifid to pinnatisect. Inflorescences spicate, centrifugal, usually very long, with dense flowers. Pedicel long. Calyx 5-lobed. Corolla tube decurved distally; galea toothless; beakless; lower lip spreading. Capsule oblique.

About five species: Asia, Europe, North America; three species in China.

1a. Bracts rhombic-ovate to broadly ovate; plants usually less than 4 cm tall 310. *P. orthocoryne*

1b. Bracts linear-lanceolate to linear; plants usually 5–10 cm tall.

2a. Galea rounded in front; stigma included or very short exerted 308. *P. oederi*

2b. Galea not rounded in front, distinctly obliquely truncate at apex; stigma long exerted, to 4 mm 309. *P. stylosa*

308. *Pedicularis oederi* Vahl in Hornemann, Dansk Oekonom. Plantel. ed. 2, 580. 1806.

欧氏马先蒿 ou shi ma xian hao

Herbs perennial, 5–10(–20) cm tall, drying black. Stems usually scapellike, woolly. Leaves mostly basal; petiole to 5 cm, pubescent; leaf blade linear-lanceolate to linear, 1.5–7 cm, abaxially sometimes pubescent along veins, adaxially usually glabrous, pinnatisect; segments 10–30 pairs, ovate to oblong, dentate. Stem leaves 1 or 2, similar to basal leaves but smaller. Inflorescences ca. 5(–10) cm; bracts linear-lanceolate to linear, ca. as long as to shorter than flowers, usually woolly. Calyx 0.9–1.2 cm; lobes 5, ± equal. Corolla yellow, with purple galea, occasionally lower lip purple-spotted, more than 2 cm; tube falcate apically, 1.2–1.6 cm, apex obtuse or ± acute; galea 0.7–1.4 cm, rounded in front; lower lip 5–7 mm × 0.7–1.4 cm, middle lobe rounded, smaller than lateral lobes. Anterior filament pair pubescent. Stigma included or slightly exerted. Capsule long ovoid to ovoid-lanceolate, to 1.8 cm × 7 mm. Fl. Jun–Sep, fr. Jul–Oct. $2n = 16$.

Alpine meadows, pastures, damp limestone rocks, tundra, grassy slopes; 2600–5400 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, Japan, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; C and N Europe, N North America].

1a. Leaf segments 10–20 pairs 307a. subsp. *oederi*

1b. Leaf segments 25–30 pairs 307b. subsp. *multipinna*

308a. *Pedicularis oederi* subsp. *oederi*

欧氏马先蒿(原亚种) ou shi ma xian hao (yuan ya zhong)

Pedicularis versicolor Wahlenberg.

Leaf segments 10–20 pairs. Calyx lobes broadly lanceolate, entire to dentate apically. Corolla galea 0.7–1.4 cm × ca. 3.5 mm, shorter than tube; middle lobe of lower lip not projected.

Alpine meadows, pastures, moist meadows of mountain slopes, damp limestone rocks, tundra; 4000–5400 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, S, SE, and W Xizang, Yunnan [Bhutan, Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; C and N Europe, N North America].

Four varieties were treated in the Fl. Reipubl. Popularis Sin.: var. *oederi* with a 7–9 × 3–3.5 mm galea and broadly lanceolate, entire to distally dentate calyx lobes; var. *heteroglossa* Prain with a 1.1–1.4 cm galea; var. *sinensis* (subsp. *branchyophylla* (Pennell) P. C. Tsoong is

here treated as a synonym) with a 7–9 mm galea and calyx lobes with spatulate dentate-lobulate tips; and var. *angustiflora* (H. Limpricht) P. C. Tsoong with a 2 mm wide galea. Variety *oederi* includes two forms: f. *oederi* with a yellow corolla and sometimes a purple galea or lower lip with purple spots, and f. *rubra* (Maximowicz) P. C. Tsoong with a dark red corolla.

T. Yamazaki (Fl. Japan IIIa: 369–370. 1993) treated the plants occurring in Japan as *Pedicularis oederi* subsp. *heteroglossa* (Prain) Pennell.

308b. *Pedicularis oederi* subsp. *multipinna* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 334. 1963.

多羽片欧氏马先蒿 duo yu pian ou shi ma xian hao

Pedicularis oederi Vahl var. *multipinna* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 89. 1949.

Leaf segments 25–30 pairs, horizontal. Calyx and corolla tube slightly short. Corolla yellow, sometimes with purple galea or lower lip purple spotted, slightly shorter than galea; galea ca. as long as tube, middle lobe of lower lip projected.

• Grassy slopes; ca. 4200 m. W Sichuan.

309. *Pedicularis stylosa* H. P. Yang, Acta Phytotax. Sin. 18: 242. 1980.

长柱马先蒿 chang zhu ma xian hao

Herbs perennial, 8–10 cm tall, drying black. Roots numerous. Stems scapellike, white woolly. Basal leaves usually in a rosette; petiole 1–5 cm, pubescent; leaf blade linear-lanceolate to linear, 2–7 cm × 5–10 mm, abaxially white scurfy, adaxially pilose, pinnatisect; segments 15–25 pairs, ovate to oblong, dentate. Stem leaves 1 or 2. Inflorescences racemose; bracts linear. Pedicel 2–4 mm. Calyx oblong, ca. 1 cm, slightly cleft anteriorly, white woolly, 5-lobed. Corolla yellow, ca. 2.3 cm; tube erect, longer than calyx; galea not rounded in front, distinctly obliquely truncate at apex; lower lip shorter than galea, ca. 6 × 8 mm, middle lobe rounded, smaller than lateral pair. Anterior filament pair pubescent. Stigma long exerted, to 4 mm. Fl. Jun.

• About 4300 m. S Xizang.

310. *Pedicularis orthocoryne* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 89. 1949.

直盔马先蒿 zhi kui ma xian hao

Pedicularis oederi Vahl var. *bracteosa* Bonati, Notes Roy. Bot. Gard. Edinburgh 8: 142. 1913.

Herbs perennial, less than 4 cm tall, drying black. Roots numerous, fleshy. Stems unbranched, puberulent. Basal

leaf petiole 1–1.5 cm, slender, puberulent; leaf blade oblong-lanceolate, ca. 2.2 cm × 8 mm, puberulent to glabrescent, pinnatisect to pinnatipartite; segments 8–10 pairs, dentate. Inflorescences ca. 2 cm, few flowered; distal bracts rhombic-ovate to broadly ovate, crenate-serrate. Pedicel 2–3 mm. Calyx ca. 8 × 3–4 mm; lobes 5, unequal, posterior one triangular and entire, lateral lobes larger, ovate, serrate. Corolla yellow throughout,

to ca. 2.3 cm; tube ca. 1.1 cm. Galea straight, rounded apically; lower lip ca. 9 mm, erose, middle lobe smaller than lateral pair, projecting. Anterior filament pair villous apically. Capsule oblong-ovoid, ca. 1.1 cm × 4 mm. Fl. Jun, fr. Jul–Aug.

• Grassy slopes; 4000–5300 m. W Sichuan, NW Yunnan.

103. Ser. Corydaloides H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 148. 1949.

拟紫堇系 ni zi jin xi

Stems and branches often procumbent to ascending. Leaves alternate or pseudo-opposite, pinnatisect. Inflorescences terminal, usually distinctly centrifugal, or flowers axillary. Calyx 5-lobed. Corolla tube decurved distally; galea toothless, beakless; lower lip spreading.

• Three species: endemic to China.

1a. Galea straight, ca. 6 mm; leaf segments usually 4–6 pairs 311. *P. corydaloides*

1b. Galea falcate, 7–9 mm; leaf segments usually 7–12 pairs.

2a. Roots ± fusiform, fleshy; middle lobe of lower corolla lip entire, slightly projecting 312. *P. cryptantha*

2b. Roots slender; middle lobe of lower corolla lip emarginate, much projecting 313. *P. nyingchiensis*

311. Pedicularis corydaloides Handel-Mazzetti, Symb. Sin. 7: 851. 1936.

拟紫堇马先蒿 ni zi jin ma xian hao

Herbs perennial, to 16 cm tall, slender. Stems erect, short, slender, sparsely long branched apically, with remote scales basally, outer stems usually procumbent to ascending, sometimes branched, pubescent. Basal leaves numerous, petiole to 4 cm, slender, puberulent; leaf blade ovate-elliptic to ovate-oblong, 1–4 × ca. 1.8 cm, abaxially white scurfy, adaxially glabrous; segments usually 4–6 pairs, ovate to oblong, pinnatifid or incised-dentate. Stem and leaves usually pseudo-opposite, smaller than basal leaves. Flowers axillary, usually racemose apically, centrifugal. Pedicel 2–10(–14) mm. Calyx 5–6 mm, pubescent; lobes 5, unequal, posterior one usually lanceolate and entire, lateral lobes larger, serrate. Corolla yellow; tube cylindrical, longer than calyx; galea straight, ca. 6 mm, sparsely glandular pilose apically, rounded in front, minutely apiculate at apex; lower lip ca. as long as galea, ciliate, lobes ± equal, rounded. Filaments pubescent. Capsule ca. 5 × 4–4.5 mm. Fl. Jul–Aug, fr. Aug–Sep.

• Forests, shrubby grass of hillsides, alpine meadows; 3200–3800 m. SE Xizang, NW Yunnan.

312. Pedicularis cryptantha Marquand & Shaw, J. Linn. Soc., Bot. 48: 211. 1929.

隐花马先蒿 yin hua ma xian hao

Herbs perennial, to 12(–14) cm tall, drying ± black. Roots ± fusiform, fleshy. Stems usually procumbent to ascending, short, pubescent; branches densely clustered. Basal leaves numerous; petiole to 6 cm, sparsely pubescent; leaf blade ovate-oblong to ovate, 3.5–7 × ca. 1.8 cm, adaxially sparsely pubescent to glabrous; segments 8–12 pairs, linear-lanceolate, margin double dentate. Flowers axillary, 10–20-flowered, sometimes racemose apically, centrifugal; bracts leaflike, lanceolate. Pedicel more than 2 cm, slender. Calyx tube

cylindric, ca. 4 mm, sparsely to densely pubescent; lobes 5, unequal. Corolla yellow, 1.6–2 cm, tube expanded, curved apically; galea ± falcate, 7–9 mm, front rounded, apex slightly acute; lower lip with middle lobe rounded, smaller than lateral lobes, entire, slightly projecting. Filaments glabrous. Fl. May–Aug, fr. Sep–Oct.

Grassy stream banks, woods and *Pinus* forests; 2700–4700 m. SE Xizang [Bhutan].

1a. Stems usually procumbent to ascending, ca. 10 cm tall; leaves to 12(–14) cm; calyx

usually sparsely pubescent 312a. subsp. *cryptantha*

1b. Stems erect, ca. 7 cm tall; leaves barely 4.5

cm; calyx usually densely pubescent 312b. subsp. *erecta*

312a. Pedicularis cryptantha subsp. *cryptantha*

隐花马先蒿(原亚种) yin hua ma xian hao (yuan ya zhong)

Stems usually procumbent to ascending, ca. 10 cm tall. Leaves to 12(–14) cm. Calyx usually sparsely pubescent.

