

though not exactly comparable with, that of mercuric iodide. The substance is slightly soluble in ether and benzene, soluble in ethyl and methyl alcohols, and very soluble in acetone and chloroform. It undergoes incipient decomposition when heated, melting to a deep red oil at 160–1°C.

Analysis: 0.2100 gram of substance consumed 9.4 cc. $\frac{N}{10}$ acid (Kjeldahl) 6.27 per cent N. Theory for $C_{20}H_{17}O_2N_2I = 6.30$ per cent N.

SUMMARY

A number of derivatives of the Schiff base type have been prepared from 3-methoxy-4-hydroxy-5-iodo-benzaldehyde and aromatic amines.

The 5-iodo vanillidene aryl amines are not phototropic.

The addition of iodine to meta methoxy para hydroxy benzaldehyde apparently reduces its ability to yield thermotropic anils when condensed with amines.

Upon vigorous trituration the condensation products of the aldehyde and amines produce polymorphic forms, differing markedly in color

BOTANY.—*New or critical ferns from Haiti.*¹ WILLIAM R. MAXON,
National Museum.

The present paper contains descriptions of four new species of Polypodiaceae from Haiti, as well as notes upon several other species that either are new to the Haitian flora or have other points of interest. Of the new species three are based upon material collected in the early part of 1920 by E. C. Leonard of the U. S. National Museum, while accompanying Dr. W. L. Abbott on an extended trip of biological exploration in Haiti. The other new species belongs to a critical group in the genus *Dryopteris*, and is founded on a specimen collected by W. Buch, this being one of a considerable number recently received from the Berlin Botanical Museum for identification. A complete enumeration of Mr. Leonard's large collection will be offered for publication later in the year; the new species only are published at the present time, in order that they may be available for citation by Dr. I. Urban, who is about to publish a systematic catalog of the pteridophyta known from the island of Hispaniola.

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Adiantum cuneatum Langsd. & Fisch.

A single collection: Morne de Ouésanne, Furcy, altitude 1,300 meters, in shaded ravine, June 13, 1920, *Leonard* 4781.

Apparently indigenous. So far as the writer knows, this South American species has not previously been reported as native to the West Indies. It is cultivated the world over and in tropical regions is known to have sometimes escaped and become naturalized; for example, on banks in the vicinity of the botanical station at Cinchona, Jamaica, at 1,500 meters elevation.

Cheilanthes leonardi Maxon, sp. nov.

Rhizome multicapital, the divisions 1 to 3 cm. long, horizontal, densely paleaceous, the scales oblique, imbricate, rigid, subulate to linear-triangular and attenuate, 2 to 3 mm. long, up to 0.5 mm. broad at base, dark castaneous, greatly thickened throughout, entire. Fronds numerous, close, rigidly erect, mostly 20 to 30 cm. high; stipes 14 to 21 cm. long, 0.3 to 0.6 mm. thick, straight above the arcuate base, wiry, dull dark castaneous, naked; blades broadly ovate-deltoid, subpentagonal, 6 to 11 cm. long, 3.5 to 10 cm. broad at base, sub-bipinnate below, deeply pinnatifid at apex, both the apex and pinnae conspicuously long-caudate; rachis similar to stipe, but closely glandular-puberulous along the ventral groove; main pinnae 1 to 3 pairs, ascending, the basal ones the largest, these sessile, deltoid in outline, inequilateral, 2 to 6 cm. long, 1.5 to 4.5 cm. broad at base, nearly pinnate, with 1 to 5 pairs of segments (the proximal basal one longest), these distant, subopposite, oblique, narrowly linear, 2 mm. broad, arcuate, abruptly discontinuous, the apical segment greatly elongate, linear, up to 4 cm. long in large specimens; second pair of pinnae 1 to 2 cm. distant, adnate, elongate-triangular, strongly inequilateral, in small blades simple or with a single elongate proximal basal segment, in larger blades with 3 to 5 proximal and 1 to 3 distal segments, these all distant, linear, simple; third pair of pinnae simple or sometimes with 1 or 2 proximal basal segments; remaining pinnae simple, narrowly linear, oblique, decurrent, the apical ones joined by a rachis wing as broad as their own width, abruptly discontinuous, the long-caudate terminal segment up to 5.5 cm. long in large blades, 2 mm. broad at base; veins free, arcuate, once-forked, impressed above; segments subcoriaceous, evenly and obliquely crenate from the development of saccate recesses underneath the sharply revolute margin, a vein-branch terminating at each sinus; sori terminal (the receptacle transversely enlarged), the sporangia spreading laterally in a continuous line, partly concealed; indusium continuous, brown, firmly membranous, broad, often extending nearly to the strongly elevated costa, flat or (at maturity) arched or even reflexed to the plane of the blade, entire.

