

# STUDIES OF TROPICAL AMERICAN FERNS—NO. 1.

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## INTRODUCTION.

In this and following papers it is the purpose of the writer to present under a collective title some results of studies of tropical American ferns, especially those of the West Indies, Mexico, and Central America. The matter is designed to include notes on some of the earlier species, corrections in nomenclature, descriptions of new species and, when material warrants, revisions of certain genera and smaller groups of species.

A considerable number of the early species, of those even which have figured longest in literature, are still imperfectly understood and not infrequently appear under wrong names. To determine with exactness these historic species is of much taxonomic importance. The accomplishment of this, often a matter of extensive detail, is made vastly easier than formerly to American students by the large series of specimens gathered in recent years by American collectors; but even with these at hand there remain other considerations which render the serious study of so variable a group more than ordinarily difficult. As chief of these—aside from the usual insufficiency of the diagnoses and the location of the historic early collections, with their numerous types and frequently cited numbers, in European herbaria—may be mentioned the lack of attention given in the past to the matter of type localities and the failure to appreciate the fact of the more or less definite geographical distribution of species. From this there has resulted the greatest confusion.

To illustrate: The extent of variation even in a suite of specimens from a single locality in tropical America, these known absolutely to constitute but a single variable though definitely restricted species, is sometimes—and this in no one genus and no one tribe—little short of astounding. To such a series known under one name may have been joined a closely allied group from some other and perhaps dis-

tant region, this also with its various forms diverging, it may be, along quite different lines; and to this fast-growing "polymorphic species" may have been added a third and a fourth form, each with its attendant variations. If the herbarium material at hand is considerable and represents forms from a wide geographic range, the chance of determining with certainty the limits of the several species previously merged or confused is, naturally, improved; yet also the greater is the need of study and of a thorough search of literature in applying the names correctly. With only scant material available a brief diagnosis of a Jamaican or a Martinique plant might be thought to apply well enough to Mexican specimens, in the absence of specimens from the type region, and one name might be made to apply to the whole. If this happened a century ago the reference, whether right or not, may have the weight of monographic "authority" of the intervening period, and the present-day writer may be confronted with the need of determining the boundaries and relationship not of one, but of two, three, or more species, as the case may be. Or, the original form having been rare or not much collected since, the name given to this may have become fixed definitely upon a single species, but this very different from the original and possibly from a distant region. On the other hand, the older writer, in the lack of connecting forms since collected in abundance, may have recognized far too many "species." When, finally, the limits of the several allied species have been made out, it may appear that in the case of any or all of these which may have received names, the nomenclatorial type, having been determined not by selection but (often of necessity) by mere accident of first discovery, is not truly typical of the species and represents one of the outlying forms. Under these circumstances the nonavailability of a type specimen for comparison or, at least, a lack of knowledge as to its exact origin, becomes a doubly serious handicap.

It is not to be supposed that the difficulties mentioned exist in a study of the ferns alone, though it must be admitted that this group in particular has suffered radically diverse treatment at the hands of various students. This has resulted naturally from the circumstances. Fern species, partly by reason of their ready dispersal and their unusual breadth of variation, are commonly supposed to occupy extensive ranges that would at once be discredited for the great majority of phanerogams. Undoubtedly a very wide distribution is to be ascribed to many tropical ferns, mainly lowland species, and very many others in one form or another too close to be separated are known to stretch over half a continent; yet marked exceptions occur, as in the Cyatheaceae, which have been found to be relatively local in range and in which, as might be supposed, definite though

minute diagnostic characters are noted upon painstaking study. Too few trustworthy modern data are available in published form to permit of more than general deductions as to geographic distribution. The problem often is, at present, to determine whether variations noted are local and essentially individual or, rather, are susceptible of correlation with geographic and physiographic factors.

In this connection the importance of further field work should not be underestimated. With the important exception of Santo Domingo and certain large areas in Cuba the West Indies have been fairly well covered within recent years. There remain on the North American continent Nicaragua, Salvador, Honduras, and the vast humid region of eastern Mexico. To the extreme south is Panama, connecting geographically the two continents, its flora nearly unknown but almost certainly containing the strong South American element noted in that of Costa Rica immediately to the north. The exploration of eastern Mexico at mid-elevations toward the lowlands seems especially desirable in order to bring to light many of the species described during the first half of the last century. Exploration of the other regions mentioned, particularly of Panama, is hardly less important, as certain to afford data bearing upon larger problems.

The writer wishes to extend his thanks to the curators of the herbaria mentioned later for courteously placing at his disposal for study numerous specimens which have been of material assistance.

#### **ASPLENIUM SALICIFOLIUM AND CONFUSED SPECIES.**

The *Asplenium salicifolium* of Linnæus has been almost universally misidentified. It was founded upon Plumier's plate 60, representing a plant described by Plumier with the remark that he had found it at "several places in the French islands of America." In identifying the Linnæan species, then, we should expect to associate this name with no very uncommon plant of the West Indies. To assist us there is a passable figure, somewhat idealized but yet showing a plant since many times collected and rarely if ever referred to under its right name—commonly, rather, as *Asplenium auriculatum* Sw., a name given originally to Brazilian specimens. Ample Brazilian material, lacking in American herbaria, might show the true *A. auriculatum* to be a different species from the West Indian specimens passing under that name, though this is certainly to be doubted; but in any event these West Indian specimens undoubtedly represent the true *Asplenium salicifolium* of Linnæus, as the following notes are intended to show.

*Asplenium salicifolium* L. Sp. Pl. 1080. 1753.

PLATE LV.

At Pl. LV is shown a Cuban plant, which is one of a series collected by the writer at Monte Verde, Yateras, Province of Oriente.<sup>a</sup> This will be seen to agree closely with plate 60 of Plumier, particularly in the following characters: (1) The relative length of stipe and lamina; (2) the narrowly ovate frond, only slightly reduced below and terminated by a lobed caudiform segment; (3) the direction, position, and shape of the numerous pinnae, the number being nearly the same; (4) the type of marginal crenation. In this last character some slight allowance must be made for plate 60, as in the case of many others of the Plumier figures; for the plant to be placed under this name is really less regularly and more deeply crenate, even bicrenate often towards the base of the pinnae. The outer portions of the lower pinnae in plate 60 are, however, shown rather more correctly as obliquely serrate-crenate. It is hardly necessary to add that the venation and sori shown in plate 60 are incorrect for any West Indian species known and will probably remain so. The pinnae, too, are rather closer than in any plant seen by the writer. Taking the plate as a whole, nevertheless, it is evident that it is of the species shown at Pl. LV, and nothing points to this more certainly than the shape of the apical portion.

The specimen figured in plate 55 measures 69 cm. in length; stipe 31 cm.; lamina 38 cm. long, 17 to 18 cm. broad. The texture is subcoriaceous.

The following additional specimens in the U. S. National Herbarium may be cited:

CUBA: Farallones of La Perla, north of Jaguey, Yateras, province of Oriente, altitude 540 to 585 meters, *Maxon* 4376.

HAITI: Ravines northwest of Marmelade, altitude 663 meters, *Nash & Taylor* 1351.

PORTO RICO: Barranquitas, *Sintenis* 2692b; Luquillo Mountains, *P. Wilson* 304.

JAMAICA: Without locality, *Jenman*; without locality, *ex herb. Bot. Dept. Jamaica*.

DOMINICA: Laudat, *Lloyd* 332.

GRENADA: *Murray & Elliott* 24.

MEXICO: District of Cordoba, State of Vera Cruz, *Finck* 46a, 142.

COLOMBIA: Santa Marta, altitude 750 meters, *H. H. Smith* 2446.

Some of these specimens are submembranaceous in texture; and several have the pinnae widely overlapping the rachis at their upper base, as shown by Hooker,<sup>b</sup> but without free auricles. The Jenman plant has the pinnae almost hastate at the superior base.

Wright's no. 848 from Cuba, cited by Hooker under *A. auriculatum*, is missing in the National Herbarium. In the Sauvalle herbarium at Havana, Cuba, this number is *Asplenium abscissum* Willd.; and in the herbarium of the New York Botanical Garden it is a mixture of *A. abscissum* and a reduced state of *A. salicifolium*. A sheet of no. 848 in the D. C. Eaton Herbarium, marked as coming from "La Perla, in crevices of rocks," comprises three plants, viz.: (1) *Asplenium abscissum* Willd., (2) *A. salicifolium* (*verum*), and (3) the reduced form here included under *A. salicifolium*. Matching this inferior state are two Cuban numbers collected by the writer, viz., 4311 which grew with 4306, and 4375 with 4376. These and certain other specimens from the West Indies and especially from Central America would probably pass

<sup>a</sup> No. 4306, from humus and well-rotted logs in the humid forest, altitude about 575 meters, April 30, 1907.

<sup>b</sup> Sp. Fil. 3: pl. 171.

for *A. hastatum* Klotzsch, a species which is certainly of the closest alliance, if indeed it should not be merged with *A. salicifolium*. The typical *A. hastatum*, well illustrated by Hooker,<sup>a</sup> is seen in Fendler's 144, Venezuela (herb. Gray), between which and the West Indian *A. salicifolium* there is almost every intermediate stage. It seems not unlikely that *A. salicifolium* (*verum*), *A. auriculatum* Sw., *A. semicordatum* Raddi, and less certainly *A. hastatum* Klotzsch are all referable to a single variable polymorphic species, to which must probably be added several "species" proposed by various writers, for example, the *A. bicrenatum* of Liebmann, which apparently is but the typical form of *A. salicifolium*.

The following species either are closely related to *A. salicifolium* or have been confused under that name in the herbarium material examined:

*Asplenium integerrimum* Spreng. Acad. Caes. Leop. Nov. Act. 10: 231. 1821.

PLATE LVI, FIGURE 2.

*Asplenium salicifolium integerrimum* Mett. Abhand. Senck. Nat. Gesell. 3: 145. 1860.

The present species was described briefly from Porto Rican specimens, has since been collected in Porto Rico, and probably forms the greater part of Wright's no. 841 from Cuba. (See footnote under *A. rectangulare*, following.) It was originally described by Sprengel in these words:

*A. fronde pinnata, pinnis alternis petiolatis lanceolatis acuminatis basi cuneatis, rachi marginata, soris parallelis.*

In Portorico ad arborum radices. *Bertier.*

Stipes semiteres, glaber. Frons bipedalis, lanceolata. Pinnae spithameae glaberrimae, lanceolatae, acuminatae, integerrimae, margine subdiaphano.

Cum nulla alia specie confundenda.

The following more complete description is drawn mainly from a series of specimens collected by the writer in the Yateras region of Oriente (Santiago) Province, Cuba, in the heart of the territory so thoroughly botanized by Wright:

Fronds few (2 or 3), 75 to 80 cm. long, lax, borne closely. Rhizome short-repent, with a noticeable tuft of long filiform dark brown chaff; stipe 25 to 30 cm. long, dull brownish stramineous, stout, sulcate in drying; lamina very chartaceous, 50 to 55 cm. long, simply pinnate, ovate, comprising about 8 pairs of narrow-spaced ascending subopposite to alternate pinnae and a large terminal segment about the size of the basal pinna; rachis narrowly alate; pinnae nearly of the same size and outline, the 5 or 6 lower pairs subpetiolate, 15 to 16 cm. long, 2.5 to 2.7 cm. broad, the others 2 to 3 cm. shorter, all exactly lanceolate, straight or slightly falcate, attenuate in the outer third, at the base nearly equal, the superior margin cut away to about 40°, the inferior to about 30°, the base thus strongly cuneate; margins absolutely entire throughout, hyaline; sori about 12 pairs to the pinna, equidistant or slightly nearer the midvein, 1.5 to 2 cm. long, borne at an angle of about 25° on the anterior branch of the mostly twice or thrice dichotomously forked veins; indusium firm, narrow, 1 mm. wide, persistent, recurved and inconspicuous at maturity.

*A. integerrimum* may have a considerable range through the West Indies. It appears not to occur in Jamaica, if one may judge from recent large collections, mainly of ferns, from that island. Fendler's no. 96 from Trinidad (G, N) may be referred here tentatively, though the narrow spreading pinnae (mainly opposite), the more reduced upper pinnae, and the deeply cleft terminal segment indicate a form possibly distinct.

<sup>a</sup> Sp. Fil. 3: pl. 172.

The specimens seen by the writer are as follows:<sup>a</sup>

PORTO RICO: Near Adjuntas, *Sintenis* 4381, determined by Kuhn as *A. salicifolium*. (G)

CUBA: Near Monte Verde, *Wright* 841 (G, 2 sheets; herb. Sauvalle). Yateras district (several localities: Santa Ana, Bella Vista, Monte Verde, La Perla, Las Gracias, etc.), Province of Oriente, altitude 420 to 625 meters, on stumps and tree trunks, *Maxon* 4196, 4223, 4269a, 4327, 4379, 4479, 4494a. (All in N) Sevilla Estate, in the Sierra Maestra west of Santiago de Cuba, Province of Oriente, altitude 900 meters, *Taylor* 456. (Y, N)

In the herbarium of the Missouri Botanical Garden there is a sheet (properly labeled *A. integerrimum*) without data, other than that it is of the Bernhardi herbarium.

The perfectly entire margins will distinguish this species at once from all excepting *A. neogranatense*, to which it must be nearly allied. See under *A. neogranatense*.