• Grassy streambanks, woods; 2700–4700 m. SE Xizang.

312b. Pedicularis cryptantha subsp. *erecta* P. C. Tsoong, Acta Phytotax. Sin. 3: 275. 1955.

直立隐花马先蒿 zhi li yin hua ma xian hao

Stems erect, ca. 7 cm tall. Leaves barely 4.5 cm. Calyx usually densely pubescent.

• *Pinus* forests. SE Xizang.

313. Pedicularis nyingchiensis H. P. Yang & Y. Tateishi, Acta Phytotax. Sin. 31: 288. 1993.

林芝马先蒿 lin zhi ma xian hao

Herbs perennial, ca. 12–15 cm tall, drying ± black. Roots slender. Stems usually 8–10, cespitose; lateral branches procumbent to ascending, sparsely white

villous. Leaves alternate; petiole 1–5 cm; leaf blade ovate-oblong to oblong, 2–5 × 1–2 cm, adaxially white villous; segments 7–9 pairs, ovate to oblong, coarsely dentate. Inflorescences short racemose; bracts leaflike. Pedicel 0.3–2 cm. Calyx cylindric, 7–8 mm, sparsely white villous; lobes 5, unequal. Corolla cream colored, 1.6–2 cm; tube expanded and slightly curved apically;

galea falcate, 7–9 mm, rounded in front, apex sometimes acute; lower lip ca. 1 cm, erose, middle lobe emarginate, much projecting. Anterior filament pair pubescent. Fl. May–Jun, fr. Jul–Aug.

•Rocks at streamsides, *Quercus* thickets; 3000–3300 m. E Xizang.

104. Ser. Pseudo-oederianae H. Limpricht, Repert. Spec. Nov. Regni Veg. 20: 217. 1924.

假欧氏系 jia ou shi xi

Herbs less than 15 cm tall. Roots fusiform, fleshy. Leaves alternate. Basal leaves numerous; petiole long; leaf blade pinnatisect. Inflorescences more than 1/2 height of plant, centrifugal. Calyx lobes 5. Corolla tube decurved; galea with 1 marginal tooth near apex, beakless.

•Two species: endemic to China.

1a. Corolla yellow with purple-red galea; filaments 2 pubescent, 2 glabrous 314. *P. pseudoversicolor*
1b. Corolla red throughout; filaments 2 densely pubescent, 2 glabrous 315. *P. habachanensis*

314. *Pedicularis pseudoversicolor* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 104. 1920.

假多色马先蒿 jia duo se ma xian hao

Herbs perennial, 10(–15) cm tall, drying black. Roots numerous. Stems usually single, stout, pubescent. Basal leaf petiole to 5.5 cm; leaf blade lanceolate, 2–6 × ca. 1.2 cm, abaxially white scurfy, tinged with purple along veins, pinnatisect; segments 11–18 pairs, oblong or obovate, sparsely ciliate, incised-dentate. Stem leaves 1–3 or absent, alternate. Inflorescences 3–10 cm, dense; proximal bracts leaflike, pubescent. Pedicel to 4 mm or almost absent, wide. Calyx 1–1.2 cm; lobes 5, lateral lobes ca. 1/2 as long as tube, unequal. Corolla yellow, with purple-red galea, 2.3–2.8 cm; tube slightly bowed and expanded apically, slightly longer than calyx; galea bent apically, 1–1.4 cm; lower lip shorter than galea, sparsely ciliate. Filaments 2 pubescent apically, 2 glabrous throughout. Fl. Jun–Aug, fr. Sep.

Alpine meadows; (3600–)4300–4500 m. S Xizang (Chumbi Xian), NW Yunnan [Bhutan].

315. *Pedicularis habachanensis* Bonati, Notes Roy. Bot. Gard. Edinburgh 15: 151. 1926.

哈巴山马先蒿 ha ba shan ma xian hao

Herbs perennial, 3.5–15 cm tall, drying black. Stems 1 to several, erect, unbranched, with lines of hairs. Basal leaf petiole 2.5–4 cm, fleshy, glabrous; leaf blade linear to elliptic-oblong, 3–4 × ca. 1 cm, pinnatisect; segments 8–23 pairs, triangular or ± ovate-oblong, pinnatifid, incised-dentate. Stem leaves few, alternate.

Inflorescences dense; proximal bracts linear. Flowers short pedicellate. Calyx 1–1.2 cm; lobes 5, unequal, long ciliate. Corolla red throughout; tube ca. 1.2 cm; galea ca. as long as tube, slightly falcate; lower lip much shorter than galea. Filaments 2 densely pubescent, 2 glabrous. Fl. Jul, fr. Aug.

•Alpine swampy meadows; 4100–4600 m. NW Yunnan.

1a. Leaf segments 8–10 pairs 315a. subsp. *habachanensis*
1b. Leaf segments 12–23 pairs 315b. subsp. *multipinnata*

315a. *Pedicularis habachanensis* subsp. *habachanensis*

哈巴山马先蒿(原亚种) ha ba shan ma xian hao (yuan ya zhong)

Plants low. Leaf segments 8–10 pairs.

•Alpine swampy meadows; 4100–4600 m. NW Yunnan.

315b. *Pedicularis habachanensis* subsp. *multipinnata* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 419. 1963.

多羽片哈巴山马先蒿 duo yu pian ha ba shan ma xian hao

Plants tall. Leaf segments 12–23 pairs.

•NW Yunnan.

105. Ser. Rhynchodontae Prain in Hooker's Icon. Pl. 23: t. 2290. 1894.

喙齿系 hui chi xi

Herbs moderately tall. Roots fusiform. Leaves almost all basal; leaf blade pinnatisect. Inflorescences centrifugal. Calyx lobes 5. Corolla large; galea projected into a broad beaklike apex, with several marginal teeth on each side.

•One species: endemic to China.

316. *Pedicularis rhynchodonta* Bureau & Franchet, J. Bot. (Morot) 5: 108. 1891.

喙齿马先蒿 hui chi ma xian hao

Pedicularis rhynchodonta Bureau & Franchet f. *maxima* Bonati.

Herbs perennial, 10–20(–30) cm tall, drying black. Roots fascicled. Stems dark purple, shiny, pubescent when young, glabrescent. Leaves mostly basal, in a rosette; petiole 2–4(–7) cm; leaf blade linear-oblong to lanceolate-oblong, 3–5 (–11) cm, abaxially sparsely long pubescent, adaxially glabrous, pinnatisect; segments 12–26 pairs, triangular to ovate-

oblong, pinnatifid to incised-dentate. Stem leaves few, alternate, smaller than basal leaves. Inflorescences 3–7(–9) cm; bracts slightly longer than calyx. Pedicel short, sparsely pubescent. Calyx ca. 1.1 cm, slightly cleft anteriorly; lobes 5, ± equal, serrate. Corolla purple-red, 2–2.2 cm; tube ca. as long as calyx; galea bent apically, 1–1.2 cm, truncate, proximal teeth most

distinct and longest; lower lip slightly shorter than galea, praemorse-serrulate and ciliate. Filaments 2 pubescent, 2 glabrous. Capsule lanceolate-ovoid, ca. 1.4 cm. Fl. May–Jun, fr. Jun–Aug.

- Alpine meadows, grassy slopes; 3700–4700 m. SW and W Sichuan.

106. Ser. Filiculae H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 9. 1949.

拟蕨系 ni jue xi

Herbs mostly low. Roots fleshy. Leaves almost all basal; stem leaves alternate; petiole long; blade pinnatifid to pinnatisect. Inflorescences racemose, centrifugal, or flowers axillary. Calyx 5-lobed. Corolla large; tube less than 2 × as long as calyx; beak short, sometimes dentate apically; lower lip often less than 1.2 cm wide.

Nine species: Bhutan, China, Nepal, Sikkim; eight species in China.

1a. Corolla purple-red to red throughout.

2a. Leaf segments 10–25 pairs; beak of corolla dentate apically; calyx 1.1–1.3 cm.

3a. Leaves 2–3 cm, pinnatifid; lower corolla lip not ciliate; filaments pubescent; capsule lanceolate, ca. 2 cm

..... 318. *P. wallichii*

3b. Leaves 2–6 cm, pinnatisect; lower corolla lip ciliate; filaments 2 pubescent, 2 glabrous; capsule oblong,

ca. 1.2 cm 319. *P. filicula*

2b. Leaf segments 5–11 pairs; beak of corolla 2-cleft apically; calyx 5–11 mm.

4a. Corolla ca. 2.5 cm; lower lip not ciliate; leaves pinnatifid to pinnatipartite 321. *P. tsangchanensis*

4b. Corolla ca. 1.6 cm; lower lip ciliate; leaves pinnatipartite to pinnatisect 322. *P. anomala*

1b. Corolla white to yellow at least on throat.

5a. Corolla yellowish white; leaf segments 3–5 pairs; filaments pubescent 320. *P. potaninii*

5b. Corolla bicolored; leaf segments 6–20 pairs; filaments 2 pubescent.

6a. Corolla yellow with purple beak; leaf segments 10–20 pairs 319. *P. lecomtei*

6b. Corolla red with yellowish white throat; leaf segments 6–13 pairs.

7a. Leaf blade oblong, 1.5–3 cm, pinnatisect; inflorescences ca. 10-flowered 323. *P. filiculiformis*

7b. Leaf blade lanceolate-oblong, 0.7–1.5 cm, pinnatipartite; inflorescences ca. 7- or 8-flowered 324. *P. takpoensis*

317. *Pedicularis lecomtei* Bonati, Bull. Soc. Bot. France 55: 543. 1908.

勒公氏马先蒿 le gong shi ma xian hao

Herbs perennial, 5–12 cm tall, drying black. Roots fascicled, fusiform. Stems unbranched, rust colored villous. Leaves barely all basal; petiole 3–4 cm, pubescent; leaf blade oblong-lanceolate to linear-lanceolate, 3–5.5 cm × 6–11 mm, abaxially densely white scurfy, adaxially glabrescent, pinnatipartite; segments 10–20 pairs, ovate to long ovate, pinnatifid or incised-dentate. Inflorescences racemose, 4–5 cm; proximal bracts leaflike. Pedicel 1–1.5 cm, slender, densely rust colored villous. Calyx 1–1.5 cm, villous, slightly cleft anteriorly; lobes 5, unequal, leaflike. Corolla yellow, with purple beak, 3–3.5 cm; tube straight, 1.2–2.2 cm, glabrous; galea ± falcate apically; beak 2–2.5 mm, indistinctly marginally 1- or 2-toothed near apex; lower lip ca. 1.1 × 1.6 cm, not ciliate. Anterior filament pair densely villous. Fl. Jun–Jul, fr. Jul–Aug.

- Rocky slopes; ca. 3500 m. NW Yunnan.

318. *Pedicularis wallichii* Bunge in Walpers, Repert. Bot. Syst. 3: 415. 1844.

