

88. SPIRADICLIS Blume, Bijdr. 975. 1826–1827.

螺序草属 *luo xu cao shu*

Chen Tao (陈涛); Charlotte M. Taylor

Herbs, annual or perennial, or subshrubs, unarmed. Raphides present. Leaves opposite, sometimes clustered and appearing whorled, rosulate, or pseudovercillate, isophyllous to anisophyllous, without domatia; stipules persistent to caducous, interpetiolar, triangular, entire to 2(–5)-lobed. Inflorescences terminal and/or pseudoaxillary, cymose to panicleform with axes slender and dichasial or often scorpioid, several to many flowered, pedunculate, bracteate or bracts reduced. Flowers sessile to pedicellate, bisexual, usually if not always distylous. Calyx with ovary portion usually 5-ridged or -winged, limb 5-lobed. Corolla white, pink, purple, or red, campanulate, funnellform, urceolate, or tubular, inside usually pubescent in throat and with pubescent ring near middle; lobes 5, in bud valvate or induplicate-valvate, often winged or keeled dorsally, sometimes notably pinnatinerved. Stamens 5, inserted below middle of corolla tube and included in long-styled flowers, inserted in throat or middle of corolla tube and partially exerted in short-styled flowers; filaments short to developed; anthers dorsifixed. Ovary 2-celled, ovules numerous in each cell on peltate axile placentas attached to middle of septum; stigmas 2-lobed, included to shortly exerted in long-styled flowers, included and positioned near middle of corolla tube in short-styled flowers. Fruit capsular, subglobose, often 5-ridged to -winged, with apical portion prolonged into beak, dehiscent loculicidally and often also simultaneously or subsequently septicial from top, dividing partially to completely into 2 or 4 valves with walls usually persistent, papery to stiff, with calyx limb persistent, sometimes elongating; seeds numerous, small, angled; testa reticulate or alveolate; embryo minute; endosperm fleshy.

At least 40 species: Bhutan, China, India, Indonesia, Myanmar, Vietnam; 35 species (31 endemic, one of unconfirmed occurrence) in China.

Robbrecht (Opera Bot. Belg. 1: 1–271. 1988; Opera Bot. Belg. 6: 1–200. 1993) accepted earlier conclusions that *Spiradiclis* is related to *Ophiorrhiza*; a more recent study based on molecular data suggests that the situation may be more complex and calls into question the separation of these genera (Rydin et al., Pl. Syst. Evol. 278: 101–120. 2009). H. S. Lo (in FRPS 71(1): 86. 1999) described the corolla lobes as valvate in bud, but they were described as induplicate-valvate by Bakhuizen f. (Fl. Java 2: 289. 1965). This genus does not appear to be well known at all. It has only been studied regionally, in particular by H. S. Lo et al. (Acta Bot. Austro Sin. 1: 27–36. 1983), H. S. Lo (Bull. Bot. Res., Harbin 6(4): 31–53. 1986), Deb and Rout (Candollea 44: 225–229. 1989), H. S. Lo (Bull. Bot. Res., Harbin 18: 275–283. 1998), and R. J. Wang (Novon 12: 420–423. 2002). Ma et al. (J. Trop. Subtrop. Bot. 13(3): 264–270. 2005) studied seed morphology of sixteen *Spiradiclis* species and found partial correlation with the infrageneric classification of Lo.

H. S. Lo (loc. cit. 1998: 275–276) recognized two subgenera, distinguished as follows:

Spiradiclis subg. *Spiradiclis*: ellipsoid to linear-oblong capsules that are 2–4 × as long as wide and have straight valves, including eight (or possibly nine or ten) species in China;

Spiradiclis subg. *Sinospiradiclis* H. S. Lo: subglobose capsules that are ± as long as wide and have the valves ultimately twisted, including the remaining Chinese species.

One subsequently described species, *Spiradiclis chuniana* R. J. Wang, was not classified to subgenus when it was published because the fruit were unknown. The key here follows that of H. S. Lo in FRPS (71(1): 86–88. 1999), apparently intended as a schematic outline of the genus classification, with some changes: here the full range of variation that is given in the descriptions has been added to the key leads, and a few species have been moved to different sections within the key based on Lo's descriptions. This key does not fully distinguish all the species; however, it cannot be improved on with the information now available and is here presented to summarize in English the existing information on Chinese *Spiradiclis* and to highlight problematic areas of its taxonomy.

- 1a. Capsules narrowly ellipsoid, ellipsoid, oblanceoloid, narrowly oblong, or linear-oblong, 2–4 × as long as wide, with valves becoming twisted (dehiscence unknown in *S. baishaiensis*, *S. laxiflora*, *S. longzhouensis*) (*S.* subg. *Spiradiclis*).
 - 2a. Capsules linear-oblong, oblanceoloid, or narrowly oblong, 2–4 × as long as wide, glabrous or puberulent.
 - 3a. Stems and leaves glabrous; petioles 3–4.5 cm; stipule unlobed 23. *S. "microcarpa"*
 - 3b. Stems and abaxial leaf veins glabrescent, scaberulous, puberulent, villosulous, or strigillose; petioles 0.2–1 cm; stipules deeply 2-lobed.
 - 4a. Corolla tube 2–2.5 mm; corolla lobes apparently perhaps keeled dorsally; fruit 5–6 mm, with 2 valves or these later partly splitting 4. *S. caespitosa*
 - 4b. Corolla tube 3–4 mm; corolla lobes smooth dorsally; fruit 2.5–4.5 mm with 4 valves.
 - 5a. Capsules 2.5–4 mm; stipules persistent 1. *S. arunachalensis*
 - 5b. Capsules 4–4.5 mm; stipules caducous 9. *S. cylindrica*
 - 2b. Capsules narrowly ellipsoid or ellipsoid, ca. 2 × as long as wide, glabrous, pilosulous, or villosulous.
 - 6a. Leaves tomentose or pilosulous at least abaxially; capsules glabrous to pilosulous or villous.
 - 7a. Peduncle 5–9 cm; calyx lobes 3–4 mm, longer than fruit; capsules glabrous 2. *S. baishaiensis*
 - 7b. Peduncle 0.1–0.5 cm; calyx lobes ca. 1 mm, shorter than fruit; capsules villosulous 10. *S. emeiensis*

