



Crepidomanes shenzhenense (subg. *Crepidomanes*; Hymenophyllaceae), a new filmy fern species from Guangdong, southern China

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Abstract

A new filmy fern, *Crepidomanes shenzhenense* (Hymenophyllaceae) is described from Shenzhen, Guangdong, southern China. *Crepidomanes shenzhenense* is a tiny fern characterized by having a broadly obovate lamina only with internal false veinlets and crenate to dissected margins of involucre lips. The new species is presently known from two localities in Shenzhen. The distinctiveness between the new species and three relatives, *C. parvifolium*, *C. megistostomum* and *C. latealatum* complex, are presented in detail.

Keywords: Endangered species, filmy ferns, southern China

Introduction

Filmy fern family, Hymenophyllaceae, is the most diverse basal lineage of polypodiidae ferns which comprises ca. 600 species (Dubuisson *et al.* 2003). Plants of this family are easily distinguished by very thin (usually single-cell-thick) lamina of fronds and are usually small. The monophyly of the family has been proved with morphological and molecular studies (Hennequin 2003, Hennequin *et al.* 2003, Pryer 2004, Smith *et al.* 2006). Traditionally, two large genera have been recognized in this family on the basis of their soral involucre: *Hymenophyllum* Smith (1793: 418) with bivalved involucre and *Trichomanes* Linnaeus (1753: 1097) with tubular involucre, respectively (Christensen 1905–1906). Copeland (1938) split the family into 34 genera based on his study of Asian members and his scheme has also been adopted by several scholars on their floristic works of Asia (Copeland 1958; Ching 1959; Nakaike 1975; Tagawa & Iwatsuki 1979; Parris 1992). On the other hand, Morton (1968) recognized six genera in the family, including two traditional large genera in the family with several subgenera, sections and subsections, and four monotypic genera. The most recent classification of Hymenophyllaceae was proposed by Ebihara *et al.* (2006) based on morphological, molecular-phylogenetic and chromosomal studies. In this scheme, *Hymenophyllum s.l.* was conserved as a single genus, *Hymenophyllum* and *Trichomanes s.l.* were split into eight genera. Herein, we followed his classification.

According to Ebihara *et al.* (2006), *Crepidomanes* (C. Presl 1851: 618) C. Presl (1849: 258) comprises more than 30 species throughout the Old World tropics to northern temperate regions. Plants of this genus are mainly characterized with lack of roots or replaced by root-like shoots, long-creeping rhizomes covered with dark short hairs, lamina often with submarginal false veinlets and/or internal false veinlets, rare lacking, soral involucre tubular, involucre lips usually bilabiate, sometimes dilate. The genus *Crepidomanes* in China comprise 11 species (Lee *et al.* 2003; Knapp 2011; Liu *et al.* 2013), and most of them distributed in southeastern, southern and southwestern China.

From 2017 to 2018, we collected two specimens of *Crepidomanes* from Mt. Yangtaishan and Mt. Wutongshan, Shenzhen. These plants grew on wet granitic rocks under shaded evergreen forest. Their habits are dwarf, the lamina lacks submarginal false veinlets but have internal false veinlets, and the apex of ultimate segments is retuse and lips

of involucre are dissected. As this species does not match any existing species of *Crepidomanes* (Holttum 1954, Tagawa *et al.* 1979, Lee *et al.* 2003, Ebihara 2008, Knapp 2011, Liu *et al.* 2013), it is described here as a species new to science.

Taxonomy

Crepidomanes shenzhenense Wang Hui & X. Yun Wang, *sp. nov.* (Figs. 1 & 2).

Type:—CHINA. Guangdong Province: Shenzhen City, Mt. Yangtaishan, 22°39'7"–26" N, 113°57'16"–24" E, elev. ca. 530 m, well shaded evergreen forest, on granitic rock, by stream in humid, 7 January 2017, Zhao Guo-hua, Wang Xiao-yun & Xu Ting 1701006 (holotype SZG-00109026!; isotypes KUN!, MO!, PE!, SZG00109002!, SZG00109027!, SZG00109028!).

