

Five New Species of South American *Polybotrya*¹

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Few fern genera have had less study over the years than *Polybotrya*. Fée (1845) described several species and, in a limited sense, is its only monographer. In recent years, the late Dr. A. C. Brade (1969a, b, c) described several species from Brazil, Costa Rica, and Venezuela. The Andean species, however, have scarcely been studied at all. Besides the ones described in this paper, recent exploration in Colombia (Lellinger & de la Sota, 1972) has brought several others to light, which will be described in another paper. Still others must remain undescribed for want of fertile and sufficiently mature sterile material.

Like *Maxonia*, which is similar and related to *Polybotrya* but which has indusiate sori, *Polybotrya* is a hemiepiphyte. It has a high-climbing rhizome that remains rooted in the soil, giving the plant the positional advantage of an epiphyte for spore distribution and exposure to light and the terrestrial advantage of water supplied by the soil. The spores of *Polybotrya* germinate, for the most part, on the ground. The young, thin, rhizomes bear scattered, usually juvenile, sterile fronds and creep in the soil or leaf mold until reaching a tree. (I once found a dense bed some 20 m in diameter of young *Polybotrya alfredii* fronds, near Zapote, Costa Rica. The forest had been logged recently, and I believe the additional light either caused the adult plants to produce fertile fronds and spores or influenced the success of the gametophytes and young sporophytes.) The rhizomes often increase in diameter as they grow upward on the tree trunk. Naturally, the most mature sterile fronds and the fertile fronds are borne toward the rhizome apex. Because of the variability in size and dissection of the juvenile to mature sterile fronds, it is important to trace the rhizome back to its connection with the ground and to collect both juvenile and mature sterile fronds, as well as fertile fronds, when they are available.

I have attempted to state the relationships of the new species described and illustrated below, in hopes of aiding future monographers.

Polybotrya crassirhizoma Lellinger, sp. nov.

Figs. 1 and 8.

Planta hemiepiphytica; rhizoma scandens, 1–1.5 cm diam, dense et laxe paleaceum, paleis linearibus usque ad 1.5 cm longis, 0.5 mm latis, concoloribus vel plus minusve concoloribus basi bicoloribus brunneis cum marginibus pallidioribus, rufocastaneis, obscuris, marginibus erosodenticulatis, cellulis contortis; stipites 10–21(102) cm longi, 2.5–5 mm diam, straminei sulcati, basi dense paleacei, sursum parce paleacei, paleis linearibus usque ad 1.5 cm longis, 0.3 mm latis (basi 0.5 mm latis), leviter bicoloribus brunneis cum marginibus pallidioribus, marginibus dentatis; rhachides stramineae sulcatae pilosulae in sulco, parce paleaceae, paleis stipitum similibus praeditae; laminae steriles papyraceae vel subcoriaceae, lanceolatae, basi fere truncatae, apice acutae, 50–75 cm longae, 20–35 cm latae apice pinnatifidae, pinnatae, pinnis 14–18 paribus alternis vel suboppositis, inferiori-

