

BOTANY.—*New West Indian ferns.*¹ WILLIAM R. MAXON, National Museum.

Several collections from the West Indies, chiefly the Greater Antilles, in the last few years have added materially to our knowledge of the fern flora by extending the known range of species previously regarded as confined to one or more of the islands or to continental regions, and by bringing to light a considerable number of new species. Six of the latter are described herewith.

Cyathea brittoniana Maxon, sp. nov.

Caudex erect, 2.5 to 8 meters high; fronds erect-spreading, up to 3 meters long; stipes up to 12 mm. thick at base, ochraceous-olivaceous from a darker base, lustrous, glabrescent, thickly beset with slender straight pungent spines up to 1.5 mm. long, conspicuously paleaceous at base, the scales subulate-attenuate, about 3.5 cm. long, 2 mm. broad at base, rigid, straight, minutely erose-denticulate throughout, golden brown, highly lustrous; blades of an ovate type, abruptly short-acuminate, 2 meters long or more, 1 to 1.2 meters broad, subtripinnate, the rachis ochraceous-olivaceous, aculeolate or muriccate, at first closely hirsutulous above, glabrescent, lustrous; pinnae alternate, subdistant, laxly spreading, stalked (1 to 3.5 cm.), linear-oblong, acuminate, 45 to 62 cm. long, 12 to 18 cm. broad, the secondary rachis strigose above, beneath distantly aculeolate or muriccate, scantily and laxly hirsutulous, and bearing a few deciduous scales, these linear, up to 9 mm. long, tortuous, fimbriate-ciliate; pinnules 25 to 30 pairs below the tip, distant to approximate, mostly alternate and short-stalked (1 mm.), linear-oblong, 6 to 10 cm. long, 12 to 18 mm. broad, obliquely pinnatifid to about 1 mm. from the costa, the costa densely hirsute-strigose above with curved grayish hairs, beneath thinly hirsute and distantly paleaceous, the scales bright yellow-brown, mostly ovate and long-acuminate, 1 to 2.5 mm. long, slightly concave, asymmetrical or not, thin, lustrous, denticulate-ciliolate; segments 16 to 18 pairs below the tip, oblong, falcate, distally acutish, 3.5 to 4 mm. broad, close, parallel, crenate-serrate (deeply so toward the tip), the costule hispid above, beneath thinly hirsute and bearing a few small scales toward the base, these mostly bullate, bright yellowish brown, thin; veins 8 to 10 pairs, oblique, mostly once forked below the middle, prominulous and glabrous above, thinly hirsute beneath, the hairs extending to the leaf tissue; sori 3 to 5 pairs, small (about 0.7 mm. in diameter), slightly inframedial; indusium globose, membranous, transparent, rupturing irregularly, the divisions subpersistent; receptacle small, short-capitate; paraphyses numerous, short, flattish; flaccid, deciduous. Leaf tissue dull dark green, slightly paler beneath, delicately membranous.

Type in the U. S. National Herbarium, no. 755,722, collected in mountain forest, Mt. Alegrillo, Porto Rico, at 900 meters altitude, April 3, 1913, by N. L. Britton, F. L. Stevens, and W. E. Hess (no. 2620). Other specimens examined are as follows:

PORTO RICO: Maricao, July, 1913, *Hioram* 809.

CUBA: Monte de la Prenda, Oriente, altitude 800 meters, in forest, *Eggers* 5211. Pinal de Santa Ana, Oriente, altitude 800 meters, *Eggers* 5031.

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DOMINICAN Republic: Paradis, Barahona Province, at 450 meters altitude, *Abbott* 1590.

TRINIDAD: Without locality, *Fendler* 80 (3 sheets, as *C. schan-schin*). Mt. Tocuche, in forest, *Britton, Hazen & Mendelson* 1351.