- 6b. Leaves glabrous; capsules glabrous.
- 8a. Stems with 2 lines of dense hispidulous hairs 22. *S. malipoensis*
- 8b. Stems glabrous or sparsely evenly pubescent.
- 9a. Leaves 10–15 cm, with secondary veins 9–11 pairs 16. *S. laxiflora*
- 9b. Leaves 15–21 cm, with secondary veins 16–23 pairs 20. *S. longzhouensis*
- 1b. Capsules subglobose, ellipsoid, to ovoid, or subglobose-obconic, ± as long as wide, valves remaining straight (fruit unknown in *S. chuniana*, *S. corymbosa*, *S. ferruginea*, *S. fusca*, *S. longipedunculata*, *S. napoensis*, *S. rubescens*, *S. spathulata*, *S. xizangensis*; fruit dehiscence unknown in *S. hainanensis*, *S. longibracteata*, *S. oblanceolata*, *S. villosa*) (*S.* subg. *Sinospiradichlis*).
- 10a. Leaves cordate, cordulate, subtruncate, or broadly obtuse at base.
- 11a. Leaves 0.6–1.8 cm; plants creeping.
- 12a. Calyx lobes 2–4 mm, in fruit 2 or 3 × as long as capsule 13. *S. guangdongensis*
- 12b. Calyx lobes 1.2–1.5 mm, in fruit ± equal to or shorter than capsule 14. *S. hainanensis*
- 11b. Leaves 1.5–13 cm, at least some more than 1.8 cm; plants erect or creeping.
- 13a. Corolla 20–21.5 mm; leaves 1.5–4 cm; plants creeping 33. *S. umbelliformis*
- 13b. Corolla 6–9 mm; leaves 3–13 cm; plants ascending or acaulescent.
- 14a. Plants with leaves distributed along developed stems; leaves 3–6.5 × 1.6–3 cm, broadly obtuse to truncate at base 5. *S. chuniana*
- 14b. Plants acaulescent or with short stems, with leaves often clustered at base of plant; leaves 5–13 × 2–5.5 cm, cordate or cordulate at base 7. *S. cordata*
- 10b. Leaves acute, cuneate, obtuse, or rounded at base.
- 15a. Corolla with tube 13.5–23 mm.
- 16a. Calyx lobes 1–1.5 mm, ± as long as or shorter than corolla “tube” (i.e., hypanthium portion together with unlobed basal part of calyx limb).
- 17a. Stems developed with leaves borne at developed internodes 30. *S. scabrida*
- 17b. Stems short or hardly developed, with leaves clustered at base 31. *S. spathulata*
- 16b. Calyx lobes 1.6–10 mm, longer than corolla “tube.”
- 18a. Leaves glabrous on both surfaces; flowers dark red 6. *S. coccinea*
- 18b. Leaves pubescent (hirsute, pilose, strigose, hispidulous, hirtellous) on one or both surfaces and/or ciliate marginally; flowers red, bluish purple, white, purplish red, purplish white, or pink (flowers unknown in *S. xizangensis*).
- 19a. Corolla tube 19–22 mm.
- 20a. Calyx lobes generally equal in size; leaves adaxially densely hispidulous-strigose; corolla bluish purple, tube 19–21 mm 28. *S. purpureocaerulea*
- 20b. Calyx lobes unequal in size; leaves adaxially sparsely puberulent or glabrous; corolla red or purplish red, tube 21–22 mm.
- 21a. Secondary leaf veins 18–29 pairs; calyx lobes 3–10 mm; corolla tube ca. 22 mm 18. *S. longibracteata*
- 21b. Secondary leaf veins 9–11 pairs; calyx lobes 3.5–4.5 mm; corolla tube ca. 21 mm 29. *S. rubescens*
- 19b. Corolla tube 12–18 mm (only known in bud in *S. napoensis*).
- 22a. Calyx lobes unequal in length, one distinctly longer and/or wider than others; corolla tubes glabrescent or uniformly pubescent over broad areas inside.
- 23a. Corolla pubescent inside; leaf secondary veins 8–15 pairs 11. *S. ferruginea*
- 23b. Corolla glabrescent inside; leaf secondary veins ca. 7 pairs 35. *S. xizangensis*
- 22b. Calyx lobes equal or subequal in size; corolla tubes with 1 or 2 discrete white villous rings of pubescence inside.
- 24a. Leaves rounded, obtuse, or acute at apex, with 18–29 pairs of secondary veins; corolla sparsely purplish red pubescent outside; stipules broadly ovate 18. *S. longibracteata*
- 24b. Leaves acuminate at apex, with 6–10 pairs of secondary veins; corolla glabrous or with 5 lines of pubescence outside; stipules subulate to linear.
- 25a. Leaves lanceolate, ovate, subelliptic, or subelliptic-oblong, yellowish brown on lower surface when dry; stipules and bracteoles 2–3 mm; corolla with 5 lines of pubescence outside, lobes narrowly winged on dorsal surface 15. *S. howii*
- 25b. Leaves narrowly ovate to broadly ovate, pale on lower surface when dry; stipules 2–8 mm and bracteoles

- 6–10 mm; corolla glabrous outside, lobes smooth
on dorsal surface 25. *S. napoensis*
- 15b. Corolla shorter, tube 2–9 mm (flowers unknown in *S. bifida*, *S. villosa*; only buds known in *S. microphylla*).
- 26a. Stems and inflorescences glabrous.
- 27a. Leaves narrowly elliptic-oblong or oblanceolate, 3.5–4.5 × as long as wide; stipules long triangular; stems with developed internodes 26. *S. oblanceolata*
- 27b. Leaves obovate, broadly obovate, oblong-elliptic, oblong-lanceolate, or subelliptic, 1.5–3 × as long as wide; stipules triangular, triangular-orbicular, suborbicular, or long triangular; stem internodes developed to reduced.
- 28a. Stipules suborbicular or triangular-orbicular, cuspidate and 2-lobed; stem internodes developed 19. *S. longipedunculata*
- 28b. Stipules triangular to long triangular, at apex acuminate; stem internodes developed or reduced.
- 29a. Leaves 1.5–3.5 cm wide, with 10–13 pairs of secondary veins; petioles 0.5–1.5 cm; corolla tube ca. 9 mm 12. *S. fusca*
- 29b. Leaves 3–4.5 cm wide, with 7–9 pairs of secondary veins; petioles 1–4 cm; corolla tube ca. 5 mm 21. *S. luochengensis*
- 26b. Stems and inflorescences pubescent.
- 30a. Stems short, with leaves crowded at base of plant.
- 31a. Flowers subsessile; corolla pubescent inside 17. *S. loana*
- 31b. Flowers on pedicels 1–5 mm; corolla glabrous inside 32. *S. tomentosa*
- 30b. Stems prolonged, erect to prostrate, with leaves separated by developed internodes.
- 32a. Calyx and capsules glabrous or subglabrous; leaves 10–21 cm, with 15–19 pairs of secondary veins 3. *S. bifida*
- 32b. Calyx and capsules pubescent; leaves 1–25 cm, with 4–17 pairs of secondary veins.
- 33a. Capsules villous; calyx lobes ca. 4 mm 34. *S. villosa*
- 33b. Capsules puberulent, pilosulous, pilose, or hispidulous; calyx lobes 0.3–1.5 mm.
- 34a. Leaves 6.5–14 cm, with 11–17 pairs of secondary veins; corolla tube 7.5–9 mm 8. *S. corymbosa*
- 34b. Leaves 1–5 cm, with 4–9 pairs of secondary veins; corolla tube ca. 2 mm (only known in bud in *S. microphylla*).
- 35a. Leaves 1–3 × 0.5–4 cm, with 4–7 pairs of secondary veins; fruit with 4 valves 24. *S. microphylla*
- 35b. Leaves 3–5 × 1.5–3 cm, with ca. 9 pairs of secondary veins; fruit valves 2, sometimes tardily splitting into 4 27. *S. petrophila*

1. *Spiradiclis arunachalensis* Deb & Rout, Candollea 44: 225. 1989.

藏南螺序草 zang nan luo xu cao

Spiradiclis caespitosa Blume f. *subimmersa* H. S. Lo.

Herbs, perennial, usually prostrate and rooting on basal nodes; stems glabrous to densely villosulous. Petiole 0.2–1 cm; leaf blade drying papery, oblanceolate to lanceolate-elliptic, 1.5–7.5 × 0.3–1.8 cm, adaxially glabrescent to scaberulous or strigillose marginally and on principal veins, abaxially strigillose to puberulent along principal veins and glabrescent on lamina, base cuneate to acute, apex acute; secondary veins 6–11 pairs; stipules persistent, deeply 2-lobed, lobes narrowly triangular, 4–10 mm, strigillose to glabrescent, acute. Inflorescences dichasially branched 1 or 2 times, strigillose or puberulent; peduncles 2–6 cm; axes scorpioid; bracts linear-lanceolate, 1.5–3 mm. Flowers subsessile. Calyx glabrous; hypanthium portion obconic to cylindrical, 1.7–2.2 mm; limb 0.6–1 mm, deeply lobed; lobes triangular to ovate. Corolla white, shortly tubular, outside puberulent to glabrous; tube 3–4 mm; lobes ca. 1 mm. Capsules narrowly oblong to narrowly oblanceoloid, 2.5–4 ×

1.5–2 mm, glabrous, valves 4, becoming twisted. Fl. and fr. Sep.

Moist understories of forests, rice fields at forest margins. Guangxi, Guizhou, Yunnan [India].

See comments about the identity and circumscription of this species under *Spiradiclis caespitosa*.

2. *Spiradiclis baishaiensis* X. X. Chen & W. L. Sha, Bull. Bot. Res., Harbin 8(3): 107. 1988.