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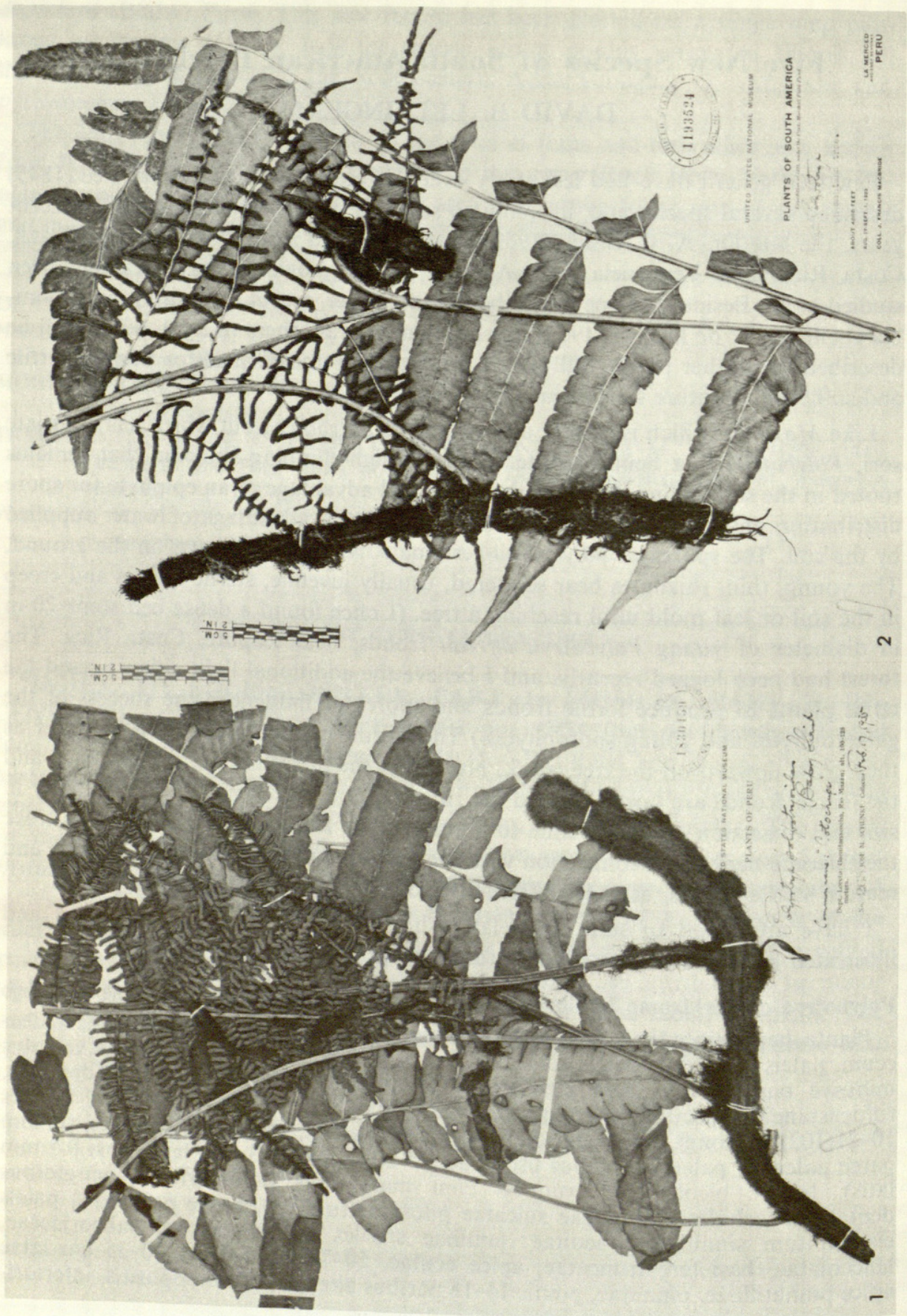


Fig. 1. Holotype of *Polybotrya crassirhizoma*, Schunke 268 (US). Fig. 2. Holotype of *Polybotrya macbridei*, Macbride 5602 (US).

bus subpetiolulatis, superioribus sessilibus, quadrangularibus, 3.5–18 cm longis, 1.25–3(3.5) cm latis, basi plus minusve rotundatis subaequilateralibus (basi inferiore minime excavatis), apice acutis vel acuminatis, marginibus integris vel leviter crenatis, costis rectis sulcatis, subtus sparse paleaceis et sparse pilosis, costulis usque ad 35-jugis, venis 4–6, etiam vena intermedia simplici ex costa ad marginem necnon praeditis; laminae fertiles lanceolatae, basi obtusae, apice acutae, 40–60 cm longae, 11–17 cm latae, pinnato-pinnatifidae, pinnis 17–21 paribus alternis vel suboppositis quadrangularibus, usque ad 14 cm longis, 1–2.4 cm latis, costis rectis sulcatis, pilosulis, segmentis 2–12 mm longis, 1–2 mm latis.

TYPE: Gamitanacocha, Río Mazán, alt 100–125 m, Dept. Loreto, Peru, *Schunke* 268 (US; isotypes F, NY).