Cyathea brittoniana is closely related to *C. tenera* (J. Sm.) Griseb., to which the material above described has been erroneously referred in recent years. That species, described originally from St. Vincent, is widely distributed in the West Indies. It differs from *C. brittoniana* in its darker and more strongly aculeate stipes (the spines fewer, up to 3 mm. long), its dilatate, less falcate, nearly obtuse segments (the sinuses broader), its more numerous bullate scales (these usually extending two-thirds the length of the costule), and its scant hirsutulous rather than hirsute condition beneath, the hairs inconspicuous, much shorter than in *C. brittoniana*, and rarely if ever extending to the leaf tissue. One other character is noted in the paraphyses, which are somewhat rigid, dark castaneous to vinaceous, and subpersistent, in contrast to those of *C. brittoniana*.

The following specimens of *C. tenera* are at hand:

ST. VINCENT: *H. H. Smith* 1717; *H. H. & G. W. Smith* 292; *Eggers* 6859.

GRENADA: *Elliott* 10; *Murray & Elliott* 10; *Sherring* 157, 228 (4 sheets).

MARTINIQUE: *Sieber* 374.

MARGARITA ISLAND (Venezuela): *Johnston* 143 (2 sheets).

TRINIDAD: Heights of Aripo, *Broadway* 9968 (2 sheets). Morne Bleu, *Britton, Freeman & Bailey* 2285.

CUBA: Loma San Juan, Sierra Maestra, altitude 1,050 meters, *Léon, Clement & Roca* 10535.

DOMINICAN REPUBLIC: Paradis, Barahona Province, altitude 600 meters, *Abbott* 1664.

***Polypodium oxypholis* Maxon, sp. nov.**

Rhizome wide-creeping (15 cm. or more), 1 to 2 mm. in diameter, sinuous, green, emitting a few radiceous rootlets at intervals, densely paleaceous at the growing tip (2 to 5 cm.), subpersistently so throughout, the scales dark brown, divaricate, 5 to 6 mm. long, evenly linear-attenuate from a deltoid-lanceolate deeply auriculate base, attached at the distant included sinus, rigid, subdentate, clathrate, the cells of the elongate portion narrowly oblong to linear-polygonal, with strongly sclerotic yellowish-brown partition walls, the outer walls thin and translucent. Fronds several, 1 to 2.5 cm. apart, 30 to 35 cm. long, ascending; phyllopodia small, 1.5 mm. high; stipes 11 to 17 cm. long, very slender (0.5 to 1 mm. thick), stramineous, naked; blades 17 to 22 cm. long, 2 to 3.5 cm. broad at middle, simple, varying from narrowly oblong-lanceolate to pointed-linear, long-acuminate or attenuate at base, caudate at apex (the tip about 3 cm. long, 5 mm. broad at base), repand, the margins unevenly sinuate; costa greenish-stramineous, elevated on both surfaces, 0.5 mm. broad or less; main veins 25 to 35 pairs, mostly alternate, diverging from the costa at an angle of 45° to 50°, elevated beneath nearly to the margin, flexuous, the connecting veins strongly arcuate; areoles mostly arranged in 4 series from costa to margin, variable in shape, size, and venation, the costal ones in the middle portion of the blade mostly obovate-cuneate, with a single included fertile veinlet; second and third areoles broader,

with 1 or 2 short included fertile veinlets, or one or both of these excurrent to the next cross-vein, or the areole divided by a median excurrent veinlet, the marginal areoles commonly so divided; sori in 4 irregular incomplete rows on either side of the costa, appearing sparse; leaf tissue translucent, firmly pergamentaceous, sublustrous, the margins somewhat cartilaginous and narrowly revolute, the veins (primary ones excepted) immersed.

Type in the U. S. National Herbarium, no. 1,077,311, collected on a damp cliff of Morne de Ouésanne (Morne de Brouet), near Furcy, Haiti, altitude about 1,300 meters, June 13, 1920, by E. C. Leonard (no. 4782).

A peculiar species, without near relatives. In its slender stipes and slight, wide-creeping, divaricately paleaceous rhizomes only it suggests *P. vulpinum* Lindm.² a species which differs widely in its much smaller size, in shape of blade and in most details of venation, and in its rhizome scales, these thin, ferruginous, concolorous, and nonclathrate, the cells with all the walls thin and nonsclerotic. The relationship with *P. vexatum* D. C. Eaton is remote, that species having the rhizome short-creeping and much stouter (3 to 8 mm. thick), the rhizome scales thin, *orbicular-ovate*, *peltate*, and *closely appressed* to the rhizome, and the blades very strongly long-attenuate downward to the narrowly alate stipe. On the basis of scale characters alone the species may be distinguished at a glance.