百色螺序草 bai se luo xu cao

Herbs, perennial, ascending, 20–50 cm tall; stems usually unbranched. Petiole 1.5–4 cm, yellow pilosulous or -villosulous; leaf blade drying papery, adaxially brown, abaxially straw-yellow, ovate-elliptic, obovate, or oblanceolate, 7–10 × 3–6 cm, adaxially glabrous, abaxially densely yellowish brown tomentose, base cuneate to acute and usually slightly inequilateral, apex acute or acuminate; secondary veins 11–23 pairs; stipules persistent, ovate-lanceolate, 9–13 × 4–6 mm, obtuse. Inflorescence cymose to paniculiform, glabrous, purplish red; peduncles 5–9 cm; branched portion 5–8 cm, dichasial; bracts linear-lanceolate, 8–15 × 1.5–2 mm; bracteoles linear, 3–5 mm; pedi-

cels 3–4 mm. Calyx glabrous; hypanthium portion ovoid to ellipsoid, ca. 2.5 mm; limb lobed to base; lobes linear, 3–4 mm. Corolla purplish red, becoming brownish yellow when dry, tubular or tubular-funnelform, outside glabrous; tube 8–13 mm, inside pubescent near middle or bearded in throat; lobes ovate-oblong, ca. 2 mm. Capsules ellipsoid, ca. 3×1.5 mm. Fl. May.

- Forests. Guangxi.

In the protologue this species was said to be similar to *Spiradiclis oblancoolata*, although this species was classified in *S.* subg. *Spiradiclis* while *S. oblancoolata* was classified in *S.* subg. *Sinospiradiclis*. The protologue of *S. baishaiensis* apparently described short-styled flowers (cf. f. 3, f. 4, and description of style as half as long as corolla and anthers exerted); however, H. S. Lo (in FRPS 71(1): 106. 1999) reported this to be a description of a long-styled flower. The protologue described the corollas as pubescent near the middle inside, while H. S. Lo described the corollas as bearded in the throat.

3. *Spiradiclis bifida* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 310. 1872.

大叶螺序草 da ye luo xu cao

Herbs, to 0.5 m tall, apparently perennial; stems ascending, ?villous. Petiole 1–3 cm, pubescent; leaf blade drying thinly papery, elliptic or elliptic-oblong, 10–21 \times 3–6.5 cm, adaxially sparsely pilose to subglabrous, abaxially pubescent along veins, base obtuse then decurrent, apex acuminate or subcaudate; secondary veins 15–19 pairs; stipules subulate, caudate. Inflorescences paniculate, to 20 cm, ?villous; axes numerous, 1–2 cm, scorpioid; bracts minute. Flowers shorter than 5 mm. Capsules subglobose, ca. 2 mm in diam., valves 4.

Wet places in forests. S and SW Yunnan [NE India].

4. *Spiradiclis caespitosa* Blume, Bijdr. 975. 1826–1827.

螺序草 luo xu cao

Herbs, perennial, usually rooting at basal nodes but ascending in upper parts; stems puberulent to glabrescent. Petiole 0.3–1 cm; leaf blade drying papery, elliptic to elliptic-ovate, 1–6.5 \times 1–3 cm, puberulent to glabrescent on both surfaces, base cuneate to obtuse, apex obtuse to acute; secondary veins 3–7 pairs; stipules deciduous or caducous, deeply 2-lobed, lobes narrowly triangular to linear, 4–5 mm, puberulent to glabrescent. Inflorescences cymose, puberulent to strigillose, unbranched or dichasially branched 1 time; peduncle 1–4.5 cm; axes scorpioid; bracts filiform. Flowers subsessile. Calyx glabrous to puberulent; hypanthium portion oblanceoloid to cylindrical, 1.5–2 mm; limb 0.5–1 mm, deeply lobed; lobes triangular. Corolla white, shortly tubular, outside glabrous; tube 2–2.5 mm; lobes 1–1.5 mm, dorsally keeled. Capsules linear-oblong to oblanceoloid, 5–6 \times 1.5–1.7 mm, valves 2, becoming twisted, sometimes later partially splitting.

Moist shady sites, often along streams; near sea level to 1200 m. Perhaps present in China, no confirmed material seen [Indonesia (Java)].

This species is here circumscribed more narrowly and somewhat differently than done by H. S. Lo (in FRPS 71(1): 107–110. 1999); it has not yet been confirmed from China and is included here for comparison, based on the description of Bakhuizen f. (Fl. Java 2: 289. 1965) who studied plants in the type region. Authors outside China have separated the Himalayan plants with 4-valved capsules as *Spiradiclis*

cylindrica (Deb & Rout, Candollea 44: 225–229. 1989; Springate & Wright, Fl. Bhutan 2(2): 772–774. 1999) and are followed here; H. S. Lo et al. (Acta Bot. Austro Sin. 1: 31. 1983) synonymized this name under *S. caespitosa* f. *cylindrica*.

H. S. Lo (Acta Bot. Austro Sin. 1: 31–32. 1983) described several forms of *Spiradiclis caespitosa*. In FRPS (H. S. Lo, loc. cit. 1999: 110), f. *subimmersa* was distinguished by its narrowly lanceolate to lanceolate leaves 3–7 \times 0.7–1.5 cm. The plants included in f. *subimmersa* were subsequently treated as a species, *S. arunachalensis*, by Deb and Rout (loc. cit.: 225). These plants correspond to *S. cylindrica* as circumscribed here, rather than to *S. caespitosa* under which the varietal name was actually published. Most of the specimens studied and described by Deb and Rout were not seen by Lo, and similarly Lo's material was not seen by them. *Spiradiclis arunachalensis* is provisionally treated here pending further study.

5. *Spiradiclis chuniana* R. J. Wang, Novon 12: 423. 2002.

焕镛螺序草 huan yong luo xu cao

Herbs, annual, to 8 cm tall, mostly unbranched, perhaps ascending; stems densely villous. Petiole 1–3 cm, villous; leaf blade ovate, 3–6.5 \times 1.6–3 cm, sparsely villous on both surfaces, base broadly obtuse to truncate and often oblique, apex rounded to obtuse then mucronate; secondary veins 10–12 pairs; stipules persistent, villous, 2–5-lobed, lobes linear, 5–10 mm. Inflorescences cymose, several flowered, villosulous; peduncle 2.5–6 cm; branched portion ca. 1.5 cm; axes mixed dichasial and scorpioid; bracts linear, 1.2–2 mm; pedicels to 5 mm. Flowers distylous, sessile to pedicellate. Calyx puberulent; hypanthium portion obconic to ellipsoid, ca. 1 mm; lobes narrowly triangular, ca. 1 mm. Corolla white, funnelform, puberulent outside; tube ca. 7.5 mm, inside with villous ring at middle and sparsely pubescent above; lobes ca. 1.5 mm. Immature capsules apparently subglobose. Fl. Aug.

- Shady and wet places in forests on slopes of limestone hills; ca. 400 m. Guangxi (Nonggang).

This species was not classified to subgenus in the protologue because the mature fruit were unknown, and predicting the states of unknown characters is problematic in many Rubiaceae (e.g., Razafimandimbison & Taylor, Novon 10: 71–73. 2000).

6. *Spiradiclis coccinea* H. S. Lo, Bull. Bot. Res., Harbin 6(4): 38. 1986.

红花螺序草 hong hua luo xu cao

Herbs, erect, ca. 40 cm tall, presumably perennial; stems grayish brown when dry, glabrous or subglabrous. Petiole 1–2 mm; leaf blade drying papery, adaxially grayish brown, abaxially grayish yellow, narrowly elliptic-oblong or elliptic-oblong, 4.5–9 \times 1.3–3 cm, glabrous on both surfaces, base cuneate, apex obtuse to acute; secondary veins 6–9 pairs; stipules triangular, rapidly narrowed to subulate, long acuminate apex. Inflorescence cymose, ca. 1 cm, with more than 10 flowers; peduncle very short. Flowers distylous. Calyx glabrescent; hypanthium portion obconic, 1.2–1.5 mm; lobes narrowly lanceolate, 1.7–2 mm, with gland at each side of base inside. Corolla dark red, slenderly tubular-salverform, outside glabrous or puberulent; tube 15–18 mm, inside with pilose ring above stamens; lobes broadly ovate to suborbicular, 4.5–6 mm. Capsules subglobose, 4.5–5.5 mm in diam., valves 4. Fl. Aug.

- On rocks in dense forests. Guangxi (Longzhou).

7. *Spiradiclis cordata* H. S. Lo & W. L. Sha, Acta Bot. Austro Sin. 1: 34. 1983.