Diagnosis:—*Crepidomanes shenzhenense* resembles *C. latealatum* (van den Bosch 1863: 138) Copeland (1938: 60) but differs from the latter in having broadly obovate (vs. ovate to oblong or triangular) lamina, 1–4 (vs. 5–12) pairs of pinnae, involucre lips margin crenate to dissected (vs. entire), and sori only borne on the long acroscopic (vs. short acroscopic) segment .

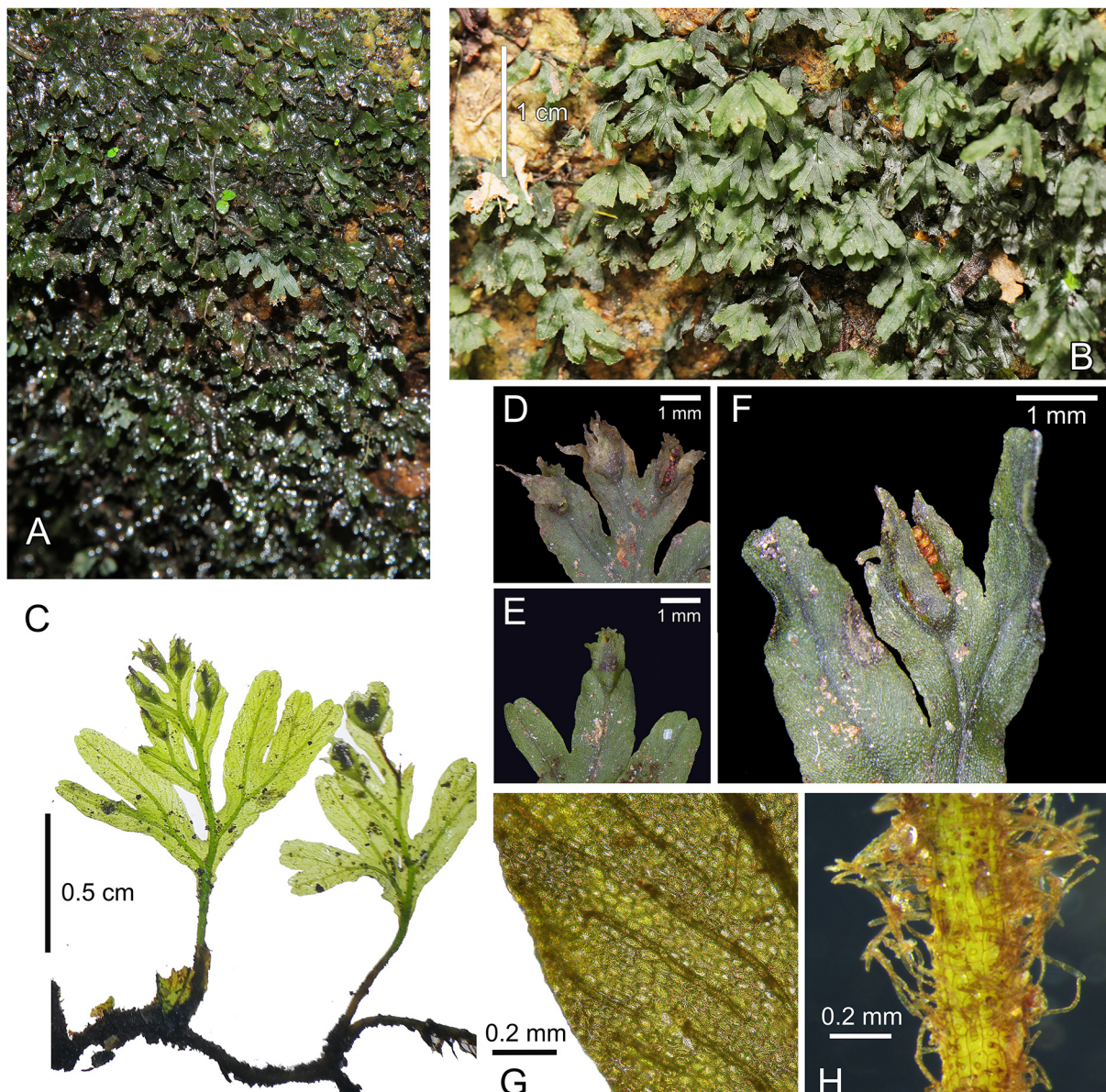


FIGURE 1. *Crepidomanes shenzhenense*.—A–B. Habits of the new species *in situ*.—C. Fronds with sori.—D–F. Sori from different individuals.—F. Internal false veinlets.—H. Portion of stipe showing hairs.