***Asplenium rectangulare* Maxon, sp. nov.**

Frond 95 cm. long; stipe 40 cm. long, brownish, from an incomplete short-repent rhizome clothed with lanceolate attenuate brownish iridescent scales about 1.5 cm. long; lamina oblong-ovate, 55 cm. long, 25 cm. broad, comprising about 10 pairs of simple distant horizontal pinnae and a similar large terminal segment; lowermost pinnae subopposite, succeeding ones gradually alternate, all but the uppermost petiolate (3 to 4 mm.); lower and middle pinnae of nearly equal size and form, 14 cm. long by 3 cm. broad, falcate, oblong-lanceolate, broadest near the base but of nearly equal width in the basal third, then tapering very gradually to a narrow acuminate upcurved apex, at the base decidedly unequal, the upper side exactly rectangular and rounded (not auriculate), the lower cut away in a straight line to an angle of 35° from the midvein; margins of the upper base crenate, of the middle and outer portions of the pinnae irregularly and inconspicuously shallow crenate-serrate; sori 10 or 11 pairs to the pinna, 16 to 20 mm. long, narrow, nearer the midrib than the margin, borne at an angle slightly less than 30°, slightly curved, continuous on the successive anterior branches of the twice or thrice-forked veins; indusium 1 mm. broad, firm, appearing much narrower when recurved at maturity.

Type in the U. S. National Herbarium no. 50359, collected in eastern Cuba by Charles Wright (no. 841 in part),<sup>b</sup> in 1859 or 1860; distributed as *A. salicifolium* L. Known also from Haiti: *Nash & Taylor* 1123, from Mount Malauvre, altitude nearly 500 meters, growing on a shaded bank (Y, N).

<sup>a</sup> In this as in following papers the herbaria from which specimens are cited will be indicated by letters: E, D. C. Eaton Herbarium at Yale University; G, Gray Herbarium; M, herbarium of the Missouri Botanical Garden; N, herbarium of the U. S. National Museum (U. S. National Herbarium); S, herbarium of Capt. John Donnell Smith; Y, combined herbaria at the New York Botanical Garden.

<sup>b</sup> In the Gray Herbarium there are two sheets of no. 841, both being *A. integerrimum*; and no. 841 in the Sauvalle Herbarium at Havana, Cuba, is the same. The material which should be under this number at the D. C. Eaton Herbarium is not to be found, nor is this number in the herbarium of the New York Botanical Garden. Christ (Engler's Bot. Jahrb. 24:105. 1897) has listed a specimen of no. 841 as *A. vomeriforme* Hook. (Sp. Fil. 3: 109. pl. 162. 1860). The plant thus referred may be either *A. salicifolium* or *A. rectangulare*. *A. vomeriforme* is apparently confined to Peru and seems quite distinct from either.

The present species must be closely related to the form regarded by Mettenius as typical *A. salicifolium* and figured by him,<sup>a</sup> presumably on a Peruvian plant, collected by Poeppig, this being the only specimen cited by him as of the typical form. Our specimens of *A. rectangulare* differ in having the pinnæ longer-stalked, broader, and with less pronounced marginal serrations. The general form of the pinnæ is exactly the same.

† *Asplenium integerrimum* and *A. kapplerianum*, reduced to varietal rank by Mettenius, are here dealt with separately.

**Asplenium obtusifolium** L. Sp. Pl. 1080. 1753.<sup>b</sup>

? *Asplenium repandulum* Kunze, Linnæa 9: 65. 1834. (Type from Peru.)

*Asplenium riparium* Liebm. Dansk. Vid. Selsk. Skr. V. 1: 244. 1849. (Type from Mexico.)

Not closely related to *A. salicifolium*, but distributed under that name, is Mosen's no. 2111 from Caldas, Minas Geraes, Brazil, which must be referred to the polymorphic *A. obtusifolium* ranging through the West Indies and in larger States from Mexico to Peru and Brazil. That which Hooker considered the most typical form of the species he figured<sup>c</sup> as *A. riparium* Liebmann, a name first applied to Mexican specimens; but the plate is drawn, probably, from a Brazilian plant, several of which are cited; none of the Mexican and Central American specimens shows quite the same extreme development, while the Brazilian specimen above mentioned agrees exactly.

The peculiarities of the species in this broader sense are well brought out by Hooker, who places the better known dwarf mainly lobed or lacinate form as the "var. *obtusifolium*" of *A. riparium*, notwithstanding its priority of name. Hooker's opinion on the specific identity of these widely varying forms is here adopted; reluctantly, however, not only because of the inordinate breadth thus ascribed to the species, but also on account of the manifestly inappropriate name under which the extreme form must rest along with the typical West Indian form to which it is properly applicable.

The following specimens are in the U. S. National Herbarium:

I. WEST INDIAN FORM (mainly). Fronds small; pinnæ usually obtuse, sharply cuneate at the base, sometimes nearly entire,<sup>d</sup> with sinuate-dentate margins, or more often deeply lobed and irregularly lacinate, with sharply erose-dentate margins.

PORTO RICO: Utuado, *Sintenis* 6443, 6533.

GRENADA: *Elliott* 94.

DOMINICA: *Rosalie, Lloyd* 698.

MONTSEBBAT: *Turner*.

TRINIDAD: *Fendler* 139.

COLOMBIA: Santa Marta, *H. H. Smith* 1126.

II. CONTINENTAL FORM. Fronds large (up to 60 cm. long); pinnæ larger and more numerous, nearly all auriculate and less acutely cuneate at the base, toward the apex acute or (in the Mosen specimen) attenuate, margins sinuate-dentate or irregularly serrate-dentate. (*A. riparium* Liebm.)

MEXICO: Vallée de Cordoba, State of Vera Cruz, *Bourgeau* 2014 (received as *A. repandulum* Kunze); District of Cordoba, State of Vera Cruz, *Finck* 35a.

<sup>a</sup> Abhand. Senck. Nat. Gesell. 3: 144. pl. 4. f. 14. 1860.

<sup>b</sup> Founded on the West Indian *Adiantum alis latioribus* of Petiver (Pter. Am. no. 117 pl. 2. f. 14. 1712, incorrectly cited by Linnæus as f. 4).

<sup>c</sup> Sp. Fil. 3: 119. pl. 169.

<sup>d</sup> Hook. & Grev. 2: pl. 239. 1831.

GUATEMALA: Pansamalá, Alta Verapaz, altitude 1140 meters, *von Türckheim* (John Donnell Smith 630);<sup>a</sup> near the Finca Sepacuité, Alta Verapaz, *Cook & Griggs* 58; wet forest floor between Sepacuité and Secanquim, Alta Verapaz, altitude 1,000 meters, *Maron & Hay* 3263.

COSTA RICA: without locality, *Wercklé* (det Christ).

BRAZIL: Caldas, province of Minas Geraes, *Mosen* 2111 (two sheets; also in G); near Rio Janeiro, *Wilkes expedition*, as *A. salicifolium*; without definite locality, *Glaziou* 1771 (listed by Fée<sup>b</sup> as *A. salicifolium*).

A second specimen from Costa Rica (Suerre, Llanuras de Santa Clara, altitude 300 meters, *John Donnell Smith* 6885) is exactly intermediate between the two types. The Mosen specimens are the most extreme of all. Hooker's notes will be found of interest.

***Asplenium oligophyllum*** Kaulf. Enum. Fil. 166. 1824.

A single specimen under cover of *A. salicifolium*, in the Gray Herbarium, Fendler's no. 326, from Tovar, Venezuela, accords well with Kaulfuss' description of *A. oligophyllum*, and this number is so referred by Hooker in his description of the species. The margins are correctly said to be "obscurely crenate-serrate." The broad pinnae and numerous sori are characteristic.

Two Brazilian species, *Asplenium escragnollei* Fée<sup>c</sup> and *A. camptocarpum* Fée,<sup>d</sup> referred here by Christensen, appear from Fée's excellent illustrations entitled to recognition. The former especially seems very different and to be allied rather to the Colombian *A. ocaniense* Karst.,<sup>e</sup> known to the writer from a specimen collected by H. Pittier (no. 708) in the western Cordillera, State of Cauca, Colombia, December, 1905.

***Asplenium neogranatense*** Fée, 7me Mém. 47. pl. 14. f. 1. 1854.

A species with a few entire pinnae, figured by Fée, with no mention of the characters offered by rhizome and chaff. Apparently in its few sori a near ally of *A. integerrimum* Spreng., but quite remarkable, as noted by Fée, in the great length of the veins which are borne at a very acute angle to the midvein.

***Asplenium austrobrasiliense*** (Christ) Maxon.

*Asplenium salicifolium austrobrasiliense* Christ, Denkschr. K. Akad. Wiss.

Wien. Math.-naturw. Klasse 79: 23. pl. 5. f. 1. 2. pl. 8. f. 3. 4. 1906.

A peculiar form, well illustrated by Dr. Christ and supposed by him to be common in southern Brazil. It has no near alliance with the true *salicifolium*, but is apparently allied to *A. oligophyllum*. From this it is easily distinct, obviously in its more numerous, smaller, and gradually reduced upper pinnae which give rise to an enlarged terminal segment (instead of a conform terminal pinna), in its fewer more spaced sori, and especially in its bipinnatifid form with corresponding modification in position of sori indicated by Dr. Christ.

The original material has not been seen by the writer, to whom it is known only from specimens recently sent by Dr. Rosenstock under no. 296, these from the Serra do Mar, State of São Paulo, Brazil.

The form from Apiaby listed by Dr. Christ as true *salicifolium* is, judging from description, referable to *A. oligophyllum* Kaulf.

<sup>a</sup> First determined as *Asplenium auriculatum* Sw., subsequently as *A. cultrifolium* L.

<sup>b</sup> Crypt. Vasc. Brés. 1: 64. 1869.

<sup>c</sup> Crypt. Vasc. Brés. 1: 62. pl. 15. 1869.

<sup>d</sup> Crypt. Vasc. Brés. 1: 63. pl. 16. f. 1. 1869.

<sup>e</sup> Fl. Col. 1: 173. pl. 86. 1861.



*Asplenium kapplerianum* Kunze, *Linnæa* 21: 216. 1848.

The writer has seen no material to be referred to this species; yet it seems desirable to call attention to its status in order that it may be definitely placed by those who have access to the original material.

*Asplenium kapplerianum* was founded by Kunze on specimens collected near Para by Kappler (no. 1769). The author refers here also specimens from two additional sources, as follows:

I. Surinam plants collected by Splitgerber and described<sup>a</sup> by that writer under the Linnæan name *Asplenium salicifolium*. Kunze regards Splitgerber's description as excellent for his own *kapplerianum* and compares the Surinam plants with what he considers the true *salicifolium* as previously elaborated by him<sup>b</sup> on the basis of Peruvian plants collected by Poeppig (probably the same form figured by Mettenius as typical of *salicifolium*). But here Kunze falls into the error of selecting for his "*salicifolium*," as already pointed out, an obscure plant from Peru; whereas the true *salicifolium* is a West Indian plant, collected in several localities by Plumier, and, as has been shown, well known from the West Indies under the name *A. auriculatum*.

II. Guiana plants, listed by John Smith<sup>c</sup> as *A. integerrimum*, which are not the *integerrimum* of Sprengel.

*Asplenium integerrimum* and *A. kapplerianum* were merged by Moore<sup>d</sup> who cites many specimens. From description *A. kapplerianum* certainly appears to be distinct from *A. integerrimum* and rather closely related to *A. salicifolium*. Splitgerber's var.  $\beta$  is referred by Kunze<sup>e</sup> to *Asplenium falx* Desv.<sup>f</sup> which is probably a true synonym of *salicifolium*.

In conclusion it may be said that the plant figured by Mettenius as *A. salicifolium* is probably still without a name, unless it is found to be identical with *A. rectangulare* here described.

## A NEW GENUS OF ASPLENIROID FERNS.

*Holodictyum* Maxon, gen. nov.<sup>g</sup>

PLATE LVI, FIGURE 4.

Fronds numerous, densely cespitose upon an erect rhizome, simple, linear-lanceolate, chartaceo-membranaceous, costate; venation wholly areolate, the areoles in about 5 or 6 series on either side of the costa, free included veinlets none; costal areoles elongate, cuneate, nearly parallel to the costa, the others oblique, broader, oblong, mostly hexagonal, gradually much smaller toward the hyaline margin; sori elongate, diverging at a slight angle from the costa, confined to the outer vein of the costal areoles, one to each areole; indusium single, straight or nearly so, firm, persistent, attached along one side.

Type, *Asplenium ghiesbreghtii* Fourn.

*Holodictyum* differs from *Asplenium* and *Diplazium* in its pronounced hexagonal areolation, this accompanied by a complete suppression of lateral

<sup>a</sup> Tijds. Nat. Gesch. 7: 418, 419. 1840.

<sup>b</sup> *Linnæa* 9: 64. 1834.

<sup>c</sup> London Journ. Bot. 1: 199. 1842.

<sup>d</sup> Ind. Fil. 138. 1859.

<sup>e</sup> *Linnæa* 21: 216. 1848.

<sup>f</sup> Mém. Soc. Linn. Paris 6: 274. 1827. See Mettenius' description (Abhand. Senck. Nat. Gesell. 3: 145. 1860) with reference to Fée's figure.

<sup>g</sup> The name is from Greek *δλος*, whole, and *δικτυον*, a net, referring to the complete anastomosis of the veins.

nerves. The sorus is placed uniformly upon the longest (outer) side of the costal areole; otherwise the veins of the whole frond are of equal rank; all are discontinuous in direction, adjoining only at an angle. The venation thus shows some approach to the type of Diplaziopsis; but in that genus, as in *Hemidictyum*, there are well-developed lateral nerves, lost in a network only toward the margin.

Species two:

**Holodictyum ghiesbreghtii** (Fourn.) Maxon.

*Asplenium ghiesbreghtii* Fourn. Mex. Pl. 1: 111. pl. 5. 1872.

Described and figured from specimens collected by Ghiesbreght (no. 16) on wet rocks, Barranca de Tlacolula, Oaxaca, Mexico, 1842-43. This number is represented in the U. S. National Herbarium by a portion of a frond.

**Holodictyum finckii** (Baker) Maxon.

*Asplenium finckii* Baker, Ann. Bot. 8: 126. 1894.

Described from specimens at Kew, collected in the District of Cordoba, State of Vera Cruz, Mexico, by Hugo Finck. Represented in the U. S. National Herbarium by an incomplete frond recently received from Kew, this showing the areoles to be in five or six series, not in four as described by Mr. Baker.