瓦氏马先蒿 wa shi ma xian hao

Herbs perennial, 3.5–12 cm tall, drying black. Roots fleshy, fusiform. Stems single, unbranched. Basal leaves few, 1–4. Petiole 2–6 cm. Stem leaves 1–3, linear-lanceolate, 2–3 cm × 2.5–5 mm, pinnatifid; segments 12–25 pairs, ovate-lanceolate, sinuate-dentate. Inflorescences racemose, 2–5-flowered; bracts leaflike, ca. 1.6 cm. Pedicel short. Calyx ca. 1.3 cm, glabrous, slightly cleft anteriorly; lobes 5, lanceolate, equal. Corolla purple-red; tube 1.6–1.8 cm; galea falcate; beak ca. 3.5 mm, truncate apically, denticulate; lower lip ca. 1.6 cm wide, glabrous, sinuate-dentate. Filaments pubescent apically. Capsule obliquely lanceolate, ca. 2 cm × 7.5 mm. Fl. Jun–Aug, fr. Aug.

Alpine meadows; 3800–4800 m. S and SE Xizang [Bhutan, Nepal]. This might be *Pedicularis tantalorhynchoides* T. Yamazaki, since *P. wallichii* is W Himalayan. Further study is needed on Chinese specimens labelled as *P. wallichii*.

319. *Pedicularis filicula* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 573. 1888.

拟蕨马先蒿 ni jue ma xian hao

Herbs perennial, 5–18 cm tall, drying dark black. Roots fleshy, fusiform, fascicled. Stems 3 or 4(–6), unbranched, with 2 or 3 lines of densely rust colored hairs. Leaves mostly basal, usually in a dense rosette; petiole 2–4 cm, sparsely pubescent apically; leaf blade linear-lanceolate, 2–6 cm × 5–13 mm, abaxially white scurfy, adaxially glabrous, pinnatisect; segments 10–25 pairs, lanceolate-ovate, margin double dentate. Stem leaves few, smaller than basal leaves or absent. Inflorescences 2–3(–10) cm, centrifugal, usually densely pubescent, with long rust colored hairs. Pedicel 1–3 mm. Calyx 1.1–1.3 cm; lobes 5, unequal, leaflike. Corolla purple-red; tube ca. as long as calyx; galea bent at a right angle apically; beak 3–4 mm, truncate apically, denticulate; lower lip ca. 1 cm, ciliate, erose. Filaments glabrous or anterior pair sparsely pubescent. Capsule oblong, ca. 1.2 cm × 5 mm. Fl. May–Jul, fr. Jul–Aug.

• Alpine meadows; 2800–4900 m. SW Sichuan, Yunnan.

- 1a. Beak of corolla 3–4 mm; middle lobe of lower lip smaller than lateral lobes; anterior filament pair sparsely pubescent, posterior pair glabrous 319a. var. *filicula*
1b. Beak of corolla less than 3 mm; middle lobe of lower lip larger than lateral lobes; filaments glabrous 319b. var. *saganaica*

319a. *Pedicularis filicula* var. *filicula*

拟蕨马先蒿(原变种) ni jue ma xian hao (yuan bian zhong)

Corolla beak 3–4 mm; middle lobe of lower lip smaller than lateral lobes. Anterior filament pair sparsely pubescent.

• Alpine meadows; 2800–4900 m. NW Yunnan.

319b. *Pedicularis filicula* var. *saganaica* Handel-Mazzetti, Symb. Sin. 7: 858. 1936.

木里拟蕨马先蒿 mu li ni jue ma xian hao

Corolla beak less than 3 mm; middle lobe of lower lip larger than lateral lobes. Filaments glabrous.

• SW Sichuan, Yunnan.

320. *Pedicularis potaninii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 570. 1888.

波氏马先蒿 bo shi ma xian hao

Herbs perennial, 5–8 cm tall, glabrous except for ciliate leaf sheath and calyx. Roots fleshy. Stem single, unbranched, drying black. Leaves almost all basal, ca. as long as stems; petiole several × as long as leaf blade, sulcate; leaf blade ovate, 2–3.5 × 0.8–1.3 cm; segments 3–5 pairs, obovate, incised-dentate. Inflorescence subcapitate, glabrous; bracts opposite, leaflike, with short dilated petioles. Calyx oblong, 0.9–1.1 mm, thin; lobes 5, unequal, rounded, short, incised-serrate. Corolla yellowish white, 1.8–2 cm; tube erect, longer than calyx; galea bent at a right angle; beak falcate, conical, short, 4–6 mm; lower lip rounded, ca. as long as galea, wider than long, middle lobe smaller than

lateral pair, slightly projecting. Filaments pubescent, anterior pair densely so. Fl. Jun.

• Forests. S Gansu.

321. *Pedicularis tsangchanensis* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 571. 1888.

苍山马先蒿 cang shan ma xian hao

Herbs perennial, 8–15 cm tall, drying black. Roots linear, slightly fleshy. Stems usually 2 or 3, ascending, unbranched, ± pubescent, with 1 or 2 lines of hairs. Basal leaf petiole ca. 3 cm, pubescent; leaf blade ovate-oblong to lanceolate-oblong, ca. 4 × 1.3 cm, abaxially densely long pubescent along midvein, adaxially slightly pubescent, pinnatifid to pinnatipartite; segments 6–11 pairs, crenate-dentate. Stem leaves alternate, sometimes pseudo-opposite, shorter petiolate; leaf blade ca. 3.5 × 1.5 cm. Inflorescences racemose, centrifugal; proximal bracts leaflike, distal ones linear, ca. as long as calyx. Pedicel ca. 1 cm basally, slender, pubescent. Calyx 1–1.1 cm, slightly cleft anteriorly, densely pubescent; lobes 5, unequal, dentate. Corolla red, ca. 2.5 cm; tube erect, ca. 1.6 cm, sparsely pubescent; galea bent apically; beak ca. 5 mm, 2-cleft apically; lower lip ca. 1.3 × 1.2 cm, glabrous, erose-dentate. Anterior filament pair pubescent.

• About 4000 m. NW Yunnan.

322. *Pedicularis anomala* P. C. Tsoong & H. P. Yang, Acta Phytotax. Sin. 18: 243. 1980.

奇异马先蒿 qi yi ma xian hao

Herbs perennial, ca. 30 cm tall, ± drying black. Roots conical. Stems 1, 3, or 4, branched. Basal leaves withering early, long petiolate. Stem leaves alternate; petiole 0.5–1.5 cm; leaf blade oblong to oblong-ovate, 1–4 cm, abaxially densely white scurfy, pinnatipartite to pinnatisect; segments 5–9 pairs, obliquely ovate to oblong, serrate. Inflorescences centrifugal, subcapitate, lax basally; bracts leaflike. Pedicel 4–8 mm. Calyx 5–8 mm, densely white villous, 1/3 cleft anteriorly; lobes 5, unequal, ± flabellate, 3–5-cleft. Corolla bright red, ca. 1.6 cm; tube erect, longer than calyx; galea falcate apically; beak bent downward, straight, ca. 4 mm, slightly 2-cleft; lower lip ciliate. Anterior filament pair villous. Capsule ovoid, ca. 1.2 cm. Fl. Jul–Aug, fr. Aug–Sep.

• *Abies* forests; 3200–3800 m. E Xizang.

323. *Pedicularis filiculiformis* P. C. Tsoong, Acta Phytotax. Sin. 3: 275. 1955.

假拟蕨马先蒿 jia ni jue ma xian hao

Herbs perennial, ca. 12 cm tall, glabrous, drying black. Roots numerous, fleshy. Stems 1 to several, with dense, lanceolate, membranous scales at base. Leaves mostly basal; petiole to 4 cm, glabrous; leaf blade oblong, 1.5–3 cm × 5–11 mm, abaxially white scurfy, adaxially glabrous, pinnatisect; segments 6–13 pairs, oblong, margin double dentate. Stem leaves 3 or 4, shorter petiolate and smaller than basal leaves. Inflorescences racemose, to more than 6 cm, ca. 10-flowered, centrifugal; bracts leaflike. Calyx ca. 7 mm; lobes 5,

unequal. Corolla red, with deep red galea and yellowish white throat, 2–2.2 cm; tube erect, bent at a right angle apically, 1.4–1.5 cm; beak ca. 4 mm, slightly 2-cleft apically; lower lip ca. 9 × 9 mm. Anterior filament pair pubescent. Fl. Jul, fr. Aug.

Shaded or damp places, rocky hillsides; ca. 4700 m. SE Xizang [Bhutan].

Chinese plants belong to var. *filiculiformis* (endemic); var. *dolichorhyncha* P. C. Tsoong is endemic to Bhutan.

324. *Pedicularis takpoensis* P. C. Tsoong, Acta Phytotax. Sin. 3: 276. 1955.

塔布马先蒿 ta bu ma xian hao

Herbs perennial, to 9 cm tall, drying black. Roots fleshy. Stems usually numerous, red, with 2 or 3 lines of sparse hairs. Basal leaves long petiolate, glabrous; leaf blade

lanceolate-oblong, 0.7–1.5 cm × 3–5 mm, abaxially white scurfy, adaxially glabrous, pinnatipartite; segments 7 or 8 pairs, crenate-dentate. Stem leaves smaller than basal leaves; segments 3–5 pairs. Inflorescences racemose, 7- or 8-flowered, centrifugal; bracts leaflike. Calyx tube ca. 5 mm, slightly cleft anteriorly, pubescent; lobes 5, unequal. Corolla red, with deeply red galea apically and white throat, 1.8–2 cm; tube ca. 1.5 cm, glabrous; galea ± bent at a right angle apically; beak bent downward, straight, 5–5.5 mm, slender; lower lip 9–10 mm × ca. 1.2 cm. Anterior filament pair slightly pubescent. Fl. Jun, fr. Jul.

• Open rocky slopes; ca. 4500 m. SE Xizang.

107. Ser. *Macrorhyncha* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 9. 1949.

长喙系 chang hui xi

Stems single or few. Leaves often almost all basal. Inflorescences long spicate, centrifugal. Calyx 5-lobed. Corolla tube slightly less than 2 × as long as calyx; galea erect, more than 3 × as long as lower lip; beak long, more than 3 × as long as lower lip, slender, often S-shaped; lower lip very small.

• One species: endemic to China.

325. *Pedicularis macrorhyncha* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 108. 1949.

长喙马先蒿 chang hui ma xian hao

Herbs perennial, 15–25 cm tall, drying black. Roots fleshy. Stems usually single, puberulent. Basal leaves few; petiole 1–2 cm; leaf blade lanceolate-linear to lanceolate-oblong, 2.5–9 × 0.4–2 cm, abaxially pubescent along veins, adaxially puberulent, pinnatisect; segments 10–18 pairs, ovate-lanceolate to lanceolate, margin double dentate. Stem leaves few or absent, alternate or sometimes pseudo-opposite. Inflorescences

centrifugal, 7–18 cm; bracts leaflike. Pedicel 1–3 mm. Calyx tubular, ca. 1.1 cm, ca. 1/4 cleft anteriorly, pubescent; lobes 5, equal or slightly unequal, dentate. Corolla purplish red, ca. 3.2 cm; tube erect basally, ± bent at a right angle apically, ca. 1.8 cm; galea erect; beak 1.6–1.8 cm, S-curved; lower lip shorter than galea, glabrous. Filaments pubescent. Capsule narrowly triangular-ovoid, 1.4–1.7 cm. Fl. May–Sep, fr. Sep–Oct.