Stenochlaena amydrophlebia Slosson, sp. nov.

Rhizome flat, woody, 12 mm. broad, densely paleaceous at the produced tip, the scales bright russet brown, lance-attenuate, 6 to 9 mm. long, about 1.5 mm. broad, very lax, membranous, denticulate and bearing very long filament-like gland-tipped teeth. Sterile frond 70 cm. long; stipe 25 cm. long, dull brown, finely paleaceous in the basal part; blade lance-oblong, obtuse, 45 cm. long, 14 cm. broad near the middle, pinnate, the rachis strongly foliaceo-marginate; pinnae 16 or 17 on each side, alternate, distant (inserted 2 to 3 cm. apart on each side), linear, 6 to 9 cm. long, 10 to 13 mm. broad, narrowly cuneate at the inequilateral base, rather abruptly short-caudate at apex (the tip 5 to 7 mm. long, 1 to 2 mm. broad, blunt), oblique, straight or subfalcate, subentire or at apex sinuate-dentate, glabrous above; apical pinna conform; midvein broad and obtusely sulcate above, beneath minutely and obscurely paleaceous at the elevated base, a few very minute substellate scales extending to the veins and leaf issue; veins close, slightly oblique, mostly once forked near the base, deeply immersed, concealed above, their course barely evident beneath; leaf tissue coriaceous, dull green above, a little paler or somewhat yellowish green beneath. Fertile frond 63 cm. long; stipe 22 cm. long; blade lanceolate, 41 cm. long, about 10 cm. broad below the middle, the rachis deciduously fibrillose; pinnae about 16 pairs, alternate, distant, oblique, linear, mostly 4 to 7 cm. long, 2 mm. broad, substipitate; spores minutely papillose.

Type in the Underwood Fern Herbarium, New York Botanical Garden, collected in dense forest, Río Icaco and adjacent hills, Sierra de Naguabo, Porto Rico, altitude 465 to 720 meters, July 30 to August 5, 1914, by J. A. Shafer (no. 3510a); fragments are in the U. S. National Herbarium, no.

² Described from Brazil and now known from numerous Haitian specimens (Furcy, Leonard 4287, 4638, 4721, 4778; Mission, Leonard 4010, 4024.

694,686. Other Porto Rican specimens are a sterile unnumbered Sintenis plant, without special locality data, and two juvenile plants collected in the Sierra de Naguabo by Britton and Hess (no. 2294) at an altitude of 950 meters. Received recently also from the Dominican Republic (*Fuertes* 1044c), the specimens fertile and entirely characteristic.

A well marked species, related apparently to *Stenochlaena wrightii* (Mett.) Griseb, of eastern Cuba (*Wright* 787; *Maxon* 4300, 4481; *Shafer* 8833; *Léon, Clement & Roca* 10385; *Hioram & Maurel* 2484; *Pollard & Palmer* 150; *Pollard, Palmer & Palmer* 220). That species, however, differs conspicuously in its sterile fronds, the pinnae (5 to 10 pairs) being obovate to oblong-oblong-olate, 1.5 to 3 cm. broad, and abruptly truncate below the long-caudate apex.

