SUPPLEMENTARY NOTES ON GRAMMITIS IN ECUADOR

C. V. Morton

In 1967 I published a brief revision of the genus Grammitis in Ecuador (Contr. U. S. Nat. Herb. 38: 85--123. 1967), based mostly on the material in the U. S. National Herbarium. Through the kindness of Sir George Taylor, Director, Royal Botanic Gardens, Kew, and of Dr. Frances Jarrett, I have had on loan some of the material from Kew for study, and this has enabled me to amplify or modify some of my remarks, and has also provided the type material for two rather remarkable new species.

Grammitis apheloleplis Morton, Contr. U. S. Nat. Herb. 38: 97. 1967.
Additional Ecuadorean specimen examined: "In regione frigida andium Pastoensium ad arborum truncis," Jameson 370 (K).

Grammitis attenuatissima (Copel.) Morton, Contr. U. S. Nat. Herb. 38: 112. 1967.
Additional Ecuadorean collections examined: Niebli, Sodiro 177 (K). Andes Quitenses, Spruce 5634 (K).
These two collections are larger than the type and have more numerous veins but seem otherwise typical.

Grammitis asplenifolia (L.) Proctor, Brit. Fern Gaz. 9: 76. 1962.
Polypodium asplenifolium L. Sp. Pl. 1084. 1753. Type: Petiver, Pterid. t. 7, f. 16. Petiver's plate, the sole basis for the species (excluding Linnaeus' var β) is a redrawing of Plumier, Tract. Fil. t. 102A, representing a plant from Martinique. This is not by any means a good representation of the species commonly called P. asplenifolium although it may have been intended to be that.

In my treatment of Grammitis in Ecuador I should probably have included G. asplenifolia, for this species had been reported from Ecuador by Sodiro (Crypt. Vasc. Quit. 318. 1893, under the name P. suspensum L.), but I did not because so many of Sodiro's records are suspect. That his report is indeed accurate is shown by a specimen at Kew from near Niebly, Ecuador, collected by Sodiro, July, 1873. This specimen represents the large, long-stipitate form that is the commonest in the Andes and which perhaps deserves a varietal name. In my key G. asplenifolia will run directly to G. lehmanniana (Hieron.) Morton, which is indeed very closely allied. The latter is not well enough known, but apparently differs somewhat in having more and somewhat larger segments, more numerous veinlets, and perhaps a denser pubescence. It is not certain if the stipe is bent at the apex in G. lehmanniana as it characteristically is in G. asplenifolia.

Copeland, in his "Ctenopteris in America," adopted for this species the name C. suspensa (L.) Copel. I have elsewhere (Contr. U. S. Nat. Herb. 38: 58. 1967) commented on the identity of Polypodium suspensum L., and came to the conclusion that this species is by no means the same as P. asplenifolium L. but is probably the same as P. jubiforme Kaulf., for which it would be the earliest name if adopted. However, this can hardly be proved definitely at the present time and so I prefer to consider P. suspensum L. as dubious, for to adopt the name in preference to P. jubiforme would be confusing and not justifiable unless the change could be shown to be absolutely unavoidable.

Grammitis blepharolepis (C. Chr.) Morton, Contr. U. S. Nat. Herb. 38: 98. 1967.

Additional Ecuadorean specimens examined: Eastern Andes of Quito, Jameson (K). "Crescit in devexis Andium regione sylvatica super arborum alt. 7000 ped.," Jameson 350 (K). "In sil. subandin. occident.," Sodiro 48/184 (K). Quito, Jameson (K). Andes of Ecuador, Spruce 5273 (K).

This species has been known in Ecuador from only one collection, but it is evidently quite common. Most of the above collections, none of which have any specific localities strangely, have been referred to G. trichomanoides (Swartz) Ching, which they do indeed resemble. However, they agree with G. blepharolepis in having ciliate rhizome scales.