心叶螺序草 xin ye luo xu cao

Herbs, fleshy, low, apparently perennial, acaulescent or stems short, densely hirsute. Leaves often clustered at base of plant; petiole 1–7 cm, densely villosulous to hirsute; blade drying papery, pale to green, elliptic-ovate to elliptic-oblong, 5–13 × 2–5.5 cm, adaxially sparsely hispidulous, abaxially hispidulous to villous with pubescence denser along veins, base cordate to cordulate, apex obtuse to rounded; secondary veins 15–19 pairs; stipules deciduous, hispidulous to villous, deeply 2-lobed, lobes linear, 4–8 mm. Inflorescences cymose to paniculate, puberulent to strigillose; peduncles 6–16 cm; principal axes 4–9, 1–3 cm, mostly scorpioid; bracts linear or subulate, ca. 2 mm. Flowers subsessile. Calyx densely puberulent to pilosulous; hypanthium portion obconic, 0.5–0.8 mm; lobes triangular, ca. 0.8 mm. Corolla white, tubular-funnelform, outside puberulent to glabrescent; tube ca. 5 mm, villous above middle inside; lobes subtriangular, ca. 1 mm. Capsules brown, subglobose, ca. 1.8 mm in diam., valves 4, flat. Fl. Aug, fr. Aug–Nov.

- Rocks at roadsides; ca. 400 m. Guangxi.

8. *Spiradiclis corymbosa* H. S. Lo, sp. nov.

密花螺序草 mi hua luo xu cao

Type: China. Guangxi: Daxin, Taiping, 4 Jun 1977, D. L. Chao 2–64 (holotype, GXMI).

Validating Latin description: that of “*Spiradiclis corymbosa* W. L. Sha e [sic!] X. X. Chen” (H. S. Lo, Bull. Bot. Res., Harbin 18: 276. 1998).

Herbs, 24–30 cm tall, perhaps perennial, unbranched, perhaps ascending; stems densely pubescent. Leaves in slightly unequal opposite pairs; petiole 0.5–2.5 cm, pubescent; blade drying papery, elliptic to long elliptic, 6.5–14 × 2–4.7 cm, both surfaces pilose along veins, base cuneate, apex acute; secondary veins 11–17 pairs; stipules long triangular, to 23 mm, ciliate, apex subulate. Inflorescences corymbose, densely many flowered, densely pubescent; peduncles 4.5–9 cm; axes usually scorpioid; bracts linear, 3–18 mm, ciliate; bracteoles linear, ca. 2 mm, ciliate; pedicels to 2 mm. Flowers sessile to pedicellate. Calyx pubescent; hypanthium portion turbinate, ca. 1.5 mm; lobes long triangular, ca. 1 mm, ciliate. Corolla red, pubescent inside and out; tube 7.5–9 mm; lobes ovate, 1.5–2 mm. Capsules unknown. Fl. Jun.

- Rocks in forests on limestone hills. Guangxi.

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 and 37.7 of the *Vienna Code*. This species as circumscribed here reportedly (H. S. Lo in FRPS 71(1): 100. 1999) comprises the Chinese plants previously treated as *Spiradiclis leptobotrya* (Drake) Pitard var. *longiflora* Merrill, in particular as treated under that name by H. S. Lo et al. (Acta Bot. Austro Sin. 1: 29. 1983).

9. *Spiradiclis cylindrica* Wallich ex J. D. Hooker, Fl. Brit. India 3: 76. 1880.

尖叶螺序草 jian ye luo xu cao

Spiradiclis caespitosa Blume f. *cylindrica* (Wallich ex J.

D. Hooker) H. S. Lo.

Herbs, perennial, often prostrate and rooting on basal nodes, at apices ascending; stems densely villosulous. Petiole 0.3–1 cm; leaf blade drying papery, elliptic, narrowly elliptic, or lanceolate-elliptic, 2–8 × 1–4 cm, adaxially scaberulous to glabrescent, abaxially scaberulous, puberulent, or villosulous at least along veins, base obtuse to acute, apex acute; secondary veins 7–9 pairs; stipules caducous, strigillose to puberulent, 2–10 mm, deeply 2-lobed, lobes narrowly triangular to linear. Inflorescences cymose to paniculate, puberulent; peduncle 2–8 cm; principal axes dichasially branched 1 or 2 times, higher order axes scorpioid; bracts linear, 1–5 mm. Flowers subsessile. Calyx glabrous to puberulent; hypanthium portion obconic to oblanceoloid, 1.5–2 mm; limb ca. 1 mm, lobed nearly to base; lobes triangular. Corolla white, shortly tubular, outside glabrous; tube ca. 3.5 mm; lobes ca. 1 mm, smooth dorsally. Capsules linear-oblong to oblanceoloid, 4–4.5 × 1–1.7 mm, valves 4, becoming twisted.

Ravines in forests, rice fields at forest margins; 1200–1500 m. Guangxi, Guizhou, Xizang, Yunnan [Bhutan, Myanmar, N Vietnam].

See comments regarding the circumscription and recognition of this species under *Spiradiclis caespitosa*.

10. *Spiradiclis emeiensis* H. S. Lo, Acta Bot. Austro Sin. 1: 36. 1983.

峨嵋螺序草 e mei luo xu cao

Herbs, decumbent, rather fleshy, presumably perennial; stems densely pubescent. Petiole 1–4 cm, densely pubescent; leaf blade drying thinly papery, grayish green, ovate to elliptic, 4–9 × 2–4 cm, both surfaces sparsely pubescent or often densely so along abaxial veins, base cuneate then often decurrent, apex acute to obtuse; secondary veins 9–12 pairs; stipules persistent, deltoid, acuminate. Inflorescence cymose to subcapitate, villos; peduncle 0.1–0.5 cm; branched portion 1–2 cm, with axes dichasial; bracteoles subulate, 1.5–2 mm. Flowers subsessile. Calyx pilosulous to villous; hypanthium portion ellipsoid-cylindrical, ca. 1.5 mm; limb deeply lobed; lobes triangular-lanceolate, ca. 1 mm. Corolla white, urceolate-tubular, white villous outside; tube 3.5–4 mm; lobes lanceolate to elliptic, 2–2.5 mm. Capsules narrowly ellipsoid, ca. 6 × 3 mm, pilosulous to villos, valves 4, becoming slightly twisted. Fl. Jun, fr. Aug.

- Dense forests. Sichuan, Yunnan.

This species was described based on fruiting material; later H. S. Lo (Guihaia 11: 102. 1991) provided a detailed description of the inflorescences and flowers, which apparently represent the short-styled form of a distylous species.

- 1a. Infructescence 1–2 cm, subsessile; capsules villous 10a. var. *emeiensis*
- 1b. Infructescence ca. 3.5 cm; peduncles ca. 0.5 cm; capsules pilosulous 10b. var. *yunnanensis*

10a. *Spiradiclis emeiensis* var. *emeiensis*

峨嵋螺序草(原变种) e mei luo xu cao (yuan bian zhong)

Infructescence 1–2 cm, subsessile. Capsules villous.

- Dense forests. Sichuan (Emei Shan).

10b. *Spiradiclis emeiensis* var. *yunnanensis* H. S. Lo, *Guihaia* 11: 102. 1991.

河口螺序草 *he kou luo xu cao*

Infructescence ca. 3.5 cm; peduncles ca. 0.5 cm. Capsule pilosulous.

- Dense forests. Yunnan (Hekou).

11. *Spiradiclis ferruginea* D. Fang & D. H. Qin, *Bull. Bot. Res.*, Harbin 13: 334. 1993.

锈茎螺序草 *xiu jing luo xu cao*

Herbs, prostrate to ascending, 3–20 cm tall, presumably perennial; stems densely ferruginous pubescent. Petiole 0.5–5 cm, densely ferruginous pubescent; leaf blade drying papery, ovate, ovate-elliptic, or rarely elliptic, 3–12 × 1.5–5 cm and slightly anisophyllous, both surfaces densely pubescent, base rounded and sometimes inequilateral, apex acuminate or obtuse; secondary veins 8–15 pairs; stipules ovate-lanceolate, 8–10 mm, sparsely pubescent, ciliate. Inflorescence cymose, 7–10-flowered, densely pubescent; peduncle 3–6 cm; bracteoles lanceolate-linear, 5–7 mm; pedicels 1–7 mm. Flowers distylous, pedicellate. Calyx pubescent; hypanthium portion turbinate, ca. 1 mm; lobes narrowly lanceolate, unequal, one lobe ca. 5 mm, others ca. 4 mm, ciliate, with a gland in each sinus. Corolla pale purplish red, tubular-funnelform, outside and inside pubescent; tube ca. 16 mm; lobes ovate-triangular, ca. 3 mm. Capsules unknown. Fl. Mar.