Christensen has suggested that *A. finckii*, which apparently was founded by Mr. Baker without regard to the earlier *A. ghiesbreghtii*, may be identical with the latter. To this the writer is at present unwilling to assent. The type of venation in the two type specimens is the same, but the areoles of *finckii* are actually larger and relatively broader; the sori diverge from the costa at a greater angle and are shorter, those of *ghiesbreghtii* (according to Fournier) even attaining a maximum length of one inch. Yet we refer to *finckii* excellent specimens collected from shady situations among rocks in a long deep canyon near Gómez Farías, State of Tamaulipas, Mexico, altitude about 350 meters, by Dr. Edward Palmer (no. 336), April, 1907, which differ in their greater size and higher average number of series of areoles and in having the sori rather less divergent from the costa, this last character being in the direction of *ghiesbreghtii*. Whether the differences noted among the three specimens are no greater than should be accounted variations within a single species can not be determined with certainty from the material at hand; but it seems reasonable, on the strength of the characters mentioned above, to recognize for the present the two species already described.

The upper and apical portion of a normal frond of Doctor Palmer's no. 336 is shown in Pl. LVI, Fig. 4. The rhizome of the plant, though split in half, lengthwise, yet carries fifteen fronds, which must be about half the original number for the living plant. The fronds are about 40 cm. long and taper very gradually from about their middle to a long attenuate base, being narrowly winged down to the rhizome.

### THE IDENTITY OF *ASPLENIUM RHIZOPHYLLUM* L.

Three very different elements were merged in Linnæus in 1753 under the name *Asplenium rhizophyllum*.<sup>a</sup> The names under which these have usually gone are: (1) *Camptosorus rhizophyllus*, applied to the fern of the eastern United States, (2) *Camptosorus sibiricus*, restricted to an Asiatic species, (3) *Fadyenia prolifera*, for a West

<sup>a</sup> Not to be confused with the second *Asplenium rhizophyllum* of Linnæus (Sp. Pl. ed. 2. 1540. 1763), discussed at page 490 of the present paper.

Indian plant. The last is, however, an invalid name; and in substituting another, occasion may be taken to indicate the grounds for fixing upon the Virginian plant as the type of *Asplenium rhizophyllum* in preference to the other two elements originally included by Linnæus.

At page 1078 of the first edition of the *Species Plantarum* appears the following:

*rhizophylla*. ASPLENIUM frondibus cordato-ensiformibus indivisis: apice filiforme radicante. *Amoen. acad.* 2. p. 337.

Phyllitis filicifolia parva saxatilis virginiana per summitates foliorum radicata. *Pluk. alm.* 154. t. 105. f. 3.

Phyllitis non sinuata minor, apice folii radices agente. *Sloan. jam.* 14. hist. 1. p. 71. t. 26. f. 1.

Phyllitis saxatilis virginiana per summitates foliorum prolifera. *Moris. hist.* 3. p. 557. s. 14. t. 1. f. 14.

*Habitat in Jamaica, Virginia, Canada, Sibiria.*

Turning to the second volume of the *Amoenitates* we find the twenty-ninth, by Halen, dated December 22, 1750, comprising pages 332 to 364, to be entitled "Plantae Camschatcenses Rariores" and to contain among other things a brief chapter descriptive (at least by citation) of some eleven plants of a recent Kamchatkan collection which are supposed to be identical with species known previously from North America. One of these is mentioned at page 337 as follows:

ASPLENIUM frondibus lanceolatis indivisis: apice filiformibus radicanibus.

Phyllitis non sinuata minor, apice folii radices agente. *Sloan. Flor.* 14.

Filicifolia Phyllitis parva saxatilis virginiana per summitates foliorum radicata. *Pluk. alm.* 154. t. 105. f. 3. Phyllitis saxatilis virginiana, per summitates foliorum prolifera. *Moris. hist.* 3. p. 557. s. 14. t. 1. f. 14.

Although the plant in hand was from Kamchatka the citations show clearly that the Jamaican plant described and figured by Sloane and the Virginian described and figured by both Plukenet and Morrison were confused with this. The question is merely upon the restricted application of the trivial name *rhizophyllum* given later by Linnæus.

The *Amoenitates* description, "ASPLENIUM frondibus lanceolatis indivisis: apice filiformibus," though without much doubt drawn to cover the Kamchatkan plant particularly, must in any event apply either to this or to the Virginian, for the descriptive term "filiform" is totally inapplicable to the apices of the Jamaican species. Later, in the *Species Plantarum* (1753), the specific character (though credited to the *Amoenitates*) is so altered as to read "frondibus cordato-ensiformibus \* \* \* ; apice filiforme \* \* \*." Thus, to those who know the several species under discussion, it should be apparent at once that the Virginian plant is here especially meant,

and that it must stand as the type of *Asplenium rhizophyllum*; for it alone, not only of the two, but of the three species, has a cordate base.

There is, moreover, in the Linnæan herbarium under the name *Asplenium rhizophyllum* a plant of *Camptosorus rhizophyllus* received from Kalm,<sup>a</sup> apparently held by Linnæus to be representative of his "species."

The two species of *Camptosorus* Link, 1835, are:

***Camptosorus rhizophyllus* (L.) Link, Hort. Berol. 2: 69. 1833.**

Confined to the United States and Canada: from Maine and southern Quebec south to Georgia, Alabama, and Texas. A form from Iowa has been described as variety *intermedius* Arthur.<sup>b</sup>

***Camptosorus sibiricus* Rupr. Beitr. Pfl. Russ. Reich. 3: 45. 1845.**

Known only from Siberia, China, and Japan.

The West Indian plant should be known as:

***Fadyenia hookeri* (Sweet) Maxon.**

*Asplenium proliferum* Sw. Prod. 129. 1788, not Lam. 1786.

*Aspidium proliferum* Hook & Grev. Ic. Fil. 1: pl. 96. 1829, not R. Br. 1810.

*Aspidium hookeri* Sweet, Hort. Brit. ed. 2. 579. 1830, not Wall. 1829, *nomen nudum*.

*Polystichum?* *grevillianum* Presl, Tent. Pterid. 82. 1836.

*Fadyenia prolifera* Hook. Gen. Fil. pl. 53. B. 1840.

*Aspidium fadyenii* Mett. Fil. Hort. Lips. 95. pl. 23. f. 13. 14. 1856.

*Fadyenia fadyenii* C. Chr. Ind. Fil. 319. 1905.

In taking up Mettenius' specific name Christensen has passed by two of earlier date, either of which is available. There appears to be no reason for allowing Wallich's *nomen nudum* to invalidate the same name adequately published by Sweet the following year. But even should this be done, Presl's name would have to be taken up. The doubt expressed by Presl relates merely to the very questionable reference of this plant to the genus *Polystichum*, a doubt abundantly sustained some four years later by Hooker, who recognized in it a monotypic genus to which he gave the name *Fadyenia*. Presl's new specific term was simply a substitute for the homonym of Hooker and Greville and was placed with doubt under *Polystichum*.

*F. hookeri* is known from Jamaica, Cuba, and Porto Rico.

### A NEW NAME FOR ANAXETUM.

The genus *Anaxetum* was based by Schott on the single species *Polypodium crassifolium* L., which was made the subject of an excellent illustration. Fée called attention to the unavailability of the name, *Anaxeton* having been applied previously by Gaertner to a new genus of Compositae, and elevated Presl's section *Pleuridium* to generic rank, expressly founding the genus on *Polypodium crassifolium*, surely in ignorance of the genus of mosses previously so named by Bridel and since generally adopted. No other name having been published in the interim the following is proposed:

<sup>a</sup> D. C. Eaton in *Canadian Naturalist* 13: 25. 1870.

<sup>b</sup> J. C. Arthur in *Botanical Gazette* 8: 200. pl. 3. 1883.

**Pessopteris** Underw. & Maxon, nom. nov.<sup>a</sup>

*Anaxetum* Schott, Gen. Fil. pl. 1. 1834. Not *Anaxeton* Gaert. Fruct. 2: 406, pl. 166. f. 10. 1791.

*Pleuridium* Fée, Gen. Fil. 273. 1850-52. Not *Pleuridium* Bridel, Mant. Musc. 10. 1819.

The type and sole species is:

**Pessopteris crassifolia** (L.) Underw. & Maxon.

*Polypodium crassifolium* L. Sp. Pl. 1083. 1753.

*Anaxetum crassifolium* Schott, Gen. Fil. pl. 1. 1834.

*Pleuridium crassifolium* Fée, Gen. Fil. 274. 1850-52.

Generally distributed throughout tropical America, and subject to considerable variation, several forms having been described as distinct species.

**THE CUBAN SPECIES OF ADIANTOPSIS.**

Three species of *Adiantopsis* have been known hitherto from Cuba. These are:

**Adiantopsis radiata** (L.) Fée, Gen. Fil. 145. 1850-52.

*Adiantum radiatum* L. Sp. Pl. 1094. 1753.

Not uncommon through tropical America generally.

**Adiantopsis pedata** (Hook.) Moore, Ind. Fil. 18. 1857.

*Hypolepis pedata* Hook. Sp. Fil. 2: 73. pl. 92. A. 1852.

Known definitely from Jamaica and Cuba; accredited also to Peru.

**Adiantopsis paupercula** (Kunze) Fée, Gen. Fil. 145. 1850-52.

*Adiantum pauperculum* Kunze, Farnkr. 2: 65. pl. 127. 1850.

Known only from Cuba and Jamaica.

To these must be added a fourth very different species:

**Adiantopsis rupicola** Maxon, sp. nov.

Plant rigid, 50 cm. high, fronds several, closely clustered upon an ascending woody rhizome covered with bright brown glossy linear chaff with a dark median line; stipe 20 cm. long, naked, shining, purplish brown; lamina 30 cm. long, 10 to 12 cm. broad, deltoid-lanceolate, coriaceous, glabrous except for a few whitish club-shaped glandular hairs on the under surface, bipinnate or, as to mature specimens, subtripinnate in the lower half; pinnæ subopposite, for the most part unequally deltoid-lanceolate with subhastate entire apices; basal pinnæ about 7 cm. long, 3 cm. broad at base, unequally triangular, the two lowest pairs of pinnules pinnate, the inferior twice as long as the superior; second and third pairs of pinnæ narrower, of similar but less pronounced basiscope development, only the basal pair of pinnules again pinnate; succeeding pinnæ pinnate only (except for the pinnatifid basal pinnule), gradually pinnatifid, finally auriculate and entire, the uppermost produced to form the somewhat attenuate apex of the frond; pinnules at right angles to the secondary rachis, characteristic ones broadly elliptical to ovate, obtuse, somewhat excised at the base below, auriculate; sori numerous, marginal, terminal on the veins; indusia single (or rarely double), spaced about half their width or less, whitish, oblong to subreniform, reflexed at maturity to the plane of the frond.

Type in the U. S. National Herbarium, no. 372124, collected by William Palmer and J. H. Riley (no. 242) in crevices of partially shaded limestone

<sup>a</sup> From Greek *παισσίον*, a draughtboard (checkerboard) and *πτέρις*, a kind of fern, in modern use any fern.

cliffs, in mountains near El Guama, Province of Pinar del Rio, Cuba, March 10, 1900. Two other sheets of no. 242 show the species in less mature states, in which the branching is bipinnate and tripinnatifid only.

*A. rupicola* is by no means closely related to any described species, though it is perhaps to be compared with *A. pedata* and *A. paupercula*. In the former species the prolongation of the lowermost pair of pinnæ into lateral branches renders the short frond ternate as to its main vascular parts, and the unusual basisopic development of the basal pinnules of the lateral branches again gives the frond a broad pentagonal form. In *A. rupicola*, on the other hand, the frond is elongate and the comparatively slight extension of the inferior pinnules of the three or four lowermost pairs of pinnæ indicates no near relationship to *A. pedata*. In method of branching *A. rupicola* is near *A. paupercula*, but the pinnules differ essentially in shape, being of the type of *A. radiata* and *A. pedata*.

### A NEW GENUS ALLIED TO VITTARIA.

The Jamaican plant described by Swartz as *Pteris angustifolia*, placed under *Vittaria* by Baker and taken up under this name by Diels, has been recognized by several writers as typifying a distinct genus to which the name *Pteropsis* has been applied. There can be no doubt that the species is a very foreign element under *Vittaria*; but, equally, it ought not to rest under the name *Pteropsis*. This last was given by Desvaux in 1827 to an odd assemblage of ten species belonging to no fewer than six genera. The first three species are now placed under *Drymoglossum* Presl (1836), the fourth is the plant under consideration, the fifth is *Paltonium lanceolatum*, the sixth is *Vittaria scolopendrina*, the seventh and eighth (described as new) are regarded by Christensen as problematical, the ninth and tenth are *Eschatogramme furcata*. *Paltonium* Presl dates from 1849; *Vittaria* J. E. Smith from 1793; *Eschatogramme* Trev. from 1851.

The original diagnosis of *Pteropsis* reads as follows: "Sporangia in sorum continuum immersum marginalem disposita. Involucrum nullum. Frondes simplices." In fixing upon the type for the genus it is not necessary to have recourse to a "first species rule" in any narrow sense; for, notwithstanding the diversity of types included, the preference of the author seems to be fairly indicated. The first three species are of the same type, being indeed referred by Christensen to a single species (*Drymoglossum heterophyllum*), and by their very position point out the importance they had assumed to the author. *Pteropsis* thus restricted is, unfortunately, quite synonymous with *Drymoglossum* of later date and must prevail for the several species now associated under the latter name, unless Mirbel's genus *Candollea* (1802) is to be fixed arbitrarily on the same type.<sup>a</sup>

<sup>a</sup> See Underwood, A review of the genera of ferns proposed prior to 1832. Mem. Torr. Bot. Club 6: 247-283, December 1, 1899.