Grammitis cuencana (Hieron.) Morton

This species, previously known only from the type from Cuenca, Ecuador (Lehmann 5728) may now be reported from five other collections: Chimborazo, August, 1860, Spruce (K), Steere (K); Playa de Antombos, Río Pastaza, Spruce 5274 (K); Quito, Jameson (K); and Surucucho, Jameson (K). It is recognizable by its small size, few veins, and numerous black setae on the lower surfaces.

Grammitis cultrata (Willd.) Proctor, Rhodora 63: 35. 1961.

Additional Ecuadorean specimen examined: Pendent epiphyte in deep, in montane forest, steep-sided valley 5 miles northeast of Borja, Cerro Antisana, Prov. Pichincha, 5,300 feet alt., July 30, 1960, Grubb et al, 1110 (US).

Grammitis daguensis (Hieron.) Morton, Contr. U. S. Nat. Herb. 38: 98. 1967.

When publishing the combination G. daguensis, I predicted that this Colombian species would be found in Ecuador, and a specimen has now come to my attention: In the forests of Esmeraldas, Ecuador, on trunks of trees at 5,000 feet elevation, Jameson (K).

Grammitis erecta Morton, sp. nov.

Rhizoma erectum, terrestre, crassum, 14--24 cm. longum (ad 50 cm. fide Spruce), 2--3 mm.diam., dense et ubique paleaceum, paleis

persistentibus, late lanceolatis, appressis, magnis, 7--9 mm. longis et ultra, 2--3 mm. latis et ultra, integris, non ciliatis, iridescentibus, imbricatis, gradatim attenuatis, apice obtusis, non filiformibus, paullo involutis, eleganter clathratis cellulis numerosissimis, basi in 50-seriebus et ultra, non valde elongatis, saepe subrectangularibus, parietibus non incrassatis, tenuibus, marginalibus transversis parvis et non valde prominentibus; frondes erectae, dissitae, non numerosae; stipites plus minusve crassi, 1--2.5 cm. longi, ca. 1.0 mm. diam., teretes sed utrinque latere minutissime alati, glabri, non setiferi; laminae rigidae, 14--18 cm. longae, 1.0--1.4 cm. latae, apice attenuatae et forsan indeterminatae, basi attenuatae, rhachi ubique anguste alata, atra, utrinque glabra et non squamosa; segmenta numerosissima, 60-juga et ultra, horizontalia, valid coriacea et rigida, medialia oblonga, ca. 4-plo longiora quam latiora, 6--7 mm. long, ca. 1.5 mm. medio lata, margine paullo incurva, alterna, omnia basi late adnata, basalia minora, triangularia, infima valde reducta et anguste semilunata, 3 mm. basi lata et vix 1 mm. longa, omnia glabra, non setosa, opaca; costa et venae immersae, obscurae, costa flexuosa, venis in segmentis maximis 4-jugis, brevibus; sori superficiales, pauci, saepe 1 vel 2 paria, magnae, dorsales in venulis non terminales; sporangia numerosa, glabra, non setosa, tenuiter pedicellata.

Type in the Royal Botanic Gardens, Kew, collected on Mount Tunguragua, Ecuador, November 1857, by R. Spruce, no. 5279A. A paratype is also from Tunguragua, at 9000 feet alt., Spruce 5413 (K).

Neither of the above-mentioned specimens has previously been identified. They are obviously of the group of Grammitis moniliformis (Lag.) Proctor, but differ from the common moniliformis itself and from its allies in being much more robust, the thick rhizome being apparently erect, up to two feet high according to the collector, and with erect leaves. The general habit is somewhat like Grammitis assurgens (Maxon) Morton. The rhizome scales are exceedingly large and rather closely inrolled. They are fragile and difficult to get off without being fragmented. They have more rows of cells than in any previously known species, more than 50 rows. The great difference in aspect from G. moniliformis or G. assurgens is due to the shape of the segments, which are about four times as long as broad in G. erecta and only as long as broad or at least not more than about twice as long as broad in the other two species. In spite of the segments being much longer they have hardly any more pairs of veinlets than G. moniliformis, about four pairs in the largest segments. However, due to the narrowness of the segments the veinlets are short, which obscures to a certain degree the fact that the sori are borne dorsally on the veinlets and not terminally. There are few sori to a segment in the material at hand, mostly only one pair, but this may be an individual peculiarity.

