

New Additions to the Fern Flora of Taiwan (2)

臺灣蕨類植物誌增註 (2)

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Abstract

This study is a report of two fern taxa, *Athyrium palustre* Seriz. (Athuriaceae) and *Polystichum attenuatum* Tagawa et K.Iwats. (Dryopteridaceae), as new records of Taiwan. Type information, morphological descriptions, habitats, distributions, taxonomic notes, line drawings and photographs are provided to facilitate the identification. The threatened statuses of these two species in Taiwan are evaluated herein according to the International Union for Conservation of Nature and Natural Resources (IUCN) Red List Category and Criteria.

摘 要

本文報導兩種臺灣新紀錄蕨類植物，即蹄蓋蕨科的沼生蹄蓋蕨 (*Athyrium palustre* Seriz.) 與鱗毛蕨科的長羽芽苞耳蕨 (*Polystichum attenuatum* Tagawa et K.Iwats.)，除分別陳述其模式資訊、形態描述、生境、世界分布、分類註解外，並提供相關圖繪及照片俾利鑑別。另根據國際自然保育聯盟 (IUCN) 物種瀕絕分類及標準，評估二種植物在臺灣的受威脅等級。

Key words: *Athyrium palustre*, fern, new records, *Polystichum attenuatum*, Taiwan

關鍵詞：沼生蹄蓋蕨、蕨類、新紀錄、長羽芽苞耳蕨、臺灣

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INTRODUCTION

Two unrecognized ferns were collected in the wild during a recent investigation of ferns in Taiwan. After consulting the floras of adjacent regions of Taiwan (e.g. Copeland 1960a & b, Iwatsuki 1995, Kato 1995, Wang & Hsieh 1999, Kung *et al.* 2001, Knapp 2011, Wang *et al.* 2013, Zhang *et al.* 2013) and examining the specimens of related species, these two ferns are confirmed as new taxa to Taiwan: *Athyrium palustre* Seriz. and *Polystichum attenuatum* Tagawa et K.Iwats., respectively.

In this paper, type information, morphological descriptions, synonyms, distributions, and taxonomic notes are provided to explain their taxonomic issues and our treatment. Line drawings and photographs are also presented to facilitate identification. In

addition, their threatened statuses are evaluated according to the International Union for Conservation of Nature and Natural Resources (IUCN) Red List Categories and Criteria (IUCN 2001, 2003).

TAXONOMIC TREATMENTS

- (1) *Athyrium palustre* Seriz., J. Jap. Bot. 45: 264. 1970; Nakaike, Enum. Pterid. Jap., Filic. 141. 1975; *ibid.* New Fl. Jap., Pterid. 298, pl. 298. 1982; M. Kato, in K. Iwats. *et al.*, Fl. Jap., vol. 1: 206. 1995. — TYPE: JAPAN. Kyushu: Kagoshima Prefecture, Yaku Island (=Yakushima), near Mt. Ishizuka, *S. Serizawa s.n.* (holotype: TNS, photo!), Nov. 1968. 沼生蹄蓋蕨 (Figs. 1, 2)

