



Three New Species and New Records of *Dennstaedtia* Bernh. from Mesoamerica

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Abstract

Navarrete & Øllgaard [1] indicated the presence of a “C” group within *Dennstaedtia* Bernh. that contains *D. obtusifolia* (Willd.) T. Moore, which is the type material of the genus *Patania* C. Presl and indicated that it could require taxonomic recognition. They also discussed the situation generated by other authors including *D. cornuta* (Kaulf.) Mett. and *D. obtusifolia* as synonyms for *D. dissecta* (Sw.) T. Moore and then separated them as valid species; however, they insist on mentioning variables within the mentioned species and indicated that other species could be included. As a result of this group’s review from Costa Rica, it was found that there are three easily distinguishable new species: *D. axillaris* A. Rojas, *D. rectangularis* A. Rojas and *D. riparia* A. Rojas. Also, *D. cornuta* is registered from Mexico and Guatemala, and *D. sprucei* T. Moore is registered from Costa Rica.

Subject Areas

Biology, Botany, Taxonomy

Keywords

Dennstaedtia Bernh., *D. dissecta* Complex, Ferns, New Taxa, *Patania* C. Presl

1. Introduction

The genus *Dennstaedtia* Bernh., is characterized by having commonly terrestrial habitat (sometimes hemiepiphytic or epiphytic) with creeping rhizome and it without scales (hairy or setose), patent frond to 7 m long and 1.5 m broad, herbaceous laminar tissue, sorus over a vein and indusium bivalve to cyathiform [2].

Dennstaedtia is a genus with approximately 45 species, principally in tropical to temperate regions of world [3]. Tryon [4] made the revision of the genus from America and Tryon y Tryon [5] defined tentatively 11 species from the continent. Through new regional studies [1] [6], near 22 species are registered from America and specifically from Costa Rica 13 species are mentioned. At the beginning of the century, Navarrete & Øllgaard [1] described three new species from Ecuador; after that, Rojas y Tejero [2] described a new species from Mexico. In this work, three new species more are described from Mesoamerica.

2. Materials and Methods

The new species were compared with related species in different taxonomic treatments from Mesoamerica and South America (Gómez & Arbeláez [7], Mickel & Smith [8], Moran [6], Murillo *et al.* [9], Navarrete & Øllgaard [1], Tryon & Stolze [10] and Yañez *et al.* ([11] 2014). In addition the collections of: Museo Nacional de Costa Rica (CR), Herbario Nacional de México (MEXU), Universidad de Costa Rica herbarium (USJ) and Instituto de Ecología (XAL) were consulted. The examined specimens are deposited in the following herbaria CR, MEXU, USJ and XAL (acronyms following Thiers, [12]). To ensure the correct application names, original type material or digital type images were examined as available (Jstor Global Plants (<http://plants.jstor.org/>)), and the new names were corroborated with International Plant Name Index (<http://www.ipni.org/ipni/plantnamesearchpage.do>).

3. Results

In this paper three new species are described and two species are registered from different countries in Mesoamerica.

3.1. New Species

3.1.1. *Dennstaedtia axilaris*

A. Rojas, sp. nov. (Figure 1)

1) Type: COSTA RICA. Heredia: Sarapiquí, Puerto Viejo, Estación Biológica La Selva, nearest grid post 1800:1450, 10°26'N, 84°01'W, 50 m, 6 Sep 2001, *M. Jones & P. Olivas* 249 (Holotype: CR).

2) Diagnoses: *Dennstaedtia axilaris* A. Rojas differs from *D. dissecta* (Sw.) T. Moore by its thinner rhizome; shorter fronds; axes with acicular and brown hairs throughout; more equilateral pinnules; and one sori in the axil of segments.

3) Description: Rhizome 0.8 - 1.3 cm in diameter, short-creeping, sparsely setose to glabrescent, the setae 2 - 5 × less than 0.5 mm long, brown; fronds 0.9 - 1.5 m long, arching; stipe (30-) 45 - 75 cm long, strawish to brown, opaque, glabrous or with very sparse hairs, less than 0.5 mm long, hyaline; blade 60 - 75 × 45 - 55 cm, ovate to lanceolate, 2-pinnate-pinnatifid, green and opaque adaxially, more clear abaxially, without axillar buds, hairy only in the axes; rachis strawish to brown, liso (sin espinas); basal and medial pinnae 23 - 28 × 7 - 10

