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THE GENUS GRAMMITIS IN ECUADOR

By CONRAD V. MORTON

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CONRAD V. MORTON

Introduction

The Ecuadorian collections of the late Dr. Wendell H. Camp contained a rather large number of specimens of the fern genus *Grammitis* as I currently recognize it. The present paper is the result of the study of this material, which included a number of rarities, among them several undescribed species.

For the past 35 years or more, I have been following Dr. William R. Maxon in recognizing an extremely large, very diverse genus *Polypodium*. Maxon was, in turn, following Christensen, Hieronymus, and other noted fern students. Evidence, however, has been accumulating in recent years that there are two major groups of species—those centering around the true *Polypodium*, as typified by *P. vulgare* L., and those belonging to *Grammitis* Swartz and some closely related small genera. It seems that there is no alternative now to recognizing *Polypodium* and *Grammitis* as distinct genera; in fact some authors go so far as to place these genera in different families, as Polypodiaceae and Grammitidaceae, although this is an extreme view to take of plants that, in some instances, can hardly be distinguished from one another. Copeland in his monograph of *Ctenopteris* (which I consider to be *Grammitis*), in at least one instance included specimens of a true *Polypodium* and a *Grammitis* under a single name (*Ctenopteris truncorum*), and he also noted that *Polypodium pectinatum*, *P. plumula*, and their allies were probably referable to *Ctenopteris*, although more recent studies have shown that these species are truly *Polypodium*, closely mimicking "*Ctenopteris*" in habit.

Polypodium and *Grammitis* differ in all parts of the plants—vegetative fronds, sporangia, spores, and gametophytes. Possibly the most uniform and easily observable difference is in the spores, those of *Polypodium* being monolete and those of *Grammitis* trilete; however, not all species have been investigated from this point of view. If this character really holds, it is fortunate; that it is not necessarily a fundamental character is shown by the fact that both monolete and trilete spores may occur in species unquestionably in the same genus, as in *Vittaria*, *Antrophyum*, and *Dicranopteris*. The spores of *Gram-*

mitis are said to be green and those of *Polypodium* not green. A still more easily observable character is found in the type of hairs on the vegetative parts. In *Grammitis*, these hairs are spreading, rigid, dark, elongate, and one-celled; such hairs seem to be always found on the stipes, and are also frequently found on the blades, especially on the margins or among the sporangia. In *Polypodium*, such hairs (usually called setae) are absent; hairs, if present, are either short and glandular or flaccid and septate. The rhizome scales in *Polypodium* are usually of a more "clathrate" type, with large lumina and narrow walls, although such scales are found also in some species of *Grammitis*. Although the fronds of some species of *Polypodium* are scaleless (such as *P. vulgare*), they often have scales on the stipes, midribs, or leaf surfaces. According to Kenneth A. Wilson,[1] the sporangial stalk in *Polypodium* is two-celled at the base and that of *Grammitis* one-celled. Alma G. Stokey and Lenette R. Atkinson have published a paper [2] on the gametophytes of *Grammitis* in which some differences from *Polypodium* have been shown (1958, p. 402): "The bulbous basal cell or cells, or the mass or plate, giving rise to the filament, the bead-like cells of the filament, the growth of the filament by 'Budding,' the protracted filamentous stage, and the characteristic fragmentation of the filament" in *Grammitis*. The gametophytes of *Polypodium* are cordate and have the typical "polypodioid" type of development.

The genus *Grammitis* Swartz was described [3] as follows: "*Capsulae* in lineolis rectis, sparsis. *Indusia* nulla. Origo vocis a γραμμη, *linea*. . . ." This was intended to be contrasted with *Polypodium* L., which had the following diagnosis: "Capsulae in puncta subrotunda sparsa, congestae absque *Indusio*." Thus, *Grammitis* included those species with the sporangia scattered in a straight line, whereas *Polypodium* had them congested in a rotund sorus. Although this character is not a real distinction, for some species properly included in *Grammitis* have rotund sori and conversely some undoubted Polypodiums, such as *P. astrolepis* Liebm., have elongate sori, the species included by Swartz did form a reasonably cohesive group. They were *G. linearis* Swartz [now *G. graminea* (Swartz) Copel.], *G. marginella* (Swartz) Swartz, *G. lanceolata* Swartz [now *Loxogramme lanceolata* (Swartz) Presl], *G. serrulata* (Swartz) Swartz [based on *Acrostichum serrulatum* Swartz, now called *Xiphopteris serrulata* (Swartz) Kaulf. by some authors], *G. graminoides* (Swartz) Swartz [*Acrostichum graminoides* Swartz, now *Cochlidium graminoides* (Swartz) Baker], and *C. myosuroides* (Swartz) Swartz [based on *Polypodium*

[1] "The sporangia of three problematic species of Polypodium," Amer. Fern Journ. 49:147–151. 1959.

[2] "The gametophyte of the Grammitidaceae, Phytomorphology" 8:391–403. 1958. See also, Alma G. Stokey, "Polypodium pectinatum and P. plumula—Polypodiaceae or Grammitidaceae?," Amer. Fern Journ. 49:142–146. 1959.

[3] *In* Journ. Bot. Schrad. 1800 (2):17. 1801.

myosuroides Swartz, called *Xiphopteris myosuroides* (Swartz) Kaulf. by some authors]. Thus, all the species are still retained in *Grammitis* or referred to the closely allied groups *Loxogramme*, *Cochlidium*, and *Xiphopteris*.

There was, of course, no original designation of a type for the genus *Grammitis*, nor were there any comments by Swartz indicating that he had any particular species in mind as being more "typical" than another. The designation of a lectotype is of importance, since although the original six species are undoubtedly allied, they are sufficiently different to have been referred to different genera. Copeland [4] merely states: "The first species listed is *G. linearis*, the same author's *Polypodium gramineum*, Prod. (1788) 130. This, being its first species, and being retained in it here, as it has been by all authors except J. Smith who have maintained the genus, must be its type species." As often occurs, however, Copeland's typifications are based on false premises. Very few authors in the past and probably none at present consider that the first species listed has any more claim to be the lectotype of a new genus than any of the others. In fact, the International Code of Nomenclature (1961 ed., p. 64, in the "Guide for the determination of types") specifically states: "Designation of a lectotype should be undertaken only in the light of an understanding of the group concerned. Mechanical systems, such as the automatic selection of the first species or specimen cited . . . should be avoided as unscientific. . . ." In the case of *Grammitis*, John Smith [5] excluded this first species, *G. linearis*, from the genus *Grammitis*, calling it *Lomaphlebia*; for the purposes of typification, it does not matter that the character used by Smith in segregating this new genus may not be considered of generic significance. Smith specifically typified *Grammitis* on *G. australis* R. Brown, but since this was not one of the original species of the genus it is not a possible choice; however, Smith did keep one of the original species in the genus, *G. marginella*. Christensen [6] followed this up by definitely selecting *G. marginella* as the type of the [subsection] *Grammitis*, recognizing also a [subsection] *Lomaphlebia*, with type *G. graminea*. This must, therefore, be considered as a definite choice of *G. marginella* as lectotype of *Grammitis*.

It is a rather unfortunate fact that none of the six original species of *Grammitis* are really representative of most of the species of the genus as it is currently recognized. Strangely enough, although these are rather numerous, they were not known in the time of Swartz. The type species *G. marginella* is no exception; it has the blades with

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[4] Phil. Journ. Sci. 80:93. 1951.
[5] Hist. Fil. 182. 1875.
[6] Ind. Fil. XLIX. 1906.

a conspicuous black border, merely a border and not a marginal vein, for the real veins end some distance within the margin. This is a peculiar character, but there are no other differences. Even Copeland, whose generic concepts in this group are certainly narrow, did not separate this group of species from *Grammitis*, but called it *Grammitis* subg. *Melanoloma*.[7] No type was specifically designated, and, therefore, *G. marginella* Swartz is here designated lectotype. This group of about 14 species, of both the Old and New World, does not occur in Ecuador. It must now be called sect. *Grammitis*, of which subg. *Melanoloma* is a synonym.

Since the name *Grammitis* must now be applied to the small group of species typified by *G. marginella*, another sectional name must be found for the bulk of the species that have commonly been called *Grammitis*. A possible name is *Grammitis* sect. *Chilopteris* Presl,[8] which included originally the three species *G. billardieri*, *G. linearis* [i.e. *graminea*], and *G. marginella*. Christensen,[9] by listing this as a complete synonym of [subsect.] *Grammitis*, effectively chose *G. marginella* as type, and thus sect. *Chilopteris* remains a synonym of sect. *Grammitis*. The next possible name, and the one that is correct, is *Grammitis* sect. *Grammitastrum* Fourn.,[10] which was based on the two species *Polypodium pseudoaustrale* (Fourn.) Fourn. and *P. lasiosorum* (Blume) Hook. The former species, which is based on *Grammitis pseudoaustralis* Fourn.,[11] is here designated lectotype; it is much the more suitable, for it was well known to Fournier, whereas he may have misidentified *P. lasiosorum*.

The late E. B. Copeland published revisions or monographs of *Grammitis*,[12] *Xiphopteris*,[13] and *Ctenopteris*,[14] of varying worth. The *Grammitis* paper is creditable and typical of Copeland's previous monographic works—fairly good taxonomic judgments combined with unusable keys, no descriptions, and a lack of definiteness in statements of range. The *Xiphopteris* paper is brief, and actually only an adaptation of Maxon's previous work on the species allied to *Polypodium serrulatum* [15] and *P. trichomanoides*,[16] with the addition of several new species, most of which had been previously segregated by Maxon (as species of *Polypodium*). The *Ctenopteris* paper, undertaken when Copeland was at an advanced age, is much the poorest of

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[7] Phil. Journ. Sci. 80:253. 1951.
[8] Tent. Pterid. 208. 1836.
[9] Ind. Fil. LIX. 1906.
[10] Ann. Sci. Nat. [Paris] V, 18:282. 1873.
[11] Bull. Soc. Bot. France 16:423. 1869.
[12] "Grammitis," Phil. Journ. Sci. 80:93–267, pls. 1–6, figs. 1–108. 1951.
[13] "The American species of Xiphopteris," Amer. Fern Journ. 42:41–52, 93–110. 1952.
[14] "Ctenopteris in America," Phil. Journ. Sci. 84:381–470, pls. 1–16. 1955.
[15] "Notes upon Polypodium duale and its allies," Contr. U.S. Nat. Herb. 17:398–406. 1914.
[16] "Polypodium trichomanoides and its American allies," Contr. U.S. Nat. Herb. 17:542–557. 1916.

any of Copeland's published works, being replete with errors of all sorts—typographical, certainly, but more importantly in morphological observations and in taxonomic judgments. It is essentially unusable. The species are distributed among 10 groups, but these groups are not named, not keyed, and only briefly or not at all characterized or described. I have noted below an instance of what is essentially the same species that Copeland has placed under three different names in three different groups. A restudy of the American species is much needed; the present paper is the beginning of such a study.

Copeland attempted to maintain *Grammitis*, *Xiphopteris*, and *Ctenopteris* as distinct genera, *Grammitis* being defined as having the fronds simple or lobed less than halfway to the midrib, *Xiphopteris* with lobed to pinnatifid fronds with the veinlets simple or with a single branch, and *Ctenopteris* with pinnatifid fronds, the segments with pinnate veins. Since there are no other differences, these are "one-character" genera, and this one character an essentially insignificant one. The division of the frond (simple as opposed to pinnatifid) has never been considered a generic character in ferns, apart from other differences. And the difference between having one vein branch and several of them is only correlated with having the lobes short or elongate. These ferns vary from having no lateral vein-branches, to having one, two, several, or many. Copeland realized these affinities very well, but chose to recognize the three genera as a matter of convenience. To me, it is more convenient to group them together as a coherent genus. For the purpose of classifying the species it may be convenient to group the species in corresponding "sections," with the realization that these sections may not represent natural phylogenetic units.

Systematic Treatment

Grammitis Swartz

The system of American *Grammitis* that I adopt is:

Grammitis Swartz, *in* Journ. Bot. Schrad. 1800(2):17. 1801.

Sect. Grammitis (Lectotype: *Polypodium marginellum* Swartz).

Grammitis subg. *Melanoloma* Copel. Phil. Journ. Sci. 80:253. 1951 (Lectotype: *Polypodium marginellum* Swartz, Prodr. Veg. Ind. Occ. 130. 1788).

Sect. Grammitastrum Fourn. Ann. Sci. Nat. [Paris] V, 18:282. 1873 (Lectotype: *Grammitis pseudoaustralis* Fourn. Bull. Soc. Bot. France 16:423. 1869).

Grammitis subg. *Grammitis* sensu Copel.

Sect. Cryptosorus (Fée) Fourn. Ann. Sci. Nat. [Paris] V, 18:282. 1873 (Lectotype: *C. blumei* Fée, based on *Polypodium obliquatum* Blume).[17]
Ctenopteris auctt.[18]
Sect. Xiphopteris (Kaulf.) Presl, Tent. Pterid. 208. 1836 (Type: *Acrostichum serrulatum* Swartz.)
Xiphopteris Kaulf. Berlin Jahrb. Pharm. 1820:35.

