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# FIELDIANA

## Botany

NEW SERIES, NO. 22

### PTERIDOPHYTA OF PERU

#### Part II

#### 13. Pteridaceae-15. Dennstaedtiaceae

Rolla M. Tryon

Robert G. Stolze

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- CRONQ, V. B.: 1976, *Flora of Barro Colorado Island*, Stanford University Press, Stanford, Calif., 943 pp.  
CRONQ, V. B., B. L. PHILLIPS, AND T. D. BRYAN: 1976, "A comparison of midland and lowland rain forest in Ecuador. I. The tree community: phytogeography and floristics," *Journal of Ecology*, 51: 587-601.  
JANZEN, P. H.: 1970, "Yucca among the Stars. Ethical patterns in vision," pp. 63-81, *In*: B. V. Berman, D. L. and B. A. Schweitzer, eds., *Stars, Shamans, and Stars*, Mouton Publishers, The Hague, Netherlands.  
MORSE, J.: 1946, "The history of the use of the word 'epiphyte,'" pp. 782-821, *In*: Steudner, J. H., ed., *Handbook of South American Geobotany*, Vol. 2: The Andean Utilizations, Bulletin 143, Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.  
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## Botany

NEW SERIES, NO. 22

### PTERIDOPHYTA OF PERU

#### Part II

#### 13. Pteridaceae-15. Dennstaedtiaceae

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# PTERIDOPHYTA OF PERU

## Part II

### 13. Pteridaceae–15. Dennstaedtiaceae

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#### Introduction

This second part of "Pteridophyta of Peru" contains treatments of the Pteridaceae, Vittariaceae, and Dennstaedtiaceae, including a total of 30 genera and 171 species known to occur in Peru. It represents a considerable revision of "The Ferns of Peru (Dennstaedtiaceae to Oleandreae)" by Rolla Tryon (Contr. Gray Herb., 194: 1–253. 1964), due to newly published information and numerous collections made in Peru in the last 25 years. These collections have mostly been made under the auspices of the Universidad Nacional de Trujillo, the Museo de Historia Natural de Universidad de San Marcos, the Missouri Botanical Garden, and Field Museum of Natural History. The treatment has been prepared by Rolla Tryon aided by the critical review of Robert G. Stolze.

Prior to 1944 the Department of Pasco was a part of Junín and until recently Ucayali was a part of Loreto. An attempt has been made to account for these changes, and this is not difficult when labels cite towns and provinces. However, on older specimens the labels often contain only sketchy data, making it impossible to determine in which part of Loreto or Junín a plant was collected. The map of Peru at the end of the text shows the departments and indicates the sequence of the collection citations.

New names published here are indicated by boldface in the Index to Names. Collections have been cited from each department of Peru from which material has been seen and further collections are sometimes cited to include other herbaria. In general, all collections seen are cited for rare species and a selection is cited for common species. Type collections, mentioned in the nomenclature, are not included in the specimen ci-

tations, although they are included in the Peruvian range and ecology.

Appended to some of the generic treatments are portions of text labeled **Comments**. Herein are included species to be expected in Peru, names based on Peruvian material but of uncertain application, excluded species (erroneous reports that may have special significance), and cultivated species that are possibly adventive.

Besides the original drawings, a number of plates published in *Fieldiana* for "The Ferns and Fern Allies of Guatemala" (*Fieldiana*, Bot., n.s., 6. 1981) have been used for species occurring in Peru. Voucher specimens cited in the captions are from Peru unless otherwise indicated.

Abbreviations of periodical publications generally follow the system of *Botanico-Periodicum-Huntianum* (1968), and abbreviations of authors' names and of books generally follow *TL-2 Taxonomic Literature* (2nd ed.) by Stafleu and Cowan (1976 *et seq.*).

#### Acknowledgments

The treatments of the genera *Eriosorus* and *Jamesonia* have been prepared with the collaboration of Alice F. Tryon, and the treatment of *Lindsaea* has been reviewed by Karl U. Kramer. The authors appreciate this aid which has improved the treatments of these technical genera. Special thanks are extended to Field Museum's scientific illustrators Zorica Dabich and Clara Richardson and to volunteer artist Julia A. Liesse for their artwork, which adds an important dimension to

the generic treatments. The collaboration of the staff and officers of the following institutions has been especially valuable in making loans available for study and during visits: Field Museum of Natural History (F); Harvard University Herbaria, most Gray Herbarium (GH) and some Arnold Arboretum (A); Herbarium Truxillense, Universidad de Trujillo, Trujillo, Peru (HUT); Missouri Botanical Garden, St. Louis, (MO); University of California, Berkeley (UC); United States National Herbarium, Smithsonian Institution, Washington, D.C. (US); and Museo de Historia Natural "Javier Prado" de Universidad Nacional Mayor de San Marcos, Lima, Peru (USM).

Earlier work on "The Ferns of Peru," which provided a considerable basis for the present treatment, was supported by National Science Foundation Grants 1064, 15949, and N-1565 to Rolla M. Tryon. The present work is currently supported in part by National Science Foundation Grant BSR-8516358 to Rolla M. Tryon and Robert G. Stolze. We appreciate this financial aid which provides essential assistance. However, any opinions and conclusions expressed are those of the authors and do not necessarily reflect the views of the Foundation.

### Family 13: PTERIDACEAE

**Pteridaceae** Reichenb., Hand. Nat. Pfl.-Syst. 138. 1837, as *Pteroideae*. TYPE: *Pteris* L.

**Stem** erect to long-creeping, bearing trichomes or scales or both. **Leaves** usually small to large, ca. 1–6 m long, circinate in vernation, monomorphic to dimorphic, usually pinnate, or entire, pinnatifid, pedate, palmate, ternate, or radiate, or the

petiole furcate apically into two strongly recurved rachises, glabrous, glandular, pubescent, farinose and (or) scaly. **Petiole** lacking stipules, not articulate to the stem. **Veins** free or fully anastomosing, the areolae without included veinlets. **Sori** at the vein ends, or the sporangia in short to long soral lines along the veins, or the sporangia on a marginal commissure, or scattered on the veins, or on anastomosing veins and between them, exindusiate or the recurved margin modified as an indusium. **Sporangia** with a 2–3-rowed stalk, annulus vertical or rarely oblique, interrupted by the stalk.

The Pteridaceae are a family of about 33 genera and 750 species, widely distributed through most of the World. There are 16 genera in Peru. The family is diverse, including undoubtedly old and distinctive evolutionary lines, as well as recent and poorly defined groups. It is characterized by a chromosome number of  $n = 29$  or  $30$  or multiples (there are exceptions), trilete spores, and the sporangia in exindusiate sori or soral lines, or covered by a marginal, variously modified indusium. Pteridaceae is used here since the earlier Parkeriaceae is always used for a monogeneric family, including *Ceratopteris*.

In the following key to genera, the characters are sometimes restricted, for the sake of convenience, to Andean species.

### Reference

TRYON, R. M., AND A. F. TRYON. 1982. Pteridaceae, pp. 213–354, in *Ferns and allied plants*, Springer-Verlag, New York.

### Key to Genera of Pteridaceae

- a. Margins of the fertile segments not modified, or somewhat modified but not or hardly concealing the sporangia ..... b
- b. Sporangia borne on the anastomosing veins and between them ..... c
  - c. Sterile lamina densely scaly abaxially ..... XII. **Trachypteris**
  - c. Sterile pinnae glabrous to slightly pubescent abaxially ..... XVI. **Acrostichum**
- b. Sporangia borne only on the veins, on a vascular receptacle, or on a vascular commissure ... d
  - d. Stem scarcely developed, not bearing leaf bases from previous years ..... V. **Anogramma**
  - d. Stem well developed and bearing leaf bases from previous years ..... e
    - e. Lamina simple, entire ..... III. **Pterozonium**
    - e. Lamina deeply lobed or 1-pinnate or more complex ..... f
      - f. Stem bearing only trichomes or bristles ..... g

- g. Pinnae with several lobes, or pinnatifid or more complex; the segment margins not or hardly enrolled; the lamina usually clearly determinate . . . . . I. **Eriosorus**
- g. Pinnae entire; the margins strongly enrolled; the lamina usually indeterminate . . . . . II. **Jamesonia**
- f. Stem bearing only scales, or trichomes also sometimes present . . . . . h
- h. Two or more vascular bundles near the base of the petiole; the lamina farinose, glandular, densely pubescent, or glabrous abaxially . . . . . IV. **Pityrogramma**
- h. One vascular bundle near the base of the petiole, or if 2, then the lamina densely scaly abaxially . . . . . i
- i. Sporangia borne on the veins, entirely or nearly from the costa to the margin; segments thinly to moderately pubescent abaxially . . . . . XI. **Hemionitis**
- i. Sporangia borne at the vein ends, or extending on the veins about halfway to the costa (rarely more and then glabrous or farinose abaxially), or on a complete or incomplete marginal commissure . . . . . j
- j. Lamina densely pubescent or scaly abaxially . . . . . VI. **Cheilanthes**
- j. Lamina glabrous or farinose abaxially . . . . . k
- k. Lamina farinose abaxially, or if not, then glabrous and the petiole and rachis very dark reddish to atropurpureous and the pinnae stalked . . . . . VIII. **Notholaena**
- k. Lamina not farinose, glabrous abaxially; the petiole and rachis straw-colored to ruddy brown, or if atropurpureous or darker, then the pinnae sessile . . . . . IX. **Pellaea**
- a. Margins of the fertile segments modified as an indusium, mostly or wholly concealing the sporangia . . . . . l
- l. Veins extending into the indusium where they bear the sporangia . . . . . XIV. **Adiantum**
- l. Indusium without veins or sporangia . . . . . m
- m. Paraphyses (trichomes unlike other lamina indument) present among the sporangia . . . . . XV. **Pteris**
- m. Paraphyses absent (immature sporangia may be present) . . . . . n
- n. Sporangia borne separately on the veins; plants aquatic or semiaquatic; leaves dimorphic, the sterile lamina thin, with evident anastomosing veins . . . . . XIII. **Ceratopteris**
- n. Sporangia adjacent, in sori or soral lines, rarely single at a vein end; plants terrestrial or rupestral . . . . . o
- o. Lamina pinnate, it and the pinnae with a rather large, entire, stalked terminal segment nearly as large as the adjacent ones, or pinnae mostly entire or ternate . . IX. **Pellaea**
- o. Lamina pedate, ternate, or radiate, or usually pinnate and the lamina and pinnae with a pinnatifid apex, or the pinnae pinnately lobed to pinnatifid, or the terminal segment minute, ca. 1 mm long . . . . . p
- p. Lamina pedate; petiole with 2 vascular bundles near the base and veins free, or with 1 bundle and veins anastomosing, at least along the costa . . . . . X. **Doryopteris**
- p. Lamina pinnate or radiate, or pedate and then the petiole with 1 vascular bundle near the base and the veins free . . . . . q
- q. Lamina pedate, or usually pinnate, and the petiole terete or adaxially concolorously (or nearly) 2-ridged; spores cristate, verrucate, granulate, or rugose . . . . . VI. **Cheilanthes**
- q. Lamina ternate or radiate, or pinnate and the petiole adaxially with 2 thin, light-colored ridges; spores echinate . . . . . VII. **Adiantopsis**

**I. Eriosorus**

**Eriosorus** Fée, (Mém. foug. 5) Gen. fil. 152, t. 13B, f. 1. 1852. TYPE: *Eriosorus scandens* Fée = *E. aureonitens* (Hooker) Copel. **Figure 1.**

**Terrestrial.** Stem decumbent or usually creeping and slender, bearing trichomes or bristles (very rarely scales). **Leaves** usually rather closely spaced. **Lamina** 1-4- or 5-pinnate (rarely to 6-pinnate), sparsely to usually definitely pubescent, some-

times densely so, especially abaxially, veins free. **Sori** rather elongate along the veins, usually not extending to the vein tip, not paraphysate, exindusiate. **Spores** tetrahedral-globose, trilete, with a usually prominent equatorial flange, tuberculate or coarsely ridged, with a basal triangular ridge.

*Eriosorus* may be separated from the very closely related *Jamesonia* by the usually determinate lamina, the stalked or rarely sessile pinnae, and the not or hardly enrolled margins of the pinnae. *Jamesonia* has the lamina indeterminate, or if determinate, the pinnae adnate, and the margins of the pinnae enrolled. Both genera have the unusual feature of basally slender petioles.

There is clear morphological and cytological evidence of hybrids; for example, *Eriosorus warszewiczii* × *Jamesonia scammanae* in Costa Rica

and *Eriosorus cheilanthoides* × *E. brasiliensis* on Mt. Itatiaia, Brazil (A. F. Tryon, 1970). Material from Peru (see **Comments**) with abortive spores undoubtedly represents hybrids, but these are often difficult to identify with particular parents. Field studies are needed to assess variation in populations, spore abortion, and cytology of Peruvian species and hybrids.

This treatment of *Eriosorus* follows that of A. F. Tryon (1970), and has been prepared with her collaboration.

## Reference

TRYON, A. F. 1970. A monograph of the fern genus *Eriosorus*. *Contr. Gray Herb.*, **200**: 54–174.

## Key to Species of *Eriosorus*

- a. Leaves erect, or if scandent or scrambling then to 3-pinnate; lamina mostly to ca. 50 cm long, not exceeding 1 m ..... b
- b. Lamina narrowly linear, usually 2-pinnate; pinnae nearly as long as broad 3. ***E. cheilanthoides***
- b. Lamina elongate-triangular, -ovate, or -rhomboid; central or lower pinnae nearly twice as long as the upper ones ..... c
- c. Both surfaces of the pinnae sparsely or moderately pubescent ..... d
- d. Pinna stalks, at least of the lower pinnae, descending from the rachis ... 6. ***E. wurdackii***
- d. Pinna stalks at right angles to the rachis, or ascending from the rachis ..... e
- e. Lamina 2-pinnate to rarely 2-pinnate-pinnatifid; pinnae at right angles to the rachis, sessile or nearly so ..... 1. ***E. rufescens***
- e. Lamina 2-pinnate-pinnatifid to 3-pinnate; pinnae ascending from the rachis, stalked ..... 2. ***E. accrescens***
- c. Both surfaces of the pinnae tomentose with matted trichomes ..... f
- f. Lamina rather elongate-triangular; rachis straight or nearly so; pinnae sessile or subsessile ..... 4. ***E. stuebelii***
- f. Lamina broadest above the base; rachis fractiflex; pinnae stalks strongly ascending from the rachis ..... 5. ***E. aureonitens***
- a. Leaves scandent, twining, or scrambling, to 3 m long or more; lamina 4-pinnate or more complex ..... g
- g. Ultimate segments orbicular or cuneate, broad, with 6–20 veins ..... 7. ***E. orbignyanus***
- g. Ultimate segments dichotomously lobed to deeply bifid, slender, each lobe with 1 or 2 veins ... 8. ***E. flexuosus***

1. ***Eriosorus rufescens*** (Fée) A. F. Tryon, *Rhodora* 65: 56. 1963. **Figure 1a.**

*Gymnogramma rufescens* Fée, (Mém. foug. 5) Gen. fil. 181, t. 19C, f. 3. 1852. TYPE: Peru, "Andibus," *Mathews* (not located).

*Gymnogramma mohriaeformis* Mett., *Fil. lechl.* 1: 9. 1856. TYPE: Peru, Puno, San Gavan (Río San

Gabán), *Lechler* 2255 (holotype, B!; photo, GH; frag., NY!; isotype, GH!).

*Gymnogramma mathewsii* Hooker, *Sp. fil.* 5: 128, t. 290. 1864. TYPE: Peru, *Mathews 1814* (holotype, K!; photo, GH).

**Leaves** erect, determinate. **Lamina** elongate-deltoid, 2-pinnate to rarely 2-pinnate-pinnatifid,

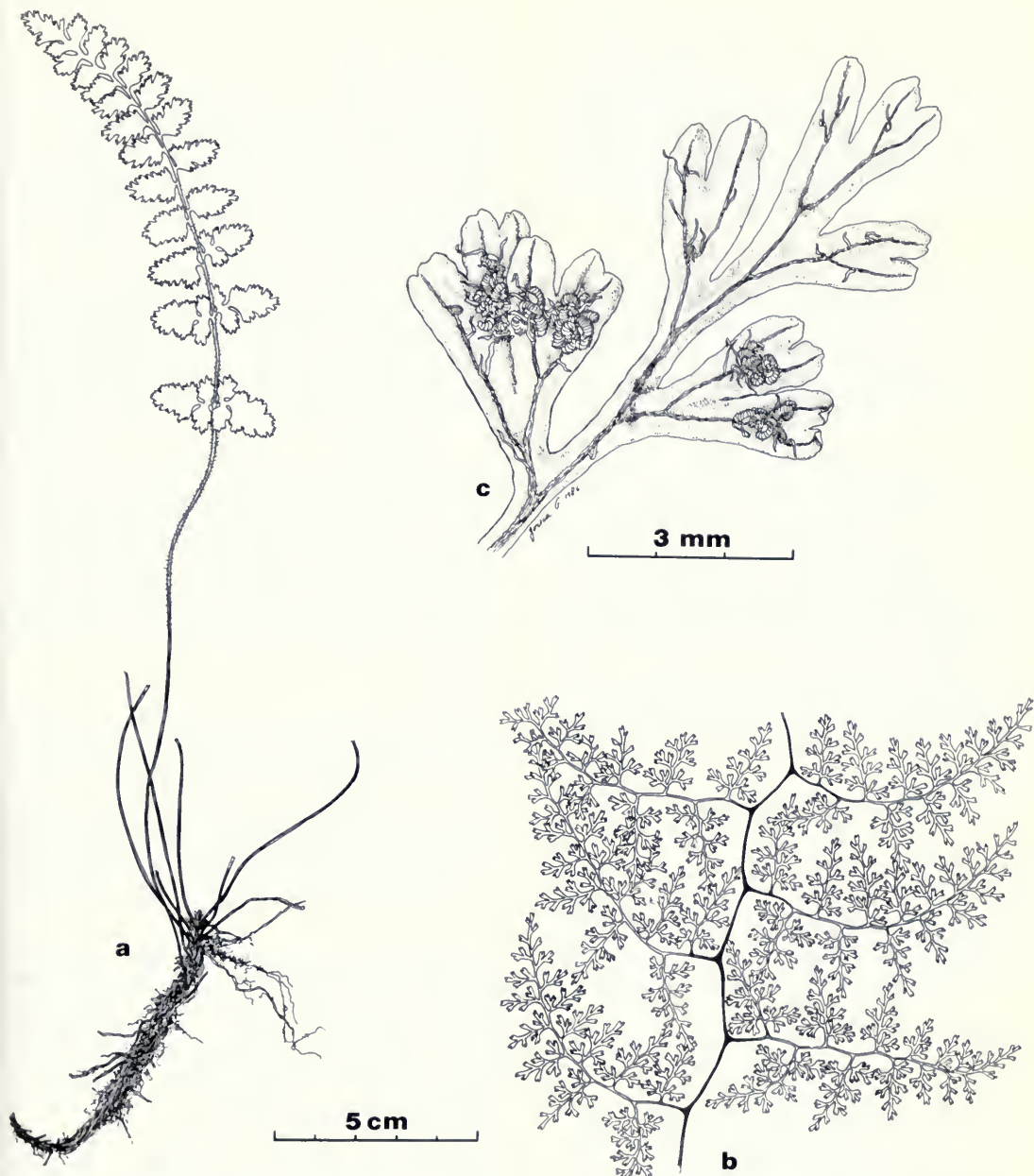


FIG. 1. *Eriosorus rufescens*: a, habit. *Eriosorus flexuosus*: b, portion of lamina; c, apex of penultimate division. (a from Macbride 4302, F; b, c from Macbride 4518, F.)

rachis straight, shallowly grooved adaxially. **Pinnæ** sessile or nearly so, nearly at right angles to the rachis, both surfaces pubescent, with rigid, clear or bicolorous trichomes, ultimate segments broadly lobed to crenulate, the vein ends extending to the margin.

Among rocks, on mossy banks, in *Sphagnum*, often growing in open places in cloud forests, 2300–3600 m, Cajamarca to Puno.

Venezuela, Colombia, south to Bolivia.

This Andean species has the lamina usually bearing bicolorous trichomes.

**Cajamarca:** Prov. Cutervo, La Pucarilla, *López & Sagástegui 5456* (GH). **La Libertad:** Prov. Patáz, Pumatambo, Puerto del Monte, *López & Sagástegui 3436* (GH). **Huánuco:** Cushi, *Bryan 683* (F, US). Pampayacu, *Kanehira 166* (GH, US). **Pasco:** Border Prov. Oxapampa and Pasco, San Gotardo, *van der Werff et al. 8600* (MO, UC). **Ayacucho:** Prov. La Mar, eastern massif of Cordillera Central, *Dudley 12032* (GH). **Cuzco:** Prov. Urubamba, *Vargas 2897* (MO, US). Prov. Paucartambo, *Vargas 12192* (GH).

2. **Eriosorus accrescens** A. F. Tryon, *Rhodora* 65: 57. 1963. TYPE: Peru, (Cuzco), Prov. Urubamba, Puyupata to "Yuncapata," *Vargas 2921* (holotype, us!; isotype, mo!).

**Leaves** erect to subsucculent, with indeterminate growth. **Lamina** elongate-lanceolate or elongate-ovate, 2-pinnate-pinnatifid or 3-pinnate, rachis nearly straight to slightly flexuous, plane to slightly grooved adaxially. **Pinnae** stalked, ascending, both surfaces sericeous, ultimate segments bluntly lobed to crenulate, the vein ends terminating in a sinus at the margin.

Wooded ravines, 2950–3500 m, Amazonas, San Martín, Pasco, and Cuzco.

Peru.

Additional material is needed to adequately characterize this rare species.

**Amazonas:** Prov. Chachapoyas, entre Leimebamba y Balsas, *López et al. 4444* (GH). **San Martín:** Prov. Mariscal Cáceres, Río Abiseo National Park, *Young & León 4726* (F). **Pasco:** Prov. Oxapampa, Santa Bárbara, *D. Smith 8129* (F). **Cuzco:** Valle de Lares, Montaña de Colca, *Bües 1925* (US). Altura de Chaco, *Bües 2135* (US).

3. **Eriosorus cheilanthoides** (Sw.) A. F. Tryon, *Brit. Fern Gaz.* 9: 271. 1966.

*Grammitis cheilanthoides* Sw., *Syn. fil.* 23, 219, 419. 1806. TYPE: Tristan da Cunha (Mauritius in error) (holotype, Herb. Swartz, s!; photo, GH).

**Leaves** erect, indeterminate. **Lamina** narrowly linear, pinnate-pinnatifid, rarely 2-pinnate, rachis straight, plane to slightly grooved adaxially. **Pinnae** stalked, both surfaces more or less pubescent, or rarely glandular, the ultimate lobes bifid, the vein ends extending to, or nearly to, the segment margin.

Rocky soil, at the edge of boulders, among

shrubs, often in the cloud forest zone, 2300–4000 m, Piura to Puno.

Ecuador to Bolivia; Mt. Itatiaia, Brazil; Tristan da Cunha Islands.

This species is characterized by the pinnae being nearly the same length throughout the lamina. It is somewhat frequent at higher elevations and evidently is one parent of the hybrids discussed in

#### Comments.

**Piura:** Prov. Huancabamba, Cerro La Viuda, *Sagástegui et al. 8211* (GH, HUT, MO). **Cajamarca:** Prov. Cajabamba, Cajabamba-Luchubamba, *Sagástegui et al. 11204* (HUT, MO). Prov. Cutervo, La Pucarilla, *López & Sagástegui 5380* (GH, MO). **Ancash:** Prov. Huaráz, Huascarán National Park, *Smith et al. 9623, 12406, 12459* (F). **Huánuco:** Prov. Huánuco, Carpish, *Tryon & Tryon 5319* (GH). **Pasco:** Prov. Oxapampa, Santa Bárbara, *D. Smith 8143* (F). **Junín:** Prov. Concepción, Concepción-Satipo, *Saunders 1078* (GH). **Huancavelica:** Prov. Tayacaja, entre Colcabamba y Paucartambo, *Tovar 2026* (USM). **Ayacucho:** Prov. La Mar, between Tambo and the Apurímac, *Weberbauer 5658* (B, F, GH, US). Pampalca, *Killip & Smith 23249* (F, GH, NY, S, US). **Cuzco:** Prov. Paucartambo, Puente Aguila, *Vargas 23122* (GH). Prov. Cuzco, Río Marcapato, *Madison 1035* (GH). **Puno:** Agapata, *Lechler 2035* (B, F, G, K, P, W).

4. **Eriosorus stuebelii** (Hieron.) A. F. Tryon, *Rhodora* 65: 57. 1963.

*Gymnogramma stuebelii* Hieron., *Hedwigia* 48: 219, t. 9, f. 5. 1909. TYPE: Peru, (Amazonas), between Pacasmayo and Moyobamba, *Stübel 1058* (holotype, B!; frag., GH!; photo, GH).

**Leaves** erect, determinate. **Lamina** rather elongate-deltoid, 2-pinnate, rachis straight, subterete to slightly grooved adaxially. **Pinnae** nearly sessile, both surfaces rather densely sericeous, ultimate segments crenulate, the vein ends terminating in a sinus at the margin or protruding in a tooth beyond the margin.

In woods, 2000–3000 m, Amazonas and Puno. Peru.

The Vargas collection cited below is not entirely consistent with the type and may represent another species.

**Amazonas:** Chachapoyas, *Wurdack 1527* (US). **Puno:** Prov. Sandia, bajando a Cachi-cachi, *Vargas 11834* (GH).

5. **Eriosorus aureonitens** (Hooker) Copel., *Gen. fil.* 58. 1947.



*Gymnogramma aureonitens* Hooker, Hooker's Icon. Pl. 9: t. 820. 1852 (prior to May, cf. Gard. Chron. 1852: 278). TYPE: Peru, *W. Lobb* (holotype, κ!; frag., NY!; photo, GH).

*Eriosorus scandens* Fée, (Mém. foug. 5) Gen. fil. 152, t. 13B, f. 1. 1852 ("probably December" cf. W. T. Stearn, *Webbia* 17: 207–222. 1962). TYPE: Peru, *Ruíz* (not located).

**Leaves** subscent or pendent, with indeterminate growth. **Lamina** elongate-lanceolate, broadest above the base, 2-pinnate-pinnatifid, rachis fractiflex, subterete or shallowly grooved adaxially. **Pinnae** stalked, ascending from the rachis, adaxially, both surfaces densely tomentose, ultimate segments bluntly lobed to crenulate, the vein ends usually protruding in a tooth beyond the margin.

Shrubby areas, especially in cloud forests and elfin forests, 2700–3400 m, Piura to Cuzco.

Colombia, Ecuador, and Peru.

The fractiflex rachis and dense tomentum on the lamina are unusual features that readily characterize this species.

**Piura:** Prov. Huancabamba, Cordillera Chinguala, *Sagástegui et al. 10222* (GH, UC). **Amazonas:** Prov. Chachapoyas, middle eastern Calla Calla slopes, *Wurdack 1738* (GH, US). Prov. Bagua, Cordillera Colán, *Barbour 3370* (F, MO). **Huánuco:** Playapampa, *Macbride 4529* (F). Between Huánuco and Pampayacu, *Kanehira 153* (GH, US). **Pasco:** Prov. Oxapampa, Cordillera Yanachaga, *Foster 9016* (F, MO). Border Prov. Oxapampa and Pasco, San Gotardo, *van der Werff 8506* (MO, UC). **Cuzco:** Prov. La Convención, Cordillera Vilcabamba, *Dudley 11090* (GH).

6. *Eriosorus wurdackii* A. F. Tryon, Contr. Gray Herb. 200: 147. 1970. TYPE: Peru, Dept. Amazonas, Prov. Chachapoyas, 6–8 km W of Molinopampa, *Wurdack 1541* (holotype, GH!).

**Leaves** erect, determinate. **Lamina** elongate-triangular, 2- or 3-pinnate basally, rachis fractiflex, at least toward the base, strongly grooved adaxially. **Pinnae** stalked, at least the lower ones descending from the rachis, glabrous adaxially, slightly pubescent abaxially, ultimate segments orbicular to ovate, veins extending to, or slightly short of, the margin.

Rock crevices, in the jalca zone, 2200–2300 m, Amazonas. Only known from the type collection. Peru.

This species and *E. orbignyanus* are unusual in that the sori form a band on the fertile segment.

7. *Eriosorus orbignyanus* (Kuhn) A. F. Tryon, *Rhodora* 65: 56. 1963.

*Gymnogramma orbignyanus* Kuhn, *Linnaea* 36: 70. 1869. SYNTYPES: Bolivia, (La Paz), Yungas, *D'Orbigny 174* (B!; photo, GH; isosyntype, F!; photo, GH); Bolivia, (Cochabamba) "Yorocares" (Yuracaré), *D'Orbigny 299* (B!; photo, GH; isosyntype, F!; photo, GH).

**Leaves** scandent, evidently indeterminate. **Lamina** elongate, 4-pinnate, rachis fractiflex, strongly grooved adaxially. **Pinnae** stalked, descending from the rachis, both surfaces sparsely pubescent, ultimate segments broadly lobed to crenulate, with mostly 6–20 veins, the vein ends extending to, or nearly to, the margin.

Cloud forests, 1500–1750 m, Huánuco to Cuzco.

Colombia south to Bolivia.

**Huánuco:** Río Lullapichis watershed, Cerros del Sira, *Dudley 13474* (GH). **Pasco:** Border Prov. Oxapampa and Pasco, San Gotardo, *van der Werff et al. 8585* (MO, UC). Prov. Oxapampa, Oxapampa-Paucartambo, *Smith & Pretel 1632* (F). **Junin:** Provenir, *Killip & Smith 25947* (NY, US). **Cuzco:** Chaupimayo, *Bües 1949, 1950* (US). Prov. La Convención, *Dudley 10337, 11240* (GH).

8. *Eriosorus flexuosus* (H.B.K.) Copel., Gen. fil. 58. 1947. Figure 1b–c.

*Gymnogramma flexuosa* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 306. 1811, ex char., not *Eriosorus flexuosus* (H.B.K.) Copel. TYPE: none cited.

*Grammitis flexuosa* H.B.K., Nov. gen. sp. 1: 5. 1816. TYPE: Venezuela, *Humboldt & Bonpland* (holotype, P!; photo, GH).

*Grammitis ruiziana* Klotzsch, *Linnaea* 20: 410. 1847. TYPE: Peru, (Huánuco), Prov. Panatahuas, *Ruíz 74* (holotype, B!; photo, GH).

*Gymnogramma flexuosa* var. *peruviana* Hieron., *Hedwigia* 48: 220. 1909. TYPE: Peru, (Amazonas), Cuesta de Lejía, near Molinobamba, *Stübel 1055* (holotype, B!; photo, GH).

**Leaves** scandent, scrambling, indeterminate, sometimes more than 3 m long. **Lamina** elongate, branching in several planes, 4- or 5-pinnate, rachis more or less fractiflex, strongly grooved adaxially. **Pinnae** stalked, ascending, or nearly at right angles to the rachis, both surfaces glabrous or sparsely pubescent, ultimate segments slender, bifid to deeply lobed, each lobe with 1 or 2 veins, vein ends extending to, or short of, the segment margin.

Among shrubs in moist areas, along river banks or on mossy slopes, scrambling on other vegetation, 2200–3600 m, Cajamarca to Puno.

Mexico and Central America; Hispaniola; Guyana west to Colombia and south to Bolivia.

This species is characterized by very large and long scrambling leaves with the pinnae disposed in several planes, and slender ultimate segments with each lobe having one or two veins.

**Cajamarca:** Prov. Cutervo, La Pucarilla, *López & Sagástegui 5458* (GH). NE of Socota, *Stork & Horton 10132* (F, UC, US). **Amazonas:** 9 km below Chachapoyas, *Wurdack 777* (GH, US). Prov. Bagua, Cordillera Colán, *Barbour 3754* (F, MO). **San Martín:** Prov. Rioja, Pedro Ruíz-Moyobamba, *D. Smith 4827* (GH). **Huánuco:** Prov. Huánuco, Bosque Nacional de Iparia, *J. Schunke V. 5227* (F, GH, US). Mito, *Macbride & Featherstone 1829* (F, GH, US). **Pasco:** Prov. Oxapampa, Cordillera Yanachaga, *Foster 9010* (F, MO). **Huancavelica:** Prov. Tayacaja, E of Surcubamba, *Stork & Horton 10393* (F, GH, US). **Cuzco:** Pillahuata, Cerro de Cusilluyoc, *Pennell 13941* (F, GH, NY). Paucartambo, *Vargas 1906* (GH, US). **Madre de Dios:** Prov. Manú, Shintuya, *Chávez 859* (MO). **Puno:** Prov. Carabaya, entre Ayapata y Kahualluyoc, *Vargas 10750* (GH).

## Comments

### DUBIOUS SPECIES

*Eriosorus lechleri* (Kuhn) A. F. Tryon, *Rhodora* 65: 56. 1963; *Contr. Gray Herb.* 200: 171. 1970.

*Gymnogramma lechleri* Kuhn, *Linnaea* 36: 71. 1869. TYPE: Peru, Puno, San Gavan (Río San Gabán), *Lechler 2262* (holotype, B!; photo, GH).

The type is a single leaf that cannot be definitely identified.

### HYBRIDS

A considerable number of collections have been identified as hybrids on the basis of morphological irregularities, abortive spores or sporangia, and characters intermediate between putative parents. The two most frequent ones are the following.

*Eriosorus cheilanthoides* × *Eriosorus* sp.

*Gymnogramma flabellata* Grev. & Hooker, *J. Bot. (Hooker)* 1: 61, *t.* 120. 1834. TYPE: Ecuador,

(Azuay), near Cuenca, *Jameson in 1832* (holotype, Herb. Greville, E!; photo, GH; isotype, Herb. Hooker, K!; photo, GH).

*Eriosorus flabellatus* (Grev. & Hooker) Copel., *Gen. fil.* 58. 1947.

Specimens of this hybrid mostly have abortive spores. They are similar to *Eriosorus cheilanthoides* in the narrowly elongate lamina; however, the pinnae are about twice as long as broad. The other parent may be *Eriosorus flexuosus*.

**Cajamarca:** San Juan, *Vargas et al. 5512* (USM). **La Libertad:** Prov. Sánchez, between Huamachuco and Cajabamba, *Smith & Cáceres 2233* (F, MO). **Ancash:** Prov. Yungay, Huascarán National Park, *Smith et al. 10378, 10379* (GH). **Cuzco:** Prov. Paucartambo, Puente Aguila, *Vargas 23123* (GH).

*Eriosorus cheilanthoides* × *Jamesonia* sp.

*Gymnogramma elongata* Grev. & Hooker, *J. Bot. (Hooker)* 1: 61, *t.* 119. 1834. TYPE: Ecuador, (Azuay), near Cuenca, *Jameson in 1832* (holotype, Herb. Greville, E!; photos, BM, GH; isotype, Herb. Hooker, K!; photo, GH).

*Eriosorus elongatus* (Grev. & Hooker) Copel., *Gen. fil.* 58. 1947.

Specimens are similar to both parents in the narrowly linear lamina. Some collections may be part of the variation of *Eriosorus cheilanthoides*, while others with abortive spores are probably hybrids with one of the species of *Jamesonia*. The collections will key out to *E. cheilanthoides*, but the ultimate lobes have three or usually more veins, rather than one or two veins.

**Piura:** Prov. Huancabamba, above Huancabamba, *Hutchison 1616* (GH). Prov. Huancabamba, E of Huancabamba, *Weberbauer 6096* (B, F, GH, US). **Cajamarca:** Prov. San Miguel, El Tingo, *Sagástegui et al. 9516* (F). **Amazonas:** Summit of Puma-urcu, *Wurdack 1161* (GH, US). Cerros Calla Calla, *Hutchison & Wright 6978* (F, GH, US). **La Libertad:** Prov. Bolívar, La Quinuas, *López & Sagástegui 3348* (GH). **Huánuco:** Carpish, *Stork & Horton 9910* (F, GH, MO). Carpish, *Ferreira 8172* (GH). **Cuzco:** Cerro de Cusilluyoc, *Pennell 13850* (F, GH, NY, S, US).

## II. *Jamesonia*

*Jamesonia* Hooker & Grev., *Icon. fil.* 2, *t.* 178. 1830. TYPE: *Jamesonia pulchra* Hooker & Grev. **Figure 2.**

*Psilogramme* Kuhn, *Festschrift 50 jähr jub. Real. Berlin* 332 (reprint *Chaetopterides* 12). 1882, *nom. superfl.* for *Jamesonia* and with the same type.

**Terrestrial.** **Stem** decumbent to usually creeping, bearing trichomes or bristles. **Leaves** usually well spaced. **Lamina** 1-pinnate, pubescent or glandular abaxially, veins free. **Sori** rather elongate along the veins, extending almost to a vein tip, not paraphysate, exindusiate. **Spores** tetrahedral-globose, trilete, coarsely ridged or tuberculate, with a prominent equatorial flange.

Differences of *Jamesonia* and the closely related *Eriosorus* are discussed under the latter genus.

Specimens that are old or incomplete are often difficult to identify. The indument on the pinnae is best observed in younger leaves toward the apex

of the lamina. Several leaves and pinnae should be examined in order to be certain of a character. The mature sporangia of fully fertile pinnae may conceal the indument on the abaxial surface.

This treatment of *Jamesonia* follows that of A. F. Tryon (1962) and has been prepared with her close collaboration.

## Reference

TRYON, A. F. 1962. A monograph of the fern genus *Jamesonia*. *Contr. Gray Herb.* **191**: 109-197.