The following name, given by Professor Underwood and the writer some time ago to a large series of the *Pteris angustifolia* of Swartz, collected in Jamaica, is here proposed:

**Ananthacorus** Underw. & Maxon, gen. nov.<sup>a</sup>

Rhizome chaffy, creeping; fronds contiguous, exstipitate, simple, linear, entire, costate, the costa concealed; veins of uniform rank, all joined in hexagonal (less commonly pentagonal) elongate areoles in 3 or 4 series on each side of and parallel to the costa, without free veins; sori slightly impressed, non-indusiate, in a continuous or subcontinuous line at the outer edge of the ultimate series of areoles, distant 1.0 to 1.5 mm. from the margin; paraphyses spatulate, flaccid.

Type, *Pteris angustifolia* Sw. Monotypic.

**Ananthacorus angustifolius** (Sw.) Underw. & Maxon.

*Pteris angustifolia* Sw. Prod. 129. 1788.

*Taenitis angustifolia* Spreng. Syst. Veg. 4: 42. 1827.

*Pteropsis angustifolia* Desv. Mém. Soc. Linn. Paris 6: 218. 1827.

*Vittaria angustifolia* Baker, in Mart. Fl. Bras. 1<sup>2</sup>: 544. 1870.

The following specimens are in the U. S. National Herbarium:

JAMAICA: Mansfield and adjoining properties near Bath, altitude 300 to 500 meters, on tree trunks of humid forested slopes, *Maxon* 1794, 1805, 2392, 2423, 2431, 2446. Vicinity of Troy, altitude 600 to 660 meters, *Maxon* 2858. Above Moore Town, altitude 450 meters, *Clute* 272. Near Williamsfield, *Fredholm* 3352. Cuna Cuna Pass, *Fredholm* 3216 (as *Taenitis lanceolata*).

CUBA: Mountains north of San Diego de los Baños, Province of Pinar del Rio, on forest trees, *Palmer & Riley* 485, 513, 562. Monte Verde, Yateras, Province of Oriente, altitude 575 meters, on trunk of palm in forest, *Maxon* 4289; in the same vicinity, *Wright* 978. "Posesion de Stark," near Jaguey, Yateras, Province of Oriente, on tree trunks, altitude 450 to 525 meters, *Maxon* 4445. Forested slopes of the Finca Las Gracias, Yateras, Province of Oriente, on trunk of manaca palm, altitude about 500 meters, *Maxon* 4465. Alto Cedro, *Underwood & Earle* 1554.

SANTO DOMINGO: *Wright, Parry, & Brummell* 2A.

GRENADA: *Elliott* 68 (as *Vittaria remota*, det. J. G. Baker).

TRINIDAD: *Fendler* 116.

MEXICO: District of Cordoba, State of Vera Cruz, *Finck* 116.

GUATEMALA: Cubilquitz, Alta Verapaz, altitude 350 meters, *von Türckheim* (J. D. S. 8038). Banks of the Rio Polochic, below Panzos, on trunk of palm, *Maxon & Hay* 3097.

PANAMA: *Hayes* 10.

COLOMBIA: La Esmeralda, near Jamundí, Cauca Valley, altitude 1,100 meters, *Pittier* 954.

FRENCH GUIANA: Near Cayenne, on tree trunks, *Leprieux* 106.

BRAZIL: Matto Grosso, *Lindman* A. 3453.

The relationship of *Ananthacorus* is with *Vittaria*, from which it differs radically in its type of venation which is strictly areolate without lateral veins. The details of venation are shown by Presl (Tent. Pterid. pl. 10. f. 3.), by John Smith (Hist. Fil. pl. 10. f. C.), and by Hooker (Gen. Fil. pl. 77. A.).

<sup>a</sup> The name is composed of Greek  $\alpha$  privative,  $\alpha\nu\theta\omicron\varsigma$ , flower, and  $\acute{\alpha}\kappa\omicron\upsilon\varsigma$ , in modern use the sweet flag, the fronds resembling the leaves of that plant.

## MISCELLANEOUS NOTES AND CHANGES OF NAME.

*Asplenium conquistum* Underw. & Maxon; Christ, Bull. Herb. Boiss. II. 7: 270. 1907.

Dr. Christ in some notes (l. c.) on this species (up to that time unpublished) listed recently four of the writer's numbers from Jamaica and Guatemala. The first of these, from Jamaica, *Maxon* 1558, represented in the U. S. National Herbarium by sheet no. 427829, may be regarded as the type.

The species was fully characterized by Jenman<sup>a</sup> under the name *Asplenium rutaccum* Mett. In his later studies Jenman recognized the plant as distinct from *rutaccum* but unfortunately assigned to it in the herbarium a specific name already preoccupied in this genus. Dr. Christ has indicated the main distinctive characters.

The following specimens are in the U. S. National Herbarium:

JAMAICA: Moist woods near the Mabess River, altitude 900 meters, *Maxon* 1558 (type); rocky bank in humid forest, vicinity of Morces Gap, altitude 1,500 meters, *Maxon* 2761; between Morces Gap and Vinegar Hill, *Underwood* 1377.

GUATEMALA: Tree trunks in humid forest, on the trail between Sepacnité and Secanquim, Alta Verapaz, altitude 1,000 meters, *Maxon & Hay* 3257; on a stump in humid forest, on the trail from Senahú to Actalá, Alta Verapaz, *Maxon & Hay* 3310.

*Diplazium oreophilum* Underw. & Maxon, nom. nov.

*Asplenium franconis* Jenman, Bull. Bot. Dept. Jamaica II. 1: 91. 1894. Not *Diplazium franconis* Liebm. Dansk. Vid. Selsk. Skr. V. 1: 256. 1849.

The type of *Diplazium franconis* is from Oaxaca, Mexico. As illustrative may be cited the following Guatemalan specimens in the National Herbarium: *John Donnell Smith's* no. 636, collected at San Pedro Carchá, Depart. Alta Verapaz, altitude 1,150 meters, by von Türckheim, June, 1885; and *Maxon & Hay* no. 3324, collected in Alta Verapaz, along the trail between Senahú and Actalá, January 17, 1905. These agree closely with the original collection of Liebmann as represented by a fragment in the herbarium of the New York Botanical Garden.

Compared with these the Jamaican plant is readily seen to be distinct. The fronds are broadly triangular ovate, tripinnate or even quadripinnatifid, the pinnae ordinarily 20 to 25 cm. long<sup>b</sup> and 10 to 13 cm. broad, the pinnules 6 to 7 cm. long, lanceolate, stipitate (0.5 cm. in the largest), acuminate. The larger pinnules comprise about 8 pairs of oblong or ovate-oblong obtuse segments, of which the lowermost are free, deeply lobed and almost comparable to the pinnules of the much simpler *D. franconis*. The contrast with *D. franconis* in size, form, and degree of subdivision is too pronounced to require more detailed comparison.

*D. oreophilum* is not infrequent in humid depressions nearly up to 900 meters in the Blue mountains of Jamaica and is oftenest met with in a sterile condition. Ordinarily it is found fertile only in the vicinity of forest openings, and in such cases there is to be noted a marked dimorphic tendency, the sori (if present at all) being borne very closely and in great profusion, with a corresponding reduction of leaf tissue. It is apparently confined to Jamaica. Jenman's specimens (the types) are at the New York Botanical Garden. The following are in the National Herbarium: *Maxon* 1178, 2483, 2376; *Clute* 276; *Moore*; and one from the Botanical Department of Jamaica.

<sup>a</sup> Bull. Bot. Dept. Jamaica II. 1: 62. 1894.

<sup>b</sup> According to Jenman even 35 cm. long.



**Dryopteris oligophylla** Maxon, nom. nov.

*Polypodium incisum* Sw. Prod. 133. 1788, not Forst. 1786.

*Nephrodium sloanei* Baker in Hook. & Baker, Syn. Fil. ed. 2. 263. 1874, not Presl, 1825.

*Dryopteris sloanei* Kuntze, Rev. Gen. Pl. 2: 813. 1891.

*Nephrodium incisum* Desv. Mém. Soc. Linn. Paris 6: 257. 1827.

The above synonymy, if complete as to specific names, indicates the need of a new name for this common tropical American fern. Swartz followed his brief but excellent first description with a reference to Sloane's plate 51, illustrating a Jamaican specimen. This is unmistakably the plant known of late years as *Dryopteris* (or *Nephrodium*) *sloanei* and best described by Jenman.<sup>a</sup> Why Christensen should have relegated it to subspecific rank and that under *Dryopteris patens* is not clear; for its specific distinctness is evident, and in any case the alliance is with *Dryopteris serra*, as Jenman pointed out. The latter's remarks on its occurrence in Jamaica are otherwise of interest: "Common among the lower hills and widely spread through the country, ascending to 5,500 ft. altitude, on banks and other open places. A very fine species, the fronds however not erect but arching from the base outwards. A much wider-plumaged plant than *Serra*, to which it is closely allied. The texture is rather thin but hard, becoming rigid when dry. The rootstock is very wide-creeping under the surface of the ground, with the stipites scattered along it. Frequently the fructification does not reach the outer of the pinnae."

The following collections are in the National Herbarium:

JAMAICA: Elevations mainly of 600 meters or less, Maxon 995, 1003, 1777, 1781, 1859, 1935, 1991, 2379, 2527, 2823; Underwood 104, 3249, 3301; Clute 131; Harris 8962; Jenman.

CUBA: Wright 3922; Maxon 3920.

PORTO RICO: Heller 6345; Underwood & Griggs 75, 762; Sintenis 2636.

ST. KITTS: Britton & Cowell 483.

HAITI: Picarda 1030.

COSTA RICA: J. D. Smith 6901; Pittier 20964; Wercklé (as *Aspidium macrourum*).

COLOMBIA: H. H. Smith 2454.

*Nephrodium paucijugum* Jenman is referred to by Jenman (*l. c.*) as possibly a young state of the present species. Under this name in the Jenman herbarium at the New York Botanical Garden are two immature sterile plants on separate sheets. One of these, with creeping rhizome and *serrate* segments, agrees well with the original description of *paucijugum* and is undoubtedly the type; it is too young to refer with certainty to any described species, but it is positively not *sloanei* (*i. e.* *oligophylla*). The second is a different species, with *entire* segments and long-attenuate pinnae; it also is young, but apparently a young state of *sloanei* (*i. e.* *oligophylla*). Jenman's erroneous association of this second specimen with his type of *paucijugum* explains satisfactorily his later suggestion that *paucijugum* might be a young state of *sloanei*. *Nephrodium paucijugum* itself, properly restricted to the original, must for the present be kept among the *species inquirendae*.

**Dryopteris pyramidata** (Fée) Maxon.

*Goniopteris pyramidata* Fée, 11me Mém. 61. pl. 16. f. 2. 1866.

This little known species was founded on a plant collected in Gaudeloupe by L'Herminier in 1861. No. 50240 in the U. S. National Herbarium, collected in Santo Domingo by Wright, Parry, and Brummel (no. 12) in 1871 is apparently the same. It is a true *Dryopteris* (§ *Eudryopteris* of Christensen) and is by

<sup>a</sup> Bull. Bot. Dept. Jamaica II. 3: 164, 165. 1896.

no means to be confused with any form of *D. tetragona*, which is of the section *Goniopteris*. Fée's detail figure almost certainly represents one of the lowermost pinnae, probably the lowest or next to the lowest; at least in the specimen at hand only the two or three lowermost pairs of pinnae are contracted at the base, as shown in the figure. See under *D. johnstoni*, page 498, and under *D. latiuscula*, page 498.

**Dryopteris radicans** (L.) Maxon.

*Asplenium radicans* L. Syst. Nat. ed. 10. 2: 1323. 1759.

*Asplenium rhizophyllum* L. Sp. Pl. ed. 2. 1540. 1763. Not *Asplenium rhizophyllum* L. Sp. Pl. ed. 1. 1078. 1753; Sp. Pl. ed. 2. 1536. 1763.

*Asplenium rhizophorum* L. Gen. Fil. ed. 6. (emendation, at end). 1764.

*Polypodium repens* Sw. Prod. 132. 1788. Not Sw. Prod. 130. 1788, which is *Campyloneurum repens*.

*Polypodium reptans* Gmelin, Syst. Nat. 2<sup>2</sup>: 1309. 1791.

*Goniopteris reptans* Presl, Tent. Pterid. 182. 1836.

*Phegopteris reptans* D. C. Eaton, Bull. Torr. Club 10: 101. 1883.

*Nephrodium reptans* Diels in Engl. & Prantl, Nat. Pfl. 1<sup>4</sup>: 168. 1899.

*Dryopteris reptans* C. Chr. Ind. Fil. 288. 1905.

The *Asplenium radicans* of Linnæus (1759) was founded directly upon Sloane's plate 29 and plate 30, figure 1, representing Jamaican plants, and upon Plukenet's plate 253, figure 4.

The *Asplenium rhizophyllum* published in the second edition of the Species Plantarum (page 1540) was founded on the identical plates cited under *Asplenium radicans*, with the addition of a reference to Browne's "*Asplenium simplex minus reflectens*, etc.," this in turn having been established partly (or perhaps wholly) on the Sloane and Plukenet figures cited under *radicans* and *rhizophyllum*.

*Asplenium rhizophorum* L., 1764, is merely a change of name for *rhizophyllum* of the second edition, page 1540; not *rhizophyllum* of the first edition, page 1078, and of the second edition, page 1536, which is *Camptosorus rhizophyllus*.

The three names are thus identical in application, having to do with the same plates; and the earliest is *radicans*, 1759.

The plates cited represent a species of *Dryopteris*,—a common and well known tropical American fern usually called *Dryopteris* (or *Nephrodium*) *reptans*. The figures are unmistakable, Sloane's plate 29 in particular representing a characteristic form of the typical Jamaican plant. Sloane's description is not less distinctive.

