

(empty); circle at base marks insertion point. (e) Largest measured antheridium (empty). (f) Detail of oogonium in fig. a, showing gelatinous plug. (g) Broken end of a filament showing the dual nature of the wall: outer wall slightly tinged with yellow, inner wall hyaline. (h) Stratified cellulose (?) thickenings inside a filament; lower end shows a definite constriction of the filament. (i) Five stages in the opening of the antheridium: 1) Plain cellulose membrane. 2) Thickening of the apex and formation of inner diaphragm and stratified cellulose callus. 3) Cellulose callus becoming a gelatinous plug; inner diaphragm still present. 4) Resorption of inner diaphragm, and completion of gelatinous plug. 5) Plug is gone, and antheridium emptied. (Figs. a, g, h, 200 μ scale; figs. b-f and i, 100 μ scale.)

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NEW FERNS FROM THE NORTHERN ANDES

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Recent large collections of tropical American ferns received at the United States National Herbarium for identification have included a good many that apparently are new. Several of these from the northern Andes are described herewith as a small contribution toward making known this exceedingly rich fern flora. The first three are illustrated at slightly less than natural size by portions of the type specimens.

HYPOLEPIS crassa Maxon, sp. nov. PLATE 4.—Rhizoma late repens, brunnescens, ca. 5 mm. diam., sulcatum. Folia solitaria, ca. 70 cm. longa, suberecta; stipites 30–35 cm. longi, 3–5 mm. diam., e basi fusca castanei, tenuiter muriculati, leviter villosuli, pilis tortuosis mox delapsis; laminae subdeltoideae, acuminatae, 40 cm. longae, basi ca. 22 cm. latae, 2-pinnatopinnatifidae, rhachi stipiti simili, flexuosa; pinnae ca. 12-jugae, subobliquae, triangulares vel superiores triangulari-oblongae, acutae, mediae 8–9 cm. longae, basi 3–5 cm. latae, infimae maximae, suboppositae, patulolulatae (1.5 cm.), 12–15 cm. longae, basi 6–7 cm. latae; pinnulae ca. 9-jugae, majores plerumque late triangulari-oblongae, obtusae, 2.5–4.5 cm. longae, 1–3 cm. latae, basi pinnatisectae, sursum profunde pinnatifidae (segmentis ca. 6-jugis), ceterae omnino pinnatifidae, rhachibus minoribus subtus leviter sed persistente brunneo-villosulis, pilis paucis venas adunatibus; segmenta coriacea, opaca, plerumque oblonga, crasse lobata, lobis vel dentibus perpaucis, brevibus, deltoideis, apice rotundatis, majoribus emarginatis; venae infra valde depressae, fertiles 1- vel interdum 2-furcatae; sori 1–3-jugi, magni (1.5 mm. diam.), submarginales, crenatura marginali magna, rigide recurva, omnino immutata, crasse eroso-dentata; sporangia annulo articulis ca. 17 formato cincta, sporis diplanatis, ellipsoidibus, laevigatis, 30 μ longis, ca. 21 μ crassis.

Type in the U. S. National Herbarium, no. 1,859,521, collected in dense chaparral, northwest slopes of Cayambe, on headwaters of east fork of Río Desaguadero, Imbabura Province, Ecuador, at about 3,840 meters altitude, July 10, 1944, by Ira L. Wiggins (no. 10386).

The outstanding features of *Hypolepis crassa* are its harsh texture and its coarse dissection, in which respect it is not very closely approached by other members of the genus. The notched margins of the segments and the huge sori, with their equally large, deeply recurved, unaltered, opposed marginal crenatures, are so coarse even as to carry a brief suggestion of *Dicksonia*.