Key to the Species of Grammitis in Ecuador

Fronds entire or lightly repand (sect. *Grammitastrum*).
Rhizome not paleaceous. Veins forked . . . . . **1. G. jungermannioides**
Rhizome with minute scales at apex, these more or less hidden among the numerous hairs.
Veins forked . . . . . **2. G. yarumalensis**
Veins simple . . . . . **3. G. sprucei**
Fronds lobed to pinnatisect.
Segments with only a costa or this with a single anterior veinlet (sect. *Xiphopteris*).
Costa of the segments unbranched.
Fertile part of the frond subentire, the sterile part toothed or lobed less than halfway to the costa.
Sporangia borne on the costa as well as on the base of the veins, thus confluent; rhizomes elongate; sterile part of the blade merely toothed, the fertile part short and contracted . . . **4. G. serrulata**
Sporangia borne only on the base of the veins, not confluent; rhizomes short, erect; sterile part of the blade lobed, with deltoid segments, the fertile part elongate and tail-like . . . . . **5. G. jamesonii**
Fertile and sterile parts of the blades alike, deeply pinnatifid, the lobes oblong, narrowed from the base. Stipes stout, erect; rhizome scales ciliate . . . . . **6. G. caucana**
Costa of the segments with a single anterior branch (veinlet), this often subbasal.
Rhizome scales not setose on the margins, sometimes with a very few short, several-celled, glandular hairs. Blades deeply lobed, densely setose, long-stipitate . . . . . **7. G. aphelolepis**
Rhizome scales setose on the margins, the setae stiff, spreading, one-celled, eglandular.
Blades nearly or quite exstipitate, decurrent as a wing on the stipe, lobed less than halfway to the costa, conspicuously setose throughout . . . . . **8. G. truncicola**
Blades obviously stipitate, deeply lobed nearly to the costa, the lobes oblong, slightly gibbous [19] on the upper margin. **9. G. blepharolepis**

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[17] Fée had only two species in his genus *Cryptosorus: C. dionaea* and *C. blumei*. The genus was distinguished primarily, as indicated by the generic name chosen, by the sunken sori, a character well shown in *C. blumei* (i.e. *Polypodium obliquatum* Blume) but not or hardly in *C. dionaea*, which is considered to be a synonym of *Polypodium venulosum* Blume. Therefore, *C. blumei* is the logical choice of lectotype.

[18] The question of the publication of *Ctenopteris* has been discussed recently elsewhere (Amer. Fern Journ. 56:65–68. 1966).

[19] The term "gibbous," i.e., hunch-backed, is used to describe a slight hump or lobe on the anterior margin of some of the larger segments of these ferns; it is an indication of the forking of the vein.

Segments with a costa, this with pinnate veinlets (sect. *Cryptosorus*).
Veinlets forked. Epiphytes.
Fronds not setose beneath (except slightly on the midrib beneath in *G. crispata*); rhizome scales not ciliate; blades lobed to pinnatifid but not pinnatisect.
Fronds white-ceraceous beneath, not at all setose. Segments elongate, not fully confluent, auriculate at the upper base . . **10. G. farinosa**
Fronds not white-ceraceous beneath.
Veins free or a few casually anastomosing; blades with a short, entire decurrent base; sori superficial, mostly elongate, without setae intermixed with the sporangia; blades not setose on the midrib beneath, sometimes with a few marginal setae.
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 . . . . . **11. 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 . . . . . **12. G. trifurcata**
Veins more or less regularly anastomosing to form a series of aeroles along the midrib; blades with an elongate entire basal portion; sori impressed, mostly round, sparsely setiferous; blades sparsely setiferous on the midrib beneath, copiously ciliate . **13. G. crispata**
Fronds more or less setose beneath; rhizome scales ciliate; blades pinnatisect, the segments free from each other, not connected by a continuous wing, more surcurrent than decurrent.
Rhizome scales eglandular-ciliate; segments acute, mostly twice as long as broad, evidently crenate-undulate, glabrous above, setose beneath . . . . . **14. G. semiadnata**
Rhizome scales glandular-ciliate; segments rounded, mostly 1.5 times as long as broad, entire or lightly undulate, sparsely setose above near the margin and apex, glabrous beneath . . . **15. G. intricata**
Veinlets simple, not forked.
Sporangia pilose or setose. Pendent elongate epiphytes (or rarely saxicolous), softly hairy (or merely setiferous-margined in *G. alfarii*); rhizome scales ciliate (or absent in *G. alfarii*).
Blades (or some of them) once- or twice-forked. Plants sometimes saxicolous at high elevations . . . . . **16. G. heteromorpha**
Blades not forked.
Blades (or some of them) bipinnate. Plants always epiphytic. **17. G. variabilis**
Blades simply pinnate or only pinnatisect.
Rhizome scales absent; segments strongly unequal-sided at base, strongly gibbous or humped at upper base . . . **18. G. alfarii**
Rhizome scales present; segments more or less equal-sided, not gibbous.
Pinnae 3–10 mm. long.
Pinnae usually 6–10 mm. long; white hydathodes none or inconspicuous on the upper surface; blades usually more than 12 cm. long.
Rhachis without coarse, dark stellate hairs; veins mostly only 2 pairs . . . . . **19. G. senilis**

Rhachis with some dark, coarse, stellate hairs mixed with the soft white ones; veins 3 or 4 pairs . . **20. G. dependens**

Pinnae usually 3–6 mm. long; white hydathodes present or none; blades usually less than 12 cm. long.

White hydathodes present and conspicuous on the upper surface; segments oblong, not much or not at all narrowed toward the base . . . . . **21. G. subtilis**

White hydathodes none; segments obviously narrowed at the base above . . . . . **22. G. subflabelliformis**

Pinnae longer, up to 45 mm. long.

Marginal hairs all solitary; hairs of the rhachis beneath solitary; hairs all rather coarse and stiff . . . **23. G. lehmanniana**

Marginal hairs mostly paired; hairs of rhachis beneath often partly fasciculate; hairs mostly soft and silky.

Sporangia with only one short hair or many of them hairless; plants sparingly hairy; blades pectinate, the segments close . . . . . **24. G. laxa**

Sporangia all with hairs, these usually 2 or more and often elongate; plants densely hairy; blades with rather distant segments.

Segments with 9–14 pairs of veins (and usually also sori), elongate, usually over 20 mm. long.

Hairs of rhachis beneath all pale, even the fasciculate ones . . . . . **25. G. lanigera** var. **lanigera**

Hairs of the rhachis beneath (or some of them) coarser, darker, and fasciculate, the fascicle often somewhat stalked and thus forming a "stellate" hair.

25a. G. lanigera var. **stella**

Segments with 2–7 pairs of veins (and usually sori), shorter, under 18 mm. long . . . . . **26. G. cultrata**

Sporangia glabrous.

Blades (or some of them) once- or twice-forked. Epiphytes (or saxicolous at high elevations); plants soft-hairy . . . **16. G. heteromorpha**

Blades not forked.

Blades (or some of them) bipinnate. Soft-hairy epiphytes.

17. G. variabilis

Blades pinnate, or rarely pinnate-pinnatifid.

Segments ascending at an acute angle, narrow and elongate, long-decurrent at the base. Epiphytes.

Blades pinnatifid only, the segments connected by a narrow wing. Rhachis above green and glabrous; segments entire.

27. G. subsessilis

Blades fully pinnate.

Pinnae subentire. Rhachis more or less viscid-puberulous.

28. G. jamesonioides

Pinnae crenulate to pinnatifid.

Rhachis above with numerous, short, white, stiff hairs; pinnae merely crenulate . . . **29. G. pseudocapillaris**

Rhachis above with a few, conspicuous, elongate, dark setae; pinnae pinnatifid . . . . . **30. G. myriophylla**

Segments spreading horizontally.
Stipes densely short-pubescent. Blades not setulose; rhizome scales ciliate; rhizomes erect, short; texture firm; veins obscure; segments fully adnate but not confluent.
Middle segments 10–20 mm. long; epiphyte . . **31. G. major**
Middle segments ca. 6 mm. long, relatively broad; terrestrial. **32. G. tunguraguae**
Stipes with sparse or numerous setiform hairs, not short-pubescent.
Rhachis hirtous or setose above. Plants epiphytic (or occasionally apparently saxicolous or terrestrial in *G. anfractuosa*, *G. taxifolia*, *G. leucosticta*, and *G. semihirsuta*).
Plants spreading by delicate, radicant, rootlike, stolon-like rhizomes. Blades small and delicate. **33. G. anfractuosa**
Plants not stoloniferous. Segments 3 times as long as broad or longer.
Rhizome scales not ciliate; hydathodes without lime incrustations above. Segments elongate; veins 6–15 pairs; stipes stout, 0.7–1 mm. in diameter.
Lateral veins dark and visible; segments narrow and elongate, with parallel sides, obtuse at apex, with abundant, pale brown setae on the lower surfaces, the margins usually plane, the texture rather thin. **34. G. taxifolia**
Lateral veins immersed, hardly visible; segments shorter, acutish, the margins incurved, with dark, numerous or few setae, the texture thick.
Stipes up to 3.5 cm. long, glabrate; segments sparingly setose . . . . . **35. G. firma**
Stipes up to 11 cm. long, densely setose; segments densely dark-setose . . . . . **36. G. vernicosa**
Rhizome scales ciliate, sometimes sparingly so; hydathodes with obvious lime-dots on the upper surface.
Plants lax, the stipes delicate, 0.2–0.4 mm. in diameter; veins 3–6 pairs, immersed, not visible. Segments with dark setae on the surface; rhizome scales dark, with dark cilia . . . . . **37. G. pichinchensis**
Plants coarser, the stipes (0.5) 0.7–1.6 mm. in diameter; veins often more numerous (few in *G. cuencana*).
Veins only 2–4 pairs; segments short and broad; stipes short, 1–2 cm. long . . . **38. G. cuencana**
Veins more numerous; segments elongate; stipes usually longer.
Veins 4–8 pairs, visible but not obvious. Dark setae present on the surfaces of the segments, usually none on the margins; segments more or less gradually narrowed from a broad base; stipes 2.5–11 mm. long.
Rhizome scales blackish, with dark cilia. **39. G. pichinchae**
Rhizome scales dark brown, with pale brown cilia. **40. G. attenuatissima**

Veins more numerous, (5) 8–20 pairs, usually dark and readily visible. Rhizome scales *very* sparsely ciliate; stipes elongate, 7–25 cm. long.
Veins (5) 8–11 pairs; segments more or less gradually narrowed from a broad base. Dark setae very sparse on the surfaces and margins. . . . . **41. G. leucosticta**
Veins usually more numerous, 8–20 pairs; segments elongate, with more or less parallel sides.
Dark setae numerous and short on the surfaces; cilia of the rhizome scales weak and spreading. . . . . **42. G. alsopteris**
Dark setae absent on the lower surfaces, very few on the upper margin; cilia of the rhizome scales rigid, appressed-ascending. . . . . **43. G. semihirsuta**
Rhachis glabrous above or nearly so. Rhizome scales not ciliate.
Plants epiphytic. Midrib immersed, not or scarcely visible.
Rhizomes slender, ca. 1 mm. in diameter. Setae usually sparse, except among the sporangia . . **44. G. rigens**
Rhizomes thicker, 1.5–2.5 mm. in diameter.
Black setae present on the surfaces of the fertile segments; rhizome scales without hairlike tips. **45. G. pseudonutans**
Black setae present only on the rhachis beneath and among the sporangia; rhizomes scales with elongate hairlike tips only one cell thick. **46. G. sodiroi**
Plants saxicolous or terrestrial, mostly rigid and erect. Segments mostly not more than twice as long as broad.
Rhizomes slender, 0.9–1.1 mm. in diameter (excluding the scales).
Midribs of the segments dark and prominulous; blades up to 24 cm. long. Stipes up to 5 cm. long, 0.5 mm. in diameter; segments truncate, obtuse, 5–6 mm. long and 4 mm. broad. . . . . **47. G. wolfii**
Midribs of the segments immersed in the leaf-tissue, hardly visible; blades usually much less than 24 cm. long.
Rhizomes always very widely creeping, with distant fronds. Stipes elongate, 2–6 cm. long, slender, and wiry; segments usually about twice as long wide . . . . . **48. G. flabelliformis**
Rhizomes often shorter, with closer fronds.
Segments mostly about 1.5 times as long as wide; stipes very slender (0.2–0.4 mm. in diameter), mostly only 1–2 cm. long. **49. G. peruviana**
Segments mostly about as long as broad, very thick; stipes stouter, often more elongate. **50. G. moniliformis**

Rhizomes thicker, 1.5–5 mm. in diameter, excluding the scales.
Segments triangular from a broad base . **51. G. rosarum**
Segments broadly oblong to semicircular.
Plants large and coarse, mostly 25–35 cm. long; stipes ca. 1 mm. in diameter . . **52. G. assurgens**
Plants smaller, mostly less than 20 cm. long; stipes usually ca. 0.5 mm. in diameter.
50. G. moniliformis

1 **Grammitis jungermannioides** (Klotzsch) Ching, Bull. Fan Mem. Inst. Biol. Bot. 10:240. 1941.
Polypodium jungermannioides Klotzsch, Linnaea 20:373. 1847. Type: Mérida, Venezuela, *Moritz* 312 (presumably B).
Grammitis repanda Kunze ex Mett. Fil. Lechl. 1:9. 1856. Illegitimate renaming of *Polypodium jungermannioides* Klotzsch.
Polypodium sprucei var. *furcativenosa* Hieron. Bot. Jahrb. Engler 34:499. 1904. Syntypes: Near Putumayo, on Río Balsayacu, Cordillera de Pasto, Colombia, *Lehmann* 654 (isosyntype US). Chilcasco, Guatemala, *Salvin & Godman.*
Polypodium sprucei var. *costaricensis* Christ, Repert. Sp. Nov. Fedde 8:17. 1910. Type: Volcán de Barba, 2,200 m., Costa Rica, *Brade* 296 (isotype NY).

Range: Jamaica; Guatemala to southern Colombia.
Habitat: Epiphytic.
This species has not yet been found in Ecuador, but it may very well occur there. Its characters were discussed by Maxon in detail.[20]

2. Grammitis yarumalensis (Hieron.) Proctor, Bull. Inst. Jam., Sci. Ser. 5:36. 1953.
Polypodium yarumalense Hieron. Bot. Jahrb. Engler 34:499. 1904. Type: Yarumal, Colombia, *Lehmann* 7390 (isotype US).