cm, linear-lanceolate, subsessil, acuminate at apex; pinnules 1.7 - 3.2 × 0.7 - 1.4 cm, lanceolate to shortly oblong, lobulate to pinnatifid, sessil and decurrent at base, rounded to acute and dentate at apex, the basal one of basal pinnae reduced, the medial ones equilateral to slightly inequilateral; axes without herbaceous and perpendicular wings adaxially; costae and main veins of pinnules, densely hairy abaxially, the hairs 0.2 - 0.5 mm long, acicular, thin, brown throughout; lobes to 0.8 × 0.6 mm, slightly falcate, entire; secondary veins sparsely hairy, the hairs as costae, brown; segments 3 - 7 mm broad, obtuse to truncate at apex; apex of sterile veins claviform; sori 1 (rarely 2 in the basal acroscopic lobe) in the axil between lobules; indusia 0.5 - 0.7 × 0.9 - 1.2 mm, bulliform to cyathiform, entire and brown marginally.

4) Etymology. The name of its species make reference to the presence of sori only in the axil of segments.

5) Distribution: Known only from Caribbean side of Nicaragua and North slope of Cordillera Central in Costa Rica at 50 - 900 m.

6) Additional revised material: COSTA RICA. Heredia: Sarapiquí, Puerto Viejo, La Selva Biological Station, nearest grid post 400:200, 23 Oct 2001, *M. Jones & P. Olivas* 317 (CR); *ibidem.*, nearest grid post 2400:850, 2 May 2002, *M. Jones & P. Olivas* 440 (CR).

NICARAGUA. Managua: Las Nubes, Casa Colorada, ca. 900 m, Nov 1976, *L. Gómez & Villa* 6452 (CR). Zelaya: 22 miles of Rama, over road to Juigalpa, at edge of tributary Río Mico, 400 m, Nov 1976, *L. Gómez & Citar* 6445 (CR).

7) Notes. *Dennstaedtia axilaris* differs from *D. dissecta* by its costae and main veins with hairs 0.2 - 0.5 mm long, acicular, thin and brown throughout (vs. 0.1 - 0.3 mm long, linear-lanceolate to linear, expanded at base and brown only in the onion between cells), and sori in the axil of broad and obtuse lobes (vs. sori in the axil narrow, acute and falcate lobes). **Figure 1** shows pinna detail with axillar sori of broad and obtuse lobes.

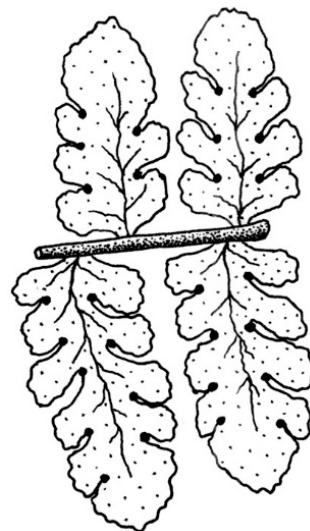


Figure 1. *Dennstaedtia axilaris* pinna detail (*M. Jones & P. Olivas* 249 (CR)).

3.1.2. *Dennstaedtia rectangularis*

A. Rojas, sp. nov. (Figure 2)

1) **Type:** COSTA RICA. San José: Vásquez de Coronado, La Palma area, NE of San Jeronimo, above La Hondura valley, 10°02'N, 84°00'W, 1500 m, 27 May - 1 Jun 1968, *W. Burger & R. Stolze* 5273 (Holotype: CR; Isotype: F?).

2) **Diagnoses:** *Dennstaedtia rectangularis* A. Rojas differs from *D. dissecta* (Sw.) T. Moore by its rectangular segments and they with truncate apex, and one the sori 1-3 in superior side over the margin.

3) **Description:** Rhizome not seen, probably short-creeping, no branched; fronds 1.3 - 2.2 m long, stipe 0.6 - 1 m long; blade 70 - 120 × 60 - 90 cm, ovate-lanceolate, 3-pinnate to 3-pinnate-lobulate, slightly reduced at base, papiraceous to chartaceous; pinnae 30 - 45.5 × 15 - 20 cm, alternate to subopposite, with basal pinnules (at less of the basal and medial pinnae) reduced, without axilar gems; pinnules 8 - 10 × 2 - 2.8 cm, lanceolate, equilateral, without acroscopic lobe, truncate at base or slightly expanded, caudate at apex; pinnulules or segments 1 - 1.4 × 0.4 - 0.7 mm, rectangular, inequilateral, basiscopically excavate and attenuate with the axes, acroscopically expanded, obtuse to truncate and entire to lobulateat apex; apex of sterile veins claviform; sori 1 - 3 in the superior side and 0 to rarely 1 in the inferior side; indusia 0.5 - 0.7 × 0.7 - 1.0 mm, bulliform to cyathiform, entire and brown marginally.