Grammitis intricata Morton, Contr. U. S. Nat. Herb. 38: 101. 1967.

Additional Ecuadorean collections examined: Andes of Quito, Jameson 77 (FI). Volcán Cotopaxi, 13,000 feet, Jameson 439 (FI).

This species has previously been known only from the type. The first collection cited above has the segments quite glabrous above, and so my description should be modified to this effect; the type has the segments very sparsely setose above near the margins.

Grammitis lehmanniana (Hieron.) Morton, Contr. U. S. Nat. Herb. 38: 104. 1967.

A second Ecuadorean collection, quite typical of the species, may now be reported: Foot of Mount Chimborazo, Prov. Chimborazo, Ecuador, August, 1860, Spruce 5711 (K). The only previously known specimen from Ecuador was from the Province of Napo-Pastaza.

An allied Colombian species is Grammitis longisetulosa (Copel.) Morton, comb. nov. (basionym: Ctenopteris longisetulosa Copel. Phil. Journ. Sci. 84: 461. 1955). The type of this is stated by Copeland as "Colombia, Dept. Antioquia, Rionegro; l. Bro. Daniel 68a," which is inaccurate. The holotype is in the U. S. National Herbarium, although not so stated by Copeland. I do not understand what Copeland's "l." stands for, since there is nothing on the label like this. The correct number is Daniel 680, not 68a. This species differs from G. lehmanniana and its allies in having fewer segments and a blade that is more or less triangular in outline, being truncate at base. The species is placed by Copeland in the group of meridensis, probably on the basis of the blade shape, but that is by no means the alliance of this or of G. lehmanniana, which are much closer to the group of sericeo-lanata, i.e. Grammitis lanigera, which consists of delicate epiphytes with flaccid, pendent, densely pilose blades and pilose sporangia.

Grammitis leucosticta (J. Smith) Morton, Contr. U. S. Nat. Herb. 38: 112. 1967.

Additional Ecuadorean collection examined: Pichincha, August, 1858, Spruce 5636 (K).

Grammitis mathewsii (Kunze ex Mett.) Morton, Amer. Fern Journ. 60: 66. 1970.

Polypodium mathewsii Kunze ex Mett. Abhandl. Senckenb. Naturf. Gesell. 2: 74. 1856. Syntypes: Chachapoyas, Peru, Mathews 1811, 3281 (B, not seen).

In my key to Grammitis in Ecuador, this peculiar species ought to be inserted at the top of page 91, which should then read:

Segments with a costa, this with pinnate veinlets (sect. Cryptosorus).

Veinlets forked or else variously anastomosing. Epiphytes.

Fronds not setose beneath; rhizome scales not ciliate; blades lobed to pinnatifid but not pinnatisect, except in G. mathewsii.

Fronds white-ceraceous beneath, but not at all setose. Segments elongate, not fully confluent, auriculate at the upper base. G. farinosa

Fronds not white-ceraceous beneath.

Sori sunken, round or slightly elongate; blades not pinnatifid, merely slightly lobed, with an elongate, entire basal portion, sparsely setiferous on the costa beneath and copiously ciliate; veins more or less regularly anastomosing to form a series of costal areoles. Texture spongiose. (Probably not in Ecuador). . . . . G. crispata

Sori superficial; blades pinnatifid or lobed; veins free or anastomosing.

Veins free or only a few casually anastomosing.

Blades at base deeply pinnatifid almost to the rhachis, elongate and narrow, truncate at base, the segments united by only a narrow wing. Texture firm. G. melanopus

Blades shallowly lobed to pinnatifid, short-decurrent at base, the rhachis wing broader, at least 1 mm. broad, the segments or lobes short and broad. Texture spongiose.

Blades linear, just slightly lobed. . . . . G. trichosora

Blades broader than linear.

