

## New Species of *Thelypteris* from Puerto Rico

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During the course of field work in Puerto Rico since July 1983, many new fern records have been discovered, some of them representing entities new to science. Preliminary to publication of a book about Puerto Rican ferns, a series of short papers has been initiated in order to describe new taxa and discuss other relevant matters. A previous paper (Proctor, 1984) described a new species of *Trichomanes*; the present one concerns the genus *Thelypteris*.

All the newly discovered Puerto Rican thelypterids belong to subgenera *Amauropelta* and *Goniopteris*. In considering *Amauropelta*, the sectional assignments follow those of Smith (1974). There is no satisfactory modern classification of *Goniopteris*; therefore the species of this group are not assigned to sections in the present paper. In citing my own collections other than types, the first set of specimens is deposited in the herbarium of the Department of Natural Resources, San Juan, Puerto Rico (SJ); the second and third sets are deposited at the United States National Herbarium (US) and the Institute of Jamaica (IJ), respectively.

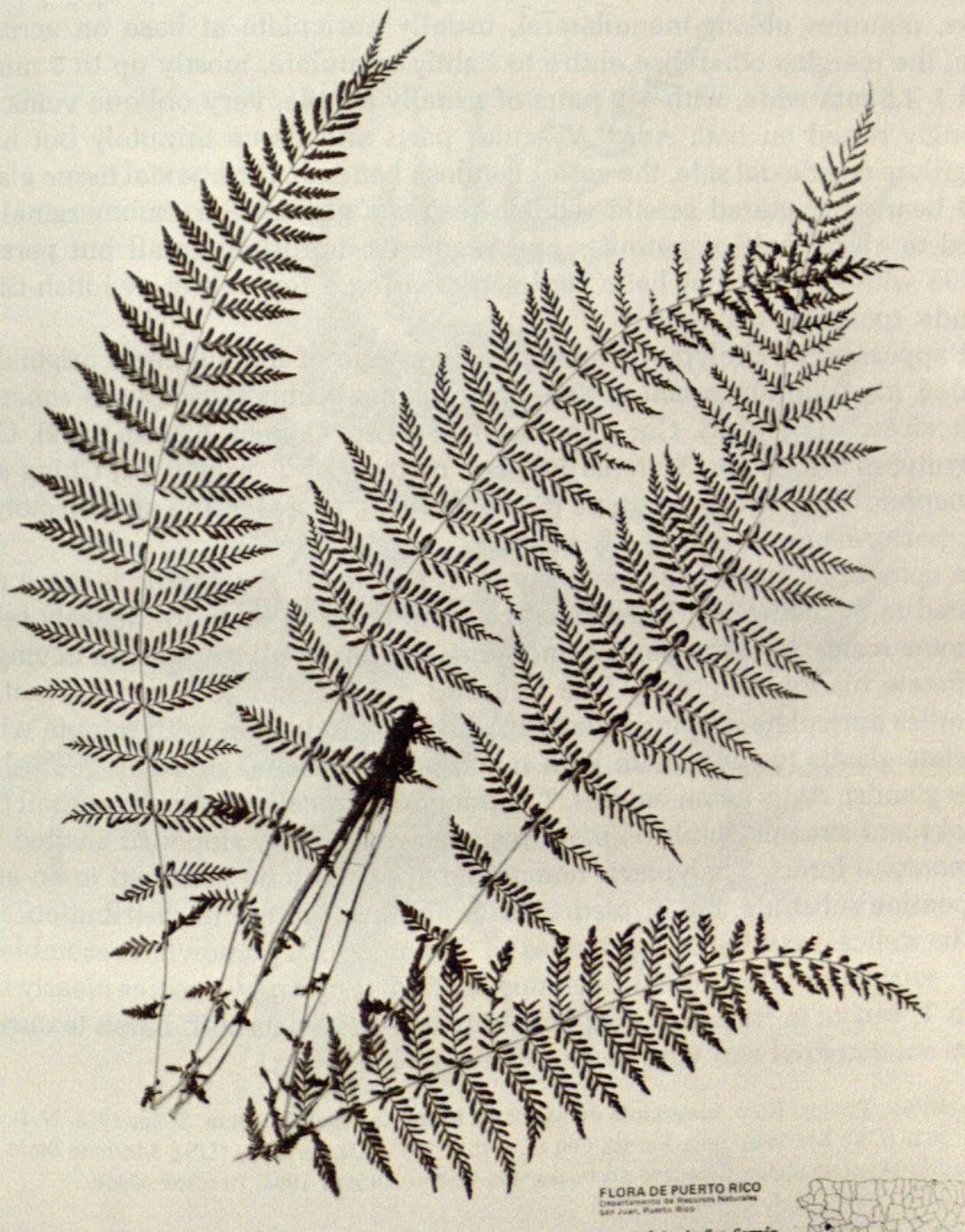
More than 100 species of *Thelypteris* occur in the Antilles, and nearly half of these belong to subgenus *Amauropelta*. The importance of these islands as centers of speciation for the latter taxon is emphasized by the recent discovery of three new Puerto Rican species, now being described. Two of these belong in section *Amauropelta*, and thus are allied to the species bearing sessile, reddish-resinous glands characterized many years ago by Morton (1963).