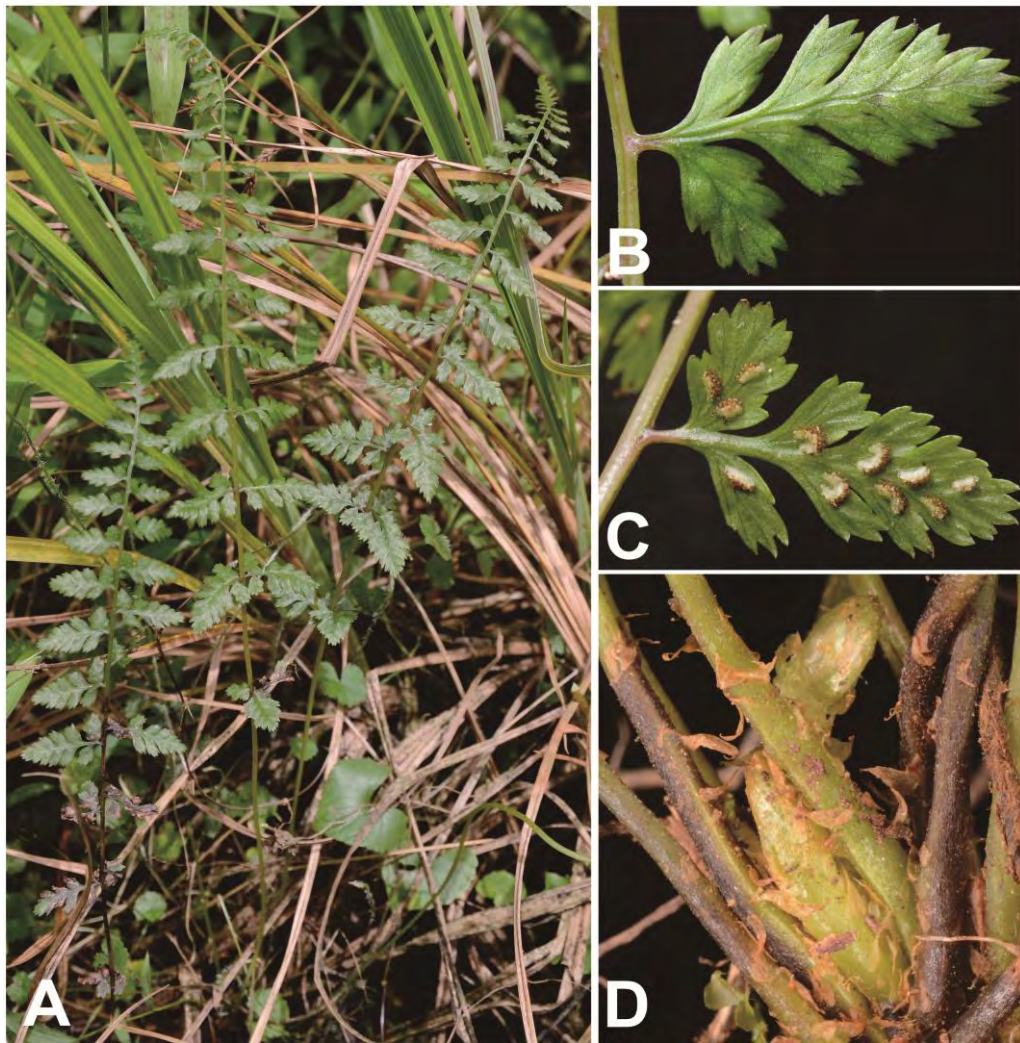


Fig. 1. *Athyrium palustre*. A: Habit. B: Adaxial side of a pinna. C: Sori on abaxial pinna surface. D: Scaly basal parts of stipes. Photographed by Tian-Chuan Hsu.