Only one other sheet of no. 10386 was collected, this (Dudley Herbarium, Stanford University) quite like the type specimen. In reply to an inquiry Dr. Wiggins writes: "I remember the site at which the specimens were collected. In fact the memory of that point is accompanied by an involuntary shiver, for we camped there overnight and nearly froze! It was on a little shoulder of a lateral moraine, with a thick carpet of sphagnum over much of the ground, with *Puya* growing along the margin of the shelf and the whole area soaked with water. The fern was growing in a dense thicket of *Clusia* and several shrubs and trees that were not in flower or fruit. The soil in which the fern grew was rich in humus, black and mucky. It was on a fairly steep slope just above the comparatively level spot on which we pitched our tents, and was protected from the sweeping winds by the ridge above it and the density of the thicket. The deep green, glossy fronds were very attractive and quite outstanding in contrast with some of the other ferns there."

ADIANTUM elegantulum Maxon, sp. nov. PLATE 5.—Subg. *Euadiantum*. Rhizoma epigaeum, breviter repens (1–2 cm.), 0.8 mm. diam., ubique dense paleaceum, paleis late imbricatis, e basi cordata lanceolatis, longissime attenuatis, 1.5–2.5 mm. longis, basi 0.2–0.4 mm. latis, cinnamomeis, lucidis, subintegris. Folia ca. 8, disticha, adscendentia, 10–21 cm. longa; stipites 4–8 cm. longi, tenues (0.2 mm. diam.), brunnei, lucidi, tenuiter et minute paleacei, paleis fere capillaceis, flexuosis; laminae lineares, 6–13 cm. longae, 1.3–2.3 cm. latae, basin versus vix angustatae, apice acuminato-caudatae, 1-pinnatae, rhachi notis omnibus stipiti simillima, paleis minutis persistentibus; pinnae 10–21-jugae, patentes, breviter petiolulatae, trapeziformi-oblongae, apice rotundae, majores 8–11 (12) mm. longae, 3–4 mm. latae, vel fertiles subfalcatae et basi dimidiata latiores (usque ad 6 mm.), marginibus nisi fertilibus argute dentatis; pinnae supra glabrae, subtus tenuiter villosae, pilis fulvis tenuibus laxis obliquis subflexuosis ca. 0.8 mm. longis; venulae tenues, obliquae, crebrae; sori plerumque 4 vel 5, e basi anteriore pinnarum fere apicem adeuntes (interdum quoque 1 vel 2 latere posteriore apicem versus enati), oblongi vel sublunati, 1–1.5

mm. longi, lobo marginali reflexo, amplo, dense setuloso, indusio vero angusto, minute lacero-fimbriato; sporangia annulo articulis ca. 17 formato cincta, sporis triplanatis, sublaevibus, ca. $33\ \mu$ diam.

Type in the U. S. National Herbarium, no. 1,774,736, collected in the region of Villavicencio, toward El Parrao, Intendencia El Meta, Colombia, altitude 500 meters, November 10, 1938, by J. Cuatrecasas (no. 4632).

Though the single specimen described is simply pinnate only, it is possible or even probable that further material will show the mature condition to be bipinnate, placing the species in the neighborhood of *A. terminatum* Kunze, notwithstanding its extreme delicacy. The stipes and rachises are as slender as those characterizing the tropical American species centering around *A. dolabriforme* Hook., a group to which *A. elegantulum* is, however, not at all closely related.

POLYPODIUM militare Maxon, sp. nov. PLATE 6.—Subg. *Eupolypodium*. Rhizoma repens, 2–3 cm. longum, ca. 1 mm. diam., copiose paleaceum, paleis ochraceo-brunneis, teneris, laxe imbricatis, lanceolatis, 2–3 mm. longis, basi rotunda vel subcordata 0.5–0.8 mm. latis, apice attenuatis, laxe ciliatis (ciliis ca. 2 mm. longis, ochroleucis), tenere clathratis, parietibus exterioribus pallidis, nitidis, transversalibus fuscis, ca. $9\ \mu$ crassis. Folia plura, non remota, rigide erecta, 10–18 cm. longa; stipites ca. 1 cm. longi, 0.5–0.7 mm. diam., plerumque arcuati, atrofusci, primum dense et minutissime puberuli, pilis rigidis, ochroleucis, ca. 0.2 mm. longis; laminae ligulatae, 9–17 cm. longae, 2–3.5 mm. latae, basin versus angustatae, oblique pinnatisectae, glaberrimae, rhachi atrofusca, infra valde elevata, supra plana; segmenta crasse coriacea, latere utroque 45–85, valde obliqua, ambitu inaequilateraliter deltoidea, basi 2–3 mm. lata, apice rotunda (siccitate plus minusve acutiuscula), decurrentia, valde concava (marginibus integris late revolutis), fertilia praesertim fere saccata; segmenta inferiora sensim reducta, venis simplicibus vel furcatis; venae pinnarum majorum pinnatim ramosae, venulis utrinque 1 vel 2, tenuibus, laxe et varie dispositis; sori mediocres, solitarii, venis ipsis subterminales, saepe basi venulae distalis aut anterioris aut posterioris siti; sporangia annulo articulis ca. 12 formato cincta, sporis triplanatis, papillois, 35–44 μ diam.