## Key to Species of *Jamesonia*

- a. Pinnae asymmetrical, inequilateral at the usually cordate base ..... b
- b. Abaxial surface of the pinnae densely tomentose, the trichomes often matted ..... c
- c. Lamina not reduced apically, with patent or slightly appressed trichomes ..... d
- d. Stem trichomes dark brown to atropurpureous, darker than the stem surface; border of the pinnae usually broad, indusoid ..... 2. **J. pulchra**
- d. Stem trichomes tan to light brown, lighter than the stem surface; border of the pinnae narrow to moderately broad ..... 9. **J. imbricata**
- c. Apex of the lamina vermiform, glandular-pubescent, usually vernicose ... 3. **J. scammanae**
- b. Abaxial surface of the pinnae glabrous, glandular, or somewhat sparsely and loosely pubescent ..... e
- e. Pinnae rigidly herbaceous, the abaxial surface pubescent ..... f
- f. Pinnae pubescent adaxially, especially on the enrolled margin ..... g
- g. Pinnae with rather short trichomes adaxially, these hardly extending to other pinnae ..... 1. **J. rotundifolia**
- g. Pinnae with long trichomes adaxially, these usually enveloping several pinnae ..... 4. **J. peruviana**
- f. Pinnae glandular-pubescent abaxially ..... 7. **J. boliviensis**
- e. Pinnae coriaceous, the adaxial surface glabrous or rarely with appressed glands or a few trichomes ..... h
- h. Lamina the same width toward the apex; tomentum of apex and rachis concolorous ..... 5. **J. alstonii**
- h. Lamina broadened and narrowly clavate toward the apex; tomentum of the apex and rachis bicolorous, usually with a prominent dark streak ..... 6. **J. goudotii**
- a. Pinnae symmetrical, equilateral at the truncate to cordate base ..... i
- i. Pinnae with slender stalks usually 1 mm or more long, these often perpendicular to the rachis; the pinna border entire to slightly short-ciliate; veins extending to the margin ..... j
- j. Pinnae cordate at the base, the abaxial surface glandular or with a few short trichomes ..... 8. **J. scalaris**
- j. Pinnae truncate to subcordate at the base, the abaxial surface usually tomentose ..... 9. **J. imbricata**
- i. Pinnae adnate, sessile or subsessile, or with a stalk usually ca. 1 mm long and at an oblique angle to the rachis; the pinna border short- to long-ciliate ..... k
- k. Stem trichomes dark brown to atropurpureous; veins extending nearly to the margin ..... 10. **J. blepharum**
- k. Stem trichomes tan to golden brown; veins ending well back of the margin ..... 11. **J. cinnamomea**

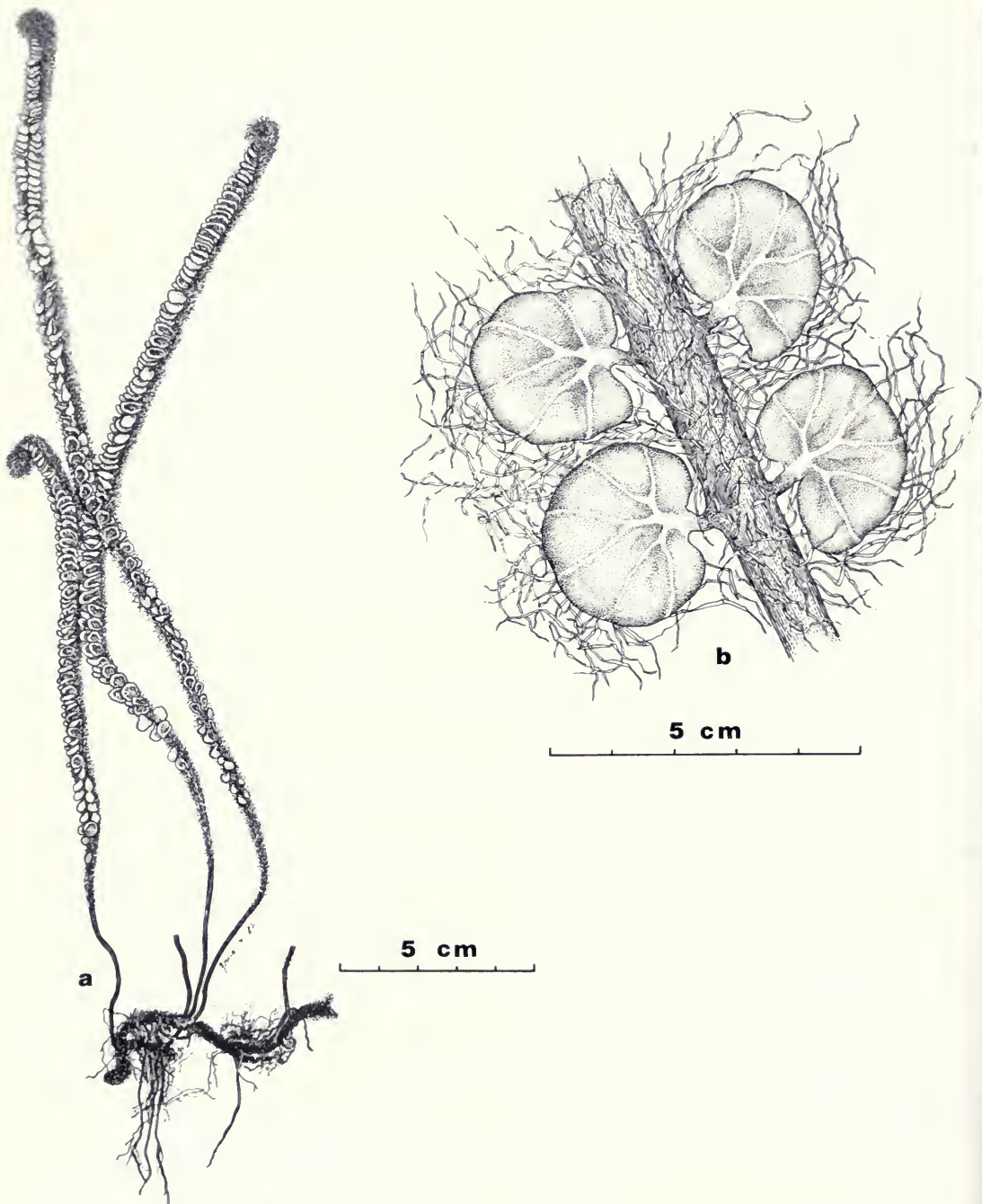


FIG. 2. *Jamesonia alstonii*: **a**, habit; **b**, portion of rachis with pinnae, adaxial side. (a from Killip & Smith 17475, Colombia, GH; b from Cleef 9736, Colombia, GH.)

1. *Jamesonia rotundifolia* Fée, Mém. foug. 7: 41, t. 10. 1857. TYPE: Colombia, Schlim 363 (holotype, not located; isotypes, G!, K!, P!; photo, GH of P).

**Stem trichomes** castaneous to light brown. **Lamina** about the same width throughout, the bud with patent or slightly appressed trichomes. **Pinnae** rotundate-cordate, inequilateral at the base, rigidly

herbaceous, adaxial surface more or less pubescent, abaxial surface pubescent or glabrous, the stalk at an oblique angle to the rachis, border moderately broad, extended at the vein ends, irregularly dentate, sometimes little modified and similar to the pinna in texture.

Moist, grassy steppes, rocky places, especially in the jalca of northern Peru, 3200–3500 m, Piura, Amazonas, and Huánuco.

Costa Rica; Colombia to Peru.

This species is characterized by its rotundate-cordate, inequilateral pinnae that are pubescent on the adaxial surface.

**Piura:** Prov. Huancabamba, San Antonio-Talaneo, *Sagástegui & Cabanillas 8622* (F, MO, UC). Prov. Huancabamba, E of Huancabamba, *Weberbauer 6076* (B, F, GH, US). **Amazonas:** Prov. Chachapoyas, Cordillera de Calla Calla, *López et al. 4447* (HUT). **Huánuco:** Cushi, *Bryan 612* (F).

2. **Jamesonia pulchra** Hooker & Grev., *Icon. fil.* 2, t. 178. 1830. TYPE: Ecuador, (Pichincha), Monte Cayambe (cited as Peru), *Jameson* (holotype, E!; photos, BM, GH; isotype, Herb. Hooker, K!).

**Stem** trichomes dark brown to atropurpureous, darker than the stem surface. **Lamina** usually slightly broader in the central portion, the bud with patent or slightly appressed trichomes. **Pinnae** ovate to orbicular, cordate, inequilateral at the base, rigidly herbaceous, adaxial surface glabrous or slightly pubescent, abaxial surface densely tomentose, the stalk at an oblique angle to the rachis, border usually broad, often indusoid, entire or somewhat dentate.

In a *Sphagnum* bog, 3350 m, Pasco.

Colombia, Ecuador, and Peru.

*Jamesonia pulchra* has only recently been collected in Peru. It probably also grows in the jalca of northern Peru where several other species of the genus occur. The broad, often indusoid, border of the pinnae is especially characteristic of this species.

**Pasco:** Prov. Oxapampa, Cordillera Yanachaga, *D. Smith 7729* (F, GH).

3. **Jamesonia scammanae** A. F. Tryon, *Contr. Gray Herb.* 191: 164. 1962. TYPE: Costa Rica,

Cerro de la Muerte, *Scamman & Holdridge 7929* (holotype, GH!).

**Stem** trichomes lustrous, light to dark brown. **Lamina** about the same width throughout, the bud vermiform, glutinous, often vernicose, with appressed trichomes. **Pinnae** ovate, sometimes lobed, inequilateral or nearly so at the base, adaxial surface glandular and vernicose or crustose, abaxial surface tomentose, stalk bent, short to nearly absent, border moderately broad, entire or slightly undulate, firm-membranous or similar to the pinna in texture.

Grassy and rocky places, usually moist sites, 2750–4400 m, Ancash to Puno.

Costa Rica; Colombia to Bolivia.

This species is readily recognized by the small, vermiform and usually vernicose lamina apex.

**Ancash:** Prov. Huari, Huascarán National Park, *Smith & Goodwin 8749* (F, GH). **Huánuco:** Huánuco, *Macbride & Featherstone 2182* (F, GH, US). **Lima:** Huarochiri, *Saunders 399* (BM). **Pasco:** Prov. Oxapampa, Santa Barbara, *Foster et al. 10427* (F). **Junín:** Prov. Satipo, Pampa Hermosa, *Saunders 1036* (GH). **Apurímac:** Bosques de Ampay, *Vargas 1060* (GH). **Cuzco:** Cerro de Cusilluyoc, *Pennell 13870* (F, GH, US). Achirani, *Vargas 11165* (F, K, UC). **Puno:** Tabina, *Lechler 2032* (B, E, K, LE, P).

4. **Jamesonia peruviana** A. F. Tryon, *Contr. Gray Herb.* 191: 167. 1962. TYPE: Peru, (Huánuco), Tambo de Vaca, *J. F. Macbride 4404* (holotype, F!).

**Stem** trichomes castaneous to atropurpureous. **Lamina** broadest at the apex, the bud with tan or light brown, patent or somewhat appressed trichomes. **Pinnae** reniform or orbicular-cordate, inequilateral at the base, rigidly herbaceous or slightly coriaceous, adaxial surface with long trichomes, these usually enveloping several pinnae, abaxial surface sparsely pubescent, stalk straight, perpendicular to the rachis, border broad, with more or less uniform papillae, firm-membranous.

Grassy places, especially in moist and rocky sites, 2800–4300 m, Amazonas to Puno.

Peru and Bolivia.

This species is characterized by the very long trichomes, borne on the adaxial surface of the pinnae, which envelope the adjacent pinnae.

**Amazonas:** Prov. Chachapoyas, summit of Cerros de Calla Calla, *Wurdack 1216* (GH, US). **La Libertad:** Las

Quinuas, *López & Sagástegui 3346* (F, GH, MO, UC). **Ancash:** Huari, above Ponto, *Weberbauer 3302* (B, G, US). **Huánuco:** Tambo de Vaca, *Bryan 648* (F, US). **Pasco:** Prov. Oxapampa, Santa Barbara, *D. Smith 8114* (F, GH), *Foster et al. 10433* (F). **Junin:** Tarma, *Née* (F). **Cuzco:** Cerro Cusilluyoc, *Pennell 13873* (F, GH, US). **Puno:** *Lechler 2153*, in part (B, E, G, K, LE, P).

5. *Jamesonia alstonii* A. F. Tryon, *Contr. Gray Herb.* 191: 168. 1962. TYPE: Colombia, del Valle, Los Farallones, *Cuatrecasas 21884* (holotype, GH!). **Figure 2.**

**Stem** trichomes usually dark brown or blackish, sometimes light brown. **Lamina** about the same width throughout, the bud with straw-colored, matted, or slightly appressed trichomes, the tomentum of the apex and rachis concolorous. **Pinnæ** ovate-cordate or orbicular-cordate, inequilateral at the base, coriaceous, the adaxial surface glabrous, rarely glandular, abaxial surface sparsely pubescent, stalk straight, perpendicular to the rachis, border moderately broad, extended at the vein ends, dentate, with sparse, short, bulbous cilia or entire, rigidly herbaceous.

Wet grasslands, among boulders, 3400–4000 m, Cajamarca to Puno.

Southern Mexico; Guatemala and Costa Rica; Colombia to Bolivia.

*Jamesonia alstonii* is distinguished by the coriaceous pinnæ and the concolorous tomentum of the lamina apex and rachis. It is most closely related to *J. goudotii*.

**Cajamarca:** Prov. Contumazá, jalca de Pozo Kuan, *Sagástegui et al. 10790* (F, HUT). **La Libertad:** Prov. Patá, Paseo de Alaska, *López & Sagástegui 8176* (GH, MO). Huillias, N of Cachicadón, *Stork & Horton 10007* (F, G, K, UC). **Ancash:** Prov. Bolognesi, Condorcocha, *Cerrate 2547* (GH). **Huánuco:** Mito, *Macbride & Featherstone 1883* (F, G, US). **Junin:** Huayllay, *Mathews 979* (E, GL, K). **Cuzco:** Cordillera Vilcabamba, *Dudley 11191* (GH). *Bües 1378* (US). **Puno:** *Lechler 2153*, in part (B, E, G, K, LE, P, S).

6. *Jamesonia goudotii* (Hieron.) C. Chr., *Index fil.* 373. 1905.

*Gymnogramma goudotii* Hieron., *Bot. Jahrb. Syst.* 34: 476. 1904. TYPE: Colombia, *Goudot* (holotype, B!; photo, GH; isotype, G!; photo, GH).

**Stem** trichomes light brown to lustrous black. **Lamina** narrowly clavate, broadest at the apex, the

bud with erect or slightly appressed trichomes, the tomentum of the apex and rachis bicolorous, usually with a patch or streak of dark trichomes. **Pinnæ** reniform or orbicular-cordate, inequilateral at the base, coriaceous, the adaxial surface usually glabrous, sometimes glandular, abaxial surface sparsely pubescent, stalk straight, perpendicular to the rachis, border usually extended at the vein ends, irregularly dentate or ciliate, rarely entire or nearly so, rigidly herbaceous.

In grasslands and elfin forests, sometimes near glaciers, usually in wet sites, 3200–4800 m, Amazonas to Cuzco.

Colombia to Peru.

*Jamesonia goudotii* is characterized by the narrowly clavate lamina that is broadest at the apex and the bicolorous tomentum in that region.

A single collection from Amazonas: Top of divide between Río Marañón and Río Utcubamba, 28–31 km SW of Leimebamba, jalca, 17 June 1978, *Gentry et al. 23168* (F, MO) is evidently a hybrid of *J. goudotii* and *J. imbricata*.

**Amazonas:** Prov. Bagua, Cordillera de Colán, *Barbour 3166* (MO). **Ancash:** Huascarán National Park, *D. Smith 11301* (GH), *Smith et al. 11655* (F), *Smith et al. 12345* (F, GH). **Junin:** near Comas, *Weberbauer 6629* (F, GH, US). **Cuzco:** *Bües 1406* (US).

7. *Jamesonia boliviensis* A. F. Tryon, *Contr. Gray Herb.* 191: 174. 1962. TYPE: Peru, Apurímac, Bosques de Ampay, *Vargas 1060a* (holotype, GH!).

**Stem** trichomes lustrous, atropurpureous or blackish. **Lamina** about the same width throughout, the bud with rust-colored, patent trichomes. **Pinnæ** orbicular-cordate or ovate-cordate, inequilateral at the base, rigidly herbaceous, both surfaces pubescent, stalk straight, perpendicular to the rachis, border narrow, with capitate cilia.

In woods and elfin woodlands, 3200–3400 m, Pasco and Apurímac.

Peru and Bolivia.

This species is unique in having the same form of indument on both surfaces of the pinnæ and on the border.

**Pasco:** Prov. Oxapampa, Santa Bárbara, *Foster et al. 10387* (F). **Apurímac:** Abancay region, Oct. 1935, *V. Santander et al.* (UC).

8. *Jamesonia scalaris* Kunze., Bot. Zeit. (Berlin) 2: 738. 1844. TYPE: Peru, (Huánuco), Pillao, Ruiz 49 (holotype, B!; photo, GH).

**Stem** trichomes light to dark brown or atropurpureous. **Lamina** about the same width throughout, the bud with tan or rust-colored, patent or slightly appressed trichomes. **Pinnae** ovate-cordate, usually lobed, equilateral or nearly so at the base, herbaceous, the adaxial surface with papillate glands, abaxial surface pubescent, sometimes tomentose, stalk straight or slightly bent, perpendicular to the rachis, veins extending to the margin, border narrow, with capitate cilia.

Shrublands and grasslands, dwarf forests, cloud forests, especially in open, wet sites, 2700–4300 m, La Libertad to Puno.

Peru and Bolivia.

This species is distinguished from others with equilateral and stalked pinnae by the cordate pinnae with the stalk perpendicular to the rachis.

**La Libertad:** Prov. Pataz, Pumtambo, López & Sagástegui 3435 (GH). **Ancash:** Prov. Yungay, Huascarán National Park, Smith et al. 9090 (F, GH). **Huánuco:** Punta de Panao, Asplund 13718 (GH, s). Playapampa, Macbride 4524 (F, US). **Pasco:** Prov. Oxapampa, Cordillera San Gutardo, León et al. 533 (USM). **Junín:** Prov. Huancayo, arriba de Chilifruta, Cerrate 5649 (USM). **Huancavelica:** Prov. Tayacaja, entre Marcavalle y Huachocolpa, Tovar 4230 (GH, USM). **Ayacucho:** Prov. La Mar, near Cusi-

machay, Madison 10389 (GH). **Cuzco:** Prov. La Convención, Cordillera Vilcabamba, Dudley 11190 (GH). **Prov. Paucartambo,** Vargas 4322 (GH). **Puno:** Ayapata, Lechler 2036a (B, E, G, K, LE, P).

9. *Jamesonia imbricata* (Sw.) Hooker & Grev., Icon. fil. 1: 2. 1831.

**Stem** trichomes tan to dark brown. **Lamina** about the same width throughout, the bud with tan, brown, or bicolorous, patent or appressed trichomes. **Pinnae** orbicular to ovate, equilateral and truncate or slightly inequilateral and somewhat cordate at the base, rigidly herbaceous, adaxial surface glandular or sometimes also with a few trichomes, rarely glabrous, abaxial surface tomentose, stalk usually bent or twisted and oblique to the rachis, veins extending to the margin, border moderately broad, entire or dentate and sparsely ciliate.

This is a variable species with three varieties recognized by A. F. Tryon (1962). Among these, var. *imbricata* is known in Peru only from two collections, including the type, and var. *glutinosa* is known from several collections, especially from the Department of Amazonas. The other, var. *meridensis* A. F. Tryon, is confined to Venezuela and Colombia.

Venezuela, Colombia, Ecuador, and Peru.

### Key to Varieties

- a. Stem trichomes tan to light brown, lighter than the stem surface; pinnae slightly inequilateral at the base and somewhat cordate ..... 9a. var. **imbricata**  
a. Stem trichomes reddish to dark brown, the same color or darker than the stem surface; pinnae equilateral at the base, truncate ..... 9b. var. **glutinosa**

#### 9a. *Jamesonia imbricata* var. *imbricata*

*Pteris orbiculata* Poirlet in Lam., Encycl. 5: 710. 1804, not Houtt., Nat. Hist. 14: 108. 1783. TYPE: "Pirou," *J. Jussieu* (holotype, Herb. Jussieu no. 1332, P!; photo, GH).

*Pteris imbricata* Sw., Syn. fil. 102. 1806, based on *Pteris orbiculata* Poirlet.

In the jalca, 3150 m, Lambayeque.  
Colombia, Ecuador, and Peru.

**Lambayeque:** Prov. Ferreñafe, Laguna Tembladera, Sagástegui et al. 12796 (UC).

#### 9b. *Jamesonia imbricata* var. *glutinosa* (Karsten) A. F. Tryon, Contr. Gray Herb. 191: 182. 1962.

*Jamesonia glutinosa* Karsten, Fl. Columb. 2: 85, t. 143. 1865. TYPE: Colombia, (Cundinamarca), Bogotá, Montc Guadcloupé, Karsten (holotype, LE!; photo, GH).

In grasslands, scrub forests, and rocky places, 3100–3700 m, Amazonas to Cuzco.

Venezuela, Colombia, Ecuador, and Peru.

**Amazonas:** Prov. Chachapoyas, Cordillera Calla-Calla, Leimebamba to Balsas, *López et al. 4447, 4448* (GH). Summit of Puma-urcu, SE of Chachapoyas, *Wurdack 1160* (GH, US). 28–31 km SW of Leimebamba on road to Balsas, *Gentry et al. 23167* (F, MO, US). **La Libertad:** Prov. Bolívar, Nevada de Cajamarquilla, *Ferreya 1348* (USM). **Pasco:** Prov. Oxapampa, Santa Barbara, *D. Smith 8125* (F, GH). **Cuzco:** Tinke, *Humbert 30735* (GH).

10. **Jamesonia blepharum** A. F. Tryon, Contr. Gray Herb. 191: 190. 1962. TYPE: Peru, Huánuco, Pampayacu, *Ryozo Kanehira 148* (holotype, GH!; isotype, US!).

**Stem** trichomes lustrous, light to dark brown to atropurpureous. **Lamina** nearly the same width throughout or the base and apex more slender, the bud with dark brown, appressed, glutinous trichomes. **Pinnae** orbicular, equilateral at the base, rigidly herbaceous, the adaxial surface vernicose with appressed glands, abaxial surface pubescent, stalk oblique (if present), often broad and decurrent on the adaxial surface of the rachis, veins extending nearly to the margin, border narrow, ciliate.

In woods, in dwarf forests, 2700–2800 m, Huánuco, Pasco, and Cuzco.

Colombia to Bolivia.

The characters in the key provide an adequate separation of this species and *Jamesonia cinnamomea*. It is characterized by nearly adnate pinnae and the usually long-ciliate pinna-border. The lamina is sometimes determinate.

**Huánuco:** Carpish, entre Huánuco y Tingo María, *Ferreya 6702* (GH). Prov. Huánuco, Carpish, *Hutchison et al. 5961* (GH). **Pasco:** Border Prov. Oxapampa and Pasco, San Gotardo, *van der Werff et al. 8553, 8565* (UC). **Cuzco:** Valle de Lares, *Bües 1908, 1824, 1914* (US).

11. **Jamesonia cinnamomea** Kunze, Bot. Zeit. (Berlin) 2: 738. 1844. TYPE: Colombia, *Hartweg 1516* (holotype, Herb. Shuttleworth, BM!; photos, F, GH, NY, US; isotypes, B!, BM!, G!, GH!, K!, LE!, US!).

**Stem** trichomes lustrous tan to golden brown. **Lamina** nearly the same width throughout, the bud with a tomentum of rather appressed, cinnamo-

meous trichomes. **Pinnae** orbicular, equilateral at the base, coriaceous, the adaxial surface with appressed, glutinous trichomes, often vernicose, abaxial surface somewhat pubescent, stalk oblique to the rachis, veins ending well back of the margin, border usually narrow, ciliate or glandular.

In the jalca area of northern Peru, 3150 m, Lambayeque.

Colombia, Ecuador, and Peru.

The orbicular pinnae and usually large, reddish brown lamina bud are characteristic of this species. Rarely the lamina may be determinate.

**Lambayeque:** Prov. Ferreñafe, Laguna Tembladera, *Sagástegui et al. 12796* (HUT).

### III. *Pterozonium*

**Pterozonium** Fée, Mém. Soc. Mus. Nat. Hist. Strasbourg 4: 202. 1850. Also (Mém. foug. 5) Gen. fil. 37, 178. 1852. TYPE: *Pterozonium reniforme* (Mart.) Fée (*Gymnogramma reniformis* Mart.). **Figure 3.**

**Terrestrial** or usually rupestral. **Stem** small to stout, prostrate-creeping to erect, bearing trichomes, bristles, or scales. **Leaves** clustered or sometimes well spaced. **Lamina** simple, entire, or 1-pinnate or partly 2-pinnate, glabrous to pubescent abaxially, veins free. **Sori** along the veins, short and near the vein tips to long and along most of the vein, not paraphysate, but some short trichomes or farina may be among the sporangia, exindusiate. **Spores** tetrahedral-globose, trilete, with a prominent equatorial flange, the surface nearly smooth to somewhat tuberculate or rugose.

The 13 species of *Pterozonium* center on the Roraima sandstones of Venezuela, where all of the species occur. The genus is endemic to northern South America and Peru where two species grow.

### Reference

LELLINGER, D. B. 1967. *Pterozonium*, in The Botany of the Guayana Highland—Part 8, Mem. New York Bot. Gard., 17: 2–23.

### Key to Species of *Pterozonium*

- a. Lamina suborbicular to orbicular, with flabellate venation; stem with trichomes . . . . . 1. **P. reniforme**
- a. Lamina elongate, with pinnate venation; stem with scales . . . . . 2. **P. brevifrons**



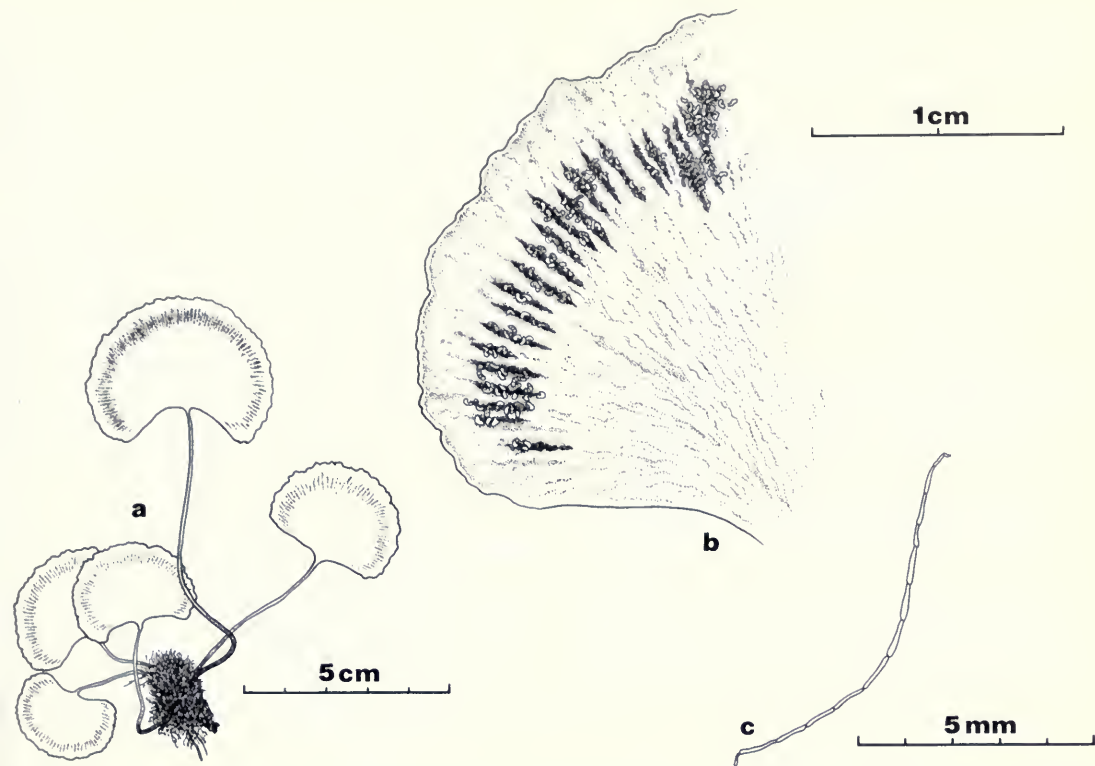


FIG. 3. *Pterozonium reniforme*: a, habit; b, portion of fertile leaf, abaxial side; c, stem trichome. (From Steyermark 60480, Venezuela, F.)

1. ***Pterozonium reniforme*** (Mart.) Fée, (Mém. foug. 5) Gen. fil. 178. 1852. **Figure 3.**

*Gymnogramma reniformis* Mart., Icon. pl. crypt. 88, t. 26. 1834. TYPE: Colombia, (Amazonas), Mt. Cupatí, Río Japurá, ("Brasilia"), *Martius* (holotype, M or BR; isotype, HBG; photos, GH, US; frag., US!).

**Stem** with yellowish to reddish brown trichomes. **Leaf** ca. 5–40 cm long, petiole dark reddish brown to blackish, with pale ridges extending downward from the base of the lamina. **Lamina** coriaceous, suborbicular to orbicular, cuneate to deeply cordate at the base, with flabellate venation. **Sori** borne along part of a vein, in a band back of the margin.

Sandstone rocks, ca. 1000 m, San Martín and Loreto.

Venezuela, Colombia, and Peru.

**San Martín:** Monte Guayrapurima, Tarapoto, *Spruce* 4641 (B, GH, K, NY). **Loreto:** Cerro Isco, *Ule* 6887 (B, P). Cuesta de Yento, near Balsa Puerto, *Raimondi* 25 (B).

2. ***Pterozonium brevifrons*** (A. C. Sm.) Lell., Mem. New York Bot. Gard. 17: 12. 1967.

*Syngramma brevifrons* A. C. Sm., Bull. Torrey Bot. Club 57: 178. 1938. TYPE: Venezuela, (Bolívar), Mount Roraima, *Tate* 421 (holotype, NY; frag., US!).

**Stem** with dark brown rigid scales. **Leaf** ca. 10–50 cm long, petiole dark reddish brown to blackish, grooved toward its apex. **Lamina** coriaceous, elongate, narrowly ovate to nearly ovate, abruptly rounded to slightly cordate at the base. **Sori** extending along most of a vein from or near the costa to back of the margin.

In rock crevices and in rocky soil, ca. 2200 m, Amazonas and San Martín. Venezuela, Colombia, and Peru.

**Amazonas:** Prov. Chachapoyas, 3–6 km W of Molinopampa, *Wurdack 1408* (F, GH, USM), *1409* (US). **San Martín:** Prov. Rioja, Pedro Ruíz-Moyobamba, *D. Smith 4796* (GH).

#### IV. *Pityrogramma*

***Pityrogramma*** Link, Handbuch 3: 19. 1833. TYPE: *Pityrogramma chrysophylla* (Sw.) Link (*Acrostichum chrysophyllum* Sw.). **Figure 4.**

*Trismeria* Fée, (Mém. foug. 5) Gen. fil. 164. 1852. TYPE: *Trismeria aurea* Fée = *Pityrogramma trifoliata* (L.) Tryon (*Acrostichum trifoliatum* L.).

**Terrestrial.** Stem small to often stout, decumbent or erect, bearing scales, especially at the apex. Leaves borne in a crown or cluster. Lamina deeply

pinnatifid to 4-pinnate-pinnatifid, usually with white or yellow farinose indument abaxially, less often pubescent or rarely glabrous, veins free. **Sporangia** borne along the veins, somewhat back of the nearly unmodified margin, at maturity often confluent apparently over most of the surface, indusium and paraphyses absent.

The 16 species of *Pityrogramma* are native to America, Africa, and Madagascar; there are 11 species in America and five in Peru. A few species are adventive in the Old World, especially the widely distributed *P. calomelanos*. Hybrids, some of them mentioned in **Comments**, are probably more frequent than our present information suggests.

#### Reference

TRYON, R. 1962. *Pityrogramma* (including *Trismeria*) and *Anogramma*. Contr. Gray Herb., **189**: 52–76.

#### Key to Species of *Pityrogramma*

- a. Secondary and (if present) tertiary segments moderately or not toothed, or with broad lobes with several veins ..... b
- b. Petiole with 2, or in large leaves more, vascular bundles toward the base, these roundish, oval, to C-shaped; pinnae with numerous pinnately arranged lobes or segments ..... c
- c. Rachis, pinna-rachises, and petiole glabrous, farinose, or thinly and irregularly pubescent . . . d
- d. Rachis and petiole deep reddish brown to blackish ..... e
- e. Pinnae equilateral; the pinnules ascending, those on the basiscopic side more strongly so than those on the acroscopic side; apical pinnae strongly ascending ..... 1. ***P. calomelanos***
- e. Pinnae inequilateral; the pinnules on both sides of the pinna at nearly right angles to the pinna-rachis (or in large leaves the tertiary segments so disposed on the pinnule-rachis); apical pinnae nearly or quite at right angles to the rachis ..... 2. ***P. tartarea***
- d. Rachis and upper portion of the petiole, or all of it except the base, straw-colored to light brown ..... 3. ***P. chrysoconia***
- c. Rachis and pinna-rachises densely and persistently lanate-pubescent, the petiole similar but sometimes the pubescence deciduous ..... 4. ***P. ferruginea***
- b. Petiole with 2 nearly C-shaped vascular bundles toward the base, these with the central portion of each curved toward the center of the petiole; pinnae usually entire to 3-(rarely 5–7)-foliolate ..... 5. ***P. trifoliata***
- a. Secondary and tertiary segments strongly lacinate into linear lobes, each with 1 vein ..... 6. ***P. pearcei***

1. ***Pityrogramma calomelanos*** (L.) Link, Handbuch 3: 20. 1833. **Figure 4b-c.**

**Leaf** ca. 0.5–1 m long, its axes glabrous to thinly farinose or thinly pubescent, petiole and rachis

deep reddish brown to blackish. **Lamina** usually narrowly lanceolate to ovate-lanceolate, to long-triangular, 1-pinnate-pinnatifid to 3-pinnate. **Pinnae** equilateral, equally developed on both sides, pinnules ascending, the abaxial surface rarely gla-

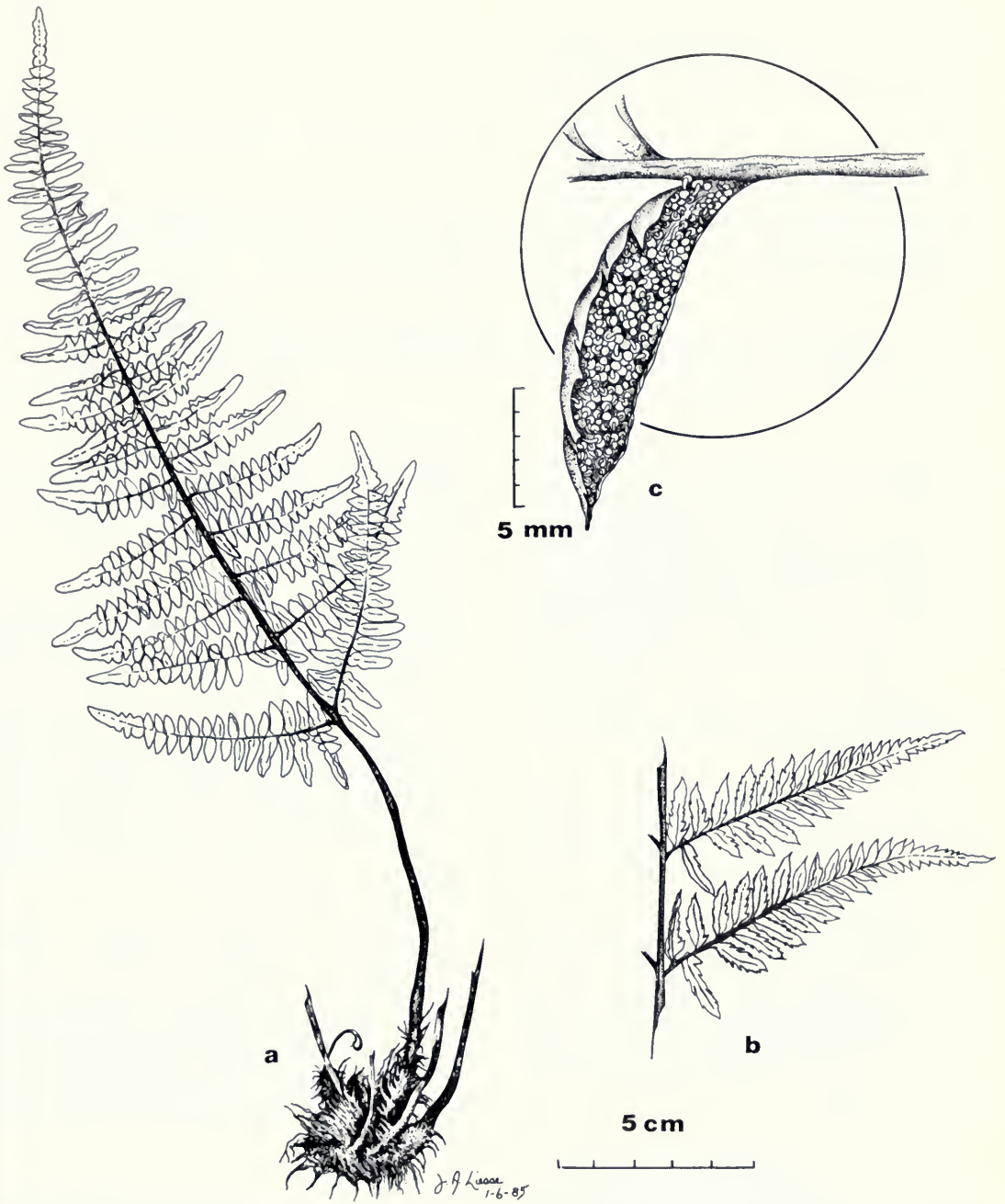


FIG. 4. *Pityrogramma tartarea*: a, habit. *Pityrogramma calomelanos*: b, portion of rachis and 2 pinnae; c, ultimate segment, abaxial side. (a from Gentry et al. 39771, F; b from Ll. Williams 1780, F; c from Ll. Williams 2201, F.)

brous, usually white, lemon yellow, bright yellow, orange-yellow, or pale roseate farinose, or pubescent.