ADDITIONAL SPECIMENS EXAMINED:

ECUADOR: Napo-Pastaza: Basin of the Río Pastaza, Río Bobanaza and adjacent tributaries, ca. 1000 m, *Gill* 47 (NY).

PERU: Loreto: Gamitanacocha, Río Mazán, alt 115 m, *Schunke* 14285 (US); Mishuyacu, near Iquitos, alt 100 m, *Klug* 1386 (F, US). Huánuco: Tingo María, alt 700 m, *Tryon & Tryon* 5221 (GH, US).

This species is most closely allied to *P. macbridei*, from which it differs in having a thicker rhizome with pale reddish, dull rhizome scales and sterile pinnae that are not lobed or divided, as those of *P. macbridei* often are.

Polybotrya macbridei Lellinger, sp. nov.

Figs. 2 and 9.

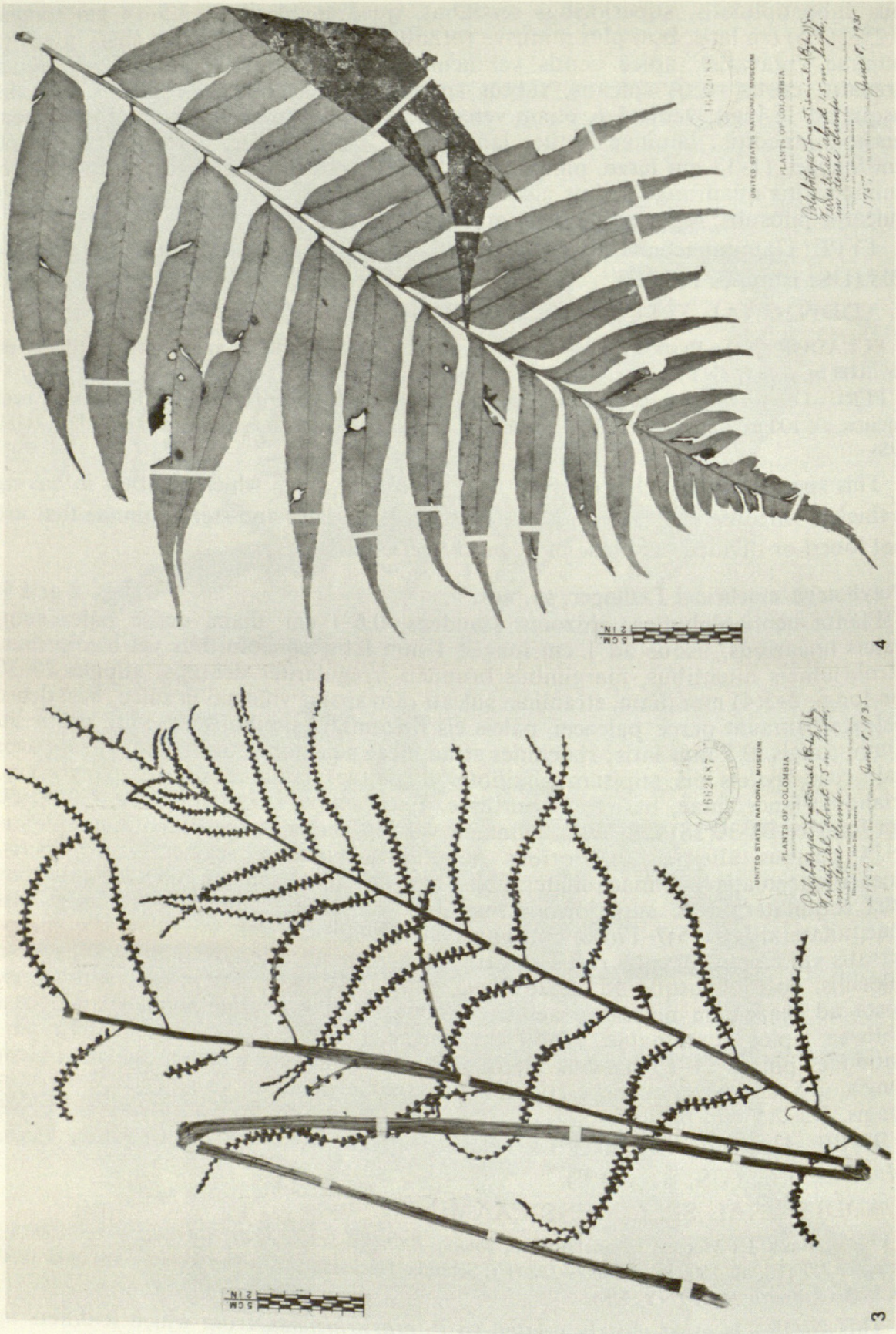
Planta hemiepiphytica; rhizoma scandens, 0.6–1 cm diam, dense paleaceum, paleis linearibus, usque ad 1 cm longis, 1 mm latis, concoloribus vel bicoloribus, atrobrunneis nitentibus, marginibus brunneis irregulariter dentatis; stipites 20–30 cm longi, 2–3(4) mm diam, straminei sulcati raro sparse villosuli in sulco, basi dense paleacei, sursum parce paleacei, paleis eis rhizomatis similibus praediti, usque ad 7 mm longis, 0.5 mm latis; rhachides stramineae