Notwithstanding this, later writers have apparently without exception substituted under one or another of the Linnæan names (usually *rhizophorum*) a plant of another genus, namely a true *Asplenium* with glossy stiff purplish brown stipes and rachis, a plant like the original only in its wide range of variation and in having a radicant tip. Swartz, in his *Observationes Botanicae*,<sup>a</sup> seems to have been responsible for formally introducing or at least sanctioning this substitution, by noting (under *A. rhizophorum*) that Sloane's plate 30, figure 1, should be referred to his own *Polypodium repens* which had been published in 1788, founded on this same plate 30, figure 1, and Plukenet's plate 253, figure 4. "*Asplenium rhizophorum*" was held by him to be bipinnate, in mature plants, a character here introduced for the first time. Because of his *P. repens* of page 130 (1788) (this is *Campyloneurum repens*) the *P. repens* of page 132 becomes *P. reptans* in the *Synopsis Filicum* (1806), a name given first by Gmelin (1791) who cited Sloane's plate 30, figure 1; and

<sup>a</sup> Page 390. 1791.

under this last name Swartz cites both plate 29 and plate 30, figure 1,<sup>a</sup> the prototypes of the Linnæan *Asplenium radicans*, 1759.

By 1806, then, the transfer of the Jamaican plants from the several Linnæan names under *Asplenium* had become complete. The confusion could have been avoided by a slight regard for the Linnæan citations.

Sloane's long description<sup>b</sup> is well worth perusal. His specimens in the herbarium of the British Museum were determined as *Polypodium reptans* by Jenman<sup>c</sup> who cites plate 29 and plate 30, figure 1, adding, "Sloane well describes the great variation of form in this species, and says that he had 'not seen in any Plant so great sporting of nature.'"

If there is the slightest evidence that any true *Asplenium* formed a part of the original *Asplenium radicans* L., 1759, *A. rhizophyllum* L., p. 1540, 1763, or *A. rhizophorum* L., 1764, it is unknown to the writer. The *Asplenium* commonly listed under these names (usually under the last) ranges from simply pinnate to tripinnate and appears to have first received a tenable name at the hands of Richard as *Asplenium cirrhatum*,<sup>d</sup> on specimens from Gaudeloupe. These were simply pinnate. Between this state and the most compound there is every intermediate stage, as shown alone by the Jamaican series in the U. S. National Herbarium. The figures given by Hooker show some of these,<sup>e</sup> but all of Hooker's synonyms are not to be credited. *A. cirrhatum* is especially common in the West Indies and occurs less frequently on the continent. In its various forms it has received many names; several of these have recently been reapplied by Urban.<sup>f</sup>

*Dryopteris serrulata* (Sw.) C. Chr. Ind. Fil. 292. 1905.

*Polypodium serrulatum* Sw. Schrad. Journ. Bot. 1800<sup>2</sup>: 25. 1801, not Mett. 1856.

*Polypodium asplenioides* Sw. Schrad. Journ. Bot. 1800<sup>2</sup>: 26. 1801.

? *Polypodium lunanianum* Hew. Mag. Nat. Hist. II. 2: 460. 1838.

*Nephrodium serrulatum* Jenman, Bull. Bot. Dept. Jamaica II. 3: 189. 1896.

The three names here involved were all given originally to Jamaican plants. *Polypodium serrulatum* Sw. was founded upon Sloane's plate 43, figure 1, representing a plant of which Sloane says: "It grows on Mount Diablo, near Archers Ridge, and other inland woody parts of the Island."

*Polypodium asplenioides* Sw. was founded on Sloane's plate 43, figure 2, this showing a plant upon which Sloane comments at length, in part as follows: "This is in everything the same as the former, only, although as high, yet 'tis in everything lesser, the *Pinnac* a little more frequent, shorter and narrower by much than that immediately preceding, being not over half an Inch broad at Base where broadest, ending in a point. And in this, which seems to be quite different from the former, there are some varieties. It grew with the former."

<sup>a</sup>Also Pluknet, pl. 286, fig. 2, which had been cited by Poiret (Encyc. 5: 530. 1804) under *Polypodium radicans*. Poiret's use of the term *radicans* is apparently independent of Linnæus, 1759; and *Polypodium radicans* Poiret is a doubtful synonym of *Dryopteris radicans*. The *Polypodium rhizophyllum* Sw. cited by him as a doubtful synonym is, of course, *Polystichum rhizophyllum* (Sw.) Presl.

<sup>b</sup>Page 77.

<sup>c</sup>Journ. Bot. 24: 34. 1886.

<sup>d</sup>Willd. Sp. Pl. 5: 321. 1810.

<sup>e</sup>Sp. Fil. 3: pl. 187. 1860, as *A. rhizophorum*.

<sup>f</sup>Symb. Antill. 4: 35. 1903.

In the early part of May, 1903, and again during the latter part of the same month in 1904, the writer spent several days in the vicinity of Mount Diablo, on both occasions staying at Hollymount (altitude about 750 meters) by kind permission of the owner of this beautiful estate, W. P. Purdon, Esq., of Kingston. Among the extensive collections made there is a series of specimens including the connecting forms between the extremes shown by Sloane in the two figures cited above; having regard for which there is no alternative but to combine all under a single name. This is the conclusion at which Jenman arrived in his later work, and he published a good description of the species in this broad sense in 1896 under the name *Nephrodium serrulatum* Jenm. (*l. c.*). Oddly enough, however, he yet made use of the Swartzian name *asplenioides* for quite a foreign group of plants, describing<sup>a</sup> under the name *Nephrodium asplenioides* Baker several different forms, of which at least a part are associable with *Dryopteris radicans* (L.) Maxon of the present paper (p. 490). That Jenman should follow Baker in misapplying the name *asplenioides* is rather remarkable, in view of his having examined Sloane's specimens in the British Museum<sup>b</sup> and his having drawn a proper diagnosis of the species under the name *Nephrodium serrulatum* Jenm. (*l. c.*), which description certainly includes the original *asplenioides* of Swartz.

The reference of *Polypodium lunanum* Heward to *D. serrulata* is, from description, doubtful.

The true *D. serrulata* is apparently confined to Jamaica. The following specimens, showing a very wide degree of variation, as described by Jenman, are in the U. S. National Herbarium:

JAMAICA: Vicinity of Hollymount, Mount Diablo, altitude about 750 meters, *Maxon* 1878, 1890, 1893, 1908, 1923, 1925, 1952; *Underwood* 1890. Hartford and adjoining properties, near Priestmans River, altitude 75 to 300 meters, *Maxon* 2514. Vicinity of Mandeville, *Maxon* 2571.

**Goniophlebium ampliatum** Maxon, nom. nov.

*Polypodium gladiatum* Kunze, *Linnaea* 9: 45. 1834, not Vell. 1827.

It has been customary to refer *P. gladiatum* Kunze, founded upon specimens collected in the interior of Cuba by Poeppig, to *Polypodium (Goniophlebium) attenuatum* H. & B., 1810, the latter a rather uncommon species described originally from plants collected in Venezuela and Brazil with mention of Schkuhr's plate 14, representing Guiana specimens. The Cuban plant, however, seems to differ constantly in the shape of the pinnae, these very long attenuate and falcate, narrowed at the base and even subpetiolate, the lower and middle ones essentially free and only the uppermost adnate or slightly decurrent, and in the more numerous deeply impressed or pustulate sori commonly borne in four rows. The margins also are conspicuously undulate, especially in the fertile fronds. The following specimens, which agree with a portion of the type collection in the herbarium of the New York Botanical Garden, show no more than a normal amount of variation.

CUBA:

PROVINCE OF ORIENTE: Near Monte Verde, *Wright* 804, *Maxon* 4301; Santa Ana, 6 miles north of Jaguey, *Maxon* 4133, 4207; vicinity of Baracoa, *Pollard, Palmer, & Palmer* 64.

<sup>a</sup> Bull. Bot. Dept. Jamaica II. 3: 211, 212. 1896.

<sup>b</sup> The Sloane specimens were reported on by Jenman in 1886 (*Journ. Bot.* 24: 36). At that time he was inclined to regard the two extreme forms as possibly representing two distinct species; from this position he later receded, as stated.

PROVINCE OF PINAR DEL RIO: Near Pinar del Rio, *Palmer & Riley* 41, 83; *Shafer* 388; in mountains north of San Diego de los Baños, *Palmer & Riley* 510, 571; Los Palacios, *Van Hermann* 3291.

PROVINCE OF MATANZAS: Vicinity of Madruga, *Britton, Britton & Shafer* 635.

ISLE OF PINES: *A. A. Taylor* 9.

JAMAICA:

Mount Hermon, near Chepstow, *Moore*.

**Phymatodes nematorhizon** (D. C. Eaton) Underw. in herb.

*Polypodium nematorhizon* D. C. Eaton, Bot. Gaz. 3: 90. 1878.

This rare species, founded on Fendler's no. 73, from Trinidad, and known hitherto only from that island, has recently been collected on the island of Margarita, Venezuela, by Mr. J. R. Johnston (no. 147) at an altitude of 500 meters. The specimens, which agree perfectly with the types, were distributed as *Polypodium lanceolatum* L.

**Polypodium kalbreyeri** Baker, *Timchri* 11, 5: 215. 1886; *Trans. Linn. Soc.* 11, Bot. 2: 291. 1887.

*Polypodium longipes* Fée, *Crypt. Vasc. Brés.* 2: 53. pl. 95. f. 3. 1872-73, not Link, 1850.

*Polypodium transiens* Lindm. *Ark. Bot.* 1: 235. pl. 11. f. 7. 1903.

The type of Fée's *P. longipes* was from Brazil (*Glaziou* 4414). Dr. Lindman refers here also Mosen's no. 3535, redescribing the species under a new name (*P. transiens*) supposed to be necessary on account of Fée's homonym. Guiana specimens in the Jenman herbarium at New York, however, show that Baker's *P. kalbreyeri*, founded in the interim on specimens from Guiana and New Granada, is the same.

Dr. Christ has reported<sup>a</sup> the species recently from Costa Rica on one of Wrecklé's specimens without definite locality, and the following specimen collected by the writer also agrees perfectly with the South American material: On tree trunks, vicinity of La Palma, Costa Rica, altitude 1450-1550 meters, May 1906, *Maxon* 466.

**Polystichum solitarium** (Maxon) Underw. in herb.

*Polystichum munitum solitarium* Maxon, *Fern Bull.* 11: 39. 1903.

Professor Underwood was strongly of the opinion that this form from Guadelupe Island off the coast of Lower California is worthy of specific rank, on the strength of the characters pointed out in the original description. No additional specimens have been seen and the species is apparently confined to Guadelupe Island. It is allied also to *P. falcinellum* of Madeira.

**Tectaria martinicensis** (Spreng.) Maxon.

*Aspidium martinicense* Spreng. *Anleit. Kennt. Gewächse* ed. 1. 3: 133. 1804.

*Aspidium macrophyllum* Sw. *Syn. Fil.* 43, 239. 1806.

*Sagenia macrophylla* Moore, *Ind. Fil.* xxxvi. 1857.

*Nephrodium macrophyllum* Baker, in *Hook. & Baker, Syn. Fil.* 300. 1867.

Common in the West Indies; apparently less so in Central and South America. Sprengel cites Plumier's excellent plate 145 as does also Swartz, who accredits the name to "Rudolphi, *Bemerk. e Reise* 2 p. 103. (Note)", a work unknown to the writer.

<sup>a</sup> *Bull. Herb. Boiss.* 11, 4: 1103. 1901, as *P. longipes*.

**Tectaria plantaginea** (Jacq.) Maxon.

*Polypodium plantagineum* Jacq. Coll. Bot. 2: 104. pl. 3. f. 1. 1788.

*Aspidium plantagineum* Griseb. Abh. Kön. Gesell. Wiss. Gött. 7: 286. 1857.

*Dryomenis plantaginea* J. Sm. Bot. Voy. Herald 229. 1854.

*Podopeltis plantaginea* Fée, Gen. Fil. 9. 1850-52.

*Bathmium plantagineum* Fourn. Bull. Soc. Bot. France 19: 254. 1872.

Appears to differ from the more typical species of *Tectaria* only in its simple fronds. There are several well marked forms which possibly deserve to rank as distinct species.

**Tectaria purdiaei** (Jenman) Maxon.

*Aspidium purdiaei* Jenman, Gard. Chron. III. 22: 282. 1897.

*Nephrodium sherringiae* Jenman, Journ. Bot. 25: 99. 1887. Not *Nephrodium sherringii* Jenman, 1879.

*Aspidium psammisorum* C. Chr. Ind. Fil. 89. 1905.

To this species may be referred Miller and Johnston's no. 158 and Johnston's no. 173, both from Margarita Island, Venezuela. The relationship is clearly with *Tectaria martinicensis*. The types of both *Aspidium purdiaei* and *Nephrodium sherringiae* were from Trinidad. *A. psammisorum* was proposed as a change of name for the latter.

**NEW SPECIES IN SEVERAL GENERA.****Asplenium sarcodes** Maxon, sp. nov.

PLATE LVI, FIGURE 3.

Fronds numerous, 12 to 15, borne in a perfect crown; rhizome (mostly subterranean) succulent, erect, 10 cm. and more high (incomplete), about 3 cm. in diameter, at the exposed apex very thickly clothed with narrowly triangular long-attenuate slightly lustrous "mummy brown" scales, 8 to 10 mm. long, the margins entire or by rupture slightly lacerate; stipe stout, 20 cm. long, sulcate and dark greenish brown in drying, toward the base beset with very narrow brownish scales; lamina oblong, 40 cm. long, at the middle 15 to 16 cm. broad, somewhat reduced below; rachis similar to the stipe but narrowly alate, flattened (in drying); pinnae coriaceous (carnose in the living plant), opaque, about 14 pairs, opposite or subopposite, the lowermost pair borne at an angle of about 45° and distant 5 cm. from the second, middle ones divergent at a greater angle and about 2 cm. apart, upper ones gradually smaller but not greatly reduced, giving rise abruptly to a petiolate terminal pinna of similar form; characteristic middle pinnae 9 cm. long, 1.8 cm. broad, nearly straight (sometimes either falcate or slightly decurved), lanceolate, petiolate, at the base unequal, rounded truncate on the superior side, deeply excised below, the margins lightly, irregularly, and obliquely crenate, more deeply crenate-serrate toward the acute apex; under surface (as well as the rachis) sparsely covered with deciduous tortuose skeleton-like dark brown scales, these filiform from a broad substellate base; veins concealed, emerging at an angle of about 45°, curved, the basal ones 2 or 3 times forked, the others mostly once forked; sori about 16 to 18 pairs, nearer the costa than the margin, borne on the anterior branch at or near its point of origin; indusia firm, whitish, broadly elliptical, 4.5 to 5.5 mm. long, 1.5 to 1.75 mm. broad; sporangia cinnamon-brown, long-pedicellate, naked.

