

***Stenolepia* Alderw. (Dryopteridaceae), a Fern Genus New to the Philippines**

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***Stenolepia tristis* (Blume) Alderw., an element of Malesian region, is newly recorded from Mindanao, Philippines. Meanwhile, it is also a fern genus new to the flora of Philippines. In addition to the background information, some taxonomic notes, line-drawings of detailed characteristics, and photographs of living material, habitat and type specimens are provided.**

Key Words: Dryopteridaceae, fern, Philippines, *Stenolepia*, *Stenolepia tristis*, taxonomy

INTRODUCTION

Botanical field works in the southern Philippines in 2012 revealed an unrecognized fern taxon on Mt. Apo and Mt. Kitanglad, respectively. After reviewing the floras of the adjacent areas or countries and checking the specimens deposited in several herbaria, including MICH, P, PNH, S, TAIF, UC, we concluded this unknown leptosporangiate fern is *Stenolepia tristis* (Blume) Alderw. It is not only a new record species but also a new record of genus to the flora of the Philippines. In the Philippines, this fern is known to occur only in middle to high mountain areas at elevations ranging from 2,300 to 2,900 m in Mindanao.

Stenolepia Alderw., a genus of Dryopteridaceae (Pichi Sermolli 1977: Aspidiaceae *s.l.* which included Dryopteridaceae; Tryon & Tryon 1982, Kramer 1990, Smith et al. 2006, 2008, Christenhusz et al. 2011), was described by van Alderwerelt van Rosenburgh (1909) and typified by *Stenolepia tristis* (Blume) Alderw. This

genus differs from other genera of Dryopteridaceae by the subglobose sori, the indusium attached only by a narrowed base under the sori (i.e., the indusium attached to the elevated receptacle on one side) and the intestine-like scales scattered on both sides of leaf axes. From the external morphology, the most likely analog is the genus *Diacalpe* Blume (see Copeland 1947, Kramer 1990, also *Peranema s.l.* including *Diacalpe*). However, *Diacalpe* is different from *Stenolepia* by its orange to chestnut, globose and inferior indusium, which encloses the sorus and ruptures irregularly from the top when mature.

Aspidium triste Blume, the basionym of *Stenolepia tristis* (Blume) Alderw., was first published by Carl (Karl) Ludwig von Blume (1828) based on his collections from Java, Indonesia. This species is a typical montane element of the Old World tropics (Kramer 1990). Due to emphases on different aspects of morphology, *Stenolepia tristis* has been assigned to different genera, e.g., *Alsophila* R. Br. (Moore 1857), *Lastrea* Bory (Moore 1858), *Cystopteris* Bernh. (Mettenius 1864), *Davallia* Sm. (Raciborski 1898), and *Cyathea* Sm. (Domin 1929). In addition, some new

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species assigned to *Athyrium* Roth (Copeland 1947) and *Dryopteris* Adans. (Rosenstock 1913) were later treated as synonyms of this species.

This paper reports on this newly recorded species and genus in the Philippines. The detailed description of the species, taxonomic status, line drawings, and photos are provided below.

TAXONOMIC ACCOUNT

Stenolepia Alderw., Bull. Dep. Agric. Indes Neerl. 27: 45. 1909; Copel., Genera Fil. 106. 1947. **Type species:** *Stenolepia tristis* (Blume) Alderw.

Small to somewhat large terrestrial ferns (depending on habitat and area). Rhizomes ascending to erect, and scaly. Fronds clustered, stipes scaly at bases. Fronds decompose, usually tripinnate but often quadripinnate in larger plants. Adaxial surfaces of rachises grooved but not confluent with the costal ones. Trichomes present on both sides of rachis and the other ranked axes, but much more plentiful on adaxial sides. Terminal segments of lateral pinnae usually obtuse to subacute, sinuate to pinnatifid. Veins free, simple or forked, almost reaching the margin. Sori subglobose, dorsal on a vein or veinlet or at the forking of a vein; receptacles elevated. Indusia spatulate-ligulate to approximately orbicular, each attached by a gradually narrowed base under the sori (i.e., the indusia attached to elevated receptacles on one side).