4) **Etimology.** The name of it species make reference to the rectangular segments.

5) **Distribution:** Known only from North slopes of Cordillera Central at 1400 - 1500 m.

6) **Additional revised material:** COSTA RICA. San José: Vásquez de Coronado, La Hondura, 1400 m, 20 Jul 1927, *M. Valerio* 173 "32802" (CR).



Figure 2. *Dennstaedtia rectangularis*: pinnule detail (*W. Burger & R. Stolze* 5273 (CR)).

7) **Notes.** *Dennstaedtia rectangularis* differs from *D. dissecta* by its rectangular (vs. triangular) segments with obtuse to truncate and entire to lobulate apex (vs. segments with acute and dentate apex) and sori 1-3 in superior side over the margin (vs. sori 1 in the axil between lobes. **Figure 2** shows pinnule detail with rectangular segments and obtuse to truncate and entire to lobulate apex.

3.1.3. *Dennstaedtia riparia*

A. Rojas, sp. nov. (**Figure 3**)

1) **Type:** COSTA RICA. Cartago: Turrialba, Valle del Reventazón, Jicotea, La Pradera Farm, 9°47'15"N, 83°32'35"W, 1000 m, 22 Jun 1995, G. Rivera & A. Rojas 2479 (holotype: CR).

2) **Diagnoses:** *Dennstaedtia riparia* A. Rojas differs from *D. dissecta* (Sw.) T. Moore by its 2-pinnate-pinnatifid and glabrous blade, segments with obtuse to truncate and entire to lobulate apex and bigger indusia.

3) **Description:** Rhizome 1 - 1.5 cm in diameter, short-creeping, rigid, scaly, glabrescent at maturity, the scales 1.5 - 3 × less 0.5 mm, linear, broadly at base; fronds 1.75 - 2.35 m long, arching to scandent; stipe 80 - 115 cm long, opaque, glabrous or with very sparse hairs, less than 0.5 mm long, hyaline; blade 95 - 120 × 70 - 100 cm, ovate to lanceolate, 2-pinnate-pinnatifid, dark green and lustrous adaxially, more clear abaxially, without axillar buds, glabrous in both surfaces; basal and medial pinnae 35 - 50 × 12.5 - 17.5 cm, linear-lanceolate, subsessil; basal pinnules reduced, medial pinnules entire to pinnatisect, sessil and decurrent

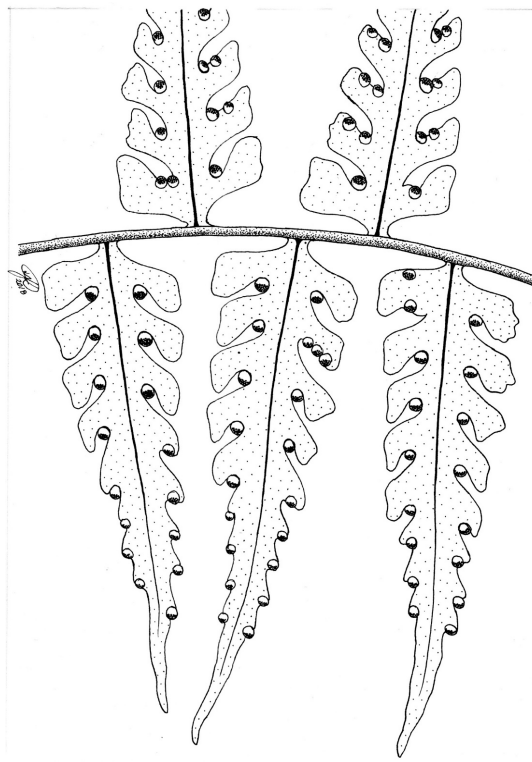


Figure 3. *Dennstaedtia riparia*: pinna detail (G. Rivera y A. Rojas 2479 (CR)).

at base, long acuminate to caudate at apex; axes without herbaceous and perpendicular wings adaxially, glabrous to sparsely hairy abaxially, the hairs 0.1 - 0.2 mm long, hyaline; segments (3-) 5 - 8 mm broad, obtuse to truncate at apex; apex of sterile veins not claviform; sori 1 (-3) in the axil between lobules; indusia 0.7 - 1 × 1.2 - 1.8 mm, bulliform to cyathiform, strawish and entire marginally.