Range: Jamaica, Hispaniola, Panama, and Colombia.
Habitat: Epiphytic.
No Ecuadorian collections are known, but they are to be expected. These small epiphytes are easily overlooked.

3. Grammitis sprucei (Hook.) J. Smith, Hist. Fil. 181. 1875.
Polypodium sprucei Hook. Second Cent., pl. 10. 1860. Type: Tarapoto, Peru, *Spruce* 4746 (isotype US).

Range: Known only from the type.
This minute fern should be searched for in Ecuador, among mosses and hepatics on tree trunks in dense moist forests at middle elevations.

4. Grammitis serrulata (Swartz) Swartz, Journ. Bot. Schrad. 1800 (2):18. 1801.
Acrostichum serrulatum Swartz, Prodr. Veg. Ind. Occ. 128. 1788. Type: Jamaica, *Swartz.*

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[20] Proc. Biol. Soc. Washington 51:35, 36. 1938.

Xiphopteris serrulata Kaulf. Enum. Fil. 85. 1824.
Polypodium serrulatum Mett. Fil. Hort. Lips. 30. 1856, non *P. serrulatum* Swartz (1801).
Xiphopteris extensa Fée, Mém. Foug. 11:14. 1866. Type from Guadeloupe, *L'Herminier*. Non *Polypodium extensum* Forst. (1786).
Polypodium duale Maxon, Contr. U.S. Nat. Herb. 16:61. 1912. Based on *Acrostichum serrulatum* Swartz, non *Polypodium serrulatum* Swartz.

Range: Common throughout the American tropics, and also in Mauritius and tropical Africa.

Habitat: Creeping on tree trunks, or occasionally on rocks, mixed with mosses and hepatics, from sea-level to 1,300 m.

Ecuadorian specimens examined: Between Baños and Mera, Prov. Napo-Pastaza, *Mexía* 6966. El Sajado, on Río Santiago, Prov. Concepción, *Mexía* 8449. Road between Quito and Santo Domingo, Prov. Pichincha, *Haught* 3219. Eastern slope of the cordillera, between Chontal and Santa Elena, on trail from Sevilla de Oro to Mendez, Prov. Santiago-Zamora, *Camp* E–809.

5. Grammitis jamesonii (Hook.) Morton, comb. nov.

Xiphopteris jamesoni Hook. Second Cent. Ferns pl. 14. 1861. Type: Andes of Quito, Ecuador, *Jameson* (K!).
Polypodium serrulatum var. *strictissimum* Hook. Sp. Fil. 4:175. 1862. Based on *X. jamesonii* Hook.
Polypodium serrulatum var. *major* Mett. Ann. Sci. Nat. [Paris] V, 2:249. 1864. Based on *X. jamesonii* Hook.
Polypodium jamesonii Jenman, Bull. Dept. Jam. 4:112, 1897, non Mett. 1883.
Polypodium serrulatum var. *jamesonii* Krug, Bot. Jahrb. Engler 24:125. 1897. Based on *X. jamesonii* Hook.
Polypodium strictissimum Hieron. Bot. Jahrb. Engler 34:501. 1904.
Polypodium strictissimum f. *minus* Hieron. Hedw. 44:85. 1905. [as "*minor*"] Type: Quito, Ecuador, *Cuming* 5 (presumably B).

Range: Venezuela, Colombia, and Ecuador, at elevations from [1,500?] 1,800 to 3,400 m.

Habitat: Epiphytic on mossy tree trunks, or sometimes on rocks at the higher elevations.

Ecuadorian specimens examined: Along trail between Río Clavadero and the ridge 10 miles south of Las Toldadas, east of Cayambe Peak, Prov. Imbabura, *Wiggins* 10499. Boggy area east of Cayambe Peak, Prov. Imbabura, *Wiggins* 10422. Páramo and sub-páramo area north and northwest of the Páramo del Castillo, 6–8 km. NNE of Sevilla de Oro, Prov. Azuay, *Camp* E–5131.

6. Grammitis caucana (Hieron.) Morton, comb. nov.

Polypodium caucanum Hieron. Bot. Jahrb. Engler 34:503. 1904. Type: Río Dagua, Dept. Cauca, Colombia, *Lehmann* 3257 (holotype B, not seen).
Xiphopteris caucana Copel. Amer. Fern Journ. 42:98. 1952.

Range: Reported by Copeland from Nicaragua to British Guiana and Ecuador.

Habitat: Terrestrial or epiphytic, at elevations from 700 to 2,300 m.

Ecuadorian collections seen: None.

The only other species with simple veins that is likely to occur in Ecuador is *Grammitis delitescens* (Maxon) Proctor (*Polypodium delitescens* Maxon, Bull. Torr. Bot. Club 32:74. 1905; Contr. U.S. Nat. Herb. 17: 403, pl. 12, fig. 10. 1914), which is common in Jamaica, and occurs also in Central America; it has been reported from Colombia. It is a much more delicate plant, with the lamina not setose as in *G. caucana*. Maxon did not definitely designate a type; the lectotype chosen by Copeland (Amer. Fern Journ. 42:52. 1952) is Jamaica, *Maxon* 1513 (US).

7. Grammitis apheloleپis Morton, sp. nov. PLATE 1

Planta epiphytica; rhizoma breve erectum ca. 2 mm. diam. basibus stipitium exclusis, apice paleaceum, paleis pallide brunneis, anguste vel late lanceolatis, 2–3 mm. longis, 0.6–1.0 mm. latis, apice abrupte angustatis et subcuspidatis, margine integris, non setoso-ciliatis hinc inde pilis minutis, ca. 70 μ longis et 10 μ latis, septatis flaccidis capitato—glandulosis praeditis, basi ca. 14 cellulis latis, cellulis subquadratis vel rectangularibus, 55–130 μ longis, 45–55 μ latis, parietibus valde incrassatis; frondes caespitosae, 10–20 cm. longae, numerosae, stipitatae, stipitibus brunneis, 1.5–4 cm. longis, 0.3–0.5 mm. diam., dense setosis, setis 2–2.5 mm. longis, late patentibus unicellularibus, pilis minutis intermixtis nullis; laminae lineares, 7–14 cm. longae, 7–10 mm. latae, pinnatifidae, rhachi supra immersa dense setosa, subtus elevata, setosa, ala costali angusta 0.25–0.75 mm. lata, segmentis crassis, 18–35-jugis, late oblongis, 4–5 mm. longis, medio ca. 2 mm. latis, ascendentibus, apice rotundatis, margine superiore gibbosis, utrinque dense setosis, setis brunneis rigidis 2–2.5 mm. longis; venae unifurcatae; sori dorsales basi venulae anticae grandes orbiculares, non setosi, non paraphysati; annulus ex ca. 13 cellulis constitutus; sporae globoso—tetraedricae, 32–43 μ diam., sublaeves.

Type in the U.S. National Herbarium, no. 2,080,287, collected near the laguna on Páramo del Castillo, on the crest of the Eastern Cordillera on the trail between Sevilla de Oro and Mendez, Province of Azuay, Ecuador, Aug. 29, 1945, at 9,000–11,000 ft. elevation, by W. H. Camp (no. E–5107).

Paratypes (all Ecuador): Páramo and sub-páramo area north and northwest of the Páramo del Castillo, Prov. Azuay, 10,000–11,200 ft. alt., Aug. 31, 1945, *Camp* E-5139 (US); between Huagrarancha and Loma de Galápagos, Prov. Azuay, 3,140–3,505 m. alt., July 9, 1943,

Steyermark 53464 (US); near lower margin of páramo, eastern slopes of Cayambe Peak, Prov. Imbabura, 11,200 ft. alt., July 16, 1944, *Wiggins* 10,412 (US); ridge about 10 km. south of Las Toldadas, east of Cayambe Peak, Prov. Imbabura, 10,650 ft. alt., July 15, 1944, *Wiggins* 10,402 (US).

8. **Grammitis truncicola** (Klotzsch) Morton, comb. nov.

Polypodium truncicola Klotzsch, Linnaea 20:374. 1847. Type: Colonia Tovar, Venezuela, *Moritz* 252 (isotype US).

Polypodium truncicola var. *major*, Klotzsch, loc. cit. Type: *Moritz* 252. Klotzsch divided *P. truncicola* into two varieties: *major* and *minor*, the former of which must be considered as the typical variety, as was done by Copeland (Amer. Fern Journ. 42:102. 1952).

Polypodium truncicola var. *minus* Klotzsch, loc. cit. [as "*minor*"]. Type: Mérida, Venezuela, *Moritz* 333 (isotype US).

Polypodium andinum Hook. Second Cent., pl. 6. 1847. Syntypes: Banks of Río Hondacha, Andes of Quito, Ecuador, *Jameson* 780 K!, and Mount Picote, near Moyobamba, Peru, *Nilson* (*Spruce* 4780 K!). The Jameson specimen, presumably at Kew, is here designated lectotype.

Grammitis andina Ching, Bull. Fan Mem. Inst. Biol. Bot. 10:240. 1941.

Xiphopteris truncicola Copel., Amer. Fern Journ. 42:101. 1952.

Range: Costa Rica, Venezuela, Colombia, Ecuador, and Peru, from sea level (in western Colombia) to 2,300 m. elevation.

Habitat: Epiphytic in dense and damp forests.

Ecuadorian specimens examined: Apparently known in Ecuador only from the Jameson specimen cited above as lectotype of *Polypodium andinum*.

Since the species *P. truncicola* and *P. andinum* were both published in 1847 and the exact date of publication is doubtful, Copeland's decision to adopt *truncicola* must be followed. This species is distinctive because of the fronds being merely shallowly lobed and not deeply pinnatifid.

9. **Grammitis blepharolepis** (C. Chr.) Morton, comb. nov.

Polypodium gracillimum Hieron. Hedw. 48:250, pl. 12, fig. 18. 1909, non Copel. (1905). Between Quito and Mindo, Ecuador, *Stuebel* 747 (B, not seen).

Polypodium blepharolepis C. Chr. Ind. Fil. Suppl. 1:58. 1913. Based on *P. gracillimum* Hieron., non Copel.

Xiphopteris blepharolepis Copel. Amer. Fern Journ. 42:109. 1952.

Range: Venezuela, Colombia, Ecudador, and Peru [fide Copeland], at low to middle elevations.

Habitat: Epiphytic in dense forests.

Ecuadorian specimens examined: Known in Ecuador only from the type.

A related species found at low elevations in the Departments of Cauca and El Valle in Colombia that will probably be found in northern Ecuador is *Grammitis* ***daguensis*** (Hieron.) Morton, comb. nov.

[*Polypodium daguense* Hieron. Bot. Jahrb. Engler 34:504. 1904; type: Río Dagua, Dept. Cauca, Colombia, *Lehmann* 1951 (isotype US)]. It can be distinguished by the segments not being at all gibbous. Still more closely similar in its gibbous segments, but differing in having entire and not setulose-margined rhizome scales is *Grammitis trichomanoides* (Swartz) Ching, which is primarily West Indian but which occurs scatteringly elsewhere. *Polypodium undulatum* Fourn. (1872) (non Willd., 1810) was based in part on *Jameson* 537 from Ecuador, which I have not seen but which may represent *G. trichomanoides*.

10. Grammitis farinosa (Hook.) Morton, comb. nov.

Polypodium farinosum Hook. Icon. Pl. 10: pl. 947. 1854. Type: "On the trunk of an old tree at the eastern ascent of the Cordillera of Quito [Ecuador], where the forests commence; rare;" *W. Jameson* (K!, fragment US).

Ctenopteris farinosa Copel. Phil. Journ. Sci. 84:470. 1955.

Range: Colombia and Ecuador.

Habitat: Epiphyte, at elevations from 2,500 to 3,500 m.

Ecuadorian specimens examined: Eastern side of Mount Tunguragua, Prov. Tunguragua, *Rimbach* 25.

11. Grammitis eminens Morton, sp. nov. PLATE 2

Planta epiphytica; rhizoma breve, perspicue paleaceum, paleis pallide flavis, lanceolatis, ca. 3 mm. longis et 0.5 mm. latis, gradatim longe acuminatis, apice non piliformibus, clathratis, basi ca. 7-cellulis latis, margine subundulatis, non ciliatis, cellulis subrectangularibus magnis, ca. 175–250 μ longis, 50–70 μ latis, parietibus crassis pallide luteis; frondes subcaespitosae 4–8, 14–43 cm. longae, verisimiliter subdimorphae, steriles breviter stipitatae, stipitibus 1–5 cm. longis quam frondibus multo brevioribus, ca. 0.7 mm. diam., teretibus, non costatis, longe et molliter setosis, setis 1.5–2 mm. longis, ca. 20 μ latis, unicellularibus, late patentibus, pallide brunneis, setis brevioribus rigidis nullis; lamina sterilis 10–20 cm. longa, 12–24 mm. lata, pinnatifida, basi cuneata, apice acuminata, rhachi immersa late alata, ala basi 1 mm. lata, supra latiore, segmentis 20–30-jugis, ascendentibus, latis, usque ad 13 mm. longis, 3.5–5 mm. latis, basi adnatis non auriculatis, apice rotundatis, margine integris, textura crassis, supra viridibus glabris, hydathodis nullis, subtus pallidioribus, non ceraceis, fere glabris, in costa sparsissime setosis, setis elongatis curvatis paucissimis, margine in sinubus pilis minutis glandulosis sparse dissitis; frondes fertiles longe stipitatae, stipite 1/3 longitudinis laminae vel lamina fere aequali vel longiore, 5.5–18 cm. longo, 0.8–1.4 mm. diam., lamina quam sterili latiore, 14–22 cm. longa, 3–6 cm. lata, segmentis lanceatis, 16–23-jugis, maximis 5.5 cm. longis et 5–7 mm.

medio latis; venulae pinnatae, immersis, in segmentis utrinque obscuris, 9–22-jugae, ascendentes, subbasaliter furcatae, ramis margine non attingentibus, ramis venarum basalium non raro apice anastomosantibus itaque areolam formantibus, venula basalis superior fere ad sinus attingens, venula altera ex costa excurrens, furcata, ramulis saepe anastomosantibus; sori paullo submediales, dorsales, in ramula antica venularum, subrotundi, receptaculo paullo elongato; sporae sphaerico-tetraedricae, triletae, 34–39 μ diam., laeves.