Type in the U. S. National Herbarium, no. 523133, collected at edge of rocky forest near the summit of the Farallones of La Perla, north of Jaguey, Yateras, province of Oriente, Cuba, altitude about 585 meters, by William R. Maxon (no. 4390), May 2, 1907.

The following additional specimens may be cited:

CUBA: Near Monte Verde, January to July, 1859, *Wright* 845 (E):  
"Summit of Nimanima, on rocks," 1856-1857, *Wright* 845 (E); without

definite locality, *Wright* 845 (Y); fragment, *Wright* 845 (N).<sup>a</sup> Santa Ana, about 6 miles north of Jaguey, Yateras, province of Oriente, altitude 600 to 625 meters, *Maxon* 4195. Near summit of Gran Piedra, province of Oriente, altitude about 1,150 meters, *Maxon* 4051.

PORTO RICO: Yauco, 1880, *Garber* 96 (E).<sup>b</sup>

Linden's no. 1887, from Cuba, and Sintenis' nos. 2692, 4234b, and 6459, from Porto Rico, cited by Hooker and by Urban, respectively, as *A. anisophyllum*, probably belong here; as does also Linden's 1890 cited by Fée<sup>c</sup> under this name, without comment, along with Linden's 1887.

*A. sarcodes* is allied to *A. anisophyllum* Kunze<sup>d</sup> and *A. sanguinolentum* Kunze, the former an African species, the latter South American. *A. anisophyllum*, as shown by two complete specimens out of the series at hand, has the rhizome erect (as in *A. sarcodes*), not creeping, as redescribed by Mettenius<sup>e</sup>, whose description is otherwise excellent. It differs from *A. sarcodes* in its firm light-colored subterete stipe and rachis (these could hardly have been carnose, as in *A. sarcodes*), in its delicate membranous texture and apparent venation, and in having the margins deeply serrate (instead of lightly crenate). The fronds are considerably larger and terminate much less abruptly than in *A. sarcodes*; they are also sometimes proliferous.

*A. sanguinolentum* Kunze,<sup>f</sup> in the typical form figured by Mettenius,<sup>f</sup> is known to the writer only from Regnell's III 1468, from Caldas, province of Minas Geraes, Brazil (N). H. H. Smith's no. 1128 from Santa Marta, Colombia, altitude about 1,650 meters (N) is similar to this in delicate texture and marginal serration, but has the superior base of the pinnæ less auriculate and scarcely excised at the inner margin. Both specimens have the rachis dark and compressed, as in *A. sarcodes*. They approach *A. sarcodes* only through Wright's Monte Verde specimen, which is the most extreme of those cited under *sarcodes* and which has the pinnæ of more delicate texture and more deeply crenate-serrate than the others. None of the Cuban and Porto Rican plants have the pinnæ auriculate or even subauriculate or excised at the inner margin.

*A. sarcodes* is thus nearest related to the continental *A. sanguinolentum*, being distinguished ordinarily by its very coriaceous texture, by having the pinnæ rounded-truncate at the superior base (even slightly overlapping the rachis in some specimens), by its lightly crenate margins, and by its concealed venation.

#### ***Cheilanthes aemula* Maxon, sp. nov.**

Fronds about 50 cm. high, clustered; rhizome short-creeping, thickly covered with narrow ferruginous chaff; stipe 22 to 25 cm. long, stout (2 to 2.5 mm. thick), more or less flexuose, blackish or dark purplish brown, rigid, terete; lamina subcoriaceous, 30 to 35 cm. long, 20 to 22 cm. broad at base, broadly triangular, very deeply quadripinnatifid below, otherwise tripinnate nearly throughout; primary rachis similar to the stipe, its upper surface and that of the secondary rachis covered with a scurfy jointed pubescence:

<sup>a</sup> *Wright* 845 was reported first by Eaton (*Am. Journ. Sci.* II. 27: 199. 1859) as "*Asplenium, salicifolium*, *L.* affine," subsequently (*Mem. Am. Acad.* II. 8: 205. 1860) as *A. anisophyllum* Kunze. It is cited under the last name by Hooker (*Sp. Fil.* 3: 112. 1860).

<sup>b</sup> Listed by Urban (*Symb. Antill.* 4: 35. 1903) as *A. anisophyllum* Kunze.

<sup>c</sup> *Hist. Foug. Antill.* 34. 1866.

<sup>d</sup> *Linnaea* 10: 511. 1836.

<sup>e</sup> *Abh. Senck. Nat. Gesell.* 3: 143. *pl.* 4. *f.* 12. 1860.

<sup>f</sup> Kunze; *Mett. Abh. Senck. Nat. Gesell.* 3: 142. *pl.* 4. *f.* 10. 1860.

pinnæ 12 to 14 pairs, the lowermost nearly or quite opposite and distant, middle ones ovate, approximate and mostly alternate, apex of the frond short; basal pinnæ very unequally and broadly triangular, 11 to 13 cm. long, 5 to 6 cm. broad at base, the first inferior pinnule 4 to 4.5 cm. long and 2 to 3 cm. distant from the main rachis, the first superior pinnule 1.5 to 2 cm. long and 1 to 1.75 cm. distant from the main rachis; pinnules triangular-ovate, those of the lowermost pairs of pinnæ relatively narrower with 6 to 9 pairs of approximate narrowly ovate pinnulæ and a subentire acute terminal segment, only the 3 or 4 larger pairs of pinnulæ of the lower pinnules again pinnatifid into small ovate segments; under surface glabrate, with a few yellowish hairs; sori confluent, continuous or occasionally interrupted by a shallow indentation; indusia narrow, membranous.

Type in the U. S. National Herbarium, no. 572224, this being one of several sheets of Dr. Edward Palmer's no. 187, collected at Victoria, State of Tamaulipas, Mexico, in a river canyon, under overhanging rocks, altitude about 320 meters, February 1 to April 9, 1907. Doctor Palmer's no. 563 and no. 564 with identical data are the same. Young semifertile or sterile plants differ in having the fronds almost ternate or subpentagonal, and the final segments obtuse or even rounded; in the last particular considerable variation is to be noted also in mature specimens.

*Cheilanthes acmula* is allied to *C. microphylla*, with which indeed it grew at the type locality; but from that species it differs notably in its broadly triangular fronds and far greater subdivision.

Additional specimens to be referred here are, as represented in the National Herbarium, Dr. C. G. Pringle's 1988 (distributed as *C. microphylla*), from shaded banks near Monterey, State of Nuevo Leon, Mexico, June 20, 1888; and Doctor Palmer's no. 1413 of his 1880 collection from some part of Coahuila or Nuevo Leon.

***Cheilanthes peninsularis* Maxon, sp. nov.**

Plant 15 to 17 cm. high, the fronds borne closely; rhizome short-creeping, branching, with compact covering of minute acicular brownish-striped scales, those of the growing point tawny and long-attenuate; stipe 7 to 10 cm. long, very slender (about 5 mm. in diameter), dark purplish brown, sparsely covered with very slender (mostly filiform) tortuose shrunken yellowish brown scales, mostly appressed and inconspicuous; lamina 6 to 8.5 cm. long, 4 to 5 cm. broad, narrowly ovate, clear bright green, deeply tripinnatifid, membranaceous; primary and secondary rachises bearing chaff similar in texture and color to that of the stipe but mostly broader, especially that of the secondary rachis which is linear-lanceolate, attenuate, tapering from the base, more or less erose; pinnæ about 6 pairs, the lowermost subopposite, with lower basal pinnules somewhat produced, 3 to 3.7 cm. long, subtriangular-ovate, 2 to 2.5 cm. distant from the next pair above, these oblong-ovate; the remaining pinnæ spaced, not overlapping, alternate; in general, the larger pinnæ deeply bipinnatifid, with about 6 pairs of spaced alternate oblong-ovate pinnules, these obliquely and deeply divided into 4 or 5 pairs of alternate ligulate-cuneate lobes connected by a flexuose wing of nearly equal width, the larger lobes again once or several times cleft toward the apex; sori terminal on the solitary veins of the ultimate lobes; indusia formed by the slightly modified inflexed margins.

Type in the U. S. National Herbarium, no. 397942, collected by T. S. Brandegee in the Cape region of Lower California, Mexico, November, 1902. There are in addition two sheets from San José del Cabo, that is to say, the same region, also collected by Mr. Brandegee, September 10, 1890. All were dis-



tributed as *Cheilanthes pringlei*, a nearly allied species described originally from Arizona and since found to range into northwestern Mexico. From *C. pringlei*, however, the new species may be distinguished by the following obvious characters: (1) The slender purplish brown stipes, with fewer narrower scales (not stout reddish brown stipes with copious chaff), (2) fronds narrowly ovate (not short, triangular or deltoid-ovate), (3) pinnæ spaced (not close-set and overlapping), (4) primary and secondary rachises with sparse narrow yellowish brown scales (not with very numerous broad whitish scales extending thickly even to the vascular parts of the pinnules and commonly obscuring the under surface). The last character is in itself sufficient to indicate the distinctness of *C. peninsularis*, though the difference in shape of fronds is almost equally pronounced.

**Diplazium delitescens** Maxon, sp. nov.

PLATE LVI, FIGURE 1.

Rhizome creeping horizontally, 2.5 cm. long (incomplete), about 3 mm. in diameter, covered thickly with distichous stipe-bases; scales of rhizome perhaps somewhat abraded, inconspicuous, minute, very dark, coarsely reticulated, brittle, elongate-triangular, acuminate, closely appressed; fronds borne singly, distichous by succession, 43 cm. long, arcuate; stipe 21.5 cm. long, at the base thickly clothed with brownish lanose hairs intermixed with a few scales like those of the rhizome, conspicuously flattened laterally, the anterior face concave, the posterior convex, thus in section narrowly hippocrepiform, vascular bundles two; lamina 21.5 cm. long, about 20 cm. broad at the base, broadly deltoid-ovate; pinnæ about 7 pairs, firm, membranaceous, the lowermost the largest, subopposite, 11 cm. long, 2 cm. broad, short-petiolate, patent, attenuate, succeeding pinnæ slightly smaller, ascending, adnate, the uppermost 1 or 2 pairs abruptly reduced, rounded or even retuse at the apex, giving rise to a sub-hastate, caudate terminal segment (about 8 cm. long), this shallowly lobed below, toward the apex obliquely serrate; characteristic pinnæ lanceolate, straight or slightly falcate, broadest near or below the middle, attenuate (casually elongate), at the base unequally cuneate-truncate (below narrowly cuneate, above subtruncate), the inner margin straight and nearly parallel to the rachis, subauriculate, margins elsewhere regularly curvessent-serrate; midveins prominent nearly throughout on the lower side, the veins mostly apparent, 3 or 4 times forked; sori elongate, 7 to 9 mm. long, narrow, slightly curved, miserial, nearer the midvein than the margin, borne on the first anterior (simple) branch; indusia narrow, firm.

Type in the U. S. National Herbarium, no. 403261, collected in the vicinity of San Luis, Province of Oriente, Cuba, by Charles L. Pollard and William Palmer (no. 348), February, 1902.

To be referred here also are the following:

HONDURAS: San Pedro Sula, Department of Santa Bárbara, altitude 300 meters, *C. Thieme* (distributed by John Donnell Smith, under no. 5675, as *Asplenium cultrifolium*). (N)

PANAMA: S. Hayes 57. (N)

A most distinct species, especially remarkable for its peculiar marginal cutting which is best described as curvessent-serrate, a term used recently by Professor Burgess. The form of the pinnæ also is uncommonly characteristic and quite unlike that of any of the smaller American species of *Diplazium*. The type specimen shows only an occasional diplazioid sorus; but the Honduras specimen cited has the sori more numerous, freely diplazioid, and extending rather closer to the margin.

*A. cultrifolium* L., which Christensen is probably correct in considering a *Diplazium*, was founded on Plumier's plate 59, supposed to represent a plant

from Martinique. It is, on this basis, a species unknown to the writer and is perhaps still to be rediscovered.

**Dryopteris johnstoni** Maxon, sp. nov.

Fronds few, 80 to 90 cm. long, borne closely from a slender creeping woody rhizome 5 to 7 mm. thick bearing a few stout cordlike roots about 1 mm. in diameter; stipes 55 to 60 cm. long, in color dull yellowish, somewhat polished beneath a minute inconspicuous stellate pubescence, quadrangular and deeply sulcate in drying, bearing at the base a few yellowish brown, ovate or oblong-ovate scales which are noticeably stellate-pubescent; lamina glabrate, broadly deltoid, 27.5 to 29 cm. long, 20 to 24 cm. broad, 10 to 12-jugate, decreasing rather abruptly toward the apex into a narrow elongate terminal cauda 9 to 11 cm. long, deeply pinnatifid below, the apex entire; rachis relatively slight, subflexuose; pinnae opposite or very nearly so, subcoriaceous, sessile, linear-lanceolate, caudate, the midvein elevated, especially below, with a few short minute simple hairs, veins apparent; the lowermost pinnae 11 to 14 cm. long, 1.5 to 2.2 cm. broad, strongly deflexed, greatly reduced at the base (particularly on the lower side), broadest in the middle, uniformly lobed one-half the distance to the rachis or slightly more, the apex long-attenuate, entire, the lobes close, about 20 pairs, slightly oblique, subfalcate, rounded, those of the lower side largest (4.5 mm. broad), with 9 or 10 pairs of simple veinlets of which commonly only the two lowermost pairs extend to the sinus; succeeding pinnae similar, differing mainly in the smaller size, shallower lobes and less reduced bases of the pinnae, the middle and upper pinnae being broadest at the base and decidedly falcate toward the extremity; sori of the larger (inferior) lobes about 9 pairs, relatively large, medial or nearly so; indusia firm, reddish, eventually deciduous, bearing numerous simple whitish hairs mostly at the margin.

