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NOVELTIES IN FERNS AND FERN-ALLIES FROM CENTRAL AMERICA

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ABSTRACT

In the studies of ferns and lycophytes from Costa Rica and Honduras, it was observed that the generic placement of several species needs to be updated. Also, it was found that the recorded distribution some species was not complete for Central America. Here, new geographic localities are recorded for 16 taxa and 8 new combinations are made: **Austroblechnum maxonii** (Broadh.) A. Rojas, **comb. nov.**, **Mucura gracilis** (Rojas & Tejero) A. Rojas, **comb. nov.**, **Parablechnum longistipitatum** (A. Rojas) A. Rojas, **comb. nov.**, **Pecluma pinnatissima** (R.C. Moran) A. Rojas, **comb. nov.**, **Pecluma plectolepidioides** (Rosenst.) A. Rojas, **comb. nov.**, **Pecluma ursipes** (Moritz ex C. Chr.) A. Rojas, **comb. nov.**, **Steiropteris nana** (A. Rojas) A. Rojas, **comb. nov**., and **Stenogrammitis guanacastensis** (A. Rojas) A. Rojas, **comb. nov**.

RESUMEN

En los estudios de taxones de helechos y licófitos de Costa Rica y Honduras, se observó que varias especies necesitaban combinarse en otros géneros para actualizar su taxonomía, también en la revisión de la distribución geográfica de algunas especies se encontró que varios no estaban registrados para algunos países de Centroamérica. Aquí se realizan ocho nuevas combinaciones y se registran 16 taxones para algunos países de Mesoamérica. Las nuevas combinaciones son: *Austroblechnum maxonii* (Broadh.) A. Rojas, *Mucura gracilis* (Rojas & Tejero) A. Rojas, *Parablechnum longistipitatum* (A. Rojas) A. Rojas, *Pecluma pinnatissima* (R.C. Moran) A. Rojas, *Pecluma plectolepidioides* (Rosenst.) A. Rojas, *Pecluma ursipes* (Moritz ex C. Chr.) A. Rojas, *Steiropteris nana* (A. Rojas) A. Rojas, and *Stenogrammitis guanacastensis* (A. Rojas) A. Rojas.

Molecular analyses have resulted in the segregation of new or revived genera from previously synonymized old names — for example *Austroblechnum* Gasper & Dittrich and *Parablechnum* C. Presl (Gasper et al. 2016), *Mucura* Triana & Sundue (Triana et al. 2022), *Steiropteris* (C. Chr.) Pic. Serm. (Almeida et al. 2016) and *Stenogrammitis* Labiak (Labiak 2011). In the case of *Pecluma* M.G. Price, the genus has been redefined, thus expanding its concept and including more species (Assis et al. 2016).

The Mesoamerican ferns and lycophytes were treated in the Flora Mesoamericana (Moran & Riba 1995), where 32 families, 136 genera and 1382 species were included. After that, Mickel & Smith (2004) published The Pteridophytes of Mexico with 124 genera and 1024 taxa. The Flora de Nicaragua (Gómez & Arbeláez, 2009) includes 114 genera and 633 species. Finally, Part One of The Ferns and Fern-allies of Costa Rica, Panama, and the Chocó is an important reference from south of Central America. However, many new species and records for the area have recently been included: Rojas (1996a-d, 1997, 2001a-d, 2002, 2003a-b, 2004a-b), Rojas & Trusty (2004), Rojas (205a-e, 2006a-f), Rojas & Palacios (2006), Rojas (2007a-g, 2008a-g, 2009a-b, 2010a-c), Rojas & Chaves (2010), Rojas (2011, 2012a-c), Rojas & Herrera (2012), Rojas (2013a-b), Rojas & Chaves (2013), Rojas & Herrera (2013), Rojas & Chaves (2014), Rojas & Sanín (2014), Rojas (2015a-b, 2017a-i) Rojas & Baaijen (2017), Rojas & Calderón (2017), Rojas, Hernández, & Moreno (2017), Rojas & Muñoz (2017), Rojas & Tejero (2017), Rojas (2018), Reyes et al. (2018), Rojas & Villalobos (20 18), Reyes, Rojas & Reyes (2019), Rojas & Barrantes (2021), and Rojas, Ospino, & Ortiz (2023).

This report complements and updates the Lycopodiopsida and Polypodiopsida floras of the Central America region.

Materials and methods

Collections have been studied from these herbaria: Museo Nacional de Costa Rica, Herbario Nacional de Costa Rica (CR), Universidad Zamorano (EAP), Missouri Botanical Garden (MO) and Universidad Nacional Autónoma de Honduras, Herbario Cyril Nelson (TEFH), acronyms following Thiers (2016). The specimens were reviewed using keys and descriptions of several Mesoamerican floras, such as Flora Mesoamericana (Moran & Riba 1995), The Pteridophytes of Mexico (Mickel & Smith 2004), Flora de Nicaragua; helechos (Gómez & Arbeláez 2009), and several papers previously mentioned. Type material or digital type images were examined as available (JSTOR Global Plants: <http://plants.jstor.org/>).

The distribution maps are based on new records together with selected specimens present in Tropicos Database and Ecobiosis of Museo Nacional de Costa Rica.

New combinations

AUSTROBLECHNUM MAXONII (Broadh.) A. Rojas, **comb. nov.** *Struthiopteris maxonii* Broadh., Bull. Torrey Bot. Club 39: 268. 1912. **TYPE. PANAMA. Chiriquí.** Cerro de la Horqueta, southern slope, around Los Siguas Camp, 1700 m, 17-19 Mar 1911, *W. Maxon 5415* (holotype: US!; isotypes: GH-n.v. (photo, NY!), NY-n.v., US!).

Blechnum mexiae Copel., Univ. Calif. Publ. Bot. 17: 32, t. 7. 1932. **TYPE. BRAZIL. Minas Gerais.** Districto Carangola, trail Areponga to Fazenda de Grama, ca. 12 km., 970 m, 27 Jan 1930, *Y. Mexia 4237* (holotype: UC!, isotypes: B!, CAS!, F!, GB!, GH!, K!, MICH!, MO!, NO!, NY!, P!, U!, US!).

According to Gasper et al. (2016), *Austroblechnum* is characterized by rhizome-bearing concolorous or bicolorous scales, fronds dimorphic, blades with reduced pinnae proximally, pinnae partially or totally adnate, with veins ending in enlarged and readily visible hydathodes; characters concordant with *A. maxonii*. As mentioned in Rojas (2008c) this species differ from *Blechnum lherminieri* (Bory) C. Chr. (now *Austroblechnum lherminieri* (Bory) Gasper & Dittrich) by thin stipe (1.0-1.5 mm in diameter vs. 1.5-3.0 mm), narrowly elliptic (vs. lanceolate to lanceolate-elliptic), narrow [3-5 (-7) cm vs. 5-12 cm)], gradually reduced (vs. abruptly reduced to truncate) blades, with 1-3 pairs of semicircular or lunular [vs. (2-) 4-7 pairs] pinnae and stramineous to rarely brown (vs. commonly atropurpureous) stipes of the fertile fronds. Gasper et al. (2016) did not include this species among those transferred to the genus *Austroblechnum.*

Gasper et al. (2016) also did not include two other species: *Blechnum flaccisquama* A. Rojas (1996d) based on the type *R. Aguillar 1641* (holotype: CR!; isotype: MO!) and *Blechnum puberulum* (Sodiro) A. Rojas (2008b) based on the type *S. Sodiro s.n.* (Type: SI). In the Tropicos database *B. flaccisquama* is indicated as a synomym of *B. occidentale* L. According with Rojas (1996) *B. flaccisquama* differ from *B. occidentale* because has bigger rhizome scales (4-8 x 1-2 mm vs. 1-5 x 0.2-1 mm), ovate to lanceolate (vs. linear-lanceolate to linear), conclorous to slightly bicolorous (vs. markedly bicolorous) and flaccid (vs. rigid), more pinnae pairs (20-35 vs. 12-23) and basifixed (vs. free at less five basal pairs), linear-deltate (vs. elliptic to broadly lanceolate), more approximate between them (continuous to 2 cm vs. 1.5-4 cm distant), the basal pinnae with an incision basiscopically and excurrent acroscopically (vs. chordate to obtuse at the base), and narrowly indusium (0.3-0.5 mm vs. ca 8 mm). In the case of *B. puberulum*, as indicated by Rojas (2008) this species differs from *B. appendiculatum* Willd. in the hairs (dense in the rachis and sparse in both surfaces, they ca. 1 mm long, reddish and catenate vs. hairs present only in the stipe and rachis, and they 0.2-0.5 mm long, whitish to brown, sparse to middle dense and cylindrical). The same differences are valid from separate of *B. glandulosum* Kaulf. ex Link.

MUCURA GRACILIS (Rojas & Tejero) A. Rojas, **comb. nov.** *Dennstaedtia gracilis* Rojas & Tejero, Rev. Biol. Trop. 50(3-4): 1008–1011, f. 1, 2a, c, 3. 2002[2003]. **TYPE. MEXICO. Hidalgo.** Mpio. de Molango: km 118 de la Carretera Federal 105, entre Zacualtipán y Molango, 20º28'21"N, 98º40'32"W, 1400 m, 15 May 2000, *A. Rojas et al. 5376* (holotype: MO!; isotypes: CR!, F!, NY-n.v., UAMIZ!, UC!, US-n.v.).