Type in the U. S. National Herbarium, no. 1,857,352, collected from "rocks covered with moss and sand," Páramo de Sonsón, Department of Antioquia, Colombia, altitude 2,700–2,850 meters, January 29, 1945, by Brother Daniel (no. 3431).

The relationship of *Polypodium militare* is clearly with *P. humile* Mett., from the same region, of which there is at hand a specimen of the type collection (*Lindig* 137) received from Kew. The two are similar in their rhizome scales, size, and perfectly glabrous, rigidly coriaceous blades, but *P. humile* may be dis-

tinguished by its broader blades, less oblique segments, and more numerous sori, as many as five being crowded together within the short revolute segments, whereas *P. militare*, as shown by a large series of specimens, is invariably monosorous. The deeply cavernous segments are a remarkable feature.

POLYPODIUM Buesii Maxon, sp. nov.—Subg. *Eupolypodium*. Rhizoma adscendens vel breviter repens, 5–10 mm. longum, ca. 5 mm. diam., apice dense paleaceum, paleis pallide ochraceis, lineari-attenuatis, 3–4 mm. longis, 0.5–0.8 mm. latis, prope basin subcordatam affixis, varie denticulatis, tenuiter clathratis. Folia plura, fasciculata, 12–20 cm. longa; stipites 1–6 cm. longi, ca. 0.5 mm. diam., sordide ochracei, copiose pilosi, pilis rigidis, rubescentibus, usque ad 2.5 mm. longis; laminae ligulatae, 11–18 cm. longae, medio 8–10 mm. latae, utroque longe attenuatae, subpinatisectae, latere utroque segmentis ala ca. 0.5 mm. lata conjunctis, 2–6-jugis infimis longe dilatatis, humilibus; segmenta majora (basalia et apicalia minuta exclusa) ca. 60-juga, patentia, anguste oblonga vel triangulari-oblonga, apice rotunda, 3–5 mm. longa, medio 1–1.5 mm. lata, basi dilatata saepe 2 mm. lata, integra, herbacea, ubique (praesertim supra) setosa, pilis plurimis 1.5–2 mm. longis; venae segmentorum sterilium majorum et fertilium omnium ca. 1 mm. supra basin furcatae, ramo basali brevi; sori in segmentis solitarii, magni (1.5 mm. diam.), rhachin partim incumbentes, ramo basali inframediales; sporangia numerosa, globosa, annulo articulis ca. 14 formato cincta, sporis triplanatis, globosis, papillosis, ca. 30 μ diam.

Type in the U. S. National Herbarium, no. 1,858,604, collected on Cerro Chuyapí, Department of Cuzco, Peru, at 2,400 meters altitude, June 24, 1941, by C. Bues (no. A45). There are at hand also another specimen (*Bues* A38) from the type locality and a single excellent plant with the following data: "Los Palmitos," Cabecera del Koribeni, Peru, altitude 3,000 meters, September 1932, *C. Bues* 1963. The three agree closely.

Because of its toothed rhizome scales, which are devoid of cilia, *Polypodium Buesii* belongs to the immediate group of *P. trichomanoides* Swartz, the most recent discussion of which¹ includes a revised key to the five species previously known, all but *P. trichomanoides* itself being wholly West Indian. It is perhaps nearest *P. trichomanoides*, figured and discussed at some length by the writer long ago,² though that species departs widely in its elongate fertile vein-branches and gibbous segments.