Type in the U. S. National Herbarium, no. 1,077,048, collected in the vicinity of Furcy, Haiti, altitude about 1,300 meters, from rocky bank of a ravine, June 5, 1920, by E. C. Leonard (no. 4552). Represented also by *Leonard* 4483 and 4498 from the same region, and by *Buch* 1946, the last a depauperate specimen from Morne de Brouet,² Haiti, in the Berlin Museum.

Cheilanthes leonardi belongs to the subgenus *Mildella*, and is the West Indian analogue of *C. intramarginalis* (Kaulf.) Hook., which ranges from Mexico to Bolivia. From that species it differs sufficiently in its slender

² According to Mr. Leonard this is the same mountain called by the natives "Morne de Ouésanne."

stipes, its short, ovate-deltoid (not lanceolate or oblong), long-caudate blades, its few and much simpler, conspicuously caudate pinnae, and its few, narrowly linear, invariably simple, distant pinnules.

Hypolepis hispaniolica Maxon, sp. nov.

Plants about 2 meters high, semierect; rhizome not collected; blades about 1.5 meters long, at least 1.2 meters broad, subquadripinnate; primary rachis 3 mm. thick, cinnamomeous, sparingly aculeate (the spines 0.5 to 1 mm. long, conical, pungent, spreading or retrorsely curved), with a loose deciduous covering of bright brown, flexuous, flattish, intestiniform hairs; primary pinnae oblique, sessile, triangular-oblong, acuminate, the largest ones 65 cm. long or more, about 35 cm. broad just above the base, the secondary rachis aculeate like the primary; secondary pinnae about 10 pairs below the acuminate apex, distant, spreading, antrorsely falcate, the distal basal one greatly reduced, the other distal ones somewhat shorter than the proximal ones, all narrowly triangular-oblong, acuminate, the largest 20 cm. long, 10 cm. broad, the tertiary rachis subflexuous, aculeolate; pinnules about 12 pairs, spreading, distant, alternate, the distal basal one greatly reduced or vestigial, the others fully developed, pinnate, oblong or deltoid-oblong from an inequilateral base, long-acuminate, the costa everywhere minutely aculeolate beneath, narrowly foliaceo-marginate; segments 7 or 8 pairs below the tip, spreading, oblong or obliquely ovate-oblong, excavate at proximal base, the larger ones nearly free, all deeply crenate or crenately lobed, the lobes minutely bicrenate; segments rigidly herbaceous, brownish or dull grayish green in drying, opaque, glabrous above, beneath persistently yellowish-strigose along the oblique prominulous veinlets, the hairs septate; sori 3 or 4 in fertile segments, seated between the lobes, marginal, 1 mm. broad; indusia about 0.3 mm. broad, herbaceous, yellowish, translucent, concave, not covering the sporangia.

Type in the U. S. National Herbarium, nos. 1,077,327-9, collected on open slopes of Morne de Ouésanne, vicinity of Furcy, Haiti, altitude 1,300 meters, June 13, 1920, by E. C. Leonard (no. 4796).

Among known members of the genus *H. hispaniolica* need be compared only with *H. nigrescens* Hook., which differs in its lax, dark green blades of thin texture, its much more strongly aculeate rachises (the spines dark), its broader and much closer secondary pinnae and pinnules, and its closer and more numerous segments (these nearly glabrous beneath), the lobes deeply dentate-crenate.

Hypolepis hispaniolica attains a much greater size than indicated in the description. This is shown by a section from a large primary pinna collected in Barahona Province, Dominican Republic, by Fuertes (no. 1335b), which is nearly 60 cm. broad and evidently came from a nearly 5-pinnate blade. There is a similar range of dissection in *H. nigrescens*, according to age of plant and position of pinnae. Mature fronds of *H. nigrescens* are often as much as 2.5 meters broad. Those of *H. hispaniolica* doubtless attain similar dimensions.