- On calcareous rocks in forests; ca. 1200 m. Guangxi (Napo).

12. *Spiradiclis fusca* H. S. Lo, *Guihaia* 11: 100. 1991.

两广螺序草 *liang guang luo xu cao*

Herbs, 30–80 cm tall, perhaps perennial, perhaps ascending; stems glabrous, when dry brownish yellow. Petiole 0.5–1.5 cm; leaf blade drying thinly papery, adaxially grayish brown, abaxially brownish yellow, oblong-lanceolate to sub-elliptic, 4–9 × 1.5–3.5 cm, adaxially glabrous, abaxially pilose on principal veins, base cuneate and somewhat decurrent, apex acuminate or subacute; secondary veins 11–13 pairs; stipules triangular, 6–7 mm, long acuminate, usually 2-parted. Inflorescences paniculiform, many flowered, together with peduncles 7–10 cm, glabrous; bracteoles subulate or linear, 2–3 mm; pedicels short. Calyx glabrous; hypanthium portion obconic, ca. 1 mm; lobes sublanceolate, ca. 1.5 mm. Corolla white or pale purple, funnelform, glabrous outside; tube ca. 9 mm; lobes subtriangular, ca. 3 mm, apically rostrate-incurved. Capsules unknown. Fl. Mar.

- Limestone hills. Guangdong (Lianxian), Guangxi (Guilin).

The characters given in the protologue, in particular the proportional length of the calyx lobes to the corolla, do not seem to correspond to the figure of this species presented by H. S. Lo in *FRPS* (71(1): 102, t. 22, f. 6–10. 1999). This species was keyed by Lo in *FRPS* (loc. cit.: 87) as having pubescent stems and inflorescences, but the description (loc. cit.: 99–100) differed from that and so the species is here included in a different section of the key.

13. *Spiradiclis guangdongensis* H. S. Lo, *Acta Bot. Yunnan.* 9:

299. 1987.

广东螺序草 *guang dong luo xu cao*

Herbs, creeping, perhaps perennial, ascending at apices; stems sparsely to densely pubescent. Petiole 2–6 mm, pubescent; leaf blade drying papery, leaden to pale gray, cordiform-rounded to broadly ovate, 0.7–1.5(–1.8) × 0.5–1.2 cm, adaxially sparsely hirsute, abaxially usually glabrous or subglabrous, base cordulate to broadly obtuse, apex subacute; secondary veins 3–5 pairs; stipules deeply 2-lobed, glabrescent, lobes linear-subulate, 2–3 mm. Inflorescence 1–3-flowered, puberulent to pilosulous; peduncles short; bracteoles linear, ca. 1.7 mm; pedicels 1–2 mm. Flowers distylous, pedicellate. Calyx hispidulous to glabrescent; hypanthium portion obconic, ca. 1 mm; lobes oblong-lanceolate, ca. 2 mm, with gland in each sinus. Corolla white, slenderly funnelform, subglabrous outside; tube ca. 11 mm, in throat densely villous; lobes subovate, ca. 4 mm, sparsely pinnatinerved. Capsules subglobose-obconic, ca. 1.4 mm, persistent calyx lobes 3–4 mm, valves 4, straight. Fl. early spring.

- Dense forests, forest margins. Guangdong, Guangxi (Hechi).

As noted by H. S. Lo in the protologue, this species is very similar to *Ophiorrhiza exigua* and, in fact, was confused with it in the original description of that species.

14. *Spiradiclis hainanensis* H. S. Lo, *Acta Bot. Yunnan.* 9: 301. 1987.

海南螺序草 *hai nan luo xu cao*

Herbs, creeping, perhaps perennial, ascending at apices; stems densely villosulous. Petiole 0.1–0.5 mm, densely villosulous; leaf blade drying thinly papery, adaxially grayish black, abaxially pale gray, cordiform-orbicular to ovate, 0.6–1.3 × 0.6–0.9 cm, both surfaces hispidulous at least on principal veins to glabrescent, base cordulate to subtruncate, apex obtuse; secondary veins 3 or 4 pairs; stipules deciduous, narrowly triangular, 1.5–2.5 mm glabrescent. Inflorescences cymose, 2- or 3-flowered, glabrescent, dichasial; peduncle 6–7 mm. Flowers subsessile. Calyx densely villosulous (Hainan plants) to glabrescent (Yunnan plants); hypanthium portion subglobose to oblanceoloid, ca. 1.5 mm; lobes narrowly lanceolate, 1.2–1.5 mm. Corolla white, funnelform, outside glabrous; tube ca. 8 mm; lobes lanceolate, 1–1.5 mm. Immature capsules ellipsoid-ovoid, ca. 2 mm, dehiscence unknown. Fl. Jul, young fr. Oct.

- Dense evergreen forests; 2100–2600 m. Hainan (Sanya), Yunnan.

The description of the flowers and stipules here as well as the extension of the geographic range into Yunnan are taken from two specimens provisionally identified here as *Spiradiclis hainanensis*, *Li Heng* 12449 and 12511.

15. *Spiradiclis howii* H. S. Lo, *Bull. Bot. Res.*, Harbin 6(4): 41. 1986.

宽昭螺序草 *kuan zhao luo xu cao*

Herbs, ascending, perennial, or subshrubs; stems subglabrous to densely pilose. Petiole 0.6–1.5 cm, densely pubescent; leaf blade drying papery, adaxially grayish green, abaxially yellowish brown, lanceolate, ovate, subelliptic, or subelliptic-ob-

long, 2.5–6.5(–9) × 1–2(–3) cm, adaxially strigose-hirsute, below villous along principal veins, base obtuse to sometimes subrounded, apex acuminate and usually subfalcate; secondary veins 6–8(–10) pairs; stipules subulate-linear, 2–3 mm, acuminate. Inflorescence cymose, many flowered, densely pubescent; peduncle 1–2.5 cm; bracteoles linear-lanceolate, 2–2.5 mm; pedicels 1–2.5 mm. Flowers distylous, pedicellate. Calyx pilosulous; hypanthium portion subobconic, 0.7–0.8 mm; limb deeply lobed; lobes narrowly lanceolate, rigid, 3–5 mm, equal or slightly unequal. Corolla white becoming golden yellow when dry, subtubular, outside with 5 hispidulous or hirsutulous lines; tube 13.5–15.5 mm, inside with villous ring near middle and pubescent above and through throat; lobes triangular-ovate, ca. 1.5 mm, apically thickened-rostrate, dorsally narrowly winged. Capsules subglobose, 3.5–4 mm in diam., pilosulous, valves 4. Fl. Sep.

- Rocks in forests; 1400–1500 m. Yunnan.

16. *Spiradiclis laxiflora* W. L. Sha & X. X. Chen, Acta Bot. Austro Sin. 1: 35. 1983.

疏花螺序草 shu hua luo xu cao

Herbs, perennial, erect or ascending, 10–25 cm tall; stems glabrous. Petiole 3.5–5 cm, glabrous; leaf blade drying papery, adaxially green, abaxially pale, elliptic or obovate-elliptic, 10–15 × 3–5 cm, both surfaces glabrous, base acute and decurrent, apex acute to acuminate; secondary veins 9–11 pairs; stipules ovate-triangular, ca. 1 cm, 2-lobed, lobes aristate-acuminate. Inflorescences and flowers not seen. Infructescence paniculate, ca. 25 cm; peduncle ca. 7 cm; axes dichasially branched 1–3 times then scorpioid; bracteoles lanceolate or linear-lanceolate, 5–17 mm. Capsules ellipsoid, ca. 3 × 1.5 mm, glabrous. Fr. Jun.

- Sparse forests on limestone hills. Guangxi (Longzhou).

17. *Spiradiclis loana* R. J. Wang, Novon 12: 420. 2002.