Type in the New York Botanical Garden, collected in the páramo and sub-páramo area north and northwest of the Páramo del Castillo, ca. 6–8 km. NNE of Sevilla de Oro, Province of Azuay, Ecuador, at 10,000–11,200 ft. elevation, Aug. 31, 1945, by W. H. Camp (no. E–5169).

Paratypes: Near the laguna at Páramo del Castillo, crest of the eastern cordillera in the trail between Sevilla de Oro and Méndez, Province of Azuay, Ecuador, at 9,000–11,000 ft. elevation, August 29, 1945, by W. H. Camp (no. E–5102) (NY, US).

12. Grammitis trifurcata (L.) Copel. Gen. Fil. 211. 1947.

Polypodium trifurcatum L. Sp. Pl. 1084. 1753. Type: Martinique, Plumier, Tract. Fil. pl. 138.

Polypodium trifurcatum L. var. *brevipes* Hieron. Bot. Jahrb. Engler 34:500. 1904. Syntypes: Quebrada de Imbi, Río Cuaiquer, Cordillera de Pasto, Colombia, *Lehmann* 77; Farallones de Cali, Colombia, *Lehmann* 1977; Cordillera west of Cali, Colombia, *Lehmann* 7664 (isosyntype US).

Range: West Indies; Surinam and Venezuela to Bolivia, at elevations from 600 to 2000 m.

Habitat: Epiphyte in dense, wet forests.

Ecuadorian specimens examined: Río Suguibi, *Rimbach* 27. Río del Cinto, on the southern slopes of Mount Pichincha, *Stuebel* 735.

Although Copeland placed this species in *Grammitis* in his restricted sense, it is out of place there. The alliance seems to be with the species placed by Copeland in the "*curvata*" group of *Ctenopteris*.

13. Grammitis crispata (J. Smith) Morton, comb. nov.

Ctenopteris crispata J. Smith, *in* Seem. Bot. Voy. Herald 227, pl. 48. 1854. Syntypes: Isla de Cacagual, southern Darien, Panama, and Bay of Chocó, Colombia, *Seemann* 995K!

Polypodium crispatum Hook. Sp. Fil. 5:1. 1864, non L. (1753).

?*Polypodium trichosorum* Hook. Second Cent., pl. 12. 1860. Type: Forests of Archedona, Andes of Quito, Ecuador, *Jameson* 349.

Glyphotaenium crispatum J. Smith, Hist. Fil. 77, pl. 2. 1872.

?*Polypodium ecostatum* Sodiro, Crypt. Vasc. Quit. 308. 1893. Type: Forests of Los Colorados, Ecuador, *Sodiro*.

Polypodium goniopteroides C. Chr. Ind. Fil. 188. 1905; 530. 1906. Based on *Ctenopteris crispata* J. Smith, non *P. crispatum* L. (1753).

Range: Southern Panama and Colombia, probably south to Ecuador.

Habitat: Epiphytic.

If the above synonymy is correct, this species is represented in Ecuador by the types of two supposed new species, neither of which was originally associated with *Ctenopteris crispata* J. Smith. In the "Index Filicum" both are recognized as species. Copeland suggested that *Polypodium ecostatum* might be the same as his *Glyphotaenium crispatum*.

14. Grammitis semiadnata (Hook.) Morton, comb. nov.

Polypodium semiadnatum Hook. Icon. Pl. 10, pl. 948. 1854. Type: Pilzhum, Andes of Quito, Ecuador, 3,600 m., *Jameson* (K, not seen).
Ctenopteris semiadnata Copel. Phil. Journ. Sci. 84:458. 1955.

Range: Known definitely only from Ecuador. The Colombian specimens referred here by Copeland may be different.

Habitat: Epiphyte, or pendent on sides of sphagnum hummocks, at elevations from 3,000 to 3,600 m.

Ecuadorian specimens examined: Papallacta, Prov. Pichincha, 3,400 m., 1918, *Mille*. San Gabriel, Prov. Carchi, "in silva prim. pr. reg. 'páramo'," *Holmgren* 902. Boggy ciénagas 1–4 miles south of Las Toldadas, east of Cayambe Peak, Prov. Imbabura, 3,090 m., *Wiggins* 10511.

15. Grammitis intricata Morton, sp. nov. PLATE 3

Planta epiphytica; rhizoma erectum, breve, ca. 1 cm. longum, vix 2 mm. diam., paleaceum, paleis fuscis lanceolatis ca. 1.8 mm. longis, 0.4 mm. latis, 9 vel 10 cellulis latis, subobtusis, margine paullo glanduloso-pilosis, pilis brevibus crassis, obtusis, ca. 50 μ longis, 20 μ latis, clathratis, cellulis anguste rectangularibus, ca. 100 μ longis, 40 μ latis, parietibus crassissimis, luminibus angustis; frondes subfasciculatae, 25–30 cm. longae, laxae pendulae, pinnatae, stipitibus quam laminis multo brevioribus, gracilibus fuscis, 3–7 cm. longis, 0.5–0.7 mm. diam., deorsum teretibus, sursum vix alatis, parce setulosis, setis gracillimis patentibus 1.5–2 mm. longis unicellularibus, pilis 2-vel 3-septatis minutis ca. 0.5 mm. longis apice glanduliferis sparse intermixtis, rhachi gracili basi non alata, apice vix alata, fusca, supra dense brunneo-setosa, setis usque ad 3 mm. longis unicellularibus, subtus setosa atque capitato-glandulosa, pilis minutis septatis; laminae lineares, 20–26 cm. longae, 13–20 mm. latae, fere ubique pinnatae, basi paullo decrescentes, apice obtusae non pinnatifidae; pinnae 28–35-jugae, alternae, ovatae, 8–10 mm. longae, 5–7 mm. latae, horizontaliter patentes, basales distantes semiadnatae, superiores ubique adnatae, apice rotundatae, margine integrae vel leviter undulatae, textura herbaceae, vix crassae, supra setis paucissimis elongatis

marginem et apicem versus praeditae, subtus glabrae, margine parce longe setoso-ciliatae; venae immersae obscurae, costa flexuosa, venulis 3-jugis, gracilibus, omnibus infra medium furcatis vel basalibus bis furcatis, liberis, marginem non attingentibus; sori superficiales, 3-jugi, apicales in ramulo antico venarum, magni rotundi ca. 1.75 mm. diam., non setosi, non paraphysati; annulus ex ca. 15 cellulis compositus; sporae sphaerico-tetraedricae triletae, ca. 33 μ diam., fere laeves.

Type in the U.S. National Herbarium, no. 2,204,844, collected in the Cordillera Oriental, at Guamani Pass, east of Pifo, Province of Pichincha, Ecuador, Nov. 10, 1944, at 3,900 m. elevation, by Joseph A. Ewan (no. 16436). Ewan's note on the label says: "In rather deep shade of bosque thickets, the old fronds persisting to form a heavy mat beneath the current live fronds, serving to hold moisture."

Grammitis semiadnata, definitely known only from Ecuador, is a close relative. The shape and pubescence is distinctive. Copeland places this species in this group "*meridensis*," but it is hardly well placed there, for the frond is not truncate at the base, as that group is characterized.

16. Grammitis heteromorpha (Hook. & Grev.) Morton, comb. nov.

Polypodium heteromorphum Hook. & Grev. Icon. Fil. 1, pl. 108. 1829. Type: Mount Pichincha, Prov. Pichincha, Ecuador, *Jameson* K!

Ctenopteris heteromorpha Copel. Phil. Journ. Sci. 84:412. 1955.

Range: Mexico to Peru.

Habitat: In Ecuador rupicolous at higher elevations, 3,500 to 4,500 m., in Colombia epiphytic on trees on the borders of páramos, 3,000 to 3,600 m.

Ecuadorian collections examined: Volcán Antisana, Prov. Pichincha, 4,000–4,500 m., *Anthony & Tate* 282 (US). Mount Pichincha, Prov. Pichincha, 4,000 m., *Mille* (US); ibid., 4,500 m., *Stuebel* 730 (US); ibid., 4,400 m., *Firmin* 576. Mount Carihuayrazo, Prov. Tunguragua, 4,200 m., *Asplund* 8479 (US). Cayambe Peak, Prov. Imbabura, 4,050–4,350 m., *Little & Parades* 6837 (US). Cubillín, Valley of Alao, 3,500 m., *Rimbach* 76 (US). Without specific locality, *Sodiro*, *Mille*, *Couthouy* (all US).

17. Grammitis variabilis (Mett.) Morton, comb. nov.

Polypodium variabile Mett. ex Kuhn, Linnaea 36:133. 1869. Syntypes: New Granada, *Purdie* K!, and Ecuador, *Jameson* K!

Range: Colombia to Peru.

Habitat: On rocky cliffs in páramos, 3,000 to 4,200 m. elevation.

Ecuadorian specimens examined: Mount Atacatzo, Prov. Pichincha, 3,000 m., *Mille* (US).

Although reduced to a synonym of *C. heteromorpha* by Copeland, this species appears recognizable to me, differing in having the blades not forked, but rather regularly bipinnate.

18. Grammitis alfarii (Donn. Smith) Morton, comb. nov.

Polypodium alfarii Donn. Smith, Bot. Gaz. 33:262. 1902. Type: Sierra Alta de Navarro, Province of Cartago, Costa Rica, 2,000 m., May, 1901, *Alfaro* 73 (Donn. Smith 8063) (US).

Polypodium oligosorum Mett. ex Kuhn, Linnaea 36:132. 1869, non Klotzsch (1847). Syntypes: Venezuela, *Moritz* 460, *Fendler* 208, *Karsten* 10.

Rhizome epiphytic, short, slender, ca. 1 mm. in diameter, scaleless; fronds subfasciculate, crowded, 8–10, 8–13 cm. long; stipes 10–14 mm. long, very slender, only 0.1–0.2 mm. in diameter, blackish, densely long-setose; blades linear, 8–15 mm. broad, attenuate to base and apex, light green, very thin and flaccid in texture, pinnatisect, the rhachis dark above and glabrous, paler beneath and sparingly setose; segments 16–38 pairs, alternate, 3–8 mm. long, 3–5 mm. broad at base, subtriangular, the apex obtuse or rounded, the base fully adnate but twice as long adnate on the superior side as on the inferior, rounded at the upper base, short-decurrent at the lower, the lower margin somewhat sigmoid, the upper gibbous with a conspicuous hump at the base extending about half the length of the pinna, the surfaces glabrous, the margin with sparse long (0.4–0.5 mm.), dark brown setae; veins dark, near the lower surface, easily visible, not nearly reaching the margin, the midvein with 2 branches on the upper side, the lower branch elongate and extending up into the hump, sterile, the upper reduced to a short, fertile spur, on the lower side with only one branch, a short fertile spur; white lime dots not present on hydathodes above; sori 2 to a pinna normally, subcostular, borne on the apices of the short distal and proximal spurs, rotund; sporangia numerous, long-setose, the brown, acicular setae borne near the sides of the annulus.

Range: Costa Rica, Venezuela, and Ecuador, at middle elevations, 950–2,700 m.

Ecuadorian specimen examined: Eastern slopes of the cordillera, valley of Río Negro, near the junction of Río Negro and Río Pailas, Prov. Santiago-Zamora, *Prieto* (Camp E-4904) (NY, US).

In its peculiar aspect, with the blade segments much more strongly adnate above than below and with a conspicuous hump on the upper side at the base, thiss pecies is similar to *Grammitis* ***phlegmaria*** (J. Smith) Morton, comb. nov. [*Polypodium phlegmaria* J. Smith, London Journ. Bot. 1:194. 1842], which species differs strongly, however, in the presence of rhizome scales, and in the nonsetiferous margins of the segments and the glabrous sporangia.

19. Grammitis senilis (Fée) Morton, comb. nov.

Polypodium senile Fée, Mém. Foug. 7:60, pl. 25, fig. 1. 1857. Type: Ocaña, Dept. Santander, Colombia, *Schlim* 364. Cf. Maxon, Contr. U.S. Nat. Herb. 13:43. 1909.

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Ctenopteris senilis Copel. Phil. Journ. Sci. 84:398. 1955.

Range: Guatemala to Ecuador; also Cuba, and Hispaniola(?).

Habitat: Pendent epiphyte, at 1,700 to 3,200 m. elevation, or occasionally at lower altitudes.

Ecuadorian specimen examined: Valley of Río Sangarinas, Cordillera de Llanganates, Prov. of Tunguragua, 3,000 m., *Asplund* 9764 (US).

20. Grammitis dependens (Baker) Morton, comb. nov.

Polypodium dependens Baker, *in* Hook & Bak. Syn. Fil. 335. 1868. Type: Mount Pichincha, Ecuador, *Spruce* 5637 [21] (photograph Maxon 146, US).

Range: Known definitely only from Prov. Pichincha, Ecuador. Probably also in Peru and Bolivia.

Habitat: Pendent epiphyte, probably from high elevations.

Ecuadorian specimens examined: Mount Pichincha, *Mille* 6 (US). Cerro Corazón, *Sodiro* 48/20 (fragment US).

