

Spiradiclis pauciflora (Rubiaceae), a new species from limestone areas in Guangxi, China

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A new species, *Spiradiclis pauciflora* L. Wu & Q.R. Liu, from Guangxi, China, is described and illustrated. It resembles *S. guangdongensis*, but can be distinguished from the latter by several distinct characters in stipules, bracts, calyx, and corolla.

Spiradiclis (Rubiaceae) is a genus consisting of approximately 40 annual or perennial herbaceous species (Chen & Taylor 2011, Deng *et al.* 2014), of which 35 are endemic to China. Species of *Spiradiclis* mainly grow in limestone areas and the center of diversity ranges from southern and southwestern China and northern India (Lo *et al.* 1983, Deb & Rout 1989, Liu & Wei 1994, Chen 1988, Lo 1998, 1999, Wang 2002, Ma *et al.* 2005, Chen & Taylor 2011, Deng *et al.* 2014, Wu *et al.* 2015). The genus appears closely related to *Ophiorrhiza*, both of them placed in the tribe Ophiorrhizeae based on morphological characters (Bremekamp 1952, Verdcourt 1958, Robbrecht 1988) and molecular data (Andersson & Rova 1999, Bremer & Manen 2000, Persson 2000, Dessein *et al.* 2005, Robbrecht & Manen 2006, Rydin *et al.* 2009, Maurin *et al.* 2007, Bremer 2009, Kainulainen 2010, Wikström *et al.* 2013). Rydin *et al.* (2009) further queried the separation of these two genera based on molecular data. However, *Spiradiclis* can be distinguished from *Ophiorrhiza* by the linear-oblong or subglobose capsules with two or four valves when mature *vs.* obcordate and compressed capsules with two valves when mature

(Bremekamp, 1952, Lo *et al.* 1983, Robbrecht 1988, Wang 2002, Chen & Taylor 2011).

During a study of *Ophiorrhiza*, we found that a specimen (Jin-Yu Luo & Zhen-Ze Wu 19855, cited below) of *O. nigricans*, marked ‘Paratype’, is morphologically different from all other types of the name. The differences are mainly in the shape of corolla and leaf. After reviewing relevant literature, it also became apparent that it matched none of the presently recognized *Ophiorrhiza* species from China. Subsequently, we carried out a field investigation at the locality in May 2013, and both flowers and fruits were observed. We confirmed this “*Ophiorrhiza*”-like species actually belongs to *Spiradiclis* because of the globose capsules with four valves after dehiscence. After a careful study of the available literature, herbarium material and living plants in the wild, it turned out we had an undescribed species at hand.

***Spiradiclis pauciflora* L. Wu & Q.R. Liu, sp. nova** (Figs. 1 and 2)

TYPE: China. Guangxi: Leye County, Huaping town, Baiyantuo village, under dense forests on limestone hill slopes, alt.