### SUBG. AMAUROPELTA SECT. AMAUROPELTA

***Thelypteris namaphila* Proctor, sp. nov. (Fig. 1)—TYPE:** Puerto Rico, Municipio de San Germán, Maricao State Forest, just S of Road 120 at approx. km 16.5, ca. 820 m, along banks of a small brook, 23 Nov 1983, Proctor 39834 (holotype US; isotype IJ, SJ).

A *T. piedrensi* (C. Chr.) Morton squamis rhizomatis dense setulosis, planta multo minore et graciliore in omnibus partibus, lamina plene 2-pinnata cum numerosis pinnulis liberis nec adnatis nec decurrentibus, pinnulis auriculatis et inaequilateralibus et indusiis glandulis minutis albocapitatis exornatis differt.

Rhizome erect, slender (0.3-0.4 cm diam.), tightly invested with stipe bases; scales lustrous brown, narrowly deltate-acuminate, up to 4 mm long and 0.8-1.2 mm broad near base, minutely but abundantly setulose. Fronds erect, up to 45 cm long, of stiff texture; stipes 1.5-7 cm long, 0.5-1 mm diam., bearing near base a few spreading scales like those of rhizome, and minutely setulose on adaxial side and groove only, otherwise glabrous. Rhachis rather densely setulose on all sides throughout. Blades 2-pinnate, narrowly elliptic, up to 39 cm long, (4-) 7-



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*Thelypteris namaphila* Proctor, sp. nov.

MARICAO STATE FOREST: S. of Road 120, km. 16.5,  
elev. c. 820 m.

On moist banks of small stream in montane woodland;  
rhizome erect; fronds of stiff texture.

Coll. George H. Proctor, No. 39834  
Fecha: Nov. 23, 1963

FIG. 1. *Thelypteris namaphila*, holotype, Proctor 39834.

8.5 cm broad near middle, gradually narrowed toward base with 7-8 pairs of reduced, increasingly widely separated pinnae (the lowest mere auricles), acuminate at apex. Pinnae sessile, the longest linear-oblong, truncate or nearly so at the slightly inequilateral base, acuminate at apex, 0.5-1 cm broad, fully pin-

nate with up to 8 pairs of non-decurrent pinnules below the deeply pinnatifid apex; pinnules oblong-inequilateral, usually auriculate at base on acroscopic side, the margins otherwise entire to lightly crenulate, mostly up to 5 mm long and 1-1.5 mm wide, with 4-6 pairs of usually simple, very oblique veins, these strongly raised on both sides. Vascular parts and tissue minutely but harshly strigillose on adaxial side, the costae setulose beneath, the abaxial tissue glabrous and bearing scattered sessile reddish-resinous glands. Sori submarginal, confined to apical half of pinnules and segments; indusium small but persistent, ciliate with stiff acicular hairs, and also bearing a few minute whitish-capitate glands; sporangia glabrous.

It appears that *Thelypteris namaphila* was one of the elements originally included in *Aspidium sanctum* var. *portoricense* Kuhn (*Dryopteris sancta* var. *portoricensis* (Kuhn) C. Chr., Smithsonian Misc. Collect. 52:380. 1909). Of two isosyntypes at US one (*Sintenis* 403) is a mixture of *T. sancta* (L.) Ching and *T. namaphila*. The other isosyntype (*Sintenis* 5956), representing an isolectotype of var. *portoricense*, is entirely *T. sancta*.

In spite of its superficial similarity to *T. sancta*, *T. namaphila* is more nearly related to *T. piedrensis*, but differs from the latter in its more densely setulose rhizome scales, in being smaller and more slender in all its parts, in having fully 2-pinnate blades with many free pinnules neither adnate nor decurrent, with pinnules auriculate and inequilateral, and in its indusium with minute whitish-capitate glands (vs. indusium with much larger, sessile, globular, reddish-resinous glands). As its name implies, *T. namaphila* typically grows in wet soil beside brooks and streams, while *T. piedrensis* grows on stony slopes or shaded banks in montane forest. *Thelypteris namaphila* appears to be confined to an area of serpentine substrate, but *T. piedrensis* is not thus limited in distribution.

The delicate cutting of the blades of *T. namaphila* somewhat resembles that of *T. sancta* (for which it has been mistaken), but this new species clearly differs from *T. sancta* in its narrow, setulose rhizome-scales, its stiff, harsh texture, and in its submarginal sori with more prominent indusium.

Paratypes: PUERTO RICO. **Municipio de Maricao:** Monte Allegrillo, 900 m, 3 Apr 1913, N. L. Britton et al. 2612 (US); Maricao State Forest, 700 m, 9 July 1963, Liogier 9823 (US); Maricao State Forest, along Río Maricao above Criadero de Peces, 450-600 m, 18 Apr 1984, Proctor 40468.

***Thelypteris rheophyta* Proctor, sp. nov.** (Fig. 2)—TYPE: Puerto Rico, Municipio de Ponce, Barrio Anón, along Río Inabón toward base of high falls, 500-700 m, among boulders beside stream, 21 Jan 1984, Proctor 40042 (holotype US; isotypes IJ, SJ).