Although reduced to a synonym of *C. heteromorpha* by Copeland, it appears to me to be distinct, and probably more closely allied to *G. sericeo-lanatum*. Apparently, it never has forked fronds like *G. heteromorpha*, and the segments are different in outline.

21. Grammitis subtilis (Kunze ex Klotzsch) Morton, comb. nov.

Polypodium subtile Kunze ex Klotzsch, Linnaea 20:375. 1847. Type: Mérida, Venezuela, *Moritz* 325 (isotype US).

Ctenopteris subtilis J. Smith, Hist. Fil. 184. 1875.

Range: Guatemala to Ecuador.

Habitat: Epiphyte in forest at elevations from 1,500 to 2,400 m.

Ecuadorian specimens examined: Alégria, east of Volcán de Cayambe, Prov. Imbabura, 2,900 m., *Drew* E–170 (US).

22. Grammitis subflabelliformis (Rosenst.) Morton, comb. nov.

Polypodium subflabelliforme Rosenst. Repert. Sp. Nov. Fedde 7:306. 1909. Type: Mount Abitagua, Ecuador, *Spruce* 5271 (isotype US).

Polypodium subflabelliforme var. *minor* Rosenst. op. cit. 307. Type: Mount Tunguragua, Ecuador, *Spruce* 5272 (not seen).

Ctenopteris subflabelliformis Copel. Phil. Journ. Sci. 84:400. 1955.

Range: Known in Ecuador only from the types; reported from Peru and Bolivia by Copeland.

Habitat: Epiphyte.

23. Grammitis lehmanniana (Hieron.) Morton, comb. nov.

Polypodium lehmannianum Hieron. Bot. Jahrb. Engler 34:513. 1904. Syntypes: Near Cuaiquer and San Pablo, Cordillera de Pasto, Dept. Nariño, Colombia, 1,000–1,300 m., *Lehmann* 19 (US); between Baños and Jivaria de Piutuc, Pastaza Valley [prob. Prov. Tunguragua],

[21] Originally published as 563, in error.

Ecuador, *Stuebel* 1011. Lectotype: *Lehmann* 19, inferentially selected by Maxon, Proc. Biol. Soc. Washington 57:18. 1944.

Polypodium pastoense C. Chr. Ind. Fil. 551. 1906. Illegitimate, an unnecessary renaming of *P. lehmannianum* Hieron., non *P. lehmannii* Mett.

Polypodium sublongipes Christ, Bull. Soc. Bot. Genève II, 1:218. 1909. Type: Costa Rica, *Wercklé* in 1904 (P). Synonymy sec. Maxon, loc. cit.

Range: Guatemala to northern Ecuador.

Habitat: Epiphyte at low elevations, 300–1,300 m.

Ecuadorian specimens examined: Puyo, Prov. Napo-Pastaza, 300 m., *Mexía* 6922 (US).

Although he saw and annotated the specimens, the North American range was overlooked by Copeland in his published account, as was also the synonym *P. sublongipes*.

24. Grammitis laxa (Presl) Morton, comb. nov.

Polypodium laxum Presl, Rel. Haenk. 1:23, pl. 4, fig. 1. 1825. Type: Mountains of Peru, *Haenke* (not seen).

Range: Peru and Bolivia; not as yet known in Ecuador, but of possible occurrence.

Habitat: Epiphyte at high elevations.

Although made a synonym of *C. lanigera* by Copeland, this seems distinguishable to me. I am taking as representative: La Convención, Dept. Cuzco, Peru, 4,500–4,750 m., *Bües* 2130 (US); between Huánuco and Pampayacu, Peru, *Kanehira* 122 (US); and Yungas, Bolivia, *Bang* 483 (US); the last named was identified as *laxum* by Hieronymus.

25. Grammitis lanigera (Desv.) Morton, comb. nov., var. **lanigera**

Polypodium lanigerum Desv. Ges. Naturf. Freund. Berlin Mag. 5:316. 1811. Type: Peru, *Dombey* (P, photograph Cintract, US).

Polypodium sericeo-lanatum Hook. Sp. Fil. 4:221. 1864. Syntypes: Pichincha, Ecuador, 12,000 ft., and woods near Baños, *Jameson* 235, 73, 29, 394; mountains of Guayrapata, Ecuador, *Spruce* 5277 K!; Ocaña, Dept. Santander, Colombia, 10,000–11,000 ft., *Schlim* 313 (indicated by Hooker as aberrant). Lectotype: Ravines of Pichincha, 11,000–12,000 ft., *Jameson* 235 (K, fragment US).

Polypodium alternifolium Hook. Sp. Fil. 4:222. 1864, non Willd. (1810). Syntypes: Near Esmeraldas and between Cuenca and Guayaquil, Ecuador, 3,000–10,000 ft., *Jameson* (K, photograph US), *Hartweg* 1496 (photograph US). Lectotype: the Jameson collection (K, fragment US).

Polypodium longum C. Chr. Ind. Fil. 541. 1906. New name for *P. alternifolium* Hook., non Willd.

Ctenopteris lanigera Copel. Phil. Journ. Sci. 84:420. 1955.

Ctenopteris sericeo-lanata Copel. op. cit. 453.

Ctenopteris longa Copel. loc. cit.

Grammitis sericeo-lanata Proctor, Rhodora 63:35. 1961.

Range: Costa Rica to Bolivia; Hispaniola, Martinique.

Habitat: Epiphyte (or perhaps occasionally rupicolous) in cool forests, in Ecuador at elevations from 2,500 to 3,300 m. The altitude "3,000 feet" given by Hooker in the original description of *P. alternifolium* was surely an error.

Ecuadorian specimens examined: Mount Pichincha,Prov. Pichincha, August 1901, *Sodiro* (US) (this collection bears a note by Weatherby: "Like the type of *P. lanigerum*"; it is also a topotype of *P. sericeo-lanatum*); ibid., *Mille* 10, 11, 382, s. n. (US). Mount Tunguragua, Prov. Tunguragua, *Rimbach* 126 (US); ibid., Rosenstock, Fil. Ecuad. 33 (US). Huagrarancha, Prov. Azuay, "llashipilla," *Steyermark* 53415 (US). Pan-American Highway 40 km. south of Cuenca, Prov. Azuay, *Wiggins* 10768 (US). Baños, Prov. Tunguragua (probably), *Jameson* 29 (K, syntype of *P. sericeo-lanatum*, photograph and fragment US).

Although Copeland recognized all three species *C. lanigera*, *C. sericeo-lanatum*, and *C. longa* as distinct, and even placed the first named in a different one of his "groups," I am unable to distinguish them. There is certainly a good deal of variation, but not more than to be expected.

25a. Grammitis lanigera (Desv.) Morton var. **stella** (Copel.) Morton, comb. nov.
Ctenopteris stella Copel. Phil. Journ. Sci. 84:452. 1955. Type: Valley of Río Urubamba, Dept. of Cuzco, Peru, *Bües* A32 (US).

Range: Colombia to Peru.

Habitat: Epiphyte, at elevations from 2,750 to 3,500 m.

Ecuadorian specimens examined: Pichincha, Prov. Pichincha, *Sodiro* (US). Paramba, August 1904, *Sodiro* (US). Las Torres, Cordillera de Llanganates, Prov. Tunguragua, *Asplund* 9814. North of Páramo del Castillo, Prov. Azuay, *Camp* E–5164. La Floresta, south of Sigsipamba, on Río Blanco, Prov. Imbabura, *Wiggins* 10298.

For some reason, not stated and not clear, Copeland placed his new species *C. stella* in a different group from either *C. lanigera* or *C. sericeo-lanata*, thus having essentially the same species in three different groups. In the group in which Copeland placed it [the "Group of Ctenopteris suspensa"], *C. stella* would indeed be distinct, but it is hardly different from typical *sericeo-lanata*, which normally has some of the hairs along the rhachis beneath stellate. The var. *stella* differs only in having these hairs darker (and thus more obvious) and perhaps often somewhat longer stalked.

26. Grammitis cultrata (Willd.) Proctor, Rhodora 63:35. 1961.
Polypodium cultratum Willd. Sp. Pl. 5:187. 1810. Type: Jamaica, *Swartz* (B, Herb. Willd. 19674, photograph US).

Polypodium elasticum Bory ex Willd. Sp. Pl. 5:183. 1810. Type: Bourbon [Réunion], *Bory*.

Polypodium cultratum var. *minus* Hook. Sp. Fil. 4:190. 1864. Based on *P. elasticum* Bory.

"*Polypodium cultratum P. elasticum*" Baker, *in* Hook. & Bak. Syn. Fil. 190. 1868. (Invalid form of varital publication in binomial form.)

Ctenopteris elastica Copel. Phil. Journ. Sci. 84:426. 1955.

Range: Mexico to Peru; Greater Antilles.

Habitat: Epiphytes, at elevations from 1,350 to 3,300 m.

Ecuadorian specimens examined: Río Palora, Prov. Napo-Pastaza, 1,400 m., *Rimbach* 68 (US). Cordillera Cutucú, Prov. Santiago-Zamora, 1,350–1,650 m., *Camp* E–1322 (US). North of Páramo del Castillo, Prov. Azuay, 3,000–3,300 m., *Camp* E–5167 (US).

Copeland said that if *P. cultratum* and *P. elasticum* are the same the "prior and valid" specific epithet is *elastica*, but this is not true. Both *elasticum* and *cultratum* were published at the same time in the same work; by "prior" in such instances Copeland meant "page priority," which has nothing to do with real priority. Copeland never followed the rule in the Code for the determination of the correct specific epithet in names of the same date [1961 ed., Art. 57], namely: "The author who first unites taxa bearing epithets of the same date has the right to choose one of them, and his choice must be followed." Hooker in 1864 in reducing *P. elasticum* to a variety of *P. cultratum* (as var. *minus*) effectively made a choice between the two epithets, and he must be followed, as he has been by Christensen and others. No other author before Copeland (1955) ever made the reverse choice of adopting *elasticum* and reducing *cultratum* to synonymy.

27. Grammitis subsessilis (Baker) Morton, comb. nov.

Polypodium pteropus Hook. Sp. Fil. 4:192, pl. 275B. 1864, non Blume, 1828. Syntypes: Andes of Quito, *Jameson* 348, *Spruce* 5712; Mount Abitagua, *Spruce*; Mount Roraima, *Schomburgk*; "New Granada." *Hartweg* 1495. Since I have not seen the original collections, I refrain from selecting a lectotype.

Polypodium subsessile Baker, *in* Hook. & Bak. Syn. Fil. 329. 1868. New name for *P. pteropus* Hook. non Blume.

Ctenopteris pteropus J. Smith, Hist. Fil. 185. 1875.

Polypodium euchlorum Kunze ex Hieron. Bot. Jahrb. Engler 34:509. 1904. Type: Must be considered an illegitimate renaming of *P. subsessile* Baker, cited in synonymy, although nominally based on *P. euchlorum* Kunze ex Klotzsch, Linnaea 20:375. 1847 (nom. nud. in syn.).

Ctenopteris subsessilis Copel. Phil. Journ. Sci. 84:411. 1955.

Range: Costa Rica to Bolivia.

Habitat: Epiphyte in dense forests at elevations from 1,100 to 2,700 m. (or at low elevations of 200 m. in the Chocó region of Colombia).

Ecuadorian specimens examined: Chiguinda, East Andes of Sigsig, Prov. Azuay, 1,800 m., *Lehmann* 6517 (US). Río Palora, Prov. Napo-

Pastaza, 1,500 m., *Rimbach* 74 (US). Bobonaza, Prov. Napo-Pastaza, 1,900 m., *Fuller* 116 (US). Río Negro, Prov. Santiago-Zamora, *Prieto* (Camp E–4903) (US). Cordillera Cutucú, Prov. Santiago-Zamora, 1,400–1,500 m., *Camp* E–1169 (US). Eastern Cordillera, 1–8 km. north of Sevilla de Oro, Prov. Azuay, 2,400–2,700 m., *Camp* E–4462 (NY).

28. Grammitis jamesonioides (Fée) Morton, comb. nov.

Polypodium jamesonioides Fée, Mém. Foug. 7:59, pl. 21, fig. 4. 1857. Type: Ocaña, Dept. Santander, Colombia, *Schlim* 399 (not seen).

?*Polypodium azuayense* Sodiro, Crypt. Vasc. Quit. 323. 1893. Type: Quinoas, Prov. Azuay, Ecuador, *Rimbach* 18 (not seen).

Range: Costa Rica to Ecuador; Hispaniola.

Habitat: Pendent epiphyte, at elevations from 2,600 to 3,600 m.

Ecuadorian specimens examined: Mount Tunguragua, *Sodiro* (US). Huagrarancha, south of El Pan, Río Collay, Prov. Azuay, *Steyermark* 53380 (US). Harta-Naqua, *Espinosa* 1021 (US).

The material from Hispaniola, Costa Rica, and Panama needs to be studied further, for it is not identical with that of South America.

29. Grammitis pseudocapillaris (Rosenst.) Morton, comb. nov.

Polypodium pseudocapillare Rosenst. Meded. Rijksherb. Leiden 19:17. 1913. Type: Above Tablas, *Herzog* 2190a (isotype US).

Ctenopteris pseudocapillaris Copel. Phil. Journ. Sci. 84:407. 1955.

Range: Colombia to Bolivia.

Habitat: Epiphyte, 3,000 to 3,400 m. elevation.

Ecuadorian specimens examined: Hoyada de Galápagos, between Huagrarancha and Loma de Galápagos, Prov. Azuay, *Steyermark* 53475 (US). Páramo area north of Páramo del Castillo, Prov. Azuay, *Camp* E–5140 (US).