Dennstaedtia gracilis was synonymized under *D. globulifera* (Poir.) Hieron. only with the mention that small sori of *D. gracilis* seem to be only a variant of *D. globulifera* (Mickel & Smith 2004). However, as indicated by Rojas & Tejero (2002), *Mucura gracilis* is separated from *M. bipinnata* (Cav.) L.A. Triana & Sundue by having smaller fronds (0.7-1.5 m long vs. 1.5-2.5 m), thinner blade texture (herbaceous to papery vs. chartaceous), dull adaxial surface (vs. glossy), laterally winged costae on apical half only (vs. wingless). It is also different from *M. globulifera* (Poir.) L.A. Triana & Sundue by thinner rhizome (0.4-0.7 cm diameter vs. 1-3 cm), smaller rhizome hairs (1.5-2.5 mm long vs. 4-8 mm) and dark brown (vs. yellowish-brown to reddish-brown), smaller fronds (0.7-1.5 m long vs. 2.3-3.5 m), costa laterally winged only in apical half (vs. costa laterally winged throughout), abaxial surface of blade glabrous (vs. hairy), deltate-lanceolate pinnules (vs. ovate to ovate-oblong) and smaller sori (0.5 mm exserted x 0.6-0.8 mm wide vs. 1 mm exserted x 1.0-1.5 mm wide).

Triana et al. (2022, p. 36) listed the new combinations and constituent species of *Dennstaedtia* but the three species described in Rojas & Villalobos (2018) — *D. axillaris*, *D. rectangularis*, and *D. riparia* -- were not included.

Key to the species of *Mucura* (Rojas & Tejero 2002).

1. Rhizome 1-3 cm in diameter; rhizome hairs 4-8 mm long, yellowish-brown to reddish-brown; winged main coast in all its extension; basal segments of pinnules sub-opposite and sub-equilateral; hairy laminar tissue; sori 1-1.5 mm wide ..... **Mucura globulifera**

1. Rhizome 0.4-1.0 cm in diameter; rhizome hairs 1.5-2.5 mm long, brown to dark brown; main costa wingless at least on proximal half; basal segments of pinnules alternate and inequilateral; glabrous laminar tissue (with hairs only on the veins); sori 0.6-1 mm wide.

2. Fronds 1.5-2.5 m long; costae without lateral wings; laminar chartaceous tissue, dorsally glossy; finlet tips evidently notched; sorus 1 mm exserted x 1 mm wide, cylindrical to subglobular ..... **Mucura bipinnata**

2. Fronds 0.7-1.5 m long; costae winged laterally on apical half only; herbaceous to papyraceous laminar tissue, opaque; finlet tips lobed; sorus 0.5 mm exserted x 0.6-0.8 mm wide, globular to oblate ..... **Mucura gracilis**

PARABLECHNUM LONGISTIPITATUM (A. Rojas) A. Rojas, **comb. nov.** *Blechnum longistipitatum* A. Rojas, Brenesia 75-76: 7-8, f. 1A-C. 2011. **TYPE. COSTA RICA. Puntarenas.** Puntarenas, Isla del Coco, Parque Nacional Isla del Coco, sendero a cerro Iglesias, parte alta, 5°31'45" N 87°04'50" W, 500-634 m, 23 Nov 2007, *A. Rojas 8187* (Holotype: CR!; Isotypes: K-n.v., MO!, USJ-n.v.).

This species is distinctive in its short creeping rhizome and stipe longer than the blade, as indicated by Rojas (2011), two characters rare in the genus. According to Rojas (2011), *Blechnum longistipitatum* differs from *B. falciforme* by having short-creeping to suberect (vs. erect) rhizome, long (+1/2-2/3 of the frond length vs. 1/3-1/2) stipe, cordiform (vs. rounded to truncate) pinnae base and low geographical distribution (350-634 m vs. 1100-3200 m). It is similar to *B. christii* C. Chr.; however, *B. longistipitatum* differs by its short-creeping to suberect (vs. erect) rhizome, more (15-24 (-32) vs.7-10) pinnae pairs, longer (10-22 cm long vs. 5-10 cm) pinnae and low geographical distribution (350-634 m vs. 1800-2700 m).

Gasper et al. (2016) did not include this species in the classification of Blechnaceae.

PECLUMA PINNATISSIMA (R.C. Moran) A. Rojas, **comb. nov.** *Polypodium pinnatissimum* R.C. Moran, Novon 2: 135, f. 4. 1992. **TYPE. PANAMA.** Panamá-San Blas border along El Llano-Cartí road, ridge trail along the divide, 250-300 m, 12 Feb 1988, *R. Moran 4098* (holotype: MO!; isotype: UC-1548870!).

According to Assis et al. (2016) *Polypodium dulce* Poir. in Lam., previously considered in the *Polypodium dulce* group (Moran 1996), joined with *Polypodium rachypterygium* Liebm., previously considered in the *Polypodium plesiosorum* group of Moran (1995) — they were included in the clade III of *Pecluma* in their phylogenetic analysis, both species characterized by few pinnae pairs, broad pinnae and oblong sori, the three characters present in *Polypodium pinnatissimum*, *Polypodium plectolepidioides* Rosenst., and *P. ursipes* Moritz ex C. Chr. The last three species are transferred to *Pecluma* in the present manuscript.

Pecluma pinnatissima is different from *Pecluma dulce* (Poir.) F.C. Assis & Salino in its pinnate blade (vs. pinnatisect to rarely 1-pinnate at base), subconform blade apex (vs. pinnatifid) and setose sporangia (vs. glabrous), as mentioned by Moran (1992). Also, *Pecluma dulce* is epilithic in the margin of rivers or streams and *P. pinnatissima* is epiphytic in lower part of trunks or epilithic in undergrowth. Another similar species is *P. plectolepidioides* (combined below), but it grows epiphytic in the upper and middle part of trees with medium to abundant light.

PECLUMA PLECTOLEPIDIOIDES (Rosenst.) A. Rojas, **comb. nov.** *Polypodium plectolepidioides* Rosenst., Repert. Spec. Nov. Regni Veg. 10(251-253): 278. 1912. **TYPE. COSTA RICA. Cartago.** Turrialba, 650 m, 5-7 Aug 1909, *A. Brade & C. Brade 361* (holotype: S!: isotypes: CR-132164!, NY!, UC-405670!, US! (fragment)).

Pecluma plectolepidioides has the biggest fronds (to 1.5 m long) in the *P. dulce* group. It is similar to *Pecluma dulce* in its long and narrow pinnae but differs in longer fronds ((80-) 100-160 cm long vs. (35-) 50-90 cm), longer (10-20 cm long vs. 5-12 cm) basal and medial pinnae and few pinnae pairs (30-50 pairs vs. 10-25), reticulate veins with a row of areoles (vs. free veins or irregularly anastomosing) and sporangia setulose (vs. glabrous). More discussion is give under *Pecluma pinnatissima*.

PECLUMA URSIPES (Moritz ex C. Chr.) A. Rojas, **comb. nov.** *Polypodium ursipes* Moritz ex C. Chr., Index Filic. 572. 1906 [nom. nov., replacing *P. ambiguum* 1869]. *Polypodium ambiguum* Mett. ex Kuhn, Linnaea 36: 134. 1869 [non Desv. 1827; non Blume 1828]. **LECTOTYPE. VENEZUELA. Aragua.** Near Colonia Tovar, *A. Fendler 254* (US!; isolectotypes: B-n.v., K!, MO!).

This species is recognized because has pinnate fronds with sessile (no adnate) and auriculate basal pinnae, free veins and setose sporangia, as indicated by Moran in Moran & Riba (1995). More discussion under *Pecluma pinnatissima*.

STEIROPTERIS NANA (A. Rojas) A. Rojas, **comb. nov.** *Thelypteris nana* A. Rojas, Brenesia 75-75: 9-10, f. 4A-C. 2011. **TYPE. COSTA RICA. Puntarenas.** Cantón de Puntarenas, Isla del Coco, Parque Nacional Isla del Coco, orillas del río Genio, después de la cascada Presidente y hasta Los Llanos, 5º32'05" N 87º03'30" W, 150-220 m, 6 Jan 2010, *A. Rojas & J. Chaves 8940* (Holotype: CR!; Isotypes: K-n.v., MO!, USJ-n.v.).

According with Smith (1995) and Salino et al. (2015) *Steiropteris* (C. Chr.) Pic. Serm. is characterized for cartilaginous keel (false vein) present below pinna sinuses, keels extending toward

costa but not meeting it; aerophores (tuberculate or often threadlike) at pinna bases usually present, absent in a few species and indusia present or absent; characters concordant with S. nana.
Steiropteris nana differs from *S. leprieurii* (Hook.) Pic. Serm. by having thinner rhizome [2-3 mm in diameter vs. (3-) 5-11 mm], smaller fronds (8-17.5 cm long vs. 53-140 cm), pinnate-lobulate to pinnate-pinnatifid (vs. pinnate-pinnatisect) blade, 1-5 free pinnae pairs [vs. (10-)15-25] and 3-5 (vs. 13-22) veins pairs per segment, as registered by Rojas (2011).

STENOGRAMMITIS GUANACASTENSIS (A. Rojas) A. Rojas**, comb. nov.** *Lellingeria guanacastensis* A. Rojas, Brenesia 45-46: 37, f. 4. 1996. **TYPE. COSTA RICA. Guanacaste.** Parque Nacional Guanacaste, Estación Pitilla, Fila Orosilito, 11º02'00" N, 85º25'20" W, 1000 m, 14 June 1989, *B. Hammel et al. 17458* (Holotype: CR!; Isotypes: CR!, MO-n.v.).

Stenogrammitis Labiak is a segregated genus of *Lellingeria* A.R. Sm. & R.C. Moran and differs of it because has linear leaves usually less than 5 mm wide, clathrate iridescent rhizome scales that are glabrous except for a single apical cilium, veins unbranched and only one per segment, fertile veins usually with the dark sclerenchyma visible beneath the sporangia (Labiak, 2011), all these characters present in *S. guanacastensis*.