Stenolepia tristis (Blume) Alderw., Bull. Dep. Agric. Indes Neerl. 27: 46, t. 7. 1909; *ibid.* Malayan ferns and fern allies, suppl. 1: 201. 1916; C. Chr., Index Fil. Suppl. 1906-1912: 70. 1913; Copel., Genera Fil. 106. 1947; J. H. Beaman *et al.* P. J. Edwards, Ferns of Kinabalu 173. 2007. (Figs. 1~4).



Figure 1. Habit and habitat of *Stenolepia tristis* (Blume) Alderw. (photographed by Pi-Fong Lu; Mt. Kitanglad, Mindanao, Philippines; 17 Dec 2012).



Figure 2. A portion of the adaxial surface of frond of *Stenolepia tristis* (Blume) Alderw. (photographed by Pi-Fong Lu; Mt. Kitanglad, Mindanao, Philippines; 17 Dec 2012)



Figure 3. Close-up view of a portion of the abaxial surface of frond with sori of *Stenolepia tristis* (Blume) Alderw. (photographed by Pi-Fong Lu; Mt. Kitanglad, Mindanao, Philippines; 17 Dec 2012)

Basionym: *Aspidium triste* Blume, Enum. Pl. Javæ 2: 169. 1828; *typus: Blume s.n.*, from Java, Indonesia (holotype; L, photo!) (Fig. 5).

Homotypic synonyms: *Alsophila tristis* (Blume) Blume ex T. Moore, Index Fil. 58. 1857. – *Lastrea tristis* (Blume) T. Moore, Index Fil. 107. 1858. – *Cystopteris tristis* (Blume) Mett., Ann. Mus. Bot. Lugduno-Batavi. 1: 241. 1864. – *Davallia tristis* (Blume) Racib., Pterid. Buit. 1: 131. 1898. – *Cyathea tristis* (Blume) Domin, Pteridophyta 263. 1929.

Heterotypic synonyms: *Dryopteris alpina* Rosenst., Repert. Spec. Nov. Regni Veg. 12: 173. 1913; *typus: C. Keysser B36* (isotype, UC, photo!), *syn. nov.* – *Athyrium atropurpureum* Copel., Philipp. J. Sci. 12: 59. 1917; *typus: Clemens 10620* (syntype, MICH, photo!), *syn. nov.* – *Dryopteris hypolepioides* Rosenst., Repert. Spec. Nov. Regni Veg. 12: 175. 1913; *typus: C. Keysser B13* (syntype, UC, photo!), and *C. Keysser B10* (paratype; S, photo!), *syn. nov.*