• Alpine meadows, open hillsides; 3500–3800 m. NW Yunnan.

108. Ser. *Robustae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 69. 1890.

壮健系 zhuang jian xi

Herbs low, sometimes ± stemless. Leaves alternate, pinnatifid. Inflorescences racemose. Calyx 1/3 cleft anteriorly, 5-lobed. Corolla tube not or slightly longer than calyx; beak straight or ± coiled, usually downward uncinat, 2-cleft apically; lower lip large, often wider than long.

Four species: Bhutan, China, Sikkim; three species in China.

1a. Beak of corolla coiled, ca. 7.5 mm; corolla tube 2.2–3 cm; leaf blade 3.5–6 cm 328. *P. garckeana*

1b. Beak of corolla straight, 4–5 mm; corolla tube 1–1.6 cm; leaf blade 2–3 cm.

2a. Stems erect; leaf blade linear, segments 12–20 pairs; pedicel 25–60 mm 326. *P. daltonii*

2b. Stems ascending; leaf blade narrowly oblong, segments 8–10 pairs; pedicel 4–9 mm 327. *P. robusta*

326. *Pedicularis daltonii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 58(2): 270. 1889.

道氏马先蒿 dao shi ma xian hao

Herbs perennial, 2–6 cm tall, densely pubescent, drying ± black. Stems 2–20, erect, unbranched. Leaves alternate; petiole 2–4 cm; leaf blade linear, ca. 2.5 cm × 5 mm, pinnatifid; segments 12–20 pairs, ovate, apiculate-dentate. Inflorescences racemose, dense.

Pedicel to 2.5–6 cm. Calyx 1–1.2 cm, 1/3 cleft anteriorly, densely pubescent; lobes 5, unequal, serrate. Corolla tube ca. 1.6 cm, externally puberulent; galea

strongly bent apically; beak straight, ca. 5 mm, slender, bent slightly downward apically, 2-cleft at apex; lower lip 1.8–2 cm wide, lobes rounded, erose-serrulate.

Filaments pubescent. Capsule obliquely oblong, ca. 2 cm × 6 mm, exceeding calyx, apiculate. Seeds ovoid. Fl. Jul–Aug, fr. Aug.

Alpine meadows; 4500–5500 m. S and SE Xizang [Bhutan, Sikkim].

327. *Pedicularis robusta* J. D. Hooker, Fl. Brit. India 4: 306. 1884.

壮健马先蒿 zhuang jian ma xian hao

Herbs perennial, 2–6 cm tall, densely pubescent, drying black. Stems ascending. Leaves alternate; petiole 1–2 cm; leaf blade narrowly oblong, 2–3 cm × ca. 5 mm,

pinnatifid; segments 8–10 pairs, ovate, crenate-dentate. Inflorescences dense. Pedicel 4–9 mm. Calyx ca. 1 cm × 4.5 mm, pubescent; lobes 5, equal, oblong, serrate. Corolla tube not exceeding calyx; galea falcate, ca. 1.2 cm; beak barely 4 mm, apex pointing downward, 2-cleft; lower lip 1.5–1.6 cm wide, lobes rounded, ± equal. Filaments long pubescent. Capsule obliquely oblong, ca. 1.8 cm × 5 mm, short apiculate. Seeds ovoid. Fl. and fr. Aug–Sep.

About 5300 m. S and SE Xizang [Sikkim].

328. *Pedicularis garckeana* Prain ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 529. 1888.

嘎克什马先蒿 *ga ke shi ma xian hao*

Herbs perennial, 6–16 cm tall, drying black. Roots fusiform, fleshy. Stems erect, slender, leafy. Leaves alternate; petiole 2–3 cm, sheathlike, enlarged basally; leaf blade linear, 3.5–6 cm × ca. 5 mm, pinnatifid; segments 12–20 pairs, ovate, apiculate-dentate.

Inflorescences centrifugal, dense. Pedicel 0.8–1.8 cm. Calyx cylindrical-campanulate, hirsute; tube 1.4–1.6 cm; lobes 5, unequal, serrate. Corolla purple, red, rose, or pink; tube 2.2–3 cm, externally minutely pubescent; beak of galea coiled, ca. 7.5 mm, slender; lower lip 1.8–2 cm, middle lobe oblong, smaller than lateral lobes, placed slightly apically. Filaments pubescent, anterior pair denser. Capsule obliquely oblong, ca. 2.2 cm, ca. 1/2 as long as calyx. Fl. Jul. $2n = 16$.

S Xizang [Sikkim].

109. Ser. *Macranthae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 69. 1890.

大花系 *da hua xi*

Leaves mostly pseudo-opposite, lanceolate; petiole long. Calyx deeply cleft anteriorly, 5-lobed. Corolla tube short, slightly exceeding calyx; beak ± coiled, long, usually deeply 2-cleft; lower lip usually more than 1.5 cm wide.

Four species: China, Himalayas; one species in China.

329. *Pedicularis insignis* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 109. 1921.

显著马先蒿 *xian zhu ma xian hao*

Herbs perennial, to 18 cm tall, densely gray downy throughout, drying black. Stems 1 to several, cespitose, unbranched. Basal leaves forming a sparse rosette.

Petiole 1.5–5 cm; leaf blade lanceolate-oblong to linear-lanceolate or ovate-oblong, 5–7 × 0.7–2 cm, abaxially densely brown villous along veins, adaxially densely ciliolate, pinnatifid; segments 9–19 pairs, ovate-triangular to triangular, crenate-dentate. Stem leaves few, usually pseudo-opposite, smaller than basal leaves. Inflorescences racemose, 4–11 cm; proximal bracts

leaflike, shorter than flowers. Pedicel erect, 1–1.5 cm, densely villous. Calyx cylindrical, 0.8–1.2 cm, cleft 1/2 anteriorly, densely villous; lobes 5, unequal. Corolla purple-red; tube slightly expanded and curved apically, ca. 1.4 cm, pubescent; galea prominently crested, marginally 1-toothed on each side; beak strongly curved; lower lip ca. 9 mm × 1.7 cm, lobes rounded. Filaments pubescent. Capsule ovoid. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine meadows; 4200–4700 m. SE Xizang, NW Yunnan.

110. Ser. *Pumiliones* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 69. 1890.

低矮系 *di ai xi*

Herbs low, some stemless, pubescent. Leaves in a rosette, narrowly oblong, ± entire or mostly pinnatifid. Calyx tube very narrow, long, 2-, 3-, or 5-lobed. Corolla tube very long; galea beaked; lower lip large.

Two species: Bhutan, China, Sikkim; both species in China.

1a. Middle lobe of lower corolla lip rounded, emarginate; beak of galea straight, 5–6 mm, 2-cleft; leaves 1.5–4 cm,

with segment pairs 9–30 330. *P. przewalskii*

1b. Middle lobe of lower corolla lip oblong-ovate; beak of galea ± S-shaped, ca. 8 mm, entire; leaves 1–1.5 cm, with

segment pairs 3–9 or entire 331. *P. bella*

330. *Pedicularis przewalskii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 55. 1877.

普氏马先蒿 *pu shi ma xian hao*

Herbs perennial, 6–12 cm tall, slightly drying black or not. Roots numerous, fascicled, ± fusiform. Stems 1–3, 1–2 cm tall or absent. Leaves mostly basal; petiole 0.1–2.5 cm, glabrous; leaf blade lanceolate-linear, 1.5–4 cm × 1.5–8 mm, adaxially glabrous to densely pubescent, sometimes glandular pubescent, pinnatifid; segments 9–30 pairs, crenate-dentate. Inflorescences centrifugal, 3-

to more than 20-flowered. Calyx ca. 1.1 cm, 2/5 cleft anteriorly; lobes 2, 3, or 5, unequal, grouped posteriorly, serrate apically, long ciliate. Corolla purple-red throughout or with yellowish white throat or white to cream with purple beak; tube 3–3.5 cm, long pubescent; galea bent at a right angle apically, stout, crested or not in front; beak straight, 5–6 mm, slender, deeply 2-cleft with linear lobes, to 3 mm; lower lip deeply lobed, lobes ± equal, middle lobe rounded to emarginate.

Filaments pubescent. Capsule obliquely oblong, ca. as long as calyx, apiculate. Fl. Jun–Jul, fr. Jul–Sep.

• Alpine meadows; 4000–5300 m. S Gansu, E Qinghai, W Sichuan, S and SE Xizang, NW Yunnan.

- 1a. Leaf blade sparsely pubescent to glabrous adaxially 330a. subsp. *przewalskii*
1b. Leaf blade densely pubescent.
2a. Calyx lobes usually 2 or 3; leaf blade glandular pubescent 330d. subsp. *microphyton*
2b. Calyx lobes 5; leaf blade not glandular pubescent.
3a. Leaf blade ca. 1.5 cm × 5 mm; corolla purple-red throughout 330b. subsp. *australis*
3b. Leaf blade ca. 2.2 cm × 8 mm; corolla purple-red, except beak of galea, becoming pale when dry 330c. subsp. *hirsuta*

330a. *Pedicularis przewalskii* subsp. *przewalskii*
普氏马先蒿(原亚种) pu shi ma xian hao (yuan ya zhong)

Leaf blade 3–3.5 cm × 4–8 mm, sparsely pubescent to glabrous adaxially, sparsely glandular. Calyx lobes 5. Corolla purple; tube partly long pubescent or glabrous or minutely glandular.

• Alpine meadows; 4000–5000 m. S Gansu, E Qinghai, W Sichuan, S Xizang.

This subspecies includes two varieties: var. *przewalskii* with a purple-red corolla, usually yellowish white throat, and uncrested galea; and var. *cristata* (H. L. Li) P. C. Tsoong with a white to cream colored corolla, a purple beak, and usually crested galea.

330b. *Pedicularis przewalskii* subsp. *australis* (H. L. Li) P. C. Tsoong, Acta Phytotax. Sin. 3: 277. 1955.
南方普氏马先蒿 nan fang pu shi ma xian hao
Pedicularis przewalskii var. *australis* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 113. 1949.

Leaf blade ca. 1.5 cm × 5 mm, densely pubescent, eglandular. Calyx lobes 5. Corolla purple-red throughout; tube long pubescent.

• Alpine meadows; 4300–5300 m. SE Xizang, NW Yunnan.

330c. *Pedicularis przewalskii* subsp. *hirsuta* (H. L. Li) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 352. 1963.

粗毛普氏马先蒿 cu mao pu shi ma xian hao

Pedicularis przewalskii var. *hirsuta* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 113. 1949.

Leaf blade ca. 2.2 cm × 8 mm, densely pubescent, eglandular. Calyx lobes 5. Corolla purple-red except beak, becoming pale when dry.

• Alpine meadows; ca. 4100 m. NW Yunnan.