sulcatae villosulae in sulco, parce paleaceae, paleis eis stipitum similibus praeditae; laminae steriles papyraceae, triangulo-lanceolatae, basi fere truncatae, apice acutae vel acuminatae, (33)40–60 cm longae, 20–30(38) cm latae, pinnatae vel bipinnatae apice pinnatifidae, pinnis 9–14 paribus alternis, inferioribus petiolulatis pinnatis, segmentis 1–5 liberis, lineari-lanceolatis basi inaequilateralibus (basi inferiore excavata) vel triangularibus basi aequilateralibus, superioribus sessilibus vel adnatis, lineari-lanceolatis, basi inaequilateralibus, (5)7–17(26) cm longis, (1.5)2–4(9) cm latis, marginibus crenato-serratis vel crenatis, costis rectis sulcatis, glabris in sulco, subtus glabris vel sparse pilosulis, costulis usque ad 20(26)-jugis, venis 7–10, vena intermedia simplici ex costa ad marginem necnon praeditis; laminae fertiles triangulo-lanceolatae, basi obtusae, apice acuminatae, 20–50 cm longae, (11)20–25 cm latae, pinnato-pinnatifidae, pinnis 11–15 paribus alternis linearibus vel lanceatis, usque ad 14 cm longis, 2.5 cm latis, costis rectis sulcatis, sparse paleaceis, segmentis 2–16 mm longis, 1.5–2.5 mm latis.