猷瑞螺序草 xian rui luo xu cao

Herbs, erect, to 15 cm tall, acaulescent with leaves crowded at base; stems pubescent. Petiole 1–4.5 cm, pubescent; leaf blade oblanceolate, elliptic, or obovate, 6–12 × 1.2–3 cm, adaxially pilose to hispid, abaxially glabrous and pubescent, base acute to cuneate, apex acute to obtuse; secondary veins ca. 10 pairs; stipules persistent, triangular to deeply 2-lobed, segments 5–10 mm, pubescent. Inflorescences cymose, many flowered, pubescent; peduncle 6–10 cm; bracts linear, ca. 1 mm. Flowers distylous, subsessile. Calyx with hypanthium portion obconic, ca. 1 mm; lobes triangular, ca. 1 mm, acute. Corolla white, tubular-funnelform, puberulent outside; tube 5–10 mm, inside with villous ring at middle and sparsely strigillose above; lobes triangular, 1–1.2 mm, acute. Capsules subglobose, ca. 2 mm in diam., valves 4. Fl. Jul–Sep, fr. Aug–Oct.

- Forests on limestone mountains; 200–300 m. Guangxi.

18. *Spiradiclis longibracteata* S. Y. Liu & S. J. Wei, Acta Phytotax. Sin. 32: 362. 1994.

长苞螺序草 chang bao luo xu cao

Herbs, presumably perennial, decumbent in lower part and ascending above, sometimes subcaulescent with leaves clustered at base; stems densely villous. Petiole 6–22 mm; leaf

blade obovate-lanceolate or oblanceolate, 4–18 × 1–6 cm, adaxially sparsely pubescent, abaxially densely pilose along veins, base acute, apex rounded, obtuse, or acute; secondary veins 18–22(–29) pairs; stipules persistent, broadly ovate, 2- or 4-lobed. Inflorescence cymose, densely many flowered, pubescent; peduncles 7–15 cm; bracts linear-lanceolate, 10–15 mm. Flowers distylous. Calyx pubescent; hypanthium portion ca. 1.5 mm; lobes generally equal and 2–2.5 mm in long-styled form, unequal and 3–10 mm in short-styled form. Corolla purplish red, sparsely purplish red pubescent outside; tube 16–18 mm in long-styled form, ca. 22 mm in short-styled form, inside with villous ring near middle and another at base; lobes ovate. Capsules globose, 2.5–3 mm, pilose. Fl. Apr, fr. Aug–Oct.

- Wet places in forests. Guangxi.

The markedly differing sizes and forms of the calyx and corollas between the long-styled and short-styled flowers are notable.

19. *Spiradiclis longipedunculata* W. L. Sha & X. X. Chen, Acta Bot. Austro Sin. 1: 35. 1983.

长梗螺序草 chang geng luo xu cao

Herbs, unbranched, ascending, presumably perennial; stems glabrous. Petiole 3–6 cm, glabrous; leaf blade drying papery, adaxially dark green, and abaxially yellowish brown, obovate or oblong-elliptic, 9–16 × 4–7.5 cm, glabrous on both surfaces, base cuneate, apex acute; secondary veins 1–13 pairs; stipules suborbicular or triangular-orbicular, 8–15 × 5–10 mm, glabrous, cuspidate and 2-lobed, lobes 4–8 mm. Inflorescences cymose-paniculate, ca. 34 cm, many flowered, glabrous; peduncles 15–22 cm; bracts linear, ca. 4 mm. Calyx glabrous; hypanthium portion ovoid, ca. 1.5 mm; lobes ca. 0.3 mm. Corolla pale yellow, tubular, outside glabrous; tube ca. 4 mm, bearded in throat. Capsules unknown. Fl. Apr.

- Guangxi (Daxin).

20. *Spiradiclis longzhouensis* H. S. Lo, Guihaia 11: 99. 1991.

龙州螺序草 long zhou luo xu cao

Shrubs or perhaps subshrubs, robust; stems glabrous or sparsely pubescent. Leaves clustered on upper parts of stems; petiole 3–4.5 cm, turning black when dry; blade drying papery, olive-green, abaxially pale, elliptic or elliptic-oblong, 15–21 × 4–8.5 cm, glabrous, base usually decurrent, apex abruptly acuminate; secondary veins 16–23 pairs; stipules subovate, ca. 10 mm, parallel veined. Inflorescence and flowers not seen. Infructescence ca. 15 cm, lax; bracteoles linear, 3–5 mm; pedicels 5–10 mm. Capsules ellipsoid, ca. 3.5 × 1.7 mm, glabrous, persistent calyx lobes linear, 2–2.5 mm. Fr. Apr.

- On rocks in dense forests. Guangxi (Longzhou).

21. *Spiradiclis luochengensis* H. S. Lo & W. L. Sha, Acta Bot. Austro Sin. 1: 34. 1983.

桂北螺序草 gui bei luo xu cao

Herbs, 20 cm or taller, presumably perennial, sometimes subcaulescent with leaves grouped at base; stems glabrous. Petiole 1–4 cm, glabrous, reddish brown when dry; leaf blade drying papery, broadly obovate, 5–11 × 3–4.5 cm, both surfaces glabrous, base obtuse then decurrent, apex acute, obtuse, or rounded; secondary veins 7–9 pairs; stipules long triangular,

glabrous, acuminate. Inflorescences cymose, many branched, many flowered, glabrous; peduncles slender, 7–10 cm; pedicels short. Calyx purple, glabrous; hypanthium portion ca. 0.5 mm; lobes triangular-ovate, ca. 1 mm. Corolla white becoming orange when dry, tubular-funnelform, outside glabrous; tube ca. 5 mm; lobes lanceolate-oblong, 2–2.5 mm. Capsules ovoid-globose, ca. 3 mm, valves 4. Fl. and fr. Apr–Jun.

- Shady places at streamsides. Guangxi.

22. *Spiradiclis malipoensis* H. S. Lo, Guihaia 11: 98. 1991.

滇南螺序草 dian nan luo xu cao

Herbs, presumably perennial, 20–25 cm tall, decumbent and rooting at base but ascending in upper parts; stems with 2 lines of dense hispidulous hairs. Petiole 0.5–1 cm, glabrous; leaf blade drying papery, olive-green, lanceolate-oblong or ovate-elliptic, 4.5–8 × 1.5–3.5 cm, glabrous, base cuneate to obtuse and shortly decurrent, apex obtuse then abruptly acuminate; secondary veins 10 or 11 pairs; stipules lanceolate-linear or linear, 5–8 mm, acuminate. Inflorescences and flowers not seen. Infructescences cymose, 2.5–3 cm, glabrescent; peduncle ca. 1 cm; pedicels 3–4 mm. Capsules white, ellipsoid, 5.5–6 mm, glabrous, valves 4, becoming slightly twisted. Fr. Nov–Dec.

- Dense forests; ca. 1100 m. Yunnan (Malipo).

23. *Spiradiclis “microcarpa”* H. S. Lo, Bull. Bot. Res., Harbin 18: 276. 1998.

小果螺序草 xiao guo luo xu cao

Herbs, apparently ascending, presumably perennial, often turning yellow when dry; stems glabrous. Petiole 3–4.5 cm, glabrous; leaf blade drying papery, adaxially leaden gray, obovate or elliptic-obovate, 5–8 × 3–4 cm, both surfaces glabrous, base obtuse then decurrent, apex obtuse to acute; secondary veins 6 or 7 pairs; stipules persistent, triangular to lanceolate, ca. 4 mm, glabrous, obtuse to acute. Inflorescences and flowers not seen. Infructescence paniculate, glabrous, branched dichasially to several orders; peduncle ca. 10 cm; branched portion ca. 4 cm; bracts narrowly triangular, 2–5 mm. Capsules subsessile, linear-oblong to oblanceoloid, ca. 2 × 0.5–0.6 mm, glabrous or puberulent, valves 4, becoming twisted. Fr. Jul.

- Shady places on limestone hills; ca. 100 m. Guangxi (Daxin).

The name *Spiradiclis “microcarpa”* was not validly published by H. S. Lo (loc. cit.) because what should have been the indication of type merely cited “Guangxi: Daxin, circ. 100 m alt[.], non collecolector [sic!] s. n.” without using the word “holotype” or “type” or an equivalent and without specifying the herbarium in which the type was conserved (*Vienna Code*, Art. 37.6 and 37.7). It has not been possible to locate a specimen from the gathering cited by Lo.