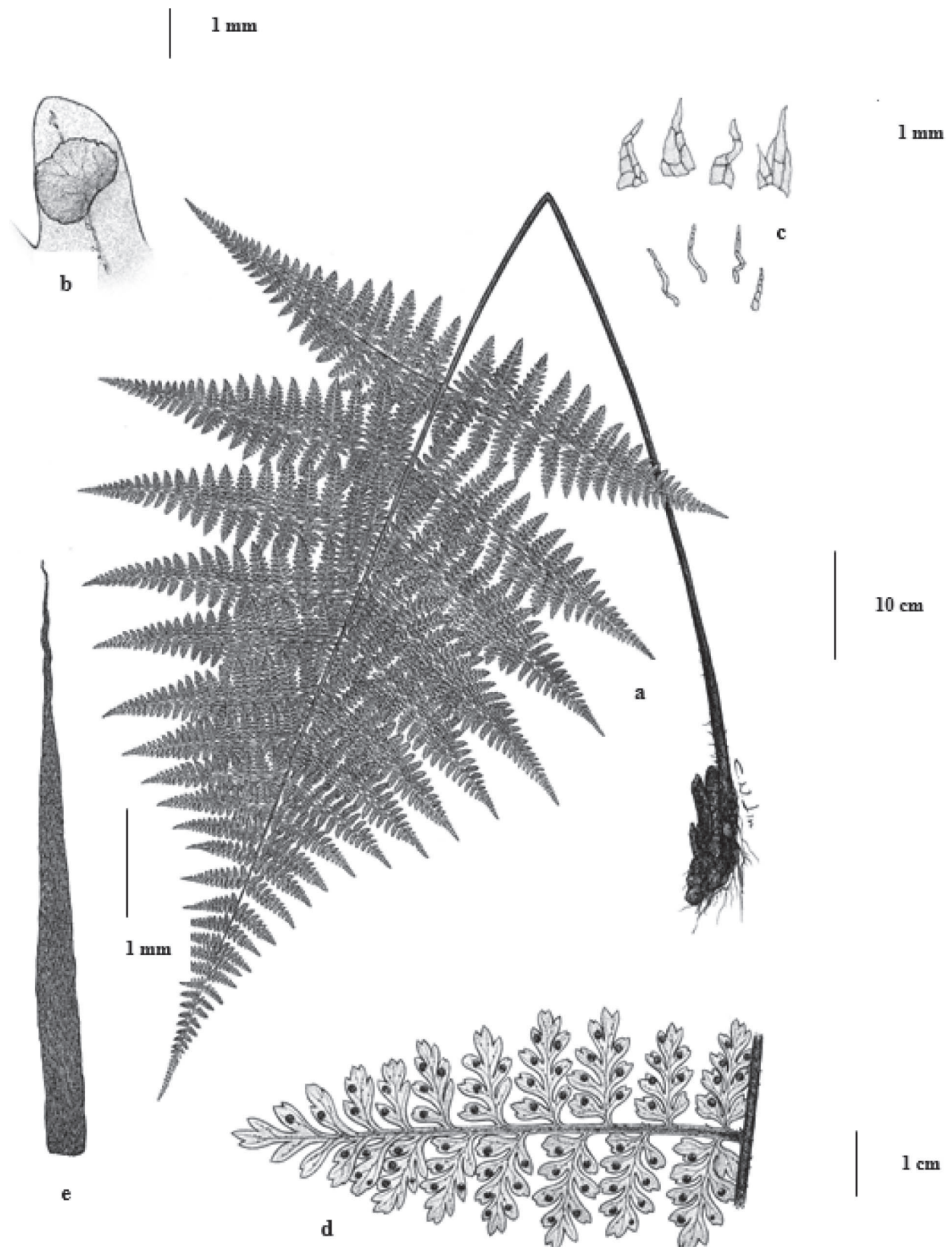


Figure 4. *Stenolepia tristis* (Blume) Alderw.: a, habit; b, indusium; c, trichomes on rachis, costae, and costules; d, abaxial view of pinnule; e, rhizome and basal stipe scale.



Figure 5. Holotype of *Stenolepia tristis* (Blume) Alderw.

Small to medium terrestrial ferns. Rhizome ascending to erect, stout, bearing narrowly lanceolate, long-acuminate, non-clathrate, tan-brown scales. Fronds clustered; stipes well-developed, ca. (10)-20-90 cm, stramineous to dark brown, scaly and somewhat verrucose at bases; scales thinning upward and becoming narrow to filiform; filiform scales also present on rachis and the other ranked leaf axes, especially much plentiful on adaxial sides. Lamina ovate-lanceolate to deltate, ca. (10)-30-90 cm long and (6)-20-60 cm broad, chartaceous-subcoriaceous, tripinnate to quadripinnatifid, often quadripinnate at base in larger plant. Pinnae caudate, pinnules acuminate, segments usually obtuse to subacute, sinuate to pinnatifid; proximal pinnae subopposite, short-stalked, distal pinnae alternate, (sub)sessile; distal pinnae and pinnules gradually reduced in size; basal 2 or 3 pairs of pinnae anadromous, but gradually changing into catadromous distally; adaxial surfaces of rachises grooved but not confluent with costal grooves. Venation abaxially dark; veins forked, almost reaching the margin. Sori dorsal on anterior veinlets, orbicular; receptacles elevated. Indusia spatulate-ligulate to broad-ovate, or orbicular, membranaceous, affixed at the posterior side of the receptacle, often reflexed and deciduous in age or caducous when dried.

