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# 65. OPHIORRHIZA Linnaeus, Sp. Pl. 1: 150. 1753.

蛇根草属 she gen cao shu

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*Hayataella* Masamune; *Mitreola* Boehmer; *Mungos* Adanson.

Annual or perennial herbs or rarely subshrubs, unarmed, often fleshy or rather succulent, sometimes creeping. Raphides present. Leaves opposite, decussate, sometimes anisophyllous, without domatia; margins sometimes undulate to denticulate; stipules persistent or caducous, interpetiolar, entire or bifid to fimbriate, sometimes glandular. Inflorescences terminal and/or pseudoaxillary or rarely axillary (*Ophiorrhiza oppositifolia*), cymose to capitate, fasciculate, or paniculiform with axes often helicoid, few to many flowered, sessile to pedunculate, bracteate or bracts absent; bracts caducous to persistent, sometimes involucral. Flowers pedicellate to sessile, bisexual and distylous or monomorphic or occasionally cleistogamous. Calyx with ovary portion turbinate to obconical, usually strongly compressed, longitudinally often 5- or 10-ribbed; limb reduced or 5(or 6)-lobed, lobed essentially to base or rarely subtruncate (*O. repandicalyx*). Corolla white, yellow, orange, pink, purple, or brown, sometimes drying with markedly different color, usually notably clavate in bud, at anthesis salverform, tubular, or funnelform with tube often swollen to gibbous at base, outside often longitudinally ridged or winged, inside glabrous to variously pubescent; lobes 5(or 6), valvate in bud, smooth or occasionally ridged, winged, and/or with hornlike appendages near apex, apex sometimes adaxially rostrate. Stamens 5(or 6), inserted near throat to below middle of corolla tube, included or exserted; filaments reduced to well developed; anthers dorsifixed near middle or base. Ovary 2-celled, ovules numerous in each cell on axile placentas attached from middle to base of septum; stigmas 2, linear to subcapitate, included or exserted. Fruit capsular, obovoid to oblate, mitriform, or obcordate, strongly laterally compressed perpendicular to septum, sometimes with apical portion prolonged into a beak, loculicidally dehiscent across top and sometimes along sides, papery, with calyx limb persistent; seeds numerous, small, angled to rhomboid, areolate to alveolate.

About 200–300 species: tropical and subtropical Asia, Australia, New Guinea, Pacific islands; 70 species (49 endemic, one of unconfirmed occurrence) in China.

*Ophiorrhiza* is a notably species-rich, taxonomically complicated genus found in wet tropical forests of SE Asia (Darwin, Lyonia 1(2): 47–102. 1976); it has been little studied and is particularly poorly known in SE Asia (I. Schanzer, pers. comm.). *Ophiorrhiza* was studied for China by H. S. Lo (Bull. Bot. Res., Harbin 10(2): 1–82. 1990), who variously described 44 of the 68 *Ophiorrhiza* species recognized by Lo in FRPS (71(1): 110–174. 1999). The genus was studied in India by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 1–148. 1997), who recognized 47 species there. Darwin (loc. cit.) reported that the plants are notably variable in many vegetative features, many of which were shown by him not to be informative to separate species. H. S. Lo (loc. cit. 1999: 111) reported that the calyx and corolla lobes are occasionally 6, but this has not been noted by other authors nor seen on specimens studied; this may be an occasional variation found in one or two flowers on unusual plants, as in many Rubiaceae species. H. S. Lo also described the placentas as ascending from the septum base; however, Darwin (loc. cit.: 56) reported that in the Pacific *Ophiorrhiza* species the placenta is inserted in the middle of the septum in the flower and then often becomes displaced to near the base of the septum in fruit, whereas Puff et al. (Rubiaceae of Thailand, 190. 2005) gave the insertion of the placenta as being in the lower half of the septum. Puff et al. reported that the fruit function as splash cups for seed dispersal and observed that, regardless of the orientation of the flowers, the fruit become erect with enlarged and strengthened pedicels. Tan and Rao (Biotropica 13: 232–233. 1981) reported vivipary in a species of *Ophiorrhiza* growing in Singapore, with the seeds germinating within the capsules, pushing their cotyledons out through the suture where the valves open normally, and extending roots through the capsule locules and tissues; a similar condition may be found in Chinese *Ophiorrhiza*.

Darwin (loc. cit.: 47–102) noted that the presence of distyly in *Ophiorrhiza* has been controversial because the arrangement of the stigmas and anthers in the first dimorphic species found here differs from that of classic distyly, with strictly reciprocal sizes and positions. However, since then the recognition of distyly in Rubiaceae has expanded to include species that are at least a bit dimorphic and have intra-morph incompatibility, and *Ophiorrhiza* clearly belongs in this group and has been considered distylous by subsequent authors (Deb & Mondal, loc. cit.; Kudoh et al., J. Trop. Ecol. 17: 719–728. 2001; Schanzer, Thai Forest Bull. 33: 140–166. 2004). Also, some species with markedly dimorphic distylous flowers have subsequently been discovered (e.g., *O. aureolina* and *O. rufopunctata*). Deb and Mondal (loc. cit.: 15, f. 7) illustrated some of the variation in stamen and stigma position and internal corolla pubescence in distylous species of this genus. Homostyly has also been confirmed in the genus (Nakamura et al., J. Jap. Bot. 81: 113–120. 2006; J. Plant Res. 120: 501–509. 2007) and some species also appear to be autogamous (Nakamura et al., loc. cit. 2006). Schanzer (loc. cit.) noted that some species appear to vary in floral biology across their range, to include both homostylous and distylous populations; this situation has been found elsewhere in some distylous Rubiaceae, which have variation in expression of distyly (e.g., Faivre & McDade, Amer. J. Bot. 88: 841–853. 2001), though in those cases, the flowers resemble one of the distylous forms while Schanzer described a distinct floral form in the monomorphic plants. Schanzer also noted that some of these floral forms may be aberrant and cleistogamous rather than distylous. Nakamura et al. (loc. cit. 2007) studied two supposedly conspecific varieties of *O. japonica* in Japan, one homostylous and the other distylous, and concluded that the self-compatible homostylous plants differed in ploidy level, comprised a distinct lineage according to cpDNA sequences, and are better considered a separate species. They also noted that floral biology is not correlated with ploidy in general in *Ophiorrhiza*. Observations and documentation of the floral biology of Chinese *Ophiorrhiza* species are so far limited. Kudoh et al. (loc. cit.) presented a detailed analysis of the floral forms and possible genetic controls of these in *O. napoensis* in Guangxi, China. Also notable in the floral morphology of this genus is the apparent wide variation in corolla pubescence within a species, sometimes with the long-styled and short-styled flowers reportedly different (e.g., *O. oppositiflora*, floral forms similar but corolla pubescence variable, Deb & Mondal, loc. cit.: 88, f. 39; *O. austroyunnanensis*, pubescence apparently correlated with floral form,

H. S. Lo, loc. cit. 1990: 31, f. 8).

Deb and Mondal (loc. cit.: 1) noted that the genus name alludes to the presumed healing properties of the root of these plants for snakebite and that *Ophiorrhiza mungos* and *O. japonica* are used for such in the Indian subcontinent. They also noted that species of this genus are used as medicine (for snakebites, stomach ulcers, skin eruptions, rheumatism, heart diseases), dye (red, for wool and hair), and food (the fruit), and list several references detailing their ethnobotany and medical chemistry.

The monotypic genus *Hayataella*, endemic to Taiwan, was recognized by several authors (particularly Taiwanese authors) as distinct from *Ophiorrhiza*, though it was synonymized by H. S. Lo (Bull. Bot. Res., Harbin 18: 276–277. 1998). Its morphology and molecular systematics were studied by Nakamura et al. (J. Plant Res. 119: 657–661. 2006), who concluded based on molecular data that the species belongs to a relatively derived clade of *Ophiorrhiza* and formally transferred the species, eliminating another of Taiwan's few endemic genera.

No infrageneric classification has been recognized by recent authors (Darwin, loc. cit.: 47–102; Deb & Mondal, loc. cit.: 1–148).

H. S. Lo (loc. cit. 1990: 1–82) presented the definitive work on this genus in China. Most recently, *Ophiorrhiza* has been studied in China by Duan and Lin (Acta Phytotax. Sin. 45: 870–879. 2007), who synonymized several of Lo's species. Their species circumscription is relatively broad compared to that of Lo, and a few of the species they synonymized are provisionally recognized here pending further study and a broader, consistent review of *Ophiorrhiza* in China.

Overall, the treatment of *Ophiorrhiza* here is primarily an organization of the published information, rather than a revisionary work. A few other species are keyed here even though their descriptions are incomplete; their placement is based in part on the key of H. S. Lo in FRPS (loc. cit. 1999: 112–117). In the FRPS treatment, H. S. Lo described in some detail the arrangement and degree of surface development and visibility of the tertiary venation on the abaxial leaf surface of many *Ophiorrhiza* species; however, this is incompletely described for the Chinese species, is variable within species, and was not used by Lo to distinguish species nor by other authors and, therefore, is not detailed here. Details of the anthers and stigmas are also incompletely described for Chinese *Ophiorrhiza* and mostly not used to separate species; the details available are summarized in the comments following the species description.

Among the names published in *Ophiorrhiza* by H. S. Lo (loc. cit. 1990), eight lacked an acceptable indication of type and were therefore not validly published under Art. 37 of the *Vienna Code*. In one case (*O. chingii*), two gatherings were cited but neither was indicated as the type, and in the other seven cases only one gathering was cited, which under Art. 37.3 is acceptable as indication of the type, but under Art. 37.6, on or after 1 January 1990, indication of the type must also include the word "typus" or "holotypus" or an equivalent in a modern language, and Lo did not include such words. All but one of the eight names were validated by S. Y. Jin and Y. L. Chen (Cat. Type Spec. Herb. China (Suppl.), 189–191. 1999) in each case by reference to Lo's Latin description and by indication of a single gathering as the type (as "T."). The one remaining name, *O. longicornis*, is validated here.

1a. Calyx lobes relatively well developed, longest ones 3.5 mm or longer (do not confuse bracts with calyx lobes).
2a. Calyx lobes strongly unequal, more than 50% different in length, longer ones 3–6 mm and shorter ones 0.8–3 mm ..... 52. *O. pingbienensis*
2b. Calyx lobes subequal, at most 50% different in length, 3.5–8 mm.
3a. Corolla purple, tube 26–29 mm; stipules 1.5–2 mm ..... 64. *O. sichuanensis*
3b. Corolla white or yellow, tube 13–19 mm (mature corolla unknown in *O. hunanica*); stipules 3–10 mm.
4a. Stems glabrescent; calyx lobes linear; corolla externally with ciliate wings ..... 27. *O. hunanica*
4b. Stems pilosulous or villous at least when young; calyx lobes linear, spatulate, or ovate; corolla externally smooth to ridged or with narrow, glabrous to pubescent wings.
5a. Stipules ca. 10 mm, 2- or 3-lobed, lobes linear; bracts 10–20 mm; calyx lobes linear ..... 41. *O. medogensis*
5b. Stipules 3–9 mm, triangular or 2-lobed; bracts 5–7 mm; calyx lobes ligulate, narrowly spatulate, ovate, or lanceolate.
6a. Corolla with tube 13–14 mm and externally ridged or ribbed, lobes 2–2.5 mm; leaves in subequal pairs ..... 15. *O. ensiformis*
6b. Corolla with tube 18–19 mm and externally ridged to winged, lobes ca. 4.5 mm; leaves in unequal pairs ..... 60. *O. rufipilis*
1b. Calyx lobes none (i.e., limb truncate) or longest lobes 3.4 mm or shorter (calyx lobe length unknown in *O. rarior*).
7a. Inflorescences axillary, paired at nodes below apex ..... 49. *O. oppositiflora*
7b. Inflorescences terminal and/or pseudoaxillary, solitary at each node.
8a. Stems densely lenticellate and moderately brown villous or -hirsute with multicellular trichomes when young ..... 56. *O. rarior*
8b. Stems sparsely lenticellate to smooth, glabrous to densely pubescent with trichomes of various colors and forms when dry.
9a. Corollas relatively small, tube 5.5 mm or shorter (corollas unknown in *O. salicifolia*).
10a. Leaves lanceolate-linear, 6 or more × as long as wide ..... 63. *O. salicifolia*
10b. Leaves variously shaped, 3 × as long as wide or broader.
11a. Corolla lobes with well-developed dorsal horns or appendages, these 1.5–2 mm.
12a. Inflorescences congested-cymose, branched to 1 or 2 orders; corolla pubescent in throat but

glabrous below inside tube, pubescent externally ..... 6. *O. cana*

12b. Inflorescences cymose to corymbose, branched to 3 or 4 orders; corolla pubescent below middle inside tube, glabrous externally ..... 35. *O. longicornis*

11b. Corolla lobes dorsally smooth, ribbed, winged, or with thickenings or short hornlike protuberances, these up to 0.8 mm.

13a. Bracts and bracteoles well developed, lanceolate to spatulate or elliptic, 1–3 mm wide, partially to fully enclosing buds and flowers.

14a. Stipules ovate ..... 4. *O. austroyunnanensis*

14b. Stipules triangular at base, quickly narrowed to a linear apex or linear lobes ..... 38. *O. lurida*

13b. Bracts and bracteoles reduced or linear to triangular, 0.1–0.8 mm wide, not enclosing buds or flowers.

15a. Plants creeping or at least relatively small, at most 30 cm tall and most plants much shorter.

16a. Stipules 1–3 mm, caducous and often not visible; fruit 5–7 mm wide ..... 53. *O. pumila*

16b. Stipules 4–10 mm, usually persisting on uppermost nodes; fruit 4–5 mm wide.

17a. Leaves strigillose to glabrous adaxially ..... 24. *O. hispidula*

17b. Leaves sparsely hispidulous adaxially ..... 62. *O. rugosa*

15b. Plants mostly weakly ascending to erect, generally rather robust, most plants 30 cm tall or taller.

18a. Plants when dry covered with golden yellow pubescence, including on corollas ..... 3. *O. aureolina*

18b. Plants glabrous or with pubescence drying white to brown, reddened, or clear.

19a. Plants to 80–100 cm tall, with leaves 15–22 × 6–10 cm, with 11–19 pairs of secondary veins; calyx limb undulate to shallowly to moderately lobed.

20a. Stipules deciduous after uppermost nodes, 4–8 mm; corolla tube 2.5–4 mm ..... 43. *O. mungos*

20b. Stipules caducous, unknown; corolla tube ca. 5.5 mm ..... 57. *O. repandicalyx*

19b. Plants to 70 cm tall, with leaves 2–15 × 1–6 cm, with (4 or)5–11(–19) pairs of secondary veins; calyx limb shallowly to deeply lobed.

21a. Stipules 3–8 mm, deciduous after uppermost nodes; Taiwan ..... 29. *O. kuroiwae*

21b. Stipules caducous and unknown, or persistent on uppermost nodes and 2–11 mm; mainland (including Hainan).

22a. Inflorescences well developed, cymose to paniculate; secondary leaf veins 7–19 pairs.

23a. Stipules caducous; corollas 3.5–5 mm ..... 43. *O. mungos*

23b. Stipules mostly persistent; corollas 6–6.5 mm ..... 49. *O. oppositiflora*

22b. Inflorescences somewhat reduced, congested-cymose to subcapitate; secondary leaf veins (4 or)5–7(–11) pairs.

24a. Corolla with pubescent ring inside tube, with lobes 1/4–1/3 as long as tube and spreading at anthesis ..... 62. *O. rugosa*

24b. Corolla pubescent in throat and on upper part of tube but glabrous through most of tube, with lobes 1/3–1/2 as long as tube and spreading to strongly reflexed at anthesis.

25a. Stipules triangular, 2–4 mm; corolla tube 2.5–4.5 mm, lobes spreading at anthesis ..... 38. *O. lurida*

25b. Stipules subfiliform, ca. 6 mm; corolla tube 4.5–5 mm, lobes strongly reflexed at anthesis ..... 70. *O. wui*

9b. Corollas larger, tubes more than 5.5 mm (corollas unknown in *O. hainanensis* and *O. salicifolia*).

26a. Leaves relatively narrow, more than 3 × as long as wide, often falcate, 4.5–11 × 0.6–2 cm.

27a. Stems with 2 discrete lines of pubescence; bracteoles 1.5–3 mm ..... 34. *O. lignosa*

27b. Stems glabrescent; bracteoles 4–5 mm ..... 63. *O. salicifolia*

26b. Leaves rather narrow to relatively broad, less than 3 × as long as wide, 0.5–25 × 0.3–10 cm.

28a. Corolla lobes dorsally with well-developed hornlike appendages 0.8–2 mm.

29a. Plants robust, to 2.5 m tall, leaves 10–20 × 4–7.5 cm, with 15 or 16 pairs of secondary veins ..... 44. *O. mycetiifolia*

29b. Plants smaller to somewhat robust, to 1 m tall, leaves 2–17 × 2–4.5 cm, with 6–13 pairs of secondary veins.

30a. Corolla tube 22–24 mm ..... 25. *O. howii*

30b. Corolla tube 10.5–12 mm.

31a. Leaves with secondary veins 8–12 pairs; calyx lobes 0.4–0.5 mm ..... 19. *O. gracilis*

31b. Leaves with secondary veins 6 or 7 pairs; calyx lobes ca. 1.5 mm ..... 55. *O. purpureonervis*

28b. Corolla lobes dorsally smooth, ridged, winged, and/or with dorsal thickenings on lobes, these sometimes hornlike but 0.7 mm or shorter.

32a. Plants creeping to procumbent, with most internodes prostrate and/or most nodes rooting.

33a. Corolla with tube 15–20 mm, lobes 5–6.5 mm.

