

Microtrichomanes digitatum (Sw.) Copel. (Hymenophyllaceae), a New Record from Taiwan

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ABSTRACT: *Microtrichomanes digitatum* (Sw.) Copel., a filmy fern species, was discovered in the southern Taiwan during the botanical inventory of past decade. It represents a new record for the fern flora of Taiwan. *Microtrichomanes digitatum* can be distinguished from its congener, *M. nitidulum* (v. d. Bosch) Copel., in bearing short, stiff, simple, and dark-brown setae on the leaf margins. The present study provides taxonomic description, photographs, and a distribution map. The problems of taxonomy, ecology, conservation, distribution and phytogeography are also discussed.

KEY WORDS: Conservation, Filmy fern, Hymenophyllaceae, *Microtrichomanes digitatum*, New record, Rare plant, Taiwan, Taxonomy, *Trichomanes digitatum*.

INTRODUCTION

Microtrichomanes (*sensu* Copeland, 1947), characterized by repeatedly dichotomous, forked, or simple (by reduction) leaf without false veins, is a small but controversial genus containing 10-14 species (Iwatsuki, 1975), mainly distributed in Paleotropics. It was first established as an illegitimate rank "gruppe" by Mettenius (1864), and then validated by Prantl (1875) as a section under *Gonocormus*. After finished the monographic study of old-world Hymenophyllaceae (Copeland, 1933, 1937), Copeland (1938) proposed a new multigeneric system to replace the traditional bigeneric system (*Trichomanes s.l.* and *Hymenophyllum s.l.*) and raised *Microtrichomanes* to the rank of genus. In fact, *Microtrichomanes*, of which the member was usually placed in *Trichomanes s.l.* by most former pteridologists, is the main reason caused Copeland to establish his new system, because he considered that *Microtrichomanes* is more allied to *Sphaerocionium* of *Hymenophyllum s.l.* than to *Trichomanes s.l.* Although Copeland's new system is broadly accepted by many floras including two editions of "Flora of Taiwan" (DeVol, 1975; Tsai and Shieh, 1994), some pteridologists treated *Microtrichomanes* as heterogeneous and polyphyletic and built up their own generic systems (Morton, 1968; Iwatsuki, 1975, 1984, 1990). Recent molecular study based on the *rbcL* data suggested that at least partial species of *Microtrichomanes* can be referred to *Hymenophyllum s.l.* or probably close to *Sphaerocionium* (Pryer *et al.*, 2001). However, this result is not conclusive for the reasons of insufficient sampling of *Microtrichomanes* and lack of resolution within *Hymenophyllum s.l.* More extensively sampling from the representative groups of *Microtrichomanes* addressed by Iwatsuki (1975), and more different gene data (Soltis and Soltis, 1998) are necessary in developing a more convincing generic system of Hymenophyllaceae. Before that, the concept of Copeland's *Microtrichomanes* is still adopted in this article.

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Only one species of this genus, *M. nitidulum* (v. d. Bosch) Copel., has been previously recorded from Taiwan (DeVol, 1968; Shieh, 1973; DeVol, 1975; Kuo, 1985; Tsai and Shieh, 1994; Kuo, 1999). In 1994, the first author collected an unknown filmy fern species (*Moore 17638*, TNU) on the mountain ridge along the pathway from Chinshuiying to Mt. Kutzulunshan, southern Taiwan. This collection has turned out to represent *Microtrichomanes digitatum* (Sw.) Copel., a previously unreported species in the fern flora of Taiwan. Recently, we found this species again at Mt. Taililishan where is not very far from former locality (ca. 9 km N of Mt. Kutzulunshan). The present paper reports this species for the first time, along with taxonomic description, photographs, and distribution map. Besides, the problems of taxonomy, ecology, conservation, distribution and phytogeography of it are also discussed here.