Distribution: probably the whole Malesian region, including Borneo, Indonesia (Java), New Guinea (incl. Papua New Guinea), and the Philippines (Mindanao).

Habitat: Usually in mountain forests at middle to higher elevations (ca. 2,100-2,900 m; in Papua New Guinea, even to 3,600-3,800 m).

Specimens examined:

Brunei: J.P. van Niel 4873 (P, photo!).

Indonesia: [Java] *Blume s.n.* (types, L & S, photos!), *Raciborski s.n.* (2 sheets, P, photo!)

Malaysia: [Mt. Kinabalu, N. Borneo] *Clemens 10620* (isotype of *Athyrium atropurpureum*, MICH, photo!)

Papua New Guinea: [Mt. Ambua] *W. Vink 17397* (P, photo!); [Mt. Amdutakin] *W. Vink 17582* (P, photo!); [Mt. Bolan (in Mts. Suruwaged)] *C. Keysser B10 & B13*, (types of *Dryopteris hypolepioides*; B10: S, B13: UC, photos!); *C. Keysser B36* (isotype of *Dryopteris alpine*; UC, photo!); [Ibiwara] *W. Vink 17225* (P, photo!).

Philippines: [Mindanao, Mt. Apo] *L.-Y. Kuo 2701 & 2767* (PNH, TAIF, and Museum of Central Mindanao University), *Y.-H. Chang 20120507-007* (PNH, TAIF, and Museum of Central Mindanao University); [Mindanao, Mt. Kitanglad] *L.-Y. Kuo 3572* (PNH, TAIF, and Museum of Central Mindanao University).

DISCUSSION

Stenolepia is a genus of Dryopteridaceae. Although Kramer (1990) reported *Stenolepia* as a monotypic genus, Johns et al. (2006) described at least five species of this genus in New Guinea, where it is apparently the center of diversity of *Stenolepia*. The systematic status of this genus within the family is still not clear (see Christenhusz et al. 2011: “insertis sedis” of Dryopteridaceae). Based on morphology, *Stenolepia* has been suggested to be closely related to *Diacalpe* or *Peranema* Don (van Alderwerelt 1909, Copeland 1947, Pichi Sermolli 1977, Tryon & Tryon 1982, Kramer 1990) in having raised receptacles and inferior, membranaceous and semi-globose. Because both *Diacalpe* and *Peranema* nest within the *Dryopteris* Adans. in recent molecular phylogenetic studies (Li & Lu 2006; Liu et al. 2007; Zhang et al. 2012), it implies that *Stenolepia* also belongs to *Dryopteris s.l.* Extensive sampling and further phylogenetic analysis are necessary to confirm the delineation and systematic position of the genus.

Furthermore, *Stenolepia tristis* is a somewhat morphologically variable species. Based on our preliminary observations, the materials from Philippines seem to be broader (subtriangular to triangular) in frond outline than the type specimen (ovate-lanceolate). The heights of mature individuals are ca. 13-20 cm at slightly exposed habitats of summit areas to over 1 m under the forest-canopy of mountains at middle elevations. In addition, the shapes of indusia of Philippine populations are broad-ovate to orbicular with membranaceous texture. This is in apparent in conflict in some aspects with the description in the protolog of the type as “...the indusium not hood-shaped but narrow, spatulate-ligulate, rigid, entire, small, too small to cover the sorus permanently...” (van Alderwerelt 1909). Intensive sampling from the whole range of the species and molecular marker analyses are necessary because some cryptic species might possibly hide therein.

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