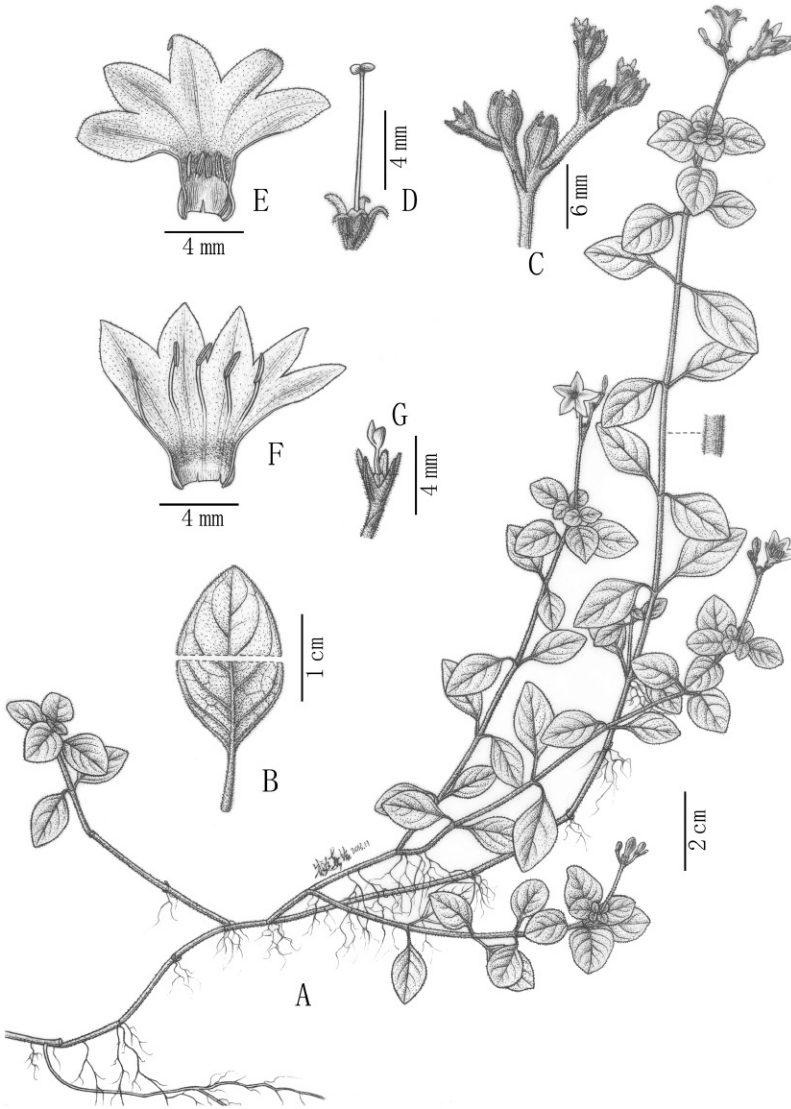


Fig. 1. *Spiradiclis pauciflora* (drawn by Y.X. Zhu from the holotype). — **A:** Habit. — **B:** Detail of leaf blade. — **C:** Infructescence. — **D and E:** Long-styled flower opened to show floral parts. — **F and G:** Short-styled flower opened to show floral parts.

1070 m a.s.l., 17 May 2013 (fl. & fr.) *L. Wu 3740* (holotype BNU; isotype PE). — **PARATYPES:** China. Guangxi, Leye County, Leye National Natural Reserve, in an limestone cave, 1030 m a.s.l., 18 May 2013 (fl. & fr.) *L. Wu 3743* (BNU); same locality as type, 18 May 2013 (fl. & fr.) *L. Wu 3750* (BNU); same county as type, Huaping town, under dense forests on limestone hill slopes, alt. 1100 m a.s.l., 18 May 1984 (fl.) *Jin-Yu Luo & Zhen-Ze Wu 19855* (GXMI); same county as type, Huaping town, in limestone crevice under dense forests, alt. 900 m a.s.l., 26 April 2007 (fl.) *Ke-Jian Yan 73932* (GXMI).

ETYMOLOGY: The specific epithet is derived from the fact that there are few flowers in the plants.

Herbs to 10 cm tall, perhaps perennial, creeping or with upper parts ascending; stems densely

reddish brown or sometimes white pubescent. Petiole 0.3–1 cm, densely pubescent; leaf blade drying papery, adaxially olive-green, abaxially pale or sometime purplish red, ovate to elliptic-ovate, rarely orbicular, 0.5–2 × 0.5–1.5 cm wide, both surfaces pubescent, abaxial principal veins densely pubescent, base obtuse to broadly cuneate, apex obtuse to acute; secondary veins 3–4 pairs; stipules small, triangular, less than 1 mm, densely pubescent. Inflorescence cymose, generally 3–7-flowered, sometimes up to 9-flowered, densely reddish brown pubescent; peduncles short, 1–3 cm long; bracts narrowly lanceolate, 1–2.5 mm long, densely pubescent; pedi-

