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Notes on Species of Amauropelta (Thelypteridaceae) with Elongate Scandent Leaves and Atropurpureus Rachises in Colombia

--Manuscript Draft--

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Abstract:	Thelypteridaceae, with 233 species spread across four recognized subgenera. Among these, subgen. Amauropeltaincludes sect. Lepidoneuron which has historically presented challenges in species delineation. Recent explorations in the Colombian páramos have uncovered the need for two new combinations: Amauropelta sunduei and Amauropelta atropurpurea, both restricted to Colombian Andes, and additionally a new synonym and a new distribution record within the subgenus for the country: Amauropelta laevigata. We present a description of the species, line drawings, macro and microphotographs, conservation status, distribution maps, and a key for related species.
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Universidad Industrial de Santander

Bucaramanga, Colombia August 17th, 2024

Respected
Dr. **Daniel Potter,**
Editor-in-Chief
Systematic Botany

Dear Dr. Potter,

Please, find attached the manuscript "**Notes on species of *Amauropelta* (Thelypteridaceae) with elongate scandent leaves and atropurpureus rachises in Colombia"** by Stephany Rodríguez–E., Felipe Castaño, Michael Sundue, Alan R. Smith, and David Sanín, which we would like to submit for publication to Systematic Botany. All authors have contributed significantly to the manuscript and agree with its content.

In this study, we present morphological evidence that corrects the misidentification of a species previously classified under *Cyathea* (Cyatheaceae), revealing its affiliation with *Amauropelta* (Thelypteridaceae). We also introduce two new taxonomic combinations: *Amauropelta sunduei* and *Amauropelta atropurpurea*, both of which are endemic to the Colombian Andes. Additionally, we report a new synonym and extend the distribution range of *Amauropelta laevigata* within the subgenus in Colombia. This research will likely be of significant interest to botanists, particularly those specializing in taxonomy and nomenclature of these plant groups.

Finally, we state that this article has not been previously published and is not being considered for publication elsewhere.

Yours sincerely,

Stephany R.

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Notes on Species of *Amauropelta* (Thelypteridaceae) with Elongate Scandent Leaves and Atropurpureus Rachises in Colombia

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Abstract*—Amauropelta* stands as the largest and most diverse genus within the Thelypteridaceae, with 233 species spread across four recognized subgenera. Among these, subgen. *Amauropelta* includes sect. *Lepidoneuron* which has historically presented challenges in species delineation. Recent explorations in the Colombian páramos have uncovered the need for two new combinations: *Amauropelta sunduei* and *Amauropelta atropurpurea*, both restricted to Colombian Andes, and additionally a new synonym and a new distribution record within the subgenus for the country: *Amauropelta laevigata*. We present a description of the species, line drawings, macro and microphotographs, conservation status, distribution maps, and a key for related species.

***Keywords*—**Andes, bipinnate lamina, endemic ferns, páramo, sect. *Lepidoneuron*, nomenclatural and distribution records.

Amauropelta Kunze is the most diverse genus within the family Thelypteridaceae, with approximately 215–233 species (PPG I 2016; Fawcett and Smith 2021). Its center of diversity lies in South America, particularly within the tropical Andes, from Colombia to Bolivia (Fawcett and Smith 2021). Smith (1974) proposed an infrageneric classification for *Thelypteris* Schmidel, identifying subgenus *Amauropelta* and delineating nine sections within it. Among these, sect. *Lepidoneuron* A.R. Sm. stands out as a monophyletic clade nested within *Amauropelta* (Fawcett et al. 2021). This clade exhibits various evolutionary trends, including the development of a more dissected lamina (bipinnate–pinnatifid), a notorious diversity in the indument, and the emergence of dark lustrous stipes and rachises. However, challenges persist regarding the precise species circumscription, the unknown phylogenetic placement of certain linages, and the unclear nomenclature and distribution, highlighting the need for further study (Smith 1974; Luteyn 1999; Salino et al. 2015; Almeida et al. 2016; Fawcett et al. 2021).

The high elevations of the Eastern Andes of Colombia harbor one of the world's most significant biodiversity hotspots, the páramo (Myers et al. 2000). This montane region hosts the largest number, size, and diversity of páramos (van der Hammen and Cleef 1986; Bello et al. 2002; Pedraza-Peñalosa et al. 2005; Madriñán et al. 2013). Despite its importance, the páramo remains one of the least studied ecosystems, particularly for ferns in Colombia (Murillo-P. 2000). Recent exploration of páramo vegetation has led to the discovery of three names that deserve special attention, resulting in two new combinations, a new synonym, and a new record of *Amauropelta* sect. *Lepidoneuron* for Colombia, which are described and presented herein.

MATERIALS AND METHODS

Taxonomic delimitation of the genus *Amauropelta* follows Fawcett and Smith (2021), and the circumscription of section *Lepidoneuron* is based on Smith (1974). Morphological terminology was revised using Smith (1974), Tryon and Lugardon (1991), Lellinger (2002), Punt et al. (2007), Patel et al. (2019), Shah et al. (2019), Fawcett and Smith (2021), and Moran (2022a, b). Digital images were retrieved from Ferns of the World (http://www.fernsoftheworld.com), Global Plants project (https://www.plants.jstor.org), Pteridoportal (https://www.pteridoportal.org/portal/index.php), and the virtual herbaria B (http://www.bgbm.org/herbarium/default.cfm), MO (https://www.tropicos.org/home), NY (https://sweetgum.nybg.org/science/vh/), P (https://science.mnhn.fr/institution/mnhn/collection/p/item/search), and US (https://collections.nmnh.si.edu/search/botany/). Additional collections were studied at COL, E, FMB, NY, UIS, and VT herbaria (acronyms according to Thiers 2023). Spores, scale samples, and images from the types were provided by the staff at B. We consulted certain bibliographic references dealing with Thelypteridaceae (Smith 1973, 1974, 1983, 1990; Moran 1995, 2022a; Luteyn 1999; Salino and Semir 2004; Salino et al. 2015; Ponce et al. 2013; Bernal et al. 2016; Fawcett et al. 2021), and the related names (Rojas and Tejedor 2016; Lehnert 2017), to structure the species concepts, define nomenclature issues, point out diagnostic characters, and compile all relevant information related to the types.

Fieldwork was conducted in high Andean rainforest and páramo (>2500 masl) ecosystems in the Boyacá and Santander Departments. Fertile specimens were collected, all samples were photographed, and DNA samples were taken for future analyses. Samples are stored at COL, E, FMB, HUA, UIS, and VT.

Additional samples were chosen and dissected for morphological study under a Scanning Electron Microscope (SEM). Micrographs were obtained using a TECSCAN model Mira 3 FEG–SEM following recommendations by Ramírez-Valencia and Sanín (2016).

Maps were crafted with original georeferencing data, supplemented by estimates from SiB Colombia's platform 'Gacetero de localidades' (https://biodiversidad.co/consultar/gacetero/), employing QGIS version 3.22 (QGIS 2021). Conservation status was assessed via Extension of Occurrence (EOO) and Area of Occupancy (AOO), cell width of 2 km^2, using the GeoCAT tool (Bachman et al. 2011), following IUCN (2013) criteria.

TAXONOMIC TREATMENT

Amauropelta sunduei (Lehnert) D. Sanín, S. Rodríguez-E. & A.R. Sm., **comb. nov.** *Cyathea incognita* A. Rojas, in Rojas & Tejedor (2016: 122), Revista Biodiversidad Neotropical 6(2): 122–125. 2016, nom. illeg., non *Cyathea incognita* (Lellinger) Christenhusz (2009: 41) [=*Hymenophyllopsis incognita* Lellinger (1984: 6)]. *Cyathea sunduei* Lehnert, Lehnert (2017), Phytotaxa 290 (1): 99–100. TYPE: COLOMBIA. Meta: Mpio. San Juanito, Cañón del Río Guatiquía, near casa "San José", 4°30.962′N, 73°41.361′W, 3325 m, 3 May 2007, *M. Sundue & A. Vasco 1326* (holotype: HUA!; isotype: NY!, VT!, photo NY4033807!).