Type in the U. S. National Herbarium, no. 532013; collected at an altitude of 450 meters on the Juan Griego trail, Island of Margarita, Venezuela, July 22, 1903, by J. R. Johnston (no. 192).

Known also from Trinidad, as shown by a specimen from the Jenman herbarium (U. S. National Herbarium, no. 428910), and a second sheet representing Fendler's no. 54 (U. S. National Herbarium, no. 50241), the latter bearing the following note attributed to D. C. Eaton: "Perhaps the *Nephrodium deflexum* J. Smith, referred to in [Hooker and Baker's] Syn. Fil. p. 292." The reference is to a note by Mr. Baker, under *Nephrodium refractum* Hook., as follows: "A Fern gathered in Trinidad by Aldridge, *N. deflexum*, J. Sm. MSS., has similarly deflected pinnae, but they are narrower, and the lobes reach halfway down to the midrib." This description, if it may be called such, applies to the plant in hand; but Smith's name is invalidated by *Nephrodium deflexum* Presl, 1825.

The relationship of *D. johnstoni* is not with *D. refracta* (Fisch. & Meyer) Kuntze, which, as represented by several specimens in the National Herbarium, is of the section Cyclosorus. In gross characters it may be compared rather with *D. falciculata* (Raddi) Kuntze, from Brazil, the West Indian *D. pyramidata* (Fée) Maxon, and the British Guianan *D. latiuscula* Maxon. *D. falciculata* is a plant with delicate herbaceous ovate fronds, very deeply cut non-caudate glandular pinnae, spaced segments, etc. *D. pyramidata* and *D. latiuscula* differ in their broader scarcely caudate pinnae, noncaudate apex and marked pubescence, and in having the lower pinnae not deflected.

**Dryopteris latiuscula** Maxon, sp. nov.

*Aspidium* (*Nephrodium*) *wardianum* Jenman, in herb. Not *Aspidium wardii* Kuhn, 1879=*Nephrodium wardii* Baker, 1874=*Dryopteris wardii* Kuntze, 1891.

Rhizome lacking; stipes 35 cm. long, light brownish, stout, deeply and irregularly sulcate, with a thick scurfy covering of minute whitish stellate hairs

below, in the upper parts and on the rachis mixed with longer simple hairs, these at length predominating; lamina triangular-deltoid, 40 cm. long, 37 cm. broad, about 15 to 17-jugate, decreasing regularly at the apex: pinnae straight or nearly so, opposite throughout, short-stalked (1 mm.), lanceolate, attenuate, the midvein stout, conspicuously elevated, covered with erect long and short simple hairs, these extending also to the veins and veinlets: lowermost pinnae 13.5 cm. long, 2.8 cm. wide, borne at an angle of 90°, by the reduction of the two or three lowermost pairs of segments nearly ligulate at the base (8 mm. wide), increasing abruptly to the full width (2.8 cm.), in the remainder of the basal half lobed about one-half the distance to the midrib, the lobes gradually much shallower toward the entire attenuate apex: lobes approximate, oblique, slightly falcate, rounded-truncate, those of the superior and inferior sides about equal, the largest 6 mm. broad, with about 9 or 10 pairs of simple veinlets, the lowermost two (or three) pairs running to the narrow sinus (or the first posterior veinlet sometimes only short-excurrent): succeeding pinnae gradually smaller, of the same general form, gradually less reduced at the base, the sixth pair of pinnae with only the first pair of segments reduced, upper pinnae with base as broad as the middle, ultimate pinnae greatly reduced (1.5 to 2 cm. long), finally adnate, decreasing regularly into a short entire apex: sori of the largest segments 9 or 10 pairs, large, medial, the indusium light brown, with numerous long simple white hairs.

Type in the U. S. National Herbarium, no. 428925; from the Jenman herbarium, marked in Jenman's hand as from the "Barima River, British Guiana." A second sheet has identical data.

*D. latiuscula* is of the section Eudryopteris and closely related to *D. pyramidata*; to be distinguished by its stouter vascular parts, opposite and less deeply lobed pinnae and especially by the greatly reduced basal segments of most of the pinnae, even the upper pinnae never broader at the base than at the middle. It is less nearly allied to *D. johnstoni*.

***Elaphoglossum palmeri* Underw. & Maxon, sp. nov.**

Mature plants 22 to 45 cm. high, with narrow fronds covered on both sides with more or less scattered irregularly stellate scales: rootstock slender, creeping, densely covered with copious dark-brown shining prickly-ciliate linear-lanceolate scales, these continuing a short distance up the slender stipe, there mingled with whitish or rusty long-ciliate scales: sterile fronds with stipes 5 to 18 cm. long, lamina 20 to 30 cm. long, very narrowly elliptic or oblanceolate, usually widest (6 to 18 mm.) one-third the distance below the apex, gradually long-tapering below, tapering more rapidly toward the apex, both surfaces covered (often densely so when young) with rather small whitish or slightly brownish, ciliate or irregularly stellate scales, those of the midrib beneath and on the margins with a broader body: sporophylls similar in shape to the sterile fronds but shorter and with relatively longer stipes, covered more or less closely with irregularly stellate scales above, fibrillose with ciliate scales on the midrib beneath: veins distinct, oblique, mostly once-forked (usually near the base), slightly thickened toward the end and scarcely reaching the margin thus forming a condition between §*Stenoneura* and §*Condyloneura* but nearly approximating the former.

Type in the U. S. National Herbarium, no. 372375; collected near El Guama, Province of Pinar del Rio, Cuba, on banks of an open stream in the pine mountains, March 12, 1900, by William Palmer and J. H. Riley (no. 286). Also collected by Charles Wright (no. 3957), in the year 1865, probably in the same part of the island. The type specimens are lacking in sporophylls but represent

the more robust stage of the species. Wright's specimens, of which there are two sheets in the herbarium of Columbia University and one in the U. S. National Herbarium, are much smaller but fertile.<sup>6</sup> The species is somewhat allied to *Elaphoglossum petiolatum* (Sw.) Urban, originally described from Jamaica, from which it differs conspicuously in its oblique veins, long-tapering fronds (long-attenuate below), in its copious covering of irregularly stellate scales, and especially in the prominent bristly-ciliate scales of the rootstock. In common with *E. petiolatum* and the Mexican *E. arancosum* (D. C. Eaton) C. Chr. it shows a tendency toward an intermediate position between the two usually well-marked sections of the genus, as elaborated by Dr. Christ in his monograph.

**Pellaea lozani** Maxon, sp. nov.

Fronds 15 to 25 cm. long, clustered upon an ascending rhizome bearing short dark acicular scales with narrow brown borders; stipes 4 to 9 cm. long (averaging 7 or 8 cm.), light brownish green, with a few narrow scales similar to those of the rhizome; lamina 10 to 17.5 cm. long, 5.5 to 8.5 cm. broad, narrowly ovate, acuminate, simply pinnate, slightly broader at the middle than at the base; rachis like the stipe, bearing numerous narrow brownish black-tipped appressed scales; pinnae 7 to 9 pairs, approximate or slightly imbricate (only the lowermost pair or two somewhat spaced), simple, falcate, the lowermost pair sessile and sometimes hastate, those above sessile, lanceolate, auriculate, the pronounced rounded auricle overlapping the rachis, rounded or subcordate below, the uppermost two or three pairs unequally subcordate, finally adnate and decurrent, giving rise to an elongate acuminate terminal segment once or twice sharply cleft below; largest pinnae (middle) 4.3 cm. long, 1 cm. broad near the base (1.4 cm., including the auricle), tapering regularly and evenly to an acute apex; texture firm, chartaceous; leaf-tissue covered sparingly both above and below with short whitish glandular hairs; veins close, repeatedly forked; sori forming a narrow continuous band completely around the slightly changed margin.

Type in the U. S. National Herbarium, no. 462684; collected on wet ledges in Iguala Cañon, near Iguala, altitude 900 meters, in the State of Guerrero, Mexico, July 23, 1907, by Filemón L. Lozano, and distributed by Dr. C. G. Pringle as no. 13947. The personal name is given at the suggestion of Dr. Pringle, who writes most appreciatively of his friend and assistant, Señor Lozano.

Notwithstanding the marked dissimilarity in form, the alliance of *P. lozani* is clearly with *P. secmanni*, from which it appears to differ sufficiently in its simple pinnae, scantier vestiture, etc.

**Pellaea notabilis** Maxon, sp. nov.

Plant about 45 cm. high, comprising 6 long-stipitate simply pinnate fronds. Rhizome stout, 1 cm. in diameter, creeping (6 cm.), very thickly clothed with linear long-attenuate tawny silky chaff (7 to 8 mm. long), that of the apical portion light straw-colored; stipes clustered, 22 to 25 cm. long, stout, 1.5 mm. in diameter, terete throughout, straw-colored with purplish bases, naked except for a few spreading silky hairs near the base; lamina bluish green, conspicuously lighter below, chartaceous, glabrous, 20 to 23 cm. long, 13 cm. broad, deltoid-ovate in drying, once pinnate, 6 to 8 pairs of narrow-spaced (2 to 3.5 cm. apart) pinnae and a similar terminal segment, the rachis stout, naked, straw-colored; pinnae opposite or subopposite, all of nearly equal size (6 to 8

<sup>6</sup>Also seen in the collection of D. C. Eaton and at Kew; indicated by Eaton as probably undescribed, and at Kew placed with *E. tectum* (H. & B.) Moore, originally from Venezuela, to whose type specimen, as seen in the Willdenow herbarium at Berlin, it has no close resemblance.—L. M. UNDERWOOD, in litt.

cm. long), simple, linear, long-attenuate, straight or nearly so, gradually tapering from the unequally subcordate base (8 to 10 mm. broad), the lowermost short-stalked (2 to 3 mm.), the middle ones less so, the upper sessile, the terminal segment 7.5 cm. long, conform, sessile; costa evident throughout; veins concealed, close, 2 or 3 times dichotomously forked, extending to the thick whitish narrowly cartilaginous margin; margin broadly revolute, the sori borne in a continuous broad band from the free mucronate tip of the pinna nearly to the base on both sides.

Type in the U. S. National Herbarium, no. 572223, collected by Dr. Edward Palmer, near Victoria, altitude about 320 meters, State of Tamaulipas, Mexico, February to April, 1907 (no. 234). Only one specimen was found, this fortunately in good condition.

The long, simple, entire, spaced pinnae will distinguish *Pellaea notabilis* at once from any known species of the group characterized by light-colored stipes and rachises.

**Phymatodes prominula** Maxon, sp. nov.

Rhizome extensively creeping, slender, 1.5 to 2 mm. in diameter, thickly covered with appressed ferruginous firm lanceolate scales terminating in a long seta, the margins lighter-colored with flaccid deciduous cilia; fronds essentially conform, exstipitate, coriaceous, glabrous, entire, 7 to 12 cm. long, 11 to 15 mm. broad, linear-lanceolate to oblanceolate, the apex subobtusate or acutish (rarely attenuate), the lower portion gradually attenuate to the base, thus narrowly cuneate; principal venation manifest, the costa and lateral veins elevated, the connecting and included veinlets scarcely so or immersed; in sterile fronds the costal areoles narrow, the paracostal larger and extending nearly to the margin; in the fertile fronds the costal and paracostal areoles of nearly equal size, the latter soriferous; recurrent included veinlets few, short, immersed; ultimate venation comprising a minor third row of incomplete areoles near the margin; sori solitary, medial, 18 to 23 pairs, impressed, borne at the end of a single branch or at the ends of two branches short-excurrent from the costal areole; spores light yellowish brown, muricate; paraphyses filiform, flaccid.

Type in the U. S. National Herbarium, no. 531952; collected on the San Juan trail, island of Margarita, Venezuela, altitude 500 meters, by J. R. Johnston (no. 155), July 6, 1903. Represented also by Fendler's no. 50 from Trinidad and by specimens collected by Charles Wright at Greytown, Nicaragua (without number).

This is one of the forms usually called *Polypodium salicifolium* Willd.,<sup>a</sup> with which species as delimited by Mettenius<sup>b</sup> it may be identical; but this name, though used recently by Hieronymus,<sup>c</sup> is not tenable, having been used by Vahl for another species in 1807. Of the several supposed synonyms associated with "*salicifolium*" as a species or as a subspecies of *lycopodioides* none appears to be available. *Polypodium surinamense* Jacq.,<sup>d</sup> as interpreted by Lindman,<sup>e</sup> differs in all essential respects, as does also *Craspedaria grandis* Fée.<sup>f</sup> Both of these have dimorphic fronds. *Polypodium dictyophyllum* Kunze, from Guiana, is from description clearly a distinct species, as recognized by Mettenius.<sup>b</sup> *P. rosmarinifolium* Kunth is an allied Ecuadorean plant whose characters have recently been pointed out by Hieronymus.<sup>c</sup>

<sup>a</sup> Sp. Pl. 5: 149, 1810.

<sup>b</sup> Abhand. Senck. Nat. Gesell. 2: 96, 1856.

<sup>c</sup> Engler's Bot. Jahrb. 34: 536, 1905.

<sup>d</sup> Coll. Bot. 3: 285, pl. 21, f. 1, 1789.

<sup>e</sup> Ark. Bot. 1: 247, 1903.

<sup>f</sup> Crypt. Vasc. Brés. 1: 119 pl. 37, f. 2, 1869.

The alliance of *P. prominula* in outline and venation is rather with the well-known *P. lycopodioides*, from which it differs not only in its more conform fronds but also in its raised venation, slighter rhizome and more translucent tissue.