Stenogrammitis guanacastensis was indicated by Labiak (2011) as synonym of *Stenogrammitis hellwigii* (Mickel & Beitel) Labiak, however differs from relative smaller fronds (2.5-5.5 cm long vs. (3.5-) 5-11 cm), pinnate (vs. pinnatifid blade) with papyraceus (vs. herbaceous) texture, flexuous (vs. not flexuous) rachis, narrower sterile segments (1.5-2.5 mm vs. 3-3.5 mm), sterile portion with entire to undulate margin (vs. crenate to lobulate) and lower altitudinal distribution (1000-1600 m vs. 2450-2750 m), as indicated by Rojas (1996d). This entity differs from *Stenogrammitis myosuroides* (Sw.) Labiak in its pinnate blade (vs. pinnatifid to pinnatisect), pinnae of sterile fronds spathulate (vs. broadly deltate) and reduced at base (vs. expanded), sterile pinnae of fertile fronds with rounded to obtuse apex (vs. acute), fertile portion of blade with entire to slightly undulate margin (vs. crenate), and lower altitudinal distribution (1000-1600 m vs. 2600-3300 m), as recorded by Rojas (1996d).

New records

ADIANTUM FRUCTUOSUM Poepp. ex Spreng., Syst. Veg. [Sprengel] 4(1): 113. 1827. **TYPE. CUBA.** 1822, *E. Poeppig s.n.* (holotype: LZ+; isotypes: B! (fragm., US!), L (photo, GH, US), US).

Distribution. Mexico, Guatemala?, Belize?, **Honduras**, Nicaragua, Costa Rica, Panama, Cuba, Trinidad & Tobago, Colombia, Venezuela, Guyanas, Ecuador, Peru, Bolivia and Brazil (see Figure 1A, Table 1). The presence of this species in Honduras was to be expected because it was known from countries north and south. The only record for Guatemala is the citation by Smith (1981). The specimen mentioned by Moran et al (1996) from Belize (*Croat 24373*, MO!) was identified by A.R. Smith in 1996 as *A. trichochlaenum* Mickel et Beitel.

Additional specimens. HONDURAS. Comayagua. Along Quebrada El Caliche, vicinity of Villa Taulabé, 600 m, 15 Jan 1978, *Molina & Molina 31662* (EAP). **Copán.** San Francisco Mountain, between San Isidro and San Cristobal, about 10 mi S of Copán Ruinas, 1200 m, 26 Aug 1975, *Molina 30701* (EAP). **El Paraíso.** Danlí, Finca Villa Elisa, 7 km E de Danlí, 14°02'51" N 086°30'57" W, 766 m, 29 Aug 1981, *Segovia 80* (MO). **Francisco Morazán.** Volcán de Guaimaca, Cordillera de Misoco, 1700 m, 18 Mar 1956, *Molina 6004* (EAP).

Adiantum fructuosum is confused with *A. tetraphyllum* Humb. & Bonpl. ex Willd., but the first has robust plant with broad and glabrous indusia.

ANEMIA × PARAPHYLLITIDIS Mickel, Brittonia 34: 407, f. 7. 1982. **TYPE. MEXICO. Oaxaca.** Dist. Villa Alta, trail from Villa Alta to airstrip, 5 Aug 1962, 4000 ft, *Mickel 1118* holotype: NY!).

Distribution. Mexico (Oaxaca, Chiapas), El Salvador, **Honduras**, Costa Rica, Venezuela, and Haiti (see Figure 1B, Table 1). The presence of this taxa in Honduras it was to be expected because it is known from countries north and south.

Additional specimens. HONDURAS. Francisco Morazán. San Juancito, 30 km NE de Tegucigalpa, 14°12' N, 87°06' W, 1300 m, 28 Aug 205, *Pavón 176* (TEFH); Valle de Ángeles, 21 km NE de Tegucigalpa, 1200 m, 2 Aug 1986, *Pineda 9* (TEFH).

According to Mickel & Smith (2004) *Anemia* × *paraphyllitidis* Mickel is the result of backcross between *A. phyllitidis* (L.) Sw. and *A. semihirsuta* Mickel. This taxon, however, is present where the presumed parents are not in contact, because *A. semihirsuta* is present in open areas with high insolation but *A. phyllitidis* is present in shady areas; *A.* × *paraphyllitidis* probably deserves recognition at species rank. *Anemia* × *paraphyllitidis* differs from *A. phyllitidis* because has 5-14 pinnae pairs (vs. (2-) 4-6 pinnae pairs) and pinnatifid (vs. conform) blade apex, according to Mickel & Smith (2004).

ANEMIA SEMIHIRSUTA Mickel, Brittonia 34: 410, f. 6. 1982. **TYPE. MEXICO. Oaxaca.** Dist. Villa Alta, trail from Villa Alta to airstrip, common on partially shaded bank, ca. 4000 ft, 5 Aug 1962, *J. Mickel 1120* (holotype: NY!).

Distribution. Mexico, **El Salvador**, **Honduras**, Nicaragua and **Costa Rica** (see Figure 1C, Table 1).

Additional specimens. EL SALVADOR. Santa Ana: Metapan, Montecristo, 14°25' N 089°21' W, 670 m, 17 Nov 1993, *Villacorta & Sipman 1270* (MO). **HONDURAS**. Lempira: Parque Nacional Montañas de Celaque, calle de acceso entre el centro de visitantes y la entrada del parque, 14°33'49" N, 88°37'48" W, 1250-1400 m, 29 Jun 2012, *Rojas 1008* (TEFH). **COSTA RICA**. Guanacaste: Cantón de La Cruz, distrito Santa Elena, Parque Nacional Guanacaste, Estación Biológica Maritza, Sendero Casa Fran, 9.611111° N, -85.4944444° W, 600 m, 9 Aug 1998, *Rojas et al. 4727* (CR). Puntarenas: Cantón de Esparza, Distrito de Macacona, Cuatro cruces, por la carretera rumbo a Chomes, 10.0347222° N, -84.5958333° W, 20 m, 23 Oct 1994, *Rojas 1622* (CR); cantón de Puntarenas, distrito de Chomes, Pitahaya, 1 km del pueblo de Chomes, 10.0527778° N, -84.8916667° W, 10 m, 23 Oct 1984, *Rojas 1623* (CR).

According to Moran & Mickel (in Moran & Riba 1995) this species originated as a hybrid between *A. hirsuta* (L.) Sw. and *A. phyllitidis*, but it is present where the presumed parents are not in contact. *Anemia hirsuta* grows in open areas with high insolation but *A. phyllitidis* is present in shady areas. See discussion under *Anemia* × *paraphyllitidis* for comments on relationships with these taxa.

ANEMIA TOMENTOSA var. **MEXICANA** (C. Presl) Mickel, Iowa State Coll. J. Sci. 36: 427. 1962. *Anemia fulva* var. *mexicana* C. Presl, Suppl. Tent. Pterid. 84. 1845. **TYPE. MEXICO.** *Leibold s.n.* (LZ, destroyed).

Distribution. Mexico, **Honduras**, Colombia, Venezuela, and Hispaniola (see Figure 1D, Table 1).

Additional specimens. HONDURAS. Francisco Morazán: drainage of the Río Yeguare, 14°N, 87°W, 900 m, 10 Sep 1950, *Williams 17238* (EAP).

According to Mickel & Smith (2004) *Anemia tomentosa* var. *mexicana* is distinguished by thin leaf texture and bipinnate-pinnatifid blades. It is closely similar to *A. karwinskyana*, which is distinct in its catadromous architecture segments that are more obtuse and rounded rather than toothed.

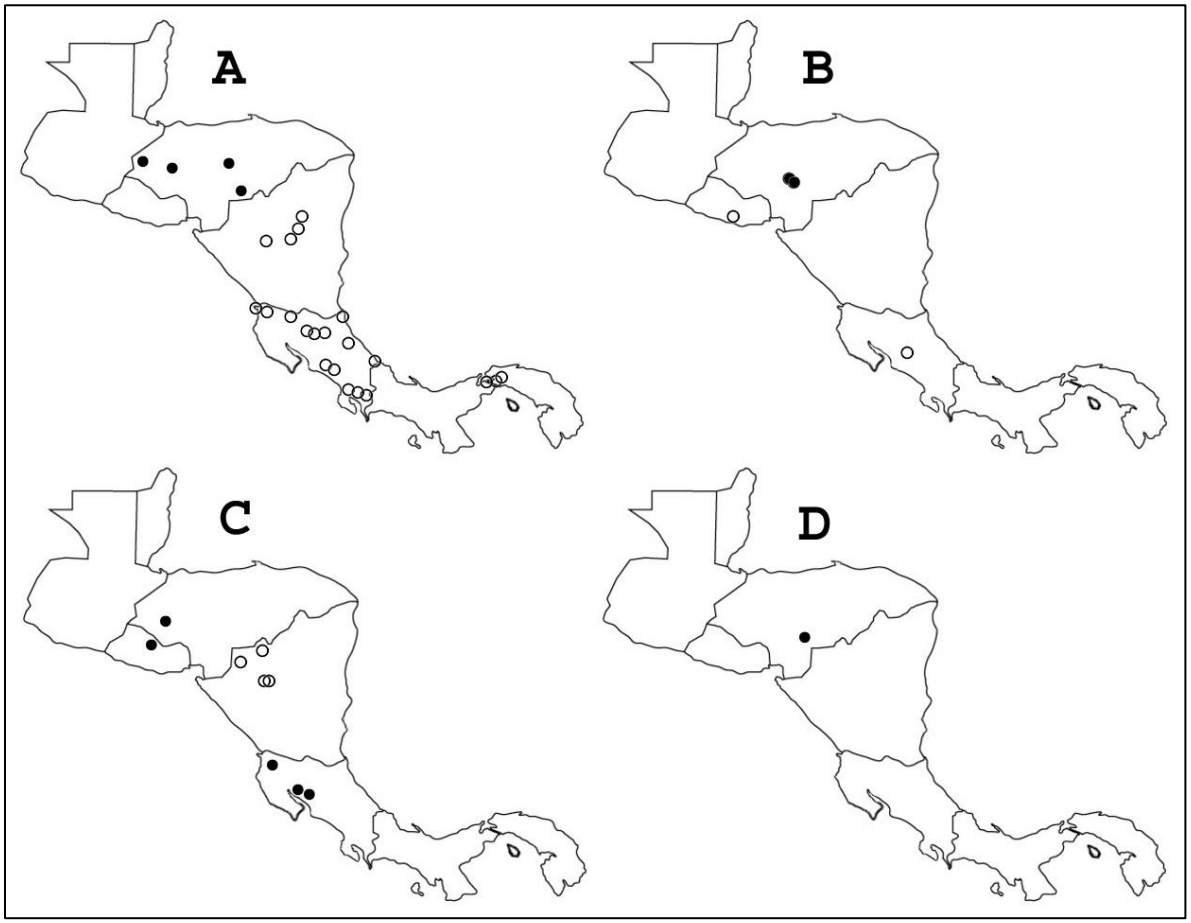

Figure 1. Distribution maps in Central America of: A. *Adiantum fructuosum* Poepp. ex Spreng.; B. *Anemia* × *paraphyllitidis* Mickel; C. *Anemia semihirsuta* Mickel and D. *Anemia tomentosa* var. *mexicana* (C. Presl) Mickel. ● = New distribution; ○ = Previously known distribution.