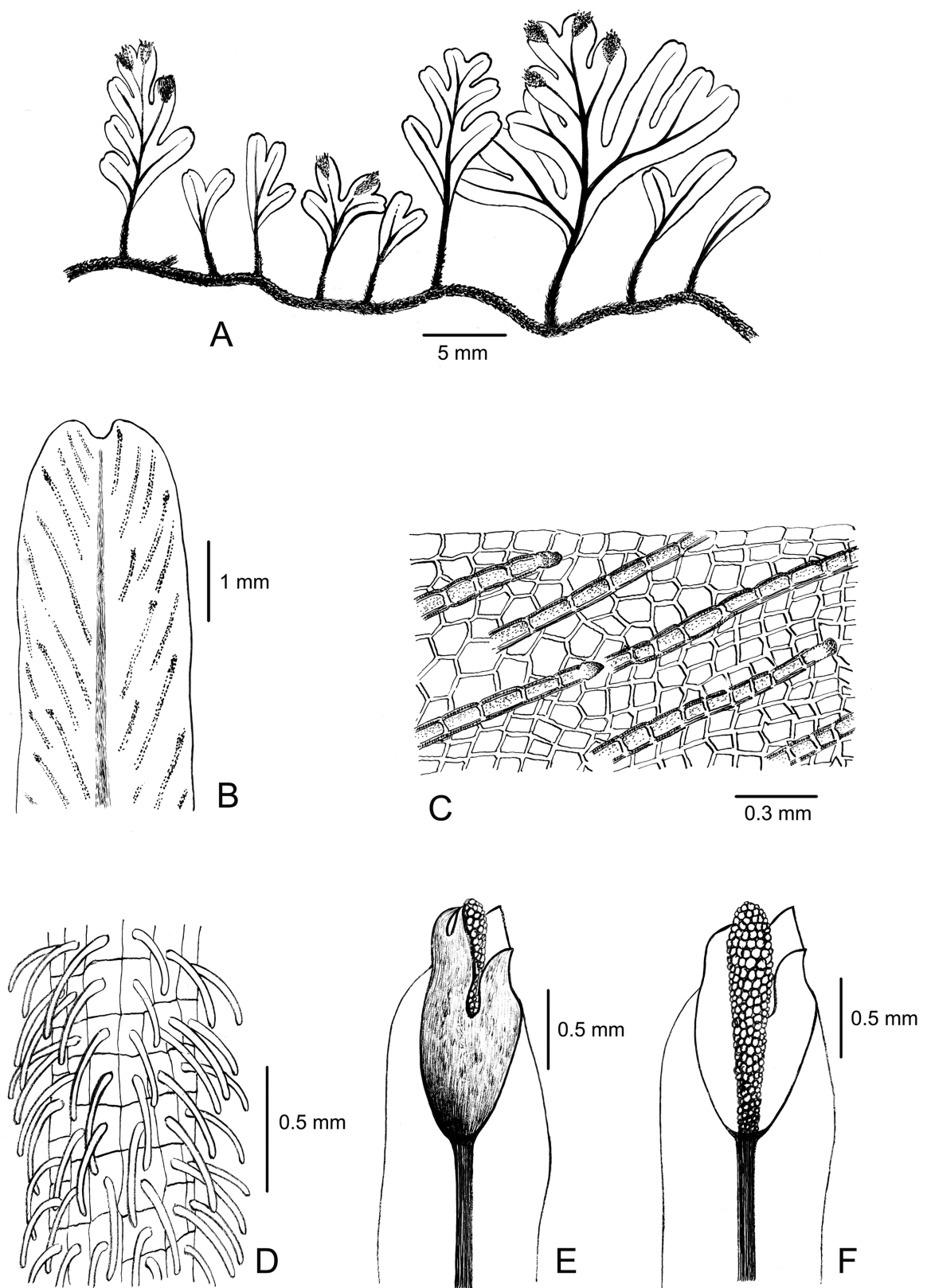


FIGURE 2. *Crepidomanes shenzhenense*.—A. Habit.—B. Portion of ultimate segment showing internal false veinlets and retused apex.—C. Internal false veinlets.—D. Hairs on the stipe.—E. Sorus with sporangia.—F. Sorus without sporangia. (Drawn by Cui Ding-han based on holotype)

Description:—Plants epilithic, 1–1.5 cm tall. Rhizome long creeping, irregularly branching, 0.4–0.6 mm in diam., densely covered with brown to dark brown short simple hairs. Fronds scattered on rhizome, 1–1.5 cm long, up to 1 cm broad; Stipe ca. 0.5 cm long, base with hairs like on rhizome, winged only at apex; lamina broadly obovate, sometimes obovate or elliptic, 1-pinnate to tri-pinnatifid, membranous, base equally cuneate, apex round, green to dark green, rachis green, winged throughout, slightly zigzag, glabrous; pinnae 1–4 pairs, closely spaced to slightly imbricate to neighboring one, alternate, sessile, base pinnae obovate, 5–7 mm long, 2.5–3 mm broad, upper pinnae linear, 2–3 mm long, ca. 1 mm broad; ultimate segments usually apart, linear, ca. 3 mm long and 1.5 mm broad, margin entire or slightly wavy, apex retused. Veins dichotomous, raised on each surface, green, sparsely covered with club-shaped hairs; submarginal false veinlets absent, internal false veinlets many, oblique, 0.5–0.8 mm long. Sori 1–5 on upper parts of frond, apical on pinnae or long acroscopic segment, involucre funnel form, elliptic, 1.5–1.8 mm long, ca. 0.8 mm wide, winged, lobed to 1/2, lips bilabiate, triangular, margin crenate to dissected; receptacles projecting, brown, 2–3 mm. Ca. 32 spores in each sporangium.

Geographical distribution:—*Crepidomanes shenzhenense* is known only from two localities, Mt. Yangtaishan and Mt. Wutongshan, Shenzhen City, Guangdong, southern China, based on our fieldwork and herbarium investigations.

Ecology:—Epilithic on wet granitic rock and cliff, near mountain stream in humid, under well shaded evergreen forest.

IUCN Red List category:—Hitherto, only two independent populations are known—the type locality in Mt. Yangtaishan Forest Park and the other in Mt. Wutongshan National Forest Park. The former population was observed to comprise about 300 individuals and the latter one about 50 (clones of the same individual excluded). These two populations are about 30 kilometers apart and their habitats are preserved by the forest park management. However, both of the two populations are close to hiking trails and threatened by human activities like trampling. Due to these limited populations at present situation, the current status of *C. shenzhenense* should be treated as EN—Endangered based on the International Union for Conservation of Nature Red List Categories and Criteria C2aii (IUCN Standards and Petitions Subcommittee 2017).

Etymology:—The specific epithet is from Shenzhen, a city located in southern China, where the new species was discovered.