TYPE: Hacienda Schunke, La Merced, alt ca. 4000 ft, Dept. Junín, Peru, *Macbride* 5602 (US; isotype F).

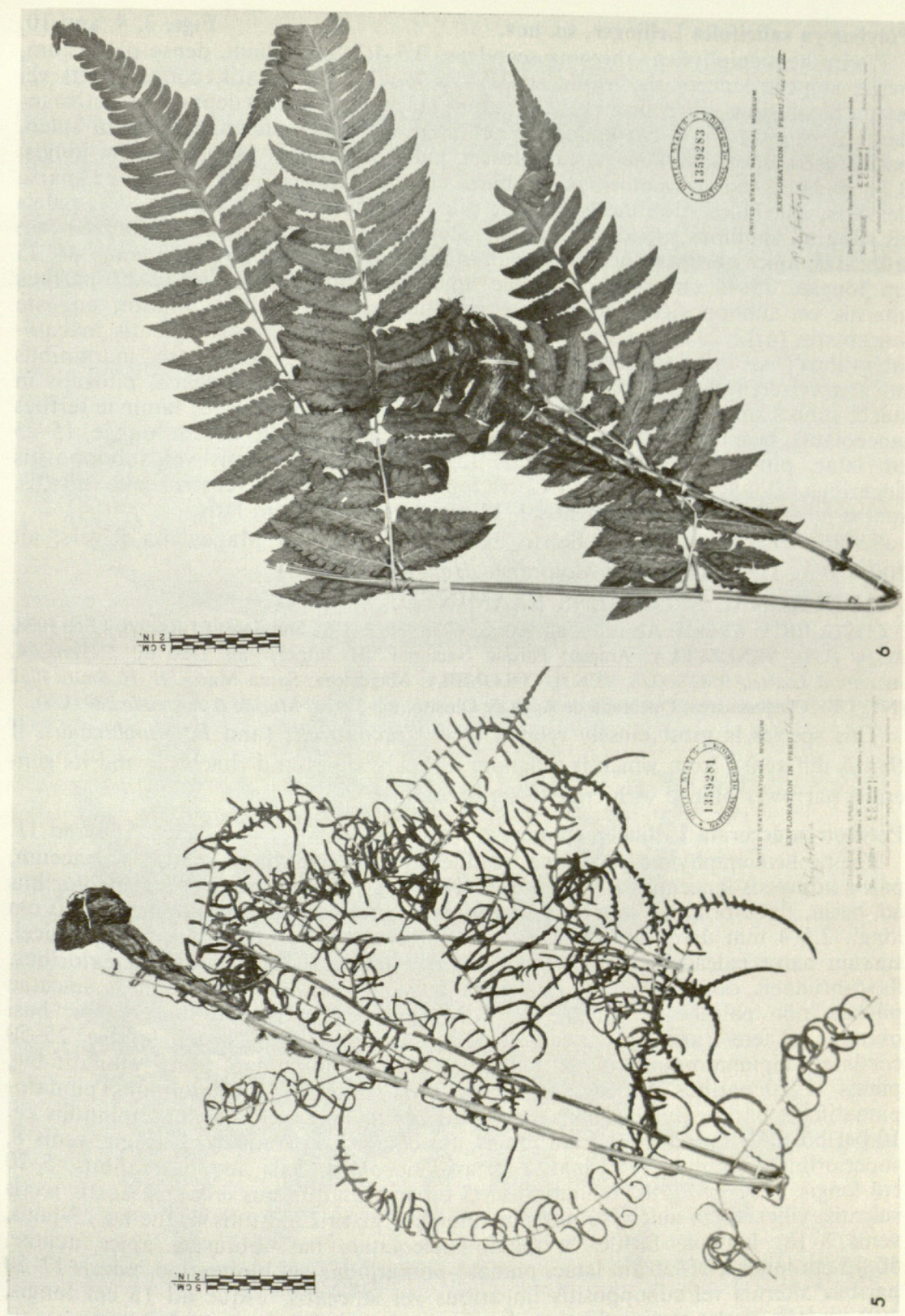
ADDITIONAL SPECIMENS EXAMINED:

PERU: Junín: La Merced, Chanchamayo, *Soukup* 1065 (F), *Schunke* 661, 812 (both F), alt 1200 m, *Schunke* 157 (F), alt 1500 m, *Schunke* 158 (F); Schunke Hacienda above San Ramón, alt 1400–1700 m, *Killip & Smith* 24605 (NY, US).

This species is most closely related to *P. crassirhizoma*, from which it differs in having a thinner rhizome with dark brown, shining rhizome scales and sterile pinnae that towards the base of the fronds are fully pinnate with 1–5 free segments.



Figs. 3-4. Fertile and portion of the sterile frond of the holotype of *Polybotrya salicifolia*, Haught 1757 (US).



Figs. 5-6. Fertile and portion of the sterile frond of the holotype of *Polybotrya decorata*. Killip & Smith 26955 (US).

Polybotrya salicifolia Lellinger, sp. nov.

Figs. 3, 4, and 10.