BLECHNUM MERIDENSE Klotzsch, Linnaea 20: 349. 1847. **TYPE. VENEZUELA. Mérida.** *Moritz 242* (holotype: B!; isotypes: BM!, NY!).

Distribution. Mexico, **Belize**, **Honduras**, Costa Rica, Panama, Lesser Antilles, Colombia, Venezuela, Peru, Brazil and Argentina (see Figure 2A, Table 1). The presence of this species in Belize and Honduras was to be expected because it was known from regions north and south. It was previously recorded from Chiapas, Mexico (Mickel & Smith 2004; Villaseñor, 2016) and Veracruz, Mexico (Villaseñor 2016) and Costa Rica (Rolleri et al. 2012).

Additional specimens. BELIZE. Sittee River Forest Reserve, 9 Mar 2016, *Brewer & Paredes 7626* (MO). Toledo: watershed of the Cocoa Branch on the Sittee River, 16°50'40" N, 88°34'05" W, 110 m, *Stevens & Paredes 7626* (MO); Southern Maya Mountains, Bladen Nature Reserve, trail between Roochire Selipan Archeological site and AC camp, 16°27'54" N, 88°52'49" W, 450 m, *Davidse 36979* (MO); ibidem, W Snake Creek, 16°27'24" N, 89°01'01" W, 500 m, 28 May 1997, *Holland & Kid 100* (MO). **HONDURAS. Comayagua.** Quebrada El Destiladero, entrando por Los Acantilados, 9 km O y 4km N de Zamorano, 25 Oct-1 Nov 1991, *Nelson & Andino 13138* (TEFH). **Olancho.** márgenes del río Talgua (Cuevas del Talgua), 8 km NE de Catacamas, 600 m, 5 Apr 1987, *A. Ortega 244* (TEFH).

Tropicos has erroneously used the name *Blechnum binervatum* (Poir.) C.V. Morton & Lellinger as the valid name for this species, probably because *Lamaria meridensis* Klotzsch has the same locality, but the type specimen is indicated as *Moritz 297* (B!). The problem is because apparently the type of *Blechnum meridense* deposited in B! and BM! has the number 24?, with the question mark probably interpreted as a number 2 by Klotzsch. The specimen in NY! is labeled as *Moritz 242*.

CTENITIS LEONII A. Rojas, Amer. J. Plant Sci. 8: 1331-1332, f. 1a-f. 2017. **TYPE. HONDURAS. Lempira-Gracias**. Celaque Mountains National Park, main path, up to ['tp' sic] Río Arcagual and heading to Don Thomas camp, 14º33'32" N 88º39'47" W, 1450-2100 m, 26 Jun 2012, *A. Rojas et al. 9965* (holotype: CR; isotypes: EAP, TEFH).

Distribution. Guatemala and Honduras (see Figure 2B, Table 1).

Additional specimens. GUATEMALA. Alta Verapaz. Along Río Cobán, 4 km E of Cobán, 1300 m, 21 Jan 1974, *Williams et al. 43635a* (EAP).

This species differs from *Ctenitis subdryopteris* (Christ) Lellinger by its apical stipe scales marginally erose to ciliate, blade surfaces with two types of hairs present in both surfaces, ones 0.7-1.5 mm long and no glandular, the others 0.3-0.5 mm long and glandular, and indusia absent (Rojas 2017c).

DIPLAZIUM DIPLAZIOIDES (Klotzsch & H. Karst.) Alston, J. Bot. 74: 174. 1936. *Lotzea diplazioides* Klotzsch & H. Karst., Linnaea 20: 358. 1847. **TYPE. COLOMBIA**. *H. Karsten II 23* (holotype: B).

Distribution. Mexico, **Guatemala**, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Bolivia (see Figure 2C, Table 1). The presence of this species in Guatemala was to be expected because it was known from Mexico and several countries to the south.

Additional specimens. GUATEMALA. Huehuetenango. 15-23 Set 2003, *R. Rodas 3652* (MO). San Marcos: Near Aldea Fraternidad, between San Rafael Pie de La Cuesta and Palo Gordo, W facing slope of the Sierra Madre Mountains, 1800-2400 m, 10-18 Dec 1963, *Williams et al. 25589* (EAP), ibidem, *Williams et al.* 25753 (EAP), ibidem, *Williams et al. 25969* (EAP), ibidem, *Williams et al.* 26214 (EAP), ibidem, *Williams et al.* 26277 (EAP); slopes of Tajumulco volcano, Sierra Madre Mountains, about 10 km W of San Marcos, 2400-2700 m, 3 Jan 1965, *Williams et a1. 27213* (EAP).

DIPLAZIUM EXPANSUM Willd., Sp. Pl. 5(1): 354. 1810. **TYPE. VENEZUELA**. Caracas: *Bredemeyer s.n.* (B-W 19948).

Distribution. Mexico, Guatemala, **Honduras**, Nicaragua, Costa Rica, Cuba, Jamaica, Haiti, Dominican Republic, Puerto Rico, Colombia, Venezuela, Guyana, French Guinana, Ecuador, Peru, Bolivia, and Brazil (see Figure 2D, Table 1). According to Tropicos Database, it also is present in Trinidad & Tobago (*Broadway 5471*, MO not seen), and *Barnard et al. 423* (MO not seen). Reyes et al. (2021), mentioned that this species was registered for Nelson et al. (1996), however Moran & Riba (1995) and Mickel & Smith (2004) did not consider it from Honduras. The species is documented here by several specimens from Honduras. The presence of this species in Honduras it was to be expected because it was known scattered in the continent.

Additional specimens. HONDURAS. Atlántida. Mountain Pico Bonito, 20-400 m, 24-25 Nov 2000, *Molina & Molina 35102* (EAP). **Olancho.** Quebrada la Presa de Catacamas, Montaña Peña Blanca, 1000 m, 28 Apr 1957, *Molina 8355* (EAP); trail between Catacamas and La Presa, N of Catacamas, 500-600 m, 20-25 Mar 1949, *Standley 18633* (EAP). **Santa Bárbara.** Lake Yojoa, Montaña de Santa Bárbara, 1000 m, 7 Aug 1948, *Williams & Molina 14485* (EAP).

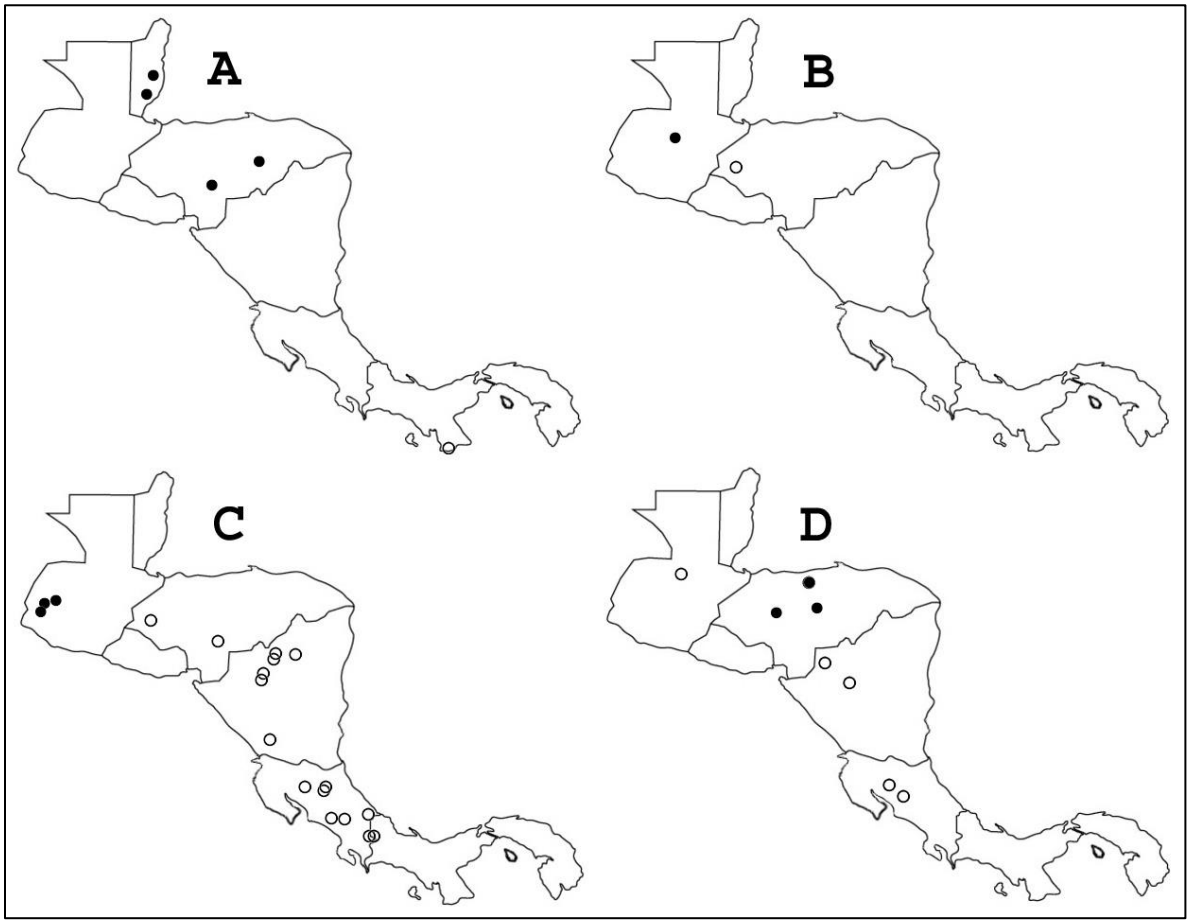

Figure 2. Distribution maps in Central America of: A. *Blechnum meridense* Klotzsch; B. *Ctenitis leonii* A. Rojas; C. *Diplazium diplazioides* (Klotzsch & H. Karst.) Alston and D. *Diplazium expansum* Willd. ● = New distribution; ○ = Previously known distribution.