Terrestrial ferns. **Rhizomes** short-creeping, suberect, 2–6 mm in diam., atropurpureus to dark brown; scales to 5 × 1–2 mm, lanceolate, uniformly distributed, basally attached, clathrate and slightly bicolored (center brown with wide cells, golden margin with thin cells). **Leaves** scandent, elongate, 50–172 cm long. **Petioles** 20–105 cm long, subterete, glabrous, atropurpureus and lustrous. **Blades** bipinnate-pinnatisect basally, pinnatifid at apex, linear-lanceolate, 30–67 cm × 10–20 cm, papyraceous. **Rachises** darkly atropurpureus,

lustrous, glabrous. **Pinnae** 15–26 per blade, proximal pairs abruptly reduced, sometimes with basal undeveloped pinnae; medial pinnae 5–10 × 1–2.5 cm, linear-lanceolate with acuminate apex, forming an angle of 45° to the rachises, with prominent, globose and pale aerophores; distal pinnae gradually tapering, costae light brown, adaxially sulcate and abaxially terete, with acicular hairs adaxially. **Segments** 9–16 pairs per pinna, 7–15 × 2–4 mm, oblong to ovate, with slightly revolute crenate margins, bases obtuse in proximal segments and adnate in distal ones, rounded to acute at apex; adaxial surface with scattered acicular and uncinate hairs adaxially (similar to costae); veins free, glabrous, 5–8 pairs per segment, dark brown to dark reddish. **Sori** rounded to 1.5 mm diam., exindusiate, ± medial, vascularized by the secondary veins. **Spores** 30–40 × 22–25 µm, monolete, ellipsoidal, perispore covered with a fine, dispersed, raised reticulum, composed of capitate thin strands that are often interconnected. Figures 1, 2, 4 (C), and 5 (C, F).

***Distribution and Habitat*—**Restricted to the Eastern Andean Cordillera of Colombia, recorded in the departments of Boyacá, Cundinamarca, Meta, Norte de Santander, and Santander (Fig. 3). The species occurs from 3160–4200 m, in the transition zone between the Andean forest and the páramo. Fertile plants have scandent leaves supported by vegetation, in the shade of well-preserved forests; whereas plants in open areas tend to coil upon themselves.

***Notes*—** *Amauropelta sunduei* is similar to *A. arborea* (Brause) A.R. Sm., *Dryopteris* (*Amauropelta*) *atropurpurea* Hieron., and *A. pteroidea* (Klotzsch) A.R. Sm. by the elongate scandent leaves. However, it differs from the first two by the bipinnate-pinnatisect laminae at the base (vs. entirely 1-pinnate-pinnatifid laminae). From *Amauropelta pteroidea*, *A. sunduei* differs by the glabrous, bicolorous rhizome scales, atropurpureus dark black lustrous petioles and rachises, and perispore with dispersed thin capitate strands (vs. rhizome scales pubescent and concolorous, light brown stramineous petiole and rachises, and perispore covered with a

wide-open reticulum). *Amauropelta sunduei* is the only species in the genus with bipinnate–pinnatisect laminae, and dark brown atropurpureous and lustrous rachises and petioles. The pale and globose aerophores are also distinctive and serve to differentiate it from other ferns.

The scandent fronds, lustrous atropurpureous axes, and pale globose aerophores of *Amauropelta sunduei* are morphologically unlike most ferns; so much so that Rojas and Tejedor (2016) originally described it as a species of *Cyathea*. While some *Cyathea* spp. share elongate scandent fronds and dissected laminae, the similarities end there. Sporangia with a vertical and interrupted annulus clearly place *A. sunduei* in the Polypodiales (PPG I, 2016). In addition, the presence of two vascular bundles in the petioles suggest its placement among families of the Suborder Aspleniineae (Sundue and Rothfels, 2014; PPG I, 2016), the aerophores and indument, support the placement within Thelypteridaceae, and the blade dissection and scandent fronds are similar to those of other species in *Amauropelta*, sect. *Lepidoneuron* (Smith, 1974). *Cyathea* (and Cyatheaceae), in contrast, is characterized by the presence of sporangia with oblique annuli, and petioles with higher complexity in the vasculature (Lehnert and Kessler, 2018). The spores of *Cyathea* are also uniformly trilete (Lehnert and Kessler, 2018), whereas the spores of *Amauropelta sunduei* are monolete (Fig. 5C).

In the wake of Rojas and Tejedor (2016), Lehnert (2017) recognized that the epithet *incognita* was preoccupied in *Cyathea* by an earlier name [=*Hymenophyllopsis incognita* Lellinger (1984: 6)] and published a replacement name *C. sunduei* Lehnert. While this solved the nomenclatural problem, it overlooked the taxonomic one, creating a name for an entity that is not a *Cyathea*. Upon transfer of this species to *Amauropelta*, the epithet *sunduei* becomes available, the earliest basionym at species rank, as stated in Art. 6.10 from the Code (Turland et al. 2018): “A new name formed from a previously published legitimate name (stat. nov., comb. nov.) is, in all circumstances, typified by the type of the basionym, even

though it may have been applied erroneously to a taxon now considered not to include that type". In this case, *M. Sundue & A. Vasco 1326* (HUA) corresponds to the type of the new combination for this taxon, *Amauropelta sunduei*.

Conservation Status—*Amauropelta sunduei* is currently known from six specimens, three of them collected after 1969. Despite efforts during several field visits to the páramos of Santander, specifically to the locality Tona where one specimen was previously collected (*M.T. Murillo & R. Jaramillo 1199*, COL), the plant could not be found, due to the conversion of páramo habitats into crop fields. Only one collection has been recorded in a protected area, specifically the Parque Nacional Natural de Pisba (*Sanín et al. 8251*, UIS). Given these circumstances, we propose classifying *Amauropelta sunduei* as 'Critically Endangered' (CR) under IUCN criteria A: A2ac, and C: C2a. Despite its extensive geographical distribution, spanning an AOO of 20000 km² and an EOO of 18818314 km², the species has likely experienced a notable population decline, as indicated by the absence of recent collections and field observations, coincident with habitat loss.

Representative Specimens Examined:—**Colombia**.—BOYACÁ: Socotá, Parque Nacional Natural Pisba, sector El Oso, 5°54'29"N, 72°31'3"W, 3263 m, 6 Aug 2022, *D. Sanín, M. Fernández-Lucero & R. Valderrama 8251* (COL, FMB, HUA, UIS, VT).—CUNDINAMARCA: Guasca, Jun 1932, *E.P.A "E. Peréz Arbeláez" 1512* (US); Fómeque, Carreterra La Paila-San Juanito, Km 10, zona amortiguación del Parque Nacional Natural Chingaza, 4.5256° N, -73.7128° W, 3376 m, *W. Testo 2619* (BRIT, COL, E, HUA, VT), *N. Zapata 1002* (BRIT, COL, HUA, VT).—NORTE DE SANTANDER: Eastern Cordillera, Páramo de Romeral, 3800–4200 m, 30 Jan 1927, *E.P. Killip & A.C. Smith 18675* (US).—SANTANDER: Santa Rita, carretera entre Bucaramanga y Pamplona, antes del Páramo de Berlín, 3160 m, 9 Nov 1969, *M.T. Murillo & R. Jaramillo 1199* (COL).

Amauropelta atropurpurea (Hieron.) D. Sanín & S. Rodríguez-E., **comb. nov.** *Dryopteris atropurpurea* Hieron., Hedwigia 46: 342. 1907. *Thelypteris atropurpurea* Hieron. ex Luteyn, Mem. New York Bot. Gard. 84: 82. 1999. Nomen nudum. TYPE: COLOMBIA. Huila: Excurs. nach dem Huila, Quebrada auf dem Páramo "Excurs. after the Huila, Quebrada on the Páramo", 1956, *A.B. Stübel 159* (Holotype: B, photo B200052732!, spores!).