TAXONOMIC TREATMENT

***Microtrichomanes digitatum* (Sw.) Copel.**, Philipp. J. Sci. 67: 36. 1938; Tagawa & K. Iwats., Fl. Thail. 3: 79. f. 5: 6. 1979. Figs. 1-A, B

Trichomanes digitatum Sw., Syn. Fil. 370, 422. 1806; Copel., Philipp. J. Sci. 51: 159. pl. 7. f. 3-4. 1933; Tard. & C. Chr., Fl. Gen. I.-C. 7(2): 66. 1939; Holtt., Rev. Fl. Mal. 2: 94. f. 32. 1966. (Type: 'In Ins. Franciae et Bourboniae' [= Mauritius and Réunion], collector unknown.)

Crepidomanes digitatum (Sw.) K. Iwats., Acta Phytotax. Geobot. 35: 175. 1984; K. Iwats., J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 13: 540. 1985; P. D. Bostock & T. M. Spokes, Fl. Australia 48: 143. 1998.

Trichomanes flabellatum v. d. Bosch, Ned. Kr. Arch. 4: 353. 1859, non Bory 1828.

Rhizome very slender, long-creeping, wiry, bearing simple, brown, slightly downy hairs; hairs usually sparsely distributed at internodes, but crowded at nodes and roots. Stipes very slender, 8-30 mm long, not winged, bearing sparse brown hairs. Lamina dichotomously branched, or sometimes with an indistinct rachis at base, some of the branchings unequal; branches and ultimate lobes about 1.5-2.5 mm wide, longest lobes about 2 cm long; margins bearing short, stiff, simple, and dark-brown setae. Sori sunken in the apices of lobes; the hollow part of indusium obconical; mouth slightly 2-lipped, lips slightly rounded; receptacle usually protruding at older sori.

Specimens examined: Pingtung/Taitung Hsien: Chinshuiying to Mt. Kutzulunshan, *S. J. Moore 17638* (TNU). Taitung Hsien: Mt. Taililishan, *H.-M. Chang 4931* (TAIF, TNU).

Notes: *Microtrichomanes digitatum* can be distinguished from the congeneric *M. nitidulum* (v. d. Bosch) Copel. (Fig. 1-C) in bearing short, stiff, simple, and dark-brown setae on the leaf margins. The latter has entire leaf without hair or bristle on margins.

Christensen (1932) ever mentioned that the Malayan-Polynesian "*Trichomanes digitatum*" is specifically different from that of eastern Africa (type locality of *T. digitatum*), and the former should be called *T. flabellatum* v. d. Bosch. This idea was partly supported by Iwatsuki (1975), who suggested a subspecies rank for *T. flabellatum* considering the differences of distribution and leaves size. But in his later works (Iwatsuki and Price, 1977; Tagawa and Iwatsuki, 1979; Iwatsuki and Kato, 1980; Iwatsuki, 1985), he never formally did such a taxonomic treatment. Otherwise most taxonomists (e.g., Copeland, 1933, 1958; Tardieu-Blot and Christensen, 1939; Andrews, 1990; Johns, 1991; Bostock and Spokes, 1998; Figueiredo, 1998) treated the plants from these two regions as conspecific, namely, *M. digitatum* (*T. digitatum* or *Crepidomanes digitatum*). Without further study to resolve this problem, a broader species concept is tentatively accepted here to fit in with most flora works.



Fig. 1. A: *Microtrichomanes digitatum* (Sw.) Copel., showing the dichotomously branched laminae in its natural habitat; B: Leaf lobe of *M. digitatum*, showing the short, stiff, simple, and dark-brown setae on the margin; C: *Microtrichomanes nitidulum* (v. d. Bosch) Copel., a close congener, showing similar dichotomously branched laminae. Bars: A & C = 1 cm; B = 0.5 mm.

Ecology and Conservation

Our species inhabits tree trunks or rocks in foggy and mossy forest between alt. 1,500-1,600 m at Central Mountain Range of southern Taiwan (Fig. 2). In Taiwan, most fern species strictly confined in the same habitat between altitude 1,000-1,600 m, e.g. most Grammitidaceae and part of Hymenophyllaceae and *Elaphoglossum* (Moore, 1999, 2000a, 2001), are tropical elements with north marginal distribution, and are rare plants (Moore, 2000b). *Microtrichomanes digitatum* is also in the same situation. There are only two populations so far known in Taiwan. Furthermore, one population (at Chinshuiying to Mt. Kutzulunshan) has disappeared when the first author visited there again in 1997, probably due to the topographical change caused by mountaineering activities. Owing to the extreme rarity and accessible destruction of habitats, this species should be deeply concerned for conservation.