A plant from Dept. Huánuco, Tingo María, Tryon & Tryon 5242 (GH) has some leaves glabrous

abaxially, others white-farinose, and one that is pubescent abaxially.

Variety *austroamericana* and var. *ochracea* usually grow above 1500 m, and var. *calomelanos* most often grows under 1000 m. The latter is widely distributed in the American tropics and seems to

grow more rapidly and is more often an occupant of disturbed habitats than the other varieties.

Some plants of *Pityrogramma calomelanos* are

not easily distinguished from *P. tartarea*, and these may represent hybrids of the species.

### Key to Varieties

- a. Lamina farinose abaxially, the color white, pale yellow, or roseate, or rarely the lamina glabrous abaxially ..... 1a. var. **calomelanos**
- a. Lamina farinose abaxially, the color bright yellow to orange-yellow, or lamina pubescent abaxially ..... b
- b. Lamina bright yellow to orange-yellow farinose abaxially ..... 1b. var. **austroamericana**
- b. Lamina slightly to densely pubescent abaxially, especially on the fertile segments ..... 1c. var. **ochracea**

#### 1a. *Pityrogramma calomelanos* var. **calomelanos**

*Acrostichum calomelanos* L., Sp. pl. 1072. 1753. TYPE: LINN 1245.19; photos, A, GH are this species.

*Acrostichum ebeneum* L., Sp. pl. 1071. 1753. LECTOTYPE (designated by Tryon, Contr. Gray Herb. 189: 60. 1962): Sloane, Voy. Jamaica t. 53, f. 1.

*Gymnogramma calomelanos* var. *denudata* Harr., J. Linn. Soc., Bot. 16: 37. 1877. TYPE: Peru, (Loreto), Pébas, *Steere* (holotype, k!; photo, GH; isotype, GH!).

*Pityrogramma ebenea* (L.) Proctor, Brit. Fern Gaz. 9: 219. 1965.

Cleared hillsides, road banks, river banks, thickets, and sometimes in forests or swamps, 100–2300 m, most commonly below 1000 m, Tumbes south to Cuzco and Madre de Dios.

Tropical America.

In the Report of the Standing Committee on the Stabilization of Specific Names (Taxon 24: 171–177. 1975), the earlier lectotypification of *Pityrogramma ebenea* was upheld. The latter one by Proctor (of LINN 1245.14), which would make the name the correct one for *Pityrogramma tartarea*, was rejected.

**Tumbes:** Between Tumbes and Caucho, *Coronado* 224 (GH, UC). Prov. Zarumilla, Bosque Nacional de Tumbes, *Simpson & Schunke* 462 (F, GH). **Amazonas:** Prov. Bagua, Aramango, *López et al.* 4161 (GH). **San Martín:** 4 mi E of Tarapoto, *Woytkowski* 35212 (MO, UC). Lamas, near Tarapoto, *Ll. Williams* 6360 (F, GH). **Loreto:** Above Pongo de Manseriche, *Mexia* 6101 (F, GH, MO, UC). Iquitos, *Tryon & Tryon* 5167 (BM, F, GH, U, US, USM). **Huánuco:** Tingo María, *Tryon & Tryon* 5244 (BM, F, GH, U, US, USM). **Pasco:** Puerto Yessup (as Junín), *Killip & Smith* 26254 (F, US). **Junín:** La Merced, *Killip & Smith* 23389 (US). **Ucayali:** Bosque von Humboldt, *Gentry et al.* 36354 (F, MO). **Ayacucho:** Near Kimpitiriki, *Killip & Smith* 22958 (US). **Cuzco:** Valle de Marcapata, *Herrera* 1199 (US). Ma-

chu Picchu to Quillabamba, *Mexia* 8089a (UC). Río Apurímac, between San Martín and Hacienda Luisiana, *Davis et al.* 1329 (F, GH). **Madre de Dios:** Prov. Tambopata, SSW of Puerto Maldonado, *Barbour* 4902 (F, MO). Parque Nacional del Manú, *Foster et al.* 3409 (GH).

#### 1b. *Pityrogramma calomelanos* var. **austroamericana** (Domin) Farw. Amer. Midl. Naturalist 12: 280. 1931.

*Pityrogramma austroamericana* Domin, Publ. Fac. Sci. Univ. Charles 88: 7. 1928; also in Bull. Misc. Inform. 1929: 221. TYPE: Bolivia, *Mandon* 1549bis (holotype, k!; photo, GH; isotype, GH!).

Open rocky places, grassy slopes, clay banks, thickets, and rarely along irrigation ditches, 200–2800 m, Piura south to Puno.

Costa Rica; mountainous regions of South America, south to Argentina and Brazil.

The formerly accepted name, var. *aureoflava* (Hooker) Bailey, has been correctly typified by a specimen of *Pityrogramma chrysophylla*: *Seemann* 945 (cited as 948), k!. Panigrahi (Kew Bull. 30: 657–667. [1975] 1976) has discussed this and it agrees with my own later study of the typification at Kew.

**Piura:** 37 km E of Olmos, on road to Pucura, *Gentry et al.* 22624 (F, MO). **Lambayeque:** Prov. Lambayeque, Abra Porculla Pass, *Hutchinson & Wright* 3480 (GH, US). **Cajamarca:** Entre Abra de Porculla y Jaén, *Ferreya* 13638 (GH, USM). **La Libertad:** Prov. Trujillo, Hacienda Mochal, *Sagástegui* 425 (GH). **Huánuco:** Between Chinchao and Puente Durand, *Coronado* 89 (GH, UC). **Yanano,** *Macbride* 3667 (F, US). **Junín:** La Merced, *Soukup* 2368 (F, GH), 3410 (GH, US). **Ayacucho:** Ayna, between Huanta and Río Apurímac, *Killip & Smith* 22697 (F, GH, US). **Cuzco:** Near Quillabamba, *Mexia* 8045 (F, GH, MO, US). Potrero, 8 km W of Quillabamba, *Tryon & Tryon* 5365

(BM, F, GH, U, US, USM). **Puno:** Prov. Sandía, abajo de Sandía, *Ferreya 16657* (GH).

1c. ***Pityrogramma calomelanos* var. *ochracea***  
(Presl) Tryon, Contr. Gray Herb. 189: 61.  
1962.

*Gymnogramma ochracea* Presl, Reliq. haenk. 1: 17.  
1825. LECTOTYPE (designated by Tryon, Contr.  
Gray Herb. 189: 62. 1962): Peru, *Haenke* (ho-  
lotype, *Haenke*, PR Herb. 24360; photos, GH, US;  
probable isolectotypes, B, K).

*Ceropteris adiantoides* var. *peruviana* Hieron., Hed-  
wigia 48: 221. 1909. TYPE: Peru, (San Martín),  
Moyobamba to Río Huallaga, *Stübel 1096* (ho-  
lotype, B).

*Pityrogramma perelegans* Domin, Publ. Fac. Sci. Univ.  
Charles 88: 8. 1928. TYPE: Peru, (San Martín),  
Tarapoto, 1855–1856, *Spruce* (holotype, K!; pho-  
to, GH).

*Pityrogramma ochracea* (Presl) Domin, Publ. Fac. Sci.  
Univ. Charles 88: 8. 1928.

Open rocky places, river banks and road banks,  
cleared land, less often in thickets, in forests or at  
forest borders, rarely along irrigation ditches, 400–  
3000 m, or in La Libertad at 50 m along an irri-  
gation ditch, La Libertad south to Puno.

Honduras; Venezuela and Colombia, south to  
Bolivia.

The variation in spores of this variety is unusu-  
al; they are often typical of the genus, with well-  
defined dark ridges, but sometimes they are smooth  
or only slightly roughened.

**Key to Varieties**

- a. Lamina farinose abaxially, the color white to pale yellow, rarely almost colorless or slightly pubescent abaxially ..... 2a. var. **tartarea**
- a. Lamina farinose abaxially, the color bright yellow, or pubescent abaxially ..... b
- b. Lamina bright yellow-farinose abaxially ..... 2b. var. **aurata**
- b. Lamina pubescent abaxially ..... 2c. var. **jamesonii**

2a. ***Pityrogramma tartarea* var. *tartarea***

*Acrostichum tartareum* Cav., Descr. pl. 242. 1802.  
TYPE: Peru, (Lima), near “Guamantanga” (Hua-  
mantanga), *Née* (holotype, seen by C. Chr. at MA,  
Dansk Bot. Ark. 9(3): 10. 1937; the upper frag-  
ments of Herb. Willd. 19568-3, B!; photos, GH,  
US, are probably from the holotype).

*Gymnogramma peruviana* Desv., Ges. Naturf. Freunde  
Berlin Mag. Neuesten Entdeck. Gesamnten Na-

**La Libertad:** Huaca del Sol, *Sagástegui 393* (GH). **San Martín:** Juan Jui, alto Río Huallaga, *Klug 4177* (F, GH, MO, UC). **Huánuco:** Tingo María, *Tryon & Tryon 5243* (BM, F, GH, U, US, USM). **Pasco:** Villcabamba, *Macbride 4994* (F, GH, US). **Junín:** La Merced, *Macbride 5276* (F, US); *Soukup 3411* (GH); *Cerrate 2833* (GH, USM). **Ucayali:** La Divisoria (as San Martín), Aug. 3, 1942, *Ridout* (GH, USM). **Ayacucho:** Estrella, between Huanta and Río Apurímac, *Killip & Smith 22667* (US). **Cuzco:** Potrero, 8 km W of Quillabamba, *Tryon & Tryon 5366* (BM, F, GH, U, US, USM). **Madre de Dios:** Prov. Manú, Salvación to Shintuya, *Plowman & Davis 5079* (GH). **Puno:** Near Puno, *Soukup 449* (F). Prov. Carabaya, Puente Inambari, *Vargas 18416* (GH).

2. ***Pityrogramma tartarea* (Cav.) Maxon, Contr. U.S. Natl. Herb. 17: 173. 1913. Figure 4a.**

**Leaf** usually 0.4–1 m long, its axes glabrous or thinly farinose or thinly pubescent, petiole and rachis deep reddish brown to blackish. **Lamina** long-triangular to deltoid, 1-pinnate-pinnatifid to 3-pinnate. **Pinnae** inequilateral, the basispic side better developed, pinnules at nearly right angles to the pinna-rachis, the abaxial surface usually white, pale yellow, or bright yellow-farinose, rarely pubescent.

The incorrect use of *Pityrogramma ebenea* (L.) Proctor for this species has been discussed under *P. calomelanos*.

turk. 5: 329. 1811. TYPE: Peru, *Joseph de Jussieu* (holotype, Herb. Jussieu 1009, P!; photos, GH, US).

*Pityrogramma peruviana* (Desv.) Maxon, Contr. U.S. Natl. Herb. 17: 173. 1913.

*Pityrogramma calomelanos* var. *peruviana* (Desv.) Farw., Amer. Midl. Naturalist 12: 280. 1931.

Rocky and shrubby hillsides, in crevices of rocks and on Inca walls, on cliffs, 800–4000 m, Piura south to Puno.

Tropical America, south to Bolivia and Brazil.

**Piura:** Prov. Huancabamba, Loma Redondo, Sapalache-Chinguela, *Sagástegui et al. 10181* (F, MO). Arriba de Canchaque, *Ferreya 3106* (GH, USM). **Lambayeque:** 29 km from Olmos on road to Jaén, *Correll & Smith P803* (GH). **Cajamarca:** Prov. Celendín, Guañambra-Sendamal, *Sagástegui et al. 12200* (F, GH). **Amazonas:** Prov. Chachapoyas, Cerros Calla Calla, *Hutchison & Wright 4819* (F, GH). **La Libertad:** Prov. Patá, Retamas, *López & Sagástegui 3604* (GH). **Ancash:** Prov. Yungay, entre Yungay y Llanganuco, *Mostacero et al. 1380* (F, GH). **Huánuco:** Mito, *Macbride & Featherstone 1429* (F, US). Carpish, *Coronado 60* (GH, UC). **Lima:** Prov. Canta, 4 km from Huamantanga, *Saunders 1249* (GH). **Pasco:** Prov. Oxapampa, Cordillera San Gotardo, *León 515* (USM). **Junín:** Huacapistana, *Tryon & Tryon 5429* (BM, F, GH, U, UC, USM). **Cuzco:** Prov. Urubamba, Cerro Machu Picchu, *Mexia 8086* (F, GH, US). **Puno:** Near Puno, *Soukup 450* (F).

2b. **Pityrogramma tartarea** var. **aurata** (Moore)  
Tryon, Contr. Gray Herb. 189: 65. 1962.

*Gymnogramma tartarea* var. *aurata* Moore, Gard. Chron. 1870: 493. TYPE: Peru, *Pearce*, cult. Veitch (holotype, k!; photo, GH).

*Pityrogramma presliana* Domin, Publ. Fac. Sci. Univ. Charles 88: 6. 1928. TYPE: Peru, *Matthews 1823* (holotype, k!; photo, GH).

Open places, clay banks, and among rocks, 800–2200 m, Cajamarca south to Cuzco.

Colombia south to Argentina.

**Cajamarca:** Prov. Cutervo, La Achira, *López & Sagástegui 5463* (GH). **Huánuco:** Villcabamba, Río Chinchao, *Macbride 4995* (F, GH, US). **Pasco:** Prov. Oxapampa, Río Boquería, *Smith et al. 1816* (MO). **Junín:** Chanchamayo valley, *Schunke 38* (F, US). Between Huacapistana and San Ramón, *Coronado 259* (GH, UC). **Cuzco:** Prov. Paucartambo, Tanamayo, *Vargas 6479* (UC). Prov. Paucartambo, near Santa Isabel, *Plowman & Davis 4990* (GH).

2c. **Pityrogramma tartarea** var. **jamesonii** (Baker)  
Tryon, Contr. Gray Herb. 189: 66. 1962.

*Gymnogramma jamesonii* Baker, Syn. fil., ed. 2, 516. 1874. TYPE: Ecuador, (Pichincha), Pichinchan Andes, *Jameson* (holotype, k!; photo, GH).

Colombia and Ecuador; this variety is expected in northern Peru.

3. **Pityrogramma chrysoconia** (Desv.) Domin,  
Publ. Fac. Sci. Univ. Charles 88: 10. 1928.

*Acrostichum chrysoconium* Desv., Mém. Soc. Linn. Paris 6: 212. 1827. TYPE: Peru, evidently *Dom-*

*bey* (holotype, P!; photo, GH; isotype, B!; photo, GH; frag., ex B, US!).

**Leaf** ca. 25–80 cm long, its axes glabrous or thinly farinose, petiole (at least the apical portion) and the rachis straw-colored to light brown. **Lamina** long-triangular, 2-pinnate to 2-pinnate-pinnatifid. **Pinnae** inequilateral, the basicopic side somewhat better developed, pinnules nearly at right angles to the pinna-rachis, the abaxial surface white- or yellow-farinose.

Rocky and shrubby slopes and hillsides, Inca walls, 2000–3100 m, Piura to Cuzco.

Costa Rica and Panama; Jamaica; Guyana to Colombia and south to Bolivia.

Plants with white farina on the leaves and those with yellow farina both occur nearly throughout the range of the species and there seems to be no reason to recognize them as varieties.

**Piura:** Prov. Ayabaca, Ayabaca, *Sagástegui & Cabanillas 8709* (HUT). **Cajamarca:** Prov. Celendín, La Trancagelig, *Sagástegui et al. 12145* (MO, HUT). **Amazonas:** Prov. Chachapoyas, Calla Calla, *Aguado 6789* (F). **Huánuco:** Mitotambo, arriba de Mito, *Ferreya 10348* (GH, USM). Mito, *Macbride & Featherstone 1393* (US). **Huancavelica:** Chuspi, Tocas, *Tovar 2052* (GH, USM). **Cuzco:** Huadquiña, *Bües 1319* (US). Prov. Urubamba, Santa Rita, *Vargas 2683* (US).

4. **Pityrogramma ferruginea** (Kunze) Maxon,  
Contr. U.S. Natl. Herb. 17: 173. 1913.

*Gymnogramma ferruginea* Kunze, Linnaea 9: 34. 1834. TYPE: Peru, (Huánuco), Quebrada de Chinchao, Jul. 1829, *Poeppig, Diar. 1160* (holotype, not located; isotype, P!; photos, GH, US).

*Eriosorus ruizianus* Fée, (Mém. foug. 5) Gen. fil. 152, t. 13B, f. 2. 1852. TYPE: (Not located).

**Leaf** ca. 0.25–1 m long, its axes densely and usually persistently lanate, the petiole sometimes deciduously so, petiole and rachis atropurpureous or blackish. **Lamina** narrowly elliptic, 1-pinnate-pinnatifid. **Pinnae** equilateral, the pinnule-lobes somewhat ascending, the abaxial surface densely to rarely thinly lanate.

Moist and dry cliffs, rocky banks, 750–2000 m, Huánuco and Pasco to Ayacucho.

Guatemala to Panama; Peru.

This is the only species of the genus in America with a markedly disjunct range. Plants of Central America are more variable than those of Peru where

the lamina is narrowly elliptic and the pinnae are subsessile.

**Huánuco:** Río Huallaga cañon, below Santo Domingo, *Macbride 4261* (F, GH, US). Tingo María, *Allard 21530* (US). **Pasco:** Oxapampa, *Soukup 1822* (F, US), *3351* (F, GH). **Junín:** 8 km SW of San Ramón, *Tryon & Tryon 5451* (BM, F, GH, U, UC, US, USM). **Ayacucho:** Between Huanta and Río Apurímac, *Killip & Smith 22482* (US).

5. **Pityrogramma trifoliata** (L.) Tryon, Contr. Gray Herb. 189: 68. 1962.

*Acrostichum trifoliatum* L., Sp. pl. 1070. 1753. SYNTYPES: LINN 1245.9, photo, A, and Sloane, Voy. Jamaica t. 45, f. 2 are both this species. *Trismeria microphylla* Fée, (Mém. foug. 5) Gen. fil. 165. 1852. TYPE: Peru (not located). *Trismeria trifoliata* (L.) Diels, Nat. Pflanzenfam. 1(4): 265. 1899.

**Leaf** ca. 0.5–1.25 m long, its axes glabrous to thinly farinose, petiole and rachis light reddish brown to blackish. **Lamina** narrowly lanceolate to usually elongate, 1–2-pinnate. **Pinnae** equilateral or inequilateral, the pinnules, when present, ascending, the abaxial surface glabrous or usually white- or yellow-farinose.

Open rocky ground, in gravel, along road borders, on river banks, along irrigation ditches, rarely in forests, nearly at sea level to 2300 m, Piura south to Arequipa.

Tropical America.

Hybrids of this species are mentioned in **Comments**.

**Piura:** Serrán to Canchaque, *Ferreya 10782* (USM). **Lambayeque:** 20 km from Olmos on road to Jaén, *Correll & Smith P796* (GH). **Cajamarca:** Prov. Contumazá, alrededores de San Benito, *Sagástegui 3740* (GH). **Amazonas:** Prov. Bagua, Chiriaco to Puente Venezuela, *Barbour 4410* (MO). **La Libertad:** Trujillo, *Osgood & Anderson 28* (F), *29* (F, US); *Worth et al. 8887* (GH, UC, US). **San Martín:** Tarapoto, *Spruce 4153* (BM, GH, US). **Loreto:** Prov. Alto Amazonas, Andoas, Río Pastaza, *Vásquez & Jaramillo 787* (F, MO). **Huánuco:** Huánuco to Muña, *Mexia 4100* (GH, MO, UC, US). **Lima:** Chosica, *Tryon & Tryon 5342* (BM, F, GH, MO, NY, U, UC, US, USM). **Junín:** La Merced, *Killip & Smith 23496* (F, US). **Ucayali:** Prov. Coronel Portillo, Bosque von Humboldt, *Smith et al. 1339* (F, MO). **Ayacucho:** Ayna, *Killip & Smith 23112* (US). **Apurímac:** 45 km from Abancay on road to Chalhuanca, *Saunders 764* (GH). **Cuzco:** Prov. Anta, Sisal to Cunyacc, *Vargas 7411* (MO, UC). **Prov. La Convención,** above Sinechinete, *Davis et al. 1286* (F, GH). **Arequipa:** Huarío, below Chuquibamba, *D. Stafford 1149* (BM).

6. **Pityrogramma pearcei** (Moore) Domin, Publ. Fac. Sci. Univ. Charles 88: 9. 1928. *Gymnogramma pearcei* Moore, Gard. Chron. 1864: 340. TYPE: *Pearce* cult. Veitch (*Pearce 274* κ! and “*Gymnogramma pearcei. n.sp*” κ!; photos, GH, are authentic).

**Lamina** ovate-lanceolate to long-triangular, highly dissected, to 4-pinnate, with slender ultimate lobes, each with 1 vein, pinnae equilateral or nearly so, glabrous.

The original material of this species may have been collected in Peru. It has not been gathered again. The species has recently been collected in Costa Rica, Panama, and Colombia along disturbed roadsides.

### Comments

Four hybrids have been proposed with *Pityrogramma trifoliata* as one parent (Tryon, 1962). These hybrids all have the vascular bundles of *P. trifoliata*, at least in large leaves, and also the strongly ascending-arching pinna-stalks of that species, at least those of the lower pinnae. They also have an elongate lamina and the pinnae with numerous pinnules.

### **Pityrogramma calomelanos** var. **ochracea** × **P. trifoliata**

Petiole and rachis essentially glabrous, segments somewhat pubescent abaxially.

**Junín:** Prov. Tarma, 3 km N of La Merced, *Tryon & Tryon 5440* (GH). **Cuzco:** *Bües 1936* (US). **Prov. La Convención,** Chaupimayo, *Bües 1433* (GH).

### **Pityrogramma ferruginea** × **P. trifoliata**

Petiole and rachis deciduously lanate, segments sparsely lanate abaxially, pinnae irregularly pinnate or lobed. Known from a single plant.

**Junín:** Prov. Tarma, 10 km SW of San Ramón, *Tryon & Tryon 5449* (GH).

### **Pityrogramma calomelanos** var. **calomelanos** × **P. trifoliata** and **P. calomelanos** var. **austroamer-**

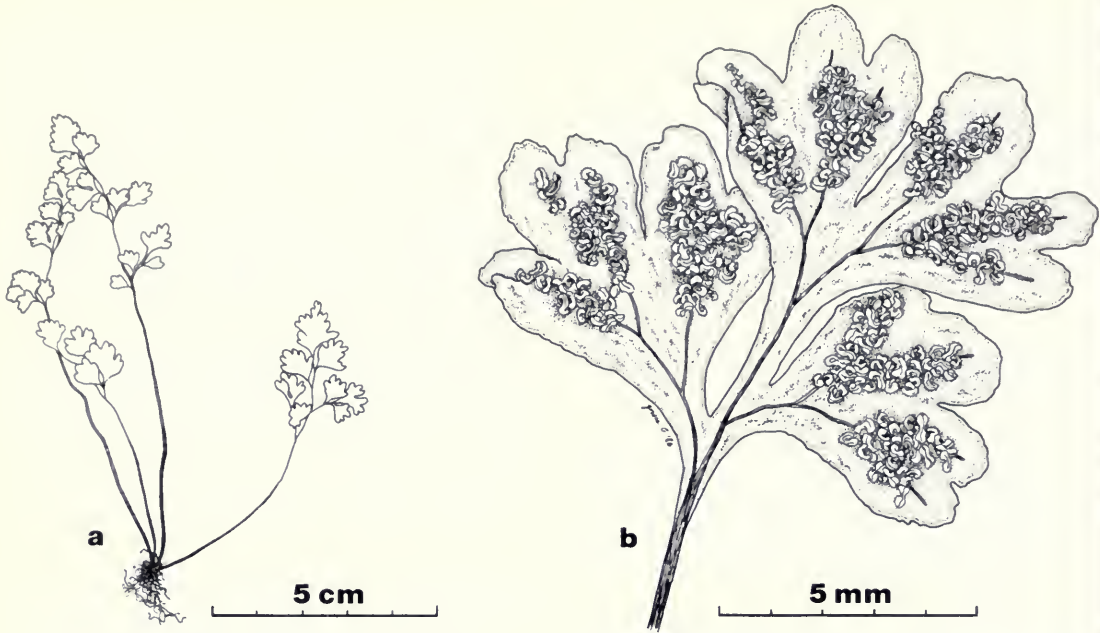


FIG. 5. *Anogramma leptophylla*: a, habit; b, fertile lamina, abaxial side. (From Tryon & Tryon 5416, F.)

*icana* × *P. trifoliata* are both known in Argentina and may be found in Peru.

#### V. *Anogramma*

*Anogramma* Link, Fil. spec. 137. 1841. TYPE: *Anogramma leptophylla* (L.) Link (*Polypodium leptophyllum* L.). **Figure 5.**

**Terrestrial.** **Stem** very small, erect, bearing trichomes or trichomes and scales. **Leaves** borne in a cluster. **Lamina** to 4-pinnate, glabrous (or, in 1 species, pubescent), veins free. **Sporangia** in rather elongate sori on the veins, somewhat back of the unmodified margin, indusium and paraphyses absent.

#### Key to Species of *Anogramma*

- a. Spores dark brown; stem and usually the base of the petiole only with trichomes; lamina usually narrowly to broadly ovate, to somewhat deltoid, the ultimate lobes somewhat obtuse ..... 1. *A. leptophylla*
- a. Spores tan; stem and usually the base of the petiole with scales and trichomes; lamina usually ovate to often deltoid, the ultimate lobes mostly acute ..... *A. chaerophylla*

*Anogramma* is a rather geographically disjunct, nearly pantropical genus of five or six species. A single species is in Peru and another may well be discovered there. The species are evidently annual, new plants arising each growing season by spores or by the growth of a dormant gametophyte. The stem is much reduced and bears only leaves of the growing season, petioles of previous years being absent. Leaf size and architecture is variable.

#### Reference

TRYON, R. M., AND TRYON, A. F. 1982. *Anogramma*, pp. 224–228, in *Ferns and allied plants*, Springer-Verlag, New York.



1. *Anogramma leptophylla* (L.) Link, Fil. spec. 137. 1841. **Figure 5.**

*Polypodium leptophyllum* L., Sp. pl. 1092. 1753. LECTOTYPE (designated by Morton, Amer. Fern J. 60: 103. 1970): LINN 1251.56; photo, A.

**Stem** very small, bearing a few trichomes, which are usually also at the base of the petiole. **Leaves** to ca. 20 cm long. **Lamina** herbaceous, narrowly ovate to somewhat deltoid, often 2-pinnate, with bifid, obtuse lobes. **Spores** dark brown.

Among rocks and at the edge of boulders (lomas of Dept. Lima), 350–600 m, and Inca walls (Machu Picchu, Dept. Cuzco), 2200–2400 m, Lima and Cuzco.

Mexico and Central America; scattered in South America; Old World east to New Zealand.

**Lima:** Prov. Chancay, Loma Lachay, *Tryon & Tryon 5416* (BM, F, GH, U, US, USM), *Coronado 14* (GH, UC, US). Prov. Chancay, Loma Granados, *Stork & Vargas 9333* (GH, UC). Prov. Cañete, Loma Quilmaná, *Coronado 26* (GH, UC, US). **Cuzco:** Prov. Urubamba, Machu Picchu, *Mexia 8083* (F, GH, MO, UC); *Coronado 94* (GH, UC, US).

**Comments**

*Anogramma chaerophylla* (Desv.) Link is reported from Bolivia and is expected to grow in southern Peru. It has a wide but rather disjunct range in tropical America. It is usually a larger species than *A. leptophylla*, with leaves to 40 cm long. Other distinctions of the two species are presented in the key.

**VI. Cheilanthes**

*Cheilanthes* Sw., Syn. fil. 5, 126. 1806, conserved name. TYPE: *Cheilanthes micropteris* Sw. **Figure 6.**

*Aleuritopteris* Fée, (Mém. foug. 5) Gen. fil. 153. 1852. TYPE: *Aleuritopteris farinosa* (Forssk.) Fée (*Pteris farinosa* (Forssk.) = *Cheilanthes farinosa* (Forssk.) Kaulf.

**Key to Species of Cheilanthes**

- a. Pinnae densely pubescent abaxially, the trichomes concealing the leaf tissue ..... b
- b. Trichomes simple ..... c

*Mildella* Trev., Rendic. R. Ist. Lombardo II, 9: 810. 1876. TYPE: *Mildella intramarginalis* (Link) Trev. (*Pteris intramarginalis* Link) = *Cheilanthes intramarginalis* (Link) Hooker.

**Stem** erect to long-creeping, with light brown, concolorous or bicolorous to wholly dark-sclerotic, linear to ovate-lanceolate, usually thin scales. **Leaves** usually monomorphic. **Petiole** with 1 or 2 vascular bundles near the base, terete to adaxially sulcate or 2-ridged. **Lamina** 1–5-pinnate, or less often pedate and to at least 3-pinnatifid, glabrous, pubescent, scaly glandular, or white-, yellow-, or orange-farinose abaxially. **Veins** free or rarely anastomosing without included veinlets, ending at or near the margin, the ends not to clearly enlarged. **Sporangia** usually in sori at or near the vein ends, or rarely single, or in soral lines along an incomplete to complete marginal commissure, exindusiate, or 1–many sori covered by a slightly to well-modified marginal indusium, paraphyses absent. **Spores** tetrahedral-globose to globose, trilete, usually cristate, sometimes rugose, verrucate, tuberculate or echinate.

*Cheilanthes* is a nearly worldwide genus of about 150 species, or perhaps more. It is especially well developed in semiarid regions, with centers of species in Mexico, the Andes, and in southern Africa. It is a diverse genus, with some of its elements often placed in the genera *Pellaea* or *Notholaena*.

Species 1–21 of *Notholaena* in Tryon (1956) and species 1–10 in Tryon (1964) are now placed in *Cheilanthes*.

**References**

TRYON, R. 1956. A revision of the American species of *Notholaena*. *Contr. Gray Herb.*, **179**: 1–106.

TRYON, R. 1964. The ferns of Peru. *Contr. Gray Herb.*, **194**: 88–121.

TRYON, R. M., AND A. F. TRYON. 1982. *Cheilanthes*, pp. 249–261, in *Ferns and allied plants*, Springer-Verlag, New York.

- c. Pinnae 1-pinnate, with appressed-ascending trichomes abaxially ..... 8. *C. obducta*
- c. Pinnae pinnatifid or 2-pinnatifid at the base, tomentose abaxially ..... d
- d. Stem rather slender, long-creeping; pinnae nearly deltoid; tips of the stem scales light brown ..... 6. *C. fraseri*
- d. Stem short, compact, multicipital; pinnae nearly oblong; tips of the stem scales dark brown ..... 7. *C. bonariensis*
- b. Trichomes stellate ..... 9. *C. mollis*
- a. Pinnae glabrous, glandular, farinose, or thinly pubescent abaxially and the leaf tissue evident, or densely scaly abaxially and the scales concealing the leaf tissue ..... e
- e. Pinnae glabrous, glandular, farinose, or thinly pubescent abaxially ..... f
- f. Rachis pubescent or with trichome-like fibrils, at least adaxially ..... g
- g. Rachis densely pubescent with short, stout trichomes, or with very short trichome-like processes ..... 5. *C. pruinata*
- g. Rachis loosely pubescent with long trichomes or trichome-like fibrils ..... h
- h. Rachis and pinnae long-pubescent with patent, whitish to light brown trichomes .... i
- i. Lamina with few, mostly sessile pinnae; stem scales whitish; petioles breaking evenly near their base ..... 3. *C. fractifera*
- i. Lamina with few to many pinnae, most of the pinnae stalked; stem scales dark brown; petioles breaking irregularly ..... 4. *C. pilosa*
- h. Rachis, at least on the adaxial side, and the pinnae somewhat pubescent, with brown, irregularly oriented trichomes and trichome-like fibrils ..... j
- j. Pinna-rachises atropurpureous to blackish on the adaxial side, except sometimes greenish apically ..... 1. *C. moritziana*
- j. Pinna-rachises, greenish on the adaxial side, except sometimes dark at its base .... 2. *C. notholaenoides*
- f. Rachis, or the primary axis of the lamina, glabrous, glandular, or farinose ..... k
- k. Lamina pedate, 3-pinnatifid at the base ..... 15. *C. concolor*
- k. Lamina pinnate ..... l
- l. Pinnae whitish-farinose abaxially ..... 14. *C. farinosa*
- l. Pinnae glabrous or with scattered sessile glands ..... m
- m. Indusia confined to the segments ..... n
- n. Segments with sessile glands abaxially ..... 11. *C. rufopunctata*
- n. Segments glabrous abaxially ..... o
- o. Stem scales brown, concolorous; each sorus covered by a separate indusium ..... 10. *C. orbignyana*
- o. Stem scales bicolorous, with narrow lighter margins; many sori covered by a long, continuous indusium ..... 13. *C. poeppigiana*
- m. Indusia extending onto the segment stalk ..... 12. *C. marginata*
- e. Pinnae densely scaly abaxially, the scales concealing the leaf tissue ..... p
- p. Petiole with 2 vascular bundles at the base; pinnae lobed or shallowly pinnatifid, with an underlayer of dissected scales on the abaxial side ..... 23. *C. sinuata*
- p. Petiole with 1 vascular bundle at the base; pinnae 1-pinnate or more complex, rarely pinnatifid, lacking a pronounced underlayer of dissected scales on the abaxial side ..... q
- q. Stem scales bicolorous with a dark center and narrow lighter margins ..... r
- r. Ultimate segments small, beadlike, suborbicular, their adaxial surface nearly glabrous ..... 16. *C. myriophylla*
- r. Ultimate segments rather large, nearly oblong, often lobed, their adaxial surface sparsely hirsute with whitish, nearly rigid trichomes ..... 17. *C. cantangensis*
- q. Stem scales light brown or yellowish to reddish brown, concolorous ..... s
- s. All ultimate segments small, nearly suborbicular, or at least the basal segments of the secondary segments suborbicular; stem scales reddish ..... t
- t. All segments glabrous above, the scales that more or less cover the adaxial surface borne on the abaxial surface; all segments suborbicular or nearly so ..... 18. *C. scariosa*

- t. Segments with narrow scales and flattened trichomes adaxially to glabrate; some to several segments oblong, especially apical ones; scales abaxially not clathrate . . . . . 21. *C. incarum*
- s. Many or most ultimate segments nearly oblong, few or no suborbicular ones . . . . . u
- u. Scales on the segments abaxially moderately dentate-ciliate or short-ciliate . . . . . v
- v. Stem scales yellowish to rarely brown; lamina ca. 8–20 cm long, mostly longer than the petiole (rarely equal in length); scales on the pinnules abaxially mostly not clathrate, the surface smooth, or clathrate and the surface roughened only at the base . . . . . 19. *C. peruviana*
- v. Stem scales reddish; lamina ca. 1.5–5 cm long, mostly shorter than the petiole (rarely equal in length); scales on the pinnules abaxially mostly clathrate and the surface roughened . . . . . 20. *C. arequipensis*
- u. Scales on the segments abaxially freely long- or somewhat short-ciliate, not clathrate, the surface smooth; stem scales brown . . . . . 22. *C. lonchophylla*

1. *Cheilanthes moritziana* Kunze, *Linnaea* 23: 307. 1850. LECTOTYPE (designated by Tryon, *Contr. Gray Herb.* 194: 98. 1964): Venezuela, (Dist. Federal, Caracas), La Guayra, *Moritz 263* (holotype, B; photo, GH; isotype, GH!).

**Stem** rather slender, creeping, sometimes knotted, scales lanceolate to lance-ovate, light brown to brown, concolorous. **Leaves** ca. 15–40 cm long, petiole terete, sometimes fibrillose, especially on the adaxial side, the rachis similar, lamina narrowly lanceolate, 2-pinnate-pinnatifid to 3-pinnate. **Pinnae** only slightly pubescent on both sides. **Indusium** more or less crispate, continuous.

Sheltered, rocky places, 1600–3400 m, Cajamarca and Amazonas to Cuzco.

Venezuela to Colombia and Bolivia.

The differences from the closely related *C. notholaenoides* are discussed under that species.

**Cajamarca:** Alrededores de San Benito, *Sagástegui 3739* (GH). Celendín, *Stübel 1045* (B). Cantanoe, Celendín to Río Marañón, *López & Sagástegui 3365* (GH, HUT). **Amazonas:** Leimebamba, valle de Utcubamba, *Stübel 1021* (B). **San Martín:** Salinas de Pilluana, *Ule 6900* (B). 29 km S of Tarapoto, *Gentry & Smith 45015* (F). **Huánuco:** Muña, *Macbride 3921* (F, US). Prov. Dos de Mayo, Chiquía, *Huapalla 3649* (USM). **Junín:** Yungay, *Woytkowski 6586* (MO, US). **Cuzco:** Yucay, *Soukup 918* (F).

2. *Cheilanthes notholaenoides* (Desv.) Weath., *Contr. Gray Herb.* 114: 34. 1936.

*Pteris notholaenoides* Desv., *Mém. Soc. Linn. Paris* 6: 298. 1827. TYPE: “Hispaniola” (holotype, P; photo, GH).