Additional specimens examined:—CHINA. Guangdong Province: Shenzhen City, Mt. Wutongshan, 22°34'05"–19" N, 114°13'03"–17" E, elev. ca. 250 m, in well shaded evergreen forest, on cliff by a waterfall, 16 March 2018 Wang Xiao-yun 1803006 (SZG).

Discussion

Ebihara *et al.* (2006) recognized three sections in *Crepidomanes*, i.e., *C. sect. Crepidium* (C. Presl 1843: 23) Ebihara & K. Iwatsuki (in Ebihara *et al.* 2006: 239), *C. sect. Crepidomanes* and *C. sect. Gonocormus* (van den Bosch 1861: 321) K. Iwatsuki (1984: 174) in *C. subg. Crepidomanes*. Subsequently, Dubuisson *et al.* (2013) added a new section: *C. sect. Cladotrichoma* Dubuisson & Rouhan (in Dubuisson *et al.* 2013: 186) distinguished with long and branched hairs on rhizomes. *Crepidomanes shenzhenense* is clearly a member of *C. sect. Crepidomanes* and it is distinctive from other species known so far in this section by its combination of lamina and involucre features. Besides, lacking of sub-marginal false veinlets, but presence of oblique internal false veinlets and deltate involucre lips indicate that this new species is closely related to *C. latealatum* van den Bosch (1863: 138), *C. parvifolium* (Baker 1867: 340) K. Iwatsuki (1985: 535) and *C. megistostomum* (Copeland 1933: 191) Copeland (1938: 60). In these three species, *C. latealatum* is the most widespread and highly variable, and Iwatsuki (1985) recognized it as a species complex that comprised at least 17 formerly described species. Our re-examination of all *C. latealatum* specimens deposited in the herbaria HK, IBSC, KFBG, KUN, PE and PYU showed that some dwarf forms of *C. latealatum* (*C. Chui*, *C. insigne* and *C. makinoi*) are somewhat similar to the new species. Moreover, *C. parvifolium* and *C. megistostomum* also share a few characters with the new species. Based on herbarium investigations, four species and three dwarf forms synonymized under the *C. latealatum* complex by Iwatsuki are compared with one another in vegetative characters and summarized in table 1.

TABLE 1. Synthesized comparison and diagnostic characters for distinguishing *C. shenzhenense*, *C. parvifolium*, *C. megistostomum*, *C. latealatum* and three dwarf forms synonymized under *C. latealatum* complex.

Taxon	<i>C. shenzhenense</i>	<i>C. parvifolium</i>	<i>C. megistostomum</i>	<i>C. latealatum</i>	<i>C. latealatum</i> (<i>C. chui</i>)	<i>C. latealatum</i> (<i>C. insigne</i>)	<i>C. latealatum</i> (<i>C. makinoi</i>)
Fronde shape	Broadly obovate, sometimes elliptic or obovate	Cuneate or oval	Flabellate to obovate	Ovate to oblong or triangular	Elliptic	Oblong or triangular lanceolate	Ovate to oblong
Number of pinnae	1–4 pairs, sterile fronds sometime forked	Fronde simple or forked	Forked or 1–2 pairs	4–12 pairs	7–9 pairs	4–6 pairs	Usually 4 pairs
Apex of ultimate segments	Retused	Retused	Obtuse	Acuminate to obtuse	Obtuse	Acuminate to obtuse	Acuminate
False veinlets arrangement	Internal, oblique to true vein	Internal, oblique to true vein	Internal, oblique to true vein	Internal, parallel or oblique to true vein	Internal, parallel to true vein	Internal, parallel to true vein	Internal, parallel to true vein
Involucre lips shape	Triangular, lips margin crenate to dissected	Triangular, lips margin entire	Round, lips margin entire	Triangular or round, lips margin entire	Round, lips margin entire	Round, lips margin entire	Triangular, lips margin entire

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