Terrestrial ferns. **Rhizomes** short-creeping, suberect, to 8 mm diam., atropurpureous; scales 1–2 × to 0.5 mm, lanceolate, dense toward the apex, appressed, clathrate, and slightly bicolored (center ochre, margin yellowish), cells with thickened walls. **Leaves** long-scandent, 220–460 cm. **Petioles** 112–157 cm long, flat to terete, glabrous, atropurpureus and lustrous, with scales at base (same as at rhizome apex). **Laminae** entirely 1-pinnate pinnatisect, lanceolate, 90–300 cm × 16–23 cm, chartaceous. **Rachises** atropurpureus, glabrous. **Pinnae** 30–36; proximal pairs abruptly reduced, sometimes almost undeveloped toward the base; medial pinnae 8–12 × 2–3 cm, lanceolate, acuminate to long–acuminate apically, ascending, with prominent aerophores; distal pinnae gradually tapering; costae brown, adaxially sulcate and abaxially terete; pubescent on adaxial surface with acicular and uncinate hairs. **Segments** 15–22 pairs per pinna, 16–18 × 3–7 mm, linear-lanceolate, with slightly revolute crenate margins, bases adnate, acute at apex; laminar tissue brown; adaxial surface between veins with scattered acicular and uncinate hairs (similar to costae); veins free, 8–10 pairs per segment, dark brown. **Sori** round, to 1 mm diam., exindusiate, medial, vascularized by the secondary veins. **Spores** 34–42 × 22–29 µm, monolete, ellipsoidal, perispore covered with a fine, dense, raised reticulum, with capitate thin strands that can be interconnected (Figures 4B, 5B, E).

***Distribution and Habitat*—**Only known from Huila and Risaralda departments of Colombia, occurring in Central and Oriental Andean Cordilleras, between 2316–3550 m, in humid montane forests and páramo (Fig. 3).

Notes*—Dryopteris atropurpurea* was published by Hieronymus (1907: 342). Smith (1974) placed the name within *Thelypteris* subg. *Amauropelta* sect. *Lepidoneuron*. However, he did not formally combine it with *Thelypteris*. In his Checklist of Plants from the Páramo, Luteyn (1999) inadvertently introduced the name *Thelypteris atropurpurea*, a *nomen nudum* (Art. 38 from Turland et al. 2018). We formally publish the new combination in *Amauropelta.*

Conservation Status*—Amauropelta atropurpurea* is known from two specimens including the type. All were collected prior to 1980, from Huila and Risaralda departments. We categorize *Amauropelta atropurpurea* as 'Critically Endangered' (CR) according to the IUCN criteria A: A3c, B1, and C: C2a. Despite its geographical distribution spanning AOO of 8000 km^2 and EOO of 0 km^2 (there are only two points, making it impossible to construct the polygon), the species appears to have experienced a population decline, as judged by the lack of recent collections.

***Representative Specimens Examined:*—Colombia.**—HUILA: Excurs. nach dem Huila, Quebrada auf dem Páramo "Excurs. after the Huila, Quebrada on the Páramo", 1956, *A.B. Stübel 159*, B (photo B200052732).—RISARALDA: Santa Rosa de Cabal, Cordillera Central, vertiente occidental, camino de herradura entre Termales y el páramo de Santa Rosa, 3550 m, 26 Jan 1980, *R. Jaramillo et al. 5945* (COL).

AMAUROPELTA LAEVIGATA (Mett. ex Kuhn) Salino & T.E. Almeida, PhytoKeys 57: 11–50. 2015. *Phegopteris laevigata* Mett. ex Kuhn, Linnaea 36: 112. 1869. *Dryopteris laevigata* (Mett. ex Kuhn) C. Chr. Index Filic. 273. 1905. *Thelypteris laevigata* (Mett. ex Kuhn) R.M. Tryon, Rhodora 69 (777): 6. 1967. TYPE: PERU. Tatanará, Ost Abhang

der Cordilleren von Peru "Eastern slope of the Cordillera of Peru", Aug 1854, *W. Lechler 2628*, B (Holotype: B, photo B 20 0058561!).

Amauropelta arborea (Brause) A.R. Sm. PhytoKeys 57: 11–50. 2015. *Dryopteris roraimensis* Brause, Notizbl. Königl. Bot. Gart. Berlin 6: 109. 1914. (nom. illeg. hom.). *Dryopteris arborea* Brause (replacement name), Repert. Spec. Nov. Regni Veg. 13: 294. 1914. *Thelypteris arborea* (Brause) A.R. Sm., Acta Bot. Venez. 14 (3): 7. 1984. TYPE: BRAZIL. Roraima. no date, *Ule 8526* (Holotype: B, photo B 200052457!, B 200052458!). Figures 3, 4A, 5A, 6.

Distribution and Habitat—*Amauropelta laevigata* is known from the tepuis of Brazil, Guyana, and Venezuela, the Occidental Andean Cordillera and Nudo de los Pastos from Colombia, and the Ecuadorian and Peruvian Andes, between 900–2743 m, in humid montane forests (Fig. 3).

Notes—Smith (1995), suggested that *Amauropelta* (*Thelypteris*) *arborea* has a distribution restricted to the Venezuelan Tepuis. By its elongate leaves, atropurpureus rachises, and pinnate-pinnatisected laminae we consider *A. arborea* as a synonym of *A. laevigata.*

The long leaves, atropurpureus petioles and rachises, and perispores covered with a finely raised reticulum and interconnected capitate thin strands, are potential synapomorphies for delineating a natural group within *Amauropelta*.

Representative Specimens Examined:—**Brazil.**—RORAIMA: no date, *E. H. G. Ule 8526* (K); Unknown data and collector (F).**—Colombia.**—CHOCÓ: Carretera Ansermanuevo-San José del Palmar, limites con el Valle del Cauca, Alto del Galápago, 2050–2100 m, 25 Aug 1976, *E. Forero et al. 2061* (COL, MO).—HUILA: Caquetá side of Huila-Caquetá divide, 20 km SE of Garzón, 2316 m, 06 Feb 1945, *E. L. Little 9390* (US).—NARIÑO: San Francisco, Carretera Pasto-Mocoa, entre el Mirador y San Francisco, 1500–2200 m, 27 Nov 1967, *L. E. Mora 4450* (COL).—PUTUMAYO: road from San Francisco to Mocoa, Km 112 from Pasto, near

El Mirador, 2190 m, 31 Oct 1974, *T. Plowman & W. Davies 4356* (COL).**—Ecuador.**—ESMERALDAS, road Lita-Alto Tambo c. Km 17.7, 900 m, 00°51' N, 78°29'W 29 Sep 1991, *B. Øllgaard 99180* (AAU).—MORONA-SANTIAGO: Indaza, 1924, *C. Crespi s.n*. (US).**—Guyana.**—RORAIMA: Cima del Roraima tepui, Sector norte de la cumbre, 2743 m, 5°12'34"N, 60°44'16"W, 27 Mar 2012, *Y. Vivas et al. 3102* (IBB, UC); MAZARUNI-POTARO: Roraima, Summit, La Proa Camp, east of bordcer, near Lake Gladys, 2800 m, *R. Liesner 23277* (MO, NY, UC).**—Peru**.—HUANCAVELICA: Tatanará, Ost Abhang der Cordilleren von Peru "Eastern slope of the Cordillera of Peru", Aug 1854, *W. Lechler 2628* (B).**—Venezuela.**—AMAZONAS: Atabapo, Cerro Marahuaca, summit on SE corner, 2700 m, 3°37' N, 65° 21°W, 12 Oct 1988, *R. Liesner 24659* (MO, NY, U, UC, US); Cerro Marahuaca, cumbre, extremo noreste, 2580–2600 m, 3°50'N, 65°28' W, 30 Mar-1 Abr 1983, *J. Steyermark & F. Delascio 129288* (MO, NY, U, UC, VEN); Cerro Marahuaca, cumbe sección noroccidental, 2500 m, 3°30'N, 65°26'W, 16 Feb 1981, *J. Steyermark et al. 124512* (MO, NY, VEN); Marahuaca, Atabapo: Cerro Marahuaca, sección suroriental, vecindades del zanjón, 2685 m, 3°37'N, 65°21'W, 15 Feb 1981, *B. Maguire 65571* (MO, NY, VEN); Cerro Marahuaca-FHUIF cumbe, 2480–2500 m, 3°35'N, 65°20'W, 1–2 Feb 1982, *J. Steyermark et al. 126045* (MO, NY); Río Negro, Cerro de La Neblina, Camp VII, 5.1 m NE Pico Phelps 21.5 km E Neblina Base Camp, 2050 m, 00°50'40"N, 65°58'10"W, 4 Feb 1985, *J. Beitel 85151* (NY, UC).—BOLÍVAR:—Summit Roraima, 2621 m [8600'], 1898, *M.F.V. McConnell & J.J. Quelch 627* (K, NY); Distrito Piar, Macizo del Chimantá. Sector centro-noreste del Chimantá tepui, cabeceras orientales del Caño Chimantá, 26–29 Jan 1983, 5°18'N, 2°09'W, 2000 m, *J. Steyermark et al. 128060* (MO, UC, VEN); *128244* (MO, UC, VEN); Ilu-tepui, lower plateau, 2500 m, 05°25'36"N, 60°29'W 16 Apr 1988, *R. Liesner 23414* (MO, NY, UC, US).