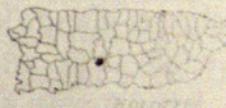
A *T. consanguinea* (C. Chr.) Proctor squamis rhizomatis fere deliquis, stipitis squamis late ovato-bullatis et cellulatis isodiametris tenuiter clathratis, pinnis paucioribus longius distantibus, pinnis maximis basi pinnulis duabus elongatis instructis, venis pluribus differt.

Rhizome erect or sometimes decumbent, 0.3-0.5 cm diam., closely invested with stipe bases, and nearly devoid of scales (those produced attached only to stipe bases). Fronds fasciculate, up to 45 cm long (often less than 25 cm); stipes



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Thelypteris rheophyta Proctor, sp. nov.

0cm | 2 3 4 5

CORDILLERA CENTRAL; Barrío Andú. Along Río Inabón toward base of high falls, elev. 500-700 m.

Among boulders beside stream; rhizome erect.

Coll.: George R. Proctor, No. 40042  
Fecha: Jan. 21, 1984

FIG. 2. *Thelypteris rheophyta*, holotype, Proctor 40042.

black at base, otherwise greenish-stramineous, 3-9.5 cm long, glabrous or nearly so, at first bearing toward base a few scattered, deciduous, broadly ovate-bullate, glabrous, delicately clathrate scales, the cells approximately isodiametric. Rhachis like the stipe, except for a line of minute incurved puberulence along adaxial

side. Blades oblanceolate, up to 33 cm long, 5–12 cm broad above the middle, gradually narrowed toward base (the lowest pinnae usually 0.5–1 cm long), long-acuminate at apex. Minute aerophores present at abaxial basiscopic base of pinnae. Pinnae usually 15–18 pairs, opposite, subopposite or alternate, inequilateral, usually ascending and somewhat falcate, with both proximal divisions (pinnules) longer than the rest, the basiscopic one usually at an angle divergent from the others on that side; longest pinnae typically 1.5 cm apart, narrowly deltate-acuminate, mostly 2.5–6 cm long, 1–1.8 cm wide at base; segments approximately 7–12 on a side, oblong-falcate, acute at apex, mostly 1.2–1.5 mm wide, all but the free proximal pinnules narrowly joined at base with up to about 6 pairs of simple veins (to 7 in proximal pinnules, with basal veins in these usually forked). Costae hispidulous on adaxial side, the costules and tissue glabrous or with a few scattered hairs; all parts glabrous beneath, the tissue bearing few to rather numerous sessile, reddish-resinous glands. Sori supramedial to submarginal; indusium often asymmetric with one side slightly prolonged downward along vein, glabrous or sparsely hispidulous, the irregular margin usually beset with globular, reddish-resinous glands; sporangia glabrous.

*Thelypteris rheophyta*, as its name implies, shares with *T. consanguinea* and other related forms (including the recently described *T. fluminalis* A. R. Smith of Ecuador) the habit of growing along the rocky courses of streams, where the plants frequently become submerged in flowing water during periods of flooding. The group as a whole needs further taxonomic study. The Puerto Rican material now being described has usually been misidentified as *T. sancta*, but it is actually more nearly related to *T. consanguinea*.

I first thought these plants might represent a form of *T. consanguinea*, but further study has revealed an apparently consistent suite of characters distinguishing the Puerto Rican populations. *Thelypteris rheophyta* differs from *T. consanguinea* in the following characters: 1) near absence of scales on the rhizome, those at base of stipe being broadly ovate-bullate and delicately clathrate with nearly isodiametric cells, vs. obvious presence of an apical tuft of rhizome scales, these mostly deltate-lanceolate, flat, and with the clathrate cells consistently much larger, and longer than broad; in addition, the latter scales have resinous-glandular margins; 2) longer stipes (3–9.5 cm vs. 2–4 cm); 3) fewer pinnae (15–18 vs. 18–35) spaced farther apart (largest ones typically 1–1.5 cm apart, vs. 0.6–0.8 cm); 4) presence of a pair of free pinnules at base of largest pinnae (as well as on reduced pinnae toward base), the basiscopic one often longer than the acroscopic, and diverging at an angle from the other (and much shorter) divisions of the same side; in *T. consanguinea*, the proximal divisions of the longest pinnae are not free, and the basiscopic one is short and not divergent from the other segments on the same side (only on reduced pinnae toward base of blade are they longer and divergent); and 5) usually more numerous veins (4–7 vs. 3–5 pairs).

*Thelypteris sancta* is a plant of more delicate texture and cutting than *T. rheophyta*; its narrower, linear-oblong segments are usually more widely separated (often by more than their own width) by broad sinuses, and an indusial structure is absent or rudimentary. The scales at base of stipes are, however,

very similar. *Thelypteris rheophyta* occurs only along stream courses, but *T. sancta* is much more widely distributed.

From *T. resinifera* (Desv.) Proctor, which often grows in similar habitats, *T. rheophyta* differs in 1) the delicate, nearly isodiametric clathrate cell structure of the bullate-ovate scales near base of stipe (vs. elongate subclathrate cells of flat lanceolate scales, more like those of *T. consanguinea* but coarser); 2) fewer pinnae (15–18 pairs, vs. usually 30–40 pairs, seldom less); 3) presence of free proximal pinnules (vs. all divisions of the pinnae adnate); and 4) lamina glabrous (or nearly so) abaxially (vs. lamina pilosulous on vascular parts beneath).