***Dryopteris petiolata* Maxon, sp. nov.**

Subgenus *Goniopteris*. Rhizome woody, decumbent, apparently 5 or 6 cm. long, about 2 cm. thick, densely paleaceous at apex, the scales imbricate-spreading, linear-attenuate, 9 to 11 mm. long, 2 mm. broad at base, bright brown, thin, lustrous, entire, laxly stellate-puberulent. Fronds several, subfasciculate, 65 to 85 cm. long, suberect; stipes 30 to 45 cm. long, stramineous, deeply sulcate at the strongly arcuate darker base, naked, deciduously stellate-pubescent, lustrous; blades lance-oblong, evenly acuminate at tip, scarcely or not at all reduced at base, 35 to 45 cm. long, 15 to 20 cm. broad, pinnate, the rachis similar to the stipe, devoid of simple hairs; pinnae 12 to 15 pairs below the tip, spreading nearly at a right angle, distant, subopposite to alternate, mostly stalked (1 to 3 mm.), the lower ones narrowly linear-lanceolate, those above nearly linear, mostly 8 to 10 cm. long, 12 to 17 mm. broad, all but the upper ones pinnatifid nearly half-way to the costa except at the attenuate subcaudate tips, these 1.5 to 2.5 cm. long, subentire; costae elevated beneath, scantily and deciduously hirsutulous, stramineous, persistently stellate-pubescent, stellate hairs extending also to the prominent veins and sparingly to the leaf tissue of both surfaces; segments about 18 pairs, slightly oblique, rounded-triangular, mostly a little longer than broad, the margins entire, slightly revolute, beset with numerous short oblique rigid cilia; veins 6 to 8 pairs, simple, close, the basal ones joined, the resultant veinlet and the second or second and third veins excurrent to sinus; sori strongly inframedial, large (nearly 1.5 mm. in diameter), round, close, forming a dense row almost against the costule; indusia minute, deterrigible, consisting of several connate branched hairs; sporangia very numerous, nonsetose.

Type in the U. S. National Herbarium, no. 1,145,848, collected on steep mountain slope near Liali, Dominican Republic, at 400 to 500 meters altitude, February 9, 1923, by W. L. Abbott (no. 2596). A second specimen of the same number is mounted on sheet no. 1,145,791.

Because of its general leaf-form and stalked pinnae *D. petiolata* is to be compared with *Dryopteris pyramidata* (Fée) Maxon, which also occurs in the eastern part of the Dominican Republic and is not uncommon in the Lesser Antilles southward to the Guianas. That species differs not only in its triangular blades and in having one or several pairs of the lower pinnae reduced at the base, but very materially also in its more oblique and more numerous veins (these usually connivent only), in its freely pilose-hirsute

rachis and costae (similar but minute simple hairs extending to the costules and veins), and in having the sori medial and distinctly indusiate, the indusia small but firm and persistent, with numerous simple marginal hairs. In *D. petiolata* a few simple hairs are found upon the costae, but all other vascular parts (including the rachis) are stellate-pubescent only, the branched hairs coarse and readily seen; whereas in *D. pyramidata* simple hairs predominate throughout, the stellate pubescence being obscure and exceedingly minute. The indusial characters are equally distinctive.

Dryopteris aripensis C. Chr. & Maxon, sp. nov.

Rhizome not seen; stipe brown, 30 cm. long, 7 mm. thick at base, flexuous, trisulcate above, flattish-angulate, densely paleaceous toward the base the scales linear-attenuate, 7 to 13 mm. long, about 0.3 mm. broad at base, flexuous, denticulate-ciliate, bright cinnamomeous, similar but reduced darker scales extending upward to the rachis; blade ovate-oblong, acuminate, about 70 cm. long, 35 to 40 cm. broad, bipinnate, the rachis villous-pilosulous above with pluricellular hairs, beneath persistently paleaceous, the scales linear-attenuate, dark brown, subentire or distantly denticulate; pinnae about 20 pairs, the lower ones short-stalked (5 mm.), opposite, the others mostly sessile, alternate, subdistant, all equilateral, linear-oblong, long-acuminate, the third or fourth pair the largest, 18 to 20 cm. long, 4 cm. broad, fully pinnate nearly throughout, the costa densely hirsute above with long oblique flattish white septate hairs, beneath scantily paleaceous, the scales brown, subulate-attenuate, denticulate, spreading; pinnules about 20 pairs, slightly oblique, the largest ones 2 cm. long, 7 to 8 mm. broad, the basal ones sometimes a little shortened, the others subequal, fully adnate and slightly decurrent, oblong, broadly rounded at apex (the smaller ones nearly truncate), straight or subfalcate, crenate-serrate to obliquely lobed one-third the distance to the costule, the lobes about 5 pairs, persistently short-ciliate; costules thinly long-hirsute above (the hairs about 1.5 mm. long, extending freely to the veins), sparsely hirsute beneath; veins 6 to 8 pairs, mostly once-forked, or the larger lobes with 2 pairs of subpinnately arranged branches, not reaching the margin, glabrous beneath; sori 2 or 3 to each group of veinlets, inframedial, nonindusiate. Leaf tissue dark green above, membranous-herbaceous.