34a. Corolla externally with 5 pubescent lines ..... 42. *O. mitchelloides*
34b. Corolla externally glabrous or uniformly pubescent ..... 33. *O. liangkwangensis*
33b. Corolla with tube 7–12 mm, lobes 2–5 mm.
35a. Corolla lobes ca. 2 mm; stems glabrescent or pilosulous in lines ..... 30. *O. kwangsiensis*
35b. Corolla lobes 2.2–5 mm; stems generally uniformly villous, hirtellous, or pilosulous.
36a. Bracts well developed, 3.5–6 mm; leaf base regularly cordate ..... 11. *O. cordata*
36b. Bracts reduced, 1–2 mm; leaf base obtuse, truncate, or sometimes cordulate.
37a. Corolla lobes 2.5–3 mm ..... 14. *O. dulongensis*
37b. Corolla lobes 4–5 mm ..... 26. *O. huanjiangensis*
32b. Plants erect to weak, with most internodes ascending and most nodes not rooting.
38a. Corolla with tube 18–27 mm.
39a. Bracts and bracteoles well developed, enclosing buds and at least partially flowers, ligulate, lanceolate, ovate, elliptic, or elliptic-oblong, 10–18 mm.
40a. Stems villous; corolla funnelform at least in upper part.
41a. Corolla lobes not evidently veined, ca. 5 mm ..... 20. *O. grandibracteolata*
41b. Corolla lobes pinnately veined, 6–8 mm ..... 58. *O. rhodoneura*
40b. Stems glabrous; corolla salverform to funnelform.
42a. Corolla funnelform, tube villous inside above middle ..... 16. *O. fangdingii*
42b. Corolla salverform to funnelform, tube glabrous inside ..... 46. *O. napoensis*
39b. Bracts and bracteoles reduced to developed, not enclosing or covering buds or flowers, linear, narrowly triangular, or narrowly lanceolate, 5.5 mm or shorter.
43a. Stems villous, villosulous, hirsute, hispidulous, strigose, strigillose, or pilosulous.
44a. Calyx lobes 0.4–1.5 mm; flowers several to many.
45a. Peduncle 1.5–3.5 cm; corolla tube 18–20 mm, pubescent inside ..... 9. *O. chinensis*
45b. Peduncle 1–1.5 cm; corolla tube 23–27 mm, glabrous inside ..... 68. *O. wallichii*
44b. Calyx lobes 1–3 mm; flowers 1–5.
46a. Corolla tube 22–26 mm; leaves without gland dots abaxially ..... 54. *O. purpurascens*
46b. Corolla tube 18–22 mm; leaves with or without gland dots abaxially.
47a. Leaves without or usually with reddish gland dots abaxially; fruit 5–6 × ca. 11 mm ..... 61. *O. rufopunctata*
47b. Leaves without gland dots abaxially; fruit ca. 3 × 8 mm ..... 69. *O. wenshanensis*
43b. Stems glabrous to puberulent.
48a. Leaves broadly ovate to broadly elliptic, abaxially with numerous small scales ..... 12. *O. crassifolia*
48b. Leaves elliptic, lanceolate, ovate, ovate-oblong, or elliptic-oblong, glabrous to variously pubescent but without scales.
49a. Stipules generally persistent at least on uppermost nodes, 6–8 mm ..... 39. *O. macrantha*
49b. Stipules generally caducous, unknown or perhaps reduced.
50a. Calyx lobes unequal, 0.7–2 mm ..... 45. *O. nandanica*
50b. Calyx lobes subequal, 0.4–1.5 mm.
51a. Fruit 14–15 mm wide ..... 68. *O. wallichii*
51b. Fruit 8–11 mm wide.
52a. Leaves 3.5–15 cm, with 9 or 10 pairs of secondary veins; corolla white to pale purple-red; widespread ..... 9. *O. chinensis*
52b. Leaves 9–15 cm, with 10–14 pairs of secondary veins; corolla red to purplish red; Xizang, Yunnan ..... 67. *O. umbricola*
38b. Corolla with tube less than 18 mm (corolla unknown in *O. hainanensis*).
53a. Stipules generally well developed, 3–16 mm, and persistent at least on uppermost nodes of flowering stems.
54a. Calyx lobes rather well developed, 1.5–2.5 mm with at least some longer than 1.5 mm.
55a. Leaves larger, 6.5–22 × 2.5–10 cm; bracts 7–9 mm ..... 40. *O. macrodonta*
55b. Leaves smaller, 1–4 × 0.6–2.5 cm; bracts reduced, to ca. 1 mm ..... 14. *O. dulongensis*
54b. Calyx lobes smaller, 0.5–1.5 mm with at least some shorter than 1.5 mm.
56a. Bracts and bracteoles reduced, to 3 mm, mostly or all deciduous before anthesis.
57a. Leaves smaller, 2–11 × 1–5 cm; corollas pubescent inside, glabrous to pubescent outside ..... 62. *O. rugosa*
57b. Leaves larger, 6.5–25 × 2–10 cm; corollas glabrous inside and puberulent to glabrous outside.
58a. Corollas yellow to pale yellow; peduncles in flower 3–10 cm (these later elongating in fruit) ..... 48. *O. ochroleuca*

58b. Corollas purplish red; peduncles in flower 2.5–5 cm (these later elongating in fruit) ..... 59. *O. rosea*
56b. Bracts and bracteoles generally well developed, 3–12 mm, generally persistent at least through anthesis.
59a. Leaves in markedly unequal pairs, larger ones 1.5–3 × as long as shorter.
60a. Corolla pink or purplish red, tube ca. 11 mm, lobes ca. 1.5 mm and dorsally with short hornlike appendage ..... 5. *O. brevidentata*
60b. Corolla white, tube ca. 9 mm, lobes 2–3 mm and dorsally narrowly winged ..... 47. *O. nutans*
59b. Leaves in subequal pairs.
61a. Leaves larger, at least some 10–16 × 4–6.5 cm; peduncles in flower 1–8 cm.
62a. Peduncle in flower 1.5–2 cm; bracts 3–4 mm; corolla pubescent inside ..... 23. *O. hispida*
62b. Peduncle in flower 1–8 cm; bracts 6–12 mm; corolla glabrous inside.
63a. Calyx with hypanthium portion 1–1.5 mm, lobes 1–1.2 mm ..... 17. *O. fasciculata*
63b. Calyx with hypanthium portion ca. 3 mm, lobes ca. 0.5 mm ..... 48. *O. ochroleuca*
61b. Leaves smaller, 0.8–13 × 0.5–4 cm; peduncles in flower 0.5–6 cm.
64a. Peduncle in flower 1–3 cm; bracts 3–6.5 mm; leaves obtuse at apex ..... 50. *O. pauciflora*
64b. Peduncle in flower 0.5–6 cm; bracts 5–10 mm; leaves acute to cuspidate or acuminate at apex.
65a. Plants viscid puberulent, trichomes unicellular and not drying particularly dark; leaves with secondary veins 15–17 pairs; Hainan ..... 21. *O. hainanensis*
65b. Plants villous, trichomes multicellular, drying reddish brown, not glandular; leaves with secondary veins 9–15 pairs; mainland ..... 47. *O. nutans*
53b. Stipules caducous and not seen, or 3 mm or shorter.
66a. Calyx and fruit densely tuberculate with peglike, flat- to round-topped protuberances; Taiwan ..... 22. *O. hayatana*
66b. Calyx and fruit smooth, glabrous to pubescent with slender trichomes.
67a. Plants drying purple throughout (on live plants, see old and dying tissues).
68a. Corolla with tube 9–14 mm; leaves 4–11 × 0.7–3.5 cm; bracts 1–6 mm ..... 28. *O. japonica*
68b. Corolla with tube 7–10 mm; leaves 5–20 × 2.5–8 cm, at least some longer than measurements in alternate lead; bracts 6–9 mm ..... 66. *O. succirubra*
67b. Plants drying green, brown, yellowed, gray, blackened, or with parts flushed purple.
69a. Stems (but not necessarily inflorescences) villous to hispid with well-developed spreading trichomes.
70a. Calyx lobes ca. 0.5 mm; corolla pale purple or white, with tube 10–12 mm and lobes ca. 1 mm ..... 23. *O. hispida*
70b. Calyx lobes 1–1.3 mm; corolla yellowish white or tinged with purple, with tube ca. 16 mm and lobes 5–5.5 mm ..... 36. *O. longipes*
69b. Stems glabrous or strigillose, puberulent, hispidulous, and/or villosulous with short, appressed to spreading trichomes.
71a. Leaves relatively broad, less than 2 × as long as wide, 11–16 × 5.5–10 cm ..... 8. *O. carnosicaulis*
71b. Leaves moderately broad to rather narrow, 2 or more × as long as wide, 1.5–20 × 0.7–7 cm.
72a. Leaves with secondary veins 13–23 pairs, at least some leaves with more than 13 pairs.
73a. Calyx puberulent; corolla lobes 1.8–4 mm, dorsally winged ..... 7. *O. cantonensis*
73b. Calyx hispidulous; corolla lobes ca. 1.5 mm, with short hornlike appendage ..... 13. *O. densa*
72b. Leaves with secondary veins 4–15 pairs, at least some leaves with fewer than 13 pairs.
74a. Bracteoles well developed, 7–12 mm ..... 2. *O. alatiflora*
74b. Bracteoles none, reduced, or moderately well developed, 6 mm or shorter.
75a. Bracts and bracteoles reduced or caducous, not or hardly visible.
76a. Leaves in unequal pairs, with secondary veins prominent adaxially ..... 37. *O. luchuanensis*
76b. Leaves in subequal pairs, with secondary veins flat to impressed adaxially.
77a. Leaves with 5 or 6 pairs of secondary veins; stems puberulent to glabrescent ..... 31. *O. laevifolia*
77b. Leaves with 7–15 pairs of secondary veins; stems glabrous, puberulent, or hispidulous.
78a. Leaves rounded-obtuse at apex ..... 65. *O. subrubescens*
78b. Leaves acute or acuminate at apex.

79a. Stems hispidulous ..... 49. *O. oppositiflora*
79b. Stems glabrous or puberulent.
80a. Corolla tube ca. 12 mm ..... 1. *O. alata*
80b. Corolla tube 4–8 mm ..... 49. *O. oppositiflora*
75b. Bracts and bracteoles developed, evident, persisting at least with flowers, bracteoles 1–6 mm.
81a. Leaves mostly or all in markedly unequal pairs, longer ones 2–3 or more × as long as shorter.
82a. Leaf pairs with longer ones 3 or more × as long as shorter; inflorescences pilosulous or puberulent with slender trichomes ..... 10. *O. chingii*
82b. Leaf pairs with longer ones 2–2.5 × as long as shorter; inflorescences mealy puberulent ..... 32. *O. laoshanica*
81b. Leaves in subequal pairs or some in unequal pairs, longer ones at most 1.5 × as long as shorter.
83a. Stems and leaves abaxially mealy puberulent; corolla lobes dorsally with short hornlike appendages ..... 18. *O. filibracteolata*
83b. Stems and leaves abaxially glabrous to variously pubescent with slender trichomes; corolla lobes dorsally smooth to winged and/or with short hornlike appendages.
84a. Leaves elliptic to elliptic-oblong, 6–20 × 1.5–7 cm, at least some leaves longer than measurements in alternate lead, with 9–15 pairs of secondary veins, generally becoming yellowed or brownish yellow when dry ..... 7. *O. cantonensis*
84b. Leaves elliptic to lanceolate or ovate, 1–11 × 0.7–4 cm, at least some leaves smaller than measurements in alternate lead, with 4–13 pairs of secondary veins, generally drying with green, gray, blackish, or purplish cast.
85a. Stigmas ovate to elliptic or lanceolate; widespread, common ..... 28. *O. japonica*
85b. Stigmas linear; known only from Yunnan, rare ..... 51. *O. petrophila*

**1. Ophiorrhiza alata** Craib, Pl. Siam. Enum. 2: 61. 1932.

有翅蛇根草 you chi she gen cao

Herbs, ascending, to 1 m tall; stems drying compressed, glabrous or puberulent. Leaves in subequal pairs; petiole 1–3 cm, subglabrous; blade drying submembranous, grayish green adaxially, pale abaxially, ovate, elliptic, or lanceolate-ovate, 7–13 × 3–5.5 cm, glabrous on both surfaces, base subcuneate and sometimes shortly decurrent, margins undulate, apex subacuminate; secondary veins 8–10 pairs; stipules caducous, not seen. Inflorescence many flowered, pubescent; peduncle 1.5–5 cm; axes helicoid, usually shorter than 1 cm; bracts reduced or absent. Flowers distylous, with pedicels ca. 2.5 mm. Calyx pubescent; hypanthium portion turbinate-campanulate, ca. 1.8 mm, 5-ribbed; lobes subtriangular, ca. 0.7 mm. Corolla white, tubular with swollen base, subglabrous outside; tube ca. 12 mm, with white villous ring in throat; lobes triangular to broadly ovate, ca. 1.5 mm, dorsally winged and with short horn at apex. Capsules ca. 2.5 × 6 mm. Fl. Apr–May.

Dense forests; 500–700 m. Yunnan [Thailand].

H. S. Lo (in FRPS 71(1): 173. 1999) described this species as distylous but described only an apparently short-styled flower.

**2. Ophiorrhiza alatiflora** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 62. 1990.

延翅蛇根草 yan chi she gen cao

Herbs or subshrubs, suberect; stems stout, terete to slightly compressed. Leaves in subequal pairs; petiole 1–1.5(–4) cm, pilosulous; blade drying papery to thickly papery, black adaxially, pale brown abaxially, ovate or oblong-ovate, 5–13 × 2–7 cm, glabrous on both surfaces or hirtellous along principal veins abaxially, base cuneate, rather inequilateral, margins subentire, apex shortly acuminate or subacute; secondary veins 7–12 pairs; stipules caducous, not seen. Inflorescence congested-cymose, many flowered, densely pubescent; peduncle 1–4 cm; axes 0.5–4 cm, helicoid; bracteoles narrowly lanceolate, 7–12 mm, acute, glabrous or sparsely ciliate. Flowers distylous, subsessile. Calyx densely pilosulous to puberulent; hypanthium turbinate, ca. 1.5 mm, 5-ribbed; lobes subtriangular or triangular, 0.5–0.7 mm, with 1 globose gland in each sinus. Corolla white striped with purple, subtubular or slightly swollen at base, outside glabrous and winged along entire length, inside with a ring of pubescence just below throat and/or in throat and onto lobes; tube 12–15 mm; lobes subovate, 2–3 mm, dorsally with wing 0.8–1 mm wide, apex rostrate. Capsules mitriform, ca. 3 × 10 mm, pilosulous.

● Forests. Yunnan.

The protologue described both of the floral forms in detail, noting explicitly that the corollas are similar and the anthers and stigmas reciprocally placed, near the middle of the corolla tube and at or just below the throat, respectively. However, the protologue figure shows partially different patterns of internal corolla pubescence in the two floral forms, with the pubescence restricted to a narrow ring well below the throat in the long-styled flowers but located in the throat of the short-styled flowers.

The varieties treated by H. S. Lo in FRPS (71(1): 160. 1999) are treated here for reference. The protologue figure was not fully labeled

but apparently illustrated only var. *alatiflora*; these same figures were reproduced in FRPS (p. 161, t. 41, f. 1–8) where they were explicitly labeled as var. *alatiflora*.

1a. Leaf blade drying with thinner texture, glabrous on both surfaces ..... 2a. var. *alatiflora*
1b. Leaf blade drying with thicker texture, crisped pubescent along principal veins abaxially ..... 2b. var. *trichoneura*

**2a. Ophiorrhiza alatiflora** var. **alatiflora**

延翅蛇根草(原变种) yan chi she gen cao (yuan bian zhong)

Leaf blade drying with thinner texture, glabrous on both surfaces.

● Forests. Yunnan.

**2b. Ophiorrhiza alatiflora** var. **trichoneura** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 63. 1990.

毛脉蛇根草 mao mai she gen cao

Leaf blade drying with thicker texture, crisped pubescent along principal veins abaxially.

● Forests. Yunnan.

**3. Ophiorrhiza aureolina** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 34. 1990.

金黄蛇根草 jin huang she gen cao

Herbs, ascending or sometimes weak at base, to 30(–45) cm tall; stems terete to compressed, usually striate, densely golden yellow pubescent. Leaves in subequal pairs; petiole 0.5–1.5 cm, densely golden yellow pubescent; blade drying papery, yellow or grayish yellow, ovate, lanceolate, or elliptic-oblong, 1.5–6 × 0.8–2 cm, adaxially sparsely strigose or glabrescent to pubescent, abaxially golden yellow pubescent to glabrescent at least on principal veins, base cuneate to acute, apex acute or shortly acuminate; secondary veins 7–10 pairs; stipules persistent on upper nodes, deeply 2-parted, lobes triangular, 3–8 mm, filiform or acuminate at apex. Inflorescences cymose to somewhat congested-cymose, many flowered, golden yellow pubescent; peduncle 5–15 mm; axes short to well developed, helicoid; bracts none or reduced and caducous. Flowers distylous, subsessile. Calyx densely golden yellow hispidulous or -pilosulous; hypanthium turbinate, 1.2–1.5 mm, 5-ribbed; lobes subtriangular, 0.5–0.7 mm. Corolla pale yellow, white, or sometimes reddish, tubular to often somewhat inflated, hispidulous outside; tube 3–4 mm, inside with a white villous ring in upper half; lobes subovate, 1–1.3 mm, apex incurved-rostrate, dorsally smooth. Capsules obcordate, ca. 2 × 4–5.5 mm, hirtellous to pilosulous. Fl. Jul.

● Forests; ca. 1800 m. Yunnan (Xishuangbanna).

H. S. Lo (loc. cit.: 34–37) recognized two forms of this species, f. *aureolina* and f. *qiongyaensis* H. S. Lo; the latter form was formally synonymized with *Ophiorrhiza pumila* by Duan and Lin (Acta Phytotax. Sin. 45: 878. 2007), who are followed here. Lo described the long-styled and short-styled forms as similar in their corollas but differing in the anthers (situated below the middle of the corolla tube in the long-styled form vs. in the throat in the short-styled form); the stigmas appear to be reciprocal in position with the anthers.

**4. Ophiorrhiza austroyunnanensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 30. 1990 [*"astroyunnanensis"*].

滇南蛇根草 dian nan she gen cao

Herbs, generally procumbent; stems pilosulous or tomentose. Leaves in equal to somewhat unequal pairs; petiole 0.5–1.5 cm, densely pilosulous or tomentose; blade drying thinly papery, usually grayish with veins brown abaxially, ovate, elliptic, elliptic-oblong, or lanceolate, 2–5(–7) × 0.8–2.2 cm, adaxially sparsely pilose, multicellular pilose along principal veins abaxially, base cuneate to subrounded, margins sometimes undulate, apex obtuse; secondary veins 7–9 pairs; stipules persistent, ovate, 5–7 mm, glabrescent, ciliate, long acuminate. Inflorescences congested-cymose to subcapitate, several flowered, glabrescent; peduncles 2–3 cm; bracts elliptic-oblong, 5–6 × 1.5–2 mm, obtuse. Flowers distylous, subsessile. Calyx glabrous; hypanthium subturbinate, 0.8–1 mm, 5-ribbed; lobes triangular, ca. 0.4 mm. Corolla tubular-salverform, outside glabrous; tube ca. 2.6 mm, with white villous ring in throat; lobes subtriangular, ca. 1.3 mm, dorsally smooth, obtuse. Infructescences with axes expanded, lax. Capsules oblate-ellipsoid, ca. 1.5 × 3.5 mm, glabrous, shortly white striate. Fl. May.

● Thickets; ca. 1500 m. Yunnan.

The protologue figure, reprinted in FRPS (71(1): 133, t. 32, f. 1–10. 1999), shows a remarkable dimorphism in the shape and internal pubescence of the corollas (salverform and densely barbate in the throat in the long-styled form vs. funnelform and glabrous internally in the short-styled form), but the protologue description said only that the corollas of both forms are similar; thus, this figure may deserve re-checking.

**5. Ophiorrhiza brevidentata** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 32. 1990.

短齿蛇根草 duan chi she gen cao

Herbs, ascending; stems drying purplish red or purplish brown, slender, terete, densely hirtellous. Leaves in markedly unequal pairs; petiole ca. 1 cm, pilosulous; blade drying papery, ovate, larger ones 2–6 cm, smaller ones 1/3–1/2 as large, strigose adaxially, villous abaxially at least along principal veins, base rounded to obtuse, apex cuspidate; secondary veins 9–11(–15) pairs; stipules lanceolate, 5–6 mm, villous, acuminate. Inflorescences congested-cymose to subcapitate, few to many flowered, densely pilosulous; peduncle 1.5–4.5 cm; axes helicoid; bracts oblong-lanceolate or elliptic-oblong, 5–7 mm, ciliate. Flowers with biology unknown. Calyx pilosulous; hypanthium ca. 1.2 mm; lobes subtriangular, 0.7–0.9 mm. Corolla pink or purplish red, tubular, outside glabrous or in bud puberulent at apex; tube ca. 11 mm, inside villous above middle and in throat; lobes ca. 1.5 mm, dorsally with very short horn. Capsule ca. 2 × 6 mm, puberulent. Fl. Apr–May, fr. Jun.

● Streamsides in forests. Yunnan.

The flowers described in the protologue resemble the short-styled form of distylous species, with the anthers shortly exserted in the throat and the stigmas positioned near the base of the corolla tube.

