

Polypodium marginellum and its immediate allies*

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Among the numerous groups of species comprising the section *Eupolypodium* of the genus *Polypodium*, as represented in tropical America, there are few if any which have a general structure so simple and unusual as that exhibited by *Polypodium marginellum* and several closely related species. This group, of which there are at least five American members, is represented also in Africa, as discussed below. The several species, which apparently are all epiphytes of moist mountain forests, are closely similar in general form, the fronds being of a narrowly linear type, simple, 5-25 cm. long, pinnately veined, and having the entire or slightly undulate margin bordered with a capillary or flattish, lustrous, dark brown or ebeneous band of sclerotic tissue, which from its firm structure is not readily perishable and may even persist long after the green tissue of the frond has disintegrated and disappeared. This sclerotic band has, so far as can be observed, no connection whatever with the fibrovascular conducting system; that is, the midvein and veins, the latter terminating at a point relatively remote from the margin. It seems rather to function primarily as a mechanical device to give strength and rigidity to the fronds, though not improbably it meets also some physiological need that is not at once apparent.

The marginal sclerotic structure just described is apparently unique in *Eupolypodium*. What appears at first to be a similar case is seen in *Polypodium gramineum* Swartz, a West Indian plant with small, very narrow, simple, entire, darkish-margined fronds; but in this species the dusky border is actually composed of conducting tissue, consisting of a marginal vein which connects the excurrent ends of the once or twice-branched lateral veins. Just outside of the marginal vein may be observed a delicate line of greenish tissue (as is not the case in *P. marginellum* and its allies),

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which suggests that reduction in the leaf expanse has taken place inward to the boundary of the longitudinal series of simple areoles constituting the venation of the leaf. The venation of *P. gramineum* is not precisely matched in any other species of *Eupolypodium*, but its peculiar character is certainly not of sufficient weight to warrant giving more than minor rank, in classification, to this species which is the type of Swartz's genus *Grammitis*. In any event the actual structure is fundamentally different from that of *P. marginellum* and its immediate allies, as may be noted readily upon an examination of specimens, and clearly places *P. gramineum* outside of this group.

Polypodium marginellum Swartz, 1788, was the first species of its own group to be described. It has since been very generally misunderstood and has been regarded mistakenly in so broad a sense as to include most of its allies, at one time or another, largely because of insufficient material for study. Without tracing in detail the varying treatment of the several forms, which is of historical interest merely, it seems worth while to offer the following key and brief synopsis, by means of which it is believed the several species may be distinguished.

KEY TO THE SPECIES

Fertile and sterile veins both mostly once forked, the branches produced.

Lamina linear, long-attenuate downward from the middle or lower, persistently hirtellous upon both surfaces and ciliate with short, stiffish, mostly simple, brown hairs; stipe usually short; rhizome scales entire or nearly so.

1. *P. marginellum*.

Lamina oblanceolate, attenuate downward to the slender greatly elongate stipe, deciduously ciliate with lax, delicate, gland-tipped, mostly simple hairs, a few similar hairs evident at first along the midvein beneath; rhizome scales evenly sinuate-dentate.

2. *P. leptopodon*.

Sterile veins simple; fertile veins nearly simple, the elliptical receptacle partially overlying the vein or wholly divergent as a short, oblique, translucent distal spur.

Rhizome scales rather lax, ligulate, yellowish brown in mass; sori nearly medial upon the veins, mostly apart from the midvein.

3. *P. limbatum*.

Rhizome scales rigid, subulate to acicular, reddish brown in mass; sori distinctly inframedial, usually thrust against the midvein or even concealing it.

Veins arising at an angle of 30 to 35°.

Lamina rigidly coriaceous, semiopaque, with a relatively heavy sclerotic marginal band.

4. *P. nigrolimbatum*.

- Lamina membrano-chartaceous, translucent; marginal sclerotic line very slender, delicate..... 5. *P. Hessii*.
 Veins arising at an angle of about 20°, closer; plants more delicate than the preceding, with smaller, usually much narrower fronds..... 6. *P. ebeninum*.

I. POLYPODIUM MARGINELLUM Swartz, Prodr. Veg. Ind. Occ. 130. 1788

Grammitis marginella Swartz, Jour. Bot. Schrad. 1800²: 17. 1801.
Mecosorus marginellus Klotzsch, Linnaea 20: 405. 1847, in part.

TYPE LOCALITY: High mountains of Jamaica.

DISTRIBUTION: Blue Mountains, Jamaica, at 1,500 to 2,100 meters elevation.

ILLUSTRATION: Schkuhr, Krypt. Gew. 1: pl. 7 (as *Grammitis marginella*).