Type in the U. S. National Herbarium, no. 1,059,366, collected on the Heights of Aripo, Trinidad, in forest, March 16, 1921, by N. L. Britton and W. G. Freeman (no. 2349). A second sheet of the same number has yielded data as to stipe and basal scales, and there are besides two other collections from the same locality: *Broadway* 9965 and *Britton & Freeman* 2352, these less developed.

Dryopteris aripensis belongs to the subgenus *Ctenitis*, group *Subincisae*, and is nearest related to *D. haitiensis* (Brause) Urban & Maxon,³ both differing from *D. subincisa* in their small, narrow, bipinnate blades. In *D. aripensis* all the pinnae are narrowly oblong and essentially equilateral, the basal ones sometimes a little shorter than those above; in *D. haitiensis* the middle pinnae are triangular-oblong and nearly equilateral, and the basal pinnae short, triangular, and inequilateral; in *D. subincisa* the basal pinnae

³ Journ. Wash. Acad. Sci. 14: 91. 1924.

are much the largest of all, compound, and strongly produced basicopically. From *D. haitiensis* the present species differs in the form of its pinnae, as just mentioned, it its more numerous, close, subequal, less deeply pinnatifid pinnules, in its thin texture, and in numerous details of scale structure and pubescence, the costules and veins of *D. haitiensis*, for example, entirely lacking the numerous, very long, stiff, white, septate hairs characterizing the same parts of *D. aripensis*.

***Leptochilus pergamentaceus* Maxon, sp. nov.**

Plants terrestrial. Rhizome woody, horizontal, creeping, relatively slender (4 to 8 mm. thick), terete or flattish, brown, closely brownish-paleaceous; fronds few, erect, subdistant. Sterile fronds up to 1 meter long or more; stipes about as long as the blades, stout, trisulcate above, stramineous from a darker fibrillose-paleaceous base; blades broadly ovate-oblong, acuminate, 40 to 60 cm. long, 25 to 45 cm. broad, simply pinnate, the rachis stout, stramineous; pinnae mostly 2 to 5 pairs and a large terminal one, alternate, oblique, ovate, lance-ovate, or broadly oblong, acuminate to acuminate-caudate (sometimes abruptly so), mostly inequilateral and subfalcate, somewhat rounded or broadly cuneate at base (the lower ones distinctly stalked), more or less repand, the margins entire or broadly sinuate; lateral veins oblique (55°), decurved at extreme base, falcate, strongly elevated almost to the margin, here upwardly arcuate; transverse veins 8 to 10 pairs, elevated, deeply arcuate; areoles mostly shorter than broad, copiously reticulate, the ultimate meshes numerous, minute, mostly with 1 or 2 free included veinlets; leaf tissue firmly pergamentaceous, glabrous, usually light green, paler beneath. Fertile fronds up to 1 meter long, long-stipitate; pinnae 2 to 4 pairs and a larger terminal one, distant, oblique, lanceolate to narrowly oblong-lanceolate, acuminate, up to 15 cm. long and 4 cm. broad, densely sporangiate, the costae excepted; sporangia glabrous, the annulus 14-celled; spores very broadly and delicately winged.

Type in the U. S. National Herbarium, nos. 521,264 and 521,265, sterile and fertile fronds respectively, collected at Green River Valley, Jamaica, altitude 750 meters, February 11, 1903, by L. M. Underwood (no. 1426). Other specimens at hand are as follows:

JAMAICA: Several localities, *Underwood* 123; *Maxon* 1841, 1951, 2380; *Maxon & Killip* 550, 805; *Hart* 111; *Clute* 283; *A. Moore*.

CUBA: Several localities, *Wright* 788 (4 sheets); *Maxon* 3908, 4164; *Van Hermann* 3203; *Pollard & Palmer* 164; *Britton & Britton* 5002; *Hioram & Maurel* 2444.