330d. *Pedicularis przewalskii* subsp. *microphyton* (Bureau & Franchet) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 353. 1963.

矮小普氏马先蒿 ai xiao pu shi ma xian hao

Pedicularis microphyton Bureau & Franchet, J. Bot. (Morot) 5: 107. 1891; *P. przewalskii* var. *microphyton* (Bureau & Franchet) P. C. Tsoong.

Leaf blade ca. 2 cm × 2–4 mm, densely glandular pubescent. Calyx lobes usually 2 or 3. Corolla with purple-red galea and white to pale yellow lower lip, not ciliate; tube appressed hirsute; lower lip not ciliate.

• Alpine meadows; 4200–4800 m. W Sichuan, SE Xizang.

This subspecies includes two varieties: var. *microphyton* (Bureau & Franchet) P. C. Tsoong with a purple-red galea and white to pale yellow lower corolla lip that is not ciliate; and var. *purpurea* (Bonati) P. C. Tsoong with a purple corolla and ciliate lower lip.

331. *Pedicularis bella* J. D. Hooker, Fl. Brit. India 4: 313. 1884.

美丽马先蒿 mei li ma xian hao

Herbs annual, barely 8 cm tall, not drying black. Roots long conical, ± woody. Stems 0.1–3 cm tall, numerous, cespitose, white pubescent. Leaves mostly basal; petiole 0.5–2 cm, sheathlike dilated base, slightly pubescent; leaf blade ovate-lanceolate, 1–1.5 cm, pinnatifid or entire; segments 3–9 pairs, crenate-dentate, abaxially whitish pubescent, adaxially densely pubescent. Flowers axillary, 1–14. Pedicel 3–7 mm, densely long whitish pubescent. Calyx 1.2–1.5 cm × ca. 5 mm, densely white pubescent, 1/3 cleft anteriorly; lobes 5, unequal. Corolla dark purple throughout or some with pale yellow tube, purple galea, and white lower lip; tube 2.8–3.4 cm, pubescent; galea falcate; beak ± S-shaped, ca. 8 mm, not 2-cleft at apex; lower lip 2–2.4 cm wide, middle lobe oblong-ovate, much smaller than lateral pair. Filaments pubescent. Capsule obliquely oblong, ca. 2 × as long as calyx. Fl. Jun–Jul, fr. Jul–Sep.

Meadows, steep rocky slopes among dwarf *Rhododendron*, cliff faces; 3600–4900 m. S and SE Xizang [Bhutan, Sikkim].

- 1a. Leaf blade pinnatifid 331a. subsp. *bella*
1b. Leaf blade ± entire 331b. subsp. *holophylla*

331a. *Pedicularis bella* subsp. *bella*

美丽马先蒿(原亚种) mei li ma xian hao (yuan ya zhong)

Leaf blade pinnatifid.

Moist meadows; 4200–4900 m. S Xizang [Bhutan, Sikkim].

331b. *Pedicularis bella* subsp. *holophylla* (Marquand & Shaw) P. C. Tsoong, Acta Phytotax. Sin. 3: 277. 1955.

全叶美丽马先蒿 quan ye mei li ma xian hao

Pedicularis bella J. D. Hooker var. *holophylla* Marquand & Shaw, J. Linn. Soc., Bot. 48: 211. 1929.

Leaf blade ± entire.

• Steep rocky slopes among dwarf *Rhododendron*, cliff faces, alpine meadows; 3600–4400 m. SE Xizang.

This subspecies includes var. *holophylla* with a dark purple or rarely pale red corolla, and var. *crisifrons* P. C. Tsoong with a pale yellow corolla tube, purple galea, and white lower lip.

111. Ser. Longiflorae Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 67. 1890.

长花系 chang hua xi

Herbs often low. Basal leaves often persistent, long petiolate. Stem leaves alternate, numerous, lanceolate-oblong, often pinnatipartite. Inflorescences centrifugal. Calyx lobes 2, 3, or 5, unequal. Corolla tube very long, more than 2 × as long as calyx; galea beaked; lower lip spreading.

About 21 species: China, India, Kazakstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Sikkim, Tajikistan, Turkmenistan, Uzbekistan; 18 species in China.

- 1a. Corolla yellow throughout or with red galea and white lower lip margins, galea ± coiled but not twisted.
2a. Corolla yellow, with red galea and white margin on lower lip; lower lip to 3 cm wide 334. *P. tricolor*
2b. Corolla usually yellow throughout; lower lip less than 2.6 cm wide.
3a. Leaves pinnatisect; corolla tube 2.5–3 cm; calyx lobes (2 or)3 332. *P. croizatiana*
3b. Leaves pinnatifid to pinnatipartite, some merely undulate-lobed; corolla tube more than 4 cm;
calyx
lobes usually 2, some 3.
4a. Galea crested in front; corolla tube less than 3 × as long as calyx; calyx lobes 3 333. *P. cranolopha*
4b. Galea not crested in front; corolla tube 3–10 × as long as calyx; calyx lobes usually 2.
5a. Galea bent at a right angle, beak ca. 15 mm 338. *P. armata*
5b. Galea curving gradually, beak 6–10 mm.
6a. Lobes of lower corolla lip emarginate; beak of galea 2-cleft at apex; plants
glabrescent 336. *P. longiflora*
6b. Lateral lobes of lower corolla lip rounded, not emarginate; beak of galea entire at
apex;
plants pubescent.
7a. Leaves basal and on stem, leaf blade to 7 × 1.8 cm; corolla tube 4.5–5 cm; galea
slightly
bent apically, forming nearly a circle, beak strongly curved 335. *P. chinensis*
7b. Leaves basal, leaf blade ca. 5 × 1 cm; corolla tube ca. 7.5 cm; galea curving
downward
into a horseshoe-shape, beak nearly straight 337. *P. bidentata*
- 1b. Corolla purple, with purple galea; galea twisted.
8a. Middle lobe of lower corolla lip emarginate to deeply 2-lobed.
9a. Beak of corolla ca. 5 mm, ± semicircular; leaves pinnatipartite to pinnatisect 339. *P. latituba*
9b. Beak of corolla 7–15 mm, usually S-shaped; leaves pinnatisect.
10a. Calyx 5–6 mm, lobes 2; corolla tube 1–2.5 cm; plants low, with short creeping stems 341. *P. humilis*
10b. Calyx more than 10 mm, lobes 2 or 3(–5); corolla tube more than 3 cm; plants tall or short.
11a. Beak of galea 1–1.5 mm; all filaments pubescent 348. *P. sigmoidea*
11b. Beak of galea to 11 mm; filaments 2 pubescent, 2 glabrous 349. *P. siphonantha*
- 8b. Middle lobe of lower corolla lip entire, truncate, or rounded.
12a. Corolla white, some with a purple galea.
13a. Corolla white with purple galea 342. *P. variegata*
13b. Corolla white throughout.
14a. Calyx lobes 3–5; corolla tube 5–6 × as long as calyx; filaments 2 pubescent, 2
glabrous 344. *P. leptosiphon*
14b. Calyx lobes 2; corolla tube 8–9 × as long as calyx; all filaments pubescent 345. *P. paxiana*
- 12b. Corolla red, rose, to purple throughout (corolla of *P. fastigiata* is rose with a deep red galea).
15a. Calyx 12–24 mm, lobes usually 2; leaves usually pinnatifid to pinnatipartite.
16a. Corolla tube to 12 cm; all filaments pubescent 340. *P. decorissima*
16b. Corolla tube 3–5 cm; filaments 2 pubescent, 2 glabrous 346. *P. dolichantha*
- 15b. Calyx 7–10 mm, lobes 3; leaves pinnatisect.
17a. Corolla tube 3.5–4 cm; beak of galea semicircular; all filaments glabrous 343. *P. fastigiata*
17b. Corolla tube 8–11 cm; beak of galea S-shaped; anterior filament pair pubescent
apically,
others glabrous 347. *P. tenuituba*

332. *Pedicularis croizatiana* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 187. 1949.

克洛氏马先蒿 ke luo shi ma xian hao

Herbs perennial, 5–21 cm tall, drying slightly black. Stems usually numerous, unbranched, ascending or procumbent, densely pubescent. Leaves alternate,

sometimes ± opposite; petiole 1–2.5 cm, pubescent; leaf blade lanceolate-linear to ± ovate-oblong, 2–4.5 cm × 5–10 mm, glabrous except for pubescent midvein, pinnatisect; segments 9–12 pairs, ovate-triangular to oblong-lanceolate, margin double dentate. Flowers axillary; bracts pubescent. Pedicel 1–1.8 mm, long pubescent. Calyx 1–1.3 cm, 1/3 cleft anteriorly, long pubescent; lobes (2 or)3, unequal, posterior one smallest, lateral pair incised-double dentate. Corolla yellow, 3.3–4 cm; tube 2.5–3 cm, sparsely pubescent; galea falcate apically, conspicuously crested in front; beak ± coiled, ca. 5 mm; lower lip 0.9–1.5 × 1.5–2.1 cm, ciliate, lobes ± equal, emarginate. Filaments densely pubescent apically. Fl. Jul–Aug, fr. Aug–Sep.

• *Pinus* forests; alpine meadows; 3700–4200 m. SW Sichuan, SE Xizang.

333. *Pedicularis cranolopha* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 55. 1877.

凸额马先蒿 tu e ma xian hao

Herbs perennial, 5–23 cm tall, ± pubescent, not drying black. Stems usually cespitose, spreading, unbranched, with 1 or 2 lines of hairs. Basal leaves sometimes withering early; petiole to 3 cm; leaf blade oblong-lanceolate to lanceolate-linear, to 6 × 1.5 cm, pinnatisect; segments to 15 pairs, ovate to lanceolate-oblong, pinnatifid to double dentate. Stem leaves alternate or sometimes proximal ones pseudo-opposite. Inflorescences racemose, few-flowered; bracts leaflike. Calyx 1.2–2 cm, 2/5–1/2 cleft anteriorly, glabrous or slightly pubescent; lobes 3, subequal to unequal, posterior ones sometimes smallest, entire, lateral pair leaflike. Corolla yellow, 4–5 cm, pubescent; tube less than 3 × as long as calyx; galea falcate apically; beak slightly semicircular, 7–8 mm; lower lip ca. 1.3 × 2 cm, densely ciliate, middle lobe emarginate. Filaments densely pubescent. Fl. Jun–Jul, fr. Aug.

• Alpine meadows; 2600–4200 m. SW Gansu, NE Qinghai, Sichuan, NW Yunnan.

1a. Calyx tube ± reticulate veined apically, posterior lobe very small 333a. var. *cranolopha*

1b. Calyx tube not reticulate veined, posterior lobe usually larger.

2a. Crest on galea modified into a prominent, slender, attenuate process 333b. var. *longicornuta*

2b. Crest on galea smaller, a mere bulge, not elongated into a pointed process 333c. var. *garnieri*

333a. *Pedicularis cranolopha* var. *cranolopha*

凸额马先蒿(原变种) tu e ma xian hao (yuan bian zhong)

Calyx tube ± reticulate veined apically; posterior lobe very small.