Planta hemiepiphytica; rhizoma scandens, 0.5–1(2?) cm diam, dense paleaceum, paleis anguste lanceolatis, usque ad 1.5 cm longis, 2 mm latis, concoloribus vel leviter bicoloribus, aureobrunneis nitentibus, marginibus sparse dentatis vel retrorso-dentatis; stipites 25–75 cm longi, 3–5 cm diam, straminei sulcati, pilosuli in sulco, basi dense paleacei, sursum parce paleacei, paleis linearibus, usque ad 2 cm longis, 0.5 mm latis, leviter bicoloribus, brunneis cum marginibus pallidioribus et sparse dentatis; rhachides stramineae sulcatae pilosulae in sulco, parce paleaceae, paleis eis stipitum similibus praeditae; laminae steriles papyraceae, lanceolatae, basi fere truncatae, apice abruptae, acuminatae in modum *Matteucciae struthiopteridis*, 40–75 cm longae, 25–45 cm latae, pinnatae apice pinnatifidae, pinnis 12–17 paribus alternis vel suboppositis, inferioribus petiolulatis, superioribus adnatis, anguste lanceolatis, (6)12–23 cm longis, (1)1.5–4 cm latis, basi plus minusve acutis inaequilateralibus (basi inferiore leviter excavata), apice acutis vel acuminatis, marginibus integris vel crenatis, ad apicem crenato-serratis, costis rectis sulcatis, pilosulis in sulco, subtus sparse pilosulis, costulis usque ad 25-jugis, venis 4–6; laminae fertiles lanceolatae, basi fere obtusae, apice abruptae, acuminatae, 30–65 cm longae, 15–25 cm latae, pinnato-pinnatifidae, pinnis 15–17 paribus alternatis vel suboppositis linearibus vel lanceatis, usque ad 12 cm longis, 0.5–2 cm latis, costis rectis sulcatis, sparse pilosulis in sulco, segmentis 1–12 mm longis, 1–2 mm latis.

✓**TYPE:** Vicinity of Puerto Berrio, between Carare and Magdalena Rivers, alt 100–700 m, Dept. Santander, Colombia, *Haught 1757* (US).

ADDITIONAL SPECIMENS EXAMINED:

COSTA RICA: *Alajuela:* Alajuelita, alt 900 m, *Alfaro 8073* (US). **San José:** El Rodeo, 4 Feb 1938, *Knight* (US). **VENEZUELA:** *Aragua:* Parque Nacional "H. Pittier," alt 1100 m, *Steyermark, Agostini & Lourteig 95827a* (US, VEN?). **COLOMBIA:** *Magdalena:* Santa Marta, *H. H. Smith 1052* (NY, US). *Cundinamarca:* Quebrada de Agua de Diosito, alt 530 m, *Murillo & Jaramillo 289* (US).

This species is most closely related to *P. fractiserialis* (and *P. plumbicaulis*, if that is different), from which it differs in its scaly stipes and rhachises and its generally narrower pinnae with crenate-serrate apices.

Polybotrya decorata Lellinger, sp. nov.

Figs. 5, 6 and 11.

Planta hemiepiphytica; rhizoma scandens, 1–1.5 cm diam, dense paleaceum, paleis adpressis lanceolatis, usque ad 2.5 cm longis, 4 mm latis, leviter bicoloribus ad basin, flavo-brunneis obscuris, marginibus subtiliter erosis; stipites 10–30 cm longi, 2.5–4 mm diam, straminei sulcati, pilosi vel villosuli, basi dense paleacei, sursum parce paleacei, paleis usque ad 2 cm longis, 2.5 mm latis, concoloribus, flavo-brunneis, obscuris, marginibus subtiliter erosis; rhachides stramineae sulcatae pilosae, non paleaceae; laminae steriles papyraceae, triangulo-lanceolatae, basi obtusae vel fere truncatae, apice acutae vel acuminatae, 50–90 cm longae, 25–50 cm latae, bipinnato-pinnatifidae ad basin, sursum bipinnatae, apice pinnatifidae, pinnis 17–20 paribus alternis vel suboppositis, inferioribus petiolulatis pinnato-pinnatifidis, basi aequilateralibus, usque ad 25 cm longis, 10 cm latis, pinnulis ca. 10 paribus liberis, usque ad 5 cm longis, 1.5 cm latis, costulis ca. 12-jugis, venis 8, superioribus sessilibus vel adnatis, lineari-lanceolatis, basi aequilateralibus, 5–20 cm longis, 1.5–4 cm latis, pinnatifidis vel lobatis, marginibus crenatis, costis rectis sulcatis, villosulis in sulco, subtus plus minusve glabris, costulis usque ad 25-jugis, venis 8–18; laminae fertiles triangulo-lanceolatae, basi obtusae, apice acutae, 50–75 cm longae, 15–30 cm latae, pinnato-pinnatifidae vel bipinnatae, pinnis 17–20 paribus alternis vel suboppositis linearibus vel lanceatis, usque ad 15 cm longis, 4(9) cm latis, costis rectis sulcatis, pilosulis, segmentis 0.2–5 cm × 2–3 mm.