PORTO RICO: Several localities, *Sintenis* 6534; *Shafer* 3790; *E. G. Britton* 5217; *Britton, Cowell & Brown* 5258; *Britton, Britton & Brown* 6177.

DOMINICAN REPUBLIC: Laguna, *Abbott* 378. Puerto Frances, *Abbott* 1205. Paradis, *Abbott* 1598. Liali, *Abbott* 2632.

GUATEMALA: Cubilquitz, *Türckheim* (J. D. Smith, no. 8045).

COSTA RICA: Without locality, *Wercklé*.

VENEZUELA: Upper Guaremales, road from Puerto Cabello to San Felipe, *Pittier* 9108.

As a result of recent study of the material passing as *Leptochilus nicotianae-folius* (Swartz) C. Chr. it becomes necessary to recognize two species of close relationship. These were long ago distinguished by Fée⁴ as *Gymnopteris*

⁴ *Mém. Foug.* 2: 85, 86. pl. 46. 1845.

nicotianaefolia Presl and *G. acuminata* Fée, the latter a transfer of *Acrostichum acuminatum* Willd. (1810), which was founded on a sterile specimen from "Peru" and upon Plumier's illustration of a Martinique plant (*pl.* 115). Unfortunately Fée, following Willdenow and Presl, applied the name *Acrostichum nicotianaefolium* Swartz in a wrong sense. This species had been described from St. Thomas in 1806. The original specimen is an atypical intermediate frond of five pinnae, the terminal pinna and two upon one side being small and fertile, the other two lateral ones large and sterile—an obvious monstrosity, such as occasionally develops in many species with dimorphic fronds. Several photographs of the type have been received from Stockholm through the kindness of Prof. C. A. M. Lindman. Not only in leaf shape but in details of venation these show essential agreement of the St. Thomas plant with Fée's description and illustration of *G. acuminata*, based upon material from Martinique and Guadeloupe and a single specimen from Jamaica. *Gymnopteris acuminata* (Willd.) Presl is thus a synonym of *Leptochilus nicotianaefolius* (Swartz) C. Chr. If regarded as based upon Plumier's plate 115, *Acrostichum acuminatum* Willd. also is synonymous; the identification of the Peruvian specimen cited by Willdenow remains in doubt. The Cuban plant (*Linden* 2117) which Fée describes as *G. nicotianaefolia*, and of which he gives a folio illustration, belongs to the species described above as *L. pergamentaceus*.

The distinctions between the two species are for the most part clear and have been partly stated by Fée. Thus, true *L. nicotianaefolius* (*G. acuminata* Fée) is usually epiphytic, climbing at the base of trees or sometimes on rocks; the pinnae of the sterile fronds are mostly stalked, straight and equilateral, and are usually elliptic-oval or narrowly pointed-oblong, the margins rather strongly sinuate; the lateral veins are less elevated and do not approach close to the margin; the transverse veins are much less deeply arcuate; the ultimate areoles are very much larger, many of them without included veinlets; and the leaf texture is membranous, not pergamentaceous, the ultimate venation prominulous.

Leptochilus nicotianaefolius widely overlaps *L. pergamentaceus* in range. In Jamaica it has been described as *Acrostichum nicotianaefolium* var. *saxicolium* Jenman.⁵ The plant that Jenman describes as the typical form of *nicotianaefolium* is *L. pergamentaceus*.

Of *L. nicotianaefolius* the following material is in the National Herbarium:

MARTINIQUE: *Duss* 1699.

GADELOUPE: *Duss* 4145.

ST. THOMAS: Photographs of the type, *ex herb.* Swartz.

PORTO RICO: Near Mayaguez, *Britton & Marble* 634.

DOMINICAN REPUBLIC: Cotuy, *Abbott* 822. Paradis, *Türckheim* 2822.

JAMAICA: Seamen's Valley, Portland, *Maxon & Killip* 40.

GUATEMALA: Cubilquitz, Alta Verapaz, *Türckheim* (J. D. Smith, no. 8829).

⁵ Bull. Bot. Dept. Jamaica, n. s. 5: 153. 1898.