As indicated in the key, *Polypodium marginellum* is very strongly characterized by its long-forked veins and persistently hirtellous surfaces, characters which distinguish it at once from those allied species which have commonly been referred to it as the same or as only subspecifically different. Jenman, who clearly indicated its distinctness,* had seen no continental specimens; nor has the writer, though there are several mainland records, including a recent one for Costa Rica.† These probably relate to *P. nigrolimbatum* Jenman. Thus, Wright, in writing of the ferns of Mount Roraima,‡ has listed certain specimens as *P. marginellum*, with the remark: "Swartz says this species has "venis bifidis"; subsequent authors describe the veins as simple, which is the case with all the specimens at Kew." It is remarkable that true *P. marginellum* should be lacking at Kew, for it is decidedly the commoner of the two Jamaican species. Of the four Roraima specimens cited by Wright only one (*McConnell & Quelch* 568) has been seen; this is *P. nigrolimbatum*.

The following specimens of *P. marginellum*, all from the Blue Mountains, Jamaica, are in the National Herbarium: *Hart* 72; *Maxon* 1335, 1476, 2676, 2709; *Underwood* 1518, 2494, 3190, 3200.

* Bull. Bot. Dept. Jamaica II. 4: 69. 1897.

† Christ, Bull. Herb. Boiss. II. 4: 1101. 1904.

‡ Trans. Linn. Soc. II. Bot. 6: 83. 1901.

2. POLYPODIUM LEPTOPODON Wright, Trans. Linn. Soc. II. Bot.
6: 83. 1901

TYPE LOCALITY: Summit of Mt. Roraima, British Guiana, altitude about 2,620 meters.

DISTRIBUTION: Known only from the original collection (*McConnell & Quelch* 569).

Polypodium leptopodon is a well-marked species, related to true *P. marginellum* Swartz, with which it is contrasted in the preceding key. In general form it is simulated somewhat by an occasional specimen of *P. marginellum* in which the fronds are very numerous and through crowding have developed uncommonly long and slender stipes; but it differs constantly in characters of pubescence and rhizome scales. The sori, as usually also in *P. marginellum*, are borne on the base of the elongate branch, the two veinlets being subequal and terminating well short of the margin.

Besides a specimen of the type collection sent from Kew the writer has examined several plants of the same number in the Underwood Herbarium of the New York Botanical Garden. No other specimens have been seen, the species apparently being very rare.

3. *Polypodium limbatum* (Fée) Maxon

Grammitis limbata Fée, Gen. Fil. 233. 1852; Mém. Foug. 6: 6. 1853.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Guadeloupe, at 750 to 1,300 meters elevation; also St. Vincent, at 600 meters.

ILLUSTRATION: Fée, Mém. Foug. 6: *pl. 5, f. 1.*

This species, described originally upon specimens collected by Perrotet, has been very imperfectly known and understood, probably because of its rarity. Excellent Guadeloupe specimens of the Duss collection in the Underwood Herbarium show it to be amply distinct, however. Fée's illustration is excellent in all particulars save one; namely, that the sori, while nearly medial upon the veins, are not borne midway between the midvein and margin, owing to the basal curvature of the veins. The relatively pale scales, ligulate form of the exstipitate fronds, broad marginal band, and position of the sori at once distinguish it from its nearest ally, *P. Hessii*.

4. POLYPODIUM NIGROLIMBATUM Jenman, Bull. Bot. Dept. Jamaica II. 4: 69. 1897

Grammitis fluminensis Fée, Crypt. Vasc. Brés. 85. 1869. Not *Polypodium fluminense* Vell. Fl. Flum. 11: pl. 66. 1827; Mus. Nac. Rio Janeiro 5: 447. 1881.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Blue Mountains, Jamaica, at 1,500 to 1,800 meters elevation; also in Brazil, British Guiana, and Bolivia, ascending to 2,600 meters.

ILLUSTRATION: Fée, op. cit. pl. 19, f. 3 (as *Grammitis fluminensis*).

Jenman in writing of the ferns of Jamaica well distinguished this species from *P. marginellum*, its only near relative in Jamaica, but erroneously cited *Grammitis limbata* Fée as a synonym. The fronds are numerous, fasciculate, acute, and rigidly coriaceous, and narrower and more stiffly erect than in *P. marginellum*, which, though widely different in venation and minute characters, it somewhat resembles otherwise. The continental specimens are often larger than the Jamaican, but seem no different in other respects. Fée's species, *Grammitis fluminensis*, is apparently the same, judging by a fragment of the type collection in the Underwood Herbarium, but the specimen figured by him is certainly atypical in having obtuse apices.

The largest and most perfect Jamaican material studied is that collected by the writer from mossy tree trunks on the upper forested slopes of Monkey Hill (above New Haven Gap), altitude about 1,800 meters, June 22, 1904 (*Maxon* 2724, 2748).

5. *Polypodium Hessii* Maxon, sp. nov.