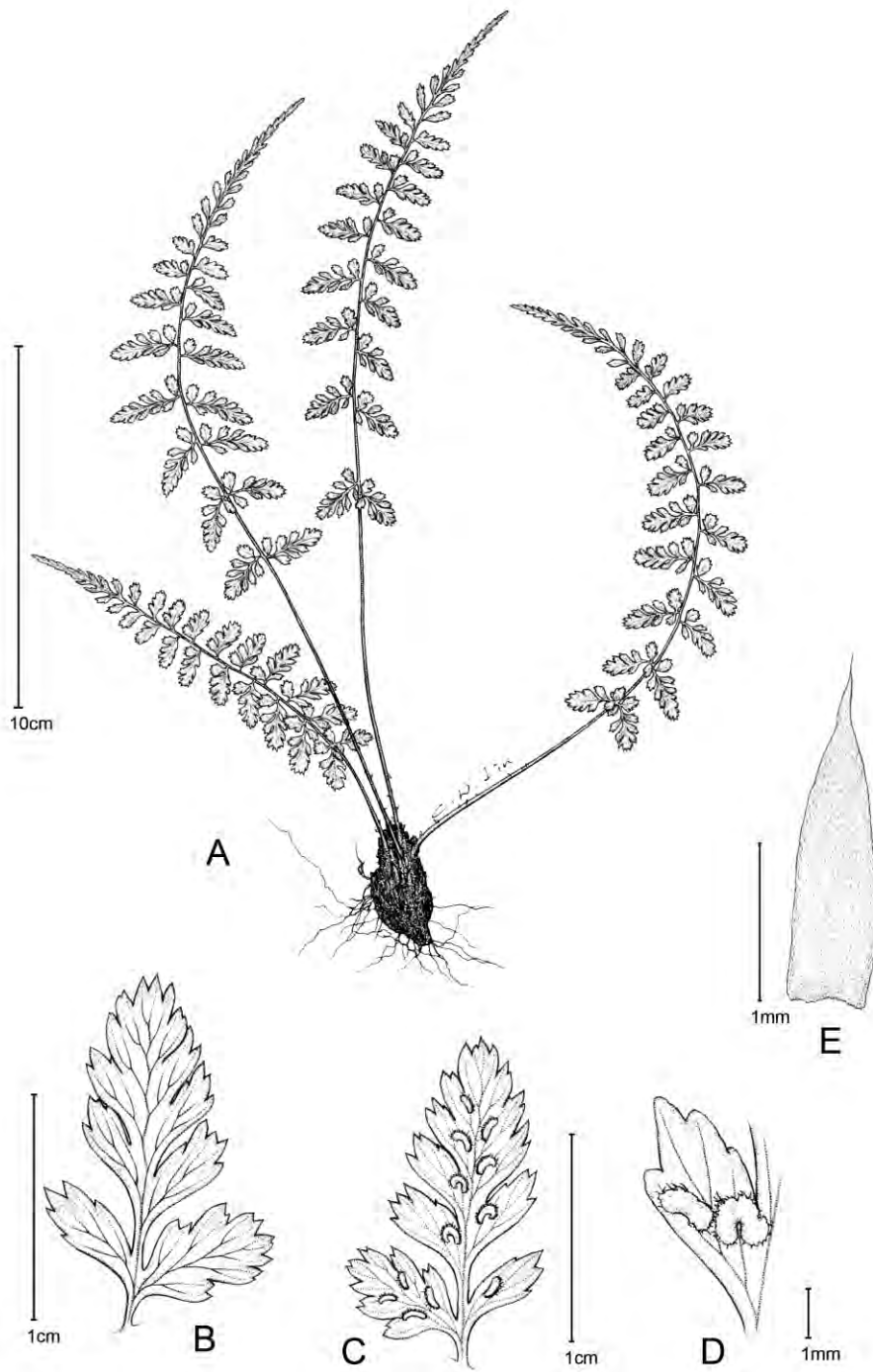


Fig. 2. *Athyrium palustre*. A: Habit. B: Adaxial side of a pinna. C: Abaxial pinna surface with sori. D: Magnified sori covered by laciniate-margined indusia. E: A scale near stipe base. Illustrated by Che-Wei Lin.

Synonyms: *Athyrium reflexipinnum* auct. non Hayata: Tagawa, Col. Ill. Jap. Pterid. 122, pl. 48-266. 1959.

Summer-green. Rhizomes ascending to erect. Stipes usually shorter than laminae, 15-35 cm, stramineous, covered with scales at bases. Scales membranous, light brown to pale brown, ovate-lanceolate, entire at margins, 2-3(-5) mm long, 0.7-1.2 mm broad. Blade lanceolate or linear-lanceolate, slightly narrowed toward bases, bipinnate to tripinnatifid, 15-50 cm long, 4-10 cm wide, thin-herbaceous, glabrous; rachises grooved on adaxial surfaces, grooves confluent with the costal ones. Pinnae pinnate to bipinnatifid, mostly perpendicular to rachises, but sometimes reflexed, deltoid-lanceolate, short-stalked, without spine on the adaxial side of costae. Pinnules ovate to oblong, usually short-stalked. Ultimate segments of tripinnatifid laminae oblong to elliptic, dentate at margins, the basal ones usually larger and free from ultimate costules. Venation pinnately free. Sori oblong or hooked, indusiate, one to several on each segment, subcostular; indusia long-toothed, laciniate or even eyelash-like at margins.

Distribution: Japan (Shikoku and Kyushu) (Serizawa 1970), and Taiwan.

Habitat: Semi-shaded wetland beside ponds or lakes of mid-mountains at 1,200-1,600 m elevation.

Specimens examined: TAIWAN. New Taipei City: Wulai District, Chuangtoumu Pond (拳頭

母池), T.C. Hsu 6755 (TAIF); Puodang Pond (破噹池), T.C. Hsu 6749 (TAIF); Puolu Pond (波露池), T.C. Hsu 2235 (TAIF). Ilan County: Songluo Lake (松羅湖), T.C. Hsu 6745 (TAIF). JAPAN. Kyushu: Fukuoka Prefecture, Chikushi-Gun, unknown 7198 & 7199, Aug. 8, 1968 (TNS); Itayakoshi, S. Tsutsui s.n., Jun. 26, 1966 & Aug. 2, 1966 (TNS). Kagoshima Prefecture, Kumage-Gun, M. Kinuta 19141 (TNS); Okuchi-Shi, T. Yamanaka s.n., Apr. 29, 1989 (2 sheets; TNS); Yaku Island, K. Mitui s.n., Jul. 27, 1966 (TNS).