**Paratypes:** PUERTO RICO. Without definite locality, May 1883, Eggers 733 (US). **Municipio de Río Grande:** Sierra de Luquillo, Caribbean National Forest: Slopes of El Yunque, 28 May 1944, W. H. Wagner s.n. (US); Road 191, km 12.3, ca. 680 m, 8 Aug 1983, Proctor 39373; Road 191, km 9.9 at Quebrada Juan Diego, 480–500 m, 10 Oct 1983, Proctor 39603; Quebrada Sonadora above crossing of Road 186, 300–450 m, 21 Feb 1984, Proctor 40172. **Municipio de Arecibo:** Barrio Esperanza, vicinity of Observatorio de Arecibo, beside Río Tanamá, 160–180 m, 26 Feb 1984, Proctor 40250, 40256.

#### SUBG. AMAUROPELTA SECT. UNCINELLA

***Thelypteris inabonensis*** Proctor, sp. nov. (Fig. 3)—**TYPE:** Puerto Rico, Município de Ponce, Cordillera Central, Toro Negro State Forest, along headwaters of Río Inabón above high falls, 1120–1250 m, 22 Jan 1984, Proctor 40069 (holotype US; isotypes IJ, SJ).

A *T. rustica* (Fée) Proctor magnitudine multo minore, squamis setulosis, pilis plerumque acicularibus in rachi et abaxialiter in costis differt. A *T. frigida* (Christ) Smith & Lell. et *T. funckii* (Mett.) Alston squamis setulosis in stipite et rachi, pilis abaxialiter in costa crassioribus et numerosioribus et indusio dense longiciliato differt. A *T. frigida* stipitibus brevioribus, rachi pilis longis crassis pluricellularibus carenti, superficie adaxiali densius strigilosa differt. A *T. funckii* costa squamis carenti differt.

Rhizome erect, slender (ca. 0.5 cm diam.) and tightly invested with stipe bases, bearing toward apex numerous dark lustrous brown, narrowly lance-linear, densely setulose scales up to 4 mm long and 0.2–0.4 mm wide near base, the tips often contorted-filiform. Fronds erect-arching, up to 60 cm long; stipes 5–10 cm long, very densely hispidulous with grayish acicular (rarely hamate) hairs of variable length (mostly 0.2–0.4 mm long), and also beset with numerous spreading scales like those of rhizome; rhachis likewise clothed with similar hairs and scales throughout. Blades narrowly elliptic, up to 55 cm long, mostly 9–11 cm broad near middle, gradually narrowed toward base with 8–10 pairs of reduced, slightly deflexed pinnae (the lowest often less than 1 cm long), long-acuminate at apex. Pinnae mostly 25–30 pairs, sessile, the longest linear-oblong, truncate at base, acutish to short-acuminate at apex, 1.3–1.7 cm wide, pinnatifid with mostly 12–14 pairs of segments; aerophores absent. Segments oblong, slightly falcate, up to 6 mm long and 2–3 mm wide, rounded to subacute at apex, with up to 7 pairs of simple veins. Vascular parts and tissue densely strigillose on adaxial side; costae and costules densely hispidulous abaxially but lacking scales, the



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*Thelypteris inabonensis* Proctor, sp. nov.

CORDILLERA CENTRAL: Toro Negro State Forest.  
Along headwaters of Rio Inabón above high falls,  
elev. 1120-1250 m.

Moist eroding earth bank of stream in partial shade.

Coll. George R. Proctor No. 40069  
Fecha: Jan. 22, 1984

0cm 1 2 3 4 5

FIG. 3. *Thelypteris inabonensis*, holotype, Proctor 40069.

tissue with numerous short, erect, acicular (rarely hamate) hairs and lacking glands. Sori small, supramedial to submarginal, often somewhat concealed by the narrowly reflexed margins, with persistent, densely long-ciliate indusium; sporangia glabrous.

This species seems related only to *T. rustica* in the West Indian area, but clearly differs from that Lesser Antillean species in its much smaller size, setulose scales, and in having mostly acicular (rather than hamate) hairs on rhachis and abaxially on costae. It more closely resembles *T. frigida* and *T. funckii* of Costa Rica and northwestern South America. From both of these it differs in its setulose scales, its stouter and more abundant abaxial costal hairs, and in its densely long-ciliate indusium. From *T. frigida* it further differs in its shorter stipes, in the intermediate and variable nature of the rhachis hairs (but none long, stout, and obviously pluricellular), and in being much more densely strigillose on the adaxial surface. From *T. funckii* it also differs in wholly lacking scales on the costae beneath.

*Thelypteris inabonensis* so far is known to occur only along the banks of a single stream, where it is uncommon. It should be considered a rare and endangered species.

#### SUBG. GONIOPTERIS

***Thelypteris cordata* (Fée) Proctor var. *imitata* (C. Chr.) Proctor, comb. et stat.**

nov.—*Dryopteris imitata* C. Chr., Kongl. Svenska Vetenskapsakad. Handl. III, 16(2):29, t. 6, figs. 1–4. 1937.—TYPE: Haiti, Ekman H 3724, isotype IJ. Range: Andros, Hispaniola, and Puerto Rico.