**Stem** rather slender, creeping, more or less knotted, scales lance-subulate, brown, with or without

a darker center. **Leaves** 10–20 cm long, petiole terete, pubescent, as is the rachis, lamina narrowly lanceolate, mostly 2-pinnate, to 2-pinnate-pinnatifid. **Pinnae** slightly pubescent to nearly glabrous. **Indusium** rather broad, more or less crispate, continuous.

Cliffs and rocky places, 2600–3300 m, Piura to Junín.

West Indies; Mexico to Venezuela, Peru and Argentina.

This species is closely related to the previous, *C. moritziana*; the character of the pinna-rachis given in the key provides a sufficient separation. In addition, the lamina of *C. notholaenoides* is rather regularly 2-pinnate and the pinnae are pinnate nearly to the tip, while in *C. moritziana* the lamina is 2-pinnate-pinnatifid and the pinnae have a definite pinnatifid apex.

**Piura:** Chira valley, *Rauh P1935* (B). **Cajamarca:** 52 km W of Cajamarca on road to Chilete, *Correll & Smith P838* (GH). Prov. Celendín, above Balsas, road to Celendín, *Hutchison & Wright 5302* (GH). **Pasco:** Yanahuanca, *Macbride & Featherstone 1242* (F, GH, US). **Junín:** Ingahuasi, between Huancayo and Izcuchaca, *Tovar 3870* (GH, USM). Uspachaca, *Macbride & Featherstone 1307* (F, US).

3. *Cheilanthes fractifera* Tryon, *Rhodora* 62: 7, t. 1252. January, 1960. TYPE: Peru, Dept. Ayacucho, *Correll & Smith P169* (holotype, GH!).

*Cheilanthes saundersii* Alston, *Lilloa* 30: 110, t. 6. August, 1960. TYPE: Peru, Dept. Lima, Huarochiri, *Saunders 350* (or 353 according to Saunders, pers. comm.) (holotype, BM; isotype(?), *Saunders 353*, US!).

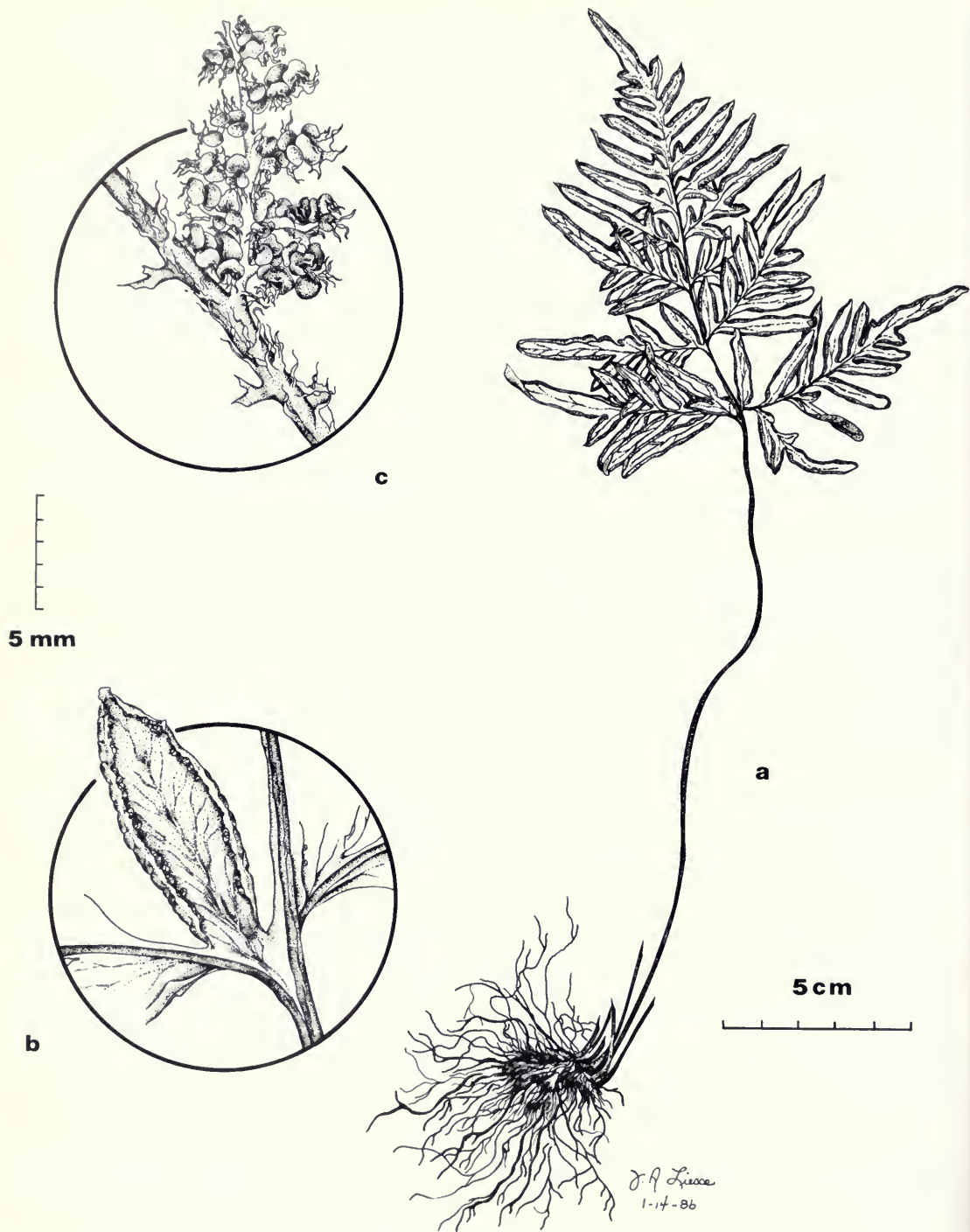


FIG. 6. *Cheilanthes poeppigiana*: a, habit; b, basal pinnule and portion of rachis, abaxial side. *Cheilanthes myriophylla*: c, portion of rachis and pinna, abaxial side. (a, b from Macbride 3672, F; c from Killip & Smith 21796, F).

**Stem** short, decumbent, scales narrowly lanceolate, light brown, concolorous. **Leaves** ca. 5–12 cm long, the petiole more or less grooved on the adaxial side, the ridges rounded and concolorous with the petiole proper, thinly whitish pubescent as is the rachis, with large whitish scales at the base, lamina deltoid to broadly ovate, 2-pinnate-pinnatifid. **Pinnae** moderately whitish pubescent abaxially, thinly pubescent adaxially. **Indusium** more or less crenate or of small lobes, well modified.

Rocky hillsides, 1600–2200 m, Cajamarca south to Arequipa.

Endemic to Peru.

This species was first discovered in 1954 by S. G. E. Saunders and since then it has been collected several times. The petiole that fractures evenly toward the base, and the large whitish scales at the base of the petiole combine to make this a distinctive species among those of Peru.

**Cajamarca:** Prov. Contumazá, Cascas-Chepate, *Sagástegui* 4482 (GH). **Lima:** Dist. Lange, *Saunders* 1050 (GH). Dist. Surco, Rímac valley, *Saunders* 219 (BM, GH). Rímac valley, *Rauh & Hirsch* P143 (B). **Arequipa:** Cerros de Caldera, *Rauh & Hirsch* P570 (B). Entre Characato y Yarabamba, *G. & C. Müller* 12592 (GH).

4. *Cheilanthes pilosa* Goldm., Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19, suppl. 1 (Meyen, Obs. bot.): 455. 1843. TYPE: Peru, *Meyen* (holotype, B!; photos, GH, US; isotype, S-PA!).

*Cheilanthes macleanii* Hooker, Sp. fil. 2: 93, t. 110B. 1852. TYPE: Andes of Peru, *John MacLean* (holotype, K!; photos, GH, US; isotype, GH!).

*Cheilanthes andina* Hooker, Sp. fil. 2: 115. 1852. TYPE: Andes of Peru, *John MacLean* (holotype, K!; photos, GH, US).

**Stem** rather slender, short-creeping, scales lance-subulate, dark brown, rather sclerotic, with or without paler borders. **Leaves** ca. 10–40 cm long, petiole terete, somewhat pubescent, the rachis similar but sometimes grooved on the adaxial surface, lamina lanceolate to narrowly so, 2–3-pinnate. **Pinnae** pubescent adaxially and more so abaxially. **Indusium** broad, deeply crispate or lobed.

On ledges and in crevices of cliffs, 2300–4400 m, Ancash to Puno.

Peru to Argentina.

The soft, spreading trichomes on the leaf and

the rigid, shining stem scales are characteristic of this species. *Cheilanthes andina* is a variant of *C. pilosa*, and their differences are perhaps related to the growth of *C. andina* under drier and more exposed conditions. The ultimate segments in *C. andina* are less expanded and thicker in texture, and the trichomes are often shorter.

Two collections evidently represent a hybrid between *C. pilosa* and *C. pruinata*: Cuzco, Visachani, *Bües* 1782 (GH) and Cuzco, Prov. Calca, *Vargas* 17409 (GH). These have, among other characters, the broad indusia of the former species and mostly the characteristic short-pubescent petiole and rachis of the latter species.

**Ancash:** Chiquián, *Cerrate* 1548 (USM). Between Llamac and Jahuacocha, *Cerrate* 2337 (USM). Prov. Huaylas, Huascarán National Park, *Smith et al.* 12141 (F). **Lima:** Prov. Huarochiri, Wankalasila, *Cerrate et al.* 4412 (USM). **Junín:** Near Huancayo, *Killip & Smith* 23365 (US), *Saunders* 647 (GH). 15 km E of Huancayo, *Tryon & Tryon* 5467 (F). **Huancavelica:** Cerro Santa Bárbara, near Huancavelica, *Tovar* 3117 (GH, USM). **Cuzco:** Cerro de Cusilluyoc, *Pennell* 13994 (F, GH, US). Velille, *Vargas* 6541 (CUZ). Valle de Lares, *Bües* 1825 (US). **Puno:** Puno, *Mexia* 7783 (F, GH, MO, UC, US). Araranca, *Pennell* 13454 (F, GH, US). Sandía, *Weberbauer* 717 (B).

5. *Cheilanthes pruinata* Kaulf., Enum. fil. 210. 1824. TYPE: “Peru” (not located).

*Cheilanthes mathewsii* Kunze, Farrnkräuter 1: 50, t. 25. 1848. TYPE: Peru, *Mathews* 605 (holotype, BM!; photo, GH, this specimen, identified by Kunze, may be the holotype, or it may serve to replace the one probably destroyed at LZ).

*Cheilanthes fasciculata* Goldm., Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19, suppl. 1 (Meyen, Obs. bot.): 456. 1843. TYPE: Peru, 9000–12000 ft., *Meyen* (holotype, B!; photo, GH).

**Stem** moderately stout, creeping, multicipital, scales dark reddish brown, concolorous or with very narrow pale borders. **Leaves** ca. 20–50 cm long, petiole terete, short-pubescent, usually densely so, rachis terete or rarely somewhat grooved, otherwise like the petiole, lamina linear, 2–3-pinnate-pinnatifid. **Pinnae** deltoid, deciduously pubescent on both sides except along the axes and midveins abaxially. **Indusium** moderately broad, deeply lobed, crispate, or as separate lobes on small ultimate segments.

In crevices or on ledges of cliffs and in rocky soil, 2500–4400 m, Cajamarca south to Puno and Moquegua.

Peru to Argentina.

The dense, very short pubescence of the petiole and rachis are especially distinctive characters. The pinnae are usually deltoid and in drying they are usually shining-varnished above. This is one of the most common and widely distributed of the Altiplano ferns.

**Cajamarca:** Cajamarca to Cajabamba, *Ferreyra* 3224 (BM, GH, USM). **La Libertad:** Above Cachicadán, *Stork & Horton* 9975 (F, UC). La Manzanas, *López* 1119 (UC, US). **Ancash:** Chiquián, *Ferreyra* 5717 (BM), 7304 (USM), *Cerate* 500 (GH, USM), 3350 (GH, USM). **Huánuco:** Mito, *Macbride & Featherstone* 1490 (F, GH, US). Panao, *Ferreyra* 1943 (USM). **Lima:** Between Parac and Tuncuyo, *Coronado* 314 (GH, UC). Matucana, *Macbride & Featherstone* 420 (F, US). **Junín:** Tarma, *Killip & Smith* 21807 (F, US). Near Huancayo, *Killip & Smith* 23362 (F, GH, US). **Huancavelica:** SE of Pampas, *Stork & Horton* 10251 (F, UC, US). Between Conaica and Laria, *Tovar* 920 (GH, USM). **Ayacucho:** Near Puquio, *Ferreyra* 7214 (GH, USM). **Apurímac:** Andahuaylas, *Stork & Horton* 10717 (GH; F and UC, in part). **Cuzco:** Near Anta, *Tryon & Tryon* 5362 (BM, F, MO, U, US, USM). **Puno:** Puno, *Mexia* 7780 (F, GH, MO, UC, US). **Arequipa:** Arequipa, *Pennell* 13199 (F, GH, US). 12 km S of Arequipa, *Eyerdam & Beetle* 22126 (GH, MO, UC, US). **Moquegua:** Prov. Mariscal Nieto, between Torata and Carumas, *Dillon et al.* 3339 (F).

6. *Cheilanthes fraseri* Kuhn, *Linnaea* 36: 83. 1869. SYNTYPES: Ecuador, *Fraser, Wagner*, and Peru, *Ruíz & Pavón* (Herb. Mett., B!, a sheet with *Pavón* and *Wagner* in a packet; photos, GH, US).

*Notholaena fraseri* (Kuhn) Baker, *Syn. fil.*, ed. 2, 83. 1874.

**Stem** short- to moderately long-creeping, scales narrowly linear-subulate, entire or remotely serrulate, brownish, concolorous or somewhat bicolorous. **Leaves** to 40 cm long, petiole about half as long as the lamina, lamina narrowly linear, pinnate-pinnatifid or 2-pinnatifid at the base. **Pinnae** mostly deltoid, with the abaxial surface densely tomentose with rather coarse, matted, pale brown trichomes. **Margin** slightly modified.

Rocky places, often shaded, 800–3500 m, Piura south to Cuzco.

Ecuador to Bolivia.

The differences between this species and the sometimes similar *Cheilanthes bonariensis* are presented in the key. Also *C. fraseri* has the petiole and rachis more slender than those in *C. bonariensis* and the petiole rather long, rather than short, in relation to the length of the lamina.

**Piura:** Huancabamba, *Scolnik* 1435 (UC). **Cajamarca:** Santa Cruz, *Weberbauer* 4139 (B). Between San Marcos and Cajabamba, *Correll & Smith* P909 (GH, US). **Huánuco:** Huánuco, *Macbride & Featherstone* 2328 (F, GH, US). Ambo, *Ferreyra* 6912 (GH, USM). **Lima:** Rimac-Tal, *Rauh & Hirsch* 146 (USM). **Huancavelica:** Prov. Tayacaja, entre Pampas y Salcabamba, *Tovar* 3848 (GH, USM). **Ayacucho:** Prov. La Mar, San Miquel-Llausea, *Velarde* 4951 (GH). **Apurímac:** Prov. Abancay, Quisapata, *Vargas* 8910 (MO, UC). **Cuzco:** Río Sambray, *Mexia* 8055 (F, GH, MO, UC, US). Quillabamba, *Stork et al.* 10449 (F, GH, UC).

7. *Cheilanthes bonariensis* (Willd.) Proctor, *Bull. Inst. Jamaica, Sci. Ser.* 5: 15. 1953.

*Acrostichum bonariense* Willd., *Sp. pl. ed. 4*, 5: 114. 1810. TYPE: "Bonaria" (holotype, Herb. Willd. 19537, B!; photo, GH).

*Pteris aurea* Poir. in Lam., *Encycl.* 5: 710. 1804. TYPE: Peru, *Joseph de Jussieu* (holotype, Herb. Jussieu 1333, P!; photos, GH, US), not *Cheilanthes aurea* Baker, 1868.

*Notholaena aurea* (Poir.) Desv., *Mém. Soc. Linn. Paris* 6: 219. 1827.

*Notholaena bonariensis* (Willd.) C. Chr., *Index fil.* 6. 1905; 459. 1906.

**Stem** short-creeping, knotted, scales lance-linear, entire, brownish, somewhat bicolorous. **Leaves** to 60 cm long, petiole  $\frac{1}{3}$  as long as the lamina or less, lamina linear-elliptic, long-attenuate at the base, pinnate-pinnatifid. **Pinnae** oblong to deltoid-oblong, with the abaxial surface covered with a dense tawny (white when young) tomentum of fine, matted trichomes. **Indusium** a very narrow subhyaline band.

On soil banks, rocky slopes, shrubby hillsides or cliffs, 1200–3800 m, Lambayeque and Amazonas south to Puno and Arequipa.

Southwestern United States to Chile and Argentina; West Indies.

*Cheilanthes bonariensis* is one of the characteristic ferns of the Altiplano. It is usually quite distinctive in the aspect of its pubescent lamina, but some variations must carefully be distinguished from *C. fraseri*. One collection (Cuzco, Ollantaytambo, *Hitchcock* 22541, GH), is evidently a hybrid. It has the slender petiole and rachis and the long petiole of *C. fraseri* and the short stem and dark scale tips of *C. bonariensis*.

**Lambayeque:** 44 km from Olmos on road to Jaén, *Correll & Smith* P821 (GH). **Cajamarca:** Prov. Chota, Llama, *López & Sagástegui* 5310 (GH, HUT, MO). **Amazonas:** Prov. Chachapoyas, Chachapoyas-Molinopampa, *Sagástegui* 6033 (GH). **La Libertad:** Huaranchal, *Sagástegui* 211 (GH). **Ancash:** Chiquián, *Ferreyra* 5786 (USM).

**Huánuco:** Between Ambo and Huánuco, *Ferreyra* 9234, 10394 (GH, USM). **Lima:** Oroya RR., *Safford* 991 (F, GH, P, US). **Junín:** Vilcabamba, *Tryon & Tryon* 5421 (BM, F, MO, U). **Huancavelica:** 4 km S of Conaica, *Tovar* 970 (GH, USM). **Ayacucho:** Pampalca, *Killip & Smith* 22256 (F, US). **Apurímac:** Prov. Andahuaylas, 2 km N of Andahuaylas, *Stork & Horton* 10716 (US). **Cuzco:** Calca, *Vargas* 3136 (F). **Arequipa:** Prov. Arequipa, near Laspinas, *Eyerdam & Beetle* 22144 (GH, US). **Puno:** Sandia, *Weberbauer* 721 (B).

8. **Cheilanthes obducta** Kuhn, *Linnaea* 36: 83. 1869. TYPE: Bolivia, *D'Orbigny* 386 (holotype, B!; photo, GH).

*Notholaena obducta* (Kuhn) Baker, *Syn. fil.*, cd. 2, 515. 1874.

**Stem** short-creeping, scales narrowly linear, pale brown, or with a castaneous central portion and lighter margins. **Leaves** to 55 cm long, petiole much shorter than the lamina, terete, slightly to densely pubescent, the rachis similar, lamina lanceolate, 2-pinnate. **Pinnae** elongate, with the abaxial surface densely subappressed pubescent, the trichomes rather straight. **Margin** unmodified.

Under shrubs and trees, 600 m, Cajamarca.

Venezuela, Colombia, south to Bolivia and Paraguay.

The trichomes on the abaxial surface of the pinnae are unusual, many of them having short, few-celled branches. Also, among the densely pubescent species, this is the only one with clearly subappressed pubescence.

**Cajamarca:** Valley of the Río Chamaya, Mesones to Muro, *Hutchison* 1425 (UC, US).

9. **Cheilanthes mollis** (Kunze) Presl, *Tent. pterid.* 160. 1836.

*Notholaena mollis* Kunze, *Linnaea* 9: 54. 1834. TYPE: Chile, (Valparaíso), near Valparaíso, Playa Ancha, *Poeppig* (holotype, LZ destroyed).

**Stem** short-creeping, knotted, scales narrow-linear, entire, concolorous or bicolorous. **Leaves** to 30 cm long, petiole usually shorter than the lamina, terete, slightly to densely pubescent, the rachis similar, lamina lanceolate, to 3-pinnate. **Pinnae** with the abaxial surface densely covered with whitish to ferruginous, stalked, stellate trichomes, ultimate segments small, many suborbicular. **Margin** unmodified, strongly revolute.

On lomas, 90–100 m, Arequipa.

Peru and Chile.

*Cheilanthes mollis* is amply distinguished by its indument of stellate trichomes.

**Arequipa:** Ocoña, *Ellenberg* 4153 (GH). Prov. Caraveli, Lomas de Atico, *Hutchison & Wright* 7130 (GH). Molendo, *Weberbauer* 1545 (B).

10. **Cheilanthes orbignyana** Kuhn, *Linnaea* 36: 82. 1869. TYPE: Bolivia, Prov. La Laguna, *D'Orbigny* 388 (Herb. Mett., B!, is doubtless from the original material; isotype, P!; photos, GH, US).

**Stem** erect, moderately stout, scales lanceolate or narrowly so, brown to dark brown, concolorous, semisclerotic. **Leaves** ca. 25–50 cm long, petiole shallowly grooved on the adaxial side, at least toward the apex, flat to convex between the small, rounded ridges that are concolorous with the petiole proper, glabrous or nearly so, rachis similar but the ridges somewhat lighter in color and rather sharp, lamina narrowly ovate, 3-pinnate-pinnatifid to 4-pinnate. **Pinnae** glabrous to slightly glandular. **Indusium** suborbicular to lunate, well modified.

Among rocks, 2750–2860 m, Cajamarca and Lima.

Peru and Bolivia.

Evidently this is a rare species but it should be found in the mountains south of Lima.

**Cajamarca:** Prov. Contumazá, Guzmango, *Sagástegui* 2937 (F, GH, US), 11435 (F, MO). Prov. Contumazá, La Herilla (Guzmango), *Sagástegui et al.* 9710 (MO, UC). Prov. Cajamarca, Las Quinas-Huatum, *Sagástegui et al.* 10132 (HUT, MO, UC). **Lima:** Bosque de Zarate, San Bartolomé, *Valencia & Franke* 666 (F).

11. **Cheilanthes rufopunctata** Rosenst., *Meded. Rijks-Herb.* 19: 9. 1913. TYPE: Bolivia, (La Paz), Araca, *Herzog* 2366 (holotype, not located; frag. ex Rosenst., US!; isotype, L; photo, GH).

**Stem** creeping, often knotted, scales lanceolate, long-triangular, reddish brown, wholly sclerotic. **Leaves** ca. 15–35 cm long, petiole grooved on the adaxial side, at least toward the apex, deeply sulcate between the relatively large, rounded ridges which are concolorous with the petiole, glabrous,

rachis grooved and glabrous, with green wings toward the apex, lamina long-deltoid to broadly lanceolate, 3-pinnate to 3-pinnate-pinnatifid. **Pinnae** glabrous on both sides, except for usually numerous reddish, sessile glands, especially abaxially. **Indusium** broad, crispate, well modified.

Rock crevices, 2600–4000 m, Lima to Puno. Peru and Bolivia.

*Cheilanthes glauca* (Cav.) Mett. of Chile seems closely related to this species. It has a pentagonal lamina, and the segments are thickly beset beneath with short, dark trichomes.

**Lima:** Prov. Canta, arriba de San José, Müller *et al.* 12474 (GH). Matucana, Macbride & Featherstone 285 (F, GH, US). **Junín:** Huancayo, Kunkel 482½ (GH). **Huancavelica:** Near Conaica, Tovar 316 (GH, US, USM). **Cuzco:** Valle de Lares, Soukup 29 (F, US). Calca, Vargas 4004 (CUZ, UC, US). **Puno:** Near Puno, Vargas 29 (MO), Soukup 29 (UC).

12. *Cheilanthes marginata* H.B.K., Nov. gen. sp. 1: 22. 1815. TYPE: Ecuador, (Pichincha), Quito, Penipe, Humboldt & Bonpland (holotype, P!; photo, GH).

**Stem** short-creeping, somewhat multicapital, scales ovate-lanceolate, attenuate, dark brown, sclerotic. **Leaves** ca. 8–25 cm long, the petiole sulcate, the ridges rounded, concolorous with the petiole, somewhat scaly, rachis sulcate, with green wings on the adaxial side above the base, lamina broadly deltoid to lanceolate, mostly 3-pinnate. **Pinnae** glabrous, ultimate segments stalked or narrowed at the base. **Indusium** glandular-fimbriate, continuous along the margins and decurrent onto the axes of the pinnules and pinnae.

On cliffs, among rocks, and in rocky soil, 2200–4000 m, Piura to Puno.

Venezuela and Colombia, south to Argentina.

The unusual condition of the indusium, which extends from the segments along their stalks and along the pinna-rachis, mark this as one of the most distinctive species of the genus in Peru.

**Piura:** Prov. Ayabaca, Ayabaca, Sagástegui *et al.* 7804 (MO). **Cajamarca:** Cajamarca to Chilite, Ferreyra 3294 (USM). El Puquio, Guzmango, Sagástegui 3918 (GH). **La Libertad:** Huaranchal, Sagástegui 207, 2664 (GH). **Ancaash:** E of Huasta, Cerrate 2264 (USM). **Huánuco:** Mito, Macbride 3226 (F, GH, US). **Pasco:** Between Salcachupán and Cerro de Pasco, Ferreyra 6619 (GH, USM). **Junín:** Huancayo, Kunkel 481 (GH). **Huancavelica:** Colcabamba

to Paucarbamba, Tovar 1969 (USM). **Ayacucho:** Pampalca, Killip & Smith 22234 (US). **Cuzco:** Machu Picchu, Tryon & Tryon 5401 (BM, F, MO, U, US, USM). **Puno:** Sandia, Soukup 157 (F), Weberbauer 718 (B).

13. *Cheilanthes poeppigiana* Kuhn, Linnæa 36: 84. 1869. SYNTYPES: Peru, Poeppig, and Bolivia, Cuming. (Cuming in Herb. Mett., B!, is determined by Mettenius as *Cheilanthes poeppigiana* and is doubtless part of the original materials.) **Figure 6a–b.**

**Stem** small, short, scales subulate-lanceolate with a dark brown sclerotic central portion and paler, thinner borders. **Leaves** ca. 8–35 cm long, petiole grooved on the adaxial side, the ridges rounded, concolorous with the petiole proper, slightly scaly to glabrate, rachis similar, but with narrow green wings on the adaxial side, at least toward the apex, lamina oblong-lanceolate to deltoid, pinnate-pinnatifid to 2-pinnate-pinnatifid. **Pinnae** glabrous, pinnules adnate to somewhat narrowed at the base. **Indusium** continuous, intramarginal, well modified.

Crevices of cliffs or of Inca walls, among rocks in ravines and on shrubby slopes, 150–3000 m (usually at 1700–2200 m), Tumbes to Puno.

Ecuador to Argentina.

Small plants of this species may have a lanceolate lamina; large ones have an ovate to broadly triangular one. The ultimate segments are relatively broad and herbaceous with a broadly attached base.

**Tumbes:** Between Tumbes and Cancho, Coronado 226 (GH, UC). Prov. Zarumilla, El Cancho, J. Schunke V. 3031 (F, GH, US). **Lambayeque:** Entre Beatita de Humay y km 38 (Carretera Olmos-Marañón), López *et al.* 4042 (GH). **Cajamarca:** Entre Cascas y Contumazá, López *et al.* 3725 (F, GH). **La Libertad:** Huaranchal, Sagástegui 194 (GH). **Huánuco:** Piedra Grande, Macbride 3672 (F). **Junín:** Huacapistana, Tryon & Tryon 5436 (BM, F, MO, U, US, USM). **Cuzco:** Machu Picchu, Tryon & Tryon 5396 (BM, F, MO, U, US, USM). **Puno:** Sandia, Weberbauer 566 (B).

14. *Cheilanthes farinosa* (Forssk.) Kaulf., Enum. fil. 212. 1824.

*Pteris farinosa* Forssk., Fl. aegypt.-arab. 187. 1775. TYPE: Forsskal (holotype, not located; isotype, BM!).

*Aleuritopteris peruviana* Saiki, J. Phytogeog. Tax. 32: 89. 1984. TYPE: Peru, (Huánuco), Muña, Bryan 555 (holotype, F!; isotype, US!).



**Stem** rather stout, very short-creeping, decumbent to nearly erect, scales narrowly long-triangular to nearly erect, brown, semisclerotic, concolorous. **Leaves** ca. 10–70 cm long, petiole terete to grooved on the adaxial side, the ridges rounded, concolorous with the petiole proper, slightly scaly or not, glabrous to farinaceous, rachis grooved on the adaxial side, glabrous to farinaceous, lamina long-triangular to ovate-triangular or narrowly so, pinnate-pinnatifid to 2-pinnate-pinnatifid. **Pinnae** glabrous to somewhat farinose on the adaxial surface, conspicuously to densely white-farinose abaxially. **Indusium** crispate, lobed, more or less continuous, well modified.

Rocky places, ca. 2000 m, Huánuco, Junín, and Cuzco.

West Indies; Mexico to Peru; Old World.

This is a most distinctive species because of the white-farinose covering of the segments which is especially evident on their under surface.

Saiki (*op. cit.*) recognized segregate species from *Cheilanthes farinosa sens. lat.* in the genus *Aleuritopteris*, along with some species of *Notholaena*. The scattered distribution of *C. farinosa* in America suggests that it was introduced from cultivated plants. It probably does represent a complex but this needs more careful study, especially of cytological and chemical characters.

**Junín:** near Huacapistana, *Tryon & Tryon 5435* (F). **Cuzco:** Nevada Sallcantay, *Bües 986* (US).

15. *Cheilanthes concolor* (Langsd. & Fisch.) R. & A. Tryon, *Rhodora* 83: 133. 1981. var. **concolor**.

*Pteris concolor* Langsd. & Fisch., *Icon. fil.* 19, t. 21. 1810. TYPE: Archipelago Marquesas, Nukahiva Island (Nukahiva or Nuku Hiva), *Langsdorff* (holotype,  $\text{LE}^?$ ; isotype, Herb. Willd. 19961-1, B; photo, GH).

*Doryopteris concolor* (Langsd. & Fisch.) Kuhn in *Decken, Reisen Ost-Afrika* 3(3): 19. 1879.

**Stem** rather short and stout, scales usually ovate-lanceolate, brown, strongly bicolorous. **Leaves** ca. 5–35 cm long, petiole usually sulcate or with lateral wings on the adaxial side, especially toward the apex, glabrous or very slightly pubescent, lamina pedate, pentagonal to suborbicular, usually 2–3-pinnatifid. **Pinnae** essentially glabrous on both sides. **Indusium** well modified, rather continuous along the fertile margin.

Rocky places and clay banks, 750–2000 m, Cajamarca, San Martín, and Cuzco.

Tropical America; Old World.

The pedate lamina is a distinctive character of this species among the Peruvian ones. All American plants belong to var. *concolor*. Variety *kirkii* is in Africa, India, and Ceylon.

**Cajamarca:** Jaén, Feb. 17, 1954, *R. Cerrón* (GH, UC, US). **San Martín:** Tarapoto, *Ll. Williams 5451* (F, GH), *Spruce 4045* (GH, K). **Cuzco:** Valley of the Vilcanota, *Mexia 8053* (GH, MO, UC, US). **Potrero,** *Tryon & Tryon 5375* (BM, F, GH, MO, U, UC, US, USM).

16. *Cheilanthes myriophylla* Desv., *Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk.* 5: 328. 1811. TYPE: Peru (holotype, Herb. Desvaux, P!; photos, GH, US). **Figure 6c.**

*Cheilanthes elegans* Desv. *Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk.* 5: 328. 1811. TYPE: "Chile" (holotype, Herb. Desvaux, P!; photo, GH; a portion of a pinna, probably from Peru: *J. Jussieu*, Herb. Jussieu 1438, P!; photos, GH, US).

**Stem** moderately stout, short-creeping, multicapital, scales lance-subulate, with a dark, sclerotic central portion and paler margins. **Leaves** ca. 15–40 cm long, petiole terete, scaly, as is the rachis, lamina lanceolate to lanceolate-oblong, or narrowly so, to 4-pinnate. **Pinnae** densely scaly abaxially, nearly glabrous adaxially, the ultimate segments small, suborbicular. **Indusium** more or less modified, rather continuous.

Rocky soil, shrubby hillsides, and cliffs, 1550–3250 m, Piura to Puno and Arequipa.

Hispaniola; Mexico to Colombia and Venezuela, south to Chile; Brazil.

This species is characterized by its small, bead-like ultimate segments that are readily visible on the adaxial side of the lamina and usually not completely concealed by the scales on the abaxial side. The narrow scales on the petiole and rachis superficially resemble matted trichomes. It is one of the most common and widely distributed of the ferns on the Altiplano.

**Piura:** Huancabamba, *Scolnik 1436* (UC, US). **Cajamarca:** Prov. Antonmaza, Jalca de Nanrá, *Sagástegui 3891* (GH). **Amazonas:** Prov. Chachapoyas, Río Sonche, near Sonche, *Wurdack 1544* (F, GH, UC, US). **La Libertad:** Trujillo to Otusco, *Saunders 896* (F, GH). **Ancash:** Chi-

quián, *Cerrate* 546 (USM). **Huánuco:** Acomayo, *Tryon & Tryon* 5328 (BM, F, MO, U, US, USM). **Lima:** Chancay, E of Sayán, *Goodspeed* 33032 (GH, MO, UC, US). **Pasco:** *Solomon* 3036 (F, MO). **Junín:** Vilcambamba, *Tryon & Tryon* 5420 (BM, F, GH, MO, U, US, USM). **Huancavelica:** N of Pampas, *Stork & Horton* 10242 (F, GH, MO, UC). **Ayacucho:** Ayacucho, *West* 3641 (MO, UC). **Apurímac:** Challhuanca, *Saunders* 772 (GH). **Cuzco:** Anta, *Tryon & Tryon* 5363 (BM, F, MO, U, US, USM). **Arequipa:** 14 km N of Arequipa, *Eyerdam & Beetle* 22164 (GH, MO, UC, US). **Puno:** Sandia, *Weberbauer* 724 (B).

17. *Cheilanthes cantangensis* (Tryon) Tryon, comb. nov.

*Notholaena cantangensis* Tryon, *Rhodora* 63: 81. 1961. TYPE: Peru, Dept. Cajamarca, Prov. Celendín, Cantange, *López & Sagástegui* 3366 (holotype, GH!).

**Stem** short, scales lanceolate, with a dark, sclerotic central portion and brown, pectinate-serrulate margins. **Leaves** 10–15 cm long, petiole terete or subterete, somewhat scaly, the rachis similar, lamina lanceolate-elliptic, 2-pinnate-pinnatifid. **Pinnæ** with the abaxial surface covered with narrowly ovate-lanceolate scales, the adaxial surface moderately pubescent with rather short, thick, and rigid trichomes. **Margin** slightly modified.

Among rocks, 1450 m, Cajamarca.  
Endemic to Peru.

This rare species is characterized by the short, rigid trichomes on the adaxial surface of the segments. It is known only from the type collection.

18. *Cheilanthes scariosa* (Sw.) Presl, *Reliq. haenk.* 1: 65. 1825.

*Acrostichum lanuginosum* Willd., *Schrift. Acad. Erfurt*, 1802: 31, t. 3, f. 4, not Desf. 1800. TYPE: Peru, Malaspina Exped. (holotype, Herb. Willd. 19554-1, B!; photos, GH, US).

*Acrostichum scariosum* Sw., *Syn. fil.* 16. 1806, *nom. nov.* for *A. lanuginosum* Willd. (not Desf.) and with the same type.

*Cheilanthes ornatissima* Maxon, *Smithsonian Misc. Coll.* 65(8): 3. 1915. TYPE: Peru, (Lima), mountains back of Lima, *Safford* 996 (holotype, us!; isotypes, F!, GH!, MO!, UC!, US!).

*Cheilanthes tripinnata* Copel., *Univ. Calif. Publ. Bot.* 19: 301, t. 58. 1941. TYPE: Peru, Dept. Apurímac, Chincheros to Andahuaylas, *West* 3724 (holotype, UC!).

**Stem** rather stout, very short-creeping, multicapital, scales long and filiform, concolorous, light

reddish brown. **Leaves** ca. 8–15 cm long, petiole densely scaly, terete, as is the rachis. **Lamina** linear to rather narrowly elliptic, 3-pinnate. **Pinnæ** densely scaly abaxially, the scales and especially their tips curving over the glabrous adaxial surface and concealing it, ultimate segments small, suborbicular or nearly so. **Margin** strongly recurved, only slightly, if at all, modified.

Exposed calcareous rocky places and cliffs, 2700–4300 m, La Libertad to Puno.  
Peru and Bolivia.

This species is unusual in that the adaxial surface of the ultimate segments is nearly concealed by the scales on the abaxial surface curving to the upper surface. Some of the scales on the rachis have such strongly curved auricles that they give the appearance of a small scale attached at the base.

This and the next four species form a distinctive group, along with *Cheilanthes squamosa* of Bolivia and Argentina. They all have rather similar scaly leaves and prominently verrucate spores.

**La Libertad:** Yanazara to Huaquil, *López & Sagástegui* 3395 (GH). **Ancash:** Mahuay, *Cerrate* 2200 (USM). Laguna de Palagatos, *López* 2388 (HUT). **Lima:** Matucana, *Macbride & Featherstone* 424 (F, US), *Goodspeed* 11347 (GH, UC). **Pasco:** 95 km S of Huánuco, road to Cerro de Pasco, *Gentry et al.* 37495 (F, MO). **Junín:** Near Tarma, *Tryon & Tryon* 5457 (BM, F, GH, MO, U, US, USM). **Huancavelica:** SE of Conaica, *Tovar* 113 (GH, MO, US). **Apurímac:** Prov. Andahuaylas, *Vargas* 8792 (CUZ, UC). **Cuzco:** Pisaj, *Vargas* 23239 (GH). **Puno:** Pucará, *Weberbauer* 425 (B).