GAGA MEMBRANACEA (Davenp.) Fay W. Li & Windham, Syst. Bot. 37: 857. 2012. *Pellaea membranacea* Davenp., Bot. Gaz. 21: 262, pl. 18. 1896. **TYPE. MEXICO**. Oaxaca. Sierra de San Felipe, 10 Dec 1895, *C. Pringle 5963* (holotype: GH!; isotype: VT!).

Distribution. Mexico, **Guatemala** and **Costa Rica** (see Figure 3A, Table 1).

Additional specimens. GUATEMALA. Chimaltenango. Volcán de Acatenango, 2700 m, 22 Jun 1999, *Véliz & Rosito MV 97.7016* (MO, USAC). **Huehuetenango.** Todos Santos, Cuchumatán, Puerta del Cielo, 15°32'12,42" N, 91°36'2,59" W, 3370 m, 17 Sep 2006, *Jiménez 298* (MO, USAC); Sierra de Los Cuchumatanes, between Raquix and San Juan Ixcoy, 3000-3350 m, 8 Jan 1974, *Molina et al. 30033* (EAP). **COSTA RICA. San José.** Pérez Zeledón, Cerro Frío, Hotel La Georgina, 09°33'-09°34' N, 83°43'-83°46' W, 3100-3400 m, 20 Sep 1983, *Davidse 24959* (MO); Pérez Zeledón, Parque Nacional Chirripó, en el km 12 camino, cañón de quebrada y refugio natural de roca, 09°28'15" N, 83°30'15" W, 3200 m, 11 Jul 2009, *Rojas et al. 8835* (CR, MO).

Gaga membranacea has a high altitudinal distribution — (2700-) 3000-3400 m — and is expected to be of local occurrence in highest peaks of the region.

MYRIOPTERIS NOTHOLAENOIDES (Desv.) Gruz & Windham, PhytoKeys 32: 59. 2013. *Pteris notholaenoides* Desv., Mém. Soc. Linn. Paris 6: 299. 1827. **TYPE. HISPANIOLA.** *Anon.* (holotype: P, photo-GH).

Distribution. México, **Guatemala**, **Honduras**, Costa Rica, Cuba, Haiti, and Venezuela (see Figure 3B, Table 1). The presence of this species in Guatemala and Honduras it was to be expected because it was known from Mexico and several more southern countries. According to Tropicos Database (1982), it also is present in Colombia, Ecuador, Peru, and Argentina.

Additional specimens. GUATEMALA. Huehuetenango. Aguacatan, canyon of a tributary of río Blanco, 5 km W above Aguacatáni, 15°20'35" N, 91°18'42" W, 2000 m, 11 Jan 1974, *Molina et al. 30231* (MO). **HONDURAS. Cortes-Comayagua-Yoro.** Proyecto Arquelógico El Cajón, 1981, *Anon. 1522* (EAP).

PECLUMA URSIPES (Moritz ex C. Chr.) A. Rojas, A. Rojas, this manuscript.

Distribution. Guatemala, El Salvador, Honduras, Costa Rica, Panama and Venezuela (see Figure 3C, Table 1). This is an extension of northern distribution.

Additional specimens. GUATEMALA. Huehuetenango. Chanximil, 15°33'11" N 091°41'55" W, 2185 m, 16 Sep 2006, *Ávila 3207* (MO, USCG), ibidem, *Morales Can 3943* (MO, USCG).

PHLEGMARIURUS OELLGAARDII (A. Rojas) B. Øllg., Phytotaxa 57: 17. 2012. *Huperzia oellgaardii* A. Rojas, Lankesteriana 5: 110, f. 3. 2005. **TYPE. COSTA RICA. San José.** Dota, along Río Pedregoso, ca. 1-2 km (by road) SE of Copey, 9º38'30" N, 83º55'00" W, 1940 m, 27 Feb 1990, *Grayum et al. 9704* (holotype: CR!; isotype: MO!).

Distribution. Honduras and Costa Rica (see Figure 3D, Table 1). This is the northernmost distribution of the species.

Additional specimens. HONDURAS. Cortés. W of San Pedro Sula, Sierra de Merendón, Parque Nacional El Cusuco, NW of the camp site Cantiles, 15°31.384´N, 88°14.822' W, 1750 m, Jul 2012, *Batke P04B05*(3) (TEFH). Olancho: al W del Centro de visitantes, 1400 m, 4 Feb 1993, *Nelson & Andino 14543* (TEFH).

POLYTAENIUM CHLOROSPORUM (Mickel & Beitel) E.H. Crane, Syst. Bot. 22: 516. 1997[1998]. *Antrophyum chlorosporum* Mickel & Beitel, Mem. New York Bot. Gard. 46: 41, f. 42K-L. 1988. **TYPE. MEXICO**. Oaxaca. Dist. Choapan, ridge between Yetzelagag and Lovani, from summit to river crossing at bottom of grade toward Lovani, 3600-5800 ft [1100-1770 m], 2 Dec 1971, *Hallberg 1546* (holotype: NY!; isotype: UC!).

Distribution. Mexico, **Honduras**, Nicaragua, Costa Rica, Panama, and Colombia (see Figure 4A, Table 1). The presence of this species in Honduras was to be expected because it was known from Mexico and countries in Central America to Colombia. According to Tropicos Database (1982) it also is present in Ecuador (*Werner 629*, MO not seen).

Additional specimens. HONDURAS. Yoro. Río Pinol Valley, 7 km SE of Nueva Esperanza, into Río Pinol and adjacent slopes, 15°12' N, 87°35' W, 1300-1500 m, 29 May 1993, *Liesner 26637* (EAP).

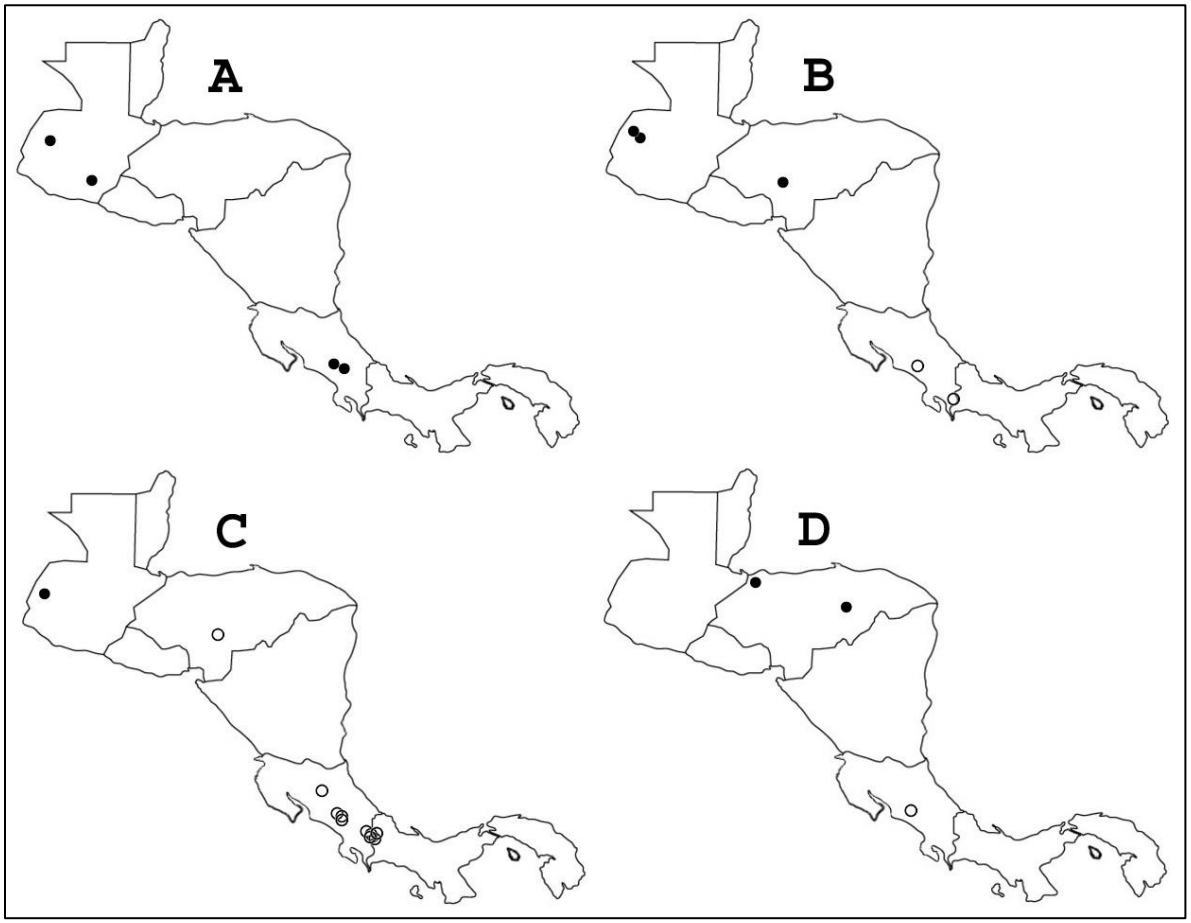

Figure 3. Distribution maps in Central America of: A. *Gaga membranacea* (Davenp.) Fay W. Li & Windham; B. *Myriopteris notholaenoides* (Desv.) Gruz & Windham; C. *Pecluma ursipes* (Moritz ex C. Chr.) A. Rojas and D. *Phlegmariurus oellgaardii* (A. Rojas) B. Øllg. ● = New distribution; ○ = Previously known distribution.