Plants epiphytic, 8-14 cm. high, the fronds few, ascending, subfasciculate. Rhizome decumbent or short-creeping, 1-1.5 cm. long, 2-3 mm. thick, sparingly radiceous beneath, the small apical portion slightly exposed, inconspicuously paleaceous; scales dark reddish brown, rigidly acicular, subfalcate, subflexuous toward the tip, 2-4 mm. long, 0.2-0.3 mm. broad, the cell walls richly colored; stipe slender, about 1 cm. long, brownish, alate, passing gradually into the lamina, deciduously pubescent with minute branched glandular hairs; lamina 7-13 cm. long, 5-9 mm. broad, linear, narrowly attenuate in the basal third, a little more

abruptly attenuate in the apical part (the extreme apex subcaudate), the margins delicately repand, appearing undulate in drying, bordered by a delicate filiform line of lustrous blackish-brown sclerotic tissue, this bearing a few minute caducous branched glandular hairs, similar hairs extending sparingly to the leaf tissue; veins free, arising at an angle of about 35° , slender, concealed, but their course easily evident, the sterile ones simple; sori oval, extending from below the apex to the middle of the lamina, seated partially or sometimes wholly upon a very short divergent translucent distal spur of the vein, far below its middle, thus borne close to the concealed but sharply elevated slender costa, separate or at maturity subconfluent. Leaf tissue firmly membranous-chartaceous, dark green, paler beneath, the veins easily evident without transmitted light.

Type in the U. S. National Herbarium, no. 694419, collected from mossy trunks of forest trees, Sierra de Naguabo, eastern Porto Rico, March 8, 1914, by Mr. W. E. Hess (no. 312). Mr. J. A. Shafer's no. 2328, collected at the same time and place, is identical. Other specimens studied, all from Porto Rico, are as follows: *Hioram* 334; *Blauner* 272; *Sintenis* 1791; *Shafer* 3320, 3516, 3660.

Polypodium Hessii is closely related to *P. limbatum* of the Lesser Antilles, but differs sufficiently in its more rigid and darker rhizome scales, in its nearly basal sori, and in its distinctly stipitate (rather than nearly or quite exstipitate), narrower, attenuate fronds. The marginal band of sclerotic tissue is, moreover, very delicate and threadlike, as opposed to the glistening, broadish, almost flat sclerotic band of *P. limbatum*. *P. Hessii* is not likely to be mistaken for the widespread *P. nigrolimbatum*, with which it is contrasted in the preceding key.

6. *Polypodium ebeninum* Maxon, sp. nov.

Plants apparently epiphytic; fronds numerous, 5–10 cm. long, ascending, imbricate-fasciculate in a small crown. Rhizome erect or ascending, 7–10 mm. long, 1–1.5 mm. in diameter, paleaceous, the apical portion partially concealed; scales acicular, 2–2.3 mm. long, 0.17–0.25 mm. broad, subflexuous toward the slender gland-tipped apex, rich castaneous from a yellowish brown base; stipe proper nearly wanting, alate, passing gradually into the narrow lamina from a brownish base; lamina 5–9 cm. long, 2–4 mm. broad, straight or slightly arcuate, narrowly linear, acutish or obtuse, broadest in the apical third, thence very gradually long-attenuate to the base, entire, slightly repand, the margin consisting

of a slender band of rigid lustrous ebeneous sclerotic tissue, glabrate; veins numerous, free, very oblique, arising at an angle of about 20° , the sterile ones simple, the fertile ones essentially so, the sori (usually confined to the apical half of the lamina) distinctly inframedial in attachment, seated upon an elliptical translucent receptacle lying upon the distal side of the vein and scarcely divergent from it, relatively large, crowded against the costa, the two lines of sori more or less confluent at maturity. Leaf tissue glabrous, rigidly herbaceous, translucent, dark green above, paler beneath; costa slender, dark brown, elevated beneath; veins readily seen beneath without transmitted light.

Type in the U. S. National Herbarium, no. 370659, collected upon the island of St. Helena, 1885, by W. H. King.

Reported commonly from St. Helena, as *P. marginellum*, but in the National Herbarium represented only by the specimens of Mr. King. It is the smallest member of the group and readily recognizable as distinct from its American relatives in both gross and minute characters. This or a very closely related form is mentioned from Guinea by Link,* as *P. marginellum*. There is also a single Canary Island specimen, collected long ago by L. von Buch, which may possibly be the same. This was first referred to the West Indian *P. gramineum* (*Grammitis linearis* Swartz), but was afterward described as a new species, *Grammitis quaerenda* Bolle.† Still later it was discussed by Kuhn,‡ who mentions the "characteristic deep black margin" and refers it to *P. marginellum*, adding that it is identical with specimens collected on St. Helena by d'Urville and apparently misidentified by Mettenius as *P. gramineum*. Kuhn's unsupported statement as to the identity of the Canary Island and St. Helena plants does not, however, seem at all conclusive, in view of the several very obvious errors of fact which occur elsewhere in his paper and considering also the circumstance that under the name *P. marginellum*, with a single variety, he lists a total of only six specimens (apparently all that were known to him) which certainly pertain to no less than three species. It seems proper to describe the St. Helena plant as new, for it is not at all improbable that the Canary Island form, if eventually found in sufficient quantity for study, will prove to be a distinct species.

* Fil. Afric. 149. 1868.

† Zeitschr. Allgem. Erdk. II. 14: 324. 1863.

‡ Oesterr. Bot. Zeitschr. 16: 70. 1866.