Phytogeography

Mainly in Paleotropics, including Sao Tome of Gulf of Guinea (Figueiredo, 1998), East Africa (Johns, 1991), Madagascar (Christensen, 1932), Mauritius (Baker, 1877), NE Australia (Andrews, 1990; Bostock and Spokes, 1998), Thailand (Tagawa and Iwatsuki, 1979), Vietnam (Tardieu-Blot and Christensen, 1939), Malesia (Bosch, 1861; Alderwerelt van Rosenburgh, 1909; Copeland, 1958; Holttum, 1966; Iwatsuki and Kato, 1980; Mitsuta, 1984;

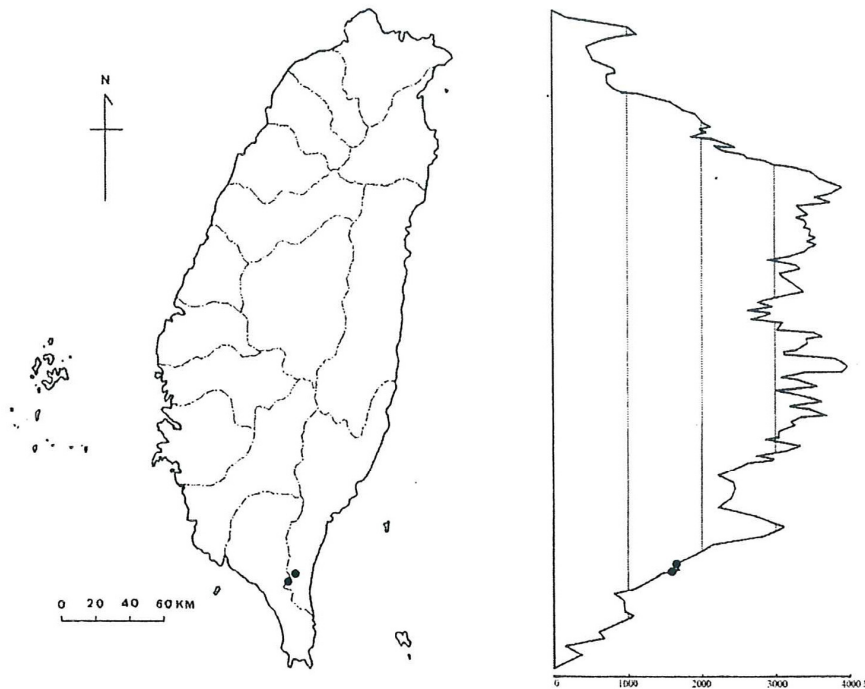


Fig. 2. Distribution map of *Microtrichomanes digitatum* (Sw.) Copel. in Taiwan.

Parris *et al.*, 1992), Admiralty Islands (Wagner and Grether, 1948), and to Samoa of Polynesia (Christensen, 1943). The distribution of this tropical species in Taiwan represents the northernmost range of its phytogeography, which might result from the modern monsoon pattern (Moore, 2000b) established after the last glaciation (Iwatsuki and Price, 1977).

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台灣膜蕨科新紀錄植物—指裂細口團扇蕨

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摘 要

在過去十年的植物探查中，筆者在南台灣發現一膜蕨科新紀錄植物—指裂細口團扇蕨(*Microtrichomanes digitatum* (Sw.) Copel.)，本種與台灣產同屬另一種—細口團扇蕨(*M. nitidulum* (v. d. Bosch) Copel.)之主要區別點為葉緣具深褐色硬毛。本文除提供分類描述、照片與分布圖外，也針對其生態、保育、分布與植物地理等方面進行討論。

關鍵詞：保育、膜蕨、膜蕨科、指裂細口團扇蕨、新紀錄、稀有植物、台灣、分類。

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