KEY TO THE SPECIES OF *AMAUROPELTA* WITH ELONGATE SCANDENT LEAVES IN COLOMBIA

1. Rhizome scales pubescent; petioles stramineous, strigose; perispore covered with an open reticulum …….…….....….*A. pteroidea*

1. Rhizome scales glabrous; petioles dark brown to atropurpureus, lustrous; perispore covered with a fine, raised reticulum, with capitate thin strands.....2

2. Laminae bipinnate; perispore covered with scattered capitate thin strands.……...…….…….*A. sunduei*

2. Laminae lobulate to pinnatisect; perispore covered with dense capitate thin strands……..……3

3. Pinnae apices straight; medial sinuses of the pinnae not reaching the costa; sori ovate; distributed on Amazonian tepuis of Venezuela and Brazil, Biogeographic Chocó, and Andes (Brazil, Colombia, Ecuador, Peru, and Venezuela)…….……*A. laevigata*

3. Pinnae apices ascending; medial sinuses of the pinnae reaching the costa; sori round; restricted to the Central and Oriental Andean Cordillera of Colombia……..…….…….*A. atropurpurea*

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AUTHOR CONTRIBUTION

DS, SRE, and FC conceptualized the manuscript. SRE, FC, MS, and DS gathered samples from the field. SRE prepared the specimens, performed SEM images, and morphological measurements on the samples. MS and ARS provided nomenclatural and taxonomical remarks. DS and SRE prepared the draft. All authors reviewed and edited the final version of the manuscript.

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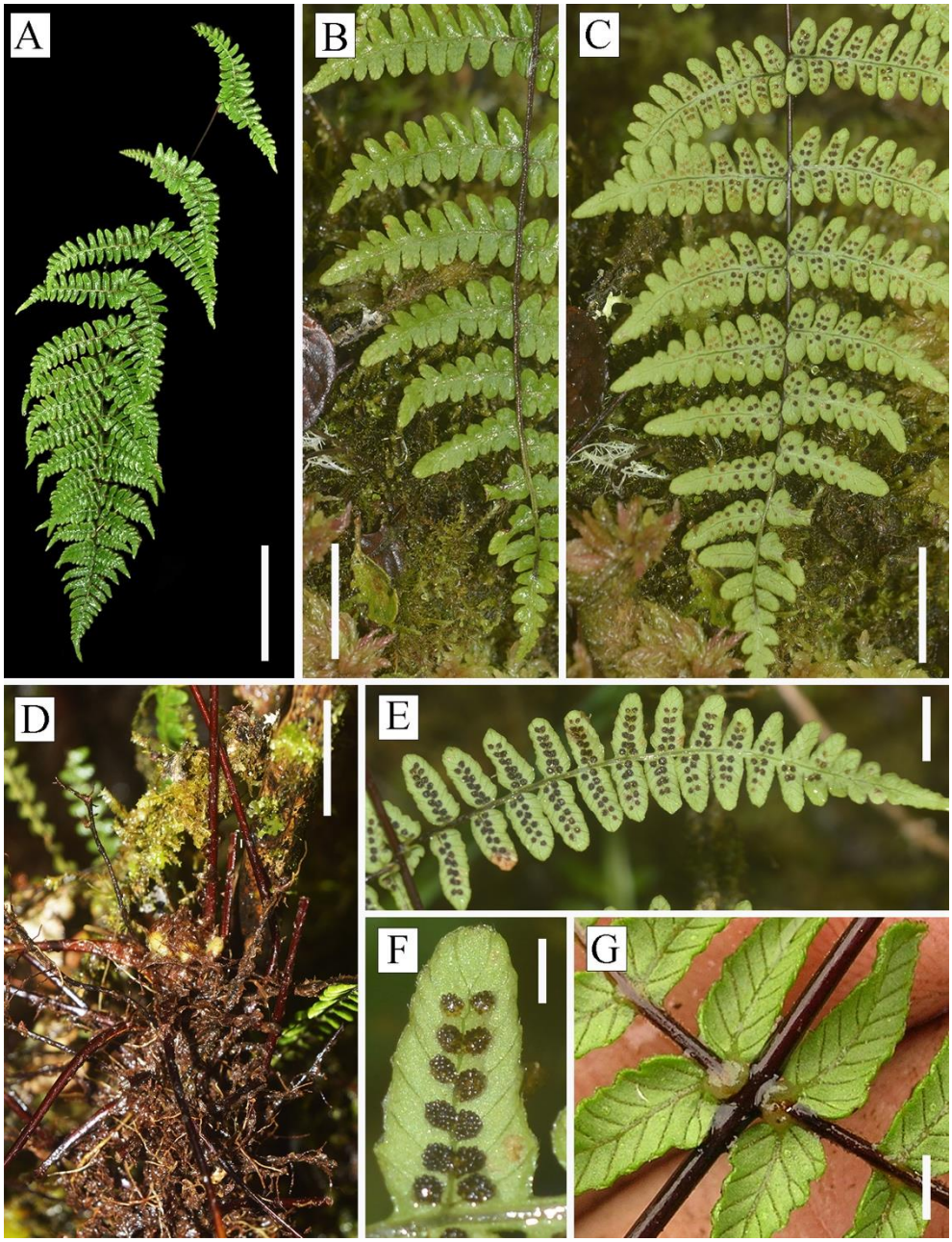