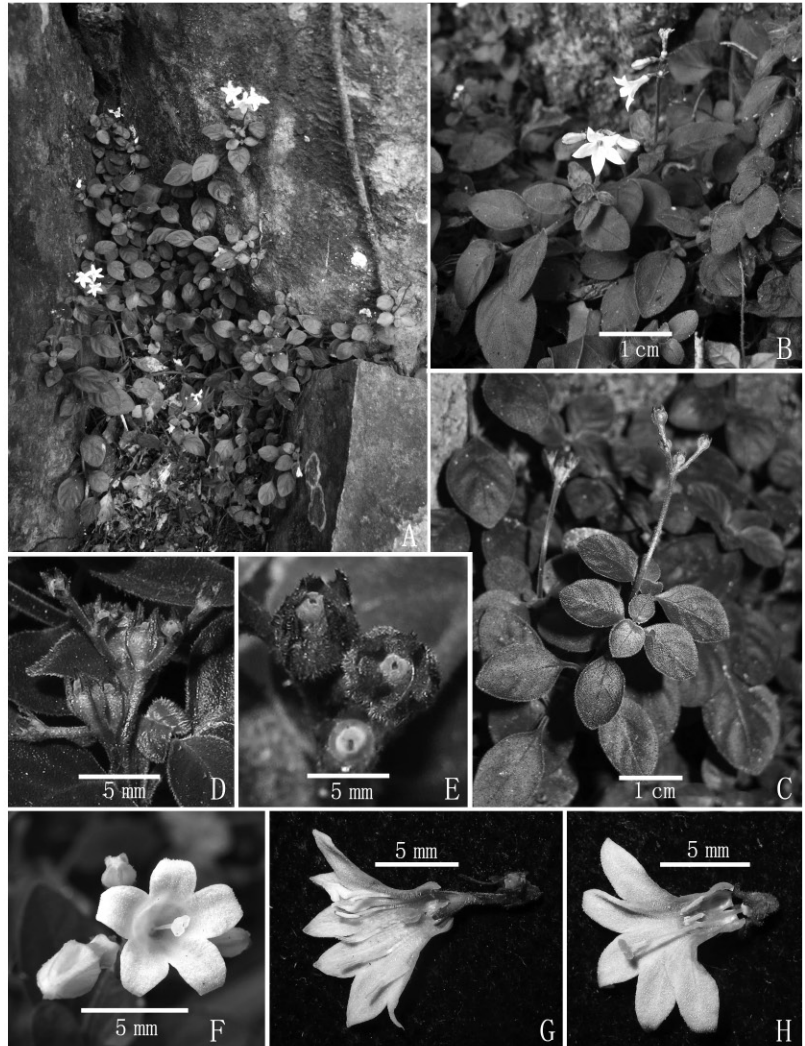


Fig. 2. *Spiradiclis pauciflora* (photograph by L. Wu). — **A:** Habitat. — **B:** Habit, with inflorescence. — **C:** Habit, with infructescence. — **D:** Fruit in lateral view. — **E:** Placenta in face view. — **F:** Flowers in face view. — **G:** Short-styled flower opened to show floral parts. — **H:** Long-styled flower opened to show floral parts.

cels 0.3–3 mm long. Flowers distylous. Calyx densely reddish brown pubescent; hypanthium portion obconic, 0.9–1.2 mm long; lobes equal, ovate-triangular, 1.2–1.6 mm long, with gland in each sinus. Corolla white to pale purplish red, funnellform, base symmetrically swollen, subglabrous outside and longitudinally ridged; tube ca. 7–9 mm long; lobes ovate-triangular, 2.5–3 mm long. Stamens 5; anthers oblong-linear, dorsifixed, 1–1.2 mm long. Stigmas bilobed. Long-styled flowers: corolla tube inside with a pubescent ring of long hairs near middle and densely scaly pubescent above middle and onto lobes; stamens inserted near base of tube, filaments ca. 0.2 mm long; styles 7.5–8.5 mm, stigma lobes

elliptic, ca. 0.5 mm. Short-styled flowers: corolla tube inside densely pubescent near middle and densely scaly pubescent above middle and onto lobes; stamens inserted at middle of tube, filaments 1.8–2.2 mm long; styles 2.7–3.0 mm, stigma lobes triangular, ca. 0.9–1.1 mm. Capsules subglobose, ca. 2 mm long, calyx persistent, valves 4, straight. Seed numerous, granulate, 0.29–0.34 mm long. Flowering from late March to early June, fruiting May to August.

DISTRIBUTION AND HABITAT: *Spiradiclis pauciflora* generally grows in humid places in dense evergreen broad-leaved forest on limestone hill slopes. Sometimes it is found in limestone caves at the altitude of 900–1300 m a.s.l. To date, it is

Table 1. Morphological comparison of *Spiradiclis pauciflora* and *S. guangdongensis*.

	<i>S. pauciflora</i>	<i>S. guangdongensis</i>
Leaf blade	abaxially pubescent	usually glabrous or subglabrous
Stipules	less than 1 mm, triangular, densely pubescent	deeply 2-lobed, 2–3 mm, glabrescent, lobes linear-subulate
Inflorescence	3–7-flowered	1–3-flowered
Bracts	densely pubescent	subglabrous
Calyx lobes	ovate-triangular, 1.2–1.6 mm long	oblong-lanceolate, ca. 2 mm long
Corolla		
shape	funnelform, base slightly enlarged	slenderly funnelform, base not enlarged
tube	ca. 7–9 mm long, inside with a pubescent ring of long hairs near middle and densely scaly pubescent above middle and onto lobes in long-styled form, densely pubescent near middle and densely scaly pubescent above middle and onto lobes in short-styled form	ca. 11 mm long, throat densely villous
lobes	ovate-triangular, 2.5–3 mm long	subovate, ca. 4 mm long
Capsules	ca. 2 mm long	1.4 mm long

only known from Leye County, Guangxi, China. Despite the narrow distribution area known so far, the populations were vigorous and the habitats are being well protected by the local authorities.

Spiradiclis pauciflora is placed in the subgenus *Sinospiradiclis* because of its subglobose capsules and untwisted valves. It is most similar to *S. guangdongensis*, the main shared characters including a creeping stem and small leaves of similar shape. However, there are several differences (Table 1).

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