4) Etymology. The name of its species make reference to the rectangular segments.

5) Distribution: Known only from North slopes of Cordillera de Tilarán and Caribbean slopes of Cordillera de Talamanca at 700 - 1000 m.

6) Additional revised material: COSTA RICA. Alajuela: Cantón de San Ramón, Reserva Biológica Alberto Manuel Brenes, La Cascada, ca. 1 km W de la estación, 10°53'N, 85°24'W, 700 m, *A. Rojas et al.* 5438 (USJ, MO).

7) Notes. *Dennstaedtia riparia* differs from *D. dissecta* by its 2-pinnate-pinnatifid (vs. 3-pinnate-pinnatifid) blade, glabrous (vs. hairy over the veins) blade, segments with obtuse to truncate and entire to lobulate apex (vs. segments with acute and dentate apex) and bigger indusia (0.7 - 1 × 1.2 - 1.8 mm vs. 0.5 - 0.8 × 0.7 - 1.0 mm). **Figure 3** shows segments with obtuse to truncate and entire to lobulate apex, also axillar sori.

3.2. New Records

3.2.1. *Dennstaedtia cornuta*

(Kaulf.) Mett., Ann. Sci. Nat., Bot., sér. 5, 2: 260. 1864. *Dicksonia cornuta* Kaulf., Enum. Filic. 227. 1824. Type: Brazil, "Sprengel communicavit", *Sello s.n.* (B).

1) Known distribution: Mexico, Guatemala, Costa Rica, Panama and South America.

2) Material of new distribution: MEXICO. Chiapas: Municipio of Rayón, Selva Negra, 10 km N above Rayón, Mezcalapa along road to Jitotol, 1700 m, 25 Jan 1973, *D. Breedlove & A. Smith* 32328 (MEXU). Guerrero: Atoyac de Álvarez, km 10 of the trail from Puerto del Gallo to Atoyac, 2060 m, 11 Jan 1983, *F. Lorea* 2347 (MEXU). Oaxaca: Ixtlán, Sierra de Juárez, 8 km S of Vista Hermosa, 71 km N of Ixtlán de Juárez, on route 175, 5400 ft. [1646 m], 23 Sep 1972, *J. Mickel & L. Pardue* 6733 (MEXU); ibidem, 5600 ft. [1707 m], 23 Sep 1972, *J. Mickel & L. Pardue* 6748 (MEXU); road Tex-tepec-Oaxaca, 9 Dec 1984, *M. Palacios* 2339 (XAL). Veracruz: Alto Lucero, Cerro de La Cima, between La Sombra and Tierra Blanca, 19°46'N, 96°41'W, 1700 m, 10 Apr, 1981, *G. Castillo & F. Vázquez* 1539 (XAL); Cuautlanillo (Orizaba), 1500 m, 1 Mar 1938, *E. Copeland* 71 (MEXU).

GUATEMALA. Chiquimula: Esquipulas, Trifinio, 14°30'28"N, 89°23'8.5"W, 1797 m, 7 Aug, 2005, *M. Véliz & J. Vargas* 15898 (MEXU).

3) Notes. *Dennstaedtia cornuta* is similar to *D. obtusifolia* (Willd.) T. Moore in falcate fertile lobes, but *D. cornuta* is a species of lower elevations with smaller fronds and narrower sterile segments.

3.2.2. *Dennstaedtia sprucei*

T. Moore, Index Filic. 308. 1861. Type: Ecuador, Spruce 5350 (holotype: K!; Iso-

types: B!, BM!, C, COL! frag., GH!, LE!, NY!, P!, SI!, US! frag.; photo: US, QCA).

1) Known distribution: Costa Rica, Colombia and Ecuador.

2) Material of new distribution: COSTA RICA. Puntarenas: Osa, Fila Costeña, headers of Piedras Blancas river; Cerro Anguciana, foot steeps O, 08°48'36"N, 083°10'12"W, 1400 - 1600 m, 10 Dec 1993, *B. Hammel* 19265 (CR, MO).

3) Notes. This is the only record of the species from Mesoamerica.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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