***Polypodium dissimulans* Maxon, sp. nov.**

A very delicate pendent plant with numerous flaccid linear fronds; rhizome erect, minute, slender, 1 to 1.5 mm. in diameter, bearing a few relatively large bright brown lanceolate scales, with dark cell walls; fronds 15 to 20 cm. long, 9 to 12 mm. broad, scarcely stipitate, greatly reduced below, the rachis filiform, dark brown or blackish, bearing 45 to 60 pairs of distant narrow alternate pinnae, decreasing gradually toward the apex or sometimes abruptly to a narrow terminal caudate segment 2 cm. long, 2 mm. broad at the base and there coarsely lobed; pinnae separated once or twice their width, adnate, smooth, membranous, translucent, the lowermost minute, decurrent, distant less than 1 cm. from the rhizome, those immediately above gradually larger and with simple midveins; characteristic pinnae 6 mm. long, 1.75 mm. broad above the base, strongly decurrent, lanceolate, straight or slightly recurved, borne obliquely (usually at an angle of about 45°), margins with a few shallow dentate serrations, apex somewhat produced, subentire, obtuse, midveins dark, flexuose, with about 4 or 5 pairs of oblique alternate veins extending half way to the margin and corresponding to the oblique marginal teeth; sori large, slightly impressed, confluent with age, terminal upon the veins.

Type in the herbarium of Capt. John Donnell Smith; collected from tree trunks near Coban, Alta Verapaz, Guatemala, at an altitude of 1,300 meters, February, 1886, by H. von Türckheim. The collection including this was distributed by Captain Smith as no. 884, *Polypodium jubaeforme* Kaulf. A specimen of this number in the U. S. National Herbarium is less complete.

The present species is readily distinguished from *P. jubaeforme* by its exceedingly delicate texture, very slender vascular parts, almost superficial sori, and toothed pinnae, the last a character noted by Captain Smith. The relationship is rather with the British Guianan *P. melanotrichum* Baker<sup>a</sup> and the closely allied *P. suprasculptum* Christ,<sup>b</sup> the latter described recently from Costa Rica. From these it differs notably in its very narrow fronds and few shallow blunt teeth.

***Stenochlaena latiuscula* Maxon, sp. nov.**

Rootstock wide-creeping, flattened, about 7 mm. broad, 3 to 4 mm. thick, naked or nearly so, bearing a few naked dark yellowish brown lanceolate scales at the base of the stipe and extending up the stipe a short distance (3 to 4 cm.). Sterile frond dark green, about 70 cm. long; stipe 20 cm.; lamina exactly lanceolate, at the base truncate, 50 cm. long, 25 cm. broad at the middle and at the base, about 17-jugate, the pinnae 12.5 cm. long by 1.6 to 1.8 cm. broad, simple, linear-lanceolate, subopposite, spaced about their width, borne at 90° to the stout terete very narrowly alate rachis, short-petiolate, subequally and rather obtusely cuneate, tapering gradually from near the middle to an evenly long-attenuate straight or slightly falcate apex, the margins evenly crenulate-revolute in drying; veins conspicuous, simple or more commonly once-forked at or near the base, diverging from the costa at an angle of about 70°; intercostal spaces about 8 to 1 cm. Fertile fronds similar but smaller, about 13-jugate, the rachis fibrillose-chaffy; pinnae linear, 10 to 11 cm. long.

<sup>a</sup> Timmeri II. 5: 216. 1886; Trans. Linn. Soc. II. Bot. 2: 292. 1887.

<sup>b</sup> Bull. Herb. Boiss. II. 5: 3. 1905.

7 to 8 mm. broad near the base, obtusely cuneate, stalked (2 to 3 mm.), long-attenuate, in drying folded along the midrib.

Type in the U. S. National Herbarium, no. 474000, collected at Juan Viñas, valley of the Reventazón, Costa Rica, altitude 1,000 meters, by O. F. Cook and C. B. Doyle (no. 208), April 22, 1903. Less perfect specimens are those collected by Wercklé and by Cooper, both without exact locality in Costa Rica. Known also from Guatemala upon a specimen collected by von Türekheim at Pansamalá, Alta Verapaz, altitude 1,200 meters, February, 1887 (*J. D. S.* 1129), in the herbarium of Capt. John Donnell Smith.

The present species is probably most closely allied to the true *S. sorbifolia*<sup>a</sup> which appears to be strictly a West Indian species. It differs in its darker almost reddish chaff, in having the frond not reduced below or only very slightly so, in the longer and relatively narrower pinnæ, these tapering and long-attenuate from near the middle and not from the outer third as in *S. sorbifolia*.

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<sup>a</sup>As delimited by Professor Underwood, *Bull. Torr. Club* 33: 591-605. 1907.

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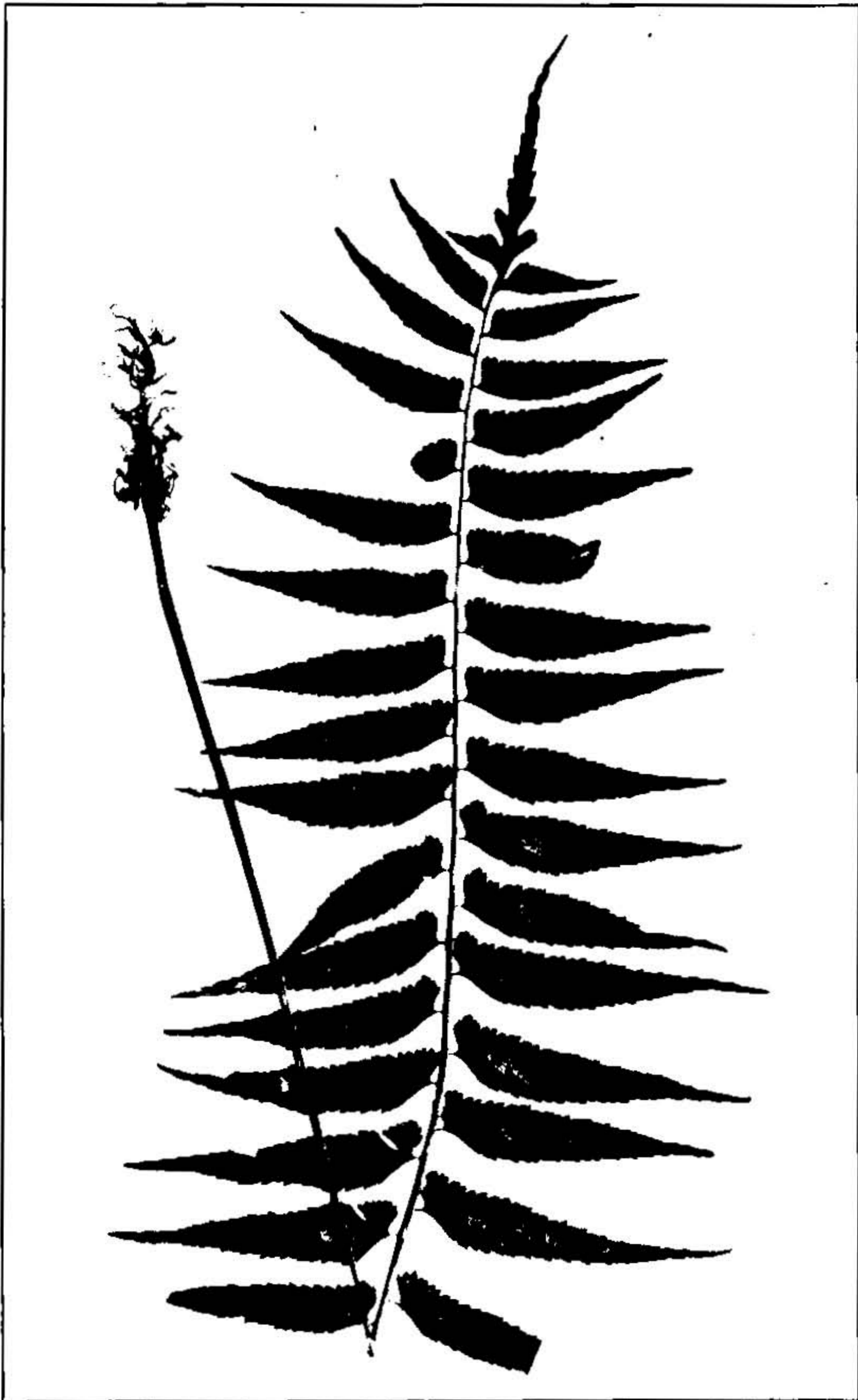
PLATE LV.

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## PLATE LV.

Photograph of specimen of *Asplenium salicifolium* L., U. S. National Herbarium no. 523061, collected at Monte Verde, Province of Oriente, Cuba, altitude about 575 meters, by Wm. R. Maxon, no. 4306. About two-fifths natural size.



ASPENIUM SALICIFOLIUM L.

PLATE LVI.

## PLATE LVI.

FIG. 1. *Diplazium delitescens* Maxon.

One of the second pair of pinnae from the type, U. S. National Herbarium no. 403261. *Pollard & Palmer* 348, from the vicinity of San Luis, Province of Oriente, Cuba.

FIG. 2. *Asplenium integerrimum* Spreng.

One of the second pair of pinnae of a frond collected on forested slopes of the Finca Las Gracias, Yateras, Province of Oriente, Cuba, *Maxon* 4479.

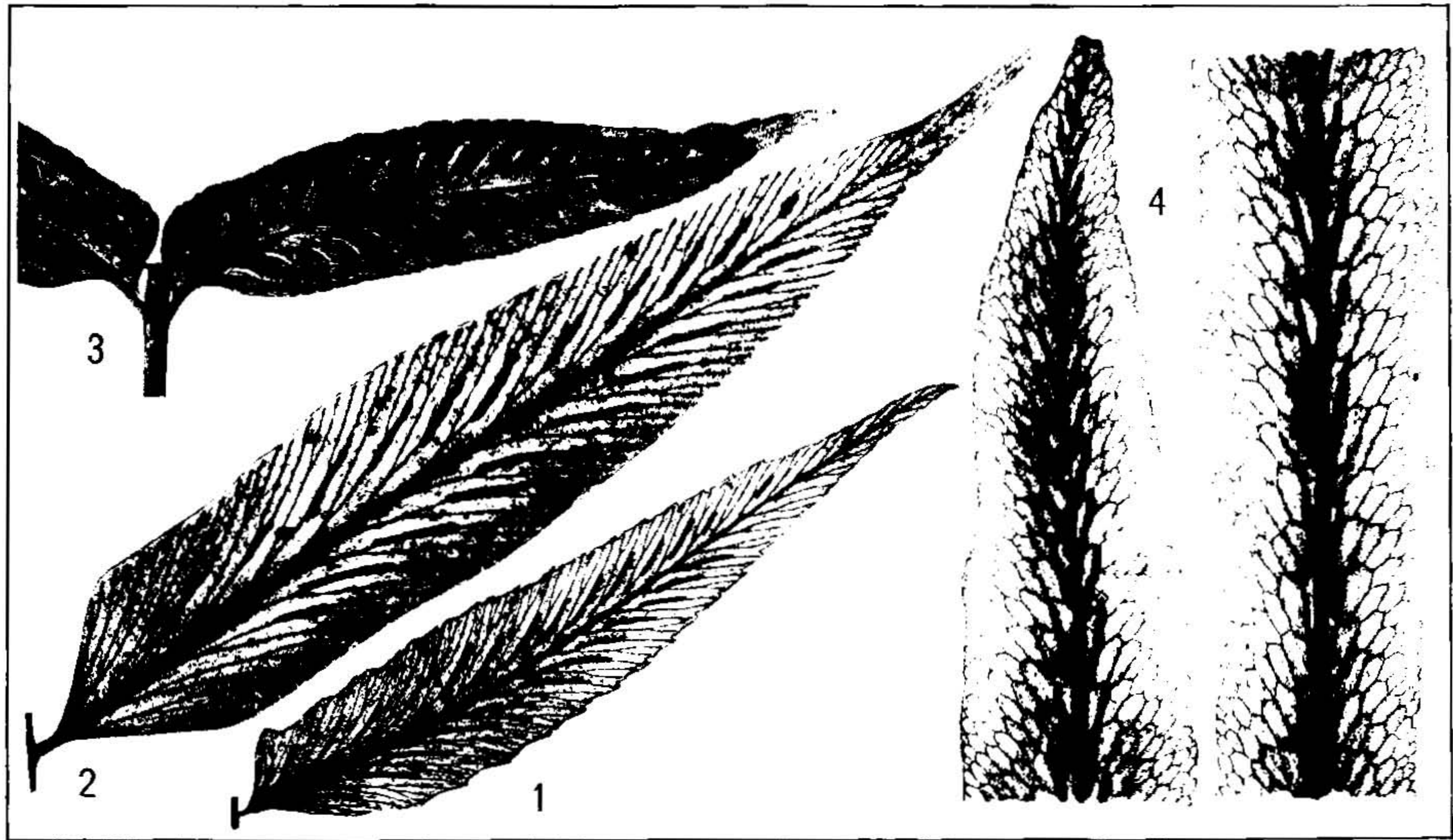
FIG. 3. *Asplenium sarcodes* Maxon.

A characteristic middle pinna from the type, U. S. National Herbarium no. 523133, collected on the farallones of La Perla, Yateras, Province of Oriente, Cuba, *Maxon* 4390.

FIG. 4. *Holodietyum fluckii* (Baker) Maxon.

Apical and adjoining portion of a frond of Dr. Edw. Palmer's no. 336, collected near Gómez Farfás, State of Tamaulipas, Mexico.

Figs. 1, 2, and 4 are from nature prints. Fig. 3 is from a photograph. All are at natural size.



DIPLAZIUM DELITESCENS MAXON, ASPLENIOUM INTEGERRIMUM SPRENG., ASPLENIOUM SARCODES MAXON AND HOLODICTYUM FINCKII (BAKER) MAXON.