

***HYPODEMATIUM GUILINENSE*, SP. NOV. – A NEW FERN SPECIES FROM CHINA**

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Abstract

Hypodematium guilinense J. X. Li & X. J. Li, sp. nov. of *Hypodematium* Kunze belonging to Hypodematiaceae from Guangxi Zhuang Autonomous Region, China is described and illustrated. It is closer to *H. crenatum* (Forssk.) Kuhn & Decken but differs for its height (25-28 cm), narrowly triangular lamina, hairy (acicular) stipe, glabrous fronds (both abaxial and adaxial) and hairy (acicular) indusia. Comparative characters of these two closely related species are discussed, and both LM and SEM structures of spores and fronds are provided.

Introduction

Hypodematium Kunze, the only genus of the family Hypodematiaceae, is distributed by 26 species in the sub-tropical parts of Asia and Africa (Shing *et al.* 1999). The genus is represented by 12 species in China (Zhang *et al.* 2013). Previous research on systematics, palynology and biogeography of *Hypodematium* (Ching 1935, 1940, 1963, 1975, 1978, Fan *et al.* 2020, 2021, Li *et al.* 1988, Li *et al.* 2018, Wang *et al.* 2010, Zhou *et al.* 1999) provided an important background that allowed the recognition of the present new species.

Materials and Methods

Materials were collected from Guilin Dabu, Guangxi Zhuang Autonomous Region (25°33'23.51" N, 110°03'44.56"E, 139.0 m a.s.l., 24 October 1993, G. Z. Li 1465019) and deposited in PE (Thiers 2016) (Fig. 1). Scanning electron microscopy (SEM) was used to record the micromorphology of spores and fronds following Wen and Nowicke (1999).

Taxonomy

Hypodematium guilinense J. X. Li & X. J. Li, sp. nov.

Diagnosis: *Hypodematium guilinense* J. X. Li & X. J. Li, sp. nov. is characterized for its height (25-28 cm), narrowly triangular lamina, hairy (acicular) stipe, glabrous fronds (both abaxial and adaxial) and hairy (acicular) indusia.

Type: China, Guilin Dabu, Guangxi Zhuang Autonomous Region (25°33'23.51" N, 110°03'44.56"E, 139.0 m a.s.l.), 24 October 1993, G. Z. Li 1465019 (PE).

Description: Plants 25–28 cm tall. Rhizomes creeping; densely reddish brown scales, linear-lanceolate, 1.0–1.6 cm × 2 mm, apex acuminate with a few slender teeth. Stipe stramineous, 10–13 cm × 1–1.2 mm; above the base sparsely set with hairs; lamina triangular to narrowly triangular, 15–18 × 13–15 cm, 3-pinnate to 4-pinnatifid (basal pinnae), base obtuse, apex acute to acuminate; pinnae 8–9 pairs, subopposite, slightly oblique, basal pinnae largest, 7–8 × 5 cm, narrowly

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Fig. 1. Habit structure of *Hypodematium guilinense* (A) and *H. crenatum* (B).

triangular, base obtuse, apex acute to acuminate, 3-pinnatifid; pinnules 6-8 pairs, anadromous, slightly oblique, basiscopic pinnule larger than acroscopic pinnule, 3×2 cm, narrowly triangular, base obtuse, apex acute, pinnate-pinnatifid to 2-pinnatifid; ultimate segments 6-7 pairs, alternate, anadromous, triangular to oblong, basal segments largest, 1.0-1.4 cm×4-6 mm, their base shortly attenuate, apex obtuse, shortly stalked to adnate, pinnatifid; medial and distal segments oblong, margin entire to repand, apex obtuse. Veins distinct on both surfaces, upper concave and lower convex, lateral veins pinnate, uni- or bifurcate, ultimate lobes with 3-4 pairs of veins, oblique, reaching the margin. Frond texture papery, yellowish green when dry, rachis and costae densely covered with acicular hairs, frond surface glabrous on both sides except for some occasional acicular hairs on the veins. Sori homomorphous, fixed in the middle of the subtending veinlet, 1 per segment; indusia reniform, pale greyish brown, membranaceous; indusia covered with acicular hairs. Spores sphaerical, perispore reticulate, short folds with rounded crests and a rough and granular appearance (verrucate to verruculate) (Fig. 4. A-F).