**6. Ophiorrhiza cana** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 20. 1990.

灰叶蛇根草 hui ye she gen cao

Herbs, creeping; stems drying compressed, striate or shallowly sulcate, pilosulous. Leaves in subequal pairs; petiole 1–1.5 cm, pilosulous; blade drying thinly papery or membranous-papery, leaden gray or sometimes green adaxially, pale and puncticulate abaxially, ovate, elliptic-oblong, or lanceolate, 3.5–11 × 1.8–4.5 cm, adaxially subglabrous or sparsely puberulent, abaxially pilosulous along principal veins, base cuneate to rarely subrounded, margins flat or undulate, apex acute or obtuse then acuminate; secondary veins 10–15 pairs; stipules persistent, broadly triangular then abruptly contracted, 4–5 mm, caudate-acuminate. Inflorescences congested-cymose, many flowered, densely pilosulous, branched to 1 order; peduncle shorter than 1 cm; axes very short, helicoid; bracteoles quickly caducous, ca. 0.3 mm. Flowers distylous, subsessile or with pedicels to 1 mm. Calyx with hypanthium subglobose to subturbinate, ca. 1.1 × 1.5 mm, 5-ribbed, hispidulous; lobes linear, 1.4–1.6 mm, with line of stiff hairs. Corolla drying orange-yellow, tubular-funnelform, hirtellous outside; tube ca. 5 mm, with villous ring in throat; lobes subovate, ca. 2 mm, acute, dorsally with horn ca. 1.5 mm. Capsules obcordate, ca. 2 × 5 mm, hispidulous.

● SE Yunnan.

The protologue described both the long-styled and short-styled forms in detail, noting that the forms have similar calyces and corollas but differ in their stamen and stigma position (i.e., stamens inserted in the corolla tube ca. 0.5 mm from the base and stigmas positioned in the throat in the long-styled form vs. stamens inserted in the throat and stigmas positioned just below the throat in the short-styled flowers). The protologue also noted that this species is known only from the type, which lacks locality or date.

**7. Ophiorrhiza cantonensis** Hance, Ann. Sci. Nat., Bot., sér. 4, 18: 222. 1862.

广州蛇根草 guang zhou she gen cao

*Ophiorrhiza bodinieri* H. Léveillé; *O. japonica* Blume var. *leiocarpa* Handel-Mazzetti; *O. longzhouensis* H. S. Lo; *O. paniculiformis* H. S. Lo; *O. seguinii* H. Léveillé; *O. violaceo-flammea* H. Léveillé; *O. yingtakensis* Masamune.

Herbs or subshrubs, weak to erect, to 1.2 m tall, often brown to yellowish brown when dry; stems glabrous to densely puberulent or villosulous. Leaves in subequal pairs; petiole 1–4 cm, glabrous to densely puberulent or villosulous; blade drying papery to thickly papery, grayish brown or grayish green adaxially, pale green to yellowish brown abaxially, oblong-elliptic, elliptic, ovate, ovate-oblong, or lanceolate-oblong, 6–20 × 1.5–7 cm, glabrous throughout or sometimes puberulent abaxially, base obtuse to acute, margins entire, apex acute to acuminate; secondary veins 7–15(to 18, *O. paniculiformis*) pairs; stipules broadly triangular, 0.8–1.5 mm, puberulent to glabrous, caducous. Inflorescences paniculiform to corymbose, several to many flowered, densely puberulent to pilosulous; peduncles 1.5–7 cm; axes helicoid; bracts linear, 1–6 mm. Flowers distylous, subsessile or pedicels to 2 mm. Calyx densely puberulent; hypanthium subglobose to turbinate, 1–1.3 mm, smooth to weakly 5-ribbed; lobes triangular, 0.4–1 mm, sometimes with 1 gland in each sinus. Corolla white to pink, often drying yellow or pale red, subtubular to tubular-funnelform, slightly swollen at base, puberulent to glabrous outside, inside villous near middle of tube and scaly pubescent above middle and onto lobes; tube 9–12(–15) mm; lobes triangular, 1.8–3(–4) mm, dorsally with wing ca. 0.3 mm wide and often prolonged near apex, apex rostrate. Capsules mitriform, 3–4 × 6–9 mm, densely puberulent to subglabrous. Fl. winter and spring, fr. spring and summer.

● Ravines and watersides in forests; 100–1700 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan (Pingshan), Yunnan.

*Ophiorrhiza longzhouensis* was synonymized formally by Duan and Lin (Acta Phytotax. Sin. 45: 870. 2007) with *O. cantonensis*; H. S. Lo's separation of *O. longzhouensis* (Bull. Bot. Res., Harbin 10(2): 79. 1990) seems to have been based on its having relatively small leaves. Duan and Lin also synonymized *O. paniculiformis* with *O. cantonensis*. In FRPS (71(1): 165–166. 1999), H. S. Lo described this species as distylous with the corollas of both forms apparently similar and the reciprocally placed anthers and stigmas positioned near the middle of the corolla tube and in its throat, respectively; Lo also described the dried color of specimens of this species as ranging to reddish or red, but those specimens here belong to the more broadly circumscribed *O. succirubra*.

**8. Ophiorrhiza carnosicaulis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 60. 1990.

肉茎蛇根草 rou jing she gen cao

Herbs, apparently ascending; stems stout, subglabrous. Leaves in subequal pairs; petiole 1.5–7 cm, subglabrous; blade drying thickly papery, brownish yellow with veins dark brown abaxially, broadly ovate or broadly elliptic, 11–16 × 5.5–10 cm, glabrous on both surfaces, base subrounded, decurrent, ± inequilateral, margins entire, apex cuspidate; secondary veins 7 or 8 pairs; stipules caducous, not seen. Inflorescence slightly sparse, many flowered, pubescent; peduncle ca. 3 cm; axes helicoid, 2–3 cm; bracteoles subulate-ensiform, 2–3 mm, costate, obtuse. Flowers distylous, subsessile. Calyx pilosulous; hypanthium turbinate, 1.5–2 mm, 10-ribbed; lobes triangular, 0.6–0.7 mm, usually with 1 gland in each sinus. Corolla pale purple, subtubular, glabrous outside; tube ca. 14 mm, pilose in basal portion inside; lobes ovate-triangular, ca. 2 mm, dorsally with very short horn, apex rostrate. Capsules dark purple, mitriform, ca. 5 × 12 mm, pilosulous. Fl. Jun–Jul.

● Wet places in forests. Yunnan (Hekou).

The protologue described the flowers as distylous but noted that long-styled flowers had not been seen; the putative short-styled flowers were described as having the anthers positioned just below the throat and the stigmas in the lower part of the corolla tube. The protologue figure was reproduced but not exactly by FRPS (71(1): 159, t. 40, f. 1–6. 1999); in particular, the protologue figure shows the calyx as pilosulous and the corollas as pilose internally in the basal portion, but the FRPS figure depicts the calyx and the corollas as glabrous.

**9. Ophiorrhiza chinensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 70. 1990.

中华蛇根草 zhong hua she gen cao

Herbs or subshrubs, to 40(–80) cm tall; stems drying straw-yellow or purplish black, terete, subglabrous to pilosulous. Leaves in subequal pairs; petiole 1–4 cm; blade drying

papery, rather pale red, lanceolate to ovate, 3.5–12(–15) cm, usually glabrous or subglabrous on both surfaces, base cuneate, obtuse, or rarely rounded, margins entire, apex acuminate; secondary veins 9 or 10 pairs; stipules caducous, not seen. Inflorescences paniculiform to cymose, several to many flowered, densely hirtellous to pilosulous; peduncle 1.5–3.5 cm; axes 1–3.5 cm, helicoid, deflexed, later becoming erect; bracteoles absent or reduced and caducous. Flowers distylous, on pedicels 1–2 mm. Calyx mealy puberulent; hypanthium subturbinate, 1.2–1.4 mm, 5-ribbed; lobes subtriangular, 0.4–0.5 mm. Corolla white or pale purplish red, tubular-funnelform, subglabrous or mealy puberulent outside, inside pilosulous to scaly hairy in upper part onto lobes and with a white villous ring near middle of tube; tube 18–20 mm; lobes triangular-ovate, 2.5–3 mm, dorsally with carinate narrow wing prolonged into very short horn near apex, apex cucullate-rostrate. Infructescence axes often becoming thickened, glabrescent, expanded, peduncle to 5 cm, axes to 6 cm, pedicels to 4 mm. Capsules obcordate-mitriform, 3–3.4 × 8–10 mm, subglabrous. Fl. winter and spring, fr. spring and summer.

● Fertile soil in broad-leaved forests; ca. 1300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan.

The protologue detailed the long-styled and short-styled flowers, which are said to be similar in corolla size and to differ reciprocally in anther and stigma position, with one structure held in the middle of the corolla tube and the other exserted from the throat, respectively.

**10. Ophiorrhiza chingii** H. S. Lo in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 189. 1999.

秦氏蛇根草 qin shi she gen cao

Herbs, weak; stems elongated, drying brownish red, glabrous or puberulent. Leaves in markedly unequal pairs; petiole 0.5–3 cm, puberulent; blade drying thinly papery, straw-yellow except usually purple on midrib, lanceolate-oblong to elliptic, larger ones 3.5–9.5 × 1.3–2.7 cm, smaller ones 1.5–6.5 × 0.7–1.8 cm, subglabrous on both surfaces or sparsely strigose or pilose adaxially and puberulent along principal veins abaxially, base cuneate, margins subentire, apex caudate-acuminate; secondary veins 8 or 9 pairs; stipules caducous, not seen. Inflorescence congested-cymose, few flowered, puberulent to pilosulous; peduncle 1–1.5 cm; axes reduced or 2 or 3, helicoid, ca. 1 cm; bracteoles linear, 3.5–4 mm, obtuse. Flowers distylous, subsessile. Calyx puberulent or pilosulous to glabrescent; hypanthium turbinate, ca. 1.2 mm, 5-ribbed; lobes subovate or sublanceolate, ca. 0.5 mm. Corolla white, tubular-funnelform, subglabrous outside, inside with white villous ring near middle and sometimes scaly villosulous in upper part and onto lobes; tube ca. 9 mm; lobes elliptic-oblong, ca. 3 mm, dorsally with wing ca. 0.5 mm wide, apex subrostrate. Capsules not seen. Fl. Apr.

● Wet places in forests. Yunnan (Yangbi).

Although the original description (H. S. Lo, Bull. Bot. Res., Harbin 10(2): 65. 1990, not validly published) reported that the long-styled flowers were not found, the figure in FRPS (72(1): 161, t. 41, f. 9–13. 1999) illustrated these. That figure shows the corollas as similar in size between the two forms but with the internal pubescence restricted to the upper middle part of the tube in the short-styled form and from the middle of the tube through the top of the lobes in the long-styled form; also, the anthers and stigmas are reciprocally positioned near or just below the middle of the corolla tube and in the throat, respectively.

**11. Ophiorrhiza cordata** W. L. Sha ex S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 189. 1999.

心叶蛇根草 xin ye she gen cao

Herbs, procumbent to creeping; stems densely brown villous with multicellular trichomes. Leaves in subequal pairs; petiole 0.8–1.7 cm, densely brownish red villous; blade drying papery, adaxially grayish black, abaxially brownish, broadly ovate to suborbicular, 3.5–6 × 2.3–4 cm, subglabrous or sparsely pilose adaxially, villous abaxially along principal veins, base cordate, margins sparsely ciliate, apex obtuse then abruptly shortly acute; secondary veins 5–7 pairs; stipules caducous, not seen. Inflorescence congested-cymose, 4–8-flowered, brownish red villous; peduncle ca. 1 cm; axes reduced; bracts elliptic-oblong, 3.5–6 mm, ciliate. Flowers with breeding biology unknown, subsessile. Calyx subglabrous; hypanthium turbinate, ca. 2 mm, 10-ribbed; lobes triangular, ca. 0.5 mm, obtuse or perhaps acute. Corolla white, tubular-funnelform, glabrous outside; tube 11–12 mm, inside glabrous except with villous ring at middle; lobes triangular, ca. 2.2 mm, dorsally narrowly winged and with very short horn, apex rostrate. Capsules unknown. Fl. Apr.

● Forests. Guangxi (Napo).

Neither the original description (H. S. Lo, Bull. Bot. Res., Harbin 10(2): 55. 1990, not validly published) nor FRPS (71(1): 154–156. 1999) described the floral biology of this species; the flowers described resemble the long-styled form of distylous species, with the anthers positioned near the middle of the corolla tube and the stigmas in the corolla throat.

**12. Ophiorrhiza crassifolia** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 47. 1990.

厚叶蛇根草 hou ye she gen cao

Herbs, perhaps ascending, notably fleshy, to 30 cm tall; stems flattened to terete, drying brown, puberulent to glabrous. Petiole 0.5–3.5 cm; leaf blade drying thickly papery, purplish red or yellowish brown abaxially, broadly ovate or broadly elliptic, 5–12 × 3.5–7 cm, glabrous on both surfaces, abaxially densely minutely orbicular scaly, base obtuse, subrounded, or subcordate, usually oblique, margins entire, apex obtuse to shortly cuspidate; secondary veins 5 or 6 pairs; stipules caducous, not seen. Inflorescences cymose or congested-cymose, many flowered, puberulent; peduncle 2.5–5.5 cm; axes short, helicoid; bracteoles narrowly spatulate, 5–5.5 mm, obtuse. Flowers with biology unknown, with pedicels 2–3 mm. Calyx puberulent; hypanthium turbinate, ca. 2 mm, 10-ribbed; lobes subtriangular, ca. 0.6 mm, in sinus with 1 gland. Corolla purplish red, salverform-funnelform, glabrous outside; tube 24–25 mm, pilose inside; lobes ovate-triangular, ca. 2.2 mm, dorsally ridged with very short horn. Capsules rhomboid, ca. 5 × 15 mm, glabrous or subglabrous. Fl. Oct.

● Rocks in forests. Guangxi (Longzhou).

**13. Ophiorrhiza densa** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 57. 1990.

密脉蛇根草 mi mai she gen cao

Herbs or subshrubs, ascending, to 1 m tall; stems terete, drying brownish purple, brown pilosulous to glabrescent. Leaves in subequal pairs; petiole 1–3 cm or longer, densely pilosulous or tomentose; blade drying thinly papery, adaxially black, abaxially pale purple, ovate or lanceolate-ovate, usually inequilateral, (5–)8–15(–18) × 1.5–4 cm, sparsely pilosulous adaxially, crisped tomentose along veins abaxially, base subcuneate, margins entire, apex caudate; secondary veins 13–18(–23) pairs; stipules caducous, not seen. Inflorescence 4–8 cm, many flowered, brown tomentose; axes helicoid; bracteoles linear, ca. 3 mm. Flowers distylous, sessile to subsessile. Calyx hispidulous; hypanthium turbinate to subglobose, ca. 1.2 mm, 5-ribbed; lobes narrowly triangular, ca. 1 mm. Corolla pale purple, subtubular to inflated, densely pilosulous outside, inside pilosulous near middle of tube and sometimes onto lobes, and/or densely glandular-pilose on lobes; tube ca. 10 mm; lobes subdeltoid, ca. 1.5 mm, dorsally with very short horn, apex rostrate. Capsules unknown. Fl. Nov.

● Dense forests; 1400–1600 m. Yunnan (Malipo).

In the protologue and FRPS (71(1): 158. 1999), H. S. Lo described the floral forms as having similar corollas and reciprocally placed anthers and stigmas near the middle of the corolla tube and shortly exserted, respectively. However, the protologue figure showed differences between the floral forms in the internal pubescence of the corollas, with the pubescence confined to the general area of the middle of the tube in the short-styled flowers but distributed from the middle of the tube to the tops of the lobes in the long-styled form; this internal corolla pubescence was not described in the protologue text. The insides of the corolla lobes were described as *"glanduloso-piloso"* in the protologue text, which is unusual and also not shown in one of the protologue figures of the corolla interior.

**14. Ophiorrhiza dulongensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 27. 1990.

独龙蛇根草 du long she gen cao

Herbs, weak to procumbent; stems drying purplish brown, pilosulous. Petiole 0.3–1 cm, densely pilosulous or villosulous; leaf blade drying membranous to papery, often green with veins purplish brown abaxially, broadly ovate or ovate, 1–4 × 0.6–2.5 cm, scattered scabrous-strigillose adaxially, abaxially moderately pilose along principal veins, base obtuse to rounded, apex acute; secondary veins 4–6 pairs; stipules persistent, subulate, 4–6 mm, glabrous. Inflorescence fasciculate, 3- or 4-flowered, glabrescent; peduncle ca. 1 cm or slightly longer; bracts linear, ca. 1 mm. Flowers distylous. Calyx puberulent to glabrescent; hypanthium 1–1.5 mm, 5-ribbed; lobes narrowly lanceolate or lanceolate, 1.5–2 mm. Corolla white, funnelform, subglabrous outside; tube 7–7.5 mm, densely villous in throat; lobes triangular-ovate, 2.5–3 mm, dorsally ribbed at least in bud. Capsules unknown. Fl. Jul.

● Evergreen broad-leaved forests; 2300–2400 m. NW Yunnan.

In the protologue and FRPS (71(1): 127. 1999), H. S. Lo detailed the floral forms, noting that their corollas are similar in size and the anthers and stigmas are reciprocally placed near the middle of the corolla tube and in its throat, respectively.

**15. Ophiorrhiza ensiformis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 22. 1990.

剑齿蛇根草 jian chi she gen cao

Herbs, ascending; stems pilosulous at least when young. Leaves in subequal pairs; petiole 1–3 cm, pilose; blade drying submembranous, brown or dark brown, elliptic, ovate, or elliptic-oblong, 5–12 × 2.5–5.5 cm, adaxially sparsely ferruginous pilosulous, abaxially glabrous or subglabrous, base obtuse then narrowed to decurrent, margins entire, apex acute to rather abruptly acuminate; secondary veins 10–12 pairs; stipules generally persistent, broadly triangular then abruptly narrowed, 3–5 mm, glabrescent, ciliate, long acuminate. Inflorescences congested-cymose, several to many flowered, ferruginous pilosulous; peduncle ca. 1.5 cm; axes rather short, helicoid; bracts linear-ensiform to narrowly spatulate, 5–7 mm, glabrescent, pinnately veined, ciliate, acute. Flowers with biology unknown, with short pedicels. Calyx with hypanthium subturbinate, ca. 1.5 × 2.5 mm, 5-ribbed, with dense ferruginous long trichomes mixed with unicellular trichomes; lobes linear-ensiform to spatulate, 5–7.5 mm, pinnately veined, glabrescent except ciliate, acute. Corolla white, tubular-funnelform, outside 5-ribbed or 5-ridged in upper portion, glabrous or sparsely hispidulous along ribs; tube 13–14 mm, inside with white villous ring in throat; lobes triangular, 2–2.5 mm, dorsally narrowly winged, obtuse, rostrate. Capsules rhomboid-pyramidal, ca. 4 × 8 mm, pilosulous. Fl. Jan.

● Streamsides; ca. 2000 m. Yunnan (Longling).

**16. Ophiorrhiza fangdingii** H. S. Lo in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 190. 1999.

方鼎蛇根草 fang ding she gen cao

Herbs, weak at base, ascending above, to 40 cm tall; stems subterete, drying brown, subglabrous. Leaves in unequal pairs; petiole 0.5–2 cm, glabrous; blade drying papery, adaxially leaden gray, abaxially pale with veins brown, oblong-ovate or oblong-lanceolate, larger ones 5–7.5 cm, smaller ones 2–5 cm, glabrous on both surfaces, base subcuneate and somewhat inequilateral, margins subentire, apex obtuse then acuminate; secondary veins 5–10 pairs; stipules caducous, not seen. Inflorescences 4- or 5-flowered; peduncle ca. 1 cm; axes short, helicoid; bracteoles linear or narrowly lanceolate, 10–18 × 1.5–4 mm, obtuse, costate. Flowers reportedly distylous, with short pedicels. Calyx glabrous; hypanthium turbinate, ca. 1.2 mm, 5-ribbed; lobes linear-lanceolate, ± unequal, 2–3 mm, obtuse. Corolla white, funnelform, glabrous outside; tube ca. 23 mm, white villous above middle inside; lobes dorsally narrowly winged, wing extending into very short horn. Capsules not seen. Fl. Jan.