TYPE: Iquitos, alt ca. 100 m, Dept. Loreto, Peru, *Killip & Smith 26955* (US; isotype NY).

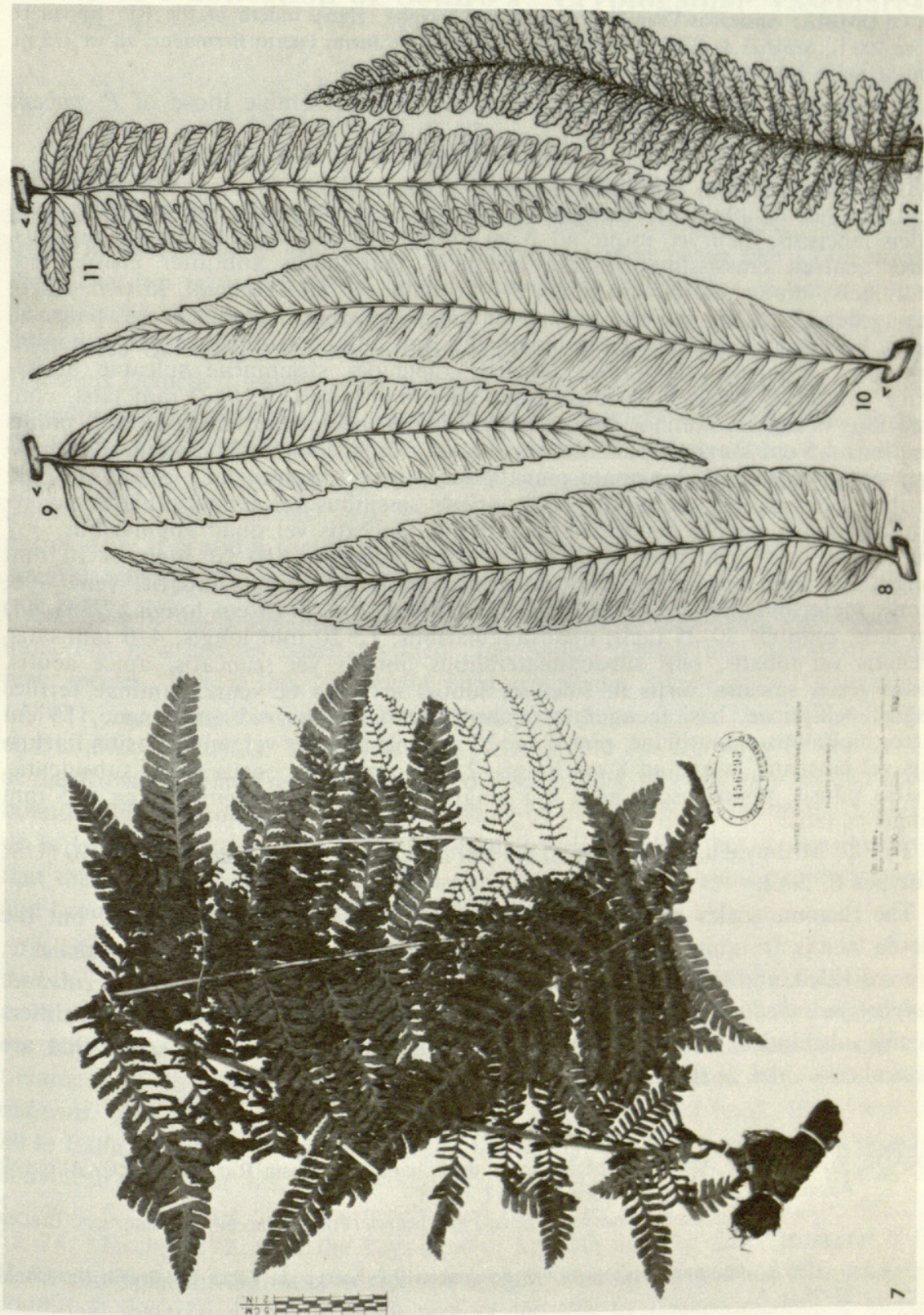


Fig. 7. Holotype of *Polybotrya subelliptica*, Klug 1390 (US). Figs. 8-12. Outline and venation of portions of sterile pinnae of *Polybotrya*. Fig. 8. *P. crassirhizoma*. Fig. 9. *P. macbridei*. Fig. 10. *P. salicifolia*. Fig. 11. *P. decorata*. Fig. 12. *P. subelliptica*.