PTERIS MURICELLA Fée, Mém. Soc. Sci. Nat. Strasbourg 5(1): 73. 1857. **TYPE. MEXICO**. Veracruz: Near Cordoba and Huatusco, 1854, *W. Schaffner 143* (syntype: P! photo, K, SPF); isosyntype: RB!).

Distribution. Mexico, Guatemala, El Salvador, **Honduras**, Nicaragua, Costa Rica, Panama, and Venezuela (see Figure 4B, Table 1). Nelson et al. (1996) recorded this species from Honduras and cited a voucher; however, Moran & Riba (1995) and Mickel & Smith (2004) did not consider this species to be in Honduras (Reyes et al. 2021).

Additional specimens. HONDURAS. Olancho. Parque Nacional de El Armado, camino de la aldea de Ocotales rumbo al caserío de La Cumbre, 1600 m, 30 Apr 1993, *Nelson & Andino 16014* (TEFH); Refugio de Vida Silvestre La Muralla, quebrada de La Habana, 15°03'40"-15°14'00" N, 86°34'20"-86°46'00" W, 1400 m, 8 Jun 1993, *Nelson & Andino 16276* (TEFH).

SELAGINELLA PALLESCENS (C. Presl) Spring, Fl. Bras. 1(2): 132. 1840. *Lycopodium pallescens* C. Presl, Reliq. Haenk. 1(1): 79. 1825. **TYPE. MEXICO**. *T. Haenke s.n.* (holotype: PRC! (photo, BM); isotype: HAL!).

Distribution. Mexico, Belize, Guatemala, El Salvador, **Honduras**, Nicaragua, Costa Rica, Panama, Cuba, Jamaica, Colombia, Venezuela, Suriname, and Brazil (see Figure 4C, Table 1). The presence of this species in Honduras was to be expected because it was known from surronding regions.

Additional specimens. HONDURAS. Atlántida. Pico Bonito National Park, río Bonito, 15°39'30" N, 86°51'00" W, 620 m, 21 Apr 1996, *Hawkins 900* (EAP, MO); Tela, orilla del río Piedras Gordas, 15°46'N, 87°25'W, 10 m, 15 Aug 1981, *Sánchez 33* (MO). **Comayagua.** Peña Blanca ridge of the Cordillera de Montecillos Biological Reserve, 14°30' N, 87°53' W, 2200 m, 10 Jun 1993, *Haukings 743* (MO, TEFH). **Cortés.** Pito Solo, 75 km S de San Pedro Sula, 1700 m, 3 Sep 1989, *Varela 112* (TEFH). **El Paraíso.** Güinope, just N of Mansaragua, along road between El Zamorano and Morolica, 13°48'N, 86°59'W, 1320 m, 16 Jun 1994, *Davidse 35017* (MO); Monserrat above Yuscarán, 17 Apr 1970, *Hernández & Hernández 5113* (TEFH). Francisco Morazán: Montaña La Tigra, sendero El Aguacatal, 40 km al NE de Tegucigalpa, 1550 m, 10 Nov 1988, *Molina 88* (TEFH). **Intibucá.** alrededores de La Esperanza, 15 km NW de Marcala, 14°18' N, 88°10' W, 1700 m, 10 Oct 2003, *Bejarano 83* (TEFH). **Lempira.** Near Gracias, Montaña de Celaque, around base camp, above río Arcágual, 17 Sep 1991, *Chorley 272* (TEFH); Montaña de Celaque, SE part of massif, canyon of the quebrada El Naranjo, 14°33' N, 88°39' W, 1800-1900 m, 24 May 1991, *Davidse & Zúñiga 34679* (MO, TEFH); Celaque National Park, along Río Arcágual, between visitor´s center and dam (water intake for the town of Gracias), 7.5 km WSW of Gracias, 14°34' N, 88°39' W, 1400 m, 11 Nov 1991, *Moran 5512* (MO, TEFH).

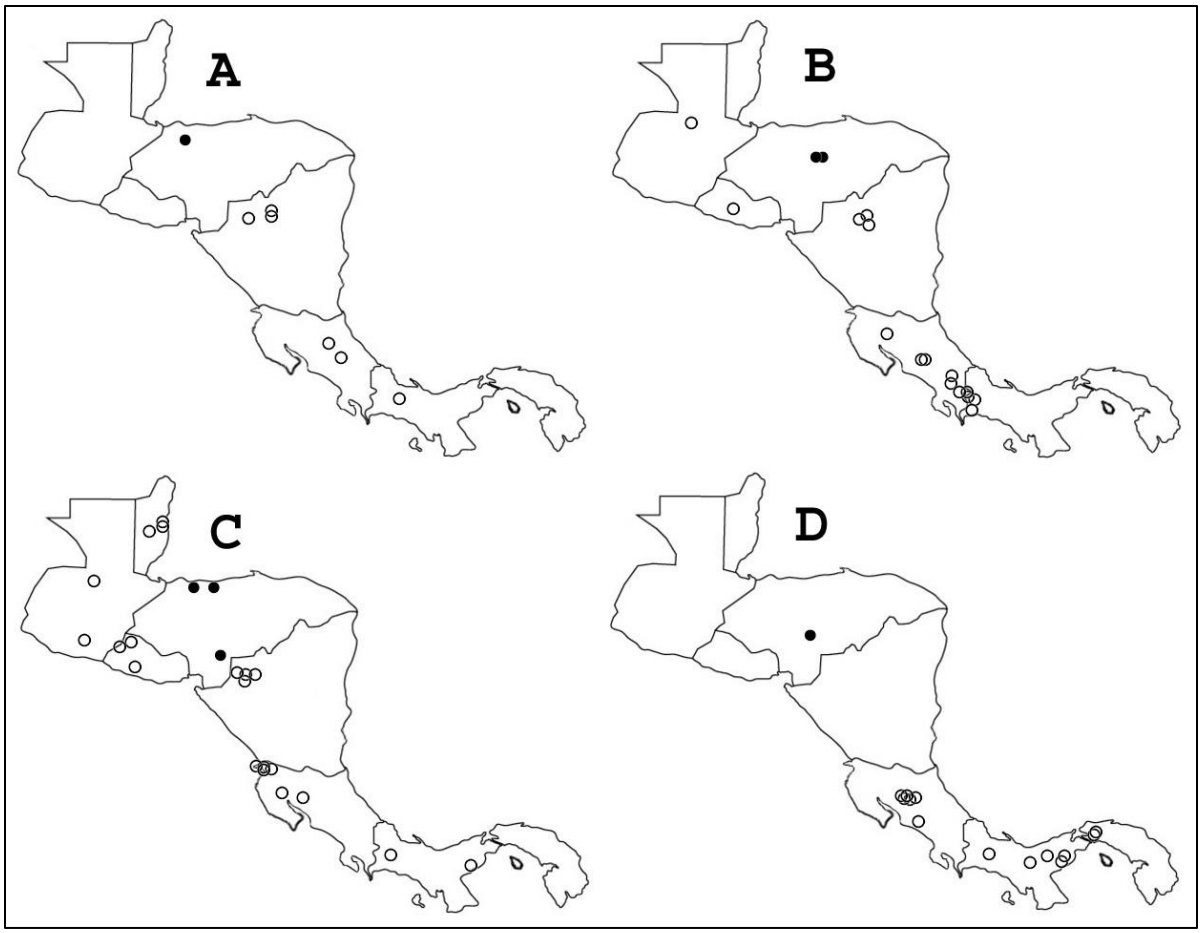

Figure 4. Distribution maps in Central America of: A. *Polytaenium chlorosporum* (Mickel & Beitel) E.H. Crane; B. *Pteris muricella* Fée; C. *Selaginella pallescens* (C. Presl) Spring and D. *Sticherus hypoleucus* (Sodiro) Copel. ● = New distribution; ○ = Previously known distribution.

In Flora Mesoamericana (Moran & Riba 1995) only var. *acutifolia* Stolze was recorded from Honduras. Var. *pallescens* was not cited from Honduras but Valdespino (in Mickel & Smith 2004) recognized var. *acutifolia* Stolze as a valid species (*Selaginella acutifolia* (Stolze) Valdespino, Mém. New York Bot. Gard. 88: 558, f. 284A-G. 2004). Reyes et al (2021) noted the occurrence of *S. pallescens* in Honduras based on *Yuncker et al 5697* (BM), but Moran & Riba did not list *S. acutifolia* from Honduras, referring to the *S. pallescens* group.

STICHERUS HYPOLEUCUS (Sodiro) Copel., Gen. Fil. 28. 1947. *Gleichenia hypoleuca* Sodiro, Recens. Crypt. Vasc. Quit. 8. 1883. **Lectotype** (Moran, Fl. Mesoamer. 1: 60. 1995; referring to it as the type**): ECUADOR**. Pichincha: *L. Sodiro s.n.* (SI-21653; isolectotype: K).