30. Grammitis myriophylla (Mett.) Morton, comb. nov.

?*Polypodium longisetosum* Hook. Sp. Fil. 4:225. 1864. Type: Andes of Quito, Ecuador, *Jameson* 79 (not seen).

Polypodium myriophyllum Mett. ex Hook. & Bak. Syn. Fil. 338. 1868.[22] Type: Tatanara, Peru, *Lechler* 2567 (fragment US and Morton photo, 1931).

Ctenopteris myriophylla Copel. Phil. Journ. Sci. 84:412. 1955.

Range: Ecuador to Bolivia.

Habitat: Pendent epiphyte, at elevations from 2,800 to 3,400 m.

Ecuadorian specimens examined: Trail between Río Clavadero and ridge 10 miles south of Las Toldadas, east of Cayambe, Prov. Imbabura, 3,400 m., *Wiggins* 10498 (US).

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[22] Cited by Copeland as "Mettenius, Fil. Lechler. I (1845) 6," but it is a nom. provis. at this place, the collection being referred to the Javan species *P. tenuisectum* Blume, with the remark that it might prove distinct.

31. Grammitis major (Copel.) Morton, comb. nov.

Polypodium tenuiculum var. *acrosora* Hieron., Bot. Jahrb. Engler 34:511 1904. Type: In dense forest around Yerbabuena, western slopes of the West Andes of Cuenca, Prov. Azuay, Ecuador, 2,500–2,900 m., *Lehmann* 5727 (isotype US).

Ctenopteris major Copel. Phil. Journ. Sci. 84:455. 1955. Based on *P. tenuiculum* var. *acrosora* Hieron.

Range: Known only from the type.

Habitat: Epiphyte.

Although Copeland's new species *C. major* is based solely on *P. tenuiculum* var. *acrosora* Hieron., on another page of his work (1955, p. 440) he lists this variety also under *C. tenuicula*, and adds the inexplicable comment: "The Herb. Univ. Calif. are: *Brade* 6465 (isotype of var. *brasiliense* Ros.) and *Luetzelburg* 6726, both from Rio. Veins simple, . . ." This statement is inexplicable because this species [or variety] does not occur in Brazil.

32. Grammitis tunguraguae (Rosenst.) Morton, comb. nov.

Polypodium tunguraguae Rosenst. Repert. Sp. Nov. Fedde 7:307. 1909. Type: Mount Tunguragua, Prov. Tunguragua, Ecuador, August 1857, *Spruce* (fragment of holotype US).

Ctenopteris tunguraguae (Rosenst.) Copel. Phil. Journ. Sci. 84:394. 1955.

Range: Known only from the type.

Habitat: Mossy slopes, presumably terrestrial.

33. Grammitis anfractuosa (Kunze ex Klotzsch) Proctor, Rhodora 63:35. 1961.

Polypodium anfractuosum Kunze ex Klotzsch, Linnaea 20:375. 1847. Type: Mérida, Venezuela, *Moritz* 330 (isotype US).

Polypodium saxicola Baker, Journ. Bot. Brit. & For. 15:264. 1877, non Swartz (1817). Type: "No. 84, Herb. Kew. 1877" [coll. Jenman?]. (Not seen.)

Polypodium induens Maxon, Bull. Torrey Bot. Club 32:75. 1905. Based on *P. saxicola* Baker, non Swartz.

Range: West Indies; Guatemala to Peru.

Habitat: Normally epiphytic, but occasionally on humus-covered rocks or banks, in Ecuador from 1,225 to 2,195 m. elevation.

Ecuadorian specimens examined: At confluence of Río Mapoto and Río Pastaza, Prov. Tunguragua, *Penland & Summers* 207. Junction of Río Barbara and Río Arenillas, Prov. Santiago-Zamora, *Steyermark* 53612 (US).

34. Grammitis taxifolia (L.) Proctor, Rhodora 63:35. 1961.

Polypodium taxifolium L. Sp. Pl. 1086. 1753. Type: There is no specimen in the Linnaean Herbarium, and consequently the species must be considered to be based on the cited synonym *Polypodium tenue et pendulum* Plum. (Tract. Fil. Amer. 69, pl. 89. 1705), based on a plant from Morne de la Calabasse, Martinique, *Plumier*. Topotypes in the National Herbarium (Calabasse, *Duss* 1575, 1674, 4573) agree

with the description and figure of Plumier. [The distributor of the Duss duplicates united different numbers of the collection representing the same species, and so it is impossible to tell which of the three numbers the collection represents.]

Ctenopteris taxifolia Copel. Phil. Journ. Sci. 84:447. 1955.

Range: West Indies; continental range uncertain, although reported from Costa Rica to Brazil and Bolivia.

Habitat: In Ecuador, "on rotting logs, bases of trees, and soil," at 1,500 m. elevation. Normally epiphytic at middle elevations.

Ecuadorian specimens examined: Dense jungle, El Topo, south side of Río Pastaza, between Baños and Mera, Prov. Tunguragua, *Prescott & Wiggins* 21 (US).

Quite similar in aspect to *G. semihirsuta*, differing in the nonciliate rhizome scales and in the setulose lower surface of the segments.

35. Grammitis firma (J. Smith) Morton, comb. nov.

Polypodium firmum Klotzsch, Linnaea 20:378. 1847, non Kaulf. (1827).[23] Syntypes: "In alpibus Chile, *Philippi;* Guiana angl. *Rich. Schomburgk* 1170." Looser (Revista Universitaria [Chile] 36[1]:75. 1951) chose the Schomburgk collection as lectotype, as others have before him inferentially (e.g. Maxon, Proc. Biol. Soc. Washington 52:119. 1939), on the basis that the Chilean record is doubtful, perhaps erroneous, since the species has never again been found in Chile.

Ctenopteris firma J. Smith, Hist. Fil. 184. 1875. Considered a new name for *P. firmum* Klotzsch, non Kaulf.

Polypodium aromaticum Maxon, Proc. U.S. Nat. Mus. 27:743. 1904. Type: Blue Mountain Peak, Jamaica, 1,950–2,225 m., *Underwood* 1449 (fragment US).

Ctenopteris aromatica Copel. Phil. Journ. Sci. 84:418. 1955. (Illegit., because the earliest legitimate epithet *firma* was not adopted.)

Range: Jamaica: Guatemala to Bolivia (and Chile?).

Habitat: Epiphyte.

Not known as yet from Ecuador, but since it is found both north and south, it is likely to be found there.

36. Grammitis vernicosa (Copel.) Morton, comb. nov.

Ctenopteris vernicosa Copel. Phil. Journ. Sci. 84:452. 1955. Syntypes Alto de la Estrella, Costa Rica, *Standley* 39140 (US). "Canaan," Mount Puracé, Dept. El Cauca, 3,100–3,300 m., *Pennell & Killip* 6638 (US). Western Cordillera, Ecuador, 2,500 m., *Rimbach* 303 (US). Lectotype: *Standley* 39140 (although not so indicated in the published work, Copeland indicated the Standley specimen as type on the sheet).

Range: Costa Rica to Ecuador.

Habitat: Epiphyte, at elevations from 2,500 to 3,300 m.

Additional Ecuadorian specimens examined: Outskirts of Pifo, Prov. Pichincha, 2,500 m., *Mexía* 7353a.

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[23] *P. firmum* Kaulf. is wrongly said by Copeland to be a *nomen nudum*. It is a legitimately published renaming of *P. attenuatum* R. Brown, non Willd., which was previously renamed *P. brownii* Wikstr. (1825).

37. Grammitis pichinchensis (Hieron.) Morton, comb. nov.

Polypodium subscabrum sensu Hook. Sp. Fil. 4:183, pl. 274A. 1864, pro parte, non Klotzsch (1847).

Polypodium pichinchense Hieron. Bot. Jahrb. Engler 34:506. 1904. Syntypes: Ecuador, in declivibus occasum solis spectantibus ad truncos arborum, alt. s.m.c. 3,000–3,400 m., May 1862, *Jameson;* in regione urbis Quito, *Cuming* 32 p.p. Lectotype: *Jameson* (B, probable isosyntype US).

Polypodium ecuadorense C. Chr. Ind. Fil. 524. 1906. Illegitimate renaming of *P. pichinchense* Hieron., non *P. pichinchae* Sodiro. The epithets, although similar, must be considered different under the Code.

Ctenopteris ecuadorensis Copel. Phil. Journ. Sci. 84:434. 1955. (Illegit.)

Range: Known only from Ecuador.

Habitat: Epiphyte, at elevations from 2,800 to 3,500 m.

Ecuadorian specimens examined: Sin. loc., 3,000 m., *Sodiro.* Pichincha, Prov. Pichincha, March, 1903, *Sodiro.* Mount Tunguragua, Prov. Tunguragua, *Rimbach* 26, 129; ibid. Rosenst. Fil. Ecuad. 37. Sin. loc., 2,800 m., August 1918, *Mille* 4; ibid., 3,180 m., March 8, 1921, *Popenoe.* Volcán Atacatzo, 3,200 m., 1918, *Mille;* ibid., 3,400 m., 1919, *Mille.* "San Miguel," margin of páramo between Atuntiaqui and Hacienda Piñon, Prov. Imbabura, *Wiggins* 10325. Tipicocha, border of Prov. Chimborazo and Cañar, *Camp* E–4075. Páramo north of Páramo del Castillo, Prov. Azuay, *Camp* E–5183.

Polypodium ecuadorense is recognized on page 434 of Copeland's treatment as a valid species (and transferred to *Ctenopteris*) and on page 455 it is reduced to the synonymy of *C. pichinchae*, another instance of the extreme carelessness of Copeland's work. Since it is actually not very close to *C. pichinchae*, he very likely intended to recognize it as distinct but was misled by the similarity of the names *P. pichinchae* and *P. pichinchense.*

38. Grammitis cuencana (Hieron.) Morton, comb. nov.

Polypodium cuencanum Hieron. Bot. Jahrb. Engler 34:505. 1904. Type: Near Chagal and Yerbabuena, Western Cordillera of Cuenca, Prov. of Azuay, Ecuador, *Lehmann* 5728 (isotype US).

Ctenopteris cuencana Copel. Phil. Journ. Sci. 84:396. 1955.

Range: Known only from the type.

Habitat: Epiphytic in dense forest, at 2,400 to 2,800 m. elevation.

39. Grammitis pichinchae (Sodiro) Morton, comb. nov.

Polypodium pichinchae Sodiro, Crypt. Vasc. Quit. 329. 1893. Type: Mount Pichincha, Prov. Pichincha, Ecuador, *Sodiro* (not seen).

Ctenopteris pichinchae Copel. Phil. Journ. Sci. 84:455. 1955.

Range: Known only from northern and eastern Ecuador.

Habitat: Epiphyte, at elevations of 3,000 to 3,200 m.

Ecuadorian specimens examined: Papallacta, Prov. Pichincha, December 1923, *Mille*. Mount Tunguragua, Prov. Tunguragua, August 1903, *Sodiro*; ibid., *Rimbach* 127a, 131, 131a. Between Río Clavadero and ridge 10 miles south of Las Toldadas, east of Cayambe, Prov. Imbabura, *Wiggins* 10495. Junction of Río Itzintza and Río Chupiasa, Cordillera Cutucú, Prov. Santiago-Zamora, 3,500 ft., *Camp* E–1394 (NY).

40. Grammitis attenuatissima (Copel.) Morton, comb. nov.

Ctenopteris attenuatissima Copel. Phil. Journ. Sci. 84:456. 1955. Type: Mount Tunguragua, Prov. Tunguragua, Ecuador, December 1904, *Sodiro* (orig. distr. as *P. taxifolium* L.) (US).

Range: Known only from Ecuador.

Habitat: Epiphyte, at elevations from 3,200 to 3,300 m.

Additional Ecuadorian specimens examined: Western Cordillera of Riobamba, Prov. Chimborazo, *Rimbach* 22. Río Luguibi [?], *Rimbach* 113a.

41. Grammitis leucosticta (J. Smith) Morton, comb. nov.

Polypodium leucosticta Fée, Gen. Fil. 240. 1852, non *P. leucosticton* Kunze ex Klotzsch (1847). Type: Quito, Ecuador, *Jameson* (possible isotype US, *Jameson*, sin. loc.)

Ctenopteris leucosticta J. Smith, Hist. Fil. 184. 1875. To be considered a new name for *P. leucosticta* Fée, non Kunze, rather than a transfer.

Polypodium longiusculum C. Chr. Ind. Fil. 541. 1906. New name for *P. leucosticta* Fée.

Ctenopteris longiuscula Copel. Phil. Journ. Sci. 84:456. 1955. (Illegit., being superfluous, the name *C. leucosticta* J. Smith being available.)

Range: Ecuador and Peru.

Habitat: On banks at middle and high elevations.

Ecuadorian specimens examined: [Volcán] Pichincha, Prov. Pichincha, 1864, *Jameson* (US); ibid., *Sodiro* 26/54; ibid., April 1921, *Mille* 12; ibid., September, 1890, *Sodiro*. [Cerro] Igualata, Prov. Tunguragua, 2,800 m., July 1915, *Mille*. Along the Rio Matadero, west of Cuenca, Prov. Azuay, 10,000–10,500 ft., Mar. 3, 1945, *Camp* E–2001 (NY).