IUCN Red List Category and Criteria: EN [B1ac(ii, iv)].

Note: The '*Athyrium* sp. 2' in Knapp's book "Ferns and Fern Allies of Taiwan" (2011) is attributed to this new record species. This species is similar to *A. oppositipinnum* Hayata var. *pubescens* (Tagawa) Y.C.Liu, W.L.Chiou & H.Y.Liu (= *A. reflexipinnum* Hayata), but differs from the latter by the adaxial side of costae almost without spine or occasionally with very short protrusions (vs. costae with very short spines, usually occur at the end of pinnae; Liu *et al.* 2009), the glabrous adaxial surface of blade (vs. pubescent), distinctly anadromously arranged, short-stalk proximal segments of pinnae (vs. almost oppositely arranged, sessile proximal segments), and the ovate-lanceolate to broad ovate-lanceolate stipe scales (vs. narrow lanceolate to lanceolate) (Serizawa 1970, Kato 1995). Besides, the preferences for habitat of these two taxa are also different: *A.*

oppositipinnum var. *pubescens* usually grows on somewhat moist grounds or slopes under temperate forests at altitudes of 2,800-3,500 m (Liu *et al.* 2009); however, *A. palustre* often occurs in semi-shaded wetlands or marshlands of mid-mountains at 1,200-1,600 m elevation.

(2) *Polystichum attenuatum* Tagawa *et* K.Iwats., Acta Phytotax. Geobot. 23: 113. 1968. — TYPE: THAILAND. Loei (=Loey) Province: northeastern ridge of Mt. Phu Luang, *M. Tagawa et al.* T1487 (holotype : KYO, photo! isotypes : L & US, photo!). 長羽芽苞耳蕨 (Figs. 3, 4)