19. *Cheilanthes peruviana* (Desv.) Moore, *Index fil.* 250. 1861.

*Notholaena peruviana* Desv., *Mém. Soc. Linn. Paris* 6: 220. 1827. TYPE: Peru, *Dombey* (holotype, P!; photos, GH, UC, US; frag., B!).

*Notholaena sinuata* var. *bipinnata* Hooker, *Sp. fil.* 5: 108. 1864. TYPE: Peru, (Huánuco), “Andes of Peru”, Baños, *Brackenridge* (Wilkes, *Explor. Exped.*) (holotype, K!; photos, GH, US).

*Notholaena brackenridgei* Baker, *Syn. fil.* 371. 1868. TYPE: the same as for *N. sinuata* var. *bipinnata*.

**Stem** erect, stout, scales linear-ligulate, long-attenuate, margins entire or nearly so, brown, concolorous. **Leaves** to 30 cm long, the petiole terete, scaly, the rachis similar, lamina narrowly lanceolate, not narrowed below, 2–3-pinnate, with some pinnules lobed. **Pinnæ** with the abaxial surface densely covered with dark brown, lanceolate to

ovate, somewhat pectinate-serrulate scales. **Margin** modified, narrow.

In soil and on rocks of lomas, and on exposed rocky slopes, 300–3900 m, Lambayeque to Moquegua.

Endemic to Peru.

This and the next species are closely related and may be separated by the characters mentioned in the key. The two perhaps are not distinct species.

**Lambayeque:** 44 km from Olmos on road to Jaén, *Correll & Smith P822* (GH, US). **Cajamarca:** El Puquio, Guzmango, *Sagástegui 3913* (GH). **La Libertad:** Prov. Otuzco, Huaranchal, *López et al. 2665* (GH). **Ancash:** Prov. Huaráz, 10 km from Cachabamba, *Smith & Budensiek 10896* (F). **Lima:** Above San Bartolomé, *Ferreyra 9742* (GH, USM). **Arequipa:** Lomas de Capac, *Coronado 39* (GH, UC, US). Lomas de Chaparra, *Ferreyra 11968* (GH, USM). **Moquegua:** Ilo, *D. Stafford 933* (BM).

20. *Cheilanthes arequipensis* (Maxon) R. & A. Tryon, *Rhodora* 83: 133. 1981.

*Notholaena arequipensis* Maxon, *Smithsonian Misc. Coll.* 65(8): 9. 1915. TYPE: Peru, (Arequipa), near Arequipa, *Rose & Rose 18797* (holotype, us!; photo, GH).

**Stem** erect or ascending, scales linear, long-attenuate, distantly denticulate with ascending teeth, reddish brown, concolorous. **Leaves** to 8 cm long, petiole terete, scaly, as is the rachis, lamina deltoid-oblong, 2-pinnate, the pinnules hardly if at all lobed. **Pinnae** with the abaxial surface densely covered with large, ovate-oblong, long-acuminate, light reddish brown, erose-denticulate scales. **Margin** somewhat revolute, unmodified.

Rocky places and crevices of rocks, 2200–3300 m, Lima and Arequipa.

Central Peru to northern Chile and northwestern Argentina.

This species is close to *Cheilanthes peruviana* and it is sometimes difficult to distinguish the two. The small leaves with strongly clathrate and roughened scales abaxially and the reddish stem scales are especially distinctive features.

**Lima:** Prov. Huarochiri, Dist. San Mateo, *Saunders 621* (F). **Arequipa:** Arequipa, *R. S. Williams 2638* (GH, NY, US), *Pennell 13198* (B, F, GH, US). Yura, *Vargas 8019* (UC). Quebrada de San Lazaro, *Munz 15500* (GH). El Misti, *D. Stafford 570* (BM).

21. *Cheilanthes incarum* Maxon, *Smithsonian Misc. Coll.* 65(8): 5. 1915. TYPE: Peru, (Cuzco), Cuzco, *Rose & Rose 19061* (holotype, us!).

**Stem** rather stout, short-creeping, multicapital, scales reddish, subulate, attenuate to a capillary tip. **Leaves** 10–25 cm long, the petiole densely scaly, terete, as is the rachis, lamina 2–3-pinnate, linear-lanceolate. **Pinnae** densely covered with scales abaxially, these not clathrate, with a few readily deciduous ones adaxially, the apical ultimate segments mostly ovate-deltoid, or oblong, the basal ones of secondary segments nearly suborbicular, their adaxial surface only partially concealed by the tips of the scales from the abaxial surface. **Indusium** rather narrow, more or less continuous.

Exposed rocky places, 2600–4100 m, Huancavelica to Puno.

Peru and northwestern Argentina.

In general appearance this species is similar to *Cheilanthes scariosa*, but may be separated by the characters mentioned in the key.

**Huancavelica:** Mejorada, *Tovar 1014* (GH, USM). **Apurímac:** 5 km N of Huacapistana, *West 3903* (UC). Prov. Ayacha, 70 km N of Mejorada, *Hutchison 1690* (GH). **Cuzco:** Saxihumán, *Tryon & Tryon 5343* (BM, F, GH, MO, U, US, USM). **Puno:** Capachia Peninsula (Lake Titicaca), *Tutin 1032* (BM).

22. *Cheilanthes lonchophylla* (Tryon) R. & A. Tryon, *Rhodora* 83: 133. 1981.

*Notholaena lonchophylla* Tryon, *Contr. Gray Herb.* 179: 19. 1956. TYPE: Peru, *Mathews 610* (holotype, k!; photo, GH).

**Stem** short, horizontal or ascending, scales linear-ligulate, sparingly antrorsely denticulate, brownish, concolorous. **Leaves** to 30 cm long, petiole terete, scaly, the rachis similar, lamina lanceolate or narrowly so, pinnate-pinnatifid to 2-pinnate-lobed. **Pinnae** with the abaxial surface densely covered with pale brown to whitish, linear-subulate, long-acuminate, pectinate-dentate scales. **Margin** unmodified.

Rocky places, 2850–2950 m, Cajamarca.

Endemic to Peru.

This rare species is characterized by narrow scales with relatively long marginal cilia on the pinnae beneath.

**Cajamarca:** Canyon of the Río Marañón, above Balsas, *Hutchison & Wright 5297* (uc, frag. GH). Prov. Cuzco, 20 km de Bagua, *Aguado 6791* (GH, HUT), *Moscatello et al. 881* (HUT). Prov. Contumazá, *López & Sagástegui 7653* (HUT).

23. *Cheilanthes sinuata* (Sw.) Domin, *Biblioth. Bot.* 85: 133. 1913, var. *sinuata*.

*Acrostichum sinuatum* Sw., *Syn. fil.* 14. 1806. TYPE: Peru, "*Squamaria sinuata*" Lagasca Herb. (holotype, Swartz Herb., s!).

*Notholaena tectaria* Desv., *Mém. Soc. Linn. Paris* 6: 219. 1827. TYPE: Peru (holotype, Desvauz Herb., p!; photos, GH, US; isotypes(?): Tarma, *Dombey* "*N. tectaria* Desv." ex Desvauz, b!; Tarma, *Dombey*, BM!).

*Notholaena sinuata* (Sw.) Kaulf., *Enum. fil.* 135. 1824.

**Stem** short, horizontal, scales linear to linear-subulate, pectinate-ciliate to entire, brownish, colorous. **Leaves** to 45 cm long, petiole terete, scaly, the rachis similar, lamina linear, pinnate-pinnatifid. **Pinnae** with the abaxial surface thickly covered with castaneous or pale brown, deltoid to lanceolate, acuminate, short-fimbriate scales, these overlying a tomentum of smaller scales dissected into long capillary processes. **Margin** unmodified.

Crevices of rocks, rocky banks and hillsides, 1000–3000 m, Piura to Amazonas and south to Arequipa.

Southwestern United States south to Argentina; Hispaniola.

This species is especially distinguished by the two vascular bundles near the base of the petiole; other American species of *Cheilanthes* have a single bundle. The var. *sinuata* occurs throughout the range of the species; other varieties occur in the southwestern United States and Mexico.

**Piura:** Cerro Prieto, 20 miles E of Cape Pariñas, *Haught 187* (US). **Lambayeque:** 20 km from Olmos on road to Jaén, *Correll & Smith P795* (GH, US). **Cajamarca:** Prov. Contumazá, entre Cascas y Contumazá, *López et al. 3687* (GH). **Amazonas:** Tambo de Carrizal, *Stübel 1041*, in part (B). **La Libertad:** Huaranchal, *Sagástegui 210* (GH). **Ancash:** S of Chiquián, *Cerrate 7589* (USM). **Huánuco:** Mito, *Macbride & Featherstone 2310* (F, GH, US). **Lima:** Santa Eulalia, *Goodspeed 11307* (GH, MO, UC, US). **Junín:** Tarma, *Ferreyra 530* (GH, USM). **Ayacucho:** Nasca to Puquio, *Correll & Smith P171B* (LL). **Cuzco:** Quillabamba, *Stork et al. 10449* (MO). **Arequipa:** Tiabaya, *Pennell 13071* (F, GH).

## Comments

*Cheilanthes buchtienii* (Rosenst.) Tryon, *comb. nov.* (*Notholaena buchtienii* Rosenst., *Repert. Spec. Nov. Regni Veg.* 5: 238. 1908) occurs in Argentina and Bolivia and may well be discovered in southern Peru. It is similar to *Cheilanthes fraseri* but is a more robust species, with larger median pinnae that are lanceolate to deltoid-lanceolate, while in *C. fraseri* the median pinnae are small and deltoid.

*Cheilanthes hypoleuca* (Kunze) Mett. of Chile was considered to occur in Peru (as *Notholaena tomentosa* Desv.) by Pichi-Sermolli (*Webbia* 8: 186–190. 1951) on the basis of two collections of W. Lobb, both at BM!: "Andes of Peru, W. Lobb and Huánico (Huánuco?) Peru, W. Lobb." There are no modern collections of this species from Peru and its presence requires confirmation. The species may occur in southern Peru. It is similar to *Cheilanthes fraseri* but has a strongly sulcate petiole and rachis, while *C. fraseri* has the petiole and rachis terete.

*Cheilanthes rigida* (Sw.) Domin was correctly indicated as from "Nova Hispania" (Mexico) by Swartz (*Syn. fil.* 104. 1806, as *Pteris rigida*) and erroneously from Peru by Swartz (*Syn. fil.* 299. 1806).

*Cheilanthes squamosa* Hooker & Grev. was reported from the Capachica Peninsula, Lake Titicaca, Puno by Tryon (1964). Further study of the specimen (*Tutin 1032*, BM) indicates that it is *Cheilanthes incarum*. *Cheilanthes squamosa* of Bolivia and Argentina is characterized by long, brown, piliform scales on the adaxial surface of the segments.

## VII. Adiantopsis

*Adiantopsis* Fée, (*Mém. foug.* 5) *Gen. fil.* 145. 1852.

TYPE: *Adiantopsis paupercula* (Kunze) Fée (*Adiantum pauperculum* Kunze). **Figure 7.**

**Terrestrial.** **Stem** erect or decumbent and short-creeping, rarely slender and long-creeping, bearing scales. **Leaves** monomorphic, ca. 10–80 cm long, usually borne in a cluster, petiole with 1–3 vascular bundles near the base, it and the lamina axes 2-ridged adaxially. **Lamina** usually 1–4-pinnate, or ternate, radiate or pedate, glabrous or somewhat short-pubescent abaxially, veins free. **Sori** separate on the vein ends, 1 (rarely 2) covered by a

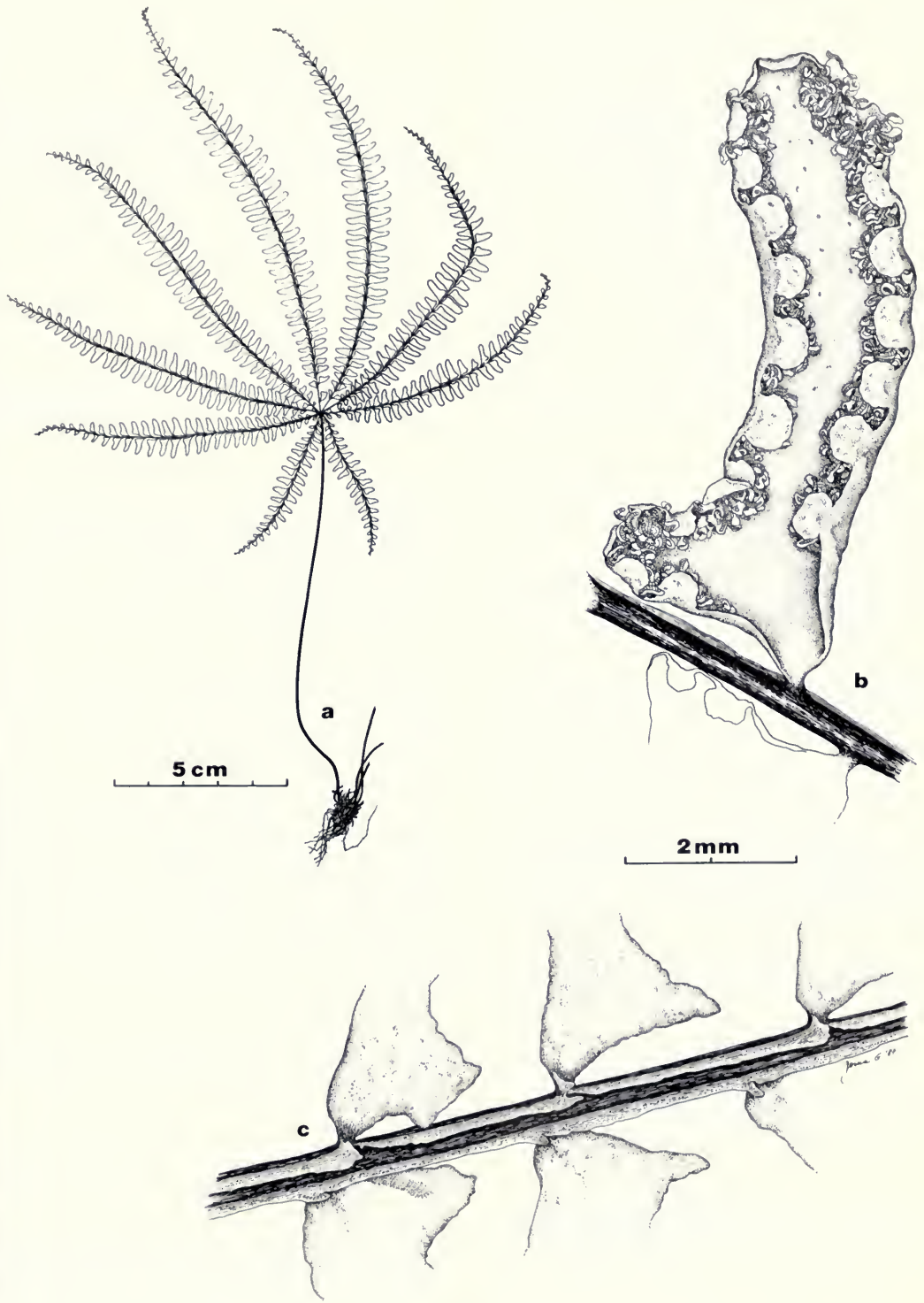


FIG. 7. *Adiantopsis radiata*: a, habit. b, ultimate segment, abaxial side; c, portion of axis and bases of segments, adaxial side. (a from Schmalz s.n., Brazil, F; b, c from Bües s.n., F.)

lunate to roundish marginal indusium, paraphyses absent. **Spores** tetrahedral-globose, trilete, echinate.

*Adiantopsis* is a small tropical American genus of about seven species, two of them in Peru. Distinctive features of the genus are the thin, brown ridges on each side of the lamina axes on the adaxial surface, and the echinate spores. In Tryon (1964) these species were treated in the genus *Cheilanthes*.

**Key to Species of *Adiantopsis***

- a. Lamina pinnate ..... 1. **A. chlorophylla**
- a. Lamina radiate or ternate ..... 2. **A. radiata**

1. **Adiantopsis chlorophylla** (Sw.) Féc, (Mém. foug. 5) Gen. fil. 145. 1852.

*Cheilanthes chlorophylla* Sw., Kongl. Vetensk. Acad. Handl. 1817: 76. TYPE: Brazil, (Minas Gerais), Villa Rica, *Freyreis* (holotype, Herb. Swartz, s!; photo, us).

**Stem** compact to creeping, scales narrowly lanceolate to subulate, bicolorous, with a dark, sclerotic central portion and light, thin margins. **Leaves** ca. 15–80 cm long, petiole with a light-colored submembranous ridge on each side of the adaxial surface, at least toward the apex, glabrate or glabrous, the rachis similar. **Lamina** elongate-triangular, 2–3-pinnate-pinnatifid, pinnæ glabrate to glabrous. **Indusium** suborbicular to elongate, well modified.

In shady woods, 850–2800 m, Cuzco. Guatemala; Colombia south to Argentina, and Brazil.

This species is evidently rare in the Andes from Colombia to Peru, although rather common in Argentina and Brazil. The pinnate lamina architecture readily separates it from *A. radiata*, the other Andean species.

**Cuzco:** Prov. La Convención, Río Chaupimayo, *Soukup 806* (F). Prov. La Convención, Hacienda Sahuayaco, *Vargas 1659* (GH). Torontoy, *Herrera 1332* (us).

2. **Adiantopsis radiata** (L.) Féc, (Mém. foug. 5) Gen. fil. 145. 1852. **Figure 7.**

**References**

TRYON, R. 1964. The ferns of Peru. *Contr. Gray Herb.*, **194**: 98–99.  
 TRYON, R. M., AND A. F. TRYON. 1982. *Adiantopsis*, pp. 266–270, in *Ferns and allied plants*, Springer-Verlag, New York.

*Adiantum radiatum* L., Sp. pl. 1094. 1753. TYPE: LINN 1252.1 (photo, A, is this species).  
*Cheilanthes radiata* (L.) John Sm., *J. Bot. (Hooker)* **4**: 159. 1841.  
*Adiantopsis ternata* Prantl, *Gartenfl.* **32**: 101. 1893. TYPE: Venezuela, Orinoco-gebiet, *Humboldt* (holotype, B!; photo, GH).

**Stem** erect to decumbent, often rather stout, scales subulate, bicolorous, with a dark, sclerotic central portion and lighter, thin margins. **Leaves** ca. 10–50 cm long, petiole glabrous, usually terete, to shallowly grooved toward the apex, axes of primary segments (pinnæ) glabrous or nearly so, with a light-colored, submembranous ridge on each side on the adaxial surface. **Lamina** ternate, or usually radiate with up to 7 (rarely to 9) pinnæ, asymmetrically circular, 2-pinnate, pinnæ glabrous or nearly so. **Indusium** suborbicular to oblong, well modified.

In dense forests, on wooded slopes, or in rocky places, 200–2800 m, Cajamarca and Amazonas, south to Cuzco.

Tropical America.

The radiate arrangement of the usually five to seven pinnæ make this a highly distinctive species. Rarely there are more pinnæ or only three or four.

**Cajamarca:** Jaén, Feb. 17, 1954, *Cerrón* (GH, UC). **Amazonas:** Río Utcubamba, 40 km S of Bagua Grande, *Hutchison 1469* (GH). Prov. Bagua, Pongo de Retema-Aramango, *Sagástegui 5944* (HUT). **San Martín:** Juan Jui, Alto Río Huallaga, *Klug 4170* (F, GH, MO, UC, US, USM). **Huánuco:** Prov. Leoncio Prado, al este de Tingo María, *J. Schunke V. 10478* (F). **Junín:** La Merced, *Macbride 5375* (F, us). **Huancavelica:** SE of Tintay, *Tovar*

4705 (GH). **Cuzco:** Torontoy, *Herrera 1299* (us). Prov. Convención, Echarate, *Vargas 1135* (GH).

VIII. **Notholaena**

**Notholaena** R. Br., Prodr. 145. 1810. TYPE: *Notholaena trichomanoides* (L.) Desv. (*Pteris trichomanoides* L.), not *Notholaena marantae* (L.) Desv. which is *Paraceterach marantae* (L.) Tryon. **Figure 8.**

*Notholaena* sect. *Argyrochosma* John Sm., J. Bot. (Hooker) 4: 50. 1841. TYPE (designated by C. Chr., Index fil. xl. 1906): *Notholaena nivea* (Poir-et) Desv. (*Pteris nivea* Poir-et). *Argyrochosma* (John Sm.) Windham, Amer. Fern J. 77: 38. 1987.

**Terrestrial** or rupestral. **Stem** small, decumbent to suberect, short- to rarely rather long-creeping and slender, bearing scales. **Leaves** monomorphic, usually ca. 5–45 cm long, usually borne in a cluster, petiole with 1 vascular bundle near the base, usually terete, rarely adaxially flattened, sulcate or slightly ridged. **Lamina** usually 1–4-pinnate, or rarely pedate and 2-pinnatifid or 2-pinnate-pinnatifid, white- or yellow-farinose abaxially and often with scales and (or) trichomes, or rarely gla-

brous, veins free. **Sori** usually on the somewhat modified vein ends, sometimes of only 1 or 2 sporangia, to rarely along most of the vein, the margin flat to slightly recurved and not or only slightly modified, paraphyses absent. **Spores** globose to tetrahedral-globose, trilete, usually cristate or somewhat rugose to plain and with a granulate deposit.

*Notholaena* is an American genus of 39 mostly Mexican species, with three in Peru. Species of *Cheilanthes* have previously often been placed in *Notholaena* as by Tryon (1956). In that treatment only species 22–58 are to be retained in *Notholaena*; the others properly are species of *Cheilanthes*. There are two sections: *Argyrochosma* John Sm. and *Notholaena*.

**References**

TRYON, R. 1956. A revision of the American species of *Notholaena*. Contr. Gray Herb., 179: 1–106.  
TRYON, R. M., AND A. F. TRYON. 1982. *Notholaena*, pp. 270–278, in Ferns and allied plants, Springer-Verlag, New York.  
WINDHAM, M. D. 1987. *Argyrochosma*, a new genus of cheilanthoid ferns. Amer. Fern J., 77: 37–41.

**Key to Species of Notholaena**

- a. Stem scales bicolorous, with a dark, sclerotic center and lighter margins; ultimate segments mostly adnate (sect. *Notholaena*) ..... 1. **N. sulphurea**
- a. Stem scales concolorous, brown; ultimate segments mostly stalked or sessile (sect. *Argyrochosma*) ..... b
- b. Ultimate segments mostly orbicular or nearly so; stem scales oily ..... 2. **N. stuebeliana**
- b. Ultimate segments mostly ovate to oblong; stem scales dry ..... 3. **N. nivea**

1. **Notholaena sulphurea** (Cav.) John Sm. in Seemann, Bot. voy. Herald 1: 233. 1854. **Figures 8b–c.**

*Pteris sulphurea* Cav., Descr. pl. 269. 1802. TYPE: Mexico, (Hidalgo), Chimapan (Zimapan), *Née* (holotype, MA, seen by C. Chr., Dansk Bot. Ark. 9(3): 23. 1937; isotypes, F!, G!).  
*Cheilanthes borsigniana* Koch, Wochen. Grtn. Pflanzenkr. 1: 2. 1858. TYPE: Peru, *Warszewicz* (holotype, B!; photos, GH, US).  
*Notholaena candida* var. *lutea* Hooker, Sp. fil. 5: 111.

1864. TYPE: Peru, (Huánuco), Huánuco, *Mathews 981* (holotype, K!).  
*Notholaena sulphurea* var. *flava* Kuhn, Abh. Naturf. Ges. Halle 11: 32. 1869. TYPE: Peru (location unknown).

**Stem** short-creeping to nearly erect, scales lance-ovate, attenuate, dark sclerotic with narrow brownish and deciduously glandular-ciliate margins. **Leaves** to 20 cm tall, petiole usually much longer than the lamina. **Lamina** pentagonal or somewhat elongate, 2-pinnate or usually 2-pinnate-pinnatifid at the base, 1-pinnate-pinnatifid above the basal pinnae, ultimate segments adnate,

the abaxial surface densely yellow- to whitish yellow-farinose. **Sporangia** borne on the vein ends, the margin thick, otherwise unmodified, somewhat recurved.

Open rocky places, 1500–2000 m, Piura and Amazonas south to Arequipa.

Mexico south to Chile.

This is the only species of section *Notholaena* that occurs in the Andes. In addition to the characters mentioned in the key, the section is characterized by a black, granulate deposit on the spores.

**Piura:** Prov. Huancabamba, Cerro Colorado, *Fosberg* 27694 (UC), *Fosberg* 27709 (US). **Cajamarca:** Cantange, Celendín to Río Marañón, *López & Sagástegui* 3367 (GH, US). **Amazonas:** Sunibamba, Utcubamba valley, *Stübel* 1048, in part (B). **Ancash:** Caráz, *Weberbauer* 3007 (B). **Huánuco:** Piedra Grande, *Macbride & Featherstone* 2051 (GH, US). **Lima:** Mts. back of Lima, *Safford* 993 (US). **Huancavelica:** Valle de Montaro, entre Pampas y Salcabamba, *Tovar* 3840 (GH, USM). **Apurímac:** 80 km from Abancay, on road to Challhuanca, *Saunders* 769 (GH). **Arequipa:** Arequipa, *Rauh* P567 (B).

2. *Notholaena stuebeliana* (Hieron.) Tryon, Rhodora 63: 83. 1961.

*Pellaea dealbata* var. *stuebeliana* Hieron., Hedwigia 48: 225, t. 12, f. 15. 1909. TYPE: Peru, Dept. Amazonas, Sunibamba, *Stübel* 1048, in part (holotype, B!).

*Argyrosma stuebeliana* (Hieron.) Windham, Amer. Fern J. 77: 41. 1987.

**Stem** short, erect or decumbent, scales linear, brown, oily, concolorous, margins entire. **Leaves** 5–30 cm long, petiole as long as or longer than the lamina. **Lamina** deltoid to long-triangular, 3–4-pinnate, the abaxial surface densely white- to very pale yellow-farinose, ultimate segments mostly orbicular or nearly so. **Sporangia** borne on the terminal ¼ or more of the vein, margin unmodified, nearly flat or recurved.

Among boulders and on ledges on shrubby slopes, moist ravines and in rocky soil, 1400–3500 m, Cajamarca and Amazonas south to Junín.

Endemic to Peru.

This species was first known from a single leaf collected in the latter half of the 19th century. Recently it has been collected at several localities and its range in Peru will probably be further extended.

**Cajamarca:** 40 km from Cajamarca on road to Chileté, *Correll & Smith* P841 (GH, LL, US). Prov. Celendín, canyon of Río Marañón, above Balsas, *Hutchison & Wright* 5288 (GH, US). Prov. Celendín, Celendín, *López & Sagástegui* 3104 (GH, HUT). **Amazonas:** Prov. Bongará, S from Pte. Ingenio to Chachapoyas, *Plowman* 5551 (GH). **La Libertad:** Retamas, *López & Sagástegui* 3606 (GH). **Huánuco:** Mito, *Bryan* 192 (F). **Junín:** Prov. Jauli, *Saa-vecha* 6318 (GH).

3. *Notholaena nivea* (Poiret) Desv., J. Bot. Appl. 1: 93. 1813. **Figure 8a.**

*Pellaea nivea* (Poiret) Prantl, Bot. Jahrb. Syst. 3: 417. 1882.

*Argyrosma nivea* (Poiret) Windham, Amer. Fern J. 77: 41. 1987.

**Stem** short, erect or ascending, scales linear-subulate, dry, concolorous, margins entire. **Leaves** 10–30 cm tall, petiole shorter than the lamina or about the same length. **Lamina** lanceolate, deltoid-lanceolate or ovate, 2–3-pinnate, the ultimate segments stalked, the abaxial surface densely white- or yellow-farinose or glabrous. **Sporangia** borne on the terminal ¼–½ (rarely more) of a vein, margin unmodified, flat to somewhat recurved.

Rocky hillsides and crevices of rocks, 500–4000 m, Cajamarca south to Puno and Arequipa.

Colombia south to Argentina and Brazil.

This is a complex South American species, consisting of the following three varieties.

#### Key to Varieties

- a. Ultimate segments white-farinose abaxially ..... 3a. var. **nivea**  
 a. Ultimate segments glabrous abaxially ..... 3b. var. **tenera**  
 a. Ultimate segments yellow-farinose abaxially ..... 3c. var. **flava**



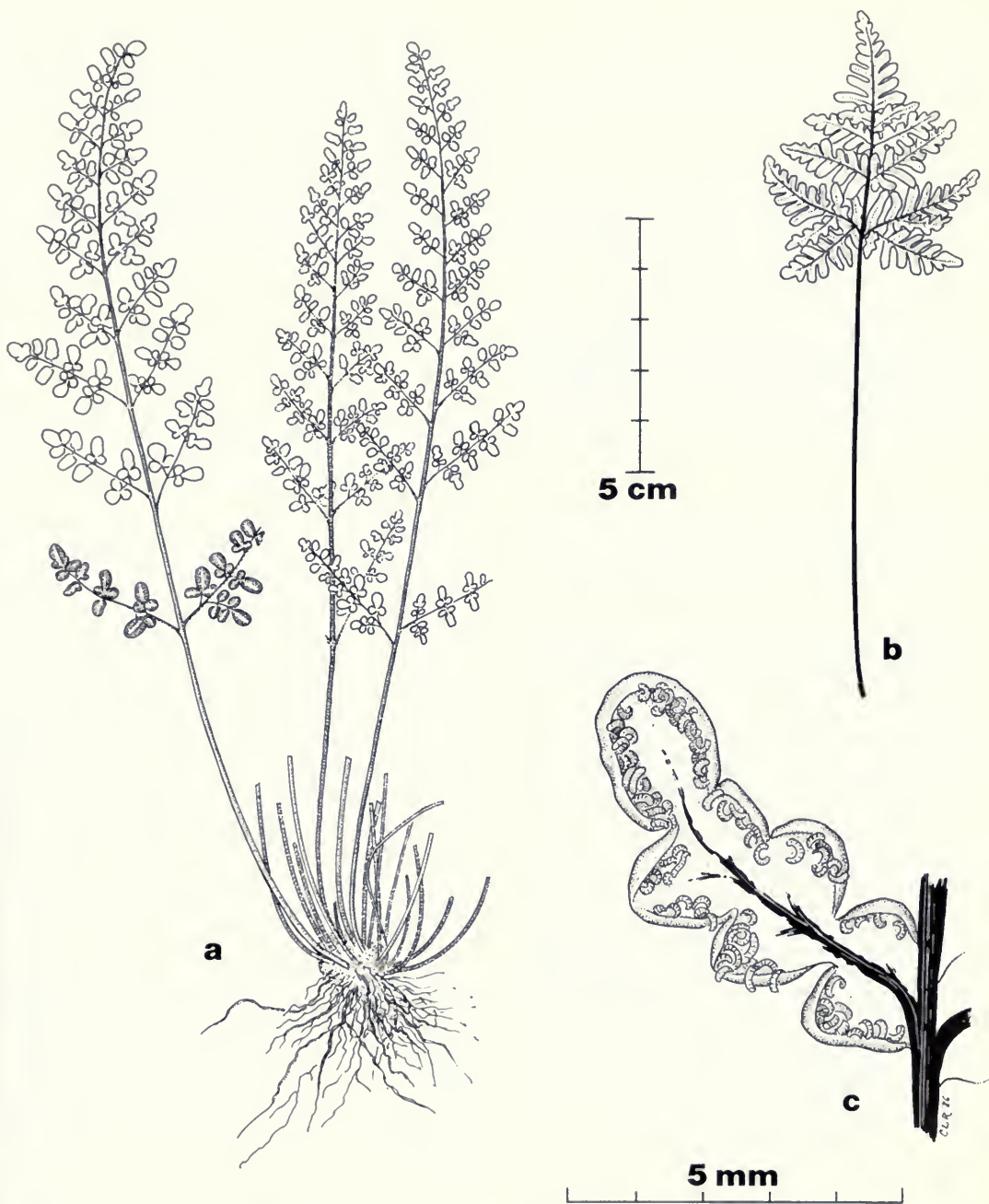


FIG. 8. *Notholaena nivea*: a, habit. *Notholaena sulphurea*: b, leaf; c, central pinna, abaxial side. (a from Stork & Horton 10718, F; b, c from Macbride 3707, F.)

### 3a. *Notholaena nivea* var. *nivea*

*Pteris nivea* Poiret in Lam., Encycl. 5: 718. 1804. TYPE: Peru, *Joseph de Jussieu* (holotype, Herb. Jussieu no. 1047, P!; photos, GH, US).

*Notholaena nivea* var. *oblongata* Griseb., Abh. Königl. Ges. Wiss. Göttingen 24 (Symb. fl. argent.): 342. 1879. TYPE: Argentina, (Salta), Salta, *Hieronimus & Lorentz* "142 and 161" (one collection) (holotype, B!; photo, GH).

La Libertad south to Puno and Arequipa.

Ecuador south to western Argentina.

The sometimes recognized var. *oblongata* is not as distinctive as the other varieties and intergrades with var. *nivea*.

**La Libertad:** Otuzco to Huamchirco, *Ferreyra* 2987 (USM). **Ancash:** Chiquián, *Cerrate* 240, 564, 2106 (USM). **Huánuco:** Huánuco, *Macbride* 3207 (F). **Lima:** San Mateo, *Ferreyra* 7028 (GH, USM). Oroya RR., *Safford* 990 (GH, NY, P, US). **Junín:** Vilcambamba, *Tryon & Tryon* 5422 (BM, F, MO, U, US, USM). **Huancavelica:** Huancavelica, *Stork & Horton* 10823 (F, UC). **Ayacucho:** Ayacucho, *West* 3642 (UC). **Apurímac:** Andahuaylas, *Stork & Horton* 10718 (F, UC, US). **Cuzco:** Saxihumán, *Tryon & Tryon* 5344 (BM, F, GH, MO, U, US, USM). **Arequipa:** Arequipa, *Pennell* 13245 (F). **Puno:** Baja Isla, Lake Titicaca, *Mexia* 7788 (F, GH, MO, UC, US).

3b. *Notholaena nivea* var. *tenera* (Hooker) Griseb., Abh. Königl. Ges. Wiss. Göttingen 24 (Symb. fl. argent.): 342. 1879.

*Notholaena tenera* Hooker, Bot. Mag. t. 3055 and text. 1831. TYPE: Argentina, spec. cult. ex Mendoza, *Gillies* (holotype, κ!; photo, GH).

*Pellaea tenera* (Hooker) Prantl, Bot. Jahrb. Syst. 3: 417. 1882.

*Pellaea peruviana* Copel., Univ. Calif. Publ. Bot. 19: 302. 1941. TYPE: Peru, Apurímac, Abancay region, *Pupils of V. Santander C.* (holotype, uc!).

La Libertad south to Puno.

Peru south to Argentina.

**La Libertad:** Prov. Otuzco, Arriba de Casmiche, *López et al.* 3962 (GH). Prov. Otuzco, Jamobamba, *Aguado* 6743 (HUT). **Ancash:** Cerro de Huasta, *Cerrate* 2456 (GH, USM). **Huánuco:** Between Huanucay and Ambo, *Ferreyra* 6566 (USM). **Lima:** Entre Matucana y San Mateo, *Ferreyra* 5306 (GH, USM). **Junín:** Palca, *Correll & Smith* P758 (GH). **Huancavelica:** Mejorada, *Tovar* 1000 (GH, USM). **Apurímac:** S of Chalhuanca, *Iltis et al.* 554 (GH). **Cuzco:** Cuzco, *Tryon & Tryon* 5353 (BM, F, MO, U, US, USM). **Puno:** Tequeña, Feb. 19, 1948, *Aguilar* (USM).

3c. *Notholaena nivea* var. *flava* Hooker, Sp. fil. 5: 112. 1855. TYPE: Ecuador, (Loja), Loxa (Loja), *Seemann* (holotype, κ!).

*Acrostichum tereticaulon* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 310. 1811. TYPE: probably Peru, *Dombe* (holotype, p!; photos, GH, US).

*Notholaena chrysophylla* Klotzsch, Allg. Gartenzeitung 23: 265. 1855. TYPE: spec. cult. ex Peru, *Warszewicz* (holotype, b!).

Cajamarca south to Cuzco.

Colombia south to Argentina and Brazil.

The type indicated for var. *flava* is the only collection, among those cited by Hooker and at Kew, that has yellow indument abaxially.

**Cajamarca:** Prov. Santa Cruz, Cumbil-Catache, *López & Sagástegui* 5162 (GH). **Huánuco:** Piedra Grande, *Macbride & Featherstone* 3706 (F, US). **Huancavelica:** Valle de Mantaro, entre Pampas y Salcabamba, *Tovar* 3847 (GH, USM). **Cuzco:** Potrero, *Tryon & Tryon* 5378 (BM, F, MO, U, US, USM).

## IX. *Pellaea*

*Pellaea* Link, Fil. spec. 59. 1841, conserved name.

TYPE: *Pellaea atropurpurea* (L.) Link (*Pteris atropurpurea* L.). **Figure 9.**

**Terrestrial** or rupestral. **Stem** short and decumbent or rather slender and short- to long-creeping, bearing scales. **Leaves** monomorphic or nearly so, 5 cm to 1.25 m long, borne in a cluster or spaced, petiole with 1 vascular bundle near the base, terete to adaxially sulcate or ridged. **Lamina** 1–4-pinnate, usually glabrous, to rarely pubescent or with a few scales abaxially, veins free or rarely anastomosing. **Sori** at the vein ends or on their apical portion, partly to wholly covered by a slightly to well-modified, recurved marginal indusium, paraphyses absent or rarely short, often farinaceous glands among the sporangia. **Spores** globose or tetrahedral-globose, trilete, usually somewhat rugose or cristate, rarely tuberculate or verrucate.