Blades with an accessory veinlet arising from the costa; basal superior veinlet running toward and nearly reaching the sinus; blades deeply pinnatifid, the larger ones with a costal wing only ca. 1 mm. wide on either side. . . . . G. eminens

Blades with no veinlets arising from the costa apart from the main lateral veins; basal superior veinlet not nearly reaching the sinus; blades shallowly lobed to pinnatifid, the costal wing always broad. G. trifurcata

Veins regularly anastomosing.

Blades deeply pinnatisect, densely setose throughout; venation goniophlebioid, with regular costal areoles, these with a single included fertile veinlet; texture firm. . . . . G. mathewsii

Blades entire or just slightly lobed, not pinnatifid, setose only on stipes, margins, and in sori; costal areoles irregular, without included veinlets, the sori in several rows outside of costal areole; texture spongiose. . . . . G. trichosora

Grammitis melanopus (Grev. & Hook.) Morton, comb. nov.

Polypodium melanopus Grev. & Hook., in Hook. Bot. Misc. 3: 384, t. 111. 1833.

Ctenopteris melanopus (Grev. & Hook.) Copel. Phil. Jour. Sci. 84: 404. 1955.

Type: Surucucho, Ecuador, Jameson, Sept. 21, 1830 (holotype K, Morton photograph 15419).

In my paper on Grammitis in Ecuador, I left this species among the dubious ones, not being able to match the original description and illustration with any material. An examination of the type shows that the species is a good one, that has probably never been found again since Jameson found it in 1830. Copeland placed it in the group of capillaris, but it does not at all belong there, but rather in the group of meridensis, as shown by the truncate base of the blade, the coriaceous texture, and the glabrate condition of the stipe and lamina. The lamina is just slightly setose on the margins by elongate, sparse setae; there are no setae on the stipe, midribs, or surfaces. The blade is nearly pinnatisect at the base, although even here there is a very narrow rachis wing. The sori do not have any setae intermixed and the sporangia are not setose; the veins of the larger segments have about 20 pairs of veinlets, all of these forked, and some bearing sori terminal on the anterior branch. This species will be found inserted in the new key provided above under G. mathewsii.

Grammitis moniliformis (Lag.) Proctor, Brit. Fern Gaz. 9: 219. 1965.

In 1967, I listed Polypodium subcrenatum Hook. (Icon. Pl. 8: t. 719. 1848) as a synonym on the basis of the treatment in the "Index Filicum." I have now seen an isotype, Andes of Quito, Jameson 215 (FI, Morton photograph 16012), which shows that this species is quite typical moniliformis. A synonym of G. moniliformis that I did not mention in my paper is Jamesonia adnata Kunze, Farnkr. 2: 80, t. 133, f. 1. 1851, based on a collection from the Páramo de Tolima, Colombia, Linden 1006 (isotype FI, Morton photograph 16010). The description of this common species as a new species of the unrelated genus Jamesonia must be ascribed to a temporary aberration of the usually reliable Kunze.

Polypodium patentissimum Mett. ex Kuhn, Linnaea 36: 134. 1869.
Ctenopteris patentissimum (Mett. ex Kuhn) Copel. Phil. Jour. Sci. 84: 459. 1955.

Type: Mount Chimborazo, Ecuador, 3000 feet alt., Spruce 5713 (holotype B, a single frond).

This is another instance of the close similarity at least superficially between Polypodium and Grammitis, for Copeland transferred this species to Ctenopteris without a question and yet it is actually a Polypodium of the P. plumula alliance. It is evident that the cited altitude "3,000 feet" is an error, for even the base of Chimborazo is at a greater elevation than that.

Grammitis phlegmaria (J. Smith) Proctor, Rhodora 68: 467. 1966.
Polypodium phlegmaria J. Smith, London Journ. Bot. 1: 194. 1842. Type: Mount Roraima, Venezuela, Schomburgk 161 (K, photograph US).

Polypodium subdimidiatum Baker, in Hook. & Bak. Syn. Fil. 324. 1867. Syntypes: Venezuela, Fendler 207; Ecuador, Jameson 2122; British Guiana, Appun 1130.