● Wet places in forests on limestone; ca. 1200 m. Guangxi (Napo).

In the original description (Bull. Bot. Res., Harbin 10(2): 40, 42. 1990, not validly published) and FRPS (71(1): 144. 1999), H. S. Lo described this species as distylous but described only the putative long-styled flowers; these resemble the long-styled form of distylous species in having the stigmas exserted and the anthers positioned below them in the upper part of the corolla tube.

**17. Ophiorrhiza fasciculata** D. Don, Prodr. Fl. Nepal. 136. 1825.

簇花蛇根草 cu hua she gen cao

Herbs or subshrubs, erect, to 0.5(–2) m tall; stems pilosulous or puberulent to glabrescent. Leaves in subequal pairs; petiole 1–1.5[–5] cm, puberulent; blade drying papery, sometimes darkened adaxially, pale abaxially, elliptic to lanceolate-elliptic, 8–12[–16] × 3–6 cm, glabrous or sparsely strigillose adaxially, abaxially puberulent on veins, base obtuse to cuneate then attenuate, apex acute to caudate-acuminate; secondary veins 10–13 pairs; stipules narrowly triangular, 4–10 mm, puberulent to glabrescent. Inflorescences congested-cymose to subfasciculate, several flowered, densely pilosulous; peduncle 1–8 cm; branched portion 1–2 cm; bracts ligulate-lanceolate, 6–12 mm, persistent. Flowers with biology unknown, subsessile. Calyx densely puberulent to hirtellous; hypanthium compressed cylindrical, 1–1.5 mm; lobes ovate to deltoid, 1–1.2 mm. Corolla white sometimes flushed with pink, drying yellowed, tubular-funnelform, outside puberulent; tube 10–15 mm, inside glabrous; lobes ovate-oblong, 1.5–2.5 mm. Capsules compressed rhombic, 1.5–4.5 × 4–10.5 mm, puberulent or hirtellous. Fr. Aug.

Broad-leaved forests; ca. 1700 m. Xizang (Mêdog) [Bhutan, India, Myanmar, Nepal].

Measurements in brackets are taken from the description of this species by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 44–47. 1997) and may be expected in Chinese plants.

**18. Ophiorrhiza filibracteolata** H. S. Lo in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 190. 1999.

大桥蛇根草 da qiao she gen cao

Herbs, apparently ascending, to 30 cm tall; stems mealy puberulent. Leaves in subequal pairs; petiole 1–5 cm; blade drying papery, dark brown, ovate to broadly ovate, 2.5–5.5 × 1.5–3.3 cm, glabrous, base obtuse or subrounded, margins entire, apex acute; secondary veins 7 or 8 pairs; stipules caducous, not seen. Inflorescence somewhat congested-cymose, many flowered; peduncle ca. 3 cm; axes up to 1 cm, helicoid; bracteoles filiform, fleshy, 2.5–3 mm. Flowers distylous, subsessile or pedicels to 2 mm. Calyx pilosulous; hypanthium subturbinate, ca. 1.4 mm, shallowly 5-ribbed; lobes triangular to narrowly lanceolate, ca. 0.7 mm, with 1 gland in each sinus. Corolla white, tubular-funnelform, outside pilosulous, inside with white villous ring at middle and scaly pilose from middle onto lobes; tubes 11–12 mm; lobes ovate-triangular, ca. 3 mm, dorsally narrowly winged and with very short horn. Capsules not seen. Fl. Apr.

● Forests. Guangdong (Ruyuan).

The original description (H. S. Lo, Bull. Bot. Res., Harbin 10(2): 52–53. 1990, not validly published) described the flowers as distylous with the short-styled flowers as unknown; the putative long-styled flowers were described as having the anthers positioned just below the middle of the corolla tube and the stigmas in the throat. In FRPS (71(1): 153. 1999), H. S. Lo gave the plant height as 20 cm, but the original description said 30 cm. Much of the information on pubescence details here is taken from the figure in the original description.

**19. Ophiorrhiza gracilis** Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 311. 1872.

纤弱蛇根草 xian ruo she gen cao

Herbs, weak at base, suberect above, to 30 cm tall; stems glabrous. Petiole glabrous; leaf blade drying membranous-papery, grayish on both surfaces, paler abaxially, lanceolate or subovate, 6–12(–17) × 2–4.5 cm, glabrous on both surfaces, base cuneate to attenuate and usually oblique, apex caudate to long acuminate; secondary veins 8–12 pairs; stipules caducous, not seen. Inflorescences many flowered, puberulent; peduncle 2–3 cm; bracteoles subulate, 0.5–1.2 mm, early caducous. Flowers distylous, subsessile. Calyx with hypanthium turbinate, ca. 1.3 mm, 5-ribbed; lobes ovate-triangular, 0.4–0.5 mm. Corolla white or reddish at apex, tubular; tube ca. 10.5 mm, white villous in throat and at middle inside; lobes triangular-ovate, 1.2–1.3 mm, dorsally with horn 0.8–1 mm. Capsules not seen. Fl. spring.

Dense forests. Yunnan [Myanmar].

H. S. Lo (in FRPS 71(1): 171. 1999) described the anthers as situated near the base of the corolla tube and the stigmas positioned just below the throat in the long-styled form vs. the anthers situated above the middle of the corolla tube and the stigmas near the base in the short-styled form.

**20. Ophiorrhiza grandibracteolata** F. C. How ex H. S. Lo, Bull. Bot. Res., Harbin 10(2): 43. 1990.

大苞蛇根草 da bao she gen cao

Herbs or subshrubs, weak at base, ascending above, to 70 cm tall; stems subterete, densely villous with trichomes multicellular or sometimes also unicellular. Leaves in unequal pairs; petiole 0.5–2(–3) cm, stout, densely multicellular villous; blade drying thinly papery, gray-black adaxially, reddish or pale abaxially, ovate, broadly ovate, or lanceolate-ovate, larger ones 4–12(–15) × 2–4.5(–6) cm, smaller ones 2–4(–6) × 1.2–2.5 cm, both surfaces glabrescent or multicellular villous on principal veins, base obtuse to cuneate and sometimes shortly decurrent, apex acute; secondary veins 7–10 pairs; stipules caducous, not seen. Inflorescence congested-umbelliform-cymose to subcapitate, 5- to many flowered or rarely 1-flowered, densely multicellular villous; peduncle ca. 0.8 cm; axes reduced; bracts and bracteoles ovate to lanceolate, 10–15 mm, pinnately veined, glabrescent except multicellular ciliate along margin and on dorsal costa. Flowers distylous, subsessile or on stout pedicels to 2 mm. Calyx multicellular villous; hypanthium broadly turbinate, 2–2.3 mm; lobes triangular, 1–1.2 mm. Corolla white or reddened, drying purplish red, funnelform, outside with 5 strigose lines from middle of tube to apices of lobes; tube 22–25 mm, inside with white villous ring above middle; lobes subovate, ca. 5 mm, sometimes weakly reticulate-veined, dorsally narrowly winged. Capsules rhomboid, 4–4.5 × ca. 11 mm, villous. Fl. Nov.

● Wet places in forests; 1200–1500 m. Guangxi (Napo), Yunnan.

The protologue and H. S. Lo in FRPS (71(1): 146. 1999) described this species as distylous, with the anthers borne well above the middle of the corolla tube and the stigmas positioned in the throat in one floral form vs. the anthers positioned near the middle of the corolla tube

and the stigmas well exserted in the other.

**21. Ophiorrhiza hainanensis** Y. C. Tseng, Fl. Hainan. 3: 582. 1974.

海南蛇根草 hai nan she gen cao

Herbs, weak to erect, to 50 cm tall; stems viscous puberulent with unicellular trichomes, to glabrescent. Leaves in subequal pairs; petiole 1–2.5 cm, puberulent; blade drying thinly papery, green on both surfaces, elliptic to ovate, 6–13 × 2.5–5 cm, adaxially glabrous, abaxially pilosulous along principal veins, base obtuse to acute, margins entire, apex shortly acuminate; secondary veins 15–17 pairs; stipules deciduous, triangular, 3–5 mm, aristate-acuminate. Inflorescence congested-cymose, several flowered, viscous puberulent; peduncles 0.5–1 mm, stout; bracts elliptic-oblong, 5–6 mm, viscid ciliate. Flowers with biology unknown. Calyx in bud sparsely puberulent; hypanthium to 2 mm; lobes triangular, to ca. 1 mm. Corolla in bud tubular. Capsules turbinate, ca. 4 × 9 mm, sparsely puberulent. Fl. (bud) and fr. Dec.

● Dense forests, uncommon. Hainan (Baoting, Qiongzhong).

*Ophiorrhiza hainanensis* was synonymized with *O. nutans* by Duan and Lin (Acta Phytotax. Sin. 45: 877. 2007). However, this species is here recognized provisionally, based on the distinctions given in the key to species.

**22. Ophiorrhiza hayatana** Ohwi, Repert. Spec. Nov. Regni Veg. 36: 57. 1934.

瘤果蛇根草 liu guo she gen cao

*Ophiorrhiza stenophylla* Hayata, Icon. Pl. Formosan. 2: 91. Oct 1912, not Valeton (Feb 1912).

Herbs, erect, to 50 cm tall; stems subterete or weakly 4-angled, glabrous to puberulent or strigillose. Leaves in subequal pairs; petiole 0.3–1.5(–2) cm, glabrous to puberulent; blade drying papery, discolorous, narrowly elliptic-oblong, elliptic, or lanceolate, 2–10(–15) × 0.8–2.5(–3) cm, glabrous on both surfaces or often hispidulous near margins adaxially, base acute to attenuate, apex acute to acuminate; secondary veins 4–8 pairs; stipules deciduous, broadly triangular to rounded, 0.5–1 mm, puberulent to glabrescent and/or glandular, sometimes erose. Inflorescence several to many flowered, cymose, densely puberulent to pilosulous sometimes in lines, fasciculate or peduncle 1.5–2(–4) cm; axes subcapitate to helicoid; bracteoles linear to narrowly triangular, 0.5–4 mm, glabrous, persistent or deciduous as fruit develop. Flowers with biology unknown, subsessile or on pedicels to 1.5 mm, sometimes tuberculate. Calyx glabrous to puberulent; hypanthium suburceolate to oblate, ca. 1.2(–2) mm, densely tuberculate with peglike structures on lower part and also sometimes on sides, 5-ribbed; lobes linear to spatulate, 1–1.3 mm. Corolla white, slenderly funnelform, outside glabrous; tube (12–)13–15 mm, inside barbate in throat; lobes triangular, 2.5–3(–4) mm, ciliate, dorsally winged and with very short horn near apex. Capsules obcordate, ca. 4 × 8–10 mm, tuberculate and sometimes pilosulous.

● Broad-leaved forests; 500–900 m. Taiwan.

Some measurements given by H. S. Lo in FRPS (71(1): 129. 1999) have not been seen on specimens and are provisionally presented in parentheses. The floral biology of this species has not been described; the specimens seen appear to be monomorphic with the anthers positioned at or just below the corolla throat and the stigmas perhaps positioned at the same level.

**23. Ophiorrhiza hispida** J. D. Hooker, Fl. Brit. India 3: 83. 1880.

尖叶蛇根草 jian ye she gen cao

Herbs, ascending, to 1 m tall; stems moderately villous or hispid. Leaves in subequal pairs; petiole 1.5–4(–7) cm, densely pilose or hispid; blade drying thinly papery, gray or olive-green, ovate or broadly ovate, 7–17 × 3.5–7 cm, sparsely hispid on both surfaces or moderately so abaxially, base obtuse, decurrent, often oblique, margins subentire, apex acuminate; secondary veins 9–14 pairs; stipules sublanceolate, markedly contracted above, pilose, ciliate, acuminate. Inflorescence congested-cymose, many flowered, villous; peduncle 1.5–2 cm; bracts linear, 3–4 mm, ciliate, persistent. Flowers distylous, subsessile. Calyx pilose; hypanthium subturbinate, ca. 1 mm, 5-ribbed; lobes subtriangular, ca. 0.5 mm, usually with 1 gland in each sinus. Corolla pale purple or white, slenderly tubular, sparsely pilose or hispid outside; tube 10–12 mm, inside with white villous ring near middle; lobes ovate-triangular, ca. 1 mm. Capsules ca. 2 × 5 mm, pilose or hispid.

Forests. SW Yunnan [NE India].

H. S. Lo (in FRPS 71(1): 134. 1999) noted that the corollas of the two floral forms are similar but that the flowers differ in the reciprocally placed anthers and stigmas positioned near the middle of the corolla tube or in the throat, respectively.

This species is circumscribed here following H. S. Lo (loc. cit.) and does not correspond to the circumscription of this species by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 59–61. 1997). Deb and Mondal described *Ophiorrhiza hispida* as having corollas with tubes 3–4 mm, leaves 2–15 × 1–4 cm, a plant stature of 35 cm or less, and calyx lobes 0.8–1 mm; the plants treated as *O. hispida* by Lo key to *O. fasciculata* in Deb and Mondal's treatment.

**24. Ophiorrhiza hispidula** Wallich ex G. Don, Gen. Hist. 3: 523. 1834.

版纳蛇根草 ban na she gen cao

Herbs, procumbent at base, ascending above, to 15 cm tall; stems glabrescent to densely villosulous. Leaves in subequal pairs; petiole 0.3–1 cm, puberulent to glabrescent; blade drying thinly papery, grayish, ovate, broadly ovate, elliptic, or sublanceolate, 1.5–4.5(–7) × 1–2.5 cm, adaxially glabrescent to sparsely strigillose, abaxially glabrous except pilosulous to puberulent along principal veins, base cuneate to obtuse, margins entire, apex acute; secondary veins 5–7 pairs; stipules persistent on uppermost nodes, triangular becoming strongly narrowed, 4–10 mm, glabrescent, long acuminate to aristate. Inflorescences cymose, several flowered, puberulent to hispidulous; peduncle 1–2.5(–4) cm; axes developed, helicoid; bracts few, narrowly triangular to linear, 0.5–2 mm. Flowers subsessile. Calyx puberulent to pilosulous; hypanthium ellipsoid to subglobose, ca. 1 mm; lobes narrowly triangular, 0.8–1 mm. Corolla white, tubular, outside puberulent; tube 4–5 mm, barbate in

throat and glabrescent to puberulent inside tube; lobes triangular-ovate, ca. 1.5 mm. Capsules obcordate, 1.5–2.5 × 4–5 mm, puberulent to villosulous. Fl. May–Sep, fr. Jul–Oct.

Dense forests. Yunnan (Xishuangbanna) [Bangladesh, India (including Andaman Islands), Indonesia, Malaysia, Thailand].

*Ophiorrhiza hispidula* was synonymized by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 131–133. 1997) under *O. trichocarpa* Blume, without explanation and reportedly without having seen Blume's type; the name *O. hispidula* is provisionally used here pending further study.

**25. Ophiorrhiza howii** H. S. Lo, Bull. Bot. Res., Harbin 18: 277. 1998.

宽昭蛇根草 kuan zhao she gen cao

*Ophiorrhiza longiflora* F. C. How ex H. S. Lo, Bull. Bot. Res., Harbin 10(2): 70. 1990, not Blume (1826).

Herbs, ascending, to ca. 1 m tall; stems terete to somewhat flattened, rather stout, drying purplish brown to black, subglabrous. Leaves in subequal pairs; petiole 1–2 cm, densely pilosulous; blade narrowly ovate, narrowly elliptic, or ovate, 5–9 × 2–3 cm, abaxially usually pilosulous along principal veins, base cuneate, apex acuminate; secondary veins 8–13 pairs; stipules caducous, unknown. Inflorescence cymose, several to many flowered, densely pilosulous; peduncles 1.5–2 cm; axes short, helicoid; bracts absent or minute and caducous. Flowers with biology unknown, on pedicels 1–2 mm. Calyx with hypanthium portion subturbinate and slightly compressed, ca. 1.7 × 2.3 mm, 5-ribbed, mealy puberulent; lobes sublanceolate, ca. 0.5 mm, subglabrous. Corolla white, salverform, puberulent outside; tube 22–24 mm, pilose or glabrous inside; lobes broadly ovate, 3–4 mm, dorsally with horn 1.5–2 mm, apex incurved rostrate. Capsules not seen. Fl. Oct.

● Forests; 1100–1500 m. Yunnan (Maguan).

The protologue described the corolla tubes as pilose inside, but the protologue figure showed the corolla tube to be glabrous inside.

**26. Ophiorrhiza huanjiangensis** D. Fang & Z. M. Xie, Acta Phytotax. Sin. 40: 155. 2002.

环江蛇根草 huan jiang she gen cao

Herbs, procumbent to creeping; stems to 23 cm, densely to moderately hirtellous or pilosulous, to sometimes glabrescent. Leaves in subequal pairs; petiole 0.15–1 cm, hirtellous; blade drying papery, ovate to elliptic-ovate, 0.5–1.85 × 0.3–1.2 cm, both surfaces puberulent at least on principal veins to glabrescent, base obtuse to cordulate, apex obtuse to acute; secondary veins 3 or 4 pairs; stipules caducous, not seen. Inflorescence cymose to umbelliform, 1–3-flowered, hirtellous to glabrescent; peduncle and/or pedicel 5–10 mm; bracts linear, 1–2 mm, sparsely puberulent to glabrescent. Flowers apparently distylous, pedunculate or pedicellate. Calyx puberulent to glabrous; hypanthium turbinate, 1–1.5 mm; lobes ovate to narrowly triangular, ca. 1 mm. Corolla white, funnelform, outside glabrous; tube 10–12 mm, puberulent inside; lobes ovate, 4–5 mm. Capsules unknown. Fl. Apr.

● Dense forests in valleys; ca. 400 m. Hunan (Huitong).

The protologue described the flowers as distylous and reported that only the short-styled form has been seen.

**27. Ophiorrhiza hunanica** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 24. 1990.

湖南蛇根草 hu nan she gen cao

Herbs, procumbent at base, to 15 cm tall; stems drying black, subglabrous. Leaves in unequal pairs; petiole 1–3 cm, subglabrous; blade drying papery, purple on veins, obovate or ovate, 6–18 × 3–6.5 cm, adaxially sparsely hirtellous-strigose, abaxially subglabrous or villous on veins, base cuneate, apex obtuse to subacute; secondary veins 10–14 pairs; stipules often persistent, ovate, 6–8 mm, ciliate, acuminate. Inflorescence cymose, many flowered, densely villous, pendulous; peduncle ca. 3 cm, arching; principal axes 2 or 3 pairs, helicoid; bracts linear, 8–15 × 1–1.4 mm, sparsely pinnately veined, sparsely ciliate. Flowers with biology unknown, subsessile. Calyx with hypanthium compressed turbinate, ca. 2 mm, 5-ribbed, densely multicellular villous; lobes linear, 6–7 mm, hispidulous along costa. Corolla in bud with color unknown, 5-winged, wings ciliate. Capsules unknown. Fl. Nov.

● Dense forests in valleys; ca. 400 m. Hunan (Huitong).

In the protologue the anthers and stigmas of the flower buds were described, but these immature structures are not reliable indicators of the size or arrangement of the mature structures.