*Pellaea* is a nearly pantropical, sometimes temperate, genus of about 35 species. Twenty-two species are American and there are three in Peru. Four sections are recognized, two of them in America with sect. *Pellaea* the only one represented in Peru. The other section in America, *Oropteris* (John Sm.) R. & A. Tryon, is primarily Brazilian.

## References

TRYON, A. F. 1957. A revision of the fern genus *Pellaea* section *Pellaea*. Ann. Missouri Bot. Gard., 44: 129–193.

TRYON, R. M., AND A. F. TRYON. 1982. *Pellaea*, pp. 284–293, in Ferns and allied plants, Springer-Verlag, New York.

**Key to Species of *Pellaea***

- a. Petiole and rachis atropurpureous to black; the pinnae mostly ternately divided ... 1. ***P. ternifolia***
- a. Petiole and rachis ruddy-brown to straw-colored; the pinnae mostly pinnate with more than 3 segments ..... b
- b. Rachis straight; stem moderately stout, compact; scales of the stem, base of the petioles, and leaf buds tan, concolorous ..... 2. ***P. sagittata***
- b. Rachis flexuous; stem mostly slender, cordlike, creeping; scales of the stem, base of the petioles, and leaf buds bicolorous, tan to dark brown, the central portion often lustrous, sclerotic ..... 3. ***P. ovata***

1. ***Pellaea ternifolia*** (Cav.) Link, Fil. spec. 59. 1841, var. ***ternifolia***. **Figure 9a.**

*Pteris ternifolia* Cav., Descr. pl. 266. 1802. TYPE: Peru, (Lima), "Valle de Guarimaya dos leguas de Guamantanga", (Huamantanga), *Née* (holotype, MA, seen by C. Chr., Dansk Bot. Ark. 9(3): 22. 1937).

*Pteris peruviana* Poirlet in Lam., Encycl. 5: 718. 1804. TYPE: Peru, *Joseph de Jussieu* (holotype, Herb. Jussieu no. 1334A, P!; photos, GH, US).

**Stem** moderately stout, elongate, decumbent, multicipital, scales straight or falcate, bicolorous with a slender sclerotic stripe narrower than the borders. **Leaves** 4–50 cm long, stiff, erect, petiole and rachis plane on the adaxial surface or sulcate, atropurpureous to black. **Lamina** linear to narrowly lanceolate, 1-pinnate, the pinnae ternate or entire, sessile or subsessile, without a pinna-rachis.

In crevices of igneous rock or on Inca walls, in sun and semishade, 1800–4600 m, Cajamarca and Amazonas south to Puno and Arequipa.

Southwestern United States south to Central America; Hispaniola; Venezuela and Colombia south to Argentina; Hawaiian Islands.

*Pellaea ternifolia* var. *wrightiana* (Hooker) A. F. Tryon (*Pellaea wrightiana* Hooker) occurs in the southwestern United States and adjacent northern Mexico. The rest of the extensive range of the species is occupied by var. *ternifolia*. *Pellaea weddelliana* of Bolivia and Argentina has mostly simple pinnae and nearly concolorous scales. It represents a variation of *P. ternifolia* that may be found in Peru.

**Cajamarca:** El Gavilan, Cajamarca, *Ferreyra* 3269 (USM). **Amazonas:** Carrizal, *Stübel* 1025 (B). **La Libertad:** Cachicadán, *Stork & Horton* 9997 (F, UC), *Sagástegui et al.* 11919 (HUT). **Ancash:** Chiquián, *Cerrate* 622 (USM), 786 (USM). **Huánuco:** Mito, *Bryan* 198 (F). **Lima:** Cerca Tupe, *Cerrate* 1089 (USM). **Junin:** Huacapistana, *Tryon & Tryon* 5424 (BM, F, MO, U, US, USM). **Huancavelica:**

Conaica, *Tovar* 976 (GH, USM). **Ayacucho:** Prov. Lucanas, Pampa Galeras, *Tovar* 6716 (USM). **Apurímac:** 2 km N of Andahuaylas, *Stork & Horton* 10720 (F, UC). **Cuzco:** Saxihuamán, *Tryon & Tryon* 5358 (BM, F, MO, U, US, USM). **Arequipa:** Tiabaya, *Pennell* 13075 (B, F, GH, NY, US). **Puno:** Juliaca, *R. S. Williams* 2633 (GH, NY, US).

2. ***Pellaea sagittata*** (Cav.) Link, Fil. spec. 60. 1841, var. ***sagittata***.

*Pteris sagittata* Cav., Descr. pl. 267. 1802. TYPE: Mexico, Cerro de Guadeloupcé, *Née* (holotype, MA, seen by C. Chr., Dansk Bot. Ark. 9(3): 23. 1937).

**Stem** moderately stout, compact, decumbent, multicipital, scales straight or nearly so, concolorous, tan to rust-colored, lanceolate-triangular, usually cordate. **Leaves** 15–80 cm long, erect, stiff, petiole and rachis convex or plane on the adaxial side, puberulous, the rachis straight or somewhat flexuous, straw-colored to ruddy-tan, or mottled, scales at the base of the petiole and on the leaf buds concolorous. **Lamina** 1–2-pinnate, rarely 3-pinnate, the pinnae ascending at acute angles to the rachis, pinnae entire or of 3–numerous segments, long-stalked.

On dry banks, in open sun or shade, among rocks and on stone walls, 1700–3000 m, La Libertad south to Cuzco.

Mexico to Guatemala and Colombia, south to Bolivia.

In addition to var. *sagittata*, there is var. *cordata* (Cav.) A. F. Tryon in the southwestern United States south to southern Mexico (*Pellaea cordifolia* (Sessé & Mociño) A. R. Sm.).

**La Libertad:** Prov. Otuzco, Motil-Chota, *López & Sagástegui* 8035 (HUT). **Ancash:** Callejon de Huallas, 8 km SSE of Yungay, *Tryon & Tryon* 6552 (GH). **Lima:** Matucana, *Macbride & Featherstone* 422 (F, GH, US). **Pasco:** Entre Salcahupan y Cerro de Pasco, *Ferreyra* 6621 (GH,

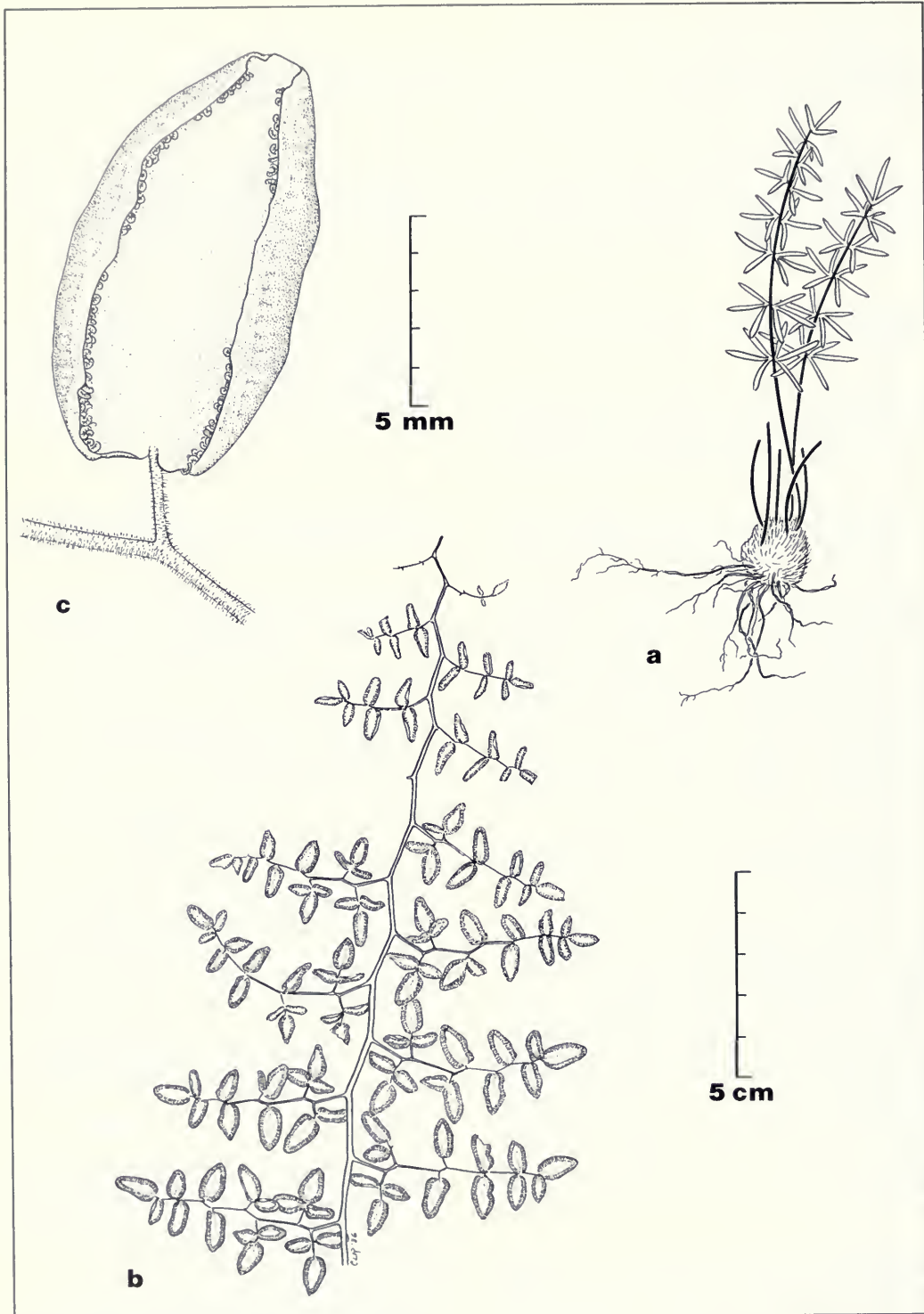


FIG. 9. *Pellaea ternifolia*: a, habit. *Pellaea ovata*: b, portion of lamina, abaxial side; c, pinnule, abaxial side. (a from Davis et al. 1650, F; b, c from Bryan 438, F.)

(USM). **Junin:** Huacapistana, *Tryon & Tryon 5431* (BM, F, GH, MO, U, US, USM). **Huancavelica:** Conaica, *Tovar 978* (USM). **Apurimac:** Prov. Abancay, upper Río Marino, *Stork et al. 10648* (F, UC). **Cuzco:** Valle de Urubamba, *Herrera 1195* (F, US).

9232 (GH, USM). **Lima:** Prov. Canta, Km. 82 Lima-Canta, *Saunders 808* (GH). **Junin:** Huacapistana, *Tryon & Tryon 5423* (BM, F, GH, MO, U, US, USM). **Huancavelica:** La Mejorada, *Kunkel 452* (GH). **Apurimac:** Andahuaylas, *Stork & Horton 10712* (F, UC, US). **Cuzco:** Yucay, *Soukup 754* (F, GH). **Puno:** Sandía, *Weberbauer 841* (B).

3. ***Pellaea ovata*** (Desv.) Weath., Contr. Gray Herb. 114: 34. 1936. **Figure 9b-c.**

*Pteris ovata* Desv., Mém. Soc. Linn. Paris 6: 301. 1827. TYPE: Peru (holotype, Herb. Desvoux, p!; photos, GH, UC).

**Stem** slender, cordlike, creeping, dichotomously branched, scales straight or somewhat falcate, bicolorous, the sclerotic central portion usually lustrous. **Leaves** 10 cm to 1.25 m long, straight or frequently twining, subsucculent, petiole and rachis convex or plane on the adaxial side, the rachis strongly flexuous, straw-colored to ruddy brown, scales at the base of the petiole and on the leaf buds bicolorous. **Lamina** elongate-triangular, 2–4-pinnate, usually 3-pinnate, the pinnae descending from the rachis, with 5–many segments, long-stalked.

In open sun, brushy grasslands, on shaded banks, among rocks and on old stone walls, 1200–2900 m, Cajamarca and Amazonas south to Puno.

Southern Texas to Costa Rica; Jamaica and Hispaniola; Venezuela and Colombia south to northern Argentina.

The leaves of *Pellaea ovata* often scramble among the branches of low shrubs and may be over 1 m long.

**Cajamarca:** 52 km W of Cajamarca on road to Chilate, *Correll & Smith P839* (GH, US). Prov. Contumazá, El Túnel, *Sagástegui et al. 12642* (HUT). **Amazonas:** Prov. Chachapoyas, Chachapoyas-Molinopampa, *Sagástegui 6031* (GH). **La Libertad:** Retamas, *López & Sagástegui 3608* (GH). **Huánuco:** Entre Ambo y Huánuco, *Ferreira*

X. **Doryopteris**

**Doryopteris** John Sm., J. Bot. (Hooker) 4: 162. 1841. TYPE: *Doryopteris palmata* (Willd.) John Sm. (*Pteris palmata* Willd.) = *Doryopteris pedata* var. *palmata* (Willd.) Hicken. **Figure 10.**

**Terrestrial** or rupestral. **Stem** decumbent and creeping to suberect, small to stout, bearing scales. **Leaves** monomorphic to dimorphic and the fertile more erect and with narrower segments than the sterile, borne in a cluster or rather spaced, petiole with 1 or 2 vascular bundles near the base. **Lamina** of various architecture, usually pedate, glabrous, veins free or anastomosing without included veinlets. **Sori** marginal, the sporangia on a nearly continuous vascular commissure and covered by a well-modified indusium, paraphyses absent. **Spores** tetrahedral-globose, trilete, the surface nearly smooth to prominently cristate.

*Doryopteris* is primarily an American genus of 25 species, with four of them in Peru. The genus centers in southeastern Brazil and only a few species extend beyond that region. The species *Doryopteris concolor* is now placed in *Cheilanthes*.

**Reference**

TRYON, R. M. 1942. A revision of the genus *Doryopteris*. Contr. Gray Herb., 143: 1–80.

**Key to Species of *Doryopteris***

- a. Venation free, single areolae present by rare exception; petiole with 2 vascular bundles, at least toward the base ..... b
  - b. Soral lines discontinuous between the pinna-segments and most other segments of the lamina ..... 1. **D. crenulans**
  - b. Soral lines continuous between the pinna-segments and most other segments of the lamina .... 2. **D. lomariacea**
- a. Venation completely areolate, or areolae only along the midveins of the segments; petiole with 1 vascular bundle ..... c

- c. Fertile and sterile lamina with partly areolate venation, the areolae mostly along the costae or midveins; proliferous buds absent at the base of the lamina ..... 3. **D. lorentzii**  
 c. Fertile and sterile lamina with completely areolate venation; proliferous buds commonly present at the base of the lamina ..... 4. **D. pedata** var. **palmata**

1. **Doryopteris crenulans** (Fée) Christ in Schwacke, Pl. nov. mineiras. 2: 26. 1900.

*Pellaea crenulans* Fée, Crypt. vasc. Brésil 2: 27, t. 87, f. 1. 1872–1873. TYPE: Brazil, (Guanabara), Ti-juca, *Glazion 5345* (5343 is excluded by Tryon, 1942) (holotype, P; photo, GH; isotypes, GH!, K!).

**Stem scales** long and narrow. **Petiole** usually densely and minutely verrucose, rarely smooth, with 2 vascular bundles near the base. **Fertile** and sterile leaves quite dimorphic, the sterile to 35 cm long, the fertile to 50 cm long, ultimate segments with free venation. **Soral lines** broken by all or nearly all of the sinuses.

On hillsides in humus or clay soil, ca. 3200 m, Cajamarca and Amazonas.

Peru to Argentina; southern Brazil.

**Cajamarca:** Prov. Cutervo, 10 km NW of Socota, *Stork & Horton 10127* (F, UC, US). **Amazonas:** Chachapoyas, *Soukup 4926* (US).

2. **Doryopteris lomariacea** Klotzsch, Linnaea 20: 343. 1847. TYPE: “British Guiana”, *Schomburgk 1197* (holotype, B?; isotypes, BM!, K!).

**Stem scales** long and narrow. **Petiole** usually smooth, with 2 vascular bundles near the base. **Fertile** and sterile leaves strongly dimorphic, the sterile to 50 cm long, the fertile to 120 cm long, ultimate segments with free venation. **Soral lines** continuous around the sinuses.

Open *Sphagnum* swamp, 1700 m, Pasco. Southern Brazil and Paraguay; Peru; Guyana.

**Pasco:** Eneñas, Pichis Trail, (as Junín), *Killip & Smith 25709* (F, US).

3. **Doryopteris lorentzii** (Hieron.) Diels, Nat. pflanzenfam. 1(4): 270. 1899.

*Pellaea lorentzii* Hieron., Bot. Jahrb. Syst. 22: 392. 1896. SYNTYPES: Argentina, (Cordobá), Cor-

dobá, *Lorentz 19*; Argentina, (Tucumán), Tucumán, *Lorentz & Hieronymus* (B!), both collections on one sheet; photo, GH.

**Stem scales** usually ovate-lanceolate. **Petiole** smooth or slightly short-pubescent at the apex, with 1 vascular bundle near the base. **Fertile** and sterile leaves moderately dimorphic, the sterile to 20 cm long, the fertile to 35 cm long, ultimate segments with areolae along the midveins, the veins free toward the margin. **Soral lines** broken by the sinuses.

Rocky places, 1200–2500 m, Cuzco.

Peru to southern Brazil.

The lamina with only partly areolate venation is distinctive of this species.

**Cuzco:** Potrero, *Tryon & Tryon 5377* (BM, F, MO, U, US, USM), *Coronado 115* (GH, UC, US). Yucay, *Soukup 921* (F). Dist. Santa Ana, *Herrera 871a* (US).

4. **Doryopteris pedata** (L.) Fée var. **palmata** (Willd.) Hicken, Revista Mus. La Plata, Secc. Bot. 15: 253. 1908. **Figure 10.**

*Pteris palmata* Willd., Sp. pl. ed. 4, 5: 357. 1810. TYPE: Venezuela, (Dist. Federal, Caracas), *Bredemeyer* (holotype, Herb. Willd. 19957, B!; photos, GH, NY, US).

*Doryopteris palmata* (Willd.) John Sm., J. bot. (Hooker) 4: 163. 1841.

**Stem scales** usually ovate-lanceolate. **Petiole** usually very short-pubescent, with 1 vascular bundle near the base. **Fertile** and sterile leaves moderately dimorphic, both to 40 cm long, and usually with proliferous buds at the base of the lamina, ultimate segments with fully areolate venation. **Soral lines** usually broken by the sinuses.

Rocky woods, hillsides, crevices of stone walls, 1000–2200 m, Cajamarca and Amazonas south to Cuzco.

Mexico south to Bolivia.

Buds are usually present at the base of the lamina and these will grow into small plants, especially on the older leaves and those that have reclined

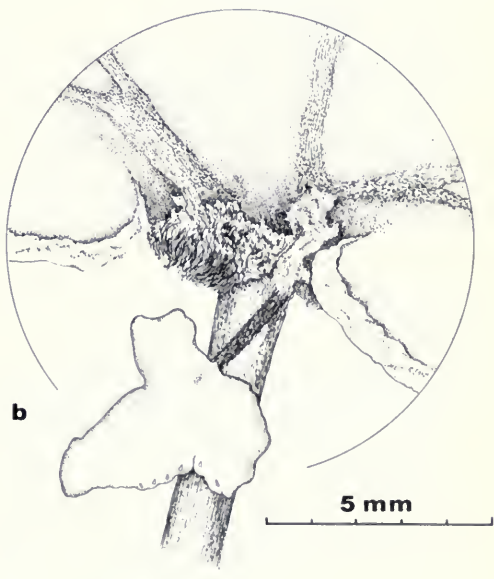


FIG. 10. *Doryopteris pedata* var. *palmata*: a, habit; b, young plant from proliferous bud at base of lamina; c, portion of indusia interrupted at segment sinus. (a, b from Tryon & Tryon 5369, F; c from Hutchison & Wright 3839, F.)

to the ground. Adult plants then may develop from these small ones.

**Cajamarca:** Prov. Santa Cruz, Bosque de Monteseo, *Sagástegui et al.* 12398 (F, MO). Prov. Santa Cruz, ca. 5 km above Monte Seco, *Dillon et al.* 4424 (F, GH). **Amazonas:** Prov. Bongará, *Hutchison & Wright* 3839 (F, GH). **Junin:** Yaupi, *Woytkowski* 6424 (MO, US). **Huancavelica:** Prov. Tayacaja, SE of Tintay, *Tovar* 4598 (GH). **Cuzco:** Prov. La Convención, Potrero, *Tryon & Tryon* 5369 (BM, F, GH, MO, U, US, USM). Quillabamba, *Coronado* 114 (GH, UC, US). Yucay, *Soukup* 920 (F).

## XI. *Hemionitis*

*Hemionitis* L., Sp. pl. 1077. 1753; Gen. pl. ed. 5, 485. 1754. TYPE: *Hemionitis palmata* L. **Figure 11.**

*Gymnopteris* Bernh., J. Bot. (Schrader) 1799 (1): 297. 1799. TYPE: *Acrostichum rufum* L. (*Gymnopteris rufa* (L.) Underw.) = *Hemionitis rufa* (L.) Sw.

**Terrestrial** or less often rupestral. **Stem** short-creeping to erect, small, bearing scales intergrading to trichomes. **Leaves** monomorphic to dimorphic

### Key to Species of *Hemionitis*

- a. Lamina pinnate, with free venation ..... b
- b. Some pinnae 1-(rarely 2-)pinnate, or several pinnae lobed, or all pinnae entire and then the basal ones cordate and long-stalked ..... 1. **H. tomentosa**
- b. All pinnae entire, rarely 1 lobe present, the basal ones broadly cuneate to truncate and short-stalked ..... 2. **H. rufa**
- a. Lamina deeply lobed, with areolate venation ..... 3. **H. palmata**

1. ***Hemionitis tomentosa*** (Lam.) Raddi, Opusc. Sci. 284. 1819.

*Asplenium tomentosum* Lam., Encycl. 2: 308. 1786. SYNTYPES: Brazil, *Commerson*, *Dombey*. A sheet in Herb. Lamarck, P!; photo, GH: "*Asplenium tomentosum* e Brasilia," without collector, is this species.

*Gymnopteris tomentosa* (Lam.) Underw., Bull. Torrey Bot. Club 29: 627. 1902.

**Leaves** ca. 20–75 cm long. **Petiole** long, it and the rachis reddish brown to atropurpureous, pubescent with short, acicular trichomes and fewer, long, multicellular ones. **Lamina** suboblong to subdeltoid, 1-pinnate and the pinnae entire, or a few

and the fertile ones longer and more erect, borne in a cluster, petiole with 1 vascular bundle near the base. **Lamina** of various architecture, usually pedate or pinnate, pubescent, veins free to wholly anastomosing without included veinlets. **Sporangia** in long lines along free veins or along the anastomosing veins, indusium and paraphyses absent. **Spores** tetrahedral-globose, trilete, cristate, echinate, or tuberculate.

*Hemionitis* is a tropical American genus of seven species, with three of them in Peru. *Hemionitis rufa* and *H. tomentosa* are distinctive in Peru. However, in Argentina to southern Brazil and rarely in Peru is *H. tomentosa* var. *subrufa* Rosenst., which seems similar to *H. rufa*. It has entire pinnae but is separable from *H. rufa* by the long stalks and cordate base, especially of the basal pinnae.

### Reference

TRYON, R. M., AND A. F. TRYON. 1982. *Hemionitis*, pp. 278–284, in *Ferns and allied plants*, Springer-Verlag, New York.

lobed, cordate or subcordate at the base, or 2-(rarely partly 3-)pinnate, pinnae stalked, the basal ones with longer stalks than those above, the dark color of the stalk often continued into the segment, both surfaces more or less pubescent with acicular, multicellular, nearly appressed trichomes.

Forest slopes, stony clearings, and in woods, 700–1600 m, Amazonas to Cuzco.

Peru to Argentina, Paraguay, and Brazil.

**Amazonas:** Prov. Bagua, valley of Río Utcubamba, *Hutchison* 1476 (GH). **San Martín:** Tarapoto, *Spruce* 3992 (B, GH), *Woytkowski* 35228 (UC). Prov. San Martín, Tarapoto-Yurimaguas, *Sagástegui* 6857 (F). **Huánuco:** Near Pozuzo, *Macbride* 4788 (F, US). **Pasco:** Río Paucartambo,





**b**

10 mm



**a**

5 cm

FIG. 11. *Hemionitis palmata*: a, habit. b, lamina apex, abaxial side. (From Klug 4288, F.)

near Perené Bridge, (as Junín), Killip & Smith 25345 (US). Junín: La Merced, Macbride 5303 (F). Rio Penedo, N of La Merced, Killip & Smith 23592 (GH, US). Cuzco: Quillabamba, Coronado 122 (GH, UC, US). Santa Ana, Cook & Gilbert 1537 (GH, US). Potrero, Tryon & Tryon 5374 (GH, U, US, USM).

2. *Hemionitis rufa* (L.) Sw., J. Bot. (Schrader) 1800 (2): 16. 1802.

*Acrostichum rufum* L., Syst. nat. ed. 10, 1320. 1759. (Not *Pteris ruffa* L., Sp. pl. 1074. 1753, which is maintained in the Syst. nat. and probably typified

by a Hort. Cliff. specimen in Herb. Banks, BM.) TYPE: Sloane, Voy. Jamaica t. 45, f. 1 or LINN 1245.6; photo, A. *Gymnopteris rufa* (L.) Underw., Bull. Torrey Bot. Club 29: 627. 1902.

Leaves ca. 20–60 cm long. Petiole usually long, it and the rachis dark reddish brown to atropurpureous, pubescent with short, acicular trichomes and fewer, long, multicellular ones. Lamina narrowly elliptic to lanceolate, 1-pinnate, the pinnae entire, or rarely a lobe present, usually cuneate at the base, short-stalked, the dark color of the stalk not continued into the segment, both surfaces more

or less pubescent with acicular, multicellular, nearly appressed trichomes.

In forests, 400–800 m, San Martín.

Southern Mexico to Panama; Greater Antilles; Surinam to Colombia and south to Peru.

**San Martín:** Juan Jui, *Klug 4174* (F, GH, UC, US).

- 3. **Hemionitis palmata** L., Sp. pl. 1077. 1753. TYPE: Plumier, *Descr. pl. Amér. t. 33, f. 1* or LINN 1248.3; photo, A. **Figure 11.**

**Leaves** dimorphic, the sterile ca. 3–10 cm long, 3-lobed or pedately 5-lobed, borne in a cluster, the fertile ca. 10–25 cm long, few, erect, pedately 5-lobed. **Petiole** brown to dark brown, pubescent with multicellular, slender-tipped trichomes. **Principal lobes** shallowly lobed or crenate, with pubescence similar to that of the petiole.

In forests, 120–900 m, San Martín, Loreto, and Cuzco.

Mexico and Central America; West Indies; Guianas to Colombia, south to Bolivia; Brazil.

The leaves bear small dormant buds in the sinuses along the margin and these may serve to propagate the plants vegetatively.

**San Martín:** Tarapoto, *Spruce 3993* (GH, US). Juan Jui, *Klug 4288* (F, GH, MO, UC, US, USM). Near Tarapoto, *Ll. Williams 6793* (F, US). **Loreto:** Iquitos and vicinity, *Ll. Williams 3559* (US). **Cuzco:** Santa Ana, *Cook & Gilbert 1477* (US).

**Key to Species of *Trachypteris***

- a. Sterile leaves entire, in a basal rosette; fertile leaves erect, pinnate ..... 1. **T. pinnata**
- a. Sterile and fertile leaves pedate ..... 2. **T. induta**

- 1. ***Trachypteris pinnata*** (Hooker f.) C. Chr., Index fil. 634. 1906. **Figure 12a.**

(holotype, K!; photo, GH; LECTOPARATYPE: Ecuador, Galápagos Islands, Chatham Island, *Capt. Wood*, K!; photo, GH).

*Hemionitis pinnata* Hooker f., *Trans. Linn. Soc. London* 20: 167. 1847. LECTOTYPE (designated by Porter, *J. Linn. Soc. Bot.* 81: 94. 1980); Ecuador, Galápagos Islands, Charles Island, *Darwin* (holotype, CGE).

*Acrostichum aureonitens* Hooker, *Hooker's Icon. Pl. t. 933* (*Cent. Ferns t. 33*). 1854. LECTOTYPE (designated by Tryon, *Contr. Gray Herb.* 194: 86. 1964); Ecuador, Galápagos Islands *Cuming 109*

**XII. *Trachypteris***

***Trachypteris*** Christ, *Schweiz. Naturfors. Ges.* 36 (*Monogr. Elaphoglossum*): 150. 1899. TYPE: *Trachypteris aureonitens* (Hooker) Christ (*Acrostichum aureonitens* Hooker) = *Trachypteris pinnata* (Hooker f.) C. Chr. **Figure 12.**

*Saffordia* Maxon, *Smithsonian Misc. Coll.* 61(4): 1. 1913. TYPE: *Saffordia induta* Maxon = *Trachypteris induta* (Maxon) R. & A. Tryon.

**Terrestrial** or rupestral. **Stem** decumbent or erect, small, bearing scales. **Leaves** monomorphic or dimorphic with the sterile entire, in a basal rosette, and the fertile erect and pinnate, densely scaly abaxially, glabrous to thinly scaly adaxially, veins anastomosing without included veinlets. **Sporangia** borne in a narrow to broad band, or from the costa to the margin, on and between the veins, indusium and paraphyses absent. **Spores** globose, trilete, strongly cristate.

This is a small genus of three species. Two of them are in America and Peru and the third is in Madagascar.

**Reference**

TRYON, R. M., AND A. F. TRYON. 1982. *Trachypteris*, pp. 302–306, in *Ferns and allied plants*, Springer-Verlag, New York.

**Sterile leaves** several, ca. 5–8 cm long, more or less prostrate, spatulate to obovate, sessile or nearly so, entire or rarely with a few lobes, with scales on the abaxial surface that are appressed and imbricate. **Fertile leaves** few, ca. 12–25 cm long, erect, subdeltooid to short-oblong, with a long, dark-col-

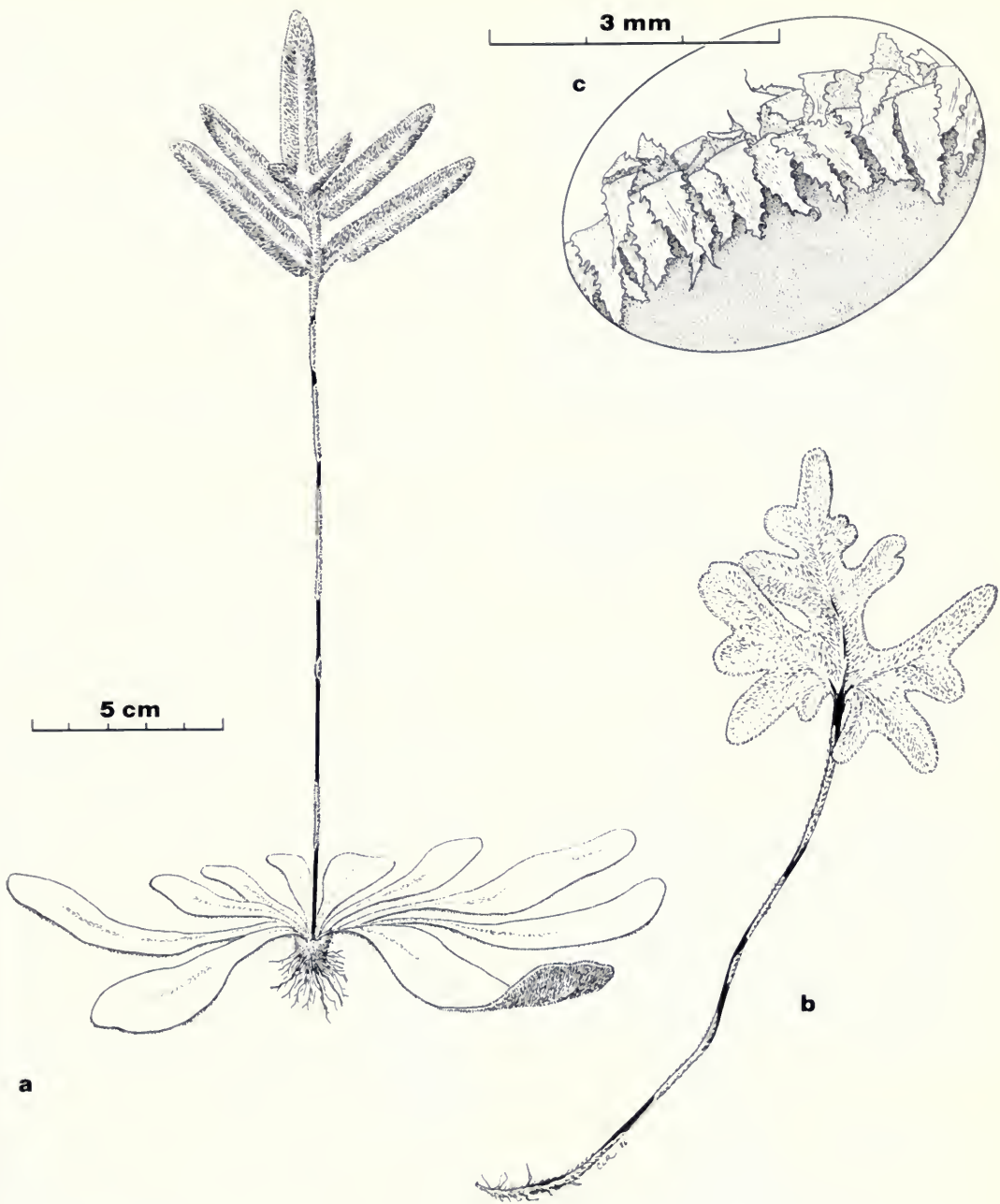


FIG. 12. *Trachypteris pinnata*: a, habit. *Trachypteris induta*: b, leaf, abaxial side; c, leaf margin, adaxial side. (a from Tovar 4603, GH; b, c from Madison 1126, GH.)

ored, often scaly petiole, scales on the abaxial surface similar to those on the sterile leaf.

In rocky woods and in forests, 680–2750 m, Cajamarca, San Martín, Huancavelica, and Cuzco.

Ecuador and Archipiélago de Colón (Galápagos Islands); Peru to Argentina and Brazil.

A critical study of the American material may show that two or three geographic varieties are present.

**Cajamarca:** Dist. Espinal, Puente El Papayo, *Vásquez* 3077 (USM). Río Crisnejas, *Sánchez* 45 (GH). Jaén, *Rauh* P2160 (B). Prov. Jaén, Río Chamaya, *Hutchison* 1424 (F, GH, UC). **San Martín:** Tambo de Carrizal, *Stübel* 1016 (B). **Huancavelica:** SE of Tintay, *Tovar* 4603 (GH). **Cuzco:** Santa Ana, *Cook & Gilbert* 1480 (US). Huadquiña, *Bües* 1339 (US). Sahuayacu, *Bües* 837 (US). Prov. La Convención, Rosariomayo, *Vargas* 22343 (GH).

2. **Trachypteris induta** (Maxon) R. & A. Tryon, *Rhodora* 83: 137. 1981. **Figure 12b-c.**

*Saffordia induta* Maxon, *Smithsonian Misc. Coll.* 61(4): 2, t. 1-2. 1913. TYPE: Peru, (Lima), along the Arroya (La Oroya) Railway in the mountains back of Lima, *Safford* 989 (holotype, us!; isotypes, B!, GH!, K!, UCL, US!).

Sterile and fertile leaves usually few, monomorphic or nearly so, ca. 15–30 cm long. Petiole dark in color, usually somewhat scaly. Lamina more or less suborbicular, pedate, densely scaly abaxially.

Among rocks, 750–2900 m, Cajamarca and Amazonas to Lima.

Endemic to Peru.

The scales at the base of the petiole are pink which is an unusual color among ferns.

**Cajamarca:** Prov. Contumazá, Cascas-Contumazá, *Sagástegui* 7670 (F, MO), *López et al.* 2936 (GH, US). Prov. Contumazá, Contumazá-Toledo, *Sagástegui et al.* 12604 (MO), 12608 (HUT). Prov. Contumazá, between Santiago and Guzmango, *Sagástegui* 2936 (GH). **Amazonas:** Prov. Chachapoyas, Cerros Calla Calla, Balsas to Leimebamba, *Hutchison & Wright* 4966 (GH). Río Marañón, at Balsas, *Madison* 1126 (GH). **La Libertad:** Prov. Otuzco, Huaranchal, *Sagástegui* 205 (GH). **Lima:** Dist. Surco, km. 68, Carretera Central, *Saunders* 218 (BM, GH). Matucana, *Rauh* P186 (B). Prov. Huarochiri, Molle, *Valencia & Franke* 559 (USM).

### XIII. *Ceratopteris*

*Ceratopteris* Brongn., *Bull. Sci. Soc. Philom. Paris* III, 8: 186. 1821. TYPE: *Ceratopteris thalictroides* (L.) Brongn. (*Acrostichum thalictroides* L.). **Figure 13.**

Terrestrial, palustral, or aquatic. Stem small, erect, bearing a few scales. Leaves dimorphic, the fertile more erect than the sterile, longer, and the lamina usually more complex, petiole with 4–many vascular bundles. Lamina deeply lobed in some sterile leaves, or 1–5-pinnate, glabrous, veins anas-

tomosing without included veinlets. Sporangia solitary, borne well apart on the veins, covered by a well-differentiated marginal indusium, paraphyses absent. Spores globose, trilete, with prominent mostly parallel ridges.