In my treatment of Grammitis in Ecuador I overlooked the fact that Polypodium subdimidiatum Baker was based partly on Ecuadorean material, and so I did not mention the name. This species was reduced by Copeland to Ctenopteris phlegmaria without question, but there is no evidence that Copeland ever saw any of the syntypes. It is likely that at least the British Guiana specimen is truly G. phlegmaria and the Fendler collection also. The Ecuadorean may possibly be different, although I have not seen it. I have in hand a collection, Jameson 756 (K), from Archidona, Province of Napo-Pastaza, Ecuador, that is close to G. phlegmaria and yet which is somewhat different in its smaller segments which have four low rounded lobes on the upper side, whereas typical G. phlegmaria has mostly just a superior basal lobe. Incidentally, I should point out that the new combination G. phlegmaria (J. Smith) Morton in my Grammitis paper (l.c. p. 103, written earlier but not published until 1967) was previously proposed by Proctor in 1966.

Grammitis pichinchae (Sodiro) Morton, Contr. U. S. Nat. Herb. 38: 111. 1967.

Additional Ecuadorean collection examined: Tunguragua, in 1860, Spruce 6580 (K).

Grammitis pilipes (Hook.) Morton, comb. nov.

Polypodium pilipes Hook. Icon. Pl. 3: t. 221. 1840. Type: Chachapoyas, Peru, Mathews in 1838 (holotype K).

Ctenopteris capillaris sensu Copel. Phil. Journ. Sci. 84: 402. 1955 as to concept not basionym.

Copeland did not see the type of Polypodium capillare Desv. (Mag. Naturf. Freund. Berlin 5: 316. 1811) and evidently assumed that it was a South American species, for he restricted the application of the name to a species occurring from Costa Rica south to Peru. This species with entire rhizome scales and a tendency for the segments of the blades to become elongate or even pinnatifid proves to be quite different from the holotype of P. capillare Desv. (P, photograph US) which is from Jamaica. This holotype is actually the same as the Jamaican species described as P. graveolens Baker, as noted by Proctor (Brit. Fern Gaz. 9: 218. 1965) without comment while making the new combination Grammitis capillaris (Desv.) Proctor. Proctor did not consider the identity of the species wrongly called capillaris by Copeland. Copeland mentions other synonyms of his "capillaris," but they are all of later date than pilipes--namely P. blandum Fée, P. decipiens Hook., P. pozuzoense Baker, P. fucoides Christ, and P. crassulum Maxon. Of these, P. fucoides (syn. P. crassulum), of Costa Rica, seems to me clearly different in its large size, coarse habit, thick texture, and especially in the very large, round sori. It may be known as

Grammitis fucoides (Christ) Morton, comb. nov. (basionym Polypodium fucoides Christ, Bull. Herb. Boiss. II, 5: 2. 1905).

Grammitis pseudonutans (Christ & Rosenst.) Morton, Contr. U. S. Nat. Herb. 38: 114. 1967.

Additional Ecuadorean specimens examined: Mount Tunguragua, Spruce 5279 (K), 5279B (K). These specimens are topotypes that agree closely with the type material.

Grammitis recondita Morton, sp. nov.