Pteridium arachnoideum (Kaulf.) Maxon.

Pteris arachnoidea Kaulf. Enum. Fil. 190. 1824.

Vicinity of Mission, Fonds Varettes, altitude 1,000 meters and above, forming thickets 2.5 to 3 meters high, on mountain slopes, *Leonard* 2883. Near Furey, altitude 1,300 meters, common, forming thickets 2 meters high or more, *Leonard* 4339, 4591.

This is common throughout the mountains of tropical America, rarely descending below 1,000 meters, and is commonly listed as a variety (var. *esculentum*) of *P. aquilinum*. It is, however, amply distinct from the Australasian plant described by Forster in 1786 as *Pteris esculenta*, and is readily distinguished from related American forms, among other characters, by the transverse arclike costal auricles that connect the segments and apical pinnules.

Asplenium heterochroum Kunze.

A single collection: Mission, Fonds Varettes, altitude 1,000 meters and above, on dryish cliff, *Leonard* 5333.

Apparently new to Hispaniola. Previously known from Bermuda, Cuba, Porto Rico, and peninsular Florida.³

Asplenium resiliens Kunze.

Vicinity of Mission, Fonds Varettes, altitude 1,000 meters and above, occasional, on steep rocky slopes, *Leonard* 3984. Base of Mt. Tranchant, near Furey, altitude 1,300 meters, on rocks, *Leonard* 4368a.

The specimens are indistinguishable from continental material ranging from the southern United States to Guatemala. Known also from the Blue Mountains of Jamaica, at 1,500 to 1,800 meters elevation.⁴

Struthiopteris tuerckheimii (Brause) Maxon.

Blechnum tuerckheimii Brause in Urban, Symb. Ant. 7: 159. 1911.

Mission, Fonds Varettes, *Leonard* 3915. Near Furey, occasional or locally common in bracken thickets and on rocky slopes, *Leonard* 4319, 4461, 4496.

The specimens cited agree closely with an example of the type collection from Constanza, Dominican Republic (*Türckheim* 2976), though some of them are larger. The species belongs under *Lomaria*, which Brause merges with *Blechnum*, following Diels and Christensen. Miss Broadhurst in treating the species of this alliance has regarded *Lomaria* as a distinct genus, and has shown⁵ the necessity of adopting for it the name *Struthiopteris* (Hall.) Scop., 1760.

Dryopteris abbottiana Maxon, sp. nov.

Subgenus *Lastrea*. Rhizome wanting, presumably ascending; fronds 80 to 90 cm. long, laxly ascending; stipe (from base to lowest vestigial pinnae) about 20 cm. long, fuliginous to dull stramineous, sulcate, densely grayish-puberulous, and bearing a very few, distant, pale brownish, linear scales

³ Contr. U. S. Nat. Herb. 17: 140, 141. f. 2. 1913; 24: 62. 1922.

⁴ Contr. U. S. Nat. Herb. 17: 143, 144. 1913.

⁵ Bull. Torrey Club 39: 257-259. 1912.

(2 to 4 mm. long); blades lanceolate, 65 to 70 cm. long, 16 to 24 cm. broad in the lower third, long-acuminate at apex, very abruptly reduced at base, with about 3 pairs of glanduliform vestigial pinnae, these mostly 1.5 mm. long, alternate, distant, the lowest one 20 cm. below the blade proper; rachis greenish-stramineous, densely whitish-puberulous, the hairs persistent; pinnae 20 to 25 pairs below the tip, alternate, slightly oblique, nearly straight, linear, up to 13 cm. long and 2 cm. broad, attenuate (the tip subcaudate, serrate to subentire), sessile, pinnatifid to about 1 mm. from the costa, the costa elevated beneath, densely antrorse-hirtellous on both surfaces; main segments of larger pinnae about 25 pairs, narrowly oblong, up to 12 mm. long, 3 to 4 mm. broad, slightly oblique, subfalcate, acutish distally, with acutish open sinuses, the basal ones of the lower 2 or 3 pairs (above the vestigial pinnae) greatly reduced; margins narrowly revolute, antrorsely ciliate; midveins elevated and antrorsely hirtellous beneath; veins 10 to 12 pairs, oblique, mostly straight (the basal ones curved), elevated on both surfaces, glabrous beneath, conspicuously scabrous above; leaf tissue membranous, above dull green and minutely scabrous, beneath paler, sublustrous, eglandulose, obscurely pilosulous, the hairs erect, delicate, persistent; sori small, 9 to 12 pairs, medial, round, 10 to 15-sporangiate, the sporangia glabrous; indusia very minute, reduced to a few short connate hairs, concealed by the sporangia.