24. *Spiradiclis microphylla* H. S. Lo, Acta Bot. Austro Sin. 1: 34. 1983.

小叶螺序草 xiao ye luo xu cao

Herbs, ascending, presumably perennial; stems pubescent. Petiole 0.4–1 cm, pubescent; leaf blade drying thinly papery, brown, ovate, 1–3 × 0.5–1.4 cm, glabrous or pilose on both surfaces, base obtuse then decurrent, apex obtuse to acute; secondary veins 4–7 pairs; stipules subulate-lanceolate, acuminate or

caudate-acuminate. Inflorescences cymose, several flowered, with axes scorpioid; peduncles 2–5 cm; bracts lanceolate or subulate-lanceolate, 1–2 mm. Calyx pilose to puberulent; hypanthium portion ca. 0.8 mm; limb deeply lobed; lobes ca. 0.7 mm. Corolla white, shortly tubular, ca. 2.5 mm; lobes ovate-triangular, carinate on dorsal surface. Capsules subglobose, valves 4. Fl. Sep–Oct.

- Sparse forests. Jiangxi (Longnan).

This species was keyed by H. S. Lo (in FRPS 71(1): 88. 1999) based on its glabrous stems and inflorescences, but the description (loc. cit.: 101) reported it as pubescent. The key here is adjusted accordingly.

25. *Spiradiclis napoensis* D. Fang & Z. M. Xie, Acta Phytotax. Sin. 40: 154. 2002.

那坡螺序草 na po luo xu cao

Herbs, ca. 65 cm tall, presumably perennial, procumbent at base, ascending above; stems moderately to densely curved pubescent. Leaves somewhat anisophyllous and clustered near top of stem; petiole 0.7–2 cm, densely curved pubescent; blade drying thinly papery to submembranous, adaxially dark green, abaxially pale, narrowly ovate to broadly ovate, 4–7 × 1.5–3.5 cm, adaxially pilosulous to glabrescent, abaxially glabrescent or curved pubescent along principal veins, base rounded to obtuse then decurrent, apex acuminate; secondary veins 8–10 pairs; stipules linear-subulate, 2–8 mm, glabrous, 2-lobed, lobes ca. 1 mm. Inflorescences cymose, 8–10-flowered, densely curved pubescent; peduncles 0.3–0.5 cm; axes 1–4 mm, puberulent; bracteoles linear, 6–10 mm, glabrous. Flowers distylous. Calyx puberulent to glabrescent; hypanthium portion ellipsoid, ca. 2 mm; limb deeply lobed; lobes narrowly triangular, ca. 2.5 mm, with a gland in each sinus. Corolla in bud white tinged with pink, subtubular, glabrous outside; tube ca. 12 mm, inside villous in throat; lobes subovate, ca. 5 mm, acute. Capsules unknown. Fl. Apr–May.

- Forests in valleys of limestone hills; ca. 1000 m. Guangxi (Napo).

Details of the long-styled and short-styled flowers are given in the protologue.

26. *Spiradiclis oblanceolata* W. L. Sha & X. X. Chen, Acta Bot. Austro Sin. 1: 35. 1983.

长叶螺序草 chang ye luo xu cao

Herbs, erect, unbranched, 13–25 cm tall, presumably perennial; stems glabrous. Petiole 3–5 cm, glabrous; leaf blade drying papery, oblanceolate or narrowly elliptic-oblong, 7–17 × 2–4 cm, glabrous on both surfaces, base cuneate, apex acute; secondary veins 9–12 pairs; stipules long triangular, ca. 8 mm, glabrous, 2-lobed, lobes ca. 3 mm. Inflorescences paniculate, many flowered, ca. 20 cm, glabrous; peduncles 9–11 cm; bracts linear, ca. 3 mm. Calyx with hypanthium portion ovoid, ca. 2 mm. Corolla white, outside glabrous; tube ca. 5 mm, bearded in throat. Capsules ovoid, ca. 2 mm, glabrous. Fl. and fr. Apr–Jun.

- Rocks in forests. Guangxi.

27. *Spiradiclis petrophila* H. S. Lo, Acta Bot. Austro Sin. 1: 33. 1983.

石生螺序草 shi sheng luo xu cao

Herbs, to 30 cm tall, apparently perennial, often procumbent at base, ascending above; stems densely pilosulous to tomentulose. Petiole 0.5–1.5 cm, densely pilosulous to tomentulose; leaf blade drying papery, ovate-elliptic to elliptic, 3–5 × 1.5–3 cm, densely tomentulose to pilosulous on both surfaces, base cuneate then decurrent, usually slightly inequilateral, apex acute; secondary veins ca. 9 pairs; stipules caducous, triangular, 1.5–2 mm, puberulent to glabrescent, acute and sometimes erose. Inflorescences paniculate, many flowered, densely pilosulous to tomentulose; peduncles slender, 3.5–6.5 cm; axes distally scorpioid, 1–1.5 cm; bracts narrowly triangular, 0.3–0.8 mm. Flowers sessile or subsessile, distylous. Calyx densely puberulent to hispidulous; hypanthium portion ellipsoid to obconic, ca. 0.8 mm; lobes triangular, ca. 0.3 mm. Corolla white, tubular, outside puberulent to glabrescent; tube ca. 2 mm; lobes triangular, ca. 1 mm, dorsally keeled, apically rostrate-inflexed. Capsules subglobose to obovoid, ca. 2 mm, somewhat flattened laterally, valves 2 then tardily splitting into 4. Fl. Sep, fr. Dec.

- On limestone rocks and dripping cliffs. Guangdong (Yangchun).

28. *Spiradiclis purpureocaerulea* H. S. Lo, Bull. Bot. Res., Harbin 6(4): 39. 1986.

紫花螺序草 zi hua luo xu cao

Herbs, presumably perennial; stems densely brown pubescent. Leaves subsessile; blade drying papery, adaxially black, abaxially pale, ovate, 3–6.5 × 1.5–3 cm, adaxially densely strigose-hispidulous, abaxially densely pubescent, base rounded or obtuse, apex obtuse; secondary veins 7–10 pairs; stipules subulate, 2–3 mm, pubescent, caudate-acuminate. Inflorescence congested-cymose, 1.5–3 cm, densely pubescent; peduncles short. Calyx pubescent; hypanthium portion obconic-globose, ca. 2 mm; lobes narrowly lanceolate, 4–4.5 mm, acuminate. Corolla bluish purple, slenderly salverform; tube 19–21 mm; lobes subovate, ca. 6 mm, obtuse. Capsules subglobose, 4–4.5 mm in diam., pubescent, valves 4. Fl. Aug.

- On rocks at roadsides. Guangxi (Longzhou).

29. *Spiradiclis rubescens* H. S. Lo, Guihaia 11: 101. 1991.

红叶螺序草 hong ye luo xu cao

Herbs, apparently ascending, low, ca. 6 cm tall, perhaps annual; stems subglabrous, drying purplish black. Leaf blade drying papery, purplish red, elliptic-oblong or oblong-ovate, 4–6 × 2–2.3 cm, glabrous on both surfaces, base obtuse, margins ciliate, apex acute to obtuse; secondary veins 9–11 pairs; stipules triangular to broadly ovate, 4–5 mm, caudate-acuminate. Inflorescence cymose, 3–5-flowered; bracteoles linear, 4–6 mm, sparsely ciliate; pedicels short. Calyx glabrous; hypanthium portion obovoid, ca. 2 mm; lobes narrowly lanceolate, unequal, larger 4–4.5 mm, smaller ca. 3.5 mm, acuminate, ciliate, with gland in each sinus. Corolla red, slenderly salverform-funnel-form, outside glabrous, strongly 5-ribbed; tube ca. 21 mm; lobes ovate, ca. 3.5 mm. Capsules unknown. Fl. Jun.

- On rocks in shady places. Guangxi (Tiandong).

This species is noted for its reddened color when dry.

30. *Spiradiclis scabrida* D. Fang & D. H. Qin, Bull. Bot. Res., Harbin 13: 333. 1993.