42. Grammitis alsopteris Morton, sp. nov. PLATE 4

Planta epiphytica; rhizoma ascendens, breve, crassum, apice paleaceum, paleis brunneis vix rigidis, anguste lanceolatis 3–5 mm. longis, medio ca. 0.5 mm. latis, acuminatis, apice piliformibus, ca. 13 cellulis latis, cellulis modice elongatis subrectangularibus 80–160 μ longis, ca. 38 μ latis, parietibus modo crassis brunneis, margine evidenter ciliatis, ciliis usque ad 0.25 mm. longis patentibus vel superioribus plus minusve adscendentibus, gradatim acuminatissimis, pallide brunneis, unicellularibus; frondes ca. 5, subcaespitosae, usque ad ca. 50 cm. longae et 7 cm. latae; stipites 8–13 cm. longi, crassi, ca. 1.8 mm. diam., fusci, teretes, non alati vel costati, ubique

dense setosi, setis patentibus rigidis brevioribus ca. 0.25 mm. longis, longioribus paucis ca. 1 mm. longis; laminae lanceolatae pinnatisectae basi vix angustiores vel interdum pinnis 2 vel 3 reductis, apice breviter acuminatae, rhachi crassa basi ca. 1.5 mm. diam., fusca, dense breviter setosa supra et infra, cum setis elongatis tenuibus ca. 2 mm. longis intermixtis; segmenta numerosa plus quam 50-jugata, alterna vel subopposita anguste elongata, 2–4.5 cm. longa, 3–3.5 mm. lata, margine leviter revoluta, non ciliata, apice rotundata vel vix acuta, basi adnata, lateribus subparallelis integris, supra pallide viridia glabra, hydathodis calcareis submarginalibus conspicuis praedita, subtus in costa setosa, in superficiebus minute setulosa, setulis brunneis patentibus rigidis vix 100–150 μ longis; venae numerosae 20–30-jugatae, angulo acuto excurrentes, simplices; sori uniseriati submarginales rotundi in venulis terminales, non paraphysati; annulus ex 12 vel 13 cellulis compositus; sporae sphaerico-tetraedricae, ca. 36 μ diam., superficebus levissime tuberculatae.

Type in the U.S. National Herbarium, no. 1,691,374, collected on tree trunk at Hacienda La Mascota, Canton Mera, Province of Napo-Pastaza, Ecuador, Feb. 28, 1935, at 900 m. elevation, by Ynes Mexía (no. 7013) (originally distributed as *Polypodium semihirsutum*).

The following Ecuadorian specimens, all more or less poor or fragmentary, are probably referable here: Río Savonilla and Zamora, eastern Andes of Loja, 600–1,200 m. alt., Nov. 1876, *Lehmann* LXXXV; Eastern Cordillera, between Ona and Río Yacuambi, Prov. Azuay, 8,000–9,500 ft. alt., Sept. 10–19, 1945, *F. Prieto* P–217; Carmen, 7,500 ft. alt., Nov. 13, 1953–June 18, 1954, *Tate* 488.

This species was included by Copeland in his *Ctenopteris semihirsuta* (Klotzsch) Copel., but it seems sufficiently distinct by the characters noted in the key.

43. Grammitis semihirsuta (Klotzsch) Morton, comb. nov.

Polypodium semihirsutum Klotzsch, Linnaea 20:379. 1847. Type: Peru, *Ruiz & Pavon* (isotypes US).

Range: Mexico to Bolivia and Brazil; Jamaica, Hispaniola.

Habitat: Epiphyte, at elevations from 1,400 to 3,300 m. At the highest elevations, on the margins of páramos, said to be sometimes terrestrial.

Ecuadorian specimens examined: Mount Tunguragua, Prov. Tunguragua, December 1904, *Sodiro* (US); ibid., 3,000 m., *Popenoe* (US). Mount Pichincha, Prov. Pichincha, 2,500 m., *Mille* 13 (US). Lloa Valley, near Quito, *Mille* (US). Ayapamba [prob. Prov. El Oro], *Rose* 23460 (US). Río Palora, Prov. Napo-Pastaza, 1,400 m., *Rimbach* 69 (US). Margin of páramo between Atuntiaqui and Hacienda Piñon, Prov. Imbabura, 3,300 m., *Wiggins* 10331 (US).

44. Grammitis rigens (Maxon) Proctor, Brit. Fern Gaz. 9:219. 1965.
Polypodium rigens Maxon, Proc. U.S. Nat. Mus. 27:741. 1904. Type: John Crow Peak, Jamaica, 1,650–1,800 m., *Maxon* 1346 (US).
Ctenopteris rigens Copel. Phil. Journ. Sci. 84:422. 1955.

Range: Greater Antilles; Guatemala to Peru.

Habitat: Epiphyte on mossy trunks, at middle elevations, 1,500–3,000 m.

This species is not known definitely from Ecuador, but it is to be expected. It is very close indeed to *Grammitis* ***pilosissima*** (Mart. & Gal.) Morton, comb. nov. (*Polypodium pilosissimum* Mart. & Gal. Mem. Acad. Brux. 15:39, pl. 9, fig. 2. 1842) described from Mexico, which is, however, saxicolous or terrestrial rather than epiphytic, and which also has darker and more numerous setae on the surfaces and margins; however, its distinctness is by no means certain.

45. Grammitis pseudonutans (Christ & Rosenst.) Morton, comb. nov.
Polypodium pseudonutans Christ & Rosenst. Repert. Sp. Nov. Fedde 5:15. 1908. Type: On trees, slopes of Mount Tunguragua, Prov. Tunguragua, 3,000 m., *Rimbach* (isotype, US).
Ctenopteris pseudonutans Copel. Phil. Journ. Sci. 84:389. 1955.

Range: Ecuador (Prov. of Carchi, Imbabura, and Tunguragua), and Colombia (Páramo del Tábano, Dept. Nariño, 3,200 m., *Cuatrecasas* 11920 (US).

Habitat: Epiphyte in forest or at lower margins of páramos, 3,000 to 3,200 m. elevation.

Ecuadorian specimens examined: Epiphytic, near lower margin of páramo, eastern slopes of Cayambe Peak, alt. 10,900 ft., Prov. Imbabura, *Wiggins* 10,407 (US). Small forms probably referable here are: tree trunk in dense forest, Hacienda La Rinconada, on trail between Morán and Olivos, Canton Espejo, Prov. Carchi, alt. 3,200 m., *Mexía* 7453 (US); base of tree ferns southeastern slopes of Volcán de Chile, near Tufino, Prov. Carchi, alt. 11,200 ft., *Wiggins* 10,619 (US).

Copeland did not clearly understand *G. pseudonutans*, which can be distinguished from *G. sodiroi* and other similar species by its thicker rhizome (2–2.5 mm. in diameter), rhizome scales without elongate, hairlike tips, stipe 2-ridged at summit above, lower pinnae much broader than long, setae not confined to sori, and so forth. *Cuatrecasas* 11920 and *Wiggins* 10407 were identified by Copeland as *sodiroi*, *Wiggins* 10619 as *rigescens*, and *Mexía* 7453 as *megaloura*, a quite different plant known otherwise only from the type from Guatemala.

46. Grammitis sodiroi (Christ & Rosenst.) Morton, comb. nov.
Polypodium sodiroi Christ & Rosenst. Repert. Sp. Nov. Fedde 5:14. 1908. Type: On tree trunks, Mount Tunguragua, Prov. Tunguragua, Ecuador, 3,500 m., *Rimbach* 24 (isotype US).

Range: Confined to Ecuador and known definitely only from Volcán Tunguragua, but two other somewhat aberrant specimens may be referable here: near Tipococha, Prov. Chimborazo-Cañar border, *Camp* E–4076; Hacienda Piñon, Prov. Imbabura, *Wiggins* 10359.

Habitat: Epiphyte in forest, 2,900 to 3,600 m. elevation.

47. Grammitis wolfii (Hieron.) Morton, comb. nov.

Polypodium wolfii Hieron. Hedwigia 48:249. 1909. Type: Near Mindo, at base of Mount Pichincha, Prov. Pichincha, *Stuebel* 745 (not seen).

Range: Known only from the type.

This species was overlooked by Copeland. From the description, it appears to be a valid species of the group of *G. moniliformis*.

48. Grammitis flabelliformis (Poir.) Morton, Contr. U.S. Nat. Herb. 38:57. 1967

Polypodium flabelliforme Poir., in Lam. Encycl. Meth. 5:519. 1804

Polypodium rigescens Bory ex Willd. Sp. Pl. 5:183. 1810. Type: Bourbon [Réunion], *Bory*.

Ctenopteris rigescens J. Smith, Hist. Fil. 184. 1875.

Range: Réunion; high mountains of Kenya, Tanganyika, Uganda, Nyasaland, and Congo; Hispaniola (one known collection); Venezuela along the Andes to Peru (and Bolivia?); Brazil.

Habitat: Perhaps variable. All the African material is epiphytic, including the type; all the American appears to be terrestrial or saxicolous, growing in páramos at elevations from 2,500 to 4,200 m.

Ecuadorian specimens examined: Pichincha: Mount Pichincha, 2,500 m., *Mille*. Volcán Atacatzo, 3,800 m., *Mille;* ibid., 4,200 m., *Firmin* 539.

Some of the American collections, including the Ecuadorian ones, appear to be slightly different from the African in having a more slender rhizome, less than 1 mm. in diameter, but this does not seem to hold in all regions. The species is exceedingly close to *G. moniliformis*, differing chiefly in having the segments more elongate, about twice as long as wide.

49. Grammitis peruviana (Desv.) Morton, comb. nov.

Polypodium peruvianum Desv. Mém. Soc. Linn. Paris 6:231. 1827. Type from Peru.

Ctenopteris peruviana J. Smith, Hist. Fil. 184. 1875.

Range: Ecuador to Bolivia; reported from Brazil and Argentina by Copeland.

Habitat: On rocks in páramos, 3,400 to 4,200 meters elevation.

Ecuadorian specimens examined: On rocks around Huasi-huaico, in Andes west of Cuenca, Prov. Azuay, 3,000–3,200 m., *Lehmann* 5006 (US).

50. Grammitis moniliformis (Lagasca ex Swartz) Proctor, Brit. Fern Gaz. 9:219. 1965.

Polypodium moniliforme Lagasca ex Swartz, Syn. Fil. 33. 1806. Type from Peru [*Ruiz & Pavon* ?].

Polypodium subcrenatum Hook. Icon. Pl. 8: pl. 719. 1848 [1845 teste Ind Fil.]. Andes of Quito, Ecuador, *Jameson* 215.
Ctenopteris moniliformis J. Smith, Hist. Fil. 184. 1875.

Range: Mexico to Bolivia; Greater Antilles.
Habitat: On mossy banks, at elevations from 2,300 to 3,900 m.

Ecuadorian specimens examined: Cerro Villanaco, Prov. Loja, *Wiggins* 10967. Between Loja and Portovelo, Prov. Loja [?], *Rose* 23314. Headwaters of Río Mangán, northeast of Azogues, Prov. Cañar, *Fosberg & Prieto* 22812. Páramo in vicinity of Cañar, Prov. Cañar, *Rose* 22757. Between Ona and Cuenca, Prov. Azuay, *Hitchcock* 21627. Páramo Tinajillas, 44 km. south of Cuenca, Prov. Azuay, *Wiggins* 10783 (NY, US). Above Sayaus, east of Cuenca, *Correll* E360. Along Río Matadero, west of Cuenca, Prov. Azuay, *Camp* E–1999. Páramos, vicinity of Toreador, between Molleturo and Quinoas, Prov. Azuay, *Steyermark* 53013. Nabón, Prov. Azuay, *Rose* 22999. Along Río Saloya, between Volcán Atacasp and Volcán Pichincha, Prov. Pichincha, *Steyermark* 52492. Páramo, 25 km. southwest of Quito, Prov. Pichincha, *Wiggins* 10253. Mount Pichincha, Prov. Pichincha, 1921, *Mille*. Río Silente, Volcán Corazón, Prov. Pichincha, *Lehmann* 408. Sin. loc., March 1921, *Mille* 5.

This is the commonest species of the group in Ecuador, judging from the number of collections, and it is also the most widely distributed. It is the one common truly terrestrial species, most of the others being either saxicolous or epiphytic.

51. Grammitis rosarum (Copel.) Morton, comb. nov.
Ctenopteris rosarum Copel. Phil. Journ, Sci. 84:387. 1955. Type: Vicinity of Huigra, Dept. of Chimborazo, Ecuador, *Rose* 22232 (US).

Range: Known from Ecuador from the type and one other collection (Carmen, Dept. of Bolivar, *Tate* 480) and from one collection from the Department of Antioquia, Colombia (*Daniel* 615).
Habitat: Not definitely known. Presumably terrestrial or saxicolous, at middle elevations.

52. Grammitis assurgens (Maxon) Morton, comb. nov.
Polypodium assurgens Maxon, Contr. Gray Herb. 165:73. 1947. Type: Quito-Santo Domingo road, Province of Pichincha, Ecuador, April 5, 1942, *Haught* 3226 (US).
Ctenopteris assurgens Copel. Phil. Journ. Sci. 84:386. 1955.

Range: Known from the type collection only in Ecuador, three collections from the Department of Cuzco, Peru, and two from Cerro Tatama, Department of Caldas, Colombia.
Habitat: Terrestrial on rocky or mossy banks or in grassy páramos, at elevations from 2,300 to 3,700 m.

Dubious Species

Polypodium curvans Mett. Ann. Sci. Nat. [Paris] V, 2:253. 1864.
Polypodium curvatum sensu Mett. Abh. Senck. Naturf. Ges. 2:58. 1857, non Swartz (1801).

Type: Peru, *Lechler*.

Placed in the synonymy of *C. curvata* by Copeland, but that can hardly be right. A specimen identified as *P. curvans* is Riobamba, Ecuador, 3,200 m., *Rimbach* 332; the material that I have seen is fragmentary. According to Dr. A. Murray Evans, *P. curvans* belongs in *Polypodium* and not *Grammitis*.

Polypodium melanopus Hook. & Grev. Bot. Misc. 3:384, pl. 111. 1833.
Ctenopteris melanopus Copel. Phil. Journ. Sci. 84:404. 1955.