The small group of ferns allied to *T. cordata* presents a somewhat intricate problem in defining taxa. Christensen (1937) described *Dryopteris imitata* as "Near *D. cordata* (Fée) C. Chr. with similar pinnae but it is pinnate nearly to the apex, not proliferous, and with very conspicuous, reniform, grey indusia make it very distinct." However, subsequent accumulation of more material from a wider range tends to reduce the distinctiveness of these two forms. Populations in Cuba and Jamaica have numerous rather long, simple hairs on the rhachis (mixed with much shorter stellate ones) and a very minute indusium with simple and forked hairs; plants of the Bahamas (Andros), Hispaniola, and Puerto Rico bear only short stellate hairs on the rhachis and have a much larger indusium likewise covered with tiny stellate hairs only. Plants from all areas vary greatly in size (the Jamaican ones most consistently large), and there seem to be no other clear-cut morphological distinctions. Since neither typical *T. cordata* nor *T. imitata* are ever proliferous, Christensen's statement in this regard seems irrelevant except in relation to the allied *T. reptans* (J. F. Gmel.) Morton, which occurs throughout the same range. In my opinion, *T. cordata* and *T. imitata* should be considered only varietally distinct from each other.

*Thelypteris cordata* var. *imitata* is quite common on sheltered limestone cliffs in Puerto Rico, where its identity was first recognized by Weatherby on the basis of material collected by Chrysler in 1947 (US). Maxon (1947, p. 126) had previously misidentified other material (Sargent 3273, US) as *Dryopteris asplenoides* (Sw.) Kuntze.

***Thelypteris abdita* Proctor, sp. nov. (Fig. 4)—**TYPE: Puerto Rico, Municipio de Utuado, Río Abajo State Forest, ca. 1.6 km due WSW of Campamento Crozier, 320–340 m, in sheltered or hidden crevices of moist vertical limestone cliff, 24 Jan 1984, Proctor 40099 (holotype US; isotypes IJ, SJ).



FIG. 4. *Thelypteris abdita*, holotype, Proctor 40099.

A *T. cordata* var. *imitata* (C. Chr.) Proctor differt magnitudine multo minore, superficie stellato-puberula, venis simplicibus vel 1-furcatis, indusio glandulosus cum multis pilis simplicibus vel raro furcatis.

Rhizome erect, suberect, or decumbent, very small (0.2-0.4 cm diam.), short,

closely invested with stipe bases, at apex bearing a tuft of glabrous or sparingly stellate-puberulous lustrous brown scales, these narrowly deltate, acuminate, up to 4 mm long and 0.3–0.8 mm broad at base. Fronds few (usually 4–7), laxly fasciculate and spreading or decumbent, 6–19 (–23) cm long, forming a loose rosette; stipes stramineous, 2–7 cm long, 0.3–0.6 mm diam., lightly puberulous chiefly on adaxial side with minute stellate (sometimes a few merely forked) hairs. Rhachis more densely stellate-puberulous than stipe, on all sides. Blades approximately linear (rarely narrowly lance-linear), 5–16 (–19) cm long, 1–2 (–3) cm broad, pinnate nearly throughout, slightly narrowed at base end and at the blunt, shortly pinnatifid apex. Pinnae 10–20 pairs, mostly alternate, apart or sometimes approximate, stalked, rounded-oblong (rarely almost rotund) or very bluntly deltate-oblong, 0.5–1 (1.5) cm long, 0.3–0.6 cm wide, the margins entire, with 3–6 pairs of veins, these all simple or the basal 1–3 pairs forked, all tips free and ending in minute elliptic hydathodes short of the margin (seen adaxially). Vascular parts, margins, and tissue on both sides puberulous with few to numerous minute stellate hairs. Sori supramedial; indusium erect at sporangial maturity, irregularly roundish, with glandular margin and bearing numerous long, simple (rarely forked) hairs; sporangia glabrous.

This diminutive species has usually been mistaken in the past for a small form of *Thelypteris cordata* (Maxon, 1947, p. 127), and in fact grows with or near *T. cordata* var. *imitata* in many localities. However, many observations in the field have clearly shown that *T. abdita* is an independent, uniformly distinct, and much smaller entity, and bears little resemblance to *T. cordata* var. *cordata* as I have long known it in Jamaica. Comparison of *T. abdita* with *T. cordata* var. *imitata* shows that besides its much smaller size (mature fronds mostly 6–19 cm long and 1–2 cm wide, seldom larger, vs. up to 50 cm long and up to 5.5 cm or more wide), *T. abdita* differs in its densely to sparsely stellate-puberulous (vs. glabrous) tissue, simple or at most 1-forked veins, these always free (vs. many 1–2-forked veins, some often anastomosing), and moderate-sized, glandular indusium with many long, simple or rarely forked hairs (vs. a more prominent, non-glandular indusium with many much smaller, always stellate hairs). *T. abdita* is endemic to Puerto Rico; small forms of *T. cordata* var. *cordata* and *T. cordata* var. *imitata* seen from Cuba and Hispaniola respectively, though rather similar in appearance, are apparently juvenile developmental stages or else environmentally stunted, and are always distinct on the basis of one or more of the characters stated above. I am satisfied that *T. abdita* as described above represents the mature stage of this species.