POLYPODIUM oreophilum Maxon, sp. nov.—Subg. *Eupolypodium*. Rhizoma repens, 2–4 cm. longum, parce ramosum, 2–3 mm. diam., ubique dense comoso-paleaceum, paleis numerosissimis, acervo incano-brunneis, deltoideo-linearibus, ca. 6 mm. longis, basi 0.5–0.7 mm. latis, longissime attenu-

¹ Amer. Fern Journ. 31: 105–111. pl. 1. 1941.

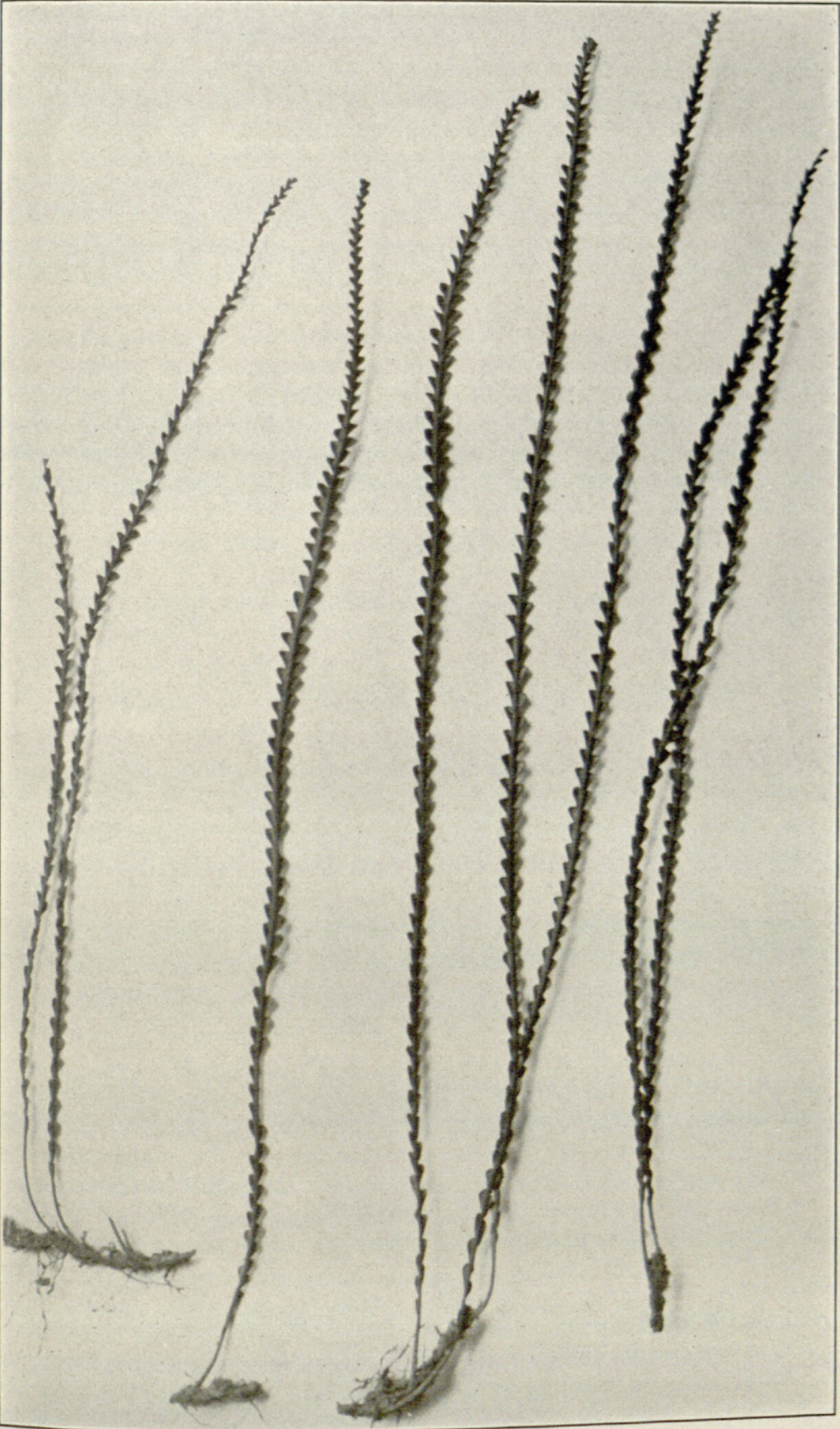
² Contr. U. S. Nat. Herb. 17: 550. pl. 35. 1916.