Type: "Hanging vertically from the trunks of trees at Lurencucho [Surucucho], near Cuenca, at an elevation of about 9000 feet above the level of the sea, Prof. W. Jameson." (not seen).

From the description and figure, the species is dubious to me, as it was also to Copeland.

Polypodium oligosorum Mett. ex Kuhn, Linnaea 36:132. 1869, non Klotzsch, 1847.

Syntypes: Venezuela, *Moritz* 460, *Fendler* 208, *Karsten* 10.

A specimen that has been referred here is Ecuador, *Jameson* 790, p.p.; it is too fragmentary for identification, cf. p. 103.

Polypodium pilosissimum Mart. & Gal. var. **tunguraguense** Hieron. Hedw, 48:252. 1909 (as "*tunguraguensis*").

"Differt a forma typica foliis majoribus, usque ad ½ m longis; petiolis in speciminibus c. usque ad 1½ dm longis; laminis 30–43 cm longis, usque ad 3 cm latis; pinnis et segmentis usque ad 1½ cm longis, 5–6 mm basi latis, quam in forma typica latioribus; soris majoribus, usque ad 1½ mm diametientibus.—Rhizoma deest.

"An melius species propria (*P. tunguraguense* Hieron.)?

"Aequatoria: habitat ad radices montis Tunguragua prope Baños in valle Pastaza (n. 844a)."

A fragment of the holotype (*Stuebel* 844a) and a drawing by Brause were received by Dr. Maxon from Berlin, but the material is not adequate to place this plant, which does not seem to be exactly matched among the specimens in the U.S. National Herbarium. It is certainly not a variety of *P. pilosissimum* Mart. & Gal., and may well represent a new species, as indicated tentatively by Hieronymus.

?**Gymnogramma sinuata** Moore ex Baker, Ann. Bot. 5:483. 1891, non Presl, 1836.

Type: Andes of Quito, Ecuador, *Jameson* (holotype, K).

Dr. Jarrett has kindly examined the type and reports that the

frond is membranous and coarsely lobed; the sori are superficial, linear and up to 6 mm. long, and lie on the main vein-branches; the veins are free, with lax, pinnately arranged branches; at the point where the main vein to each lobe is given off from the midrib there is a vein directed toward the sinus. The name *G. sinuata* Moore is illegitimate, being a later homonym, and so cannot affect the name of any of the species accepted in this treatment.

The following names, overlooked by Copeland in his treatment of *Ctenopteris*, apparently are referable to *Grammitis*, but they cannot be placed definitely without an examination of the types, which are not available for consultation. Father Bosco's types were originally at the Istituto Salesiano S. Michele, Foglizzo, Italy, but their present location is uncertain. Dr. R. E. G. Pichi-Sermollii is attempting to locate them. Inasmuch as the original descriptions are not everywhere readily available they are reproduced below. The names were all based on collections of Father Crespi from Ecuador. The plants of this collection were so wildly identified that one cannot be sure that they are even in the right genus. For instance, the plant described as *Polypodium induens* var. *subdentatum* Bosco, which should be a *Grammitis*, is actually a synonym of *Dryopteris pusilla* (Mett.) Kuntze, as shown by an isotype in the U.S. National Herbarium. Father Bosco kindly sent to the National Herbarium a duplicate set of the Crespi collections, but unfortunately there were no duplicates available for a number of the reputed new species and varieties.

Polypodium allioni Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:150. 1938.

"Species rhizomate legnoso, squamibus numerosis, lanceolatis, castaneis, caducis vestito; stipitibus remotis, subglabris, nigrescentibus, 4–6 cm. longis; frondibus coriaceis, oblongo-ovatis, in apicem acutum desinentibus, 25–40 cm. longis, 3–6 cm. latis, usque ad rachim crassam, nigram ac pilosam divisis in foliola ligulata, subacuta, integra, basi dilatata in rachim decurrentia; inferiora diminuta, paulatim orbicularia, superiora vero in apicem linearem, acutum, integrum desinentia; venis mediis nigricantibus patentibus, parvulis, venis secundariis immersis, haud visibilibus; soris 6–9 ex utraque inferiorum venarum parte singularum foliarum positis, crassis, fere contiguis.

"Hab.—Epiphyta in Paramos de Potrerillos (3200 m.) et ad Plan de Sapote (2100 m.).

"Nota.—S'avvicina al *P. mollissimum* Fée, da cui però differisce specialmente per le fronde coriacee e molto più sviluppate; e al *P. alternifolium* Hk. da cui differisce per le foglioline fra loro riunite per la base decorrente sulla rachide, stipiti e rachidi più robusti, sori piuttosto più vicini al nervo medio che al margine.

"Dedico questa specie al Missionario Salesiano, Padre M. Allioni, botanico e insigne esploratore dell'Equatore Orientale."

Polypodium crespianum Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:150. 1938.

"Specie stipitibus ut rachibus nigricantibus, permultis pilibus setiformibus obtectis; frondibus 40–60 cm. longis, 5–8 cm. latis, oblongo-lanceolatis, basim versus et ad apicem gradatim diminutis; membranaceo-coriaceis, flaccidis, pendulis, in superiori pagina foliarum pilis tenuibus, subrubris et sericeis obtectis, in inferiori vero pilis albescentibus, lanosis, copiose obtectis; usque ad rachim in foliola ligulata, subacuta divisis, inter se basi dilatata et in rachim decurrente reunitis, gradatim ad apicem distantibus, in quo paulatim foliola acuta vel irregulariter circinnata fiunt et pilosissima; venis immersis, vena media parum visibili, caeteris invisibilibus; soris 10–12 in utraque parte inferioris omnium foliarum paginae dispositis, vena media et margine aequaliter distantibus, in densis pilis nidulantibus.

"Hab.—Epiphyta in silvis regionis nomine Plan de Sapote (2100 m.).

"Nota.—È una specie le cui dimensioni e l'aspetto generale fanno pensare al *P. sericeo-lanatum* Hk. da cui però differisce sia per la maggior quantità di peli sulla pagina inferiore delle foglioline, sia per l'aspetto dei sori, le venuzze affatto invisibili, causa i molti peli che ricoprono le foglioline e le rachidi più grosse."

Polypodium moniliforme Lag. ex Swartz var. **culebriliense** Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:149. 1938.

"Differt a typo stipitibus longius distantibus inter se et brevissimis; lamina 8–15 cm. longa, 3–5 cm. lata, in apicem acutum, serrulatum desinente; segmentis triangularibus, subacutis; soris unicis in omni segmento, crassis, totam fere foliarum paginam inferiorem tegentibus.

"Hab.—In humidis petris ad Paramos de Culebrilla (3500 m.)

"Nota.—È una specie questa diffusa dal Messico al Cile e di cui esistono già, oltre il tipo, altre due varietà: *Peruvianum* Desv. del Perù e del Venezuela e *Rigescens* Bory dell'Equatore, Cile, Brasile, Cuba, Isola Fernando Po. A queste aggiungo ora la varietà Culebriliense v. n. la quale differisce dalle altre specialmente per le dimensioni e la forma delle foglioline.

"La collezione che no tra mano ha esemplari, della forma tipica e delle altre varietà, esclusa la *Peruvianum* Desv. la quale continua ad essere ancora endemica del Perù e del Venezuela."

Polypodium subsessile Baker ex Hook. & Bak. var. **longipinnatum** Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:151. 1938.

"Frondes glabrae; pinnae lineares, filiformes, mediae 3–5 cm. longae; sori inter se adpropinquantes immo confluentes et total inferiorem foliarum paginam obtegentes.

"Hab.—Epiphyta, prope viam quae a regione nomine Indanza (950 m.) ducit ad flumen Santiago (540 m.)."

Polypodium tonellii Bosco, Nu. Giorn. Bot. Ital., n. ser., 45:148. 1938.

"Rhizoma tenue, erectum; squamibus parvis et paleis fulvo-castaneis vestitum; stipites brevissimi (1–2 cm. longi), fasciculati, paleis numerosis, erectis, tenuibus ut in rachibus et in margine segmentorum quibus est quasi corona vestiti; fronda 10–12 cm. longa, sublinearis, acuminata, basin versus gradatim decrescens, 3–5 mm. lata, acuminata, pennato-partita; segmenta triangularia, acuta, inter se separata senibus concavis, a suis basibus productis; venae immersae, haud visibiles, sori subrotundi, crassi, ad costam mediam adpressi, fere totam segmentorum paginam inferiorem obtengentes.

"Hab.—In terris humidis ad Plan de Sapote (2100 m.) et Plan de Milagro (1500 m.).

"Nota.—Per le dimensioni parrebbe il *P. serrulatum* Mett. dal quale però si differenzia sia per la copiosità di peli, sia per i sori non affatto confluenti e uno su tutti i segmenti, e non raggruppati nella metà superiore delle foglie; oltre anche alla forma dei segmenti. Differisce pure bene dal *P. Truncicula* Klotzs. al cui gruppo appartiene.

"Dedico questa specie al Rev. Prof. A. Tonelli già Insegnante ordinario di Scienze Naturali al Liceo Pareggiato "Don Bosco" in Valsalice (Torino), il conservò con cura la presente collezione e ne incitò lo studio (1)."[24]

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[24] "(1) Defunto il 3-1-1938. Di Lui rimangono pubblicazioni di etnologia e glottologia di alcune tribù del Brasile e specialmente studi notevoli e pregiati sul valore scientifico e sull'autenticità della S. Sindone che si conserva nel Duomo di Torino."

PLANTS OF ECUADOR

W. H. Camp, No. E- 5107 29 Aug 45

Epiphyte.

Near the laguna.

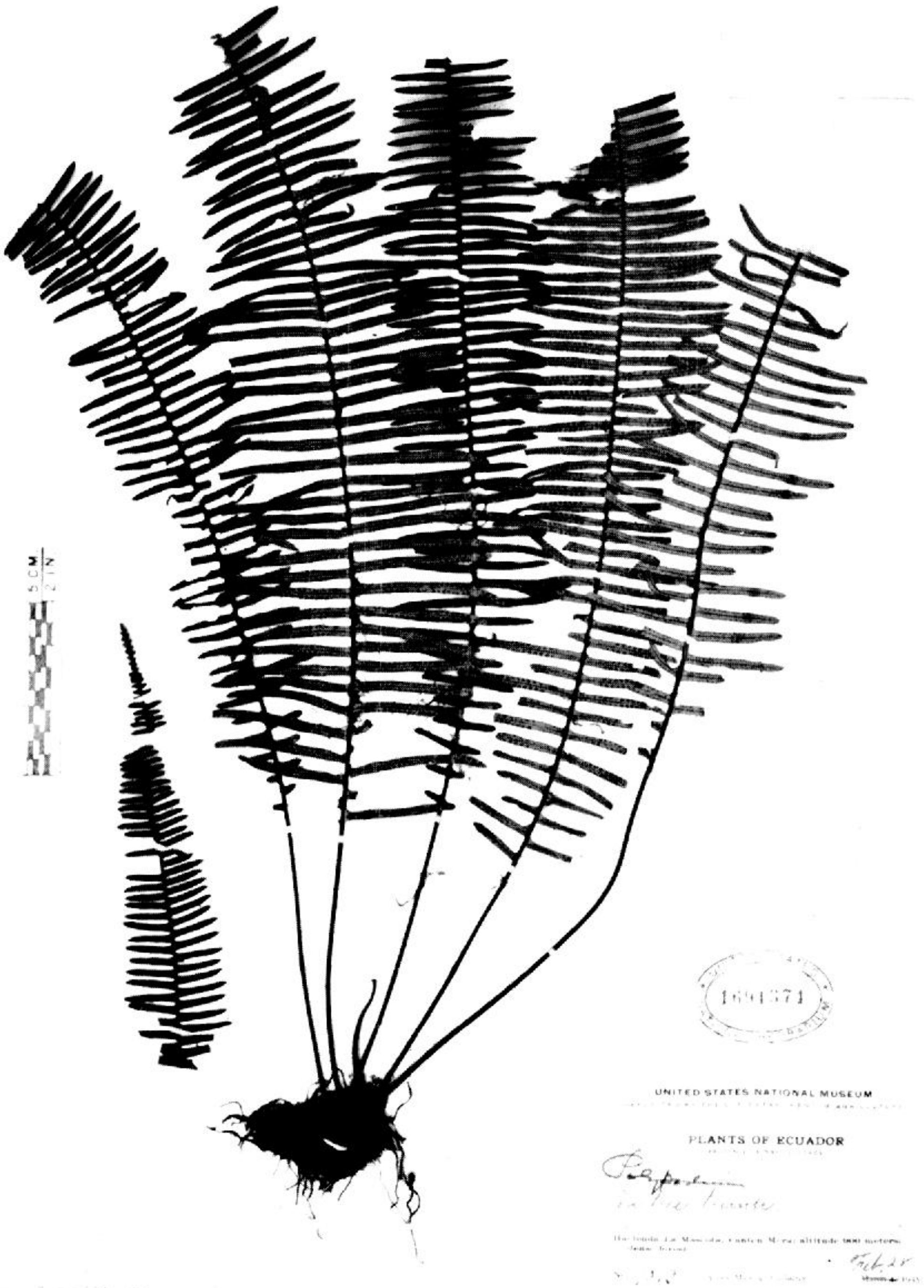
PROV. AZUAY—"ORIENTE" BORDER: Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez); 9,000–11,000 ft. elev.

Distributed by the New York Botanical Garden

Holotype of *Grammitis apheloleپis* Morton

Holotype of *Grammitis eminens* Morton

Holotype of *Grammitis intricata* Morton



Holotype of *Grammitis alsopteris* Morton

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[Synonyms in *italics*. New species, new names, and new combinations in **boldface**. Page numbers of principal entries in *italics*.]

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