**28. Ophiorrhiza japonica** Blume, Bijdr. 978. 1826–1827.

日本蛇根草 ri ben she gen cao

*Ophiorrhiza acutiloba* Hayata; *O. cavaleriei* H. Léveillé; *O. eryei* Champion; *O. dimorphantha* Hayata; *O. dimorphantha* f. *brevistigma* Hayata; *O. dimorphantha* f. *longistigma* Hayata; *O. japonica* var. *acutiloba* (Hayata) Ohwi; *O. japonica* var. *minor* J. Krause; *O. labordei* H. Léveillé; *O. monticola* Hayata; *O. monticola* f. *brevistigma* Hayata; *O. monticola* f. *longistigma* Hayata; *O. nigricans* H. S. Lo.

Herbs, weak to ascending, to 60 cm tall, often drying flushed with purple or darkened; stems subterete to slightly compressed, glabrous or with 2 hirtellous or pilosulous lines. Leaves in subequal pairs; petiole 0.3–2(–3) cm, glabrous to hirtellous or puberulent; blade drying papery, ovate, elliptic-ovate, elliptic, elliptic-oblong, lanceolate, or narrowly lanceolate, 1–11 × 0.7–3.5 cm, glabrous to strigillose or hispidulous adaxially, glabrous to puberulent, hirtellous, or villosulous abaxially, base cuneate to obtuse, margins flat to crisped, apex acute to acuminate or rarely obtuse (to rounded, *Ophiorrhiza nigricans*); secondary veins 4–8 pairs; stipules triangular, 0.8–2 mm, glabrescent, acute to bifid, caducous sometimes leaving 1 to several thickened scars to 0.3 mm. Inflorescence congested-cymose to cymose, few to many flowered, puberulent to strigillose, pilosulous, or hirtellous; peduncle 0.5–5 cm (to 6 cm, *O. nigricans*); axes congested-cymose becoming helicoid; bracts lanceolate-linear, spatulate, or linear, 1–6 mm, sometimes glabrescent, persistent. Flowers distylous, on pedicels 1–2 mm. Calyx glabrous to densely puberulent or pilosulous; hypanthium subturbinate to oblate or subglobose, 0.8–1 mm, 5-

ribbed; lobes triangular, 0.4–1.2 mm. Corolla white or pink, funnelform to tubular-funnelform, outside glabrous to puberulent or pilosulous and longitudinally winged, inside pilose near middle and pilosulous above middle through throat and sometimes onto lobes; tube 9–14 mm; lobes triangular to ovate, (1.5–1.8 mm, *O. nigricans*) 2.5–4 mm, dorsally with wing to 0.5 mm wide, apex rostrate. Capsules submitriform, 2.5–4 × 6.5–9 mm, pilosulous to glabrous. Fl. winter, fr. spring and summer.

Fertile soil of ravines in forests; 100–2400 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, S Shanxi?, Sichuan, Taiwan, NE Yunnan, Zhejiang [Japan, Vietnam].

Duan and Lin (Acta Phytotax. Sin. 45: 873. 2007) synonymized *Ophiorrhiza nigricans* with *O. japonica*. They also synonymized *O. kwangsiensis* with *O. japonica*, but that species is provisionally separated here based on the characters given in the key to species pending further study. The reproductive biology of *O. japonica* was studied by Nakamura et al. (J. Plant Res. 120: 501–509. 2007), who found the Chinese plants sampled to be distylous and diploid. The corollas are apparently similar between the two floral forms, with the reciprocally placed anthers and stigmas positioned near the middle of the corolla tube vs. at or just above its throat, respectively.

**29. Ophiorrhiza kuroiwae** Makino, Bot. Mag. (Tokyo) 20: 5. 1906 [*"Kuroiwai"*].

小花蛇根草 xiao hua she gen cao

*Ophiorrhiza japonica* Blume var. *kuroiwae* (Makino) Ohwi; *O. kotoensis* Hatusima; *O. liukiuensis* Hayata; *O. parviflora* Hayata (1912), not Reinwardt ex Korthals (1851).

Herbs, erect, to 60 cm tall; stem 4-angled, densely strigillose-tomentulose to glabrescent. Leaves in subequal pairs; petiole 0.5–2.3(–3) cm, villosulous-tomentulose to glabrescent; blade drying membranous to papery, red or pale, oblong-ovate, ovate, or elliptic-oblong, 5–12(–15) × 2–6 cm, adaxially sparsely scaberulous, abaxially puberulent at least on principal veins, base cuneate to obtuse then often narrowed and shortly attenuate, margins entire, apex acute or occasionally obtuse or shortly acuminate; secondary veins 6–11 pairs; stipules deciduous, deeply 2-parted, 3–7 mm, puberulent, lobes cuspidate or filiform. Inflorescences cymose to paniculate, several to many flowered, hirtellous- or hispidulous-tomentulose; peduncle 3.5–5 cm; axes several, elongating as buds develop, helicoid; bracts reduced, caducous. Flowers with biology unknown, subsessile or on pedicels to 2 mm. Calyx puberulent to glabrous; hypanthium subglobose, 1–1.5 mm; lobes triangular, 0.3–0.5 mm, dorsally keeled. Corolla white, tubular or inflated, outside glabrous to puberulent, inside pubescent in upper part of tube and onto lobes; tube 2.5–3.5 mm; lobes ovate-triangular, ca. 1 mm, dorsally ridged. Capsules reniform-oblate, 2–3.5 × 6–9 mm, 5-ribbed, glabrescent. Fl. Apr–Oct, fr. Sep–Feb.

Taiwan [Japan, Philippines].

**30. Ophiorrhiza kwangsiensis** Merrill ex H. L. Li, J. Arnold Arbor. 24: 453. 1943.

广西蛇根草 guang xi she gen cao

Herbs, creeping to weakly ascending, to 18 cm tall; stems drying yellowish brown, subglabrous or with puberulent to strigillose lines. Leaves in subequal pairs; petiole 0.5–1.5 cm, glabrous; blade drying papery to membranous, leaden gray or olive-green adaxially, pale green or yellowed abaxially, cordiform to cordate-ovate, 0.8–2 × 0.7–1.5 cm, glabrous on both surfaces or puberulent adaxially, base cordate to subtruncate, margins entire, apex acute to somewhat obtuse; secondary veins 4–6 pairs; stipules caducous, not seen. Inflorescence congested-cymose, few or several flowered, densely hirtellous to pilosulous; peduncle 0.7–1.5 cm; axes reduced or shortly helicoid; bracts linear to linear-lanceolate, 4.5–6 mm, glabrous except sparsely ciliolate. Flowers reportedly distylous, subsessile, fragrant. Calyx puberulent; hypanthium turbinate, ca. 1 mm, weakly 5-ribbed; lobes oblong-lanceolate, in bud 1–2.5 mm and equal to unequal. Corolla pale yellow or reddish, tubular-funnelform, outside subglabrous; tube 9–10 mm, inside sparsely pilose; lobes ovate-triangular, ca. 2 mm, dorsally costate and with very short horn. Capsules ?mitriform, 2–2.5 × 6–7 mm, puberulent. Fl. early spring or Sep.

● Shady wet places in forests. Guangxi (Shangsi).

H. S. Lo (in FRPS 71(1): 145. 1999) reported this species as distylous but described only one floral form, similar to the short-styled flowers of distylous species. The protologue described only young flower buds with no description of anther or stigma position. The protologue described the calyx lobes as ca. 1 mm without any note about them being unequal, while H. S. Lo (loc. cit.) described these as 1.5–2.2 mm and usually unequal; both conditions are included here provisionally.

*Ophiorrhiza kwangsiensis* was synonymized with *O. japonica* by Duan and Lin (Acta Phytotax. Sin. 45: 873. 2007), but a number of characters seem to distinguish it; it is provisionally separated here pending further study.

**31. Ophiorrhiza laevifolia** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 80. 1990.

平滑蛇根草 ping hua she gen cao

Herbs, suberect, to 80 cm tall; stems subterete to slightly compressed, drying black on upper part, puberulent or subglabrous. Leaves in subequal pairs; petiole 0.5(–1.5) cm; blade drying papery, adaxially dark green, abaxially pale green, ovate or lanceolate, ± inequilateral, 4–12 × 2–4.5 cm, glabrous on both surfaces, base cuneate, margins undulate or flat, apex acute, acuminate, or caudate; secondary veins 5 or 6 pairs; stipules caducous, not seen. Inflorescence congested-cymose, many flowered, densely ferruginous hirtellous; peduncle reduced or up to 1 cm; axes reduced to shortly helicoid; bracts absent or minute. Flowers reportedly distylous, subsessile. Calyx glabrescent; hypanthium obovoid, ca. 2 mm, 5-ribbed; lobes narrowly lanceolate, ca. 1 mm, with 1 gland in each sinus. Corolla pink, subtubular, glabrous outside; tube ca. 13 mm, sparsely white villous above middle inside; lobes subovate, 1.8–2 mm, dorsally with short horn 0.1–0.2 mm, apex rostrate. Capsules not seen. Fl. Apr.

● Semi-evergreen forests; 800–1000 m. Xizang (Mêdog).

The protologue reported this species as distylous but described only one floral form, similar to the short-styled flowers of distylous species; this was described as having the stigmas positioned not far below the middle of the corolla tube and the anthers exserted.

**32. Ophiorrhiza laoshanica** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 65. 1990.

老山蛇根草 lao shan she gen cao

Herbs, suberect, to 50 cm tall; stems sulcate to subterete, drying grayish yellow, subglabrous. Leaves in markedly unequal pairs; petiole 0.3–1 cm, subglabrous; blade drying thinly papery, adaxially gray to blackened, abaxially grayish yellow, ovate, larger ones 6–8(–11) × 2–3 cm, smaller ones 1.5–5 × 1–2 cm, glabrous on both surfaces, base obtuse to acute then decurrent, apex shortly acuminate; secondary veins 6–9 pairs; stipules caducous, not seen. Inflorescence ferruginous mealy puberulent; peduncle 1–2 cm; axes short, helicoid; bracteoles filiform-subulate, ca. 3 mm. Flowers reportedly distylous, subsessile. Calyx mealy puberulent; hypanthium obconic-turbinate, ca. 1 mm, 5-ribbed; lobes triangular to deltoid, ca. 0.4 mm. Corolla white, tubular-funnelform, outside glabrous; tube 9–10 mm, inside near middle with villous fascicles mixed with scale-like pilose trichomes; lobes subovate, ca. 0.7 mm, dorsally with a broad semiorbicular wing. Capsules not seen. Fl. Nov–Jun of following year.

● Wet places in forests. Guangxi.

The protologue reported this species as distylous but described only one floral form, similar to the short-styled flowers of distylous species with the anthers positioned in or shortly above the corolla throat and the stigmas situated near the middle of the corolla tube.

**33. Ophiorrhiza liangkwangensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 39. 1990.

两广蛇根草 liang guang she gen cao

Herbs, procumbent to creeping, rooting at nodes, to 30 cm tall; stems densely white- or pale yellow villous. Leaves usually in unequal pairs; petiole 0.5–2(–3) cm, densely hirtellous or villosulous; blade drying thinly papery or submembranous, broadly ovate, ovate, or oblong-ovate, 1.5–8(–11) × 1–6 cm, sparsely hirtellous to villous on both surfaces, base subrounded to obtuse, usually inequilateral, apex acute to obtuse; secondary veins 6–11 pairs; stipules caducous, not seen. Inflorescence congested-cymose, 2- or 3(–6)-flowered, densely villosulous to villous; peduncle 0.5–1.2 cm; bracts linear or filiform, 1.5–10 mm. Flowers distylous, subsessile or on pedicels to 3 mm. Calyx villosulous; hypanthium subglobose, ca. 1.5 mm; lobes filiform, ca. 2 mm, with 1 globose gland in each sinus. Corolla white or pale purple, drying yellow, slenderly funnelform, sparsely villous to glabrescent outside; tube 18–20 mm, sparsely pilose inside in basal 1/3; lobes ovate-triangular, ca. 6 mm, dorsally ribbed, apex rostrate. Capsules mitriform, ca. 3 × 7 mm, densely villous. Fl. Jun.

● Roadsides at forest margins. Guangdong (Xinyi), Guangxi.

The protologue detailed both long-styled and short-styled flowers and noted that their calyces and corollas are similar. H. S. Lo in FRPS (71(1): 142. 1999) described this species as rarely many flowered, but this has not been noted by other authors nor seen on specimens studied.

**34. Ophiorrhiza lignosa** Merrill, Brittonia 4: 176. 1941.

木茎蛇根草 mu jing she gen cao

Subshrubs, erect, to 50 cm tall; stems weakly 4-angled to terete, glabrous except with 2 pilosulous to hirtellous lines. Leaves in subequal pairs; petiole 0.6–2 cm, glabrous or villosulous; blade drying papery or submembranous, adaxially olive-green, pale abaxially, lanceolate or narrowly lanceolate, 5–11 × 1–2 cm, glabrous on both surfaces or sometimes pilosulous along principal veins abaxially, base long cuneate, margins entire, apex acuminate; secondary veins 8 or 9 pairs; stipules caducous, not seen. Inflorescence cymose to somewhat congested-cymose, many flowered, 3–4.5 cm, subferruginous pilosulous; peduncle 1–2 cm; axes helicoid, up to 1 cm; bracteoles ensiform-linear or linear and acuminate, 1.5–3 mm. Flowers with biology unknown, subsessile or on pedicels to 1 mm. Calyx hispidulous; hypanthium compressed turbinate, ca. 1.3 mm, 5-ribbed; lobes ovate-triangular, 0.5–0.7 mm, usually with 1 gland in each sinus. Corolla purple, subtubular, glabrous outside, inside with white villous ring in upper part of tube and onto lobes; tube 10–11 mm; lobes broadly ovate or oblong-ovate, ca. 3 mm. Capsules unknown. Fl. Apr.

Forests; ca. 1100 m. Yunnan (Malipo) [Myanmar].

The protologue reported this species only from Myanmar, at ca. 1200 m, and did not detail the position of the anthers but did describe the style as long enough to position the stigmas in the corolla throat; H. S. Lo (in FRPS 71(1): 152–153, t. 37, f. 4. 1999) described and illustrated the anthers as positioned near the middle of the corolla tube. Thus, the flowers described resemble the long-styled flowers of distylous species; none of these authors have posited the floral biology of this species.

**35. Ophiorrhiza longicornis** H. S. Lo, **sp. nov.**

长角蛇根草 chang jiao she gen cao

Type: China. Guangxi: Napo, *Y. Lin 3-5324* (holotype, GXMI).

Validating Latin description: that of "*Ophiorrhiza longicornis* Lo" (H. S. Lo, Bull. Bot. Res., Harbin 10(2): 57. 1990).

Herbs, apparently ascending; stems drying brownish red, terete, glabrous. Leaves in somewhat unequal pairs; petiole 1–2 cm, glabrous; blade drying papery or rather thickly papery, abaxially yellowish or greenish yellow with veins brown, narrowly elliptic-ovate to oblanceolate, 4–10 × 1.5–3.5 cm, glabrous on both surfaces, base cuneate, margins entire, apex obtuse then cuspidate or caudate; secondary veins 7–11 pairs; stipules caducous, not seen. Inflorescences cymose to subcorymbose, many flowered, branched to several orders, puberulent; peduncles 1.5–2.5 cm; axes spiciform to helicoid, principal ones ca. 1 cm; bracteoles turning purple when dry, linear-lanceolate, 3–5 mm, sharply acute. Flowers with biology unknown, subsessile. Calyx with hypanthium compressed subglobose-turbinate, ca. 1.5 mm, 5- or 10-ribbed, puberulent; lobes triangular, 0.7–1 mm, subglabrous, with 1 gland in each sinus. Corolla purplish red, tubular, glabrous and slenderly 5-ribbed outside; tube ca. 4.5 mm, inside with white villous ring below middle; lobes subtriangular, 0.4–0.5 mm, dorsally with horn 1.5–2 mm and drying black, apex incurved-rostrate. Capsules not seen. Fl. Apr.

● Forests. Guangxi (Napo).

This name was previously published by H. S. Lo (loc. cit.) but not validly so because the type was not indicated in accordance with Art. 37.6 of the *Vienna Code*.

**36. Ophiorrhiza longipes** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 49. 1990.

长梗蛇根草 chang geng she gen cao

Herbs, apparently ascending, to 100 cm tall; stems drying flattened, densely pilosulous. Leaves in markedly unequal pairs; petiole 0.5–1(–3) cm, pilosulous; blade drying thinly papery, adaxially grayish green, abaxially pale or purple, ovate or elliptic, larger ones 3.5–7.5 × 2–3.2 cm, smaller ones 2–5 × 1.5–3 cm, glabrous adaxially, abaxially glabrous or pilosulous along veins, base cuneate, obtuse, or subrounded, ± inequilateral, margins subentire, apex obtuse; secondary veins 6–8 pairs; stipules caducous, not seen. Inflorescence cymose, 5–9-flowered, often rather lax, hispidulous to hirsute; peduncle 2–2.5 cm; axes helicoid, ca. 1 cm; bracteoles subulate, 2–3 mm. Flowers with biology unknown, subsessile. Calyx pilosulous or hispidulous; hypanthium turbinate, ca. 2.5 mm, 5-ribbed; lobes triangular, 1–1.3 mm, with 1 gland in each sinus. Corolla yellowish white or tinged with purple, funnelform, glabrous outside; tube ca. 16 mm, with pilose or pilosulous ring above middle inside; lobes ovate-triangular, 5–5.5 mm, dorsally thinly winged, apex rostrate. Capsules drying brownish red, mitriform-rhomboid, ca. 3 × 7 mm. Fl. Apr.

● Rocks in wet and shady places in forests. Guangxi.

The figure of this species presented by H. S. Lo in FRPS (71(1): 150, t. 36, f. 1–6. 1999) seems to be redrawn based on the protologue figure but differs a bit from it; in particular, the lower right-hand leaf is shown in FRPS as acute or shortly acuminate, while in the protologue figure this was shown as obtuse and there corresponded to the textual description. Neither the protologue nor FRPS posited the floral biology of this species; the flower described in the protologue resembles the short-styled form of distylous species, with the anthers positioned in or just below the corolla throat and the stigmas positioned just below the middle of the corolla tube.

**37. Ophiorrhiza luchuanensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 74. 1990.

绿春蛇根草 lü chun she gen cao

Herbs or subshrubs, weak to ascending, to 2 m tall; stems densely hispid. Leaves in markedly unequal pairs; petiole 0.3–2 cm, densely hispid or pilose; blade drying papery, lanceolate to narrowly elliptic, larger ones 5–15 × 2.5–4.5 cm, smaller ones 2–6(–8) × 1–2 cm, strigose adaxially, densely hirtellous or hirsute along principal veins abaxially, base acute to attenuate, apex acuminate to caudate; secondary veins 7–12 pairs, prominent adaxially; stipules caducous. Inflorescence cymose, many flowered, densely villous; peduncle 1–3 cm; axes several, helicoid; bracts absent or minute. Flowers distylous, subsessile. Calyx glabrous or ferruginous mealy puberulent; hypanthium rhombic-turbinate, ca. 1 mm, 5-ribbed; lobes subtriangular, ca. 0.4 mm. Corolla white, salverform-tubular and slightly contracted in middle, glabrous outside; tube 7–8 mm, barbate in throat; lobes triangular, 1.8–2 mm, dorsally costate to narrowly winged near apex. Capsules drying reddish brown, broadly mitriform, ca. 1.5 × 5 mm, 5-ribbed, subglabrous. Fl. Oct.

● Shady wet places in forests; ca. 2000 m. S Yunnan (Lüchun).

The protologue described the corollas of both floral forms as similar and noted that the anthers and stigmas are reciprocally placed, at or just below the throat or at the bottom of the corolla tube, respectively. The protologue figure was apparently redrawn for FRPS (71(1): 170, t. 43, f. 1–7. 1999) and differs from the first version: in particular, the stems, petioles, and inflorescence are depicted as densely hispid or pilose in the protologue figure but apparently glabrous in the redrawn figure, and the redrawn figure shows the secund-helicoid flower arrangement on the inflorescence axes as significantly more regular than in the protologue figure.