• Alpine meadows; ca. 3800 m. SW Gansu, NE Qinghai, N Sichuan.

333b. *Pedicularis cranolopha* var. *longicornuta* Prain, Hooker's Icon. Pl. 23: t. 2208B. 1894.

长角凸额马先蒿 chang jiao tu e ma xian hao

Pedicularis birostris Bureau & Franchet.

Calyx tube not reticulate veined; posterior lobe usually large. Galea crest modified into a slender attenuate process.

• Alpine meadows; 2600–4200 m. SW Gansu, NE Qinghai, Sichuan, NW Yunnan.

333c. *Pedicularis cranolopha* var. *garnieri* (Bonati) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 359. 1963.

格氏凸额马先蒿 ge shi tu e ma xian hao

Pedicularis garnieri Bonati, Bull. Soc. Bot. France 55: 243. 1908.

Calyx tube not reticulate veined; posterior lobe usually large. Galea crest short, not elongated into a prominent pointed process.

• W Sichuan.

334. *Pedicularis tricolor* Handel-Mazzetti, Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 59: 250. 1922.

三色马先蒿 san se ma xian hao

Herbs annual, less than 5 cm tall. Stems 1 to several, unbranched, central stem erect, outer stems procumbent, longer, glabrous. Basal leaves numerous; petiole 1.5–4 cm; leaf blade lanceolate, 2.5–4.5 × 0.7–1.2 cm, glabrous, abaxially sparsely white scurfy, pinnatipartite; segments 11–14 pairs, lanceolate, incised-dentate. Stem leaves usually 2, opposite. Inflorescences racemose, to 15-flowered; bracts leaflike. Pedicel 2–8 mm, glabrous. Calyx tube ovate, 0.8–1.2 cm, to 4/5 cleft anteriorly, densely long white pubescent; lobes 3, equal, leaflike. Corolla yellow, with red galea, and white margin on lower lip; tube 3.5–5 cm, pubescent basally; galea and beak circular, ± crested, 1.5–1.7 cm; lower lip ca. 1.7 × 3 cm, glabrous, middle lobe emarginate, lateral lobes rounded or emarginate. Filaments pubescent. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine meadows; 3000–3600 m. NW Yunnan.

1a. Lateral lobes of lower corolla lip rounded, not emarginate 334a. var. *tricolor*

1b. All 3 lobes of lower corolla lip emarginate 334b. var. *aequiretusa*

334a. *Pedicularis tricolor* var. *tricolor*

三色马先蒿(原变种) an se ma xian hao (yuan bian zhong)

Lower corolla lip with lateral lobes rounded, not emarginate.

• Alpine meadows; 3000–3600 m. NW Yunnan.

334b. *Pedicularis tricolor* var. *aequiretusa* P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 419. 1963.

等凹三色马先蒿 deng ao san se ma xian hao

Lower corolla lip with all 3 lobes emarginate.

• NW Yunnan.

335. *Pedicularis chinensis* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 24: 57. 1877.

中国马先蒿 zhong guo ma xian hao

Herbs annual, to 30 cm tall, not drying black. Stems 1 to several, erect or outer stems ascending to procumbent, sometimes branched apically, with lines of hairs or glabrescent. Leaves basal and on stem; petiole to 4 cm, distal ones shorter, long pubescent; leaf blade lanceolate-oblong to linear-oblong, to 7 × 1.8 cm, glabrous on both surfaces, pinnatifid; segments 7–13 pairs, ovate, margin double dentate. Inflorescences long racemose; bracts leaflike, densely ciliate. Pedicel to 1 cm, pubescent. Calyx tubular, 1.5–1.8 cm, densely pubescent, sometimes with purplish dots, 2/5 cleft anteriorly; lobes 2, leaflike, incised-double dentate. Corolla yellow; tube 4.5–5 cm, pubescent; galea slightly bent apically, forming nearly a circle, not crested; beak semicircular, 9–10 mm; lower lip wider than long, ca. 2 cm wide, lobes rounded, densely ciliate. Filaments densely pubescent. Capsule oblong-lanceolate, ca. 1.9 cm × 7 mm. Fl. Jul, fr. Aug.

• Alpine meadows; 1700–2900 m. C and S Gansu, Hebei, Nei Mongol, NE Qinghai, Shaanxi, Shanxi.

This species includes two forms: *f. chinensis* with a yellow corolla and *f. erubescens* P. C. Tsoong with a pale purple-red corolla.

336. *Pedicularis longiflora* Rudolph, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 4: 345. 1811.

长花马先蒿 *chang hua ma xian hao*

Herbs annual, 10–18 cm tall. Stems usually short, glabrescent. Basal leaves in a rosette; petiole 1–2 cm, sparsely long ciliate; leaf blade lanceolate to narrowly oblong, glabrous on both surfaces, pinnatifid to pinnatipartite; segments 5–9 pairs, margin double dentate. Stem leaves alternate or pseudo-opposite, with shorter petioles. Flowers axillary. Pedicel short. Calyx tubular, 1.1–1.5 cm, 2/5 cleft anteriorly, glabrous except for fine ciliate lobes; lobes 2 or 3, ± palmatipartite. Corolla yellow, some with a narrow maroon stripe on each antero-lateral ridge of palate, 5–8 cm; tube pubescent; galea gradually curving into beak; beak semicircular, ca. 6 mm, 2-cleft at apex; lower lip 1.1–1.2 × ca. 2 cm, long ciliate, all lobes emarginate. Filaments densely pubescent. Capsule lanceolate, to 2.2 cm × 6 mm. Seeds narrowly ovoid, ca. 2 mm. Fl. Jul–Sep, fr. Aug–Oct. $2n = 16$.

Alpine meadows, along streams, springs, seeps; 2100–5300 m. Gansu, Hebei, Nei Mongol, Qinghai, W Sichuan, SE Xizang, NW Yunnan [India, Kazakstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Sikkim, Tajikistan, Turkmenistan, Uzbekistan].

Kharkevich (pers. comm.) indicated that further study is necessary since Russian plants are perennial.

1a. Corolla large, lower lip without a maroon stripe 336a. var. *longiflora*

1b. Corolla smaller, lower lip with a narrow maroon stripe on each antero-lateral ridge of palate.

2a. Leaves alternate; calyx lobes 2

..... 336b. var. *tubiformis*

2b. Leaves pseudo-opposite; calyx

lobes 3 336c. var. *yingshanensis*

336a. *Pedicularis longiflora* var. *longiflora*

长花马先蒿(原变种) *hang hua ma xian hao* (yuan bian zhong)

Corolla large; lower lip without a maroon stripe.

Alpine moist meadows, along streams; 3300–3500 m. Gansu, Hebei, Qinghai [Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan].

336b. *Pedicularis longiflora* var. *tubiformis* (Klotzsch) P. C. Tsoong, Bull. Brit. Mus. (Nat. Hist.) Bot. 1: 7. 1955.

管状长花马先蒿 *guan zhuang chang hua ma xian hao*

Pedicularis tubiformis Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar 106. 1862; *P. longiflora* subsp. *tubiformis* (Klotzsch) Pennell.

Leaves alternate. Calyx lobes 2. Corolla small; lower lip with a narrow maroon stripe on each antero-lateral ridge of palate. Fl. and fr. May–Oct.

Alpine meadows, springs, seeps, along streams; 2700–5300 m. W Sichuan, SE Xizang, NW Yunnan [Nepal, Pakistan, Sikkim].

336c. *Pedicularis longiflora* var. *yingshanensis* Z. Y. Chu & Y. Z. Zhao, Acta Sci. Nat. Univ. Intramongol. 19: 175. 1988.

阴山长花马先蒿 *yin shan chang hua ma xian hao*

Leaves pseudo-opposite. Calyx lobes 3. Corolla small; lower lip with a narrow maroon stripe on each antero-lateral ridge of palate. Fl. Aug.

• Alpine marshy meadows; ca. 2100 m. Nei Mongol (Yingshan).

337. *Pedicularis bidentata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 533. 1888.

二齿马先蒿 *er chi ma xian hao*

Herbs 6–8 cm tall, gray pubescent throughout. Roots fusiform, slender. Stems nearly absent, tufted. Leaves basal; petiole to 2–3.5 cm; leaf blade linear-oblong, ca. 5 × 1 cm, base attenuate, undulate-lobed; segments subrounded, shallowly undulate-dentate. Flowers axillary, 2–4. Pedicel short. Calyx cylindrical, ca. 1.5 cm, with reticulate veins; lobes 2, elliptic, ca. 5 mm, incised-serrate. Corolla yellow; tube ca. 7.5 cm × 1.5 mm, more than 4 × as long as calyx, pubescent; galea curving downward into a horseshoe-shape; beak nearly straight, ca. 7 mm, ca. as long as galea; lower lip ca. 1.7 × 2.5 cm, middle lobe rounded, ca. 6 × 8 mm, ca. 1/3 as large as lateral lobes. Filaments red pubescent.

• N Sichuan.

338. *Pedicularis armata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 24: 56. 1877.

刺齿马先蒿 *ci chi ma xian hao*

Herbs perennial, 8–16 cm tall, not drying black. Stems usually tufted, central stem erect, outer stems ascending to procumbent, usually longer than central stem, densely fine pubescent. Basal leaf petiole to 4 cm. Stem leaf petiole barely 1–2 cm, narrowly winged, white long ciliate; leaf blade linear-oblong, 2–4 cm × 4–10 mm, abaxially glabrous but with sparse scurfy dots, adaxially densely pubescent along midvein, pinnatipartite; segments 4–9 pairs, triangular-ovate to ovate, margin double dentate. Flowers axillary, many. Pedicel to 1 cm, densely pubescent. Calyx 1.6–2 cm; tube cylindric, 1/3 cleft anteriorly, densely pubescent, reticulate-veined; lobes 2, ± palmately 3–5-divided. Corolla yellow throughout or lower lip with 3 crimson or maroon spots, pubescent, 5–9 cm; galea bent at a right angle apically; beak pointing forward, semicircular, ca. 1.5 cm; lower lip large, less than 2.6 cm wide, long ciliate. Filaments densely pubescent. Fl. Aug–Sep, fr. Sep.

• Alpine meadows, sunny slopes, turf; 3000–4600 m. Gansu, Qinghai, N Sichuan.

1a. Lower lip of corolla not spotted 338a. var. *armata*

1b. Lower lip of corolla with 3 spots 338b. var. *trimaculata*

338a. *Pedicularis armata* var. *armata*

刺齿马先蒿(原变种) *ci chi ma xian hao* (*yuan bian zhong*)

Corolla yellow throughout, not spotted.

• Alpine meadows; 3700–4600 m. SW Gansu, N Sichuan.

338b. *Pedicularis armata* var. *trimaculata* X. F. Lu in T. N.

Ho, B. Bartholomew, & M. G. Gilbert, *Novon* 6: 190. 1996.

三斑刺齿马先蒿 *san ban ci chi ma xian hao*

Lower corolla lip with 3 crimson or maroon, linear or narrowly elliptic spots.

• Alpine meadows in moist areas or sunny slopes and in turf; 3000–4000 m. Gansu, Qinghai.