糙边螺序草 cao bian luo xu cao

Herbs, perhaps perennial, 40–50 cm tall, rooting near base, apices apparently ascending; stems pubescent to glabrescent. Leaves often slightly anisophyllous; petiole 0.2–0.5 cm, glabrous or usually pubescent; blade drying papery, adaxially olive-green, abaxially yellowish green, ovate, narrowly ovate, or lanceolate, 2–9 × 1–3.3 cm, glabrous or occasionally sparsely strigillose or scabridulous at least on principal veins, base obtuse, apex acuminate; secondary veins 6–9 pairs; stipules caducous to persistent, subtriangular, 0.7–1 mm, subglabrous, acute. Inflorescence corymbose-cymose, 3–24-flowered, pubescent, puberulent, or glabrescent; peduncle 0.6–2.7 cm; bracteoles linear, 2–5 mm; pedicels to 2 mm. Flowers sessile to pedicellate. Calyx puberulent; hypanthium portion obovate, 1–1.5 mm; limb deeply lobed; lobes ovate-lanceolate, 1–1.5 mm, slightly unequal, with gland in each sinus. Corolla white sometimes flushed with pink or purple, slenderly salverform-funnel-form, glabrous inside and outside; tube 25–26 mm; lobes ovate, ca. 3.5 mm. Capsules subglobose, 3–4 mm in diam., glabrescent, valves 4. Fl. Dec, fr. Mar–Apr.

- On rocks in forests; 800–1200 m. Guangxi (Napo).

31. *Spiradiclis spathulata* X. X. Chen & C. C. Huang, Guihaia 13: 3. 1993.

匙叶螺序草 chi ye luo xu cao

Herbs, low, erect, perhaps perennial, usually reduced or acaulescent with leaves clustered at base. Petiole 5–8 mm; leaf blade drying papery, adaxially olive-green, abaxially pale, spatulate or obovate-ob lanceolate, 8–13 × 2–4.5 cm, adaxially sparsely pubescent, abaxially densely pubescent at least along principal veins, base acute to cuneate and usually decurrent, apex obtuse to rounded; secondary veins 15–25 pairs; stipules lanceolate-linear or linear, 7–9 mm, densely villosulous. Inflorescences cymose, 10- to many flowered, pubescent; peduncle 7–12 cm; bracteoles linear-lanceolate, 3–4 mm; pedicels 2–3 mm. Calyx pubescent; hypanthium obconic, 1.5–2 mm; limb deeply lobed; lobes narrowly lanceolate, 1–1.3 mm. Corolla purplish red, slenderly salverform, puberulent outside; tube 15–25 mm, inside with villous ring at middle; lobes subovate, 4–6 mm. Capsules unknown. Fl. May.

- On rocks in shady places. Guangxi (Ningming).

32. *Spiradiclis tomentosa* D. Fang & D. H. Qin, Bull. Bot. Res., Harbin 13: 330. 1993.

粘毛螺序草 nian mao luo xu cao

Herbs, erect, 3–23 cm tall, presumably perennial, acaulescent with leaves clustered at base; stems densely gray-viscid multicellular tomentose. Leaves slightly anisophyllous; petiole 0.5–4.5 cm, densely tomentose; blade drying thinly papery, oblanceolate, obovate, or rarely elliptic, 3.5–14 × 1.5–5 cm, both surfaces densely tomentose, base acute, apex cuspidate to rounded; secondary veins 7–10 pairs; stipules persistent, triangular, 8–22 mm, tomentose, narrowed to subulate acuminate

apex. Inflorescences paniculiform, 8- to many flowered, tomentose; peduncles 4.5–18 cm; bracts linear, 3–7 mm; pedicels 1–5 mm. Calyx tomentose; hypanthium portion turbinate, ca. 1 mm; lobes linear, 1.5–2 mm. Corolla white, subfunnelform, outside sparsely pubescent; tube 6–8 mm, glabrous inside; lobes ovate, 2–3 mm. Capsules subglobose, ca. 2 mm in diam., valves 4, persistent calyx lobes 3.5–4 mm. Fl. Apr, fr. Jun.

- Limestone caverns; ca. 500 m. Guangxi (Fengshan).

H. S. Lo (in FRPS 71(1): 99. 1999) described the leaves as cuspidate at apex, but the corresponding figure (p. 103, t. 23, f. 7) showed the leaves to be apically rounded.

33. *Spiradiclis umbelliformis* H. S. Lo, Bull. Bot. Res., Harbin 6(4): 36. 1986.

伞花螺序草 san hua luo xu cao

Herbs, perhaps perennial, creeping or with upper parts perhaps ascending; stems densely reddish brown multicellular villosulous. Petiole 1–3 cm, reddish brown villosulous; leaf blade drying papery, adaxially olive-green, abaxially pale, ovate-orbicular, 1.5–4 × 1–3 cm, adaxially glabrescent, abaxially pilosulous to pilose at least along principal veins, base cordulate to truncate and usually decurrent, apex obtuse to rounded; secondary veins 4–6 pairs; stipules persistent, pilosulous to glabrescent, deeply 2-parted, lobes linear, to 10 mm. Inflorescences cymose, umbelliform to subcapitate, 4–10-flowered, puberulent, pilosulous, or villosulous; peduncles 2–7 cm; bracts narrowly triangular. Flowers subsessile, distylous. Calyx subglabrous; hypanthium portion turbinate to subglobose, ca. 1.5 mm; lobes ovate-triangular, ca. 0.6 mm, usually with gland in sinus. Corolla white to pale purplish red, funnelform to tubular-funnelform, glabrous outside; tube 17–18 mm, with villous ring above base inside; lobes ovate, ca. 6 mm. Capsules subglobose, 3–3.5 mm in diam., glabrescent, valves 4, flat. Fl. Apr.

- Rock crevices in forests, on limestone. Guangdong (Ruyuan), Guangxi.

34. *Spiradiclis villosa* X. X. Chen & W. L. Sha, Bull. Bot. Res., Harbin 11(3): 17. 1991.

毛螺序草 mao luo xu cao

Herbs, 30–50 cm tall, perennial, procumbent and rooting below, perhaps upper parts ascending; stems densely dark brown villous. Petiole 3.5–7 cm, densely villous; leaf blade drying membranous, oblong-elliptic or obovate-elliptic, 10–25 × 3–8 cm, adaxially dark brown pubescent, abaxially densely brown villous, base cuneate or acute, apex acute or shortly acuminate; secondary veins 14–16 pairs; stipules 2-lobed, densely dark brown villous, lobes lacinate, 15–30 mm. Inflorescences and flowers not seen. Infructescences cymose-paniculate, many flowered, densely dark brown villous; peduncles to 27 cm. Young capsules ovoid, ca. 2 mm, villous, with calyx lobes ca. 4 mm, dehiscence unknown. Young fr. Jul.

- On rocks in forests. Guangxi (Longzhou).

H. S. Lo (in FRPS 71(1): 101. 1999) described the stipules as to 30 mm, a relatively large size.

35. *Spiradiclis xizangensis* H. S. Lo, Bull. Bot. Res., Harbin 6(4): 43. 1986.

西藏螺序草 xi zang luo xu cao

Herbs, perhaps perennial, procumbent near base, ascending in upper parts; stems densely pubescent, drying purplish brown. Petiole 1–2 cm, densely pubescent; leaf blade drying thinly papery, leaden gray with veins dark purple abaxially, ovate, 3.5–6 × 1.5–3.2 cm, adaxially glabrescent except pubescent along midrib, abaxially pubescent along principal veins, base obtuse or subrounded, apex acute or slightly obtuse; secondary veins ca. 7 pairs; stipules sublanceolate, 2–2.5 mm, subglabrous, often reflexed. Inflorescence cymose, 4–6-flowered; peduncle ca. 1 cm; bracteoles linear-lanceolate, ca. 7 mm; pedicels 2–5 mm. Calyx densely pubescent; hypanthium portion subellipsoid, ca. 1.8 mm; lobes narrowly lanceolate, unequal, larger one ca. 2 mm, smaller ones ca. 1.6 mm. Corolla slenderly salverform-subfunnelform, outside pubescent; tube ca. 17 mm, glabrescent inside; lobes triangular, ca. 3 mm. Capsules unknown. Fl. May.

- Dense forests; 1800–2100 m. Xizang (Mêdog).

Fl. China 19: 330–339. 2011.