Type in the U. S. National Herbarium, no. 1,077,220, collected on Morne de Ouésanne, near Furcy, Haiti, altitude 1,300 meters, in bed of a wet ravine, June 11, 1920, by E. C. Leonard (no. 4709). Two additional fronds of the type number are preserved. Represented also by *Leonard* 4739a, from the same locality.

Dryopteris abbottiana is related to *D. demerarana* (Baker) C. Chr., of British Guiana, and *D. rusbyi* C. Chr., of Bolivia, both of which are of similar proportions, with the blade very abruptly reduced to vestigial pinnae at the base, and have the leaf tissue appressed-pubescent above. *D. demerarana* is distinguished by its broader, less attenuate, less deeply pinnatifid, and mostly subopposite pinnae, its fewer, closer, broader, and less acute segments, its fewer veins (7 to 9 pairs, the proximal basal one often forked), and its distinctly supramedial sori. The sori have been described as exindusiate, but the remnant of an indusium, consisting of a few persistent connate hairs, is invariably evident in a specimen of the type collection (*in Thurn* 356). *Dryopteris rusbyi* is perhaps more nearly related, but is at once distinguished by its horizontal *opposite* pinnae and its close-set patent segments. All three species form a natural subgroup which must be studied in connection with *D. rustica*, as that species is interpreted by Christensen.

***Dryopteris rudis* (Kunze) C. Chr.**

Mission, Fonds Varettes, altitude 1,000 meters, in thickets on mountain slopes, *Leonard* 3868; occasional in open pine woods, *Leonard* 3918. Morne de Ouésanne, near Furcy, altitude 1,300 meters, common in damp thickets, *Leonard* 4662; occasional, on steep mossy banks, *Leonard* 4626.

Collected in the same region also by W. Buch (nos. 1698 and 1706). Not reported from Hispaniola by Christensen.

Dryopteris haitiensis (Brause) Urban & Maxon, sp. nov.

Dryopteris subincisa haitiensis Brause, Ark. för Bot. 17: 67. 1922.

Rhizome wanting; frond (incomplete) 1 meter long, rigidly erect; stipe (incomplete) 33 cm. long, 5 mm. thick, nearly terete, light brown, opaque, persistently paleaceous, the scales divaricate, linear-attenuate, 10 to 13 mm. long, about 1 mm. broad at base, brown, rigid, retrorsely denticulate toward the tip; blades lanceolate, acuminate, 67 cm. long, 18 cm. broad at base, 28 cm. broad at middle, bipinnate-pinnatifid, the primary rachis divaricate-paleaceous like the stipe, the scales smaller; pinnae about 13 pairs, spreading, the lowermost 10 cm. long, 5.5 cm. broad at base, narrowly triangular, inequilateral, basispic, borne 10 cm. below the second pair; middle pinnae subopposite, 5 to 6 cm. apart, strongly catadromous, sessile, triangular-oblong, long-acuminate, nearly equilateral, 14 to 16 cm. long, about 5.5 cm. broad at base, pinnate-pinnatifid, the rachis densely hirsutulous with short several-celled brownish hairs on both surfaces, beneath scantily divaricate-paleaceous, the scales brown, lance-attenuate, 3.5 to 5 mm. long, minutely denticulate throughout; pinnules of middle pinnae about 13 pairs, distant, subarcuate, the basal ones the largest, subsessile, elongate-triangular, deeply pinnatifid (lobes about 5 pairs), those beyond less deeply pinnatifid, semiadnate, those of the outer half merely crenate, broadly adnate or dilatate at base, the apical ones passing gradually into the coarsely crenate tip of the pinna; costae of pinnules slightly strigose-hirsutulous above at base, beneath sparingly yellowish-hirsutulous throughout; lobes rounded-oblong to semicircular, the margins narrowly revolute, rather freely ciliate; leaf tissue brownish green, thick-herbaceous, glabrous on both surfaces; sori large, numerous, nonindusiate, mostly borne in distant groups of 2 or 3, only the largest lobes having 3 or 4 pairs each.