Distribution. Honduras, Costa Rica, Panama, Colombia, Guyana, Ecuador, and Peru (see Figure 4D, Table 1). This is the northernmost distribution of the species.

Additional specimens. HONDURAS. Francisco Morazán. Montaña La Tigra, 20 km de Tegucigalpa, 1800 m, *Ondina 24* (TEFH).

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LITERATURE CITED

Almeida, T.E., S. Hennequin, H. Schneider, A.R. Smith, J.A. Nogueira, A.J. Ramalho, K. Proite, and A. Salino. 2016. Towards a phylogenetic generic classification of Thelypteridaceae: Additional sampling suggests alterations of neotropical taxa and further study of paleotropical genera. Molec. Phylog. Evol. 94: 688–700.

Assis, F.C., T.E. Almeida, S.J. Russell, H. Schneider and A. Salino. 2016. Molecular Phylogeny and Recircumscription of the Fern Genus *Pecluma* (Polypodiaceae–Polypodiopsida). Phytotaxa 247: 235–246.

Gasper, A.L., V.A. Oliveira, A.R. Smith, and A. Salino. 2016. A classification for Blechnaceae (Polypodiales: Polypodiopsida): New genera, resurrected names, and combinations. Phytotaxa 275: 191–227.

Gómez, L.D. and A.L. Arbeláez. 2009. Flora de Nicaragua: Helechos. Vol. 4. Missouri Botanical Garden, St. Louis.

JSTOR Plant Science. 2013. JSTOR Plant Science/Global Plants. <http://plants.jstor.org/> Accessed 2023.

Labiak, P.H. 2011. *Stenogrammitis*, a new genus of grammitid ferns segregated from *Lellingeria* (Polypodiaceae). Brittonia 63: 139–149.

Lellinger, D.B. 1989. The ferns and fern-allies of Costa Rica, Panama, and the Chocó. Part. 1. Psilotaceae through Dicksoniaceae. Pteridologia 2A.

Mickel, J.T. and A.R. Smith. 2004. The Pteridophytes of Mexico. Mem. New York Bot. Gard. 88: 1–1029.

Moran, R.C. 1992. Five new species of ferns from the American Tropics. Novon 2: 132–138.

Moran, R.C. and R. Riba (eds.). 1995. Flora Mesoamericana. Vol. 1. Psilotaceae a Salviniaceae. Mexico: UNAM.

Nelson, C.H., G.R. Gamarra, and J.F. Casas. 1996. Hondurensis plantarum vascularium catalogus. Pteridophyta. Fontqueria 43: 1–143.

Reyes, J., O. Reyes, O. Oyuela, and A.F. Rojas. 2018. Primer registro de *Serpocaulon maritimum* (Polypodiaceae) para la flora de Honduras. Revista Nicaragüense Biodivers. 34: 2–10.

Reyes, J., A.F. Rojas and O. Reyes. 2019. Cuatro nuevos registros para la flora hondureña y un listado preliminar de pteridófitas y licófitas para la Reserva del Hombre y Biósfera del Río Plátano, Honduras. Acta Bot. Mex. 126: e1448.

Reyes, J., S. Tarvin and S.P. Batke. 2021. Ferns and lycophytes of Honduras. A new annotated checklist. Phytotaxa 506: 1–113.

Rojas, A.F. 1996a. Aportes a la Flora Pteridophyta Costarricense. I. Informes. Brenesia 45–46: 1–6.

Rojas, A.F. 1996b. Twelve new species of *Elaphoglossum* from Costa Rica and Panama. Brenesia 45–46: 7–26.

Rojas, A.F. 1996c. Aportes a la Flora Pteridophyta Neotrópica. 1. Notas sobre el género *Niphidium* (Polypodiaceae). Brenesia 45–46: 27–32.

Rojas, A.F. 1996d. Aportes a la Flora Pteridophyta Costarricense. II. Taxones nuevos. Brenesia 45–46: 33–50.

Rojas, A.F. 1997. Fourteen new species of *Elaphoglossum* (Elaphoglossaceae) from Mesoamerica. Brenesia 47–48: 1–16.

Rojas, A.F. 2001a. Informes en la familia Pteridaceae (Filicales) para el neotrópico. Rev. Biol. Trop. 49: 429–434.

Rojas, A.F. 2001b. Seis especies nuevas y dos nuevos registros de helechos (Pteridophyta) para Costa Rica. Rev. Biol. Trop. 49: 435–452.

Rojas, A.F. 2001c. Nuevas especies, nombres nuevamente utilizados y nuevas distribuciones en los helechos arborescentes (Filicales: Cyatheaceae) para el neotrópico. Rev. Biol. Trop. 49: 453–466.

Rojas, A.F. 2001d. Ocho nuevas especies y nuevos ámbitos geográficos de helechos de la familia Tectariaceae (Filicales) en el neotrópico. Rev. Biol. Trop. 49: 467–488.

Rojas, A.F. 2002. New species, new combinations and new distributions in neotropical species of *Elaphoglossum* (Lomariopsidaceae). Rev. Biol. Trop. 50: 966–1006.

Rojas, A. F. and J.D. Tejero. 2002. Una especie nueva de *Dennstaedtia* (Filicales: Dennstaedtiaceae) para México. Rev. Biol. Trop. 50: 1007–1012.

Rojas, A.F. 2003a. New taxa, new records and redefined concepts in the *Elaphoglossum* sect. *Elaphoglossum* subsec. *Pachyglossa* (Lomariopsidaceae) from Mexico and Central America. Rev. Biol. Trop. 51: 1–32.

Rojas, A.F. 2003b. Notes on *Elaphoglossum* (Lomariopsidaceae) Section *Polytrichia* Subsection *Hybrida* in Mexico and Central America. Rev. Biol. Trop. 51: 33–48.

Rojas, A.F. 2004a. Una especie nueva de *Hymenophyllum* y una variedad nueva de *Trichomanes collariatum* Bosch (Filicales: Hymenophyllaceae) en Costa Rica. Lankesteriana 4: 143–148.

Rojas, A.F. 2004b. Un nuevo híbrido en *Tectaria* (Filicales: Tectariaceae) en Costa Rica. Lankesteriana 4: 149–154.

Rojas, A. F. and J. Trusty. 2004. Diversidad Pteridofítica de la Isla del Coco. Brenesia 62: 1–14.

Rojas, A.F. 2005a. El complejo de *Campyloneurum angustifolium* (Sw.) Fée (Polypodiaceae) en Costa Rica. Lankesteriana 5: 41–48.

Rojas, A.F. 2005b. Una nueva especie de *Blechnum* L. (Blechnaceae) en el Neotrópico. Lankesteriana 5: 49–52.

Rojas, A.F. 2005c. Novedades en *Huperzia* (Lycopodiaceae) en Costa Rica. Lankesteriana 5: 109–113.

Rojas, A.F. 2005d. Una nueva especie en *Elaphoglossum* sección *Elaphoglossum* (Lomariop-sidaceae) en Costa Rica. Lankesteriana 5: 185–189.

Rojas, A.F. 2005e. Nuevos taxa de helechos arborescentes (Filicales: Cyatheaceae) en Costa Rica. Lankesteriana 5: 191–200.

Rojas, A.F. 2006a. Notas sobre *Enterosora* Baker (Filicales: Grammitidaceae) en Costa Rica. Lankesteriana 6: 9–13.

Rojas, A.F. 2006b. Una especie nueva de *Tectaria* (Filicales: Tectariaceae) en Panamá. Lankesteriana 6: 15–17.
Rojas, A.F. 2006c. A new species related to *Trichomanes crinitum* (Hymenophyllaceae). Selbyana 27: 25–29.
Rojas, A.F. 2006d. Una nueva especie de helecho del género *Danaea* (Marattiales: Marattiaceae) endémica de Costa Rica. Rev. Biol. Trop. 54: 1057–1060.
Rojas, A.F. 2006e. Nuevos taxa en Grammitidaceae (Pteridophyta) de Costa Rica. Lankesteriana 6: 95–100. <https://doi.org/10.15517/lank.v0i0.7955>
Rojas, A.F. 2006f. Two new species of *Blechnum* (Blechnaceae) from the neotropics. Brittonia 58: 388–394.
Rojas, A.F. and M. Palacios. 2006. Una especie nueva de *Pteris* (Pteridaceae) endémica de Costa Rica. Rev. Biol. Trop. 54: 1061–1066.
Rojas, A.F. 2007a. Novelties in *Tectaria* (Tectariaceae) in the Neotropics. Mét. Ecol. & Sist. 2: 6–9. Research Gate.
Rojas, A.F. 2007b. Two new species of *Adiantum* (Filicales: Pteridaceae) from Costa Rica and Nicaragua. Mét. Ecol. & Sist. 2: 5–12.
Rojas, A.F. 2007c. Una nueva especie de *Notholaena* (Pteridaceae) para Costa Rica. Mét. Ecol. & Sist. *2*(2), 18–21.
Rojas, A.F. 2007d. Novedades en *Polybotrya* (Filicales: Dryopteridaceae) para Costa Rica. Lankesteriana 7: 557–562.
Rojas, A.F. 2007e. Una especie nueva de *Lellingeria* (Filicales: Polypodiaceae) para Costa Rica, Panamá y Colombia. Lankesteriana 7: 553–556.
Rojas, A.F. 2007f. Novedades en *Cyathea* (Filicales: Cyatheaceae) para Costa Rica y Panamá. Mét. Ecol. & Sist. 2: 1–13.
Rojas, A.F. 2007g [2008]. New species in *Megalastrum subincisum* complex (Dryopteridaceae) from Costa Rica. Brenesia 68: 17–24.
Rojas, A.F. 2008a. Novelties in *Adiantum tetraphyllum* complex (Filicales: Pteridaceae) from the Neotropics. Mét. Ecol. & Sist. 3: 1–7.
Rojas, A.F. 2008b. Notes in the *Blechnum l'herminieri* complex (Blechnaceae) from the Neotropics. Mét. Ecol. & Sist. 3: 8–29.
Rojas, A.F. 2008b. Two new species, a new combination and an emended name in *Blechnum* (Blechnaceae) from the neotropics. Mét. Ecol. & Sist. 3: 36–42.
Rojas, A.F. 2008d. Five new species and new records in *Diplazium* (Athyriaceae) from the Neotropics. Mét. Ecol. & Sist. 3: 30–40. Research Gate.
Rojas, A.F. 2008e. New species in *Megalastrum biseriale* (Dryopteridaceae) from the neotropics. Mét. Ecol. & Sist. 3: 41–53.
Rojas, A.F. 2008f. The complex *Nephrolepis pendula* (Nephrolepidaceae) in the Neotropics. Mét. Ecol. & Sist. 3: 54–78.
Rojas, A.F. 2008g. Novelties of grammitid ferns (Polypodiaceae) from Costa Rica, Panama and Colombia. Mét. Ecol. & Sist. 3: 12–22.
Rojas, A.F. 2009a. Two new species and a new combination in *Elaphoglossum* sect. *Polytrichia* subsect. *Apoda* from Costa Rica. Brittonia 61: 293–300.
Rojas, A.F. 2009b [2010]. Dos especies nuevas y cuatro nuevos registros de *Diplazium* (Athyriaceae) con fronda pinnada para el neotrópico. Mét. Ecol. & Sist. 4: 23–28.
Rojas, A.F. 2010a. Novelties in the *Saccoloma inaequale* complex (Saccolomataceae) from the neotropics. Mét. Ecol. & Sist. 5: 1–15.
Rojas, A.F. 2010b. A new species in *Elaphoglossum* sect. *Elaphoglossum* subsect. *Pachyglossa* (Dryopteridaceae) from Costa Rica and Panama. Novon 20: 334–337.
Rojas, A.F. 2010c. New species and new records in *Elaphoglossum* sect. *Polytrichia* subsect. *Hybrida* from the Neotropics. Amer. Fern J. 100: 172–179.