410

411 FIG. 1. *Amauropelta sunduei.* A. Lamina. B–C. Lamina apex (adaxially and abaxially,
412 respectively). D. Rhizome. E. Middle pinna. F. Medial pinnule. G: Pinna attachment to the
413 rachis showing the aerophores. Scale bars: A= 10 cm, B & C= 2 cm, D= 1 cm, E= 1 cm, F &
414 G = 1 mm. A, G from the type *M. Sundue & A. Vasco 1326* (NY), B-F from *D. Sanín et al.*
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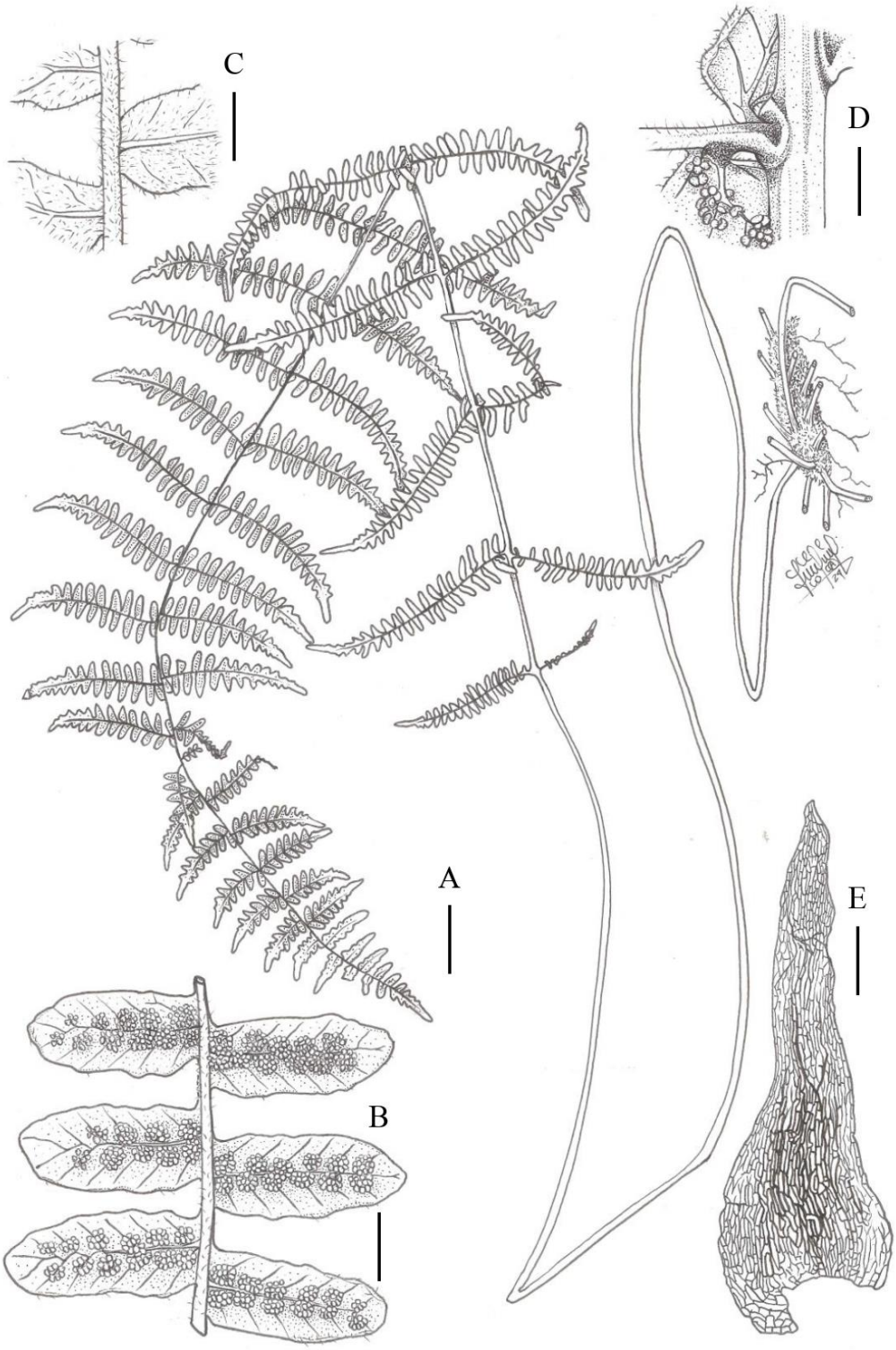

FIG. 2. *Amauropelta sunduei*. A. Habit. B. Portion of a pinna showing detail of the segments (abaxial view). C. Portion of a pinna showing detail of the segments (adaxial view). D. Pinna insertion revealing detail of the dry aerophores. E. Rhizome scale. Scale bars: A= 2.5 cm, B= 4 mm, C= 2 mm, D= 1 mm, E= 0.1 mm. All from *D. Sanín et al. 8251* (UIS).

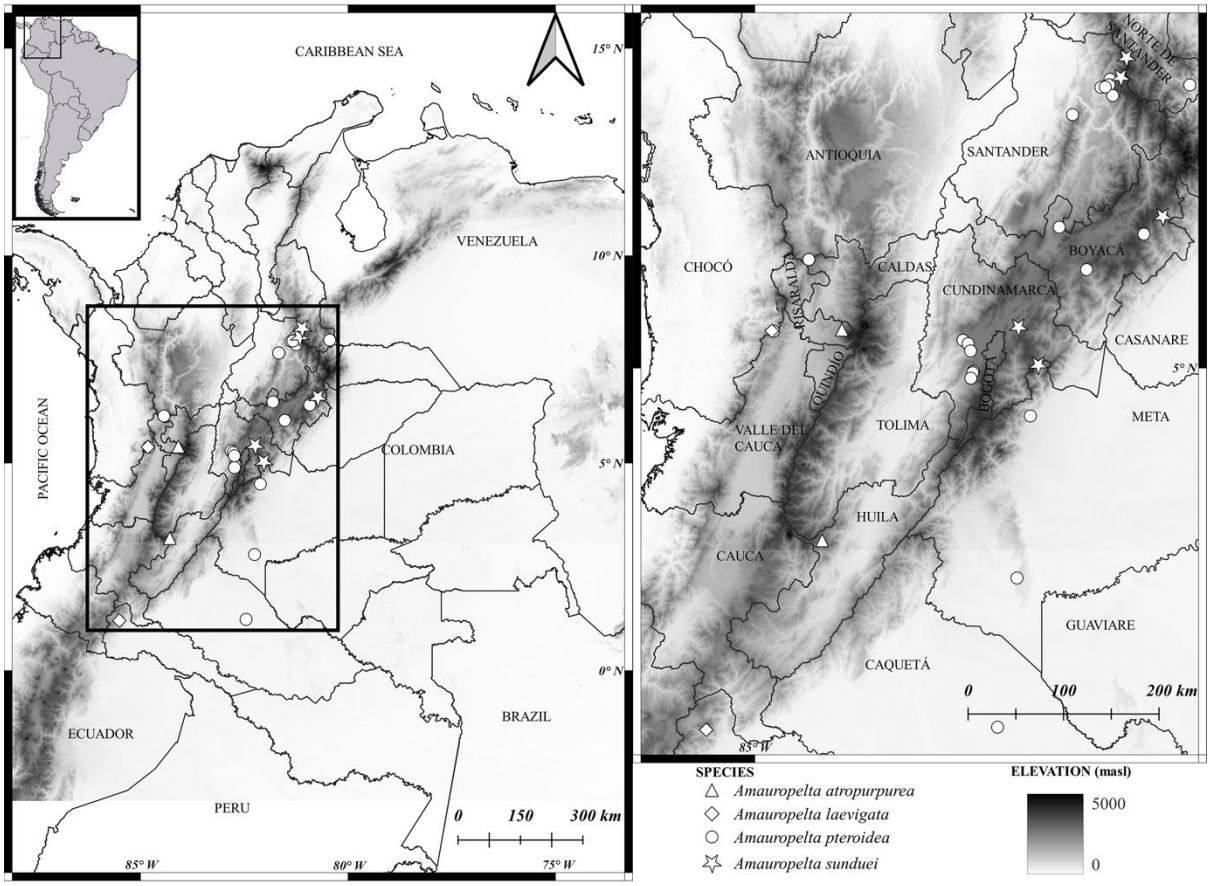

FIG. 3. Distribution of species of *Amauropelta* with long scandent leaves and atropurpureus rachises in Colombia.

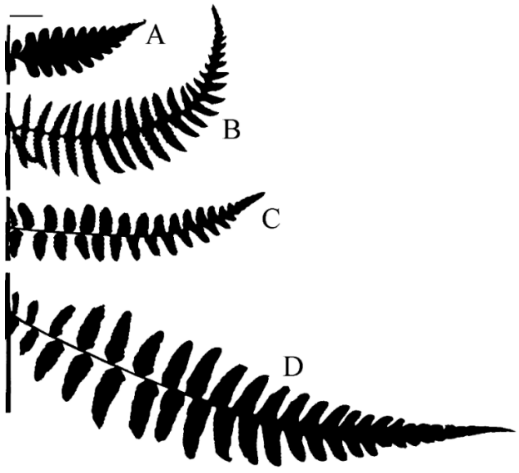

FIG. 4. Silhouette comparison of medial pinnae from similar species. A. *A. laevigata* (*L.E. Mora 4450*, COL), B. *A. atropurpurea* (*A. Stübel 159*, B*), C. *A. sunduei* (*D. Sanín et al. 8251*, UIS), D. *A. pteroidea* (*J.W.K. Moritz 291*, B*). Scale bar= 1cm. Types are labeled with asterisks (*).