ADDITIONAL SPECIMENS EXAMINED:

COLOMBIA: Amazonas-Vaupés: Soratama and vicinity, above mouth of the Río Kananarí, alt ca 900 ft, *Schultes & Cabrera 16053* (GH. US). PERU: Junín: Puerto Bermudez, alt ca 375 m, *Killip & Smith 26543* (US).

The rhizomes and rhizome scales of this species resemble those of *P. pubens* Mart., but the fronds bear a much sparser indument.

Polybotrya subelliptica Lellinger, sp. nov.

Figs. 7 and 12.

Planta hemiepiphytica; rhizoma scandens, ca. 1 cm diam, dense palaeum, paleis lanceatis, incurvis, usque ad 2 cm longis, 1.5 mm latis, leviter bicoloribus, parte centrali crassissima obscure brunneis, marginibus subtiliter erosis, fere stramineis; stipites ca. 2.5 cm longi, 3 mm diam, straminei sulcati, hirti in sulco, basi paleacei, paleis eis rhizomatis similibus praediti, sursum parce paleacei, paleis linearibus, usque ad 1 cm longis, 0.5 mm latis, concoloribus vel leviter bicoloribus, brunneis, marginibus integris; rhachides stramineae sulcatae hirtae, parce paleaceae, paleis linearibus, usque ad 6 mm longis, 0.1(0.3) mm latis, concoloribus brunneis; laminae steriles papyraceae, subellipticae, basi obtusae (pinnis basilibus 4.5 cm longis), apice acuminatae, ca. 75 cm longae, 22–28 cm latae, pinnato-pinnatifidae vel bipinnato-pinnatifidae, apice pinnatifidae, pinnis ca. 35 paribus alternis vel suboppositis, inferioribus sessilibus vel subpetiolulatis, superioribus adnatis, pinnis minoribus pinnatifidis, lanceatis vel quadrangularibus, 3–7 cm longis, 0.6–2 cm latis, segmentis quadrangularibus, 10–20 jugis, 4–10 mm longis, 2–4 mm latis, marginibus integris crenatis vel crenato-lobatis, venis 4–8, pinnis maioribus pinnato-pinnatifidis, lineari-lanceatis, 5–16 cm longis, 2.5–3.5(4) cm latis, pinnulis 20–25 jugis, quadrangularibus, 12–20 mm longis, 4–6 mm latis, crenatis vel lobatis, basi subaequilateralibus obtusis vel truncatis, apice acutis, costis rectis sulcatis, hirtis in sulco et subtus in sulco et venis; laminae fertiles anguste ellipticae, basi incognitae, apice acuminatae, ca. 45 cm longae, 15 cm latae, bipinnato-pinnatifidae, pinnis ca. 25 paribus alternis vel suboppositis linearibus vel lanceatis, usque ad 8 cm longis, 2.5–18 mm latis, costis rectis subsulcatis, sparse pilosis, pinnis usque ad 1 cm longis, 2.5 mm latis, segmentis ca. 1.5 mm longis et latis.

TYPE: Mishuyacu, near Iquitos, alt 100 m, Dept. Loreto, Peru, *Klug 1390* (US; isotypes F, NY).

The rhizome scales of this species are similar to those of *P. caudata*, but the sterile fronds are quite densely hirtous; the fertile fronds are much more delicate, more divided, and the pinnules lack the entire, caudate tips of those of *P. caudata*. *Polybotrya subelliptica* has sterile blades hirtous like those of *P. pubens*, but differs in the subelliptical lamina shape and in the narrow, stiff rhizome scales that are several cells thick at the center.

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