*Ceratopteris* is a predominantly aquatic genus of three species. It is widely distributed in the tropics, with a single species in the Amazon basin of Peru.

### Reference

LLOYD, R. M. 1974. Systematics of the genus *Ceratopteris* Brongn. II. Taxonomy. *Brittonia*, 26: 139–160.

1. *Ceratopteris pteridoides* (Hooker) Hieron., *Bot. Jahrb. Syst.* 34: 561. 1905. **Figure 13.**

*Parkeria pteridoides* Hooker, *Exot. fl.* 2, t. 147. 1825. TYPE: “British Guiana”, District of Essequibo, *Parker* (holotype, K!; photo, GH; isotype, GH!).

Sterile leaves more or less prostrate, ca. 3–20 cm long, with a broad, fleshy, usually inflated petiole, lamina deltoid, thin-herbaceous, with broad segments, old leaves often with adventitious buds. Fertile leaves more or less erect, ca. 5–50 cm long, with a large inflated petiole, with linear segments.

In slow streams, in lagoons, and along rivers, ca. 100 m, Loreto.

Tropical and subtropical America, south to Bolivia, Argentina, and Brazil.

This species is typically a floating aquatic, the inflated petiole providing buoyancy to the plant. The adventitious buds on the leaves frequently develop into separate plants.

The other species in America, *Ceratopteris thalictroides* (L.) Brongn., may occur in Peru. It typically roots in mud or in shallow water and lacks inflated petioles. *Ceratopteris richardii* Brongn. is sometimes separated from *C. thalictroides*, primarily by its spore number of 16 in a sporangium rather than 32, which does not seem to be a species character.

**Loreto:** Río Itaya, Iquitos, *Asplund* 14626 (US). Iquitos, *Killip & Smith* 27427 (US). Prov. Maynas, Isla Rodiña, opposite Leticia, *Plowman et al.* 6380 (F, GH, US). Prov. Maynas, above Bombabaje, *McDaniel & Rimachi* 17329 (F, MO).

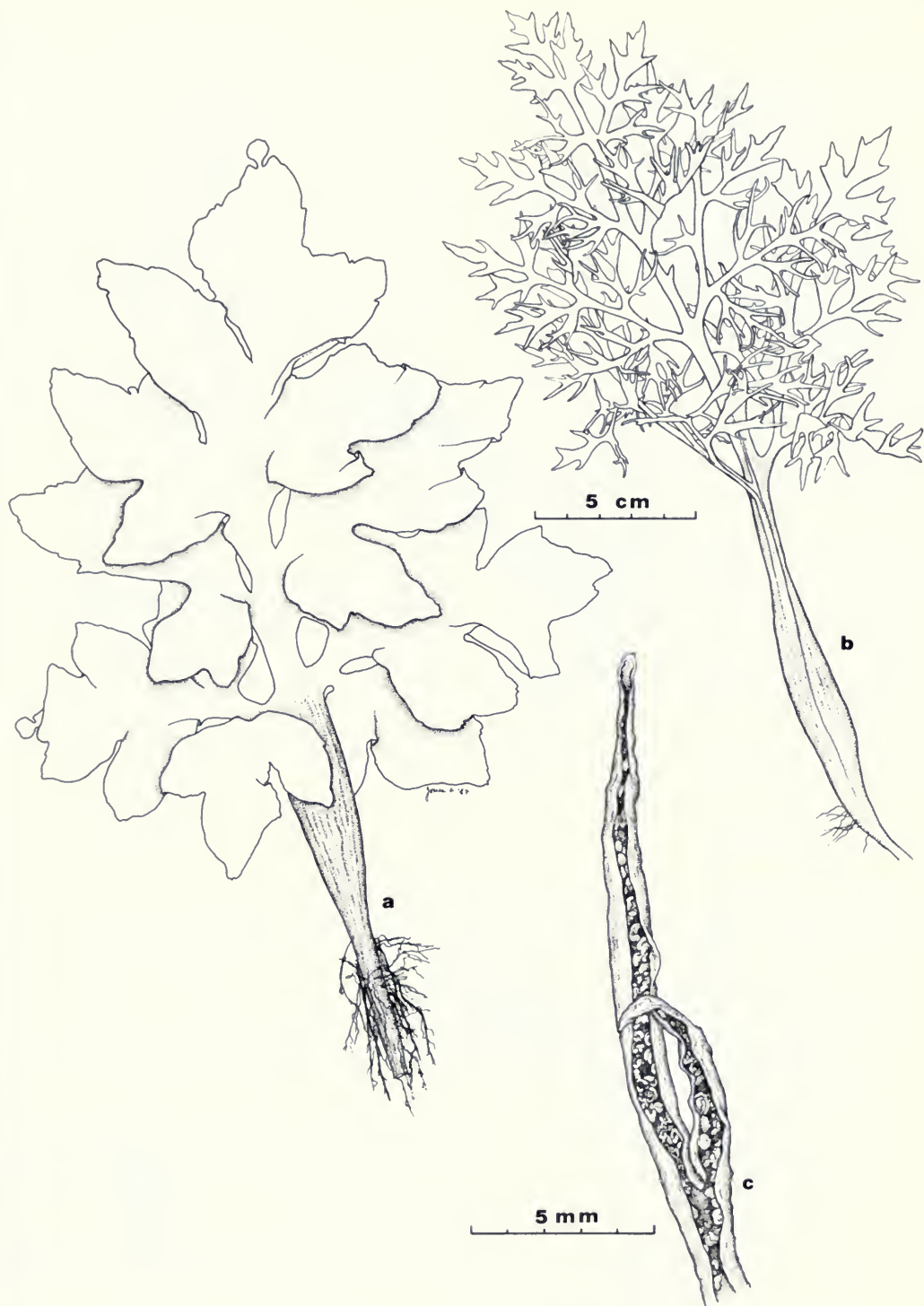


FIG. 13. *Ceratopteris pteridoides*: a, sterile leaf; b, fertile leaf; c, fertile segments, abaxial side. (a from Killip & Smith 14791, Colombia, F; b from Austin et al. 7040, Brazil, F; c from Holm-Nielsen et al. 2654, Ecuador, F.)

#### XIV. *Adiantum*

*Adiantum* L., Sp. pl. 1094. 1753; Gen. pl. 485.

1754. TYPE: *Adiantum capillus-veneris* L.

#### Figure 14.

**Terrestrial** or less often rupestral. **Stem** small and suberect, or stout and short-creeping, or slender and long-creeping, bearing scales. **Leaves** small to very large, usually pinnate (1–6-pinnate), usually glabrous, less often sparingly scaly, pubescent or farinose abaxially, veins free or rarely anastomosing without included veinlets. **Sori** marginal, not paraphysate, the sporangia borne along, or also between, the vein ends that extend into the indusium which is formed by a reflexed, modified lobe, or continuous modified margin. **Spores** tetrahedral-globose or globose, trilete, rather smooth or irregularly cristate, or rugose.

*Adiantum* is a large, widely distributed genus of about 150 species. Tropical America is the richest region for species, and there are 34 in Peru. A single species, *Adiantum capillus-veneris* is considered to be adventive. The genus is exceptionally well defined by the sporangia that are borne on the modified, reflexed portions of the margin that serve as indusia.

In species with cuneate to broadly flabellate or

nearly orbicular ultimate segments, the sori are borne on the *convex side* (apical side) of the ultimate segments. In species with rather to definitely elongate ultimate segments, the sori may be borne on the *upper side* (the acroscopic side of the segment), on the *lower side* (the basiscopic side of the segment), on the *distal side* (the apical side of the segment), or on the *inner side* (the side adjacent to the axis that bears the segment).

Some species are quite distinctive, while others are ill-defined members of complexes. Hybridization is probably rather frequent, tending to obscure the characters of otherwise distinctive taxa. The species have been arranged, insofar as possible, to bring evidently related species together, although primitive and advanced characters as well as evolutionary relations are uncertain.

#### References

- KRAMER, K. U. 1978. The pteridophytes of Suriname. Uitgaven Natuurw. Studiekring Suriname Ned. Antillen, **93**: 1–198.
- TRYON, R. 1964. The ferns of Peru. Contr. Gray Herb., **194**: 1–253.
- TRYON, R. M., AND A. F. TRYON. 1982. *Adiantum*, pp. 319–332, in Ferns and allied plants, Springer-Verlag, New York.

#### Key to Species of *Adiantum*

- a. A few to many, orbicular to long indusia on the fertile segment ..... b
- b. Lamina with 2 equal, strongly recurved rachises, these bearing 1-pinnate branches on only one side, or with the rachises unequal and 1 bearing a well-developed terminal pinna ..... 12. **A. patens**
- b. Lamina with a single rachis bearing lateral pinnae ..... c
- c. Lamina lacking a 1-pinnate terminal pinna (either gradually reduced to the apex, or with a nearly entire to lobed terminal pinna), or with a 1-pinnate terminal pinna definitely larger than the adjacent lateral ones ..... d
- d. Ultimate segments mostly rather broadly flabellate, many or most of them ca. 2 cm or more long, usually deeply cleft into spreading lobes; lamina 2- to usually 3- or 4-pinnate ..... 11. **A. digitatum**
- d. Ultimate segments of various shape, if mostly broadly flabellate then either entire or nearly so, or ca. 1 cm long, or the lamina 1-pinnate ..... e
- e. Rachis or pinna-rachises glabrous, puberulent, or pubescent; most ultimate segments definitely, although sometimes shortly, stalked, lacking a distinct midvein or with one and very long-stalked ..... f
- f. Most ultimate segments small, ca. 1 cm in length, or rarely to ca. 2.5 cm and then the fertile without a definite apex and the indusia continuous along the convex side ..... g
- g. Stalk of the ultimate segments blackish, pubescent, the color ending abruptly at the base of the segment ..... 9. **A. imbricatum**

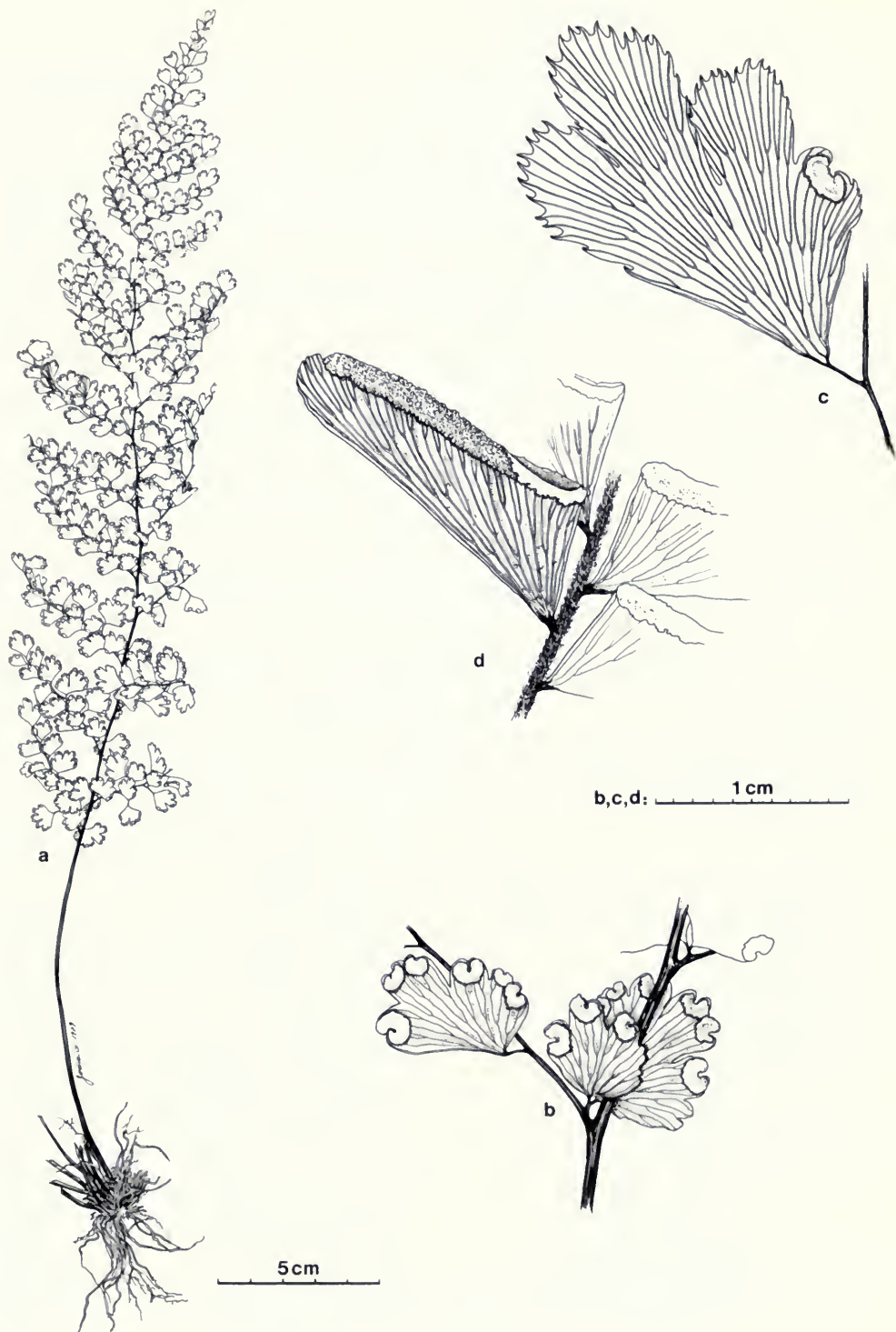


FIG. 14. *Adiantum concinnum*: a, habit; b, base of pinna, abaxial side. *Adiantum capillus-veneris*: c, ultimate segment. *Adiantum pulverulentum*: d, portion of rachis with fertile segment, abaxial side. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)

- g. Stalk of the ultimate segments light-colored to reddish brown, or if blackish then glabrous . . . . . h
- h. Most or many ultimate segments articulate at the junction with the stalk, deciduous by a sharp, clean break, the distal portion of the stalk slightly enlarged; the dark color of the stalk ending abruptly at the base of the segment . . . . . i
  - i. Lamina 2-4-pinnate, many pinnae 1-pinnate or more complex; indusia orbicular to orbicular-reniform . . . . . 10. **A. orbignyana**
  - i. Lamina 1-pinnate, the pinnae nearly entire to rather deeply incised; indusia mostly oblong to lunate . . . . . 14. **A. deflectens**
- h. Segments not articulate, deciduous by the irregular fracture of the stalk, the color of the apex of the stalk usually continuing into the segment base . . . . . j
  - j. Lamina axes more or less whitish puberulent or pubescent, at least adaxially . . . . . k
    - k. The distal 1-pinnate pinnae with the inner, upper pinnule strongly overlaying the rachis; basal pinnae short-stalked . . . . . 7. **A. henslovianum**
    - k. The distal 1-pinnate pinnae with the inner, upper pinnule not or hardly overlaying the rachis; basal pinnae long-stalked . . . . . 8. **A. lobatum**
  - j. Lamina axes glabrous . . . . . l
    - l. Basal pinnae definitely stalked, or if very short-stalked then the ultimate segments overlaying the rachis beyond the base of the lamina nearly cuneate . . . . . m
      - m. Sterile margins of the ultimate segments with each vein ending in a tooth; segments cuneate with a pronounced cartilaginous border . . . . . 4. **A. capillus-veneris**
      - m. Sterile margins of the ultimate segments with each vein ending in a sinus between the definite to indefinite teeth, or the margin nearly entire . . . . . n
        - n. Indusia orbicular to suborbicular; ultimate segments flabellate, or symmetrically or asymmetrically cuneate . . . . . o
          - o. Lamina usually 3- or 4-pinnate, or 2-pinnate well beyond the base . . . . . 1. **A. raddianum**
          - o. Lamina usually 1-pinnate with large, long-stalked, flabellate pinnae, rarely 2-pinnate basally . . . . . 13. **A. ruizianum**
        - n. Some to many indusia oblong to lunate; many ultimate segments orbicular to suborbicular . . . . . p
          - p. Scales borne at the apex of the stem (not those of a leaf-base or bud) with a long, filiform, tortuous tip, the margins denticulate or ciliate . . . . . 2. **A. poiretii**
          - p. Scales borne at the apex of the stem (not those of a leaf-base or bud) with a short, nearly straight or curved tip and entire margins . . . . . 3. **A. chilense**
      - l. Basal pinnae nearly sessile, very short-stalked; the ultimate segments overlaying the rachis beyond the base of the lamina nearly suborbicular . . . . . q
        - q. Inner, upper pinnule of lower pinnae divided into 2 or





- ultimate segment usually glabrous abaxially or somewhat pubescent and (or) scaly; pinnae usually acute, most with the distal segment (not lobe of the apex) not much reduced, about half or more the length of the longest on the pinna . . . . . 23. **A. latifolium**
- z. Segments green, usually shining abaxially . . . . . bb
- bb. Segments usually coriaceous; many ultimate segments less than twice as long as broad; sterile margins evenly and usually finely serrate . . . . . 21. **A. serratodentatum**
- bb. Segments usually herbaceous; many ultimate segments more than twice as long as broad; sterile margins unevenly and coarsely serrate . . . . . 19. **A. tetraphyllum**
- a. One usually long indusium on each side of the fertile pinna or pinnule, or only on the upper side, or a few additional short ones present . . . . . cc
- cc. Lamina 2-pinnate, with a terminal pinna about equal in size to the lateral ones which are gradually reduced to a usually acuminate apex . . . . . 22. **A. pulverulentum**
- cc. Lamina 1-pinnate, or if 2-pinnate, then the apical segment of the 1-pinnate pinnae large, about equal to the simple pinnae, or the 1-pinnate terminal pinna much larger than the 1-pinnate lateral pinnae . . . . . dd
- dd. Rachis with scales or trichomes, or both; pinnae alternate, rarely subopposite . . . . . ee
- ee. Stem scales iridescent; rachis with simple or often stellate trichomes, and often with a few scales on the adaxial side, usually glabrous abaxially; lamina 1- or 2-pinnate . . . . . 26. **A. alarconianum**
- ee. Stem scales dull; rachis with scales and often also trichomes on all sides, rarely glabrate . . . . . ff
- ff. Rachis with trichomes and scales; lamina 1- or 2-pinnate; segments glabrous or slightly scaly or pubescent abaxially; ultimate segments (usually pinnae) usually ovate, lanceolate or narrowly to broadly elliptic . . . . . gg
- gg. The dark color of the segment stalk not or hardly continuing into the base of the segment abaxially . . . . . 31. **A. lucidum**
- gg. The dark color of the segment stalk continuing well into the base of the segment abaxially . . . . . 32. **A. poeppigianum**
- ff. Rachis densely scaly, the scales freely ciliate; lamina 1-pinnate; the pinnae with long trichomes abaxially, very narrowly long-triangular, long-attenuate . . . . . 33. **A. scalare**
- dd. Rachis glabrous; lamina 1-pinnate; the pinnae usually opposite . . . . . 34. **A. macrophyllum**

1. **Adiantum raddianum** Presl, Tent. pterid. 158. 1836, based on Raddi, Pl. bras. nov. gen. 1, t. 78, f. 2. 1825.

based on *A. amabile* Moore and with the same type.

*Adiantum cuneatum* Langsd. & Fisch., Icon. fil. 23, t. 26. 1810, not Forster, 1786. TYPE: Brazil, (Santa Catarina), "Ins. St. Catharina," *Langsdorff* (holotype, LE!; photo, GH; isotype, BM!).

*Adiantum tinctum* Moore, Gard. Chron. 1862: 932. TYPE: Peru, *Hort. Veitch* (holotype, K!; photo, GH).

*Adiantum amabile* Moore, Gard. Chron. 1868: 1090, not Liebm. 1849. TYPE: Peru, *Pearce* (holotype, K!; photo, GH).

*Adiantum decorum* Moore, Gard. Chron. 1869: 582. TYPE: Peru, *Pearce* (holotype, K!; photo, GH).

*Adiantum moorei* Baker, Gard. Chron. 1873: 811,

**Stem** rather stout, very short-creeping, multicapital. **Leaves** ca. 15–55 cm tall, petiole glabrous or slightly scaly at the base, rachis glabrous. **Lamina** elongate-triangular to lanceolate-ovate, broadly ovate or deltoid, commonly 3-pinnate, less often 2- or 4-pinnate. **Pinnae** stalked, ultimate segments cuneate and symmetrical to broadly cuneate-fabellate and asymmetrical, glabrous or slightly farinose, or with sessile glands abaxially, not articulate, the color of the apex of the stalk usually passing into the base of the segment, sterile margins with each vein ending in a more or less well-

developed sinus. **Indusia** few to several, roundish to suborbicular-reniform.

In forests, open woods, thickets, on rocky banks and cliffs, borders of irrigation ditches, 400–4000 m, Tumbes south to Puno.

Tropical America.

*Adiantum raddianum* may be separated from the closely related *A. poiretii* by its orbicular to suborbicular indusia.

The ultimate segments vary from usually glabrous abaxially to rather glandular or sometimes slightly farinose. These are sporadic variations and relatively rare within the species.

The stalks of the ultimate segments are usually dark in color, including the apex, and this color passes into the base of the ultimate segment. In some collections, however, the dark color does not extend to the apex of the stalk and in others it does, but does not extend into the base of the segment. The latter variation is similar to *Adiantum orbignyanum*, although there is no articulation at the apex of the stalk and the segments break off irregularly.

**Tumbes:** El Cancho to Cotrina, *Coronado 233* (UC). **Cajamarca:** Prov. Contumazá, *Sagástegui et al. 10879* (GH, MO). Prov. Celendín, 4 km E of Celendín, *Hutchison & Wright 5189A* (F, GH, US). El Puquio, Guzmango, *Sagástegui 3917* (GH, HUT). **Amazonas:** 1–2 km W of Molinopampa, *Wurdack 1507* (F, GH, UC). **La Libertad:** Prov. Otuzco, Samne, *Angulo 1246* (GH). **San Martín:** Tarpoto, *Spruce 4664* (K). **Ancash:** Prov. Huaráz, 10 km from Cachabamba, *Smith & Buddensiek 10903* (F). Prov. Bolognesi, Huasta, *Cerrate 2442* (GH, USM). **Huánuco:** Mito, *Macbride & Featherstone 1435* (F, GH, US). Car-pish, *Coronado 80* (GH, UC, US). **Lima:** San Buenaventura, *Pennell 14559* (F, GH, NY, PH, US). **Junín:** La Merced, *Soukup 2570* (F, US, USM). 12 km SW of San Ramón, *Tryon & Tryon 5446* (BM, F, MO, U, US, USM). **Huancavelica:** A 4 km de Conaica, *Tovar 979* (GH, USM). **Apurímac:** Chincheros, *West 3694* (MO, UC). **Cuzco:** Potrero, near Quillabamba, *Tryon & Tryon 5368* (BM, F, GH, MO, U, US, USM), *5376* (BM, F, GH, MO, U, US, USM). **Puno:** Juli, near Lake Titicaca. *Shepard 14* (NY).

2. *Adiantum poiretii* Wikstrom, Kongl. Vetensk. Akad. Handl. 1825: 443. 1826, *nom. nov.* for *Adiantum crenatum* Poiret, not Willd., March, 1810.

*Adiantum crenatum* Poiret in Lam., *Encycl. suppl.* 1: 137, Sept. 1810. TYPE: Tristan d'Acugha (Tristan da Cunha), *Petit-Thouars* (holotype, Herb. Jussieu 1427, P!).

*Adiantum thalictroides* Schlecht., *Adumbr. pl.* 5: 53.

1832. TYPE: Mauritius, *Petit-Thouars* (holotype, Herb. Willd. 20101, B!; photo, GH).

**Stem** slender, rather long-creeping, with tufts of petioles borne at intervals, or sometimes more compact. **Leaves** ca. 20–50 cm. long, petiole glabrous or slightly scaly at the base, rachis glabrous or rarely slightly ceraceous. **Lamina** elongate-deltoid, to broadly ovate-deltoid, 3-pinnate (rarely 2- or 4-pinnate). **Pinnae** stalked, ultimate segments cuneate- to subcordate-flabellate, mostly suborbicular, rather symmetrical, glabrous or occasionally somewhat farinose or glandular-pubescent abaxially, not articulate, the color of the apex of the stalk usually passing into the base of the segment, sterile margins with each vein ending in a more or less well-developed sinus. **Indusia** few, oblong to long-lunate, or the smallest ones roundish.

Wooded hillsides, open woods, thickets, lomas, and rocky places, 1200–4200 m, Cajamarca and Amazonas, south to Puno and Arequipa.

Mexico and the West Indies, south to Argentina; mid-Atlantic islands and Africa and adjacent islands.

The many orbicular to suborbicular ultimate segments, with at least some oblong to lunate indusia, and the usually creeping stem with the leaves borne at intervals in clusters, distinguish this species from *Adiantum raddianum*.

It differs from *Adiantum chilense* principally in the tufts of scales at the apex of the stem. These scales are ciliate or denticulate and have a long, filiform, tortuous tip in *A. poiretii*, while they are entire-margined and have a short, straight or curved tip in *A. chilense*. Rarely the scales of *A. poiretii* have a rather short, nearly straight tip although the margins are ciliate-denticulate.

Pichi-Sermolli (Webbia 12: 693–695. 1957) considered the plants of Tristan da Cunha to represent a distinct species and restricted the name *Adiantum poiretii* to it. The widespread American and African species is then known as *Adiantum thalictroides*. However, a thorough study of the variations of this widespread species needs to be made, including *Adiantum chilense*, before an appropriate classification of the group can be made.

Rare specimens that have the ultimate segments somewhat farinose or pubescent abaxially occur scattered through the range of *A. poiretii* and are considered as within the variation of the species. Yellow farina occurs among the sporangia rather

frequently and this also seems to be a variant of the species.

**Cajamarca:** Prov. Celendín, 4 km E of Celendín, *Hutchison & Wright 5189* (F, GH). Prov. Contumazá, Guzmango, *Sagástegui et al. 10391* (GH, MO, UC). **Amazonas:** Conila, *Soukup 4166* (US). **La Libertad:** Between Huamachuco and Cajabamba, *Correll & Smith P918* (GH, US). Prov. Santiago de Chuco, Cachicadán, *Sagástegui et al. 10391* (F). **Ancash:** Cerca a Llamac, *Cerrate 2371* (GH, USM). **Huánuco:** Muña, *Macbride 3932* (F, US). Mitotambo, *Ferreyra 10382* (GH, USM). **Lima:** Churín, *Ferreyra 5356* (GH, USM). **Pasco:** Paucartambo (as Junín), *Woytkowski 6728* (MO). **Junín:** 10 km E of Huancayo, *Tryon & Tryon 5468* (BM, F, MO, U, US, USM). **Huancavelica:** Andamarca, *Tovar 1815* (GH, USM). **Ayacucho:** Between Huanta and Río Apurímac, *Killip & Smith 22320* (F, NY, US). **Cuzco:** Near town of Machu Picchu, *Tryon & Tryon 5403* (BM, F, MO, U, US, USM). **Arequipa:** 14 km S of Arequipa, *Eyerdam & Beetle 22123* (GH). **Puno:** Salcedo, *Soukup 1* (F, GH, UC, US).

3. *Adiantum chilense* Kaulf. var. *hirsutum* Hooker & Grev., Icon. fil. 2, t. 173. 1830. TYPE: Chile, *Gillies* (holotype, K! or E, Herb. Greville?; photo, GH of K).

*Adiantum poiretii* var. *hirsutum* (Hooker & Grev.) Tryon, Amer. Fern J. 47: 141. 1957.

**Stem** slender, rather long-creeping, with tufts of leaves borne at intervals, or sometimes more compact. **Leaves** ca. 10–30 cm long, petiole glabrous or pubescent or slightly scaly at the base, rachis glabrous or pubescent. **Lamina** elongate-deltoid to broadly ovate-deltoid, 2-(rarely 3-)pinnate. **Pinnæ** stalked, ultimate segments cuneate to subcordate-flabellate, mostly suborbicular, rather symmetrical, pubescent or also farinose abaxially, not articulate, the color of the stalk passing into the segment base or not, sterile margins with each vein ending in a rather well-developed sinus. **Indusia** few, oblong or lunate, or the smaller ones roundish.

Terrestrial, lomas of Capac and Atiquipa, 400–600 m, Arequipa.

Southern Peru and Chile.

*Adiantum chilense* var. *hirsutum* is pubescent and sometimes also somewhat farinose on the abaxial side of the ultimate segments. Variety *chilense* is glabrous abaxially and another variety of Chile (*Adiantum sulphureum* Kaulf.) is densely bright yellow-farinose abaxially. The species *Adiantum chilense* is distributed from southern Peru to Argentina and Chile; also in the Juan Fer-

nandez Islands. The distinctions from the closely related *Adiantum poiretii* are discussed under that species.

The materials of var. *hirsutum* of Peru, and in some cases of Chile, may be rather intermediate between the two species.

**Arequipa:** Lomas de Capac, *Coronado 42* (GH). Lomas de Atiquipa, *Coronado 31* (GH).

4. *Adiantum capillus-veneris* L., Sp. pl. 1096. 1753. LECTOTYPE (designated by Pichi-Sermolli in *Webbia* 12: 678. 1957): LINN 1252.9; photo, A. **Figure 14c.**

**Stem** rather slender, short- to long-creeping. **Leaves** ca. 15–45 cm long, petiole glabrous, or slightly scaly at the base, rachis glabrous. **Lamina** elongate-deltoid to ovate to elongate-ovate, 2–3-pinnate. **Pinnæ** stalked, ultimate segments cuneate-flabellate to suborbicular, rather symmetrical or not, glabrous abaxially, not articulate, the color of the apex of the stalk passing into the base of the segment, sterile margins with a cartilaginous border, each vein ending in a tooth. **Indusia** few, nearly squarish to oblong.

Damp, gravelly sea cliffs, banks of irrigation ditches, and local seepage areas, sea level to 2000 m, Lima and Ica.

Tropical and temperate America; Old World.

This species is distinct among those of Peru by the pronounced cartilaginous border on the mature segments, the light grayish brown stem scales, and the veins that end in a tooth of the sterile margin. Its close correlation with city, suburban, and resort areas suggests that it is adventive as an escape from cultivation.

**Lima:** Laguna de Villa, *Coronado 4* (GH, MO, UC, US). Miraflores, *Tryon & Tryon 5216* (BM, F, GH, MO, U, UC, US, USM). Chorillos, *Gentry & Prance 16461* (F, USM). **Ica:** Huamani (USM).

5. *Adiantum concinnum* Willd., Sp. pl. ed. 4, 5: 451. 1810. TYPE: Venezuela, (Dist. Federal), Caracas, *Humboldt & Bonpland* (holotype, B!, Herb. Willd. 20099; photo, GH). **Figure 14a–b.**

**Stem** moderately slender, rather short-creeping, often multicapital. **Leaves** ca. 20–80 cm long, petiole glabrous or slightly scaly at the base, rachis

glabrous. **Lamina** ovate-oblong to linear-lanceolate, 2-pinnate (except at the very base) to generally 3-pinnate. **Pinnae** subsessile, the basal pinnule divided into 2 ultimate segments, at least at the base of the lamina overlaying the rachis, ultimate segments cuneate-flabellate to broadly so to suborbicular, rather symmetrical or not, glabrous abaxially, not articulate, the color of the apex of the stalk passing into the base of the segments, sterile margins with each vein ending in a sinus. **Indusia** few to several, roundish or reniform to lunate.

In woods and along irrigation ditches, 200–2000 m, Tumbes to Ancash.

Mexico and West Indies, south to Ecuador and adjacent Peru.

In Peru, especially in Tumbes, there is variation within plants in the number of ultimate segments on the basal pinnules of the basal pinnae. *Coronado* 222 has one to four ultimate segments, and 229 has two to three. With rare exception, *A. concinnum* has two such ultimate segments, and *A. subvolubile*, one.

**Tumbes:** Between Tumbes and Cancho, *Coronado* 229 (GH, UC). Between Cancho and Cotrina, *Coronado* 222 (GH, UC). **Piura:** Hills of Chiarnique, *Barbour* 2154 (MO). Cerca a Chanchaque, *Ferreya* 10813 (GH, USM). **Lambayeque:** 20 km from Olmos on road to Jaén, *Correll & Smith* P791 (GH). **Cajamarca:** Prov. Contumazá, alrededores de San Benito, *Sagástegui* 3742½ (GH). **Ancash:** Prov. Santa, Lampanin, *Mostacero et al.* 1819 (F, GH).

6. *Adiantum subvolubile* Kuhn, *Linnaea* 36: 77. 1869. TYPE: Ecuador, (Azuay), Puente de Baños, *Spruce* 5318 (holotype, B!; isotypes, BM!, GH!, K!).

**Stem** rather slender, moderately long-creeping, or rather compact. **Leaves** ca. 20–60 cm long, petiole glabrous or slightly scaly at the base, rachis glabrous. **Lamina** more or less elongate-ovate, 2- or 3-pinnate in the center. **Pinnae** subsessile, the basal pinnule undivided, overlaying the rachis, basal pinnae often reduced or withered, ultimate segments symmetrical or not, glabrous abaxially, not articulate, the color of the apex of the stalk passing into the base of the segment, sterile margins with each vein ending in a usually well-developed sinus. **Indusia** few, roundish or nearly reniform to lunate.

Usually growing on the coastal lomas, in crevices of rocks or at the base of rocks, less often on

the ground, 50–3300 m, Piura to Cuzco and Moquegua.

Ecuador and Peru.

On the lomas Atacongo and Amancaes, Dept. Lima, a few collections vary toward *Adiantum concinnum* in having some leaves with two ultimate segments on the basal pinnule of the basal pinnae: *Cerrate* 2721, *Soukup* 3136, *Coronado* 13 (GH). Considering the distance from *A. concinnum* in northern Peru, these are regarded as variants within *A. subvolubile*.

**Piura:** Olmos to Pucará, *Gentry et al.* 22630 (F, MO, US). Canchaque, *Ferreya* 3095 (USM). **Cajamarca:** Summit of Cerro Prieto, *Haught* 280 (US). **La Libertad:** Lomas de Virú, *Coronado* 283 (GH, UC). **Ancash:** Lomas de Mongón, *Coronado* 303 (GH, UC). **Huánuco:** Gorge of Río Chinchao, *Tryon & Tryon* 5315 (BM, F). **Lima:** Loma de Atacongo, *Pennell* 14762 (F, GH, NY, PH), *Ferreya* 2440 (BM, GH, USM). Loma de Amancaes, *Coronado* 13 (GH, MO, UC, US), *Tryon & Tryon* 5214 (BM, F, MO, U, US, USM). **Cuzco:** Prov. Urubamba, quebrada de Pamahuanca, *Vargas* 16017 (GH). **Arequipa:** Molendo, *Johnston* 3573 (GH, US). Lomas de Capac, *Coronado* 38 (UC, US). **Moquegua:** Ilo, *D. Stafford* 931 (BM).

7. *Adiantum henslovianum* Hooker f., *Trans. Linn. Soc. London* 20: 169. 1847. LECTOTYPE (designated by Porter, *J. Linn. Soc., Bot.* 81: 95. 1980): Ecuador, Galápagos Islands, Charles Island, Sept. 1835, *Darwin* (CGE). ISOLECTOTYPE: Herb. Hooker, K!; photo, GH.

*Adiantum sessilifolium* Hooker, *Sp. fil.* 2: 44. 1851. TYPE: Peru, Chachapoyas, *Mathews* 1855 (holotype, K!; photos, GH, US).

*Adiantum laetum* Kuhn, *Linnaea* 36: 76. 1869. TYPE: Peru, (Amazonas), Chachapoyas, *Mathews* 3295 (holotype, B; isotype, K!; photos, GH, US of K).

*Adiantum henslovianum* var. *macroSORUM* Hieron., *Hedwigia* 48: 238. 1909. SYNTYPES: Peru, (Amazonas), near Leimabamba, *Stübel* 1931, B!, (Cajamarca), near Celendín, *Stübel* 1046, B!.

**Stem** rather small, very short-creeping. **Leaves** ca. 15–90 cm long, petiole glabrate to more or less persistently short-pubescent, the rachis puberulent to short-pubescent. **Lamina** ovate to elongate-deltoid, 2-pinnate. **Pinnae** with the pinna-rachis whitish-puberulent to short-pubescent, ultimate segments whitish-pubescent abaxially, or slightly so, sterile ones moderately lobed, those nearest the acute to broadly rounded terminal segment greatly reduced or not, the basal pinnule of at least the upper pinnae overlaying the rachis. **Indusia** few, roundish, reniform to lunate, borne on the upper and distal sides.

Rocky slopes and Inca walls, 1400–2700 m, Lambayeque to Cuzco.

Venezuela to Ecuador and Peru.

*Adiantum sessilifolium* has been separated from *A. henslovianum* primarily on the basis of its pubescent pinna-rachises while in the latter species these are puberulent. However, there is intergradation in this character and the distinction of the species cannot be maintained.

**Lambayeque:** 31 km from Olmos on road to Jaén, *Correll & Smith P807* (GH). **Cajamarca:** W of Balsas, *Osgood & Anderson 67* (F), *Osgood 67* (US). 40 km from Cajamarca on road to Chileté, *Correll & Smith P842* (GH). **La Libertad:** Prov. Patáez, between Alpamarca and Retamas, *López & Sagástegui 3634* (GH). **Huánuco:** Muña, *Bryan 428* (F, GH). **Cuzco:** Cuzco, 1854, *Lobb* (BM).

8. *Adiantum lobatum* Presl, Reliq. haenk. 1: 62, t. 10, f. 4. TYPE: Ecuador, (Guayas), Guayaquil, 1790, *Haenke* (holotype, PR; photo, GH).