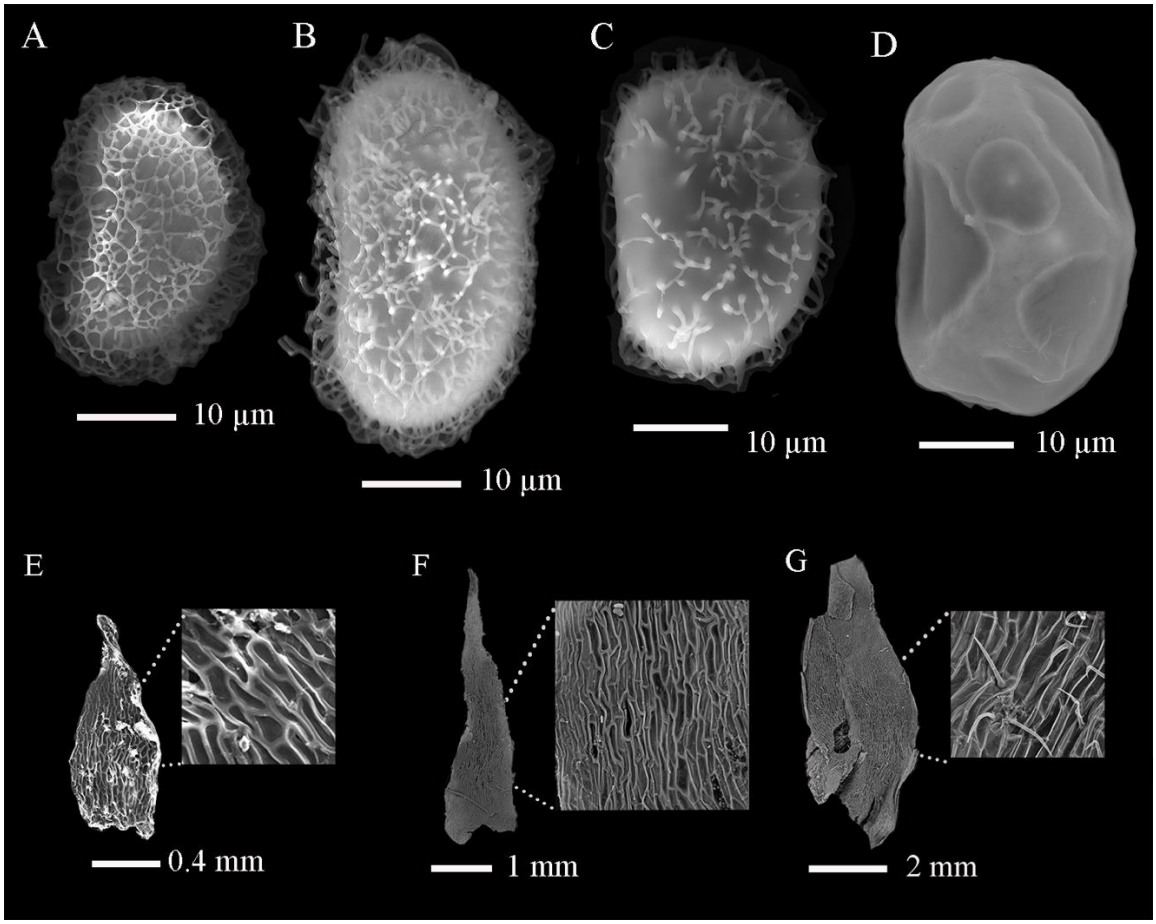

FIG. 5. Comparison of spore and scale morphology from similar species. A–D. Spores, A. *A. laevigata* (*L.E. Mora 4450*, COL), B. *A. atropurpurea* (*A. Stübel 159*, B*), C. *A. sunduei* (*D. Sanín et al. 8251*, UIS), and D. *A. pteroidea* (*J.W.K. Moritz 291*, B*). E–G. Scales, E. *A. atropurpurea* (*A. Stübel 159*, B*), F. *A. sunduei* (*D. Sanín et al. 8251*, UIS), G. *A. pteroidea* (*J.W.K. Moritz 291*, B*). Types are labeled with asterisks (*).

435

436 FIG. 6. Macroscopic view of the rhizome and the leaf in *Amauropelta laevigata*. A.
437 Rhizome. B. Lamina showing the abruptly reduced pinnae. C. Mature leaf showing the long
438 petiole. D. Medial pinna. E. Apex of the leaf. All from *A. Salino et al. 20110* (BHCB, HUA).
439 Scale bars: A= 2 cm, B= 5 cm, C= 20 cm, D= 2 cm, E= 3 cm. Photos by A. Salino.