Results and Discussions

There is a consensus among botanists studying *Hypodematium*, that the type and density of hairs on different parts of the plant are very stable and important characteristics. Therefore, this feature has become the first and important basis for taxonomic identification in this genus (Fu *et al.* 2008). *Hypodematium guilinense* fronds are glabrous on both sides (except the veins which

bear occasional acicular hairs), stipes and indusia covered with acicular hairs; in contrast, the stipe of *H. crenatum*, abaxial fronds, and the indusia are densely pubescent. Because similar parts of these two taxa have the different type of hair and with a different density, they were considered different and therefor establish the new species *H. guilinense* (Table 1 and Figs 2-3).

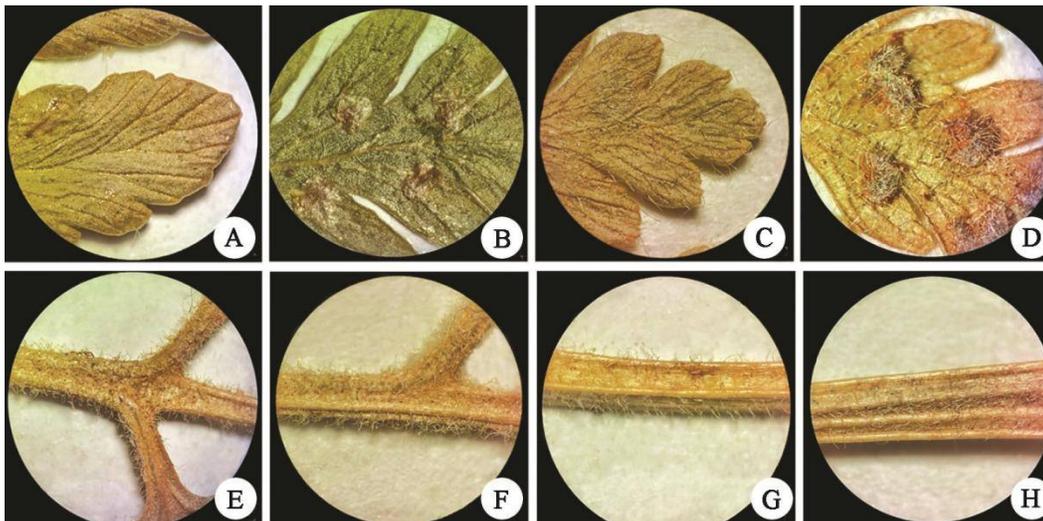


Fig. 2. Comparative structures (LM) of *Hypodematium guilinense* (A-B, E, G) and *H. crenatum* (C-D, F, H). A-B: Fronds glabrous on both sides except for occasional acicular hairs on veins; C-D: Fronds densely covered with acicular hairs (C) and pubescence (D); E-F: Rachis and costae densely covered with acicular hairs (E) and pubescence (F); G-H: Stipes covered with acicular hairs (G) and pubescence (H).

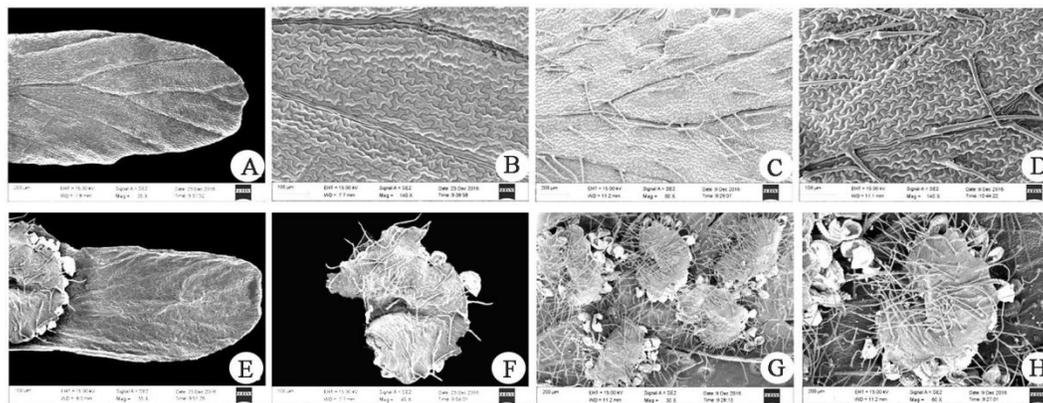


Fig. 3. Comparative structures (SEM) of *Hypodematium guilinense* (A-B, E-F) and *H. crenatum* (C-D, G-H). A-B: Fronds glabrous adaxially (35 \times , 140 \times); C-D: Fronds densely covered with acicular hairs adaxially (60 \times , 140 \times); E: Fronds glabrous abaxially (35 \times); F: Indusia covered with acicular hairs (45 \times); G-H: Fronds densely covered with pubescence abaxially (30 \times , 60 \times).