339. *Pedicularis latituba* Bonati, *Bull. Soc. Bot. France* 55: 243. 1908.

粗管马先蒿 *cu guan ma xian hao*

Herbs perennial, barely 10 cm tall, drying black or not. Stems 1 to several, 1–2(–5) cm, with lines of hairs.

Basal leaves usually in a rosette; petiole 1–2 cm, winged, pubescent; leaf blade lanceolate-oblong, 1–2 cm, glabrescent on both surfaces, pinnatipartite to pinnatisect; segments 5–11 pairs, triangular-ovate to ovate. Stem leaves alternate, sometimes pseudo-opposite on lateral branches. Flowers few, axillary, dense. Pedicel to 1–2 cm, with 2 lines of dense hairs. Calyx ± tubular, 1/3–1/2 cleft anteriorly; tube 8–10 mm; lobes (2 or) 3, deeply pinnatipartite. Corolla purple-red; tube 3–4.5 cm × ca. 2 mm, purple pubescent; galea twisted falcate, ± crested in front; beak ± semicircular, ca. 5 mm; lower lip 8–10 mm × 1.8–2 cm, short ciliate, lobes emarginate. Filaments pubescent.

• W Sichuan, SE Xizang.

340. *Pedicularis decorissima* Diels, *Notizbl. Bot. Gart. Berlin-Dahlem* 10: 891. 1930.

极丽马先蒿 *ji li ma xian hao*

Herbs perennial, to 15 cm tall, drying dark brown.

Stems usually several, densely tufted, outer stems usually procumbent to ascending, longer than central stem. Leaves basal and on stem; petiole 1–3(–6) cm, ± long pubescent; leaf blade linear to lanceolate-oblong, 2–7 × ca. 1.8 cm, glabrous except finely pubescent along midvein adaxially, usually pinnatipartite; segments 6–9 pairs, triangular to triangular-ovate, margin double dentate. Stem leaves sometimes pseudo-opposite. Flowers axillary. Pedicel short. Calyx more than 2 cm, densely long pubescent, ca. 1/2 cleft anteriorly; lobes 2, shallowly pinnatifid. Corolla rose-pink; tube to 12 cm, sparsely pubescent; galea slightly twisted, densely pubescent at middle, prominently crested in front; beak curved below; lower lip to 2.8 cm wide, long ciliate, rounded. Filaments densely pubescent. Fl. Jun–Aug, fr. Aug–Sep.

• Alpine meadows; 2900–3500 m. SW Gansu, E Qinghai, W Sichuan.

341. *Pedicularis humilis* Bonati, *Notes Roy. Bot. Gard. Edinburgh* 13: 106. 1921.

矮马先蒿 *ai ma xian hao*

Herbs perennial, low, with 5–15 cm stems. Roots numerous, fusiform. Stems numerous, creeping, slightly branched or unbranched, glabrescent. Basal leaf petiole ca. 2 mm, glabrous; leaf blade ca. 1.5 cm × 7–10 mm, pinnatisect; segments 5 or 6 pairs, ovate, pinnatifid, incised-dentate. Stem leaves alternate or rarely ± opposite, similar to basal leaves but smaller and shorter petiolate; bracts leaflike. Flowers axillary, few. Pedicel erect, 3–10 mm, glabrous. Calyx 5–6 mm, membranous, puberulent when young, glabrescent, deeply cleft anteriorly; lobes 2, palmately cleft distally, ciliate.

Corolla rose; tube 1–2.5 cm, pubescent; galea twisted basally, glandular pubescent, slightly crested; beak S-shaped, slender, 7–8 mm; lower lip 9–10 mm × ca. 1.5 cm, lobes emarginate, densely ciliate. Filaments 2 pubescent, 2 glabrous. Fl. Jul, fr. Aug.

• Alpine meadows; 3000–3100 m. NW Yunnan.

342. *Pedicularis variegata* H. L. Li, *Proc. Acad. Nat. Sci. Philadelphia* 101: 193. 1949.

变色马先蒿 *bian se ma xian hao*

Herbs perennial, less than 15 cm tall. Stems numerous, cespitose, diffuse or erect, unbranched, pubescent. Leaves basal and on stem, alternate; petiole to 2.5(–6.5) cm, pubescent; leaf blade oblong-ovate or oblong, to 4 × 1.4 cm, scabrous pubescent on both surfaces, pinnatisect; segments 9–12 pairs, ovate, dentate. Flowers axillary, ± sessile. Calyx campanulate, 7–9 mm, enlarged apically, to 6 mm wide, sparsely long pubescent, deeply cleft anteriorly; lobes 3, unequal, lateral pair larger, margin double dentate. Corolla white, with purple galea; tube erect, 3.5–4.5 cm, usually sparsely pubescent; galea strongly twisted, glandular

pubescent, inconspicuously crested; beak S-shaped, 9–10 mm; lower lip 8–9 mm × 1.8–1.9 cm, minutely ciliate, middle lobe ca. 1/3 as long as lateral lobes or smaller, entire, truncate or rounded. Anterior filament pair sparsely pubescent apically. Fl. Aug, fr. Sep.

• Swampy meadows; 4100–4200 m. SW Sichuan, Yunnan.

343. *Pedicularis fastigiata* Franchet, Bull. Soc. Bot. France 47: 25. 1900.

帚状马先蒿 zhou zhuang ma xian hao

Herbs ca. 30 cm tall. Stems erect, unbranched, glabrescent, striate, leafy throughout. Proximal leaves alternate, distal ones ± opposite; petiole long, glabrous; leaf blade linear, ca. 1 cm wide, abaxially sparsely white scurfy, pinnatisect; segments lanceolate, serrulate. Flowers axillary, proximal ones widely spaced, distal ones dense and fastigiata; sessile. Calyx ovate-oblong, ca. 1 cm, deeply cleft anteriorly; lobes 3, leaflike.

Corolla rose, with a deep red galea; tube 3.5–4 cm, slender, minutely pubescent; galea twisted, narrowly crested; beak semicircular; lower lip ca. 1 cm wide, middle lobe ca. 1/2 as large as lateral lobes, rounded. Filaments glabrous.

• NW Yunnan.

344. *Pedicularis leptosiphon* H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 194. 1949.

纤管马先蒿 xian guan ma xian hao

Herbs perennial, to 20 cm tall. Stems numerous, erect or ± diffuse, long pubescent when young, glabrescent. Leaves basal and on stem, alternate; petiole to 4 cm, long pubescent; leaf blade oblong or linear-oblong, to 3.5 × 1.1 cm, pinnatisect; segments 8–11 pairs, widely spaced, ovate, becoming glabrous or sparsely pubescent, dentate. Proximal flowers axillary, distal ones dense, ± sessile; bracts leaflike. Calyx ca. 1 cm × 3 mm, sparsely long pubescent, deeply cleft anteriorly; lobes 3–5, unequal, posterior-lateral pair largest, pinnatifid. Corolla white; tube erect, slender, 6.5–7.5 cm × ca. 1 mm; galea strongly twisted, 9–10 mm, glandular pubescent; beak S-shaped; lower lip ca. 8 mm × 1.7 cm, finely ciliate, middle lobe truncate. Anterior filament pair sparsely pubescent apically. Fl. Jul, fr. Aug.

• Alpine meadows; ca. 4000 m. SW Sichuan, Yunnan.

345. *Pedicularis paxiana* H. Limpricht, Repert. Spec. Nov. Regni Veg. Beih. 12: 483. 1922.

派氏马先蒿 pai shi ma xian hao

Herbs perennial, low, mostly stemless. Roots fleshy, fascicled. Leaves basal, barely in a rosette, glabrous; petiole flat, winged; leaf blade ca. 10 × 1 cm, pinnatipartite; segments semirounded, crenate-dentate. Calyx campanulate, white long woolly, 2-lobed. Corolla white; tube 8–9(–10) × as long as calyx; galea twisted, circular; lobes of lower lip with rounded lateral lobes, very large. Filaments pubescent. Stigma long exerted.

• About 4300 m. W Sichuan.

346. *Pedicularis dolichantha* Bonati, Notes Roy. Bot. Gard. Edinburgh 13: 107. 1921.

疏花马先蒿 shu hua ma xian hao

Herbs perennial, 15–30 cm tall, drying slightly black. Roots fleshy. Stems single, erect, unbranched, sparsely long pubescent. Basal leaves withering early. Stem leaves numerous, alternate, pubescent; petiole 1.5–4 cm, narrowly winged, ciliate; leaf blade linear to oblong, 2.5–6 × ca. 1 cm, pinnatisect or pinnatipartite; segments 10–18 pairs, ovate or triangular, incised-dentate. Flowers axillary. Pedicel erect, ca. 5 mm, slender. Calyx cylindrical, 1.2–1.8 cm, papery, scabrous pubescent, deeply cleft anteriorly, usually 2-lobed, pinnatifid to ± palmately lobed. Corolla rose; tube 3–5 cm, pubescent; galea strongly twisted, narrowly crested, glabrous; beak S-shaped, ca. 1 cm, slender; lower lip ciliate, middle lobe entire, ± rounded. Filaments 2 pubescent, 2 glabrous. Fl. Jul–Aug, fr. Sep.

• Meadows, beside ponds; ca. 3200 m. E Yunnan.

347. *Pedicularis tenuituba* Pennell & H. L. Li in H. L. Li, Proc. Acad. Nat. Sci. Philadelphia 101: 195. 1949.

狭管马先蒿 xia guan ma xian hao

Herbs perennial, to 30 cm tall. Stems numerous, unbranched, glabrous or sparsely long pubescent. Leaves basal and on stem; petiole to 4 cm, narrowly winged, long pubescent; leaf blade oblong or linear, ca. 9 × 1.6 cm, glabrescent or sparsely pubescent, pinnatisect; segments 10–15 pairs, ovate, dentate. Stem leaves alternate, rarely ± opposite, similar to basal leaves but slightly smaller. Flowers axillary, proximal ones lax, ± sessile or short pedicellate. Calyx cylindrical, 7–8 mm, deeply cleft anteriorly; lobes 3, unequal. Corolla purple; tube slender, erect, 8–11 cm × 6–8 mm, glabrous or sparsely pubescent; galea strongly twisted, inconspicuously crested, glandular pubescent; beak S-shaped, 8–10 mm; lower lip 8–9 mm × 1.4–1.6 cm, ciliate, middle lobe truncate. Anterior filament pair pubescent apically. Capsule oblong, ca. 1.7 cm × 6 mm. Fl. Jul–Aug, fr. Aug.

• Alpine meadows; 3000–3200 m. SW Sichuan, Yunnan.

348. *Pedicularis sigmoidea* Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint Pétersbourg 32: 535. 1888.