**38. Ophiorrhiza lurida** J. D. Hooker, Fl. Brit. India 3: 82. 1880.

黄褐蛇根草 huang he she gen cao

Herbs, procumbent to ascending, to 20 cm tall; stems puberulent to densely villosulous. Leaves in subequal pairs; petiole (0.1–)0.2–2.8 cm, densely villosulous; blade drying papery, adaxially green, abaxially pale green, ovate, ovate-lanceolate, or elliptic, 0.6–5 × 0.6–2.5 cm, adaxially sparsely hispidulous to hispid, abaxially puberulent or hispid along principal veins, base obtuse, truncate, or subrounded, margins entire, apex obtuse to acute; secondary veins 4 or 5 pairs; stipules generally persistent, triangular to ovate, 2–4 mm, glabrous to hirtellous, acuminate or aristate with 1–3 bristles 2–7 mm. Inflorescences congested-cymose to subcapitate, few to several flowered, glabrous; peduncles 0.5–4 cm; heads ca. 1 × 1 cm; bracts subulate-linear, lanceolate, elliptic-oblong, or spatulate, 3–8 mm, costate, obtuse to acute. Flowers with biology unknown, subsessile or on pedicels to 1.5 mm. Calyx glabrous; hypanthium subglobose, ca. 1.5 mm; lobes narrowly triangular, ca. 1 mm. Corolla white, drying yellow, tubular to inflated, glabrous outside, inside villous in upper part of tube and onto lobes; tube 2.5–4.5 mm; lobes triangular-ovate, 1–1.5 mm, dorsally narrowly winged, obtuse. Capsules not seen in China. Fl. Aug.

Broad-leaved forests, *Tsuga* forests; [300–]1800–2300 m. Xizang (Mêdog), NW Yunnan [India (Darjeeling, Sikkim)].

Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 67. 1997) described the capsules of Indian plants as flattened obturbinate, 1.5–3 × 5–8 mm, and glabrous to puberulent.

**39. Ophiorrhiza macrantha** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 28. 1990.

大花蛇根草 da hua she gen cao

Herbs, weak at base, ascending to erect above, to 50 cm tall; stems drying orange, subglabrous or puberulent when young. Leaves in unequal pairs; petiole 1–4 cm, glabrous or puberulent; blade drying thinly papery or papery, adaxially grayish green, pale or yellowish green abaxially, oblong-ovate, subovate, or elliptic-oblong, 4–16 × 1.8–4.5 cm, glabrous on both surfaces or abaxially puberulent along principal veins, base obtuse to subrounded, margins usually undulate, apex caudate; secondary veins 7–9 pairs; stipules generally persistent, narrowly triangular, 6–8 mm, with globose gland at apex and at each side of base. Inflorescences cymose, many flowered, puberulent; peduncle 2–2.5 cm; axes helicoid, 0.5–2 cm; bracteoles linear-spatulate, ca. 2 mm, ciliolate. Flowers distylous, on

pedicels 1.5–3 mm. Calyx puberulent to glabrescent; hypanthium rhomboid-subglobose, ca. 2.5 × 2 mm, 10-ribbed; lobes triangular, subequal or unequal, 1.5–2 mm. Corolla reddish or pink, funnelform, glabrous outside, inside with sparsely white villous ring at middle of tube and sparsely villous above this and sometimes onto lobes; tube 22–23 mm; lobes subovate, ca. 5.5 mm, dorsally with wing ca. 0.8 mm wide with very short apical spur, apex rostrate. Immature capsules submitriform, ca. 3 × 7–7.5 mm, 10-ribbed. Fl. Mar.

● Streamsides in dense forests; ca. 3000 m. Yunnan.

In the protologue and FRPS (71(1): 129–131. 1999), H. S. Lo noted that the long-styled flowers have the anthers positioned near the middle of the corolla tube and the stigmas in its throat, while the short-styled flowers have the anthers positioned in the throat and the stigmas below them inside the upper part of the corolla tube.

**40. Ophiorrhiza macrodonta** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 25. 1990.

大齿蛇根草 da chi she gen cao

Large herbs or subshrubs, erect, to 2.5 m tall; stems drying black to brownish red, ferruginous pilosulous to glabrescent. Leaves in subequal pairs; petiole 1–2 cm or sometimes longer; blade drying papery, adaxially grayish brown, abaxially pale, oblong-elliptic, ovate-oblong, or ovate, 6.5–17 × 2.5–5.5 cm, glabrescent on both surfaces or sparsely pilosulous adaxially and pilosulous along principal veins abaxially, base cuneate then decurrent, margins entire, apex acuminate; secondary veins 14–16 pairs; stipules ovate to lanceolate-ovate, 5–16 mm, entire or occasionally dentate, parallel-nerved, subglabrous, acuminate. Inflorescence cymose to congested-cymose, many flowered, pendulous then becoming erect, densely ferruginous hirsute or -hirtellous; peduncle ca. 1 cm; bracts sublinear, 7–9 mm, ciliolate, glabrous or sparsely pilose, persistent. Flowers reportedly distylous, on pedicels 1–1.5 mm. Calyx hispidulous; hypanthium obrhombic, ca. 1 mm, weakly 5-ribbed; lobes narrowly lanceolate, ca. 2.5 mm. Corolla greenish yellow in bud, reddish at anthesis, tubular-funnelform, glabrous outside; tube 13–14 mm, villous inside; lobes subovate, ca. 2 mm, dorsally with wing to 0.6 mm wide, apex rostrate. Capsules obcordate, 2.5–3 × 7.5–9 mm, hispidulous. Fl. Sep.

● Wet places in forests; ca. 1500 m. Yunnan.

In the protologue and FRPS (71(1): 126–127. 1999), H. S. Lo described the flowers as distylous with the long-styled flowers unknown; the putative short-styled flowers were described as having the anthers partially exserted in the throat and the stigmas situated below the middle of the corolla tube.

**41. Ophiorrhiza medogensis** H. Li, Acta Phytotax. Sin. 18: 116. 1980.

长萼蛇根草 chang e she gen cao

Herbs or subshrubs, ascending, to 60 cm tall; stems densely brown villous with multicellular trichomes. Leaves in unequal pairs; petiole 0.5–1.5(–3.5) cm, densely villous; blade drying thinly papery, pallid green on both surfaces or reddened abaxially, lanceolate, oblong-lanceolate, or subovate, 6–14 × 2.2–5.5 cm, adaxially glabrous or sparsely hispid, abaxially densely villous along principal veins, base rounded or subcordate, usually inequilateral, margins subentire or undulate, ciliate, apex abruptly acuminate; secondary veins 8–16 pairs; stipules generally persistent, with 2 or 3 subulate to filiform lobes ca. 1 cm, ciliate. Inflorescences congested-cymose, many flowered, densely villous; peduncles shorter than 1 cm; axes short, helicoid; bracts filiform or subulate, 1–2 cm, ciliate. Flowers with biology unknown, subsessile. Calyx densely villous; hypanthium subglobose, ca. 2 mm; lobes filiform, 7–8 mm, ciliate. Corolla white, tubular-funnelform, puberulent outside; tube ca. 18 mm, in throat notably expanded, inside villous above middle; lobes oblong-ovate, ca. 4 mm. Capsules obovate, ca. 5 × 10 mm. Fl. Sep.

● Broad-leaved forests on mountain slopes; ca. 1700 m. Xizang (Mêdog).

**42. Ophiorrhiza mitchelloides** (Masamune) H. S. Lo, Bull. Bot. Res., Harbin 18: 277. 1998 [*"michelloides"*].

东南蛇根草 dong nan she gen cao

*Hayataella mitchelloides* Masamune, Trans. Nat. Hist. Soc. Formosa 24: 206. 1934 [*"michelloides"*]; *Geophila exigua* H. L. Li; *Ophiorrhiza exigua* (H. L. Li) H. S. Lo.

Herbs, procumbent to creeping, generally rooting at most nodes; stems villous with multicellular trichomes. Leaves in subequal to unequal pairs; petiole 0.3–1.3 cm, densely villous to villosulous; blade drying papery, adaxially dark gray or nearly black, abaxially purplish red to reddish or rarely pale, broadly ovate, ovate, or suborbicular, 0.8–2.5 × 0.6–2 cm, sparsely pilose to villous along principal veins to throughout on both surfaces, base subtruncate to obtuse or rounded, apex acute to rounded-obtuse; secondary veins 3–5 pairs; stipules usually caducous, triangular to ligulate, 1–1.5 mm, glabrescent, acuminate to 2–4-lobed. Inflorescences fasciculate to cymose, 1- or 2(or 5)-flowered, villosulous; peduncles and/or pedicels 0.4–2 cm; bracts linear, 4–8 mm. Flowers distylous, pedunculate or pedicellate. Calyx with hypanthium compressed globose, ca. 1.2 mm, densely villosulous; lobes linear, ca. 1.4 mm, glabrescent or ciliate. Corolla white, funnelform or salverform, outside with 5 strigose or hispidulous lines; tube ca. 15 mm, inside with white villous ring just above middle and otherwise villous or glabrous except pubescent in throat; lobes broadly ovate, 5–6.5 mm. Capsules obcordate, ca. 3.5 × 9–10 mm, villous. Fl. Apr, fr. Jun.

● Broad-leaved forests or forest margins; 400–1500 m. Fujian, Guangdong, Hunan, Jiangxi, Taiwan.

This small plant was separated by some authors in a monotypic genus endemic to Taiwan, *Hayataella*. However, recent authors have noted a broader range for it and included it in *Ophiorrhiza* based on morphological (H. S. Lo, Bull. Bot. Res., Harbin 10(2): 1–82. 1990, and references cited therein) and molecular (Nakamura et al., J. Plant Res. 119: 657–661. 2006) characters. H. S. Lo in FRPS (71(1): 141–142. 1999) detailed both short-styled and long-styled flowers.

**43. Ophiorrhiza mungos** Linnaeus, Sp. Pl. 1: 150. 1753.

蛇根草 she gen cao

Herbs or subshrubs, ascending, to 100 cm tall; stems glabrescent to puberulent. Leaves in subequal pairs; petiole 1.5–5

cm, glabrous to puberulent; blade drying thinly papery, elliptic or lanceolate-elliptic, 2.5–22 × 1–9 cm, glabrous adaxially, glabrous or puberulent on principal veins abaxially, base cuneate to obtuse, apex acute to acuminate; secondary veins 10–19 pairs; stipules deciduous, narrowly triangular, 4–8 mm, sometimes 2-lobed, glabrescent. Inflorescence cymose to paniculate, several to many flowered, puberulent; peduncle 0.5–6 cm; axes helicoid; bracts reduced and caducous or none. Flowers apparently distylous, subsessile. Calyx densely puberulent; hypanthium compressed turbinate, ca. 1 mm; lobes triangular, 0.5–1 mm. Corolla white, tubular or sometimes constricted near middle, outside puberulent to glabrous; tube 2.5–4 mm, inside villosulous near middle; lobes triangular, ca. 1 mm, dorsally smooth to costate. Capsules broadly mitriform, 1.5–3 × 3–9 mm, glabrous to densely puberulent.

Expected in Yunnan [India, Myanmar, ?Philippines, Thailand to Malaysia, ?Vietnam].

This species was not included for China by H. S. Lo (Bull. Bot. Res., Harbin 10(2): 1–82. 1990; FRPS 71(1): 110–174. 1999) but has been reported from the surrounding regions (Deb & Mondal, Bull. Bot. Surv. India 39(1–4): 67–73. 1997), and some specimens from China have been identified with this name by Chinese botanists (in herb.). The description here is presented at least for reference and is based on that of Deb and Mondal (excluding *Ophiorrhiza mungos* var. *nemorosa* (Thwaites) J. D. Hooker). Deb and Mondal (loc. cit.) reported *O. mungos* to flower and fruit throughout the year and did not describe its floral biology or individual floral forms but illustrated both short-styled and long-styled flowers.

**44. Ophiorrhiza mycetiifolia** H. S. Lo, Guihaia 11: 103. 1991.

腺木叶蛇根草 xian mu ye she gen cao

Herbs or subshrubs, erect, to 2.5 m tall; stems puberulent to villosulous. Leaves in generally equal pairs; petiole 2–4 cm, densely villosulous; blade drying thinly papery, olive-green, elliptic-ovate or elliptic, 10–20 × 4–7.5 cm, sometimes weakly bullate, adaxially glabrous or sparsely strigillose to puberulent, abaxially glabrous to densely villosulous, base obtuse to rounded then shortly decurrent, margins entire, apex acute to shortly cuspidate; secondary veins 15 or 16 pairs; stipules caducous, unknown. Inflorescence congested-cymose, many flowered, 5–6 cm wide, densely villosulous-tomentulose; peduncle ca. 2.5 cm; axes several, dichasial at lower axes then helicoid above; bracts linear-lanceolate, 5–10 mm, acuminate. Flowers with biology unknown, subsessile or on pedicels to 2 mm. Calyx densely hirtellous; hypanthium subglobose, ca. 1.5 mm, 5-ribbed with ribs glabrescent; lobes triangular, 0.8–1 mm. Corolla white, tubular, outside glabrous to pilosulous, pubescent throughout inside; tubes 10–11 mm; lobes subtriangular, ca. 2 mm, reflexed, dorsally with horn 1.5–2 mm near apex. Capsules not seen. Fl. Dec.

● Sparse forests in valleys; ca. 600 m. Guangxi (Longzhou).

**45. Ophiorrhiza nandanica** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 63. 1990.

南丹蛇根草 nan dan she gen cao

Herbs, suberect, to 40 cm tall; stems drying black to brownish yellow, terete, glabrous. Petiole 1–2.5 cm, glabrous; leaf blade drying papery, dark gray or blackish gray adaxially, pale yellow or greenish yellow with veins brown abaxially, ovate to lanceolate, 4–11 × 1.5–4.5 cm, glabrous, base obtuse, apex acuminate; secondary veins 5–9 pairs; stipules caducous, not seen. Inflorescences congested, several flowered, pubescence in 2 pilose longitudinal lines; peduncle 1–2 cm; axes helicoid; bracts linear-lanceolate, 3–5 mm, weakly pinnately veined. Flowers distylous, sessile or subsessile. Calyx with hypanthium submitriform, ca. 1.5 mm, 5-ribbed; lobes triangular or narrowly triangular, markedly unequal, 1 or 2 larger ones 1–2 mm, 3 or 4 smaller ones ca. 0.7 mm, both lobes and sinuses glandular. Corolla pale yellow, subsalverform, glabrous outside; tube ca. 18 mm, glabrous inside; lobes long narrowly triangular, ca. 1.5 mm, dorsally with wing ca. 1 mm wide with very short horn at top, apex rostrate. Capsules not seen. Fl. Oct.

● Shady places in forests in limestone regions. Guangxi (Nandan).

In the protologue and FRPS (71(1): 162. 1999), H. S. Lo detailed both long-styled and short-styled flowers, with similar corollas but differing in anther and stigma positions (in the middle of the corolla tube vs. the throat, respectively and correspondingly).

**46. Ophiorrhiza napoensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 48. 1990.

那坡蛇根草 na po she gen cao

Herbs, ascending, to 30 cm or taller; stems glabrous. Leaves in unequal pairs; petiole 0.3–1.4 cm, glabrous; blade drying papery, grayish adaxially, pale yellow abaxially, narrowly lanceolate to subovate, 5–12 × 1.5–3.5 cm, glabrous on both surfaces or pilosulous along midrib abaxially, base cuneate to obtuse, margins entire, apex acute to acuminate; secondary veins 7–12 pairs; stipules caducous, triangular, 0.5–1 mm, entire or glandular. Inflorescences congested-cymose, several flowered, ferruginous- to golden yellow tomentulose or -pilosulous; peduncle 0.8–1 cm; axes short, helicoid; bracts lanceolate-linear, 10–14 mm, weakly costate, glabrous. Flowers with biology unknown, subsessile or on pedicels to 1.5 mm. Calyx with hypanthium turbinate-rhombic, 1.5–2 × 2.3–2.5 mm, 5-ribbed, densely pilosulous; lobes narrowly triangular, unequal, largest ones 1.8–2 mm, smallest ones 1.3–1.5 mm, glabrous, sinus sometimes with 2 or 3 globose glands. Corolla white, drying orange-yellow, salverform to funnelform, glabrous outside; tube 20–22 mm, glabrous inside; lobes ligulate to ovate, 2.5–5 mm, dorsally ribbed and with very short horn. Immature fruit obcordate. Fl. Oct.

● Forests on hill slopes. Guangxi (Napo), Yunnan (Maguan).

**47. Ophiorrhiza nutans** C. B. Clarke ex J. D. Hooker, Fl. Brit. India 3: 84. 1880.

垂花蛇根草 chui hua she gen cao

Herbs, weak to erect, to 70 cm tall; stems densely reddish brown villous with multicellular trichomes. Leaves in subequal to unequal pairs; petiole 0.5–2 cm, densely pubescent; blade drying papery, ovate, lanceolate, elliptic, or elliptic-oblong, 3–8(–13) × 1.5–4 cm, sparsely pilose or strigose adaxially, glabrescent except pubescent along principal veins abaxially, base obtuse to subrounded then attenuate, margins ciliolate, entire or undulate, apex acute to cuspidate; secondary veins 9–13[–15]

pairs; stipules persistent, lanceolate or subovate, 8–10 mm, acuminate to 2-lobed. Inflorescence congested-cymose to corymbiform, many flowered, densely hirtellous; peduncle 1–3[–6] cm; bracts linear-oblong or lanceolate, 5–10 mm, ciliate, sometimes fimbriate and/or with a linear lobe at each side. Flowers distylous, subsessile. Calyx densely hispidulous to glabrescent; hypanthium subturbinate, ca. 1.5 mm; lobes sublanceolate, ca. 1.2 mm. Corolla white, tubular-funnelform, glabrous or sparsely hispid outside; tube [6.5–]9[–19] mm, inside sparsely pilosulous near middle and barbate in throat; lobes subtriangular or subovate, 2–3 mm, dorsally narrowly winged. Capsules mitriform, ca. 2.5 × 6–7 mm, hispidulous to subglabrous.

Moist forests; 700–2400 m. Xizang (Mêdog), Yunnan [NE India, Myanmar, Nepal].

Measurements in brackets are taken from the description of this species by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 82. 1997) and may be expected in Chinese plants. H. S. Lo (in FRPS 71(1): 131. 1999) and Deb and Mondal noted that this species is distylous, with the corollas similar in size in both floral forms and the stigmas and anthers reciprocally placed in the corolla throat and near the base of the corolla tube, respectively. H. S. Lo described the corolla tubes as ca. 9 mm; the Fl. Bhutan (2(2): 779. 1999) described them as 6.5–8.5 mm; and Deb and Mondal described them as 13–19 mm.

*Ophiorrhiza hainanensis* was synonymized with *O. nutans* by Duan and Lin (Acta Phytotax. Sin. 45: 877. 2007). However, several distinctions between these were cited by H. S. Lo (Bull. Bot. Res., Harbin 10(2): 30. 1990), and these species are provisionally separated here pending further study.