HYPOLEPIS CRASSA Maxon



ADIANTUM ELEGANTULUM Maxon



POLYPODIUM MILITARE Maxon

atis, subflexuosis, basi subcordata incrassata firme affixis, clathratis (parietibus exterioribus hyalinis, transversalibus brunneis, ca. $18\ \mu$ crassis), copiose ciliatis, ciliis incanis, rigidis, ca. 0.2 mm. longis. Folia multa, fasciculata, erecta, 25–30 cm. longa; stipites 2–5 cm. longi, aequaliter 0.7 mm. diam., brunnei, ubique minute et dense incano-hirtelli, pilis rectis, ca. 0.2 mm. longis; laminae lineares, ca. 25 cm. longae, medio 3–4 cm. latae, utrinque attenuatae, pinnatae, rhachi utrinque atrofusca, supra dense griseo-hirtella, infra fere glabra; pinnae 75–85-jugae, confertae (sinubus angustissimis), patentibus vel leviter obliquae, lineares, majores 1.5–2.3 cm. longae, medio 2–3 mm. latae (basi leviter decurva 2.5–4 mm. latae), ultra medium modice angustatae, apice ipso rotundae, integrae, membranaceo-herbaceae, fere glabrae (subtus pilis glandulosis furcatis fuscis dissitis minutissimis instructae), costis tenuibus, fuscis, supra modice elevatis, infra subimmersis; venae 11–14-jugae, simplices, obliquae (40°), hydathodis subrotundis vel ellipticis margine remotis terminatae; sori apice venarum siti, rotundi, superficiales, ca. 1 mm. diam.; sporangia annulo articulis 12 formato cincta, sporis triplanatis globosis, papillosis, ca. $32\ \mu$ diam.

Type in the U. S. National Herbarium, no. 1,705,807, an epiphyte collected on Cerro Armas, Department of Santander, Colombia, altitude 1,200 to 1,500 meters, in forest, July 26, 1936, by Oscar Haught (no. 1959).

Of the species of comparable size having grayish-ciliate rhizome scales *Polypodium oreophilum* need be compared only with *P. Stuebelii* Hieron., of Colombia, and the well-known *P. apiculatum* Kunze, which is of wide distribution. From description and illustration *P. Stuebelii* differs in its consistently lesser dimensions (rhizome only 1 mm. thick, with small, few-ciliate scales), in its setulose segments, and its fewer and smaller sori. *Polypodium apiculatum* differs even more widely in its long stipes, and its abruptly apiculate-caudate blades, which are not attenuate at base and have the rachis conspicuously hirtellous beneath.

POLYPODIUM assurgens Maxon, sp. nov.—Subg. *Eupolypodium*. Rhizoma elongatum, adscendens, usque ad 12 cm. longum, 3–5 mm. diam. (stipitibus exclusis), ubique arte imbricato-paleaceum, paleis lanceolatis, apice attenuatis, 4–5 mm. longis, prope basin cordatam 0.7–1.2 mm. latis, brunnescentibus, clathratis. Folia 6–12, erecta, 25–35 cm. longa, oblique contigua, basi late imbricata; stipites breves, 1–3 (5) cm. longi, 1 mm. diam., brunnescentes, nudi, glabrati; laminae anguste ligulatae, utrinque attenuatae, plerumque 25–30 cm. longae, 7–12 mm. latae, pinnatisectae, rhachi valida, fusca, supra plana, subtus tereti, primum minutissime puberula; segmenta coriacea, opaca, 50–70-juga, subquadrata vel rotundato-deltaidea, alterna, apicalia sensim minuta, infima alariformia, media (maxima) 3–6 mm. longa, basi 4–6 (7) mm. lata, leviter revoluta, sinubus anguste acutis; costae immersae; venae 3–4-jugae, simplices, sub angulo