Figure 1

Click here to access/download;Figure;Fig.1_Amauropelta_sunduei.tif

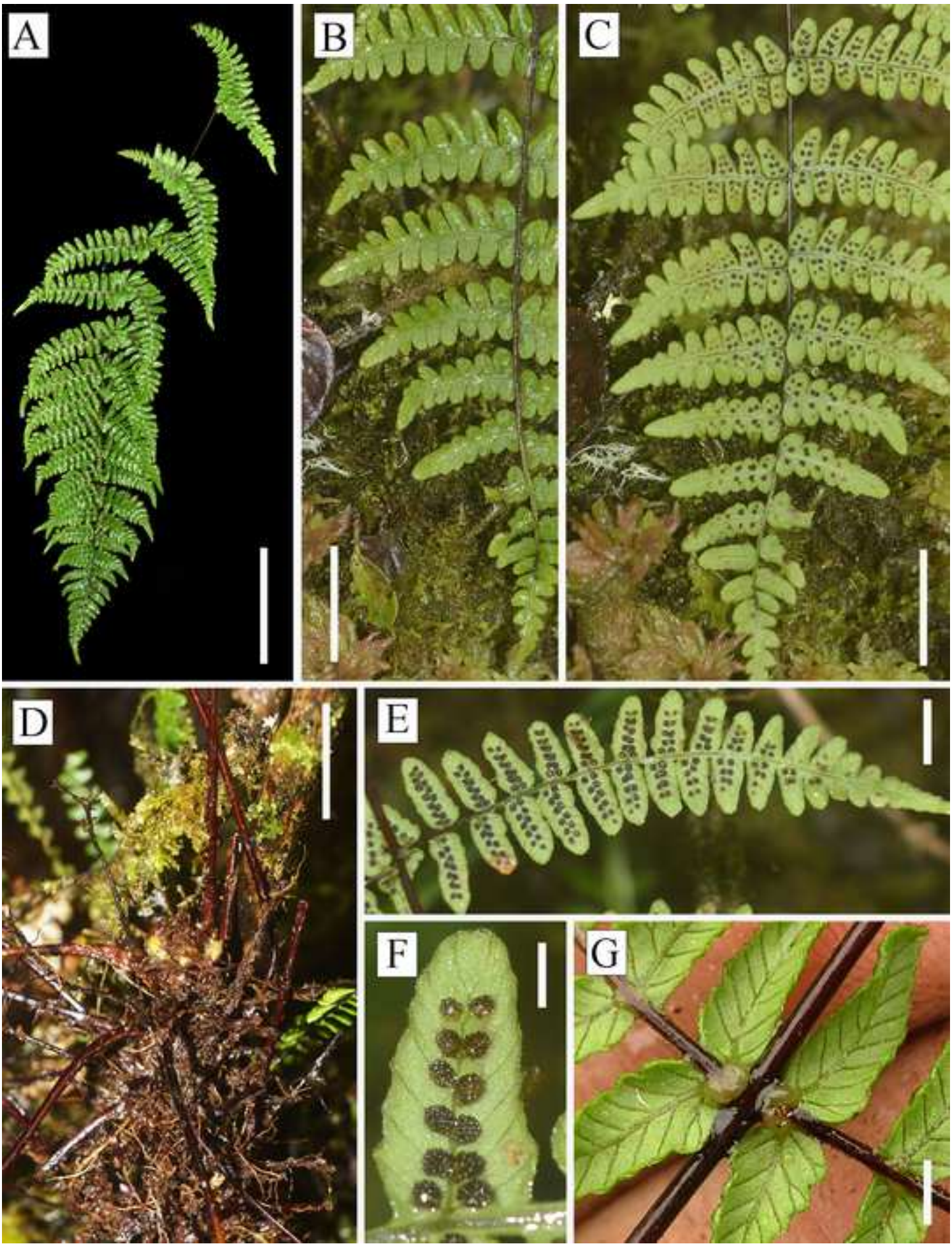

Figure 2

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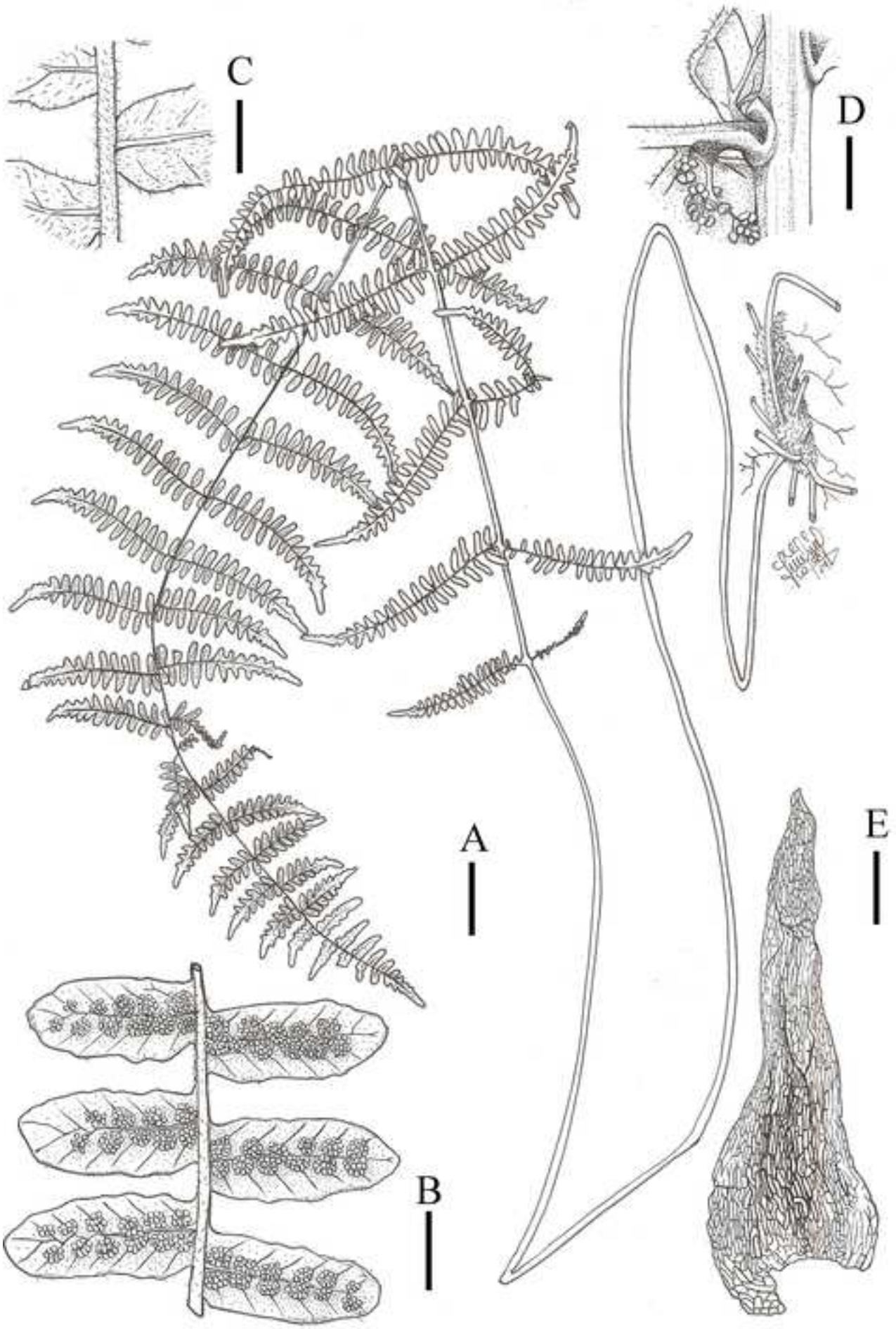