**48. Ophiorrhiza ochroleuca** J. D Hooker, Fl. Brit. India 3: 78. 1880.

黄花蛇根草 huang hua she gen cao

Herbs, annual or perennial, or subshrubs, erect, to 40[–100] cm tall; stems [glabrous to] pubescent. Leaves in subequal pairs; petiole 1–4.5 cm, subglabrous; blade drying thinly papery, adaxially pale green, abaxially paler, elliptic to lanceolate, [3.5–]13–15[–22.5] × [1.5–]4.5–6[–10] cm, subglabrous except pilosulous abaxially along principal veins, base cuneate to obtuse, margins entire, apex shortly acuminate to subacute; secondary veins [8–]10–12[–15] pairs; stipules deciduous, subovate or triangular, [4–]5[–15] mm, at apex with 1 gland. Inflorescence cymose, many flowered, branched to several orders, pilosulous; peduncle ca. 3[–10] cm; axes helicoid, 1–3[–10] cm; bracts minute, caducous. Flowers subsessile or on pedicels to 3 mm. Calyx puberulent to pilosulous; hypanthium subturbinate, ca. 3 mm, 5-ribbed; lobes triangular, ca. 0.5 mm. Corolla yellow to pale yellow, tubular, outside glabrous and 5-ribbed in upper part; tube 5.5–6.5[–12] mm, glabrous inside; lobes ca. 1 mm. Capsules mitriform, ca. 3 × [5–]7.5 mm, puberulent to glabrescent.

Wet places in forests; 300–2000 m. Yunnan [Bhutan, NE India, Myanmar].

Measurements included in brackets are from the description of this species by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 84–86. 1997). Their description conflicts with that of the Fl. Bhutan (2(2): 777. 1999), which distinguished this species by its leaves glabrous below while Deb and Mondal considered the pubescent lower leaf veins distinctive.

**49. Ophiorrhiza oppositiflora** J. D. Hooker, Fl. Brit. India 3: 80. 1880.

对生蛇根草 dui sheng she gen cao

Herbs, weak to ascending, to 70 cm tall; stems generally terete, hispidulous to glabrescent. Leaves in subequal pairs; petiole 1–2 cm, subglabrous or puberulent; blade drying papery, brown, narrowly elliptic, ovate, or lanceolate, [3–]8–15 × [1–]3.5–6 cm, subglabrous or sparsely strigillose adaxially, pilose along principal veins abaxially, base cuneate then narrowed and shortly decurrent, apex shortly acuminate; secondary veins 9–11(–15) pairs; stipules caducous or persistent on upper nodes, linear or bifid, 2–11 mm, puberulent. Inflorescence terminal and/or paired in upper stem nodes, cymose to paniculate, many flowered, ferruginous puberulent; peduncle 2–4 cm; axes helicoid; bracts minute, caducous. Flowers with biology unknown, subsessile. Calyx pubescent; hypanthium ellipsoid, ca. 1 mm; lobes triangular, ca. 0.3 mm. Corolla white, tubular-funnelform, outside glabrous; tube ca. 4[–8] mm, inside glabrous or densely barbate in throat; lobes oblong-triangular, ca. 2 mm, dorsally ridged, apex rostrate. Capsules drying yellow, mitriform-obcordate, ca. 2 × 6–7 mm, subglabrous. Fl. winter and spring.

Wet places in forests; [below 100–1500 m in Myanmar]. Hainan, Yunnan [NE India, Myanmar].

Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 86–87. 1997) described this species as annual and the flowers as variously glabrous inside or densely barbate in the throat. Measurements in brackets above are taken from their description and may be expected in Chinese plants.

**50. Ophiorrhiza pauciflora** J. D. Hooker, Fl. Brit. India 3: 84. 1880.

少花蛇根草 shao hua she gen cao

Herbs, weak to erect, to 30 cm tall; stems pilosulous to villosulous. Leaves in subequal pairs; petiole 0.5–2 cm, hirtellous; blade drying thinly papery, adaxially dark purple, abaxially purple or grayish, ovate to elliptic-ovate, 1.5–5.5 × 0.8–2.5 cm, adaxially strigose or sericeous, abaxially pubescent on principal veins, base obtuse to subrounded or sometimes shortly decurrent, apex obtuse; secondary veins 5–9 pairs; stipules persistent, narrowly triangular or usually 2-lobed, 3–6 mm, lobes narrowly triangular to linear, glabrescent. Inflorescence congested-cymose, several flowered, pubescent; peduncle 1–3 cm; bracts linear, 3–6.5 mm, persistent. Flowers distylous, subsessile. Calyx puberulent to pilosulous or glabrescent; hypanthium obovoid, ca. 1.5 mm; lobes sublanceolate, 0.8–1 mm. Corolla white, tubular, outside hispid to glabrescent; tube 8–9 mm, barbate in throat and upper part; lobes ovate, ca. 1 mm. Capsules obcordate, ca. 2 × 4.5 mm, puberulent to hirtellous or glabrescent. Fl. and fr. May–Oct.

Dense forests; 600–1600 m. Yunnan (Xishuangbanna) [NE India].

Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 89–93. 1997) recognized two varieties, the pubescent var. *pauciflora* with corollas 6–9 mm and the glabrous var. *glabra* Deb and Mondal with corollas 10–12 mm; the plants treated as *Ophiorrhiza pauciflora* by H. S. Lo (in FRPS 71(1): 127. 1999) generally fall within var. *pauciflora* but have corollas that are intermediate in size and thus cannot be conclusively included in either of the Indian varieties (suggesting that the Indian varieties may not ultimately be separable).

**51. Ophiorrhiza petrophila** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 66. 1990.

法斗蛇根草 fa dou she gen cao

Herbs, ascending, to 100 cm tall; stems drying dark brown or purplish black and shiny, slightly compressed to subterete, glabrous. Leaves in subequal pairs; petiole 0.5–1 cm, glabrous; blade drying papery, grayish green adaxially, pale abaxially, ovate or narrowly ovate, 2–7(–9) × 1.5–3(–3.5) cm, glabrous, base cuneate to obtuse, margins entire, apex cuspidate to shortly caudate; secondary veins 7–9 pairs; stipules caducous, not seen. Inflorescence 3–5 cm, many flowered, pilosulous to glabrescent; bracts filiform to subulate, 4–5 mm, obtuse, persistent. Flowers reportedly distylous, subsessile or on pedicels to 1.5 mm. Calyx glabrous; hypanthium turbinate, ca. 1.5 mm, 5-ribbed; lobes triangular, 0.7–1 mm, with 1 gland in each sinus. Corolla reddened, tubular-funnelform, outside glabrous; tube 10–11 mm, sparsely villous to scabrous throughout inside; lobes ovate-triangular, 1.5–1.8 mm, dorsally with broad lunate wing. Capsules purple, ca. 2.5 × 8 mm. Fl. May.

● Dense forests in limestone regions. Yunnan.

The protologue described this species as distylous but noted that long-styled flowers had not been seen; the putative short-styled flowers were said to have the anthers positioned in or shortly above the corolla throat and the stigmas situated near the middle of the corolla tube.

**52. Ophiorrhiza pingbienensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 20. 1990.

屏边蛇根草 ping bian she gen cao

Herbs, ascending; stems drying reddish brown and usually angled, densely reddish brown pilosulous at least when young. Leaves in subequal pairs; petiole 0.5–2.5 cm, densely pilosulous; blade drying thinly papery, oblong-ovate, elliptic, oblong-lanceolate, or ovate, 2–7.5 × 1–3 cm, adaxially sparsely puberulent, abaxially glabrescent to usually densely puberulent on principal veins, base cuneate, margins entire, apex acute to obtuse; secondary veins 5–7 pairs; stipules persistent to deciduous, lanceolate to subovate, ca. 4 mm, entire or sparsely dentate, at base usually with 2 glands, acuminate and sometimes with small globose gland at apex. Inflorescence congested-cymose, several flowered, densely reddish brown pilosulous; peduncles 1–1.5 cm; axes relatively short, helicoid; bracts linear-lanceolate, spatulate, or lanceolate, 5–7 mm, often pinnately veined, subglabrous or ciliate, obtuse to subacute. Flowers with biology unknown, subsessile or on pedicels 1.5–3 mm. Calyx with hypanthium turbinate, ca. 1.5 mm, 5-ribbed, densely pilosulous; lobes lanceolate, subovate, or spatulate, unequal, largest ones 3–6 mm, smallest ones 0.8–3 mm, pinnately veined, ciliate or subglabrous. Corolla dark red, tubular-funnelform, outside 5-winged in upper part in bud and glabrescent; tube 15–17.5 mm, inside with 5 small villous fascicles below throat and just above anthers; lobes subovate to ligulate, 2.5–3 mm, inside densely shortly scaly pubescent, dorsally with broad lunate wing, apex rostrate. Immature capsule obcordate, ca. 2 × 5.5 mm, ferruginous pilosulous. Fl. Jul.

● Streamsides; ca. 1400 m. Yunnan (Pingbian).

This species was keyed by H. S. Lo (loc. cit.: 8, as *"qinbienensis"*) based in part on its persistent, usually discernible stipule, although the accompanying figure there shows no stipules, which suggests these may be deciduous at least sometimes. As shown in the figure in the protologue, the pedicels described there could be considered inflorescence axes producing subsessile flowers by others.

**53. Ophiorrhiza pumila** Champion ex Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 169. 1852.

短小蛇根草 duan xiao she gen cao

*Ophiorrhiza aureolina* H. S. Lo f. *qiongyaensis* H. S. Lo; *O. humilis* Y. C. Tseng; *O. inflata* Maximowicz; *O. pumila* var. *inflata* (Maximowicz) Masamune.

Herbs, weak to ascending, to 20(–30) cm tall; stems drying gray or grayish yellow, weakly rugose, densely tomentulose-villosulous. Leaves in subequal pairs; petiole 0.1–1.5 cm, densely tomentulose; blade drying papery, adaxially green, grayish green, or dark grayish brown, abaxially pale to red, ovate, lanceolate, elliptic, or elliptic-oblong, (0.5–)2–5.5(–9) × (0.4–)1–2.5 cm, adaxially subglabrous to sparsely strigillose or hispidulous, abaxially densely puberulent to tomentulose or sometimes glabrescent, base cuneate and generally decurrent, margins entire to somewhat undulate, apex acute to obtuse, subacuminate, or rounded; secondary veins 5–8 pairs; stipules caducous, linear, 1–3 mm, puberulent. Inflorescences congested-cymose, several to many flowered, densely tomentulose-puberulent; peduncle 0.3–1.2 cm; branched portion 5–10 × 10–12 mm; axes becoming helicoid; bracts few, narrowly triangular to linear, 0.3–2 mm. Flowers homostylous, subsessile or on pedicels to 1.5 mm. Calyx with hypanthium subglobose, 0.8–1.2 mm, 5-ribbed, densely hispidulous except ribs glabrescent; lobes subtriangular to linear, 0.3–0.6 mm, glabrescent. Corolla white, tubular to inflated, outside puberulent to hispidulous; tube 2.5–2.8 mm, with villous ring in throat to villosulous throughout inside; lobes ovate-triangular, 1.2–1.5 mm, dorsally weakly ribbed, acute to obtuse. Capsules drying brownish yellow, mitriform or somewhat obcordate, 2–2.5 × 5–7 mm, hispidulous. Fl. Apr–Sep, fr. Jun–Oct.

Shady places on wet lands, streamsides or riversides in forests; 200–700 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, Yunnan [Japan, N Vietnam].

The floral biology of this species was studied by Nakamura et al. (J. Jap. Bot. 81: 113–120. 2006), who found the plants studied in the Ryukyu Islands and Taiwan to be long-styled-monomorphic, not distylous as previously reported. They also observed very low pollination rates in wild plants and concluded that probably at least much of the reproduction in this species is through autogamy.

This species was reviewed recently by Duan and Lin (Acta Phytotax. Sin. 45: 878–879. 2007), who newly synonymized several names under *Ophiorrhiza pumila* but separated relatively smaller plants in *O. humilis*. However, these smaller plants were included within the circumscription of *O. pumila* by H. S. Lo (in FRPS 71(1): 171. 1999), who is followed here.

**54. Ophiorrhiza purpurascens** H. S. Lo in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 191. 1999.

紫脉蛇根草 zi mai she gen cao

Herbs, often procumbent at base, ascending above; stems

densely brown villous or -hirsute with multicellular trichomes. Leaves in subequal pairs; petiole ca. 0.5 cm; blade drying papery, with veins purple, ovate, 1–3 × 0.5–1.7 cm, both surfaces brown villous with pubescence denser along veins abaxially, base rounded to obtuse and slightly oblique, margins entire, apex acute to subobtuse; secondary veins 5–8 pairs; stipules caducous, not seen. Inflorescences 1-flowered or fasciculate and few flowered, densely pubescent; peduncles or pedicels 3–10 mm; bracts filiform, ca. 5 mm. Flowers with biology unknown, pedicellate or pedunculate. Calyx with hypanthium ca. 1.5 mm; lobes filiform, 2.5–3 mm. Corolla white, slenderly subfunnelform, puberulent outside; tube 22–23 mm, with white villous ring at middle inside; lobes ovate-triangular, 3–4 mm, obtuse, puberulent marginally, dorsally narrowly winged. Capsules not seen. Fl. Sep.

● Shady places in ravines; ca. 1000 m. Sichuan (Xuyong).

**55. Ophiorrhiza purpureonervis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 42. 1990.

苍梧蛇根草 cang wu she gen cao

Herbs, apparently ascending, to 30 cm tall; stems glabrous. Petiole 0.3–0.5(–1) cm, glabrous; leaf blade drying papery, adaxially leaden gray, abaxially straw-yellow with veins purple, ovate, lanceolate, or broadly ovate, 2–7.5 × 1–4 cm, glabrous on both surfaces, base rounded or obtuse, margins entire, apex obtuse; secondary veins 6 or 7 pairs; stipules caducous, not seen. Inflorescences many flowered, densely ferruginous villosulous; peduncle 1.5–2.5 cm; axes stout, helicoid; bracts filiform, 2.5–3 mm, ciliate or sparsely hispidulous. Flowers reportedly distylous, subsessile or on pedicels to 1 mm. Calyx with hypanthium obovoid, ca. 1.5 mm, 5-ribbed, densely pubescent; lobes lanceolate, ca. 1.5 mm, ciliate. Corolla white or pale yellow, slenderly funnelform, glabrous outside; tube ca. 10 mm, inside with white villous ring at middle and puberulent above; lobes sublanceolate, ca. 4 mm, dorsally with horn ca. 1 mm near apex. Immature capsules obcordate, ca. 1.5 × 4 mm, pubescent. Fl. Jul.

● Dense forests; 200–500 m. Guangxi (Cangwu).

In the protologue and FRPS (71(1): 145. 1999), H. S. Lo noted that this species is distylous but described only long-styled flowers, with the stigmas borne near the corolla throat and the anthers positioned below the middle of the corolla tube.

**56. Ophiorrhiza rarior** H. S. Lo in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 191. 1999.

毛果蛇根草 mao guo she gen cao

Herbs, apparently ascending; stems moderately brown villous or -hirsute with multicellular trichomes to glabrescent, densely lenticellate when young. Petiole 4–6 cm, sparsely villous; leaf blade drying membranous-papery, adaxially olive-green, abaxially pale, narrowly elliptic-oblong, 13–21 × 4.5–5 cm, sparsely strigose adaxially, abaxially glabrescent except sparsely hirsute along veins, base acute, margins subentire, ciliate, apex acuminate or acute; secondary veins 14–18 pairs; stipules caducous, not seen. Inflorescences and flowers not seen. Infructescences branched to several orders, villous; peduncle ca. 8.5 cm, 4-angled; axes 4–5.5 cm, helicoid; bracts lanceolate to linear-subulate, 4–8 mm, ciliate, persistent. Capsules mitriform, ca. 4 × 10–11 mm, crisped villous. Fl. Jun.

● Wet places in forests. Guangxi (Longzhou).

**57. Ophiorrhiza repandicalyx** H. S. Lo in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 191. 1999.

大叶蛇根草 da ye she gen cao

Herbs, erect, to 100 cm tall; stems drying dark brown, rather stout, glabrous. Leaves in subequal pairs; petiole 0.8–1.5 cm, glabrous; blade drying papery, adaxially grayish green, abaxially pale green, broadly ovate, ovate, or elliptic, 15–22 × 6–10 cm, glabrous on both surfaces, base obtuse then abruptly narrowed, apex cuspidate; secondary veins 11–16 pairs; stipules caducous, not seen. Inflorescences congested-cymose to subcapitate, many flowered, ca. 3 cm in diam., mealy pubescent; peduncle ca. 1.5 cm; axes helicoid; bracts absent. Flowers reportedly distylous. Calyx mealy pubescent; hypanthium broadly turbinate, ca. 2.1 mm; limb tubular, ca. 1.5 mm, undulate to shallowly 5-lobed. Corolla green, rather stoutly tubular, mealy puberulent outside; tube ca. 5.5 mm, white villous above middle inside; lobes triangular-ovate, ca. 1.5 mm, dorsally broadly winged and with horn ca. 0.5 mm near apex. Capsules unknown. Fl. Nov.

● Forests in ravines; ca. 1100 m. Yunnan (Jinghong).

The original description (H. S. Lo, Bull. Bot. Res., Harbin 10(2): 79–80. 1990, not validly published) noted that the flowers are distylous but described only a presumed long-styled form, with the anthers positioned near the middle of the corolla tube and the stigmas positioned at or just above the corolla throat.

**58. Ophiorrhiza rhodoneura** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 45. 1990.

红脉蛇根草 hong mai she gen cao

Herbs, ascending, to 50 cm tall; stems subterete, rather stout, densely ferruginous villous with multicellular trichomes. Leaves in somewhat unequal pairs; petiole 1–4 cm, densely villous; blade drying subleathery-papery, with veins ferruginous-red abaxially, ovate or elliptic, 5.5–12 × 2.5–6 cm, glabrous adaxially, villous on principal veins abaxially, base subrounded, apex acute; secondary veins 9–13 pairs; stipules caducous, not seen. Inflorescence congested-cymose and rather umbelliform to subcapitate, many flowered, densely villous; peduncles 3–3.5 cm; axes short, helicoid; bracts linear-spatulate, 10–13(–15) mm. Flowers reportedly distylous, subsessile. Calyx densely villosulous; hypanthium compressed turbinate; limb reduced, denticulate. Corolla funnelform, outside ± pubescent; tube 24–27 mm, inside villous below middle; lobes subovate, 6–8 mm, pinnately veined, dorsally with narrow ciliate wing, apex rostrate. Capsules obcordate-mitriform, ca. 4.5 × 8–10 mm, villosulous. Fl. Sep, fr. Nov.

● Broad-leaved forests; ca. 1300 m. Guangxi (Napo).

In the protologue and FRPS (71(1): 148. 1999), H. S. Lo noted that this species is distylous but described only putative short-styled flowers, with the stigmas borne near the base of the corolla tube and the anthers positioned just below the corolla throat.

**59. Ophiorrhiza rosea** J. D. Hooker, Fl. Brit. India 3: 78. 1880.

美丽蛇根草 mei li she gen cao

Herbs or subshrubs, to 100[–150] cm tall; stems drying rugose, grayish yellow, pilosulous becoming glabrescent. Leaves in subequal pairs; petiole 1–3(–5) cm, hirtellous; blade drying thinly papery, ovate, elliptic, or broadly ovate, [6.5–]10–22[–25] × [2–]5–10 cm, glabrous adaxially, densely hispidulous along principal veins abaxially, base cuneate, obtuse, or subcordate, apex abruptly acute to acuminate; secondary veins 8–13(–16) pairs; stipules deciduous, 2-lobed nearly to base, 5–7 mm, lobes subulate, glabrescent. Inflorescence cymose to paniculate, many flowered, puberulent; peduncle 2.8–5 cm; axes helicoid; bracts reduced, caducous. Flowers with biology unknown, subsessile. Calyx densely mealy puberulent; hypanthium compressed turbinate, ca. 1.5 mm, 5-ribbed; lobes subtriangular, ca. 0.5 mm. Corolla purplish red, tubular-funnelform, outside puberulent to glabrous, sometimes 5-ridged in bud; tube 8–9 mm, inside glabrous; lobes subovate, ca. 1 mm. Capsules broadly mitriform, ca. 3 × 8 mm, subglabrous or mealy pubescent. Fl. Oct–Dec.