Type in the herbarium of the Berlin Botanical Museum, collected at Ma Blanche, Morne de la Hotte, Département du Sud, Haiti, altitude about 1,400 meters, October 7, 1917, by E. L. Ekman (no. 556). A single pinna is preserved in the U. S. National Herbarium (no. 1,145,498).

The present species, which was indicated by Dr. Urban as possibly new, shows no very close alliance with *D. subincisa* (Willd.) Urban, with which it was associated in a varietal sense by Brause. It is immediately distinguished by its small size and lanceolate blades, the basal pinnae being distant and somewhat reduced, whereas in all forms of *D. subincisa* the blade is deltoid, the basal pinnae being the largest and best developed of all. It belongs to the group of *D. subincisa*, but among the species thus far described it appears to have no very near relatives.

Dryopteris asterothrix (Fée) C. Chr.

A single specimen: Mission, Fonds Varettes, altitude about 1,000 meters, on dry cliffs, *Leonard* 5337.

A rare but widely distributed species known from a few plants collected

in Cuba, Jamaica, Guatemala, Costa Rica, and Venezuela, and more recently the Dominican Republic (*Eggers* 2503, 2528). New to Haiti.

***Dryopteris alata* (L.) Maxon.**

Polypodium alatum L. Sp. Pl. 1086. 1753.

Vicinity of Mission, Fonds Varettes, altitude about 1,000 meters, occasional at edge of trail through thickets, April 23, 1920, *Leonard* 3797.

This species, founded by Linnaeus on Petiver's *Polypodium serratum majus costa alata* (pl. 7, fig. 13), has been practically unknown, at least in so far as actual specimens are concerned, for well over 200 years. The name *Polypodium alatum* L. is referred to *Dryopteris scolopendroides* (L.) Kuntze in Christensen's Index Filicum, but is mentioned in none of his papers on *Dryopteris*, published subsequently. That the reference is incorrect is clearly shown by the above-cited specimens. These agree well with Plumier's plate 84 (the prototype of the Petiver illustration), representing a plant from the Leoganne region, Haiti, and certainly are specifically distinct.

From *D. scolopendroides* in all its forms *D. alata* differs conspicuously in size and in its much greater subdivision. The blades are 40 to 50 cm. long and 7 to 10 cm. broad, and are pinnatifid almost to the rachis, being in fact subpinnate nearly throughout, the segments *distant*, lanceolate, 4 to 6 cm. long, long-acuminate, and themselves lobed half-way to the costa, each lobe with a strongly elevated costule and 5 to 9 pairs of oblique, pinnately arranged veins. The blades are thus once more divided than those of *D. scolopendroides*; as to venation the primary segments correspond to whole blades of the latter species. In addition, most of the blades end abruptly in huge viviparous buds, as opposed to the long-attenuate non-proliferous tips of *D. scolopendroides*. These characteristic differences are shown by illustrations which will accompany the report on Mr. Leonard's collection.

***Polystichum machaerophyllum* Slosson.**

Morne de Ouésanne, near Furcy, altitude 1,300 meters, common on a wooded slope, *Leonard* 4779.

Known previously only from eastern Cuba (*Shafer* 3262, 4127, 8096; *Wright* 828 in part; *Pollard, Palmer & Palmer* 237). It is a very close ally of *P. ilicifolium* Fée, of the same region.

***Polystichum polystichiforme* (Fée) Maxon.**

Rivière Boucandie, Furcy, occasional in damp shady ravine, *Leonard* 4443. Morne de Ouésanne, Furcy, altitude 1,300 meters, on wet rocks, *Leonard* 4718.

Known hitherto from Cuba, Jamaica, and Porto Rico. Some of the Haitian specimens are larger than other Antillean material at hand, and approach the continental *P. platyphyllum* (Willd.) Presl, as that collective species is still regarded.