45° egredientes, immersae; sori 2-3-jugi, mediales, rotundi, 1.5 mm. diam., segmentis partis superioris laminarum siti; sporangia annulo articulis ca. 12 formato cincta, sporis triplanatis, globosis, papillosis, 50-55 μ diam.

Type in the U. S. National Herbarium, no. 1,707,880, collected on the Quito-Santo Domingo road, Province of Pichincha, Ecuador, at 2,300 meters altitude, in a bed of moss, April 5, 1942, by Oscar Haught (no. 3226); several identical specimens of this number were obtained. An additional collection is from Peru: Cerro Chuyapí, Dept. Cuzco, alt. 2,500 meters, *Bues* A37.

The present species belongs to the group of *P. moniliforme* Lag. and is clearly allied to *P. Wolfii* Hieron.¹ That, however, is a much more delicate plant, and differs among other characters in having the rhizome only 1 mm. thick, stipes barely 0.5 mm. in diameter, costae of the segments dark, prominent, and terete beneath, and only a few of the segments (these basal) broadened at base and thus subdeltoid, a general condition in *P. assurgens*. In size and proportions, nevertheless, the two species are very much alike.

LINDSAEA (?) **spathulata** Maxon, sp. nov.—Rhizoma breviter repens, ca. 5 mm. diam., apice dense comoso-paleaceum, paleis brunneis, rigidis, falcatis, subulato-capillaceis, 6-8 mm. longis, basi 0.3-0.4 mm. diam., turgidis, fibrosis. Folia plura, suberecta, contigua, ut videtur disticha, 65 cm. longa; stipites 20 cm. longi, ca. 1.5 mm. diam., e basi brunnea olivacei, nudi, glabri, nitentes, subquadrangulares; laminae anguste lanceolatae, apice attenuatae, 45 cm. longae, 10-13 cm. latae, 3-pinnatopinnatifidae, rhachi subflexuosa, straminea, glabra; pinnae remotae, alternae, obliquae (45°), petiolulatae, majores utroque ca. 9, inaequilateraliter deltoideo-ovatae, usque ad 8.5 cm. longae et 4 cm. latae, acuminatae; pinnulae valde anadromae, majores utroque ca. 6, maximae basi pinnatae, divisionibus oblique subpinnatisectis, segmentis tenuiter chartaceis, paucis (3 vel 4), alternis, majoribus bilobatis vel bipartitis, ambitu cuneatis, usque ad 7 mm. longis, ceteris elliptico-spathulatis, 4-5 mm. longis et ca. 2 mm. latis, rhachibus ultimis anguste marginatis 0.5-1 mm. latis; venae segmentis vel lobis geminis solitariae, mediae; sori terminales, submarginales; indusia tenerrime membranacea, transverse oblonga vel subrotunda, 0.5-1 mm. lata, basi curvata affixa, marginem vix mutatam non attingentia; sporangia 2-4, sporis triplanatis.

Type in the U. S. National Herbarium, no. 1,705,808, collected on Cerro Armas, Department of Santander, Colombia, altitude 1,300 meters, July 26, 1936, by Oscar Haught (no. 1960).

LINDSAEA (?) **Killipii** Maxon, sp. nov.—Rhizoma repens, 5 mm. diam., dense paleaceum, paleis imbricatis, brunneis, rigidis, subulato-attenuatis, 5-7 mm. longis, prope basin usque ad 0.8 mm. latis, integris, turgidis,

¹ Hedwigia 48: 250. pl. 12, figs. 17, 17a, 17b. 1909.



Maxon, William R. 1947. "New ferns from the northern Andes." *Contributions from the Gray Herbarium of Harvard University* (165), 69–75.

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