Broad-leaved forests; 1300–2100 m. Xizang (Mêdog), Yunnan [Bhutan, NE India, Myanmar, Thailand].

Measurements in brackets are taken from the description of this species by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 103–105. 1997) and may be expected in Chinese plants.

**60. Ophiorrhiza rufipilis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 17. 1990.

红毛蛇根草 hong mao she gen cao

Herbs, suberect to procumbent and rooting along lower portion; stems drying striate, densely reddish brown villous with multicellular moniliform trichomes. Leaves in markedly unequal pairs; petiole 1–5 cm, densely villous; blade drying papery, pallid green, oblong-lanceolate, lanceolate, elliptic, or subovate, larger ones 3–10 × 1–4 cm, smaller ones 1–6 × 0.5–2.5 cm, adaxially sparsely strigose-villous, abaxially densely pubescent on principal veins, base obtuse, subrounded, or occasionally subcordate, margins ciliate, apex acuminate or obtuse and abruptly acuminate; secondary veins in larger leaves 10–16 pairs, in smaller leaves 5–8 pairs; stipules generally persistent, lanceolate-triangular or usually 2-lobed, 7–9 mm, sparsely ciliate, long acuminate. Inflorescence cymose, several to many flowered, densely reddish brown villous; peduncle shorter than 1 cm; axes rather short, helicoid; bracts linear, ca. 5 mm, ciliate. Flowers with biology unknown, subsessile or on pedicels to 1.5 mm. Calyx with hypanthium turbinate-subglobose, ca. 1.5 × 1.5 mm, densely villous; lobes subovate or lanceolate, 3.5–4 mm, glabrescent, pinnately veined, hispid along margin and midrib, acute to shortly rounded. Corolla white or pale yellow, funnelform, outside glabrescent with 5 hispid or villous lines on ridges; tube 18–19 mm, sparsely scaly pubescent inside; lobes lanceolate to ovate, ca. 4.5 mm, dorsally with broad ciliate wings, apex rostrate. Immature capsules subobcordate, ca. 3.5 × 7 mm, 5-ribbed, villosulous. Fl. Feb.

● Dense forests; ca. 1200 m. SE Yunnan.

**61. Ophiorrhiza rufopunctata** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 15. 1990.

红腺蛇根草 hong xian she gen cao

Herbs, weak at base, ascending above, to 15 cm tall; stems brownish hispidulous or -strigose. Leaves in somewhat unequal pairs; petiole 0.3–1.5 cm, pilosulous or hirsutulous; blade drying papery, oblong-ovate, ovate, or broadly ovate, 3–8(–10) × 2–3.5 cm, adaxially glabrescent and usually with scattered reddened gland dots, abaxially with red gland dots and glabrous or hispidulous to strigose on veins, base obtuse to subrounded or subcordate, often oblique, margins undulate, apex obtuse, subrounded, or acute; secondary veins 4 or 5 pairs; stipules persistent at least on upper nodes, subtriangular to ovate, 2–3 mm, obtuse and glandular at apex. Inflorescence 1-flowered or usually cymose and 2–5-flowered, densely brown hispidulous; peduncle ca. 1 cm; bracteoles linear-subulate, ca. 3 mm, usually hirtellous and/or with reddish gland dots. Flowers distylous, on short pedicels. Calyx hispidulous and/or with red gland dots; hypanthium turbinate to ellipsoid, ca. 3 mm, 5-ribbed; lobes linear, ca. 3 mm, each sinus with 1 gland. Corolla pale purple, funnelform; tube 18–22 mm, white villous or pilosulous above middle and densely pilosulous at middle inside; lobes ovate, 4–5 mm, dorsally ridged and with very small horn. Capsules 5–6 × ca. 11 mm, hispidulous. Fl. Nov.

● Wet places in forests. Sichuan.

In the protologue and FRPS (71(1): 118. 1999), H. S. Lo noted that the short-styled flowers have the anthers situated in the upper part of the corolla tube and the stigmas situated near its middle, while the long-styled flowers have the anthers situated near the middle of the corolla tube and the stigmas in its throat.

**62. Ophiorrhiza rugosa** Wallich in Roxburgh, Fl. Ind. 2: 547. 1824.

匍地蛇根草 pu di she gen cao

*Ophiorrhiza harrisiana* Heyne ex G. Don var. *rugosa* (Wallich) J. D. Hooker; *O. prostrata* D. Don; *O. prostrata* var. *rugosa* (Wallich) Panigrahi & S. K. Kar.

Herbs, sometimes annual, weak to erect, to 60 cm tall; stems pilosulous to tomentulose. Leaves in subequal pairs; petiole 0.5–1.5(–3) cm, puberulent to tomentulose; blade drying thinly papery, ovate-lanceolate, lanceolate, or elliptic, 2–6(–11) × 1–3(–5) cm, adaxially glabrous to sparsely strigillose or hispidulous, abaxially pilosulous or hispidulous along principal veins, base cuneate to obtuse, apex caudate-acuminate, obtuse, acute, or weakly acuminate; secondary veins 5–7(–11) pairs; stipules generally persistent on uppermost nodes, triangular then contracted to linear, 4–10 mm, puberulent to glabrescent. Inflorescence cymose to congested-cymose, several to many flowered, pilosulous to glabrescent; peduncles 1.5–3 cm; axes short to developed, becoming helicoid; bracts few, deciduous, linear, 2–3 mm. Flowers with biology unknown, subsessile. Calyx puberulent; hypanthium ellipsoid, ca. 0.8 mm; lobes 0.2–1.5 mm. Corolla pink to white, tubular-funnelform, outside puberulent to glabrous; tube 3–6 mm, inside with pubescent ring near or above middle; lobes triangular, 1–2 mm, dorsally smooth to ridged. Capsules obconic, 2–2.5 × 4–5 mm, puberulent to glabrescent.

Evergreen forests; 1700–3400 m. Xizang, Yunnan (Gongshan) [Bhutan, NE India, Nepal, Sri Lanka].

The description here is based mostly on the description by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 107–118. 1997); the elevational range is taken from Fl. Bhutan (2(2): 778. 1999). This species was treated by Deb and Mondal as a widespread, morphologically rather variable species; Fl. Bhutan noted that this species is variable and not well circumscribed.

**63. Ophiorrhiza salicifolia** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 50. 1990.

柳叶蛇根草 liu ye she gen cao

Subshrubs, apparently ascending, to 1 m tall; stems flattened to terete, subglabrous. Leaves in subequal pairs; petiole 0.5–1.5 cm, subglabrous; blade drying papery, red, lanceolate-linear, ± falcate, 4.5–11 × 0.6–1.5 cm, subglabrous on both surfaces, base cuneate, apex subobtuse; secondary veins 9–11 pairs; stipules caducous, not seen. Inflorescences and flowers not seen. Infructescences cymose-paniculate, 10–12 × ca. 8 cm, branched to several orders, pubescent; peduncles 4–6.5 cm; axes dichotomous to helicoid; bracteoles linear, 4–5 mm, subglabrous, persistent; pedicels 2–3 mm. Capsules mitriform, 2.5–3 × 7–8 mm, puberulent. Fr. May.

● Wet fertile soil. Guangxi (Shangsi).

**64. Ophiorrhiza sichuanensis** H. S. Lo, Guihaia 11: 104. 1991.

四川蛇根草 si chuan she gen cao

Herbs, procumbent in lower portion, ascending above; stems drying black, subglabrous or puberulent. Leaves in subequal pairs; petiole 0.8–2 cm, subglabrous; blade drying thickly papery, adaxially leaden gray, abaxially dark brown, broadly elliptic, 1.5–5 × 1.2–3.2 cm, glabrous on both surfaces, base rounded to obtuse, margin irregularly dentate or rarely entire, apex obtuse or acute; secondary veins 4–6 pairs; stipules generally persistent, subulate, 1.5–2 mm, acuminate. Inflorescences 1- or 2-flowered; bracts linear, 4–6 mm. Flowers with biology unknown, on pedicels 6–8 mm. Calyx with hypanthium broadly turbinate, ca. 2.5 mm, 5-ribbed; lobes linear, 3.5–4 mm, slightly obtuse. Corolla purple, funnelform, outside glabrous; tube 26–29 mm, white villous inside; lobes ovate-triangular, ca. 6 mm, apex rostrate. Capsules not seen. Fl. Apr.

● On rocks; ca. 1200 m. Sichuan (Leibo).

**65. Ophiorrhiza subrubescens** Drake, J. Bot. (Morot) 9: 215. 1895.

变红蛇根草 bian hong she gen cao

Herbs, weak to suberect, to 60 cm tall; stems glabrous to pubescent. Leaves in subequal pairs; petiole 0.5–2(–4) cm, densely pilose; blade drying thinly papery, red on both surfaces or grayish green adaxially, lanceolate to ovate, 3–11 × 1–4 cm, glabrous or sparsely strigose adaxially, ?pilose along principal veins abaxially, base cuneate, margins entire or undulate, apex rounded-obtuse to acuminate or acute; secondary veins 7–13 pairs; stipules sometimes caducous, broadly triangular then strongly narrowed, 2–3 mm. Inflorescence congested-cymose, many flowered, densely pubescent; peduncle 1–6 cm; axes helicoid, up to 1 cm, elongating as fruit develop; bracts absent, minute, or caducous. Flowers reportedly distylous, subsessile. Calyx densely pubescent; hypanthium subobcordate, ca. 1 mm, 5-ribbed; lobes subtriangular, ca. 0.5 mm. Corolla slenderly tubular, 6–8(–12) mm, outside pubescent and 5-ribbed at least in bud, inside with white villous ring at middle and scaly pubescent in throat and onto lobes; lobes triangular to subovate, dorsally narrowly winged and with very short horn. Capsules drying purplish red, obcordate, ca. 3 × 7–8 mm, pubescent. Fl. Apr–Jul.

Shady and wet places in forests. Guangxi, Hainan, Yunnan [N Vietnam].

The circumscription of this species here follows that of H. S. Lo in FRPS (71(1): 139. 1999), which partly differs from that of other authors and also conflicts with the protologue in some details. The protologue described the plants as glabrous with filiform stipules and bracts that fall before the fruit mature, while H. S. Lo said they are pubescent with narrowly triangular stipules and lacking bracts. Lo described the flowers as distylous with the corollas apparently similar in both floral forms but unusual in anther position: the forms were described as differing in style length, ca. 2 mm vs. ca. 6 mm, and anther size, ca. 2 mm vs. ca. 3 mm, but with the anthers in both forms positioned near the base of the corolla, at ± the same height as the short-styled stigmas but well below the long-styled stigmas. However, the figure in FRPS (p. 140, t. 33, f. 1–8) differs from Lo's description in its depiction of well-developed bracts that persist with the flowers, deeply bilobed stipules, corollas with only 1 ring of internal pubescence, glabrous fruit, and flower forms with the anthers of the short-styled flowers exserted on well-developed filaments.

**66. Ophiorrhiza succirubra** King ex J. D. Hooker, Fl. Brit. India 3: 82. 1880.

高原蛇根草 gao yuan she gen cao

Herbs to subshrubs, weak to erect, to 60[–75] cm tall, usually drying partly to wholly red; stems glabrous or with pilosulous lines. Leaves in subequal pairs; petiole 0.5–2 cm, glabrous or subglabrous; blade drying thinly papery, lanceolate-elliptic, ovate-elliptic, or elliptic-oblong, 5–11(–20) × 2.5–4(–8) cm, glabrous on both surfaces or sparsely pubescent adaxially, base cuneate to obtuse, margins entire or undulate, apex acuminate to caudate; secondary veins 7–10 pairs; stipules caducous, not seen. Inflorescence congested-cymose, many flowered, often pendulous later becoming erect, glabrescent or axes sometimes puberulent to pilosulous in lines; peduncle 1–1.5[–3] cm; axes short; bracts linear-lanceolate, 6–9 mm. Flowers perhaps homostylous, on pedicels 1–1.5 mm. Calyx glabrous to puberulent or densely pilosulous; hypanthium submitriform, ca. 1.5 mm, 5(or 10)-ribbed; lobes ovate-triangular to lanceolate-triangular, usually slightly unequal, 1.4–1.8 mm, with 1 gland in each sinus. Corolla pink or white, tubular-funnelform and swollen at base, outside glabrous; tube 7–7.5[–10] mm, inside glabrous or villous; lobes ovate, ca. 2.5 mm, dorsally narrowly keeled. Capsules mitriform, [2–3.5 × 6–9 mm], glabrous to puberulent or pilosulous. Fl. Jul–Oct.

Broad-leaved forests; ca. 2000 m or more. Guizhou, Xizang (Mêdog), Yunnan [Bhutan, NE India, Myanmar, Nepal].

This species has apparently been distinguished based primarily on its distinctive purple-red drying color; it is characterized further in the key to species here.

Measurements in brackets are taken from the description of this species by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 120–122. 1997), where this species is reported to flower throughout the year and grow from middle elevations up to 2400 m. H. S. Lo (in FRPS 71(1): 145–146. 1999) did not posit the floral biology but described the flowers similarly to Deb and Mondal as essentially homostylous, with the anthers and stigmas both positioned near the middle of the corolla tube.

**67. Ophiorrhiza umbricola** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 217. 1920.

阴地蛇根草 yin di she gen cao

Herbs, sometimes weak at base, ascending above, to 45(–100) cm tall; stems obtusely 4-angled, drying purple, glabrous or subglabrous. Petiole 1–4 cm, subglabrous; leaf blade drying membranous or thinly papery, adaxially dark green, abaxially pale green or red, ovate, elliptic, or lanceolate, 9–15 × 3–6.5 cm, glabrous on both surfaces or sparsely strigillose adaxially, base cuneate to obtuse, apex long acuminate or cuspidate; secondary veins 10–14 pairs; stipules caducous, not seen. Inflorescences congested-cymose, many flowered, glabrous or reddish brown hirtellous; peduncle 1.5–3 cm; axes helicoid. Flowers reportedly distylous, subsessile or on pedicels to 1 mm. Calyx glabrous; hypanthium submitriform, 1.5–2 mm; lobes with 1 gland in each sinus. Corolla red or purplish red, subtubular, glabrous outside; tube 22–24 mm, white hirsute above middle inside; lobes ovate-triangular, 3(–6) mm. Capsules drying red, mitriform, 10–11 mm wide. Fl. Jun.

Dense forests; 2000–3000 m. Xizang (Mêdog), Yunnan [Myanmar].

H. S. Lo (in FRPS 71(1): 151. 1999) described this species as distylous but described only putatively long-styled flowers, with the anthers positioned just above the middle of the corolla tube and the stigmas apparently positioned just above them.

**68. Ophiorrhiza wallichii** J. D. Hooker, Fl. Brit. India 3: 79. 1880.

大果蛇根草 da guo she gen cao

Herbs, weak at base, ascending above, to 20[–60] cm tall; stems pilosulous [to glabrous]. Leaves in unequal [to subequal] pairs; petiole [0.5–]1–3 cm or longer, glabrous; blade drying thickly papery [or leathery], adaxially grayish green, abaxially greenish yellow, ovate, sublanceolate, or elliptic-oblong, 3–14[–15] × 2–4.5[–6] cm, subglabrous on both surfaces, base obtuse and often shortly decurrent, distinctly inequilateral [or symmetrical], margins entire or undulate, apex acuminate or cuspidate; secondary veins 7 or 8(or 9) pairs; stipules caducous, reduced, subulate. Inflorescences corymbose to congested-cymose, several to many flowered, puberulent to subglabrous; peduncle 1–1.5 cm; axes short or 0.5–1 cm, helicoid; bracts linear, 2–3 mm, caducous. Flowers with biology unknown, on pedicels 1–2 mm. Calyx densely puberulent; hypanthium broadly compressed turbinate, ca. 1 mm, 5-ribbed; lobes triangular, ca. 0.4[–1.5] mm, each sinus with 1 gland. Corolla pale red, drying yellow, salverform, glabrous outside; tube 23–25[–27] mm, glabrous inside; lobes ovate-triangular, [2–]5 mm, dorsally narrowly winged, apex rostrate. Capsules mitriform, 5–6 × 14–15 mm, puberulent. Fl. Apr–Jun.

Shady and wet places in forests. Yunnan [NE India, Myanmar].

Measurements in brackets are taken from the description of this species by Deb and Mondal (Bull. Bot. Surv. India 39(1–4): 135–137. 1997) and may be expected in Chinese plants.

**69. Ophiorrhiza wenshanensis** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 17. 1990.

文山蛇根草 wen shan she gen cao

Herbs, weak in lower part, ascending above, to 20 cm tall; stems densely pilosulous to hispidulous. Petiole 0.5–1 cm, hispidulous; leaf blade drying papery, adaxially grayish green, pallid abaxially, ovate to lanceolate, 1.5–3.5(–7) × 0.8–2(–3) cm, subglabrous to sparsely hispidulous adaxially, subglabrous except pilosulous on veins abaxially, base cuneate to obtuse, apex obtuse; secondary veins 5 or 6 pairs; stipules glabrous, 2-parted almost to base, 2.5–3 mm, lobes subulate-triangular, with globose gland at apex and sometimes also stipitate glands at base. Inflorescences 1- or 2-flowered, glabrous; pedicels 3–5 mm; bracts 2, fused to hypanthium base, linear-subulate, ca. 5 mm. Flowers reportedly distylous, pedicellate or pedunculate. Calyx glabrous; hypanthium turbinate, ca. 1.5 mm, 6–8-ribbed; lobes 5–7, lanceolate-linear, sometimes unequal, 1–3 mm. Corolla white, funnelform with throat markedly expanded, outside glabrous; tube 18–20 mm, densely white villous inside through throat; lobes 6 or 7, subovate, 3–4 mm, dorsally with very short horn, apex rostrate. Capsules subobcordate, ca. 3 × 8 mm, with persistent bracteoles. Fl. May.

● Streamsides in forests. Yunnan (Wenshan).

In the protologue and FRPS (71(1): 120. 1999), H. S. Lo described the flowers as probably distylous, but only the putative short-styled form has been documented.

**70. Ophiorrhiza wui** H. S. Lo, Bull. Bot. Res., Harbin 10(2): 33. 1990.

吴氏蛇根草 wu shi she gen cao

Herbs, procumbent at base, ascending above, to 30 cm tall; stems drying reddish brown, subterete to striate-grooved, puberulent to densely pilosulous. Leaves in subequal pairs; petiole 1–2.5 cm, pilosulous; blade drying thinly papery, ovate or lanceolate-ovate, 5–11 × 1.8–4 cm, adaxially glabrous or sparsely strigillose, abaxially villosulous or hirtellous along veins, base cuneate then shortly decurrent, apex obtuse then abruptly acuminate; secondary veins 5–7 pairs; stipules subfiliform, ca. 6 mm. Inflorescences cymose, several flowered, branched to several orders, on peduncles and axes with 2 pilosulous or strigillose lines; peduncle 1–2.5 cm; axes helicoid; bracts absent or reduced. Flowers with biology unknown, subsessile. Calyx with hypanthium ca. 1.5 mm; lobes ca. 0.4 mm. Corolla white or reddish, tubular, glabrous outside; tube 4.5–5 mm, densely pubescent in throat; lobes oblong-triangular, ca. 2 mm, dorsally winged, markedly reflexed in anthesis. Capsules unknown. Fl. Apr.

● On wet limestone; ca. 1100 m. Yunnan (Luxi).

Fl. China 19: 258–282. 2011.