Paratypes: PUERTO RICO. **Municipio de Utuado:** Utuado, 25 Mar 1887, Sintenis 6588 (US); Utuado, 350 m, 12 Nov 1943, Sargent 3272 (US). **Municipio de Lares:** Road 129 [old route], km 20, 7 May 1966, Woodbury s.n. (SJ). **Municipio de Quebradillas:** Barrio Charcas, near end of Road 437 (Finca Laboy), ca. 220 m, 15 Oct 1983, Proctor 39625. **Municipio de Arecibo:** Barrio Esperanza, gorge of Rio Tanamá in vicinity of Observatorio de Arecibo, 200–270 m, 26 Feb 1984, Proctor 40241.

***Thelypteris verecunda*** Proctor, sp. nov. (Fig. 5)—TYPE: Puerto Rico, Municipio de Quebradillas, Barrio Charcas, near end of Road 437 (Finca Laboy), ca. 220 m, on moist shaded limestone ledge near base of cliff, 5 Oct 1983, Proctor 39581 (holotype US).



0cm 1 2 3 4 5

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HOLOTYPE

Thelypteris verecunda Proctor, sp. nov.

MONTAÑAS GUARIONEX: Barrio Charcas. Near end of Road 437, elev. c. 220 m.

On moist shaded limestone ledge near base of cliff.

Coll.: George R. Proctor, No. 39581 (unicate)  
Date: Oct. 5, 1983

FIG. 5. *Thelypteris verecunda*, holotype, Proctor 39581.

A *T. reptanti* (J. F. Gmel.) Morton magnitudine minore, venis liberis plerumque simplicibus, indusii pilis longis simplicibus differt. *T. abditae* Proctor magnitudine et textura similis, sed ab illa frondibus dimorphis ubique pilis stellatis et simplicibus indutis, soris inframedialibus differt.

Rhizome creeping or decumbent, slender (ca. 0.2–0.3 cm diam.), bearing at

apex a small tuft of brown, minutely stellate-puberulous, deltate-acuminate scales ca. 1 mm long and 0.5 mm wide at base. Fronds decumbent-spreading, dimorphic, clothed throughout with minute stellate (occasionally forked) and numerous much longer simple hairs, the latter mostly 0.3–0.6 mm long; stipes 1–1.5 (–2) cm long, 0.4–0.5 mm diam. Sterile blades oblong, 2.5–4 cm long, 1.5–2 cm broad, truncate at base, rounded at the broadly lobed apex, with 2–4 pairs of short-stalked, round-oblong, entire pinnae, these 0.8–1 cm long and 0.4–0.6 cm wide; veins simple or 1-forked, all free. Fertile blades linear-attenuate, 13–15 cm (or more) long, 1.2–1.8 cm broad, truncate at base, the rhachis bearing a minute proliferous bud well below the apex; pinnae 15–20 pairs (or more), somewhat variable, mostly rounded-oblong to oval, 0.5–0.9 cm long, 0.3–0.4 cm wide, entire, short-stalked (or rarely a few sessile and somewhat adnate). Sori small, inframedial; indusium minute, erect, bearing a tuft of long, white simple hairs; sporangia glabrous.