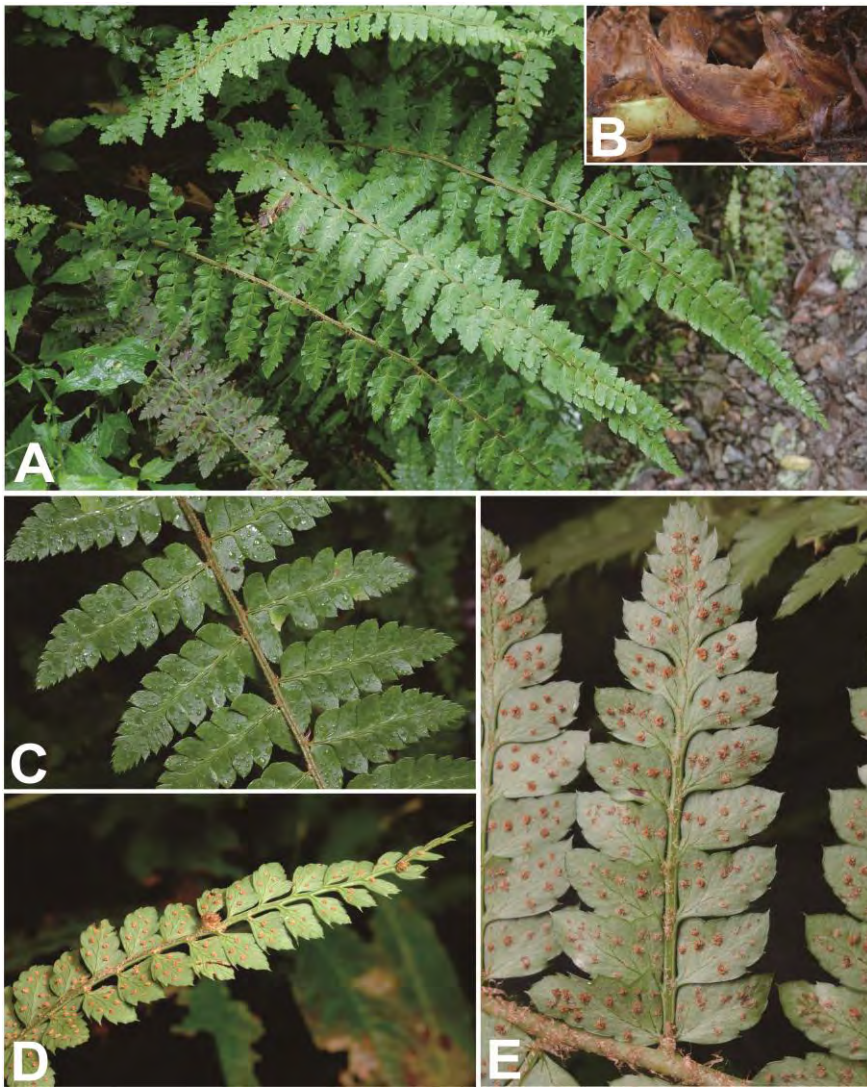


Fig. 3. *Polystichum attenuatum*. A: Habit. B: Scales on the bases of stipes. C: Adaxial side of a part of blade. D: Abaxial side of apex of blade showing two scaly buds. E: Abaxial side of a part of blade showing sori. Photographed by Tian-Chuan Hsu.

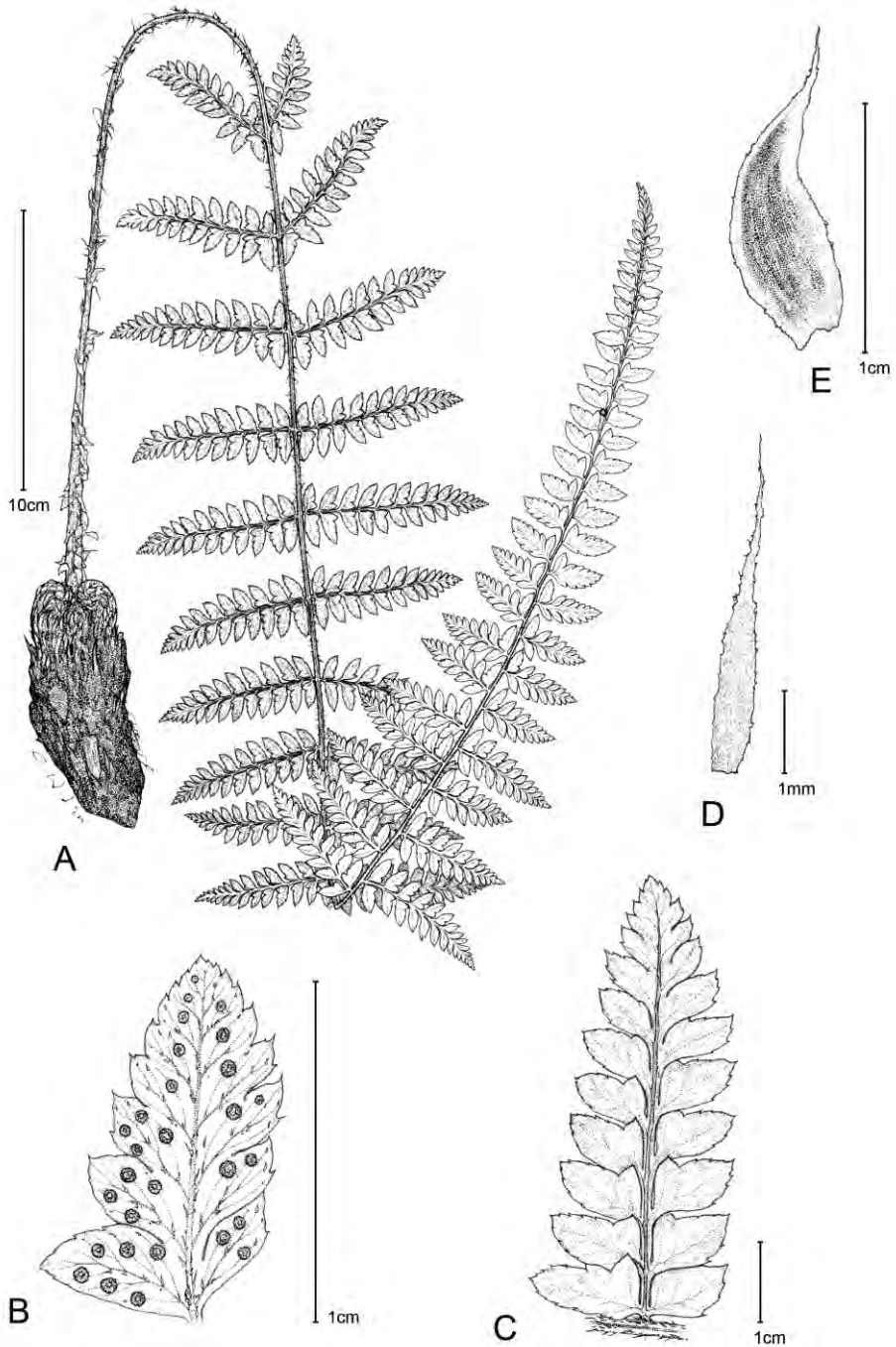


Fig. 4. *Polystichum attenuatum*. A: Habit. B: Abaxial side of a pinna showing sori covered by shrunken indusia. C: Adaxial side of a pinna. D: A linear-lanceolate and concolor scale on rachis. E: An oblong and somewhat bicolor scale on stipe base. Illustrated by Che-Wei Lin.