之行喙马先蒿 zhi xing hui ma xian hao

Herbs perennial, to 30 cm tall, stout, drying slightly black. Stems numerous, central one erect, outer stems procumbent to ascending, usually longer, striate, ± pubescent. Leaves mostly on stem, usually pseudo-opposite to pseudo-whorled; proximal petioles to 2.5 cm, narrowly winged, pubescent; leaf blade ovate-lanceolate to linear-lanceolate, to 5 × 1.6 cm, abaxially sparsely long pubescent along veins, densely gray scurfy throughout, adaxially pubescent, pinnatisect;

segments 5–11 pairs, ovate to lanceolate, pinnatifid, incised double dentate. Inflorescences 2/3–5/6 as long as stems; flowers numerous, dense apically; bracts leaflike. Calyx ca. 1.6 cm, ca. 1/2 cleft anteriorly, pubescent; lobes 3, pinnatifid to ± palmately lobed, posterior one smallest. Corolla purple-red; tube slender, 3.2–5.5 cm × ca. 1.2 mm, densely pubescent; galea strongly twisted apically; beak bent upward, S-shaped, to 1–1.5 cm; lower lip 1.8–2.4 cm wide, densely ciliate, middle lobe shallowly 2-lobed. Filaments densely pubescent. Fl. Aug–Sep, fr. Sep–Oct.

• Open stony pastures; 3000–3600 m. NW Yunnan.

349. *Pedicularis siphonantha* D. Don, Prodr. Fl. Nepal. 95. 1825.

管花马先蒿 *guan hua ma xian hao*

Herbs perennial, low to tall. Roots to 7 cm, usually cylindrical. Stems single and ± erect, or sometimes numerous and outer stems procumbent, striate, glabrescent. Leaves basal and on stem; petiole to 3.5 cm, winged, glabrescent or sparsely long pubescent; leaf blade lanceolate-oblong to linear-oblong, rarely ovate-elliptic, 1–6 × 0.7–1.6 cm, abaxially sparsely long pubescent along midvein, adaxially sparsely pubescent, pinnatisect; segments 6–15 pairs, somewhat lanceolate to broadly ovate or triangular, pinnatifid, or double dentate. Flowers axillary, dense; bracts leaflike, glabrescent or long ciliate. Calyx pubescent; tube to 1.2 cm, 1/3 cleft anteriorly; lobes 2(or 3 or 5), posterior one smallest. Corolla rose-red; tube 4–7 cm, finely pubescent; galea strongly twisted apically, with or without a conspicuously auriculate protrusion; beak semicircular or slightly S-shaped, to 1.1 cm, slender;

lower lip 1.1–1.5 × 1.5–1.8 cm, lobes emarginate or shallowly 2-lobed. Anterior filament pair pubescent. Capsule ovoid-oblong. Fl. Jun–Jul, fr. Jul–Aug. $2n = 16$.

Alpine meadows, swampy places; 3000–4600 m. W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, India, Nepal, Sikkim].

- 1a. Auriculate protrusion of galea conspicuous; calyx lobes 2(or 3); roots ± cylindrical or sometimes slightly fusiform 349a. var. *siphonantha*
 1b. Auriculate protrusion of galea inconspicuous or nearly absent; calyx lobes usually 5; roots usually strongly fusiform 349b. var. *delavayi*

349a. *Pedicularis siphonantha* var. *siphonantha*

管花马先蒿(原变种) *guan hua ma xian hao* (yuan bian zhong)

Roots ± cylindrical or sometimes slightly fusiform. Calyx lobes 2(or 3). Galea with conspicuous auriculate protrusion.

Alpine meadows, swampy places; 3500–4500 m. S and SE Xizang [Bhutan, India, Nepal, Sikkim].

349b. *Pedicularis siphonantha* var. *delavayi* (Franchet ex Maximowicz) P. C. Tsoong, Fl. Reipubl. Popularis Sin. 68: 374. 1963.

台氏管花马先蒿 *tai shi guan hua ma xian hao*
Pedicularis delavayi Franchet ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 531. 1888.

Roots usually strongly fusiform. Calyx lobes usually 5. Galea with inconspicuous auriculate protrusion or nearly none.

• Alpine moist meadows; 3000–4600 m. W Sichuan, NW Yunnan.

112. Ser. *Megalanthae* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 68. 1890.

硕花系 *shuo hua xi*

Herbs ± tall. Stems erect, unbranched. Leaves alternate, ovate-lanceolate to linear-oblong. Inflorescence racemose, centrifugal. Calyx 5-lobed. Corolla tube very long; galea toothless; lower lip large, usually enveloping galea; beak curved, slender.

About four species: Bhutan, China, India, Myanmar, Nepal, Pakistan, Sikkim; three species in China.

1a. Herbs annual, to more than 45 cm tall; roots not fusiform; calyx less than 1/3 cleft anteriorly 352. *P. megalantha*

1b. Herbs perennial, less than 15 cm tall; roots ± fusiform; calyx 1/2–2/3 cleft anteriorly.

2a. Corolla mainly yellow, with red beak or brown-red galea, some red throughout; corolla tube 1.5–3.8 cm;

leaf blade 2–5.5 cm, pinnatipartite or pinnatifid; calyx 2/3 cleft anteriorly 350. *P. megalochila*

2b. Corolla yellow throughout; corolla tube 5–6.5 cm; leaf blade 1–2.5 cm, pinnatisect; calyx 1/2 cleft anteriorly 351. *P. zhongdianensis*

350. *Pedicularis megalochila* H. L. Li, Taiwania 1: 91. 1948.

大唇马先蒿 *da chun ma xian hao*

Herbs perennial, less than 15 cm tall, not drying black. Roots fascicled, ± fusiform. Stems single or cespitose, white strigose. Leaves mostly basal; petiole to 2 cm; leaf blade oblong-lanceolate, 2–5.5 × 0.8–1.3 cm, abaxially glabrescent, adaxially pubescent along

midvein, pinnatifid to pinnatipartite; segments 6–14 pairs, triangular-ovate to ovate-oblong, margin double dentate. Stem leaves few, smaller than basal leaves; segments only 5 or 6 pairs. Inflorescences centrifugal, usually more than 1/2 as long as stems; bracts leaflike, much shorter than flowers. Pedicel to 1 cm, densely long pubescent apically. Calyx usually with purplish

dots, 2/3 cleft anteriorly; tube to 8–9 mm; lobes 5, unequal, long white ciliate. Corolla yellow, with brown-red or purple beak or corolla red throughout; tube ± erect, 1.5–3.8 cm, pubescent; galea falcate apically; beak semicircular, to 1 cm; lower lip ca. 2 × 2.5 cm, middle lobe obcordate, emarginate or ligulate, not placed apically. Filaments pubescent or anterior pair densely villous and posterior pair glabrous. Fl. Jul–Aug, fr. Aug–Sep.

Grassy slopes, among *Rhododendron*, alpine meadows, thickets; 3800–4600 m. SE and SW Xizang [Bhutan, Myanmar].

- 1a. Corolla red throughout, mainly yellow with purple beak or red galea, or yellow with a red beak; corolla tube ca. 1.5 cm; middle lobe of lower lip obcordate; all filaments pubescent 350a. var. *megalochila*
1b. Corolla yellow with brown-red galea; corolla tube to 3.8 cm; middle lobe of lower lip ligulate; anterior filament pair densely villous, posterior pair glabrous . 350b. var. *ligulata*

350a. *Pedicularis megalochila* var. *megalochila*

大唇马先蒿(原变种) da chun ma xian hao (yuan bian zhong)

Corolla red throughout, mainly yellow with purple beak or red galea, or yellow with a red beak; corolla tube ca. 1.5 cm; middle lobe of lower lip obcordate. Filaments pubescent.

Grassy slopes, among *Rhododendron*; ca. 4200 m. SE and SW Xizang [Bhutan, Myanmar].

This variety includes two forms: f. *megalochila* with a yellow corolla but with a red beak, and f. *rhododantha* P. C. Tsoong with an entirely red corolla.

350b. *Pedicularis megalochila* var. *ligulata* P. C. Tsoong, Acta Phytotax. Sin. 3: 279. 1955.

舌状大唇马先蒿 she zhuang da chun ma xian hao

Corolla yellow with brown-red galea; tube to 3.8 cm; middle lobe of lower lip ligulate. Anterior filament pair densely villous, posterior pair glabrous.

• Alpine meadows, thickets; 4200–4300 m. SE Xizang.

351. *Pedicularis zhongdianensis* H. P. Yang, Acta Bot. Yunnan. 6: 277. 1984.

中甸马先蒿 zhong dian ma xian hao

Herbs perennial, ca. 10 cm tall. Roots filiform, ± fusiform, slightly fleshy. Stems usually 3–5 cespitose, ca. 1 cm tall or nearly rudimentary. Basal leaves in a rosette; petiole ca. 1 cm, densely ciliate; leaf blade ovate-oblong to oblong, 1–2.5 cm, abaxially white scurfy, adaxially glabrescent, pinnatisect; segments 4–14 pairs, ovate-oblong, dentate. Flowers axillary. Pedicel ca. 2 mm. Calyx ca. 2 cm, densely white villous, 1/2 cleft anteriorly; lobes 5, unequal, leaflike. Corolla yellow, ca. 6.5 cm; tube 5–6.5 cm, pubescent; galea nearly falcate; beak curved to reflexed, 5–6 mm; lower lip usually enveloping galea, 1.5–1.8 × 2.5–3 cm, ciliate. Anterior filament pair pubescent. Fl. Aug, fr. Sep.

• *Pinus* forests on slopes; ca. 3300 m. NW Yunnan.

352. *Pedicularis megalantha* D. Don, Prodr. Fl. Nepal. 94. 1825.

硕花马先蒿 shuo hua ma xian hao

Herbs annual, (6–)45 cm tall, not drying black. Roots fibrous. Stems cespitose or single, glabrescent. Basal leaves usually withering early. Stem leaves few; petiole 4–6 cm; leaf blade linear-oblong, 5–7 × 2–3.5 cm, abaxially sparsely white scurfy, adaxially sparsely puberulent, pinnatipartite; segments 7–12 pairs, oblong-ovate to triangular-lanceolate, sinuate-dentate.

Inflorescences centrifugal, to more than 30 cm; bracts leaflike. Pedicel 5–12 mm. Calyx oblong, pubescent, less than 1/3 cleft anteriorly; lobes 5, unequal. Corolla usually red-rose; tube 3–6 cm, 2–4 × as long as calyx; galea bent at a right angle apically; beak circular, 1.2–1.4 cm; lower lip completely enveloping galea, 2.5–3.5 cm wide, ciliate. Anterior filament pair pubescent. Capsule ovoid-lanceolate, ca. 3 cm × 9 mm. Fl. Jun–Aug, fr. Jul–Sep. 2n = 16.

Swampy places at forest margins, damp grassy slopes; 2300–4200 m. S and SE Xizang [Bhutan, India (Darjeeling), Nepal, Pakistan, Sikkim].

Additional Entities Described from China

The following (reportedly in Xinjiang) are of uncertain status in China so they are listed here for convenience: *Pedicularis maximowiczii* Krassnow, *P. albertii* Regel, and *P. chorgossica* Regel & Winkler (see Novon 7: 373–375. 1998); also *P. geniculata* T. Yamazaki, *P. karakorumiana* T. Yamazaki, and *P. mustanghatana* T. Yamazaki (see J. Jap. Bot. 68(3): 142–148. 1993).