Rhizoma ut videtur epiphyticum, breve, erectum, tenue, paleis apicalibus numerosis, persistentibus, anguste lineari-lanceolatis, ca. 2.5 mm. longis, 1.5 mm. basi latis, gradatim attenuatis apice unicellularibus, iridescentibus, cellulis basi ca. 6-serialibus, anguste oblongis, parietibus atrorubris, parietibus externis hyalinis pallide flavis, marginalibus valde tenuibus ergo paleis ut videtur dentatis propter parietibus atrorubris marginalibus transversis procurrentibus; stipites 1--2 cm. longi, delicati et gracillimi, ca. 0.2--0.25 mm. diam., teretes, glabri, non setosi, non paleati; laminae 16--28 cm. longae, 3--4 cm. latae, delicatissimae, evidenter pendulae, pallide virides, fere pinnatae basi, alternatim valde decurrentes, rhachi gracillima et fere filiformi, ca. 0.2 mm. diam., nigrescente, subtus glabra, nitente; segmenta alterna, linearia, numerosa, ca. 30-juga, valde adscendentia, subapicalia maxima usque ad 3.5 cm. longa et 1.5 mm. lata, basalia valde reducta, omnia membranacea, pallide viridia, glabra, non squamosa, basi longe in rhachi decurrentia, non dentata vel pinnatifida sed paullo undulata; costa flexuosa, venulis remotis, ca. 14-jugis in segmentis maximis, simplicibus, non marginem attingentibus, alternis, venula prima in latere superiore, eis in latere superiore longioribus quam in latere inferiore, eis inferioribus propiis ad venulam superiorem basalem quam venulam distalem; sori pauci, in venulis terminales, paullo elongati, paullo depressi; sporangia pauca, non setosa vel pilifera, fere sessilia, annulo atro, parietibus lateralibus pallidis.

Type in the Royal Botanic Gardens, Kew, collected in the forests of Archidona, Province of Napo-Pastaza, Ecuador, by W. Jameson.

The type specimen was referred by Hooker to his Polypodium decipiens, and so it is one of the five syntypes of this species, but it can not be the lectotype because it does not agree with the description or illustration of Hooker (Sp. Fil. 4: 231, t. CCLXXIX, B. 1864), which call for a plant with some of the pinnae pinnatifid. Hooker's figure of P. decipiens was drawn from Moritz 337 from Venezuela, and this specimen (K) is here designated lectotype. Polypodium decipiens thus typified is close to or probably synonymous with Grammitis pilipes (Hook.) Morton. The present species, Grammitis recondita, is doubtless close also to G. pilipes, from which it differs primarily in having glabrous rather than strongly setose stipes. The plant is altogether

more delicate and evidently limply pendulous; the pinnae are rather spaced out and show no tendency to become toothed, lobed, or pinnatifid, or elongate and variously modified as they commonly are in G. pilipes. The sori also are somewhat sunken in small depressions.

In my key to Grammitis in Ecuador this species will run down near G. subsessilis (Baker) Morton and G. pseudocapillaris (Rosenst.) Morton. From the rather common G. subsessilis, G. recondita differs in its thin texture, narrower pinnae, not completely alate rhachis, and especially in the lower segments not being reduced to minute, rounded, semilunate lobes. Probably more closely allied is G. pseudocapillaris, which differs in having ciliate rhizome scales, and in the rhachis and costae beneath being at least slightly setose rather than glabrous. There is also a rather subtle difference in aspect. It is possible that Steyermark 53475, from Azuay, which I referred to G. pseudocapillaris in my revision, is really G. recondita, but rhizome scales are lacking.

Grammitis semihirsuta (Klotzsch) Morton, Contr. U. S. Nat. Herb. 38: 113. 1967.

Additional Ecuadorean specimens examined: Quisaya, Feb., 1874, Sodiro (K). Tunguragua, Spruce s. n. (K), (with notation cf. 5283; the true 5283 represents apparently a form of G. taxifolia).

An allied Colombian species with smaller and closer segments, less prominent veins, and rhizome scales more densely grayish ciliate is Grammitis oreophila (Maxon) Morton, comb. nov. (basionym: Polypodium oreophilum Maxon, Contr. Gray Herb. 165: 72. 1947). The species is still known only from the holotype: Cerro Armas, Santander, 1200-1500 m., July 26, 1936, Haught 1959 (US). In his account of Ctenopteris semihirsuta Copeland remarks: "There is wide variation in the pubescence of the lamina. Because it has been treated as distinct I let Polypodium oreophilum so stand," which seems to indicate that he has some doubt of oreophilum being different from semihirsuta, and yet in the same paper he transfers oreophilum to Ctenopteris and places the species in an entirely different group from semihirsuta, the group of sericeo-lanata, to which it is not at all allied.