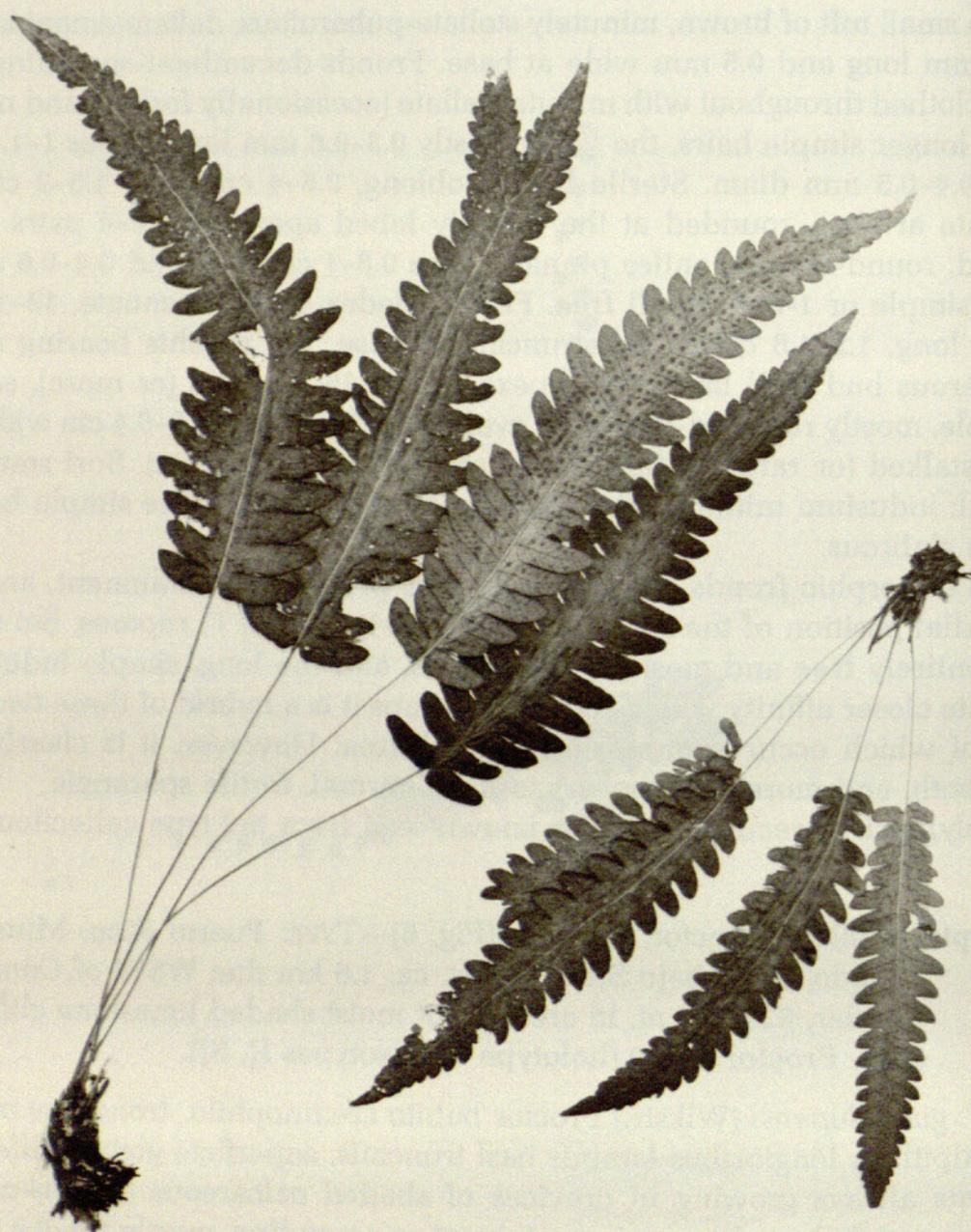
The dimorphic fronds (the elongate ones proliferous), indument, and the inframedial position of the sori suggest comparison with *T. reptans*, but the small size, entirely free and mostly simple veins, and the long, simple indusial hairs indicate closer affinity with *T. abdita*. Perhaps it is a hybrid of these two species, both of which occur in the same general area. However, it is clearly distinct from both, and moreover appears to have normal, fertile sporangia.

*Thelypteris verecunda* so far is known only from the type collection.

***Thelypteris hildae* Proctor, sp. nov. (Fig. 6)—TYPE: Puerto Rico, Municipio de Utuado, Río Abajo State Forest, ca. 1.6 km due WSW of Campamento Crozier, 320–340 m, in crevices of moist shaded limestone cliffs, 24 Jan 1984, Proctor 40100 (holotype US; isotypes IJ, SJ).**

A *T. guadalupensi* (Wikstr.) Proctor habitus cremnophilo, frondibus monomorphic stipitibus longioribus laminis basi truncatis, superficie glabra differt.

Plants always growing in crevices of shaded calcareous or non-calcareous cliffs or rock ledges. Rhizome short, erect or ascending, mostly 0.4–0.6 cm diam. (excluding the closely-investing stipe bases), at apex bearing a tuft of lustrous brown, glabrate or sparingly and minutely stellate-puberulous scales, these chiefly deltate-attenuate, up to 6 mm long and mostly 0.5–1 mm broad near base. Fronds few (usually 4–6), monomorphic, loosely fasciculate, spreading, up to 50 cm long (usually much less); stipes stramineous, (4–) 9–18 (–22) cm long (up to 45% of length of entire frond), 0.6–0.9 (–1.2) mm diam., minutely stellate-puberulous or sometimes glabrous. Blades narrowly lance-deltate or occasionally lanceolate, 12–28 (–32) cm long, 2.5–4.5 (–6.5) cm broad near base or below middle, truncate or very slightly narrowed at base, acuminate at apex, pinnatifid throughout (or sometimes a single pair of free pinnae, rarely more, at base) except toward the subentire apex. Segments 15–22 (–25) pairs, cut  $\frac{1}{2}$ – $\frac{2}{3}$  (– $\frac{3}{4}$ ) to the rhachis with mostly acute sinuses, oblong to narrowly deltate, blunt to acute at apex, with 8–17 pairs of veins, the majority of these (except in very large plants) simple and free (or a few 1-forked, these rarely anastomosing), the proximal pair from adjacent segments usually joined in the tissue and sending an excurrent veinlet



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*Thelypteris hildae* Proctor, sp. nov.

Ocmi 2 3 4 5

RIO ARAUJO STATE FOREST: c. 1.6 km. due W.S.W. of  
Campamento Crozier, elev. 320-340 m.

In crevices of moist shaded limestone cliffs.

Coll.: L. L. Proctor No. 40100  
Puerto Rico Jan. 24, 1984

FIG. 6. *Thelypteris hildae*, holotype, Proctor 40100.

to the sinus. Adaxial side of blade glabrous except for minute stellate hairs along the rhachis-groove and sometimes a few on costae; abaxial side of blade with rhachis minutely stellate-puberulous to glabrous, and with scattered minute stellate hairs on costae and veins, the tissue glabrous; margins likewise with a few

stellate hairs especially at sinuses. Sori usually about medial, sometimes paired; moderately large indusium present, always minutely stellate-puberulous; sporangia glabrous.