Synonyms: *Polystichum subattenuatum* Ching et W.M.Chu, Acta Bot. Yunnan., suppl. 5: 51, f. 32. 1992. — *Polystichum attenuatum* Tagawa et K.Iwats. var. *subattenuatum* (Ching et W.M.Chu) W.M.Chu et Z.R.He, Fl. Reipubl. Popularis Sin. 5(2): 17. 2001. — TYPE: CHINA. Yunnan Province: Gongshan County, Dulongjiang, *W.M. Chu & S.G. Lu 18987* (holotype: PYU, photo!).

Rhizomes short, ascending to erect, densely covered with scales. Stipes clustered, stramineous, 12-25 cm long, densely scaly on bases, thinner and smaller gradually upwards. Scales dimorphic; bigger ones oval to oblong, 1.0-1.5 cm long, 3-5 mm wide, thicker, brown to dark brown, often concolor but some discolor, undulate to irregularly serrulate at margins; smaller ones linear-lanceolate to lanceolate, almost concolor and brown, 0.5-1.2 cm long, 1-2 mm wide. blade lanceolate to oblong-lanceolate, 20-45 cm long, 10-16 cm wide, bipinnate, sub-coriaceous, bearing 1-2 scaly buds on abaxial side of rachises near the tips of fronds; rachises scaly on both sides, grooved on adaxial surface and not confluent with the costal ones. Lateral pinnae 15-25 pairs, pinnate, the middle ones longest, gradually acuminate towards the tips, the basal ones obviously shortened. Pinnules somewhat rectangular or rhomboid, tenderly aristate at margins. Venation bipinnately free, veinlets single or forked. Sori round, dorsal on the veinlets, indusiate; indusia peltate, brown, entire to undulate at margins, deciduous when aged.

Distribution: S & SW China, NE India, Myanmar, Thailand, Taiwan, and Vietnam.

Habitat: terrestrial, growing under semi-shaded and somewhat humid forests on hillsides of central Taiwan at 1,600-1,900 m elevation.

Specimens examined: **TAIWAN.** Nantou County: Sinyi Township, Junda logging road (郡大林道), *Y.H. Chang 20121128-052-054* (TAIF), *T.C. Hsu 6152-6154* (TAIF). **CHINA.** Kwangsi Province: Nangning City, Mt. Daming, *T.C. Hsu 6408-6413* (TAIF & IBK).

IUCN Red List Category and Criteria: **CR** [B1ab(v)c(iv), B2ab(v)c(iv), D].

Note:

There is only one small population, about 15 individuals, of *Polystichum attenuatum* found in central Taiwan. The morphology of Taiwanese population much matches with the variety *P. attenuatum* var. *subattenuatum* which has narrower, lanceolate to oblong-lanceolate, blade outline (vs. oblong-triangular or ovate-lanceolate in other variety *P. attenuatum* var. *attenuatum*), and obviously shortened basal pairs of lateral pinnae (vs. not or just slightly shortened in var. *attenuatum*) (Kung et al. 2001). However, these two varieties are better to be treated as the same taxon because they have overlapped distribution pattern (Zhang 2013) and many intermediate forms between them are founded (Kung et al. 2001)

Polystichum attenuatum also resembles *P.*

chunii Ching, a new recorded fern of Taiwan (Hsu *et al.* 2014), but can be distinguished from the latter by much larger fronds (35-70 × 10-16 cm vs. 25-50 × 3-7 cm), lanceolate to oblong-lanceolate laminae (vs. linear-lanceolate), and the most proximal acroscopic somewhat rectangular or rhomboid pinnules with tenderly aristate margin (vs. obovate or oblong-orbicular pinnules with sharply aristate margin). In addition, these two species have different habitat preference in Taiwan: *P. attenuatum* grows on humid grounds under forests of lower *Quercus* zone at altitudes of 1,500-2,000 m, but *P. chunii* grows on semi-humid slopes under *Abies* forests of sub-alpine zone at altitudes of 2,200-2,900 m.

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