Grammitis sodiroi (Christ & Rosenst.) Morton var. brevipes Morton, var. nov.

A var typica stipitibus brevioribus, 2--4 (raro 7) cm. longis, et crassioribus, ca. 1 mm. diam., differt.

Type in the Royal Botanic Gardens, Kew, collected on Mount Tunguragua, Province of Tunguragua, Ecuador, November, 1857, by R. Spruce, no. 5279.

Paratypes: Near Tipococha, Province of Chimborazo-Cañar border, Ecuador, 9,800-10,400 feet alt., July 6--9, 1945, Camp E-4076 (US). Small wooded quebrada 5 km. north of Hacienda Piñón, Province of Imbabura, Ecuador, 10,850 feet alt., June 25, 1944, Wiggins 10,359 (US).

In my Grammitis in Ecuador paper, I listed the Camp and Wiggins collections as probably aberrant specimens of G. sodiroi. The finding of still a third collection persuades me that this plant deserves a name; it may well be that it is specifically distinct but I prefer to regard it as only a variety at present. The typical G. sodiroi, which is known only from Mount Tunguragua, has longer (5--12 cm.) stipes, and these are generally more slender, often only 0.5 mm in diameter, although the stouter ones may reach 0.9 mm. The type of the variety, Spruce 5279, was probably considered by Spruce as the same as Spruce 5279A, and the "A" number may have been assigned by Hooker rather than by Spruce himself. However, 5279A is the type of the new species G. erecta, described elsewhere in this paper; it does indeed bear a strong similarity to 5279, but the two must be different. In 5279A the rhizome scales are narrower and taper to a long, one-celled tip; the rhachis bears long black setae, rather than being glabrous, and some setae are borne also among the sporangia in the sori, whereas G. erecta is completely non-setose. The segments in G. sodiroi var. brevipes are also typically more elongate, with more numerous veinlets and sori. It appears that G. erecta is terrestrial, with an erect rhizome and erect fronds, whereas according to the label data by Camp and Wiggins G. sodiroi var. brevipes is epiphytic and with pendent fronds.

Grammitis subflabelliformis (Rosenst.) Morton, Contr. U. S. Nat. Herb. 38: 104. 1967.

Additional Ecuadorean collections examined: Cerro de Abitagua, Spruce 5271 (K, isotype). Mount Pichincha, 4000 feet alt., July, 1876, André 3128 (K).

Grammitis subscabra (Klotzsch) Morton, comb. nov.

Polypodium subscabrum Klotzsch, Linnaea 20: 377. 1847.

Polypodium pichinchense Hieron. Bot. Jahrb. Engler 34: 506. 1904. Lectotype: Ecuador, 3,000-3,400 m., May, 1862, Jameson (B).

Polypodium ecuadorense C. Chr. Ind. Fil. 524. 1906. Based on P. pichinchense Hieron., not P. pichinchae Sodiro. Illegitimate renaming.

Ctenopteris ecuadorensis (C. Chr.) Copel. Phil. Journ. Sci. 84: 434. 1955. Illegitimate, since earliest available epithet pichinchensis was not adopted.

Grammitis pichinchensis (Hieron.) Morton, Contr. U. S. Nat. Herb. 38: 111. 1967.

Type: Mérida, Venezuela, Moritz 332 (isotype K, photo 15441).

Copeland in his revision of American Ctenopteris considered Polypodium subscabrum Klotzsch as a dubious member of the genus, and since I had not seen any authentic material I followed him in my treatment of Grammitis in Ecuador by recognizing P. subscabrum sensu Hook. non Klotzsch = P. pichinchense Hieron. as a distinct species. However, a recent examination of an isotype of P. subscabrum and a comparison with Jameson 51, from the Valley of

Lloa, Ecuador, the basis of Hooker's concept of P. subscabrum and of his plate 274A in his "Species Filicum, vol. 4), shows no obvious differences between the Ecuadorean plants and the isotype from Venezuela. The small, black, ciliate rhizome scales, red-setose stipe, dark setose blades, and obvious lime-dots above, and the elongate, lax blades are fairly characteristic.