The group of *T. guadalupensis* in Puerto Rico involves two common and distinct species usually lumped under one name. Typical *T. guadalupensis* (together with its somewhat enigmatic variant "forma portoricensis") is an essentially terrestrial species (sometimes also on mossy boulders, rarely on ledges), well known and widespread in the Greater and Lesser Antilles. It is common in Puerto Rico. Also in Puerto Rico occurs a related entity that is always found in the crevices of shaded cliffs and ledges, never in soil on the ground, and which is also morphologically distinctive. Although probably a close relative of *T. guadalupensis*, this entity, now described as *T. hildae*, differs consistently in 1) its habitat (always in crevices of ledges and cliffs, vs. nearly always terrestrial in soil or sometimes on mossy stones); 2) its monomorphic (vs. more or less dimorphic) fronds, these never proliferous at the tip; 3) its much longer, more slender stipes; 4) its blades truncate or but slightly reduced at base with seldom more than 1 pair of separated pinnae (if any). In *T. guadelupensis* the blades are long-decrescent downward, usually having two to many pairs of separate pinnae or widely-separated segments. In addition, *T. hildae* has glabrous (vs. minutely stellate-puberulous) tissue, and less divided, mostly free veins. This newly-recognized species is apparently endemic to Puerto Rico, where it has a wide distribution in suitable habitats. Unlike many species found on limestone rocks, *T. hildae* has also been found on cliffs of igneous origin.

*Thelypteris hildae* is named for Hilda Díaz Soltero, former Secretary of Natural Resources, under whose regime the present study of Puerto Rican ferns was initiated, and whose enthusiastic encouragement I have much appreciated.

**Paratypes:** PUERTO RICO. **Municipio de Utuado:** Probably near type locality, 7 Dec 1943, Sargent 3298 (US); 22 Apr 1947, Chrysler 6728 (US); 3 May 1983, Acevedo 46 and 57 (SJ). **Municipio de Río Grande:** Sierra de Luquillo, Caribbean National Forest, Quebrada Juan Diego above Road 191, km 9.9, 480–500 m, 10 Oct 1983, Proctor 39606. **Municipio de Ponce:** Cordillera Central, Barrio Anón, along Río Inabón toward base of high falls, 500–700 m, 21 Jan 1984, Proctor 40066. **Municipio de Ciales:** Barrio Frontón, Road 140, km 49, ca. 320 m, 12 July 1984, Proctor 40556. **Municipio de Arecibo:** Barrio Esperanza, vicinity of Observatorio de Arecibo, 250–300 m, 26 Feb 1984, Proctor 40238. **Municipio de Hatillo:** Barrio Bayaney, Cueva Clara de Empalme, near intersection of Roads 134 and 455, 250–280 m, 25 Feb 1984, Proctor 40188; Cueva de la Catedral, near intersection of Roads 129 and 134, 200–250 m, 12 Nov 1983, Proctor 39716; same locality, 11 Aug 1984, Proctor 40676. **Municipio de Quebradillas:** Barrio Charcas, near end of Road 437 (Finca Laboy), ca. 220 m, 5 Oct 1983, Proctor 39562; gorge of Río Guajataca, E side of river along bottom of gorge, ca. 130 m, 15 Oct 1983, Proctor 39610.

**Thelypteris hastata** (Fée) Proctor var. **heterodoxa** Proctor, var. nov.—**TYPE:** Puerto Rico, Municipio de Hatillo, Barrio Bayaney, Cueva de la Catedral, near intersection of Roads 129 and 134, 220–250 m, on steep wooded slope in limestone ravine, 11 Aug 1984, Proctor 40678 (holotype US; isotype SJ).

A *T. hastata* var. *hastata* lamina deltata vel ovato-deltata, pinnis latioribus marginibus lobatis differt.

Although identical in minute details, this entity differs from typical *T. hastata* in its deltate or ovate-deltate blades, the basal or next to basal pair of pinnae being the longest. This contrasts with var. *hastata*, whose blades are oblanceolate to narrowly oblong-obovate (rarely elliptic), being widest above the middle and normally having up to six gradually reduced pairs of pinnae toward base. Further, the pinnae of var. *heterodoxa* are usually 2.5 cm or more in width, with distinct marginal lobing, whereas those of var. *hastata* are seldom over 2 cm wide and are usually serrulate or crenate-serrate, or rarely shallowly lobed.

The group of *Thelypteris hastata* in Puerto Rico includes *T. hastata* itself (common), its var. *heterodoxa* (rare), *T. leptocladia* (Fée) Proctor, and several apparent hybrids involving these and other species. These forms require further investigation. However, the only other goniopterid fern in Puerto Rico with blades of somewhat similar outline to *T. hastata* var. *heterodoxa* is *T. abrupta* (Desv.) Proctor (recently discovered in this island for the first time, 26 Aug 1984, Proctor 40762), but the latter species clearly differs in details of indument, in the narrowly cuneate bases of the lower pinnae, in having a distinct, persistent indusium, and in the sporangial stalks (instead of the heads) being setulose. It is probably not closely related.

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