Sporopollen is the morphological display of the concentrated existence of the genetic material. Characteristics of the perispore are stable in the same plant population, and may show significant differences among different populations. Spore morphology of ferns was of great significance in taxonomic and phylogenetic studies, the outer wall or perispore ornamentation

varies greatly among different population, and can be used as an important character to identify different taxa (Lu *et al.* 2007). The perispore was an important character for identifying species using scanning electron microscopy (Liu and Li 1999) and contributed to the discovery of some new species, for example *Dryopteris guanchica* (Jermy 1980). There are significant differences between the perispore of *H. guilinense*, that has “perispore with reticulating, short folds with rounded crests and a rough and granular appearance (verrucate to verruculate)” and that of *H. crenatum*, showing more individual and isolated ridges with a venulate subpattern, thus providing an important micromorphological basis for establishing the new species *H. guilinense*. (Table 1 and Fig. 4).

Table 1. Comparison differentiate characters of *Hypodematium guilinense* and *H. crenatum*.

Species	Lamina shape	Stipe	Rachis and costae	Adaxial fronds	Abaxial fronds	Indusia	Ornamentation of perispore SEM	Figure
<i>H. guilinense</i>	Narrowly triangular	Acicular hairs	Densely acicular hairs	Glabrous	Glabrous	Acicular hairs	Numerous, reticulating, short folds with rounded crests and a rough and granular appearance (verrucate to verruculate subpattern)	2: A-B, E, G 3: A-B, E-F 4: A-F
<i>H. crenatum</i>	Pentagonal	Densely pubescent	Densely pubescent	Densely acicular hairs	Densely pubescent	Densely pubescent	Few, individual folds with venulate subpattern	2: C-D, F, H 3: C-D, G-H 4: G-J

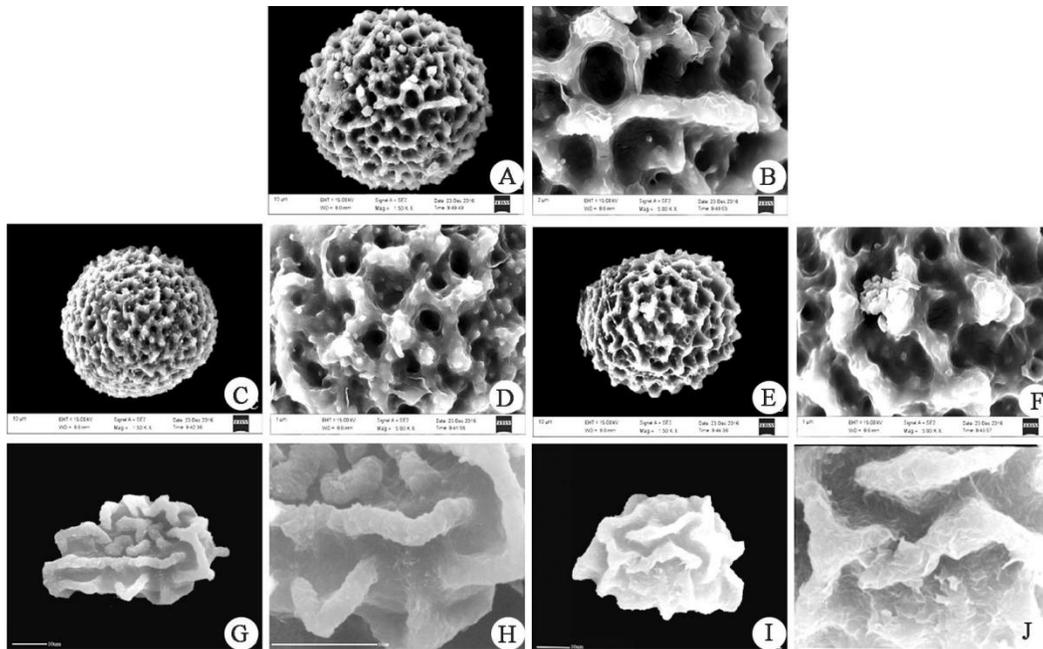


Fig. 4. SEM spore morphology of *Hypodematium* species. A-D: Spore in polar view of *H. guilinense* (1500 \times , 5000 \times); E-F: Spore in equatorial view of *H. guilinense* (1500 \times , 5000 \times); G-H: Spore in polar view of *H. crenatum* (1500 \times , 5000 \times); I-J: Spore in equatorial view of *H. crenatum* (1500 \times , 5000 \times).

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