Rojas, A.F. and J.M. Chaves. 2010. Un nuevo híbrido de *Asplenium* (Polypodiales: Aspleniaceae) para Costa Rica. Revista Guatemalensis 13: 44–53.
Rojas, A.F. 2011. New species and new records of ferns (Pteridophyta: Polypodiales) from Cocos Island, Costa Rica. Brenesia 75–76: 7–15.
Rojas, A.F. 2012a. Novedades en *Diplazium* (Woodsiaceae) con frondas pinnado-lobuladas para el Neotrópico. Actual. Biol. 34: 153–160.
Rojas, A.F. 2012b. Nuevas combinaciones en *Alansmia* (polypodiaceae) para Costa Rica, Panamá y Colombia. Actual. Biol. 34: 161–170.
Rojas, A.F. 2012c. Nuevos registros de licopodios (Lycopodiophyta) y helechos (Pteridophyta) para Honduras y el Parque Nacional Montañas de Celaque. Rev. Biodivers. Neotrop. 2: 83–92.
Rojas, A.F. and C.G. Herrera. 2012. Un nuevo híbrido de *Adiantum* L. (Polypodiales: Pteridaceae) para Costa Rica y Nicaragua. Brenesia 78: 1–5.
Rojas, A.F. 2013a. Novelties in *Grammitis* and *Stenogrammitis* (Polypodiaceae) from Costa Rica, Colombia and Venezuela. Actual. Biol. 35: 5–10.
Rojas, A.F. 2013b. Notas taxonómicas en *Danaea* Sm. (Marattiaceae) para Costa Rica, Panamá y Colombia. Actual. Biol. 35: 11–20.
Rojas, A.F. and J.M. Chaves. 2013. A new hybrid of *Serpocaulon* (Polypodiaceae) from Costa Rica. Amer. Fern J. 103: 175–181.
Rojas, A.F. and C.G. Herrera. 2013. Una especie nueva de *Terpsichore* A.R. Sm. (Polypodiaceae) para Costa Rica. Mét. Ecol. & Sist. 8: 54–61.
Rojas, A.F. and J.M. Chaves. 2014. Nuevos registros de *Pteris* (Pteridaceae) para el Neotrópico. Rev. Mex. Biodivers. 85: 301–303.
Rojas, A.F. and D. Sanín. 2014. Dos especies nuevas de *Tectaria* (Tectariaceae) para Costa Rica, Panamá y Colombia. An. Jard. Bot. Madr. 71: e004
Rojas, A.F. 2015a. A new species of *Asplenium* L. (Filicales: Aspleniaceae) from the neotropics. Mét. Ecol. & Sist. 10: 109–113.
Rojas, A.F. 2015b. Two new species in the genus *Enterosora* Baker (Filicales: Polypodiaceae) from Costa Rica. Mét. Ecol. & Sist. 10: 114–120.
Rojas, A.F. 2017a. Novelties in *Campyloneurum* (Polypodiaceae) from Mesoamerica. Amer. J. Plant Sci. 8: 921–940.
Rojas, A.F. 2017b. Four new species and additional distributions of *Elaphoglossum* sect. *Elaphoglossum* subsect. *Pachyglossa* (Dryopteridaceae) from the neotropics. Amer. J. Plant Sci. 8: 1234–1247.
Rojas, A.F. 2017c. Three new species of ferns (Pteridophyta) from Mesoamerica. Amer. J. Plant Sci. 8: 1329–1338.
Rojas, A.F. 2017d. El complejo *Jamesonia flexuosa* (Kunth) Christenh. (Pteridaceae) para el Neotrópico. Acta Bot. Malac. 42: 33–40.
Rojas, A.F. 2017e. A new species and three hybrids in the ferns from Cocos Island, Puntarenas, Costa Rica. Acta Bot. Malac. 42: 91–99.
Rojas, A.F. 2017f. Novedades en *Jamesonia* Hook. & Grev. y *Tryonia* Schuettp., J. Prado & A.T. Cochran (Pteridaceae) para el Neotrópico. Acta Bot. Malac. 42: 111–118.
Rojas, A.F. 2017g. Novedades en *Moranopteris* R.Y. Hirai & J. Prado (Polypodiaceae) para el Neotrópico. Acta Bot. Malac. 42: 149–154.
Rojas, A.F. 2017h. Novedades en *Pteris* L. (Pteridaceae) para Costa Rica. Acta Bot. Malac. 42: 165–170.
Rojas, A.F. 2017i. Tres especies nuevas de *Hymenophyllum* Sm. (Hymenophyllaceae) para Costa Rica y Colombia. Acta Bot. Malac. 42: 171–176.
Rojas, A.F. & Baaijen, W. (2017. Three new species of *Elaphoglossum* Schott ex Sm. (Dryopteridaceae) from the Pacific of Costa Rica. Acta Bot. Malac. 42: 125–129.
Rojas, A.F. and R.R. Calderón. 2017. Dos especies nuevas de *Phlegmariurus* Holub (Lycopodiaceae) para Costa Rica. Acta Bot. Malac. 42: 67–70.

Rojas, A.F., R.K. Hernández-Cibrián, and R. Moreno. 2017. Nuevos registros de helechos (Pteridophyta) para Honduras, Parque Nacional La Tigra y Reserva Biológica Misoco. Acta Bot. Malac. 42: 131–140.

Rojas, A.F. and P.E. Muñoz. 2017. A new species of *Elaphoglossum* Schott ex J. Sm. (Dryopteridaceae) from Costa Rica. Acta Bot. Malac. 42: 49–52.

Rojas, A. F. and J.D. Tejero. 2017. Novelties and notes in *Lindsaea* (Lindsaeaceae) from Mexico and Central America. Phytotaxa 296: 147–160.

Rojas, A.F. 2018. Five new species of *Diplazium* Sw. (Athyriaceae) from Nicaragua, Costa Rica and Colombia. Amer. J. Plant Sci. 9: 933–945.

Rojas, A.F. and F. Villalobos. 2018. Three new species and new records of *Dennstaedtia* Bernh. from Mesoamerica. Open Access Libr. 5: e5020.

Rojas, A.F. and L. Barrantes. 2021. *Serpocaulon* × *orosiense*, a new hybrid of *Serpocaulon* (Polypodiaceae) from Costa Rica. Open Access Libr. 8: e8047.

Rojas, A.F., Y. Ospino, and O. Ortiz. 2023. Two new records of the fern genus *Lindsaea* (Lindsaeaceae) from Panama. Checklist 19: 1–7.

Rolleri, C.H., M.C.I. Prada, L. Passarelli, J.M. Gabriel and M.M. Ciciarelli. 2012. Revisión de especies monomorfas y subdimorfas del género *Blechnum* (Blechnaceae-Pteridophyta. Bot. Comput. 36: 51–77.

Salino, A., T.E. Almeida and A.R. Smith. 2015. New combinations in Neotropical Thelypteridaceae. PhytoKeys 57: 11–50.

Smith, A.R. 1981. *Pteridophytes*. In D.E. Breedlove (ed.). Flora of Chiapas 2: 1–370. California Academy of Sciences, San Francisco.

Thiers, B. June 2022. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/science/ih/>

Triana-Moreno, L.A., A. Yañez, L.Y. Kuo, C.J. Rothfels, N.T.L. Pena, P.B. Schwartsburd, and M. Sundue. 2023. Phylogenetic revision of Dennstaedtioideae (Dennstaedtiaceae: Polypodiales) with description of *Mucura*, gen. nov. Taxon: 72: i–iv, 1–229.

Tropicos database. Tropicos. 2012. Tropicos.org: Nomenclatural, bibliographic, and specimen data accumulated in MBG's electronic databases. Missouri Botanical Garden. <http://www.tropicos.org>

Villaseñor, J.L. 2016. Checklist of the native vascular plants of Mexico. Catálogo de las plantas vasculares nativas de México. Rev. Mex. Biodivers. 87: 559–902.