Figure 3

Click here to access/download;Figure;Fig.3_Distribution_map.tif

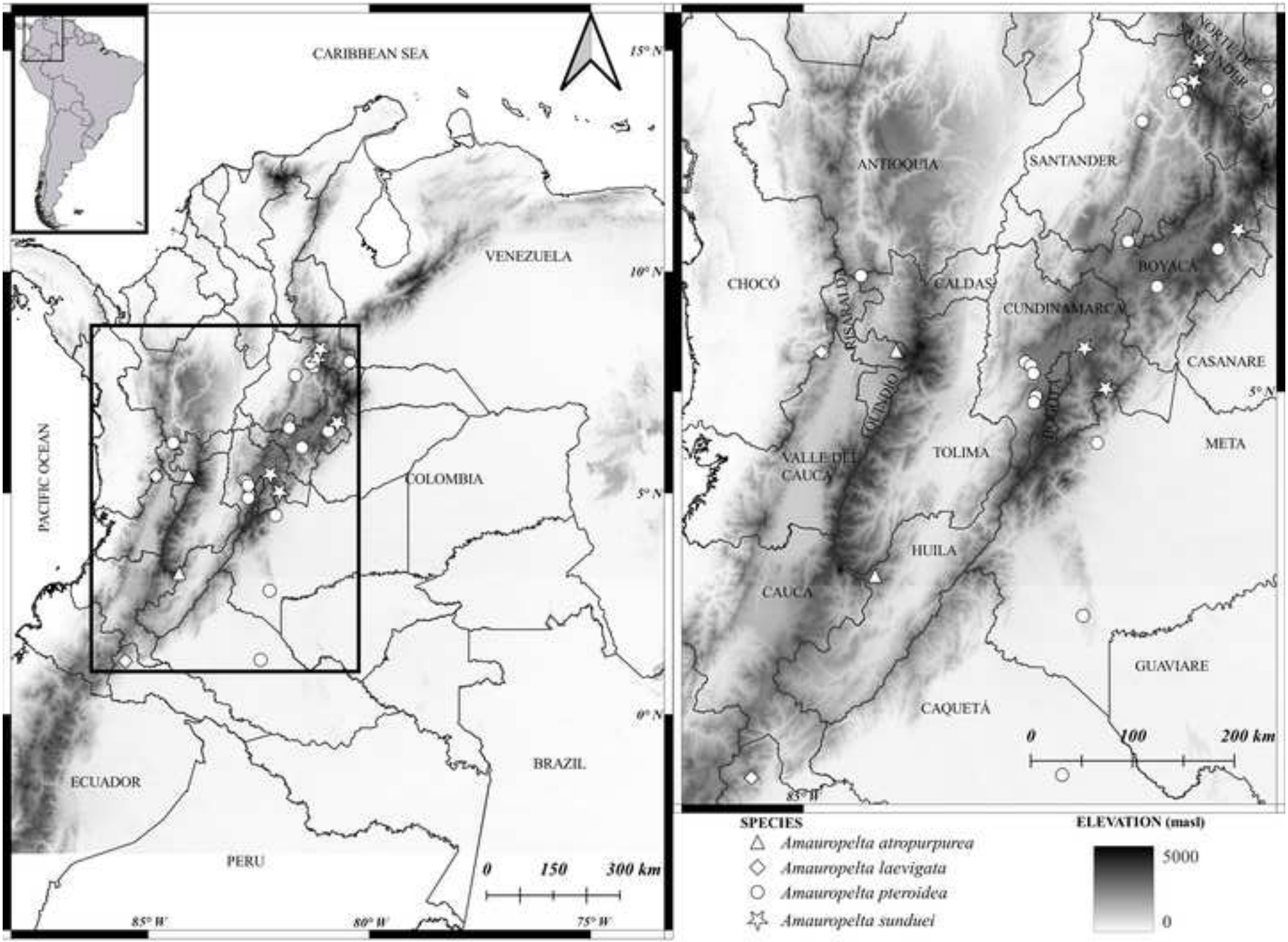

Figure 4

Click here to access/download;Figure;Fig.4_Pinnae_comparison_300.tif

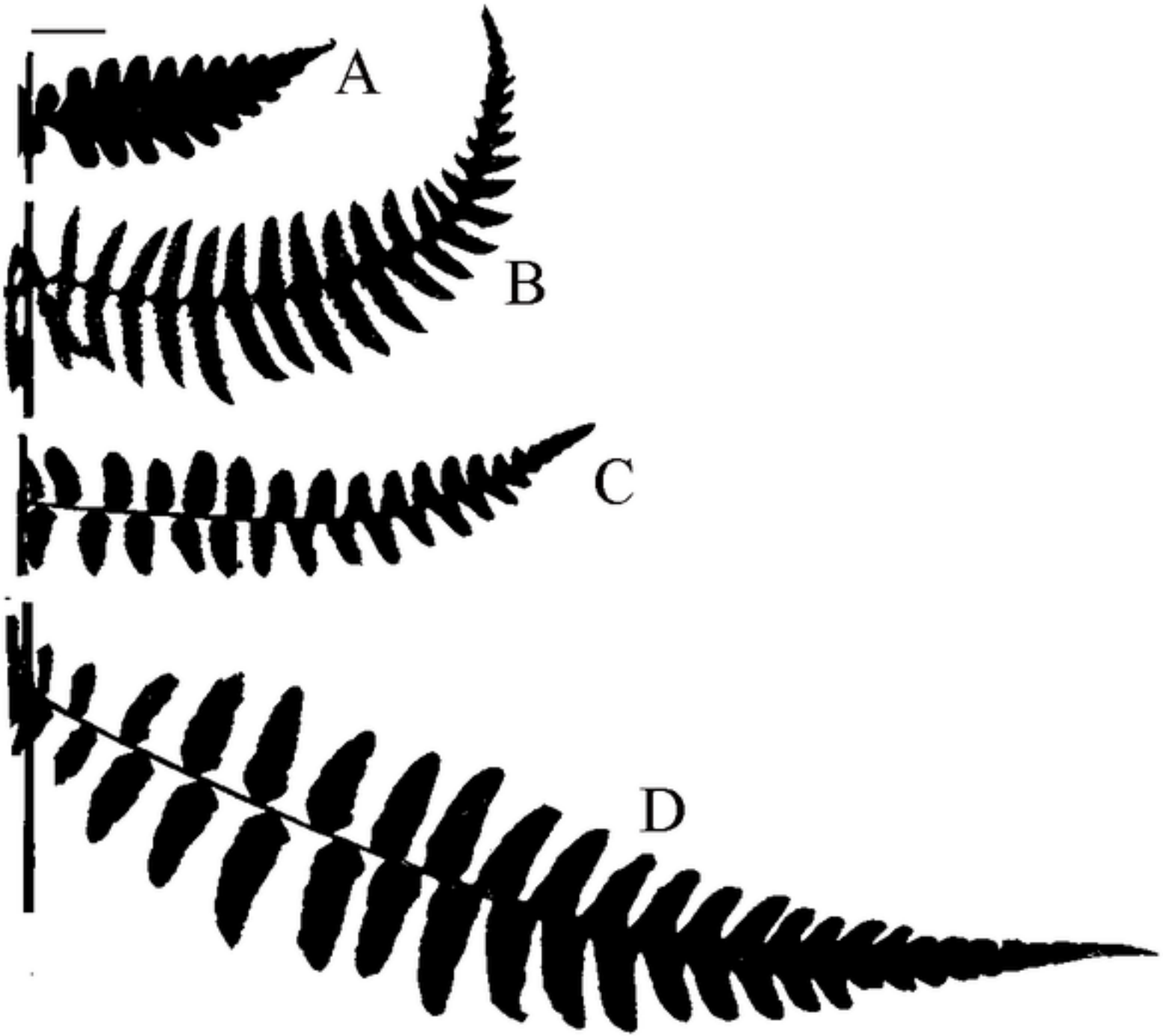

Figure 5

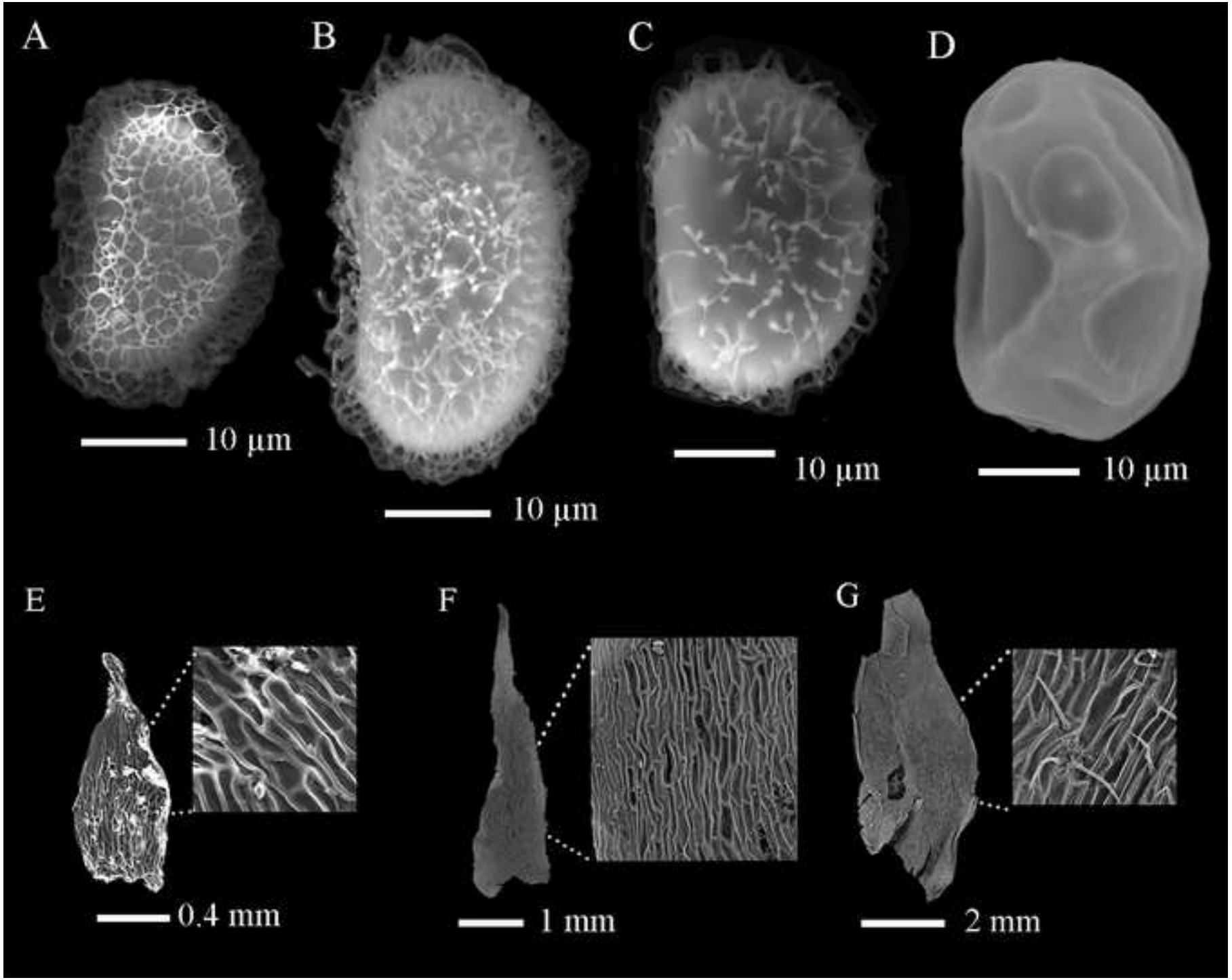

Figure 6

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