Grammitis taxifolia (L.) Proctor, Rhodora 63: 35. 1961.
Additional Ecuadorean collections: Cerro de Abitagua, in 1857, Spruce 5283 (K). Pichincha, Jameson (K). Sin. loc., Jameson (K).

Grammitis trichosora (Hook.) Morton, comb. nov.
Polypodium trichosorum Hook. Second Century t. 12. 1860.
Type: Forests of Archidona, Andes of Quito, Ecuador, Jameson 349 (holotype K, Morton photograph 15890).
There may be some doubt about the type number and type locality, for Jameson 349 in Florence is from Nanegal, Ecuador, and represents a different species, Polypodium patentissimum Mett. There is in Florence a specimen of Jameson 348, also from Nanegal, which is near G. trichosora and could conceivably represent the same species; still, it has the sori in one row only and the veins all free, and so is not by any means identical.
In my paper on Grammitis in Ecuador, I listed Polypodium trichosorum Hook. as a doubtful synonym of G. crispata (J. Smith) Morton, going on the description and plate alone. An examination of the type shows that the two are amply distinct, especially in the sori, which are in pits in G. crispata and superficial in G. trichosora. The venation is also very different, for G. crispata has regular areoles along the costa of the blade, these elongate and without an included veinlet. The venation in G. trichosora, not shown by Hooker, is highly irregular, without regular, narrow costal areoles but with the veinlets often irregularly anastomosing at the middle or beyond. It is likely that Polypodium ecostatum Sodiro, which I also listed as a possible synonym of G. crispata, is really a synonym of G. trichosora, but I have seen no authentic material. Therefore, G. crispata, which was reported in Ecuador only on the basis of these two reputed synonyms, should be excluded from the flora of Ecuador. For its place in my key to Grammitis in Ecuador, see the key presented above under G. mathewsii.

Grammitis truncicola (Klotzsch) Morton, Contr. U. S. Nat. Herb. 38: 98. 1967.
Additional Ecuadorean specimen examined: In forest at San Pablo, on Río Pamplona, Selva Alegra, southwest of Volcán Cotacachi, Prov. Imbabura, 6000 feet, Nov. 30, 1943, Ownbey 2616b (US). This is the third known collection from Ecuador, the other two, the syntypes of Polypodium andinum Hook., having been collected more than 125 years ago.

Extra-limital Species

Grammitis kaieteura (Jenm.) Morton, comb. nov.
Polypodium kaietureum Jenm. Ferns Fern-allies Brit. W. Ind. Guian. 262. 1908.
Ctenopteris kaieteura (Jenm.) Copel. Phil. Journ. Sci. 84: 439. 1955.
Type: Kaieteur Plateau, British Guiana, Jenman 1423 (not seen).
A new record for this species is Mount Roraima, Venezuela, Schomburgk 1146 (K).

Grammitis pennellii (Copel.) Morton, comb. nov.
Ctenopteris pennellii Copel. Phil. Journ. Sci. 84: 397. 1955.
Type: "San José," San Antonio, Department of El Cauca, Colombia, 2400-2700 m. alt., June 28, 1922, Pennell & Killip 7379 (holotype US). Copeland cited the type as "1. Pennell & Killip 7379," but I do not know what the "1." stands for, since there is nothing of the sort on the label. He also omitted to mention the locality and the herbarium in which the type is deposited.
This species is still known only from the type. It belongs to the group of G. moniliformis, but differs in the conspicuously dark setose rhachis beneath, and the setose midribs and sori. It is a much larger plant with more elongate segments than moniliformis or its near allies.

Grammitis sodiroi (Christ & Rosenst.) Morton, Contr. U. S. Nat. Herb. 38: 114. 1967.
The following is the first record of this species outside Ecuador: Volcán Azufral, Department of Nariño, Colombia, 3800 m. alt., March 18, 1876, on roots of shrubs in cloud-forest, André 3286 (K). Azufral is not so far north of the Ecuadorean border.

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