**Stem** rather slender, short-creeping. **Leaves** to 60 cm long, petiole atropurpureous, glabrous. **Lamina** deltoid to long-triangular, 2–3-pinnate, rachis and pinna-rachis whitish-puberulent, especially on the adaxial side. **Pinnae** with the ultimate segments glabrous, mostly oblong to trapeziform, the basal ones more or less flabellate, entire to sometimes rather strongly incised, stalks very short to usually short, the dark color entering the base of the segment, sterile vein tips end between indistinct marginal crenulations. **Indusia** orbicular to suborbicular or a few sublunate, borne on the upper and distal sides.

Brushy and rocky hillsides, 150–1400 m, Tumbes and Lambayeque.

Ecuador and Peru.

*Adiantum lobatum* is a rare species, perhaps related to *A. patens* or *A. henslovianum*. The present limited material makes any assessment of it uncertain.

**Tumbes:** El Cancho, *Coronado 227* (UC). **Lambayeque:** Prov. Lambayeque, Dist. Olmos, *Vásquez et al. 4952* (USM). 27 km from Olmos on road to Jaén, *Correll & Smith P801* (GH, LL, US). 31 km from Olmos on road to Jaén, *Correll & Smith P808* (GH, LL).

9. *Adiantum imbricatum* Tryon, Amer. Fern J. 47: 142, t. 15. 1957. TYPE: Peru, Cuzco, La

Tranca, *Bües 1377* (holotype, US!; isotypes, CUZ!, F!, GH!).

**Stem** not seen. **Leaves** ca. 12–30 cm long, petiole brownish short-pubescent or glabrate, rachis brownish short-pubescent. **Lamina** long-oblong to elongate-triangular, 2-pinnate, basal pinnae stalked, those above short-stalked, the innermost pinnule overlaying the rachis. **Pinna** axes brownish short-pubescent, ultimate segments broadly cuneate-flabellate to suborbicular, rather to quite symmetrical, mostly imbricate, pubescent abaxially, subarticulate at the junction with the stalk, the apical portion of the stalk slightly enlarged, its color abruptly distinct from that of the segment base, sterile margins not seen. **Indusia** several to numerous, roundish to orbicular-reniform, often closely spaced.

Rather rocky places, 1600–2000 m, Cuzco.

Endemic to Peru.

This is a distinctive species, adequately distinguished from others in Peru by the characters provided in the key.

**Cuzco:** Puente de Collpañi, *Bües 1303* (US). La Tranca, Río Mapillo, *Bües 1305* (US).

10. *Adiantum orbignyanum* Kuhn, Linnaea 36: 78. 1869. LECTOTYPE (designated by Tryon, Contr. Gray Herb. 194: 175. 1964): Bolivia, *Mandon 52*, B!; photo, GH. LECTOPARATYPES: Bolivia, La Laguna, *D'Orbigny 412*, B!; Bolivia, *Mandon 1577*, B!; Peru, *Poeppig*, not seen. ISOLECTOPARATYPE: Bolivia, *Mandon 1577*, GH!.

**Stem** slender, long-creeping, often branched, or more compact. **Leaves** ca. 15–40 cm long, petiole glabrous or slightly scaly at the base, rachis glabrous. **Lamina** lanceolate to narrowly ovate-deltoid, 2-(rarely 3-)pinnate. **Pinnae** stalked, ultimate segments cuneate-flabellate to suborbicular, rather symmetrical or not, glabrous abaxially, articulate at the junction with the stalk, the apical portion of the stalk enlarged, its color abruptly distinct from that of the segment base, the segment deciduous with a sharp clean break, sterile margins with each vein ending in a usually well-developed sinus. **Indusia** few to several, roundish to orbicular-reniform.

Most commonly in open, rocky places, 2100–4000 m, Cajamarca to Cuzco.

Peru, Bolivia, and northwestern Argentina.

The articulate segments of this species are best observed in older leaves that are fully developed, and especially in leaves in which some of the segments have fallen off. In these the stalks with a slightly enlarged apex may easily be observed. In some cases the stem is rather long-creeping, bearing clusters of leaves at intervals, as often in *A. poiretii* and *A. chilense*.

**Cajamarca:** San Miguel, July 30, 1952, *Dias* (USM). **Huánuco:** Pachachupam, Feb., 1940, *Ridoutt* (USM). **Junín:** Below Palca, *Correll & Smith P766* (GH, US). **Apu- rimac:** Cachora to Huillcayoc, *Vargas 9104* (UC). **Cuzco:** Yucay, *Herrera 714* (US), *718* (US), *1198* (US), *Coronado 146* (GH, UC). San Sebastian, *Pennell 13621* (F, GH, NY, PH). 10 km SE of Cuzco, *Solomon 3010* (F, MO).

11. *Adiantum digitatum* Hooker, Sp. fil. 2: 38. 1851 (Presl, Tent. pterid. 159. 1836, nomen nudum). TYPE: Brazil, *Sello* (holotype, K!; photo, GH).

*Adiantum speciosum* Hooker, Sp. fil. 2: 45, t. 85C. 1851. LECTOTYPE (Designated by Tryon, Contr. Gray Herb. 194: 178. 1964): Ecuador, Sasaranga, *Seemann 953*, K!; photo, GH.

*Adiantum palmatum* Moore, Gard. Chron. 1877: 40, f. 5. TYPE: Peru, *Roehl ex hort. B. S. Williams* (holotype, K!; photo, GH).

**Stem** moderately stout, long-creeping. **Leaves** ca. 45–150 cm long and the long ones subscaudent, petiole tawny short-pubescent or glabrate, sometimes slightly scaly toward the base, rachis similar but not scaly. **Lamina** deltoid, 3–4-pinnate or less often 2-pinnate. **Pinnae** stalked, the axes tawny short-pubescent or rarely glabrate, ultimate segments usually more or less suborbicular, deeply cleft into about 4–7 spreading lobes, quite symmetrical or not, usually flabellately veined, pubescent abaxially, rarely glabrate, the color of the apical portion of the stalk abruptly distinct from that of the segment base or not, sterile margins with each vein ending in a tooth. **Indusia** few to several, oblong, straight or nearly so.

In rocky places or at the base of rocks, in woods, or on brushy hillsides, 100–4000 m, Tumbes to Puno.

Ecuador to Argentina, Uruguay, and Brazil.

*Adiantum digitatum* is a distinctive species with

its flabellate venation, deeply cleft segments, and frequently much elongated leaf that is up to 1.5 m long. Most of the axes, especially those of the pinnae, are at right angles to the axis that bears them. In the northern half of Peru this species is frequent on lomas and a characteristic part of their flora.

**Tumbes:** Between Cancho and Cotrina, *Coronado 217* (GH, UC). **Piura:** W of Canchaque, *Stork 11396* (GH, US). Canchaque, *Ferreyra 10894* (GH, USM). **Lambayeque:** Olmos to Jaén, *Correll & Smith P829* (GH). **Cajamarca:** El Puquio, Guzmango, *Sagástegui 3915* (GH). **La Libertad:** Lomas Campana, *Coronado 280* (GH, UC). Lomas de Virú, *Coronado 287* (GH). **Ancash:** Huasta, *Cerrate 2478* (USM). Prov. Santa, arriba de Lampanin, *Mostacero et al. 1818* (F, GH). **Huánuco:** Muña, *Macbride 3919* (F, GH, US). **Lima:** Lomas de Chancayllo, *Hutchison 6296* (F, GH, US). Lomas de Patavilca, *Coronado 306* (GH, UC). Lomas de Chancay, *Ferreyra 8700* (GH, USM). **Junín:** 10 km below Palca, *Walden 3* (BM), *6* (BM). **Cuzco:** Vilcambamba, *Vargas 4018* (UC, US). Chincheros, *Davis et al. 1802* (F). **Puno:** Ollachea, *Vargas 6917* (MO, UC, US).

12. *Adiantum patens* Willd., Sp. pl. ed. 4, 5: 439. 1810. TYPE: Venezuela, (Dist. Federal), Caracas, *Bredemeyer* (holotype, B!, *Herb. Willd. 20078*; photo, GH; isotype, w!).

**Stem** rather small, short-creeping. **Leaves** ca. 20–45 cm long, petiole glabrous or slightly puberulent, rachises similar. **Lamina** deltoid-ovate to nearly circular, with 2 equal, strongly recurved rachises, these bearing 1-pinnate branches on only 1 side, or with the rachises more or less unequal and one bearing a well-developed terminal pinna. **Penultimate** segments with the axes glabrous to puberulent, rarely short-pubescent, ultimate segments glabrous abaxially, or rarely whitish short-pubescent, sterile ones moderately lobed, or evenly serrate, those nearest the broadly rounded terminal segment reduced or not, the basal ultimate segments hardly or not overlaying the adjacent axis. **Indusia** few, roundish, lunate or reniform, borne on the upper and distal sides.

In woods and on shaded rocks, 150–2050 m, Tumbes south to Cuzco.

Mexico and Central America; Venezuela and Colombia south to Bolivia.

The architecture of the lamina is distinctive in this species and similar to that of *Adiantum pedatum* of North America.

**Tumbes:** Between Cancho and Cotrina, *Coronado 233* (GH). **Piura:** Talara, *Haught 92* (US). Huancabamba, *Ferreira 10877* (GH, USM). **Lambayeque:** Prov. Lambayeque, *López et al. 4045* (GH, HUT). Olmos to Jaén, *Correll & Smith P806* (GH, US). **Amazonas:** Prov. Bagua, entre Montenegro y Lumba, *López et al. 4228*, in part (HUT). **Cuzco:** Machu Picchu, *Vargas 3352* (MO, US).

13. *Adiantum ruizianum* Klotzsch, Linnaea 18: 551. 1845. TYPE: Peru, *Ruíz 26* (holotype, B!).

*Adiantum veitchianum* Moore, Gard. Chron. 1868: 1090. TYPE: Peru, (Huánuco), Muña, *Pearce* (holotype, K!; photo, GH).

*Adiantum steerei* Harr., J. Linn. Soc., Bot. 16: 34. 1877. LECTOTYPE (designated by Tryon, Contr. Gray Herb. 194: 176. 1964): Peru, (Amazonas), Poma Cocha, *Steere*, K!. ISOLECTOTYPES: GH!, MO!, US!.

*Adiantum microsorum* C. Chr., Index fil. 30. 1905, based on *A. veitchianum* but an unnecessary new name as Ballard (Kew Bull. 1954[4]: 560) has pointed out.

**Stem** slender, long-creeping. **Leaves** 15–45 cm long, petiole glabrous or slightly scaly at the base, rachis glabrous. **Lamina** oblong or oblong-linear or oblong-tapering, 1–2-pinnate. **Pinnae** mostly long-stalked, ultimate segments broadly cuneate-flabellate to suborbicular, usually rather or quite symmetrical, glabrous, not articulate, the color of the apex of the stalk passing into the base of the segment, sterile margins with each vein ending in a more or less well-developed sinus. **Indusia** several to numerous, orbicular or nearly so, usually closely spaced.

Damp or shaded rocky places, 1600–2900 m, Amazonas, Huánuco, Pasco, and Junín.

Endemic to Peru.

Most of the material seen is 1-pinnate with rather large, flabellate pinnae on long, slender stalks. Rarely, the lamina may be 2-pinnate and then the segments may be smaller, more elongate and with shorter stalks.

**Amazonas:** Prov. Chachapoyas, Chachapoyas-Mendoza, *López & Aldave 8523* (HUT). Prov. Chachapoyas, Calla Calla, *Hutchison & Wright 4798* (F, GH), *Wurdack 1182* (F, GH, US). Prov. Chachapoyas, encima de Leimabamba, *Ferreira 15598* (UC, US). **Huánuco:** Muña, *Bryan 515* (F, US), *Machride 3942* (F, US), *Woytkowski 5223* (GH, MO). **Pasco:** Prov. Oxapampa, Palcazú, *van der Werff et al. 8378* (MO). Dos de Mayo (as Junín), *Killip & Smith 25846* (BM, F, GH, NY, US). **Junín:** Huacapistana, *Tryon & Tryon 5434* (F).

14. *Adiantum deflectens* Mart., Icon. pl. crypt. 94. 1834. TYPE: Brazil, Prov. Pará, Santarem, *Martius* (not located).

**Stem** small, short-creeping to nearly erect. **Leaves** ca. 15–30 cm long, petiole very slender, glabrous, rachis similar. **Lamina** 1-pinnate, often of two kinds, one oblong to very elongate-triangular, with a terminal segment, the pinnae cuneate-flabellate to broadly so, asymmetrical, the other kind linear, with a long, naked, rooting rachis tip, the pinnae cuneate-flabellate to cuneate-ovate, nearly or quite symmetrical. **Pinnae** stalked, entire or more or less cleft into 2–7 close lobes, glabrous, the segment articulate at the junction with the stalk, the apical portion of the stalk enlarged, abruptly distinct in color from the base of the segment, sterile margins finely and sharply serrate, with each vein ending in a tooth. **Indusia** few, oblong to linear, nearly straight to long-arcuate.

In damp, shady places, 820–1700 m, Cuzco.

Mexico and Central America; Guianas to Colombia, south to Peru, Paraguay, and Brazil.

This is one of the most distinctive of the Peruvian species. The 1-pinnate lamina in some leaves ends in a terminal segment, while in other leaves the lamina has a long, naked, rooting tip. The correct name for this species depends upon a careful study of its group throughout tropical America and the types of the several names involved. Among these are *Adiantum delicatulum* Mart., *A. dolabriforme* Hooker, *A. rhizophyllum* Mart., *A. filiforme* Hooker, *A. philipense* L., *A. lunulatum* Burm., *A. flagellum* Fée, and *A. subaristatum* Fée.

**Cuzco:** Prov. La Convención, Hacienda Sahuayaco, *Bües 822* (US), *Vargas 1658* (GH), *1660* (GH). Puente de Collpañi, *Bües 1298* (US). Machu Picchu to Quillabamba, *Mexia 8088a* (F, GH, MO, UC, US). Yanayco Grande, *Bües 1035* (US). Prov. La Convención, Quellouno, *Vargas 13553* (GH).

15. *Adiantum pectinatum* Ettingsh., Farnkr. Jetzw. 85, t. 45, figs. 14–16. 1865. TYPE: Brazil, Goyaz, *Pohl 1481* (holotype, w!; isotypes, B! (s.n.), GH!).

**Stem** very stout, moderately creeping. **Leaves** very large, up to 2 m long or more, petiole very stout (to nearly 1 cm in diameter at the base), deciduously pubescent-scaly, the rachis rather per-



sistently so. **Lamina** broadly deltoid-ovate to deltoid-circular, 4–5-(rarely 6-)pinnate, the basal pinnae largest. **Pinnae** widely alternate, pinna-rachis pubescent-scaly, ultimate segments glabrate or slightly scaly abaxially, sterile ones deeply incised-lobed, those nearest the rather obtuse to acute terminal segment of the penultimate segments moderately to greatly reduced. **Indusia** several, orbicular or mostly so, borne on the upper and sometimes also a few on the distal side.

In woods and dense forests, 700–2000 m, San Martín to Cuzco and Madre de Dios.

Costa Rica to Argentina and Brazil.

This species is characterized by the ultimate segments that are incised on the upper edge, and the complex lamina that is commonly 4–5-pinnate at the base. It is the largest of the adiantums, some leaves reaching a length of 2 m or more.

**San Martín:** Moyabamba to Huallaga, *Stübel 1091* (B). Tarapoto, *Spruce 4781* (K). **Huánuco:** Pampayacu, *Kanenhira 130* (GH). **Junín:** La Merced, *Soukup 1082* (F), *Tryon & Tryon 5437* (BM, F, MO, U, US, USM). **Cuzco:** Torontoy, *Herrera 1297* (US). Prov. La Convención, bajíos de Rosalina, *Vargas 12289* (GH). **Madre de Dios:** Parque Nacional de Manú, *M. S. Foster P-84-58* (MO).

16. ***Adiantum tomentosum*** Klotzsch, *Linnaea* 18: 553. 1845. TYPE: “British Guiana”, *Schomburgk 1202*, (holotype, B!; frag., GH!, US!).

**Stem** moderately stout, rather long-creeping. **Leaves** to ca. 1.25 m long, more or less deciduously puberulent, the rachis persistently so. **Lamina** ovate-deltoid or broadly so to broadly ovate-oblong, 2-pinnate. **Pinnae** with the pinna-rachis puberulent to pubescent only on the adaxial side or also sometimes on the lateral sides, glabrous abaxially, the terminal pinna reduced at the base, pinnules glabrous, usually imbricate, sterile ones rather coarsely but evenly serrate, those nearest the usually acute terminal segment moderately reduced. **Indusia** numerous, roundish to short-oblong, borne on the upper and distal sides, sometimes a few also on the inner side.

In dense forests, 100–650 m, Amazonas to Madre de Dios.

Guianas to Colombia, south to Peru and Brazil.

This is one of the more distinctive species. The pinna-rachises are puberulent or pubescent, but

not on the abaxial side, and the ultimate segments are obtuse and usually closely imbricate. In Peru it is most common in the Amazon basin.

**Amazonas:** Prov. Bagua, entre Montenegro y Lumba, *López et al. 4228* in part (HUT). Prov. Bagua, near Cascadas de Mayasi, *Wurdack 1940* (GH, US). **San Martín:** Palo Blanco, *J. Schunke V. 5629* (F, US). **Loreto:** Iquitos, *Killip & Smith 27415* (NY, US). Prov. Maynas, Río Nanay, *Gentry et al. 22368* (F, MO, UC). Prov. Maynas, Río Momon, *Saunders 1366* (F, GH). **Huánuco:** Tingo María, *Tryon & Tryon 5295* (BM, F, GH, MO, NY, U, UC, US, USM). **Pasco:** Puerto Bermúdez (as Junín), *Killip & Smith 26549* (GH, NY, US). **Madre de Dios:** Prov. Tambopata, Tambopata Nature Reserve, *Barbour 5181* (F, MO).

17. ***Adiantum urophyllum*** Hooker, *Sp. fil.* 2: 24, t. 84B. 1858. SYNTYPES: Colombia, Island of Gorgona, *Barclay, Hinds*; Ecuador, Salango, *Seemann*; all presumably at K.

*Adiantum pilosum* Baker, *Ann. Bot. (London)* 5: 207. 1891, not Fée, 1852. TYPE: Colombia, *Kalbreyer 956* (holotype, K!; photo, GH).

*Adiantum kalbreyeri* C. Chr., *Index fil.* 28. 1905, *nom. nov.* for *Adiantum pilosum* Baker and with the same type.

*Adiantum ceciliae* Alston, *Lilloa* 30: 109, t. 4–5. 1960. TYPE: Peru, Dept. Junín, south bank of Río Perené, within 15 miles of confluence of Río Chanchamayo and Río Paucartambo, *Gascoyne-Cecil 50* (holotype, BM; paratype, same data and collector, 47 BM).

**Stem** moderately stout, moderately long-creeping. **Leaves** ca. 60–90 cm long, petiole deciduously puberulent, the rachis persistently so. **Lamina** ovate, 2-pinnate. **Pinnae** few, pinna-rachis puberulent, pinnules glabrate, nearly subacute, mostly spaced, sterile ones coarsely and unevenly serrate, those nearest the long-acuminate terminal segment greatly reduced. **Indusia** several to numerous, roundish, borne on the upper and distal sides.

One collection seen from a forested slope, 1200 m, Huánuco.

Costa Rica to Peru.

The pinna-rachises that are puberulent on all sides make this a distinctive species. If the puberulence is eroded from the abaxial side, then the subacute and mostly spaced pinnules will separate it from *Adiantum tomentosum*.

**Huánuco:** Prov. Huánuco, Dist. Churubamba, Hacienda Mercedes, *Mexia 8175* (BM, F, GH, MO, UC, US).

18. *Adiantum macrocladum* Klotzsch, Linnaea 18: 554. 1845. TYPE: Peru, *Poeppig 1147*, (holotype, B!; photo, BM; isotypes, GH!, LE!, US!).

*Adiantum mexiae* Copel., Univ. Calif. Publ. Bot. 19: 303. 1941. TYPE: Peru, Huánuco, *Mexia 8292* (holotype, UC; isotypes, GH!, US!).

**Stem** moderately stout, rather long-creeping. **Leaves** up to 1 m long, petiole glabrous, the rachis similar. **Lamina** more or less circular to broadly ovate, 2-pinnate above the basal pinnae, where it is 3-pinnate. **Pinnae** with the pinna-rachis glabrous, pinnules glabrous, often imbricate or nearly so, sterile ones mostly evenly serrate, those nearest the long-acuminate terminal segment greatly reduced. **Indusia** numerous, mostly orbicular or nearly so, borne on the upper side.

In dense forests, 300–1500 m, San Martín to Madre de Dios.

Endemic to Peru.

The wholly glabrous pinna-rachises separate this species from *Adiantum tomentosum* which also has obtuse and usually closely imbricate pinnules.

**San Martín:** Prov. Mariscal Cáceres, 2 km abajo de Tocache Nuevo, *J. Schunke V. 3435* (GH, MO, US). **Huánuco:** Tingo María, *Stork & Horton 9531* (F, UC, US). **Pasco:** Prov. Oxapampa, W side of Cordillera de San Matías, *D. Smith 2013* (F). Cahuapanas on Río Pichis, (as Junín), *Killip & Smith 26790* (NY, US). **Ucayali:** Prov. Coronel Portillo, Bosque Nacional von Humboldt, *J. Schunke V. 10404* (F, MO). **Madre de Dios:** Cocha Cashu station, Río Manú, *Foster 2565* (GH), *Foster et al. 6905* (F).

19. *Adiantum tetraphyllum* Willd., Sp. pl. ed. 4, 5: 441. 1810. LECTOTYPE (designated by Lellinger, Proc. Biol. Soc. Wash. 89: 704. 1977): Venezuela, (Sucre), Caripe, *Humboldt*, B!, *Herb. Willd. 20082-2*; photo, GH. LECTOPARATYPE: America, *Vahl*, B!, *Herb. Willd. 20082-1*; photo, GH.

**Stem** long-creeping and slender to short-creeping and moderately stout, or compact. **Leaves** ca. 40–150 cm long, petiole persistently to deciduously pubescent-scaly, the rachis densely and persistently pubescent-scaly to moderately so. **Lamina** deltoid-ovate, to ovate-oblong, 2-pinnate. **Pinnae** with the pinna-rachis densely to moderately pubescent-scaly, pinnules green, often shining abaxially, glabrous, somewhat scaly or pubescent abaxially, the sterile margins unevenly and coarsely serrate. **Indusia** few to many, roundish to

long-oblong, borne on the upper and distal sides, or sometimes also on the inner side.

In forests and on forested slopes, sometimes in seasonally inundated forests, 100–1500 m, Tumbes to Madre de Dios.

Tropical America.

*Adiantum tetraphyllum* is treated as a variable species in Peru. It may be distinguished from related species by its 2-pinnate lamina with a terminal 1-pinnate pinna about the same size as the adjacent lateral ones, the pubescent-scaly rachis and pinna-rachises, the ultimate segments that are green and often shining abaxially, and most of them more than twice as long as broad with the sterile margins unevenly and coarsely serrate.

In Tryon (1964) several species were recognized in the *A. tetraphyllum* complex, but the material of these is now regarded as part of the variation of *A. tetraphyllum*. Some of these species may be distinctive in other regions of tropical America (for example, *A. villosum*) and the Peruvian specimens were erroneously associated with their name. In other cases they evidently represent one extreme or another of the variations within *A. tetraphyllum*. These species include *Adiantum cayennense* Klotzsch, *A. fruticosum* Sprengel, and *A. villosissimum* Kuhn. Another species of this complex, *Adiantum fuliginosum* Fée (*A. hirtum* Splitz, 1840, not (Sw.) Poiret, 1810), is sometimes credited to Peru.

The variation in *Adiantum tetraphyllum* in Peru includes the following characters: (a) stem long-creeping and slender to short-creeping and moderately stout, or compact; (b) lamina axes densely pubescent-scaly to moderately so; (c) pinnae acute with the distal segments about half as long as the longest on the pinna to long-acuminate with the distal segments much reduced; (d) ultimate segments glabrous, somewhat scaly, or pubescent abaxially; (e) apex of the ultimate segments obtuse to acute; and (f) indusia few to many on a fertile segment, roundish to long-oblong.

**Tumbes:** Prov. Zarumilla, Dist. Matapola, Campo Verde, *J. Schunke V. 2363* (F, GH, US). Between Cancho and Cotrina, *Coronado 223* (GH, UC). **Amazonas:** Prov. Bagua, above Cascadas de Mayasi, *Wurdack 1972* (F, GH, US). **San Martín:** Tarapoto, *Spruce 4665* (K). Prov. Mariscal Cáceres, Tocache Nuevo, *J. Schunke V. 3876* (F). **Loreto:** Río Itaya, near Iquitos, *Tryon & Tryon 5197* (BM, F, GH, MO, USM). Río Nanay, near Iquitos, *Tryon & Tryon 5177* (BM, F, GH, MO, U, US, USM). **Huánuco:** Tingo María, *Tryon & Tryon 5294* (BM, F, GH, MO, U, UC, US, USM). **Pasco:** Prov. Oxapampa, cerca de Puerto Bermúdez, *León et al. 297* (USM). Prov. Oxapampa, Cor-

dillera de San Matías, *D. Smith 2013A* (MO). **Junin:** La Merced, *Tryon & Tryon 5438* (BM, F, GH, MO, U, UC, US, USM). **Ucayali:** Prov. Coronel Portillo: Parque Nacional von Humboldt to Puerto Inca, *Croat 51054* (MO). **Ayacucho:** Between Huanta and Río Apurímac, *Killip & Smith 22623* (F, NY, US). **Cuzco:** Prov. La Convención, below Puerto Capiro, *Davis et al. 1312* (F, GH). Prov. Quispichanci, entre Machichi y Inambari, *Vargas 16458* (GH). **Madre de Dios:** Prov. Tambopata, Tambopata Nature Reserve, *Barbour 5306* (MO). Prov. Tambopata, Río Piedras, *Vargas 18626* (GH).

20. ***Adiantum terminatum*** Miq., *Het. Instit. Versl. Meded. Ned. Instit. Wet.* 1842: 3. 1843. (Cited by C. Chr., *Index fil.*, as *Diar. Inst. Reg. Bat.*) TYPE: Surinam, Bergendall, *Focke* (holotype, U!).

**Stem** rather slender, short- to rather long-creeping. **Leaves** ca. 20–45 cm long, petiole deciduously pubescent-scaly, the rachis persistently so. **Lamina** broadly deltoid to oblong or oblong-ovate, 2-pinnate. **Pinnae** with the pinna-rachis pubescent-scaly, pinnules dull green to faintly glaucous, with numerous simple trichomes abaxially, sterile ones mostly coarsely and evenly serrate, those nearest the acuminate terminal segment reduced. **Indusia** several to numerous, very short-oblong, borne on the upper and often also on the distal and inner sides.

In primary, or less often in secondary forests, 100–800 m, San Martín and Loreto to Puno.

Southern Mexico and Guatemala; Trinidad; tropical South America.

This species is characterized by usually many indusia on the fertile segment, the gradually reduced pinna-apex, and the long, simple trichomes on the segments abaxially.

**San Martín:** Prov. Mariscal Cáceres, Palo Blanco, *J. Schunke V. 5715* (F, US). **Loreto:** Prov. Maynas, Río Momon, *Saunders 1370* (F, GH). Near Iquitos, *Klug 1270* (NY, US). Nauta, *Ferreira 5134* (USM). **Huánuco:** Tingo María, *Tryon & Tryon 5327* (BM, F, GH, MO, U, UC, US, USM). **Pasco:** Prov. Oxapampa, Río Palcazú, *León 705* (F). Prov. Oxapampa, Paujil, *León 303a* (USM). **Junin:** Puente Perené, *Coronado 262* (GH, UC). **Ucayali:** Bosque Nacional von Humboldt, *Narita 8* (USM). **Cuzco:** Prov. Paucartambo, Río Tono, *Wachter et al. 218* (F). **Madre de Dios:** Prov. Manú, Cerro de Pantiacolla, *Foster et al. 10699* (F). Prov. Tambopata, Tambopata Nature Reserve, *Barbour 5192* (MO). **Puno:** San Gabán, *Lechler 2319, 2319a* (B).

21. ***Adiantum serratodentatum*** Willd., *Sp. pl. ed.* 4, 5: 445. 1810. TYPE: Venezuela (Sucre),

*Caripe, Humboldt & Bonpland* (holotype, B!), *Herb. Willd. 20088*; the two sterile leaves, B!; photos, BM, GH).

**Stem** slender, very long-creeping. **Leaves** ca. 35–65 cm long, petiole deciduously pubescent-scaly, the rachis persistently so. **Lamina** deltoid-ovate to oblong-ovate, 2-pinnate. **Pinnae** with the pinna-rachis pubescent-scaly, pinnules coriaceous, not glaucous, glabrate or slightly scaly abaxially, sterile ones evenly serrate, those nearest the usually obtuse terminal segment of the pinna not much reduced. **Indusia** few to several, roundish to oblong or sublunate, borne on the strongly recurved margin on the upper and distal, rarely the inner, sides.

In forests and in open habitats among grasses, 750–1500 m, Piura to Cuzco.

Mexico; West Indies; tropical South America.

This species has coriaceous and usually small, oblong pinnules. The sterile margins are usually finely and evenly serrate.

**Piura:** Cerro de Chiris, Panojal, *Bües 1711* (US). **San Martín:** Zepelacio, near Moyobamba, *Klug 3462* (F, GH, MO, NY, US). **Loreto:** Prov. Requena, Río Ucayali, *Encarnación 25032*, in part (MO). **Huánuco:** Pampayacu, *Tump* (USM). **Cuzco:** Prov. La Convención, *Vargas 17279* (GH).

22. ***Adiantum pulverulentum*** L., *Sp. pl.* 2: 1096. 1753. LECTOTYPE (designated by Proctor, *Flora Lesser Antilles* 2: 185. 1977): Plumier, *Descr. pl. Amér. t. 47.* 1693. **Figure 14d.**

**Stem** moderately stout, rather short-creeping. **Leaves** ca. 30–90 cm long, petiole more or less persistently pubescent-scaly, the rachis usually persistently so. **Lamina** short-oblong to oblong-ovate, 2-pinnate. **Pinnae** with the pinna-rachis pubescent-scaly, pinnules glabrate to somewhat scaly abaxially, sterile ones coarsely serrate, those nearest the acute to long-acuminate terminal segment greatly reduced. **Indusium** long, 1 (rarely 2) borne on the upper side, rarely a shorter one also on the distal side.

In dense or partially open forests or in secondary growth, 100–1800 m, Loreto south to Cuzco and Madre de Dios.

Tropical America.

The usually single, long indusium is sufficient to characterize this 2-pinnate species. It is especially common in the Amazon basin.

**Loreto:** Mouth of Río Santiago, *Mexia 6133a* (GH, NY, UC, US).  **Río Itaya, Killip & Smith 29431** (F, GH, NY, US). Near Iquitos, *Tryon & Tryon 5194* (BM, F, GH, MO, U, USM).  **Huánuco:** Prov. Pachitea, Dist. Puerto Inca, *D. Smith 1261* (MO).  **Pasco:** Prov. Oxapampa, Villa Rica-Yesú, *Smith et al. 5461* (GH).  **Junín:** Polonia, Satipo, 1940, *Ridout* (us).  **Cuzco:** Prov. La Convención, Río Sambray, *Mexia 8066* (F, GH, MO, UC, US).  **Madre de Dios:** Prov. Manú, Cerro de Pantiacolla, *Foster et al. 10717* (F).

23.  ***Adiantum latifolium* Lam.**, Encycl. 1: 43. 1783. Type: uncertain, there is no specimen in Herb. Lamarck; Brazil, *Commerson* (Herb. Jussieu no. 1408) ♀; photos, GH, US, is evidently a hybrid. The name is applied in its traditional sense.

*Adiantum humile* Kunze, Linnaea 9: 80. 1834. TYPE: Peru. (San Martín), Huallaga, Mission Tocache, June, 1830, *Poeppig* (holotype, LZ destroyed), ex char., the description suggests that the name is a synonym of *A. latifolium*.

*Adiantum killipii* Maxon & Weath., Amer. J. Bot. 19: 166. 1932. TYPE: Panama, Canal Zone, Ancon Hill, *Killip 2752* (holotype, us).

**Stem** slender, very long-creeping to moderately stout and short-creeping.  **Leaves** ca. 30–70 cm long, petiole deciduously pubescent-scaly, the rachis persistently so.  **Lamina** deltoid to ovate-deltoid or ovate-oblong, 2-pinnate.  **Pinnae** with the pinna-rachis pubescent-scaly, pinnules herbaceous, glaucous abaxially, glabrate, or with simple trichomes abaxially, with the sterile ones evenly serrate, those nearest the usually acute terminal segment of the pinna usually not much reduced.  **Indusia** several, usually oblong, and on the lower as well as the upper side.

In woods and in dense forests, 100–1000 m, Amazonas and San Martín to Cuzco and Madre de Dios.

Tropical America.

This 2-pinnate species has the segments glaucous abaxially and the sterile margins finely and evenly serrate. It is especially common in the Amazon basin.

**Amazonas:** Prov. de Bagua, above Cascadas de Mayasi, *Wurdack 1899* (US).  **San Martín:** Prov. Mariscal Cáceres, Tocache Nuevo, *J. Schunke V. 3410* (F).  **Loreto:** Río Putumayo, Peru-Colombia boundary, *Klug 1631* (F, GH, MO, NY, US). Dist. Iquitos, Fundo Indiana, *Mexia 6389* (BM, F, GH, MO, NY, PH, UC, US).  **Río Itaya,** near Iquitos, *Tryon & Tryon 5170* (BM, F, MO, U, US, USM).  **Huánuco:** Prov. Pachitea, Bosque Nacional de Iparia, *J.*

*Schunke V. 1139* (F, GH, US).  **Junín:** Near La Merced, *Killip & Smith 24003* (NY, US).  **Ucayali:** Bosque Nacional von Humboldt, *Gentry et al. 36219* (F, MO).  **Ayacucho:** Río Apurímac valley, near Kimpitiriki, *Killip & Smith 22925* (GH, NY, US).  **Cuzco:** Prov. Paucartambo, Kosñipata, *Vargas 10202* (MO, UC).  **Madre de Dios:** Prov. Tambopata, *Vargas 18577* (GH), *18630* (GH).

24.  ***Adiantum petiolatum* Desv.**, Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 326. 1811. TYPE: uncertain, not seen at p.

*Adiantum kaulfussii* Kunze, Linnaea 21: 221. 1848. LECTOTYPE (designated by Tryon, Contr. Gray Herb. 194: 149. 1964): Martinique, *Sieber, Fl. Martin. 371* (holotype, LZ destroyed; isotype, b!).

**Stem** slender, long-creeping to somewhat stout and more compact.  **Leaves** ca. 20–40 cm long, petiole glabrate, rachis similar.  **Lamina** more or less oblong and 1-pinnate or deltoid and 2-pinnate, with the pinnate pinnae few, entire pinnae ovate-lanceolate to oblong, strongly asymmetrical at the base.  **Pinnae** and pinnules dull, usually glaucous abaxially, sterile margins evenly serrate.  **Indusia** several, oblong-arcuate to long-arcuate or nearly straight, more numerous on the upper than on the distal side.

In forests, disturbed forests, secondary growth, or on wet, shaded cliffs, 100–600 m, Amazonas to Madre de Dios.

Tropical America.

One of the variations of *Adiantum petiolatum* has a glabrous rachis. This may be distinguished from other species by the 1-pinnate lamina with elongate pinnae with the sterile margins evenly serrate.

Plants of *Adiantum petiolatum* with the lamina 2-pinnate may be, at least in part, hybrids with *Adiantum latifolium*. Jermy and Walker (Bull. Brit. Mus. (Nat. Hist.), Bot. 13: 254. 1985) described *Adiantum* × *variopinnatum* as a hybrid between diploid and 1-pinnate *A. petiolatum* and tetraploid and 2-pinnate *A. latifolium*. Some 2-pinnate collections may represent this hybrid, while others may involve another 2-pinnate species, or simply be a 2-pinnate variation of *A. petiolatum*. Specimens that have the apical pinna much larger than the few adjacent lateral ones are most likely to represent hybrids.

**Amazonas:** Prov. Bagua, above Cascadas de Mayasi, *Wurdack 2055* (F, GH, MO, UC, US).  **San Martín:** Prov.

Mariscal Cáceres, Río Chiote, *J. Schunke V. 4307* (F, GH, US). **Loreto:** Near Iquitos, *Tryon & Tryon 5191* (BM, F, GH, MO, U, UC, US, USM). Salinas, Río Mazán, *Schunke 377* (F, GH, NY, UC, US, USM). **Huánuco:** Prov. Pachitea, Bosque Nacional de Iparia, *J. Schunke V. 2965* (F, GH, US). **Pasco:** Prov. Oxapampa, valle del Palcazú, *León 677* (F). **Junín:** Río Satipo, 1940, *Ridout* (USM). **Ucayali:** Bosque Nacional von Humboldt, *Gentry et al. 36382* (MO). **Cuzco:** Prov. Quispicanchi, Punkiri, *Vargas 15412* (GH). **Madre de Dios:** Culpa, Río Manú, *M. S. Foster P-84-36* (UC).

25. *Adiantum obliquum* Willd., Sp. pl. ed. 4, 5: 429. 1810. LECTOTYPE (designated by Lelinger, Mem. New York Bot. Gard. 23: 13. 1972.): Venezuela, (Dist. Federal), Caracas, *Bredemeyer*, b!, *Herb. Willd. 20067-1*; photos, BM, GH. LECTOPARATYPE: Portorico (Puerto Rico), *Ventenat*, b!, *Herb. Willd. 20067-2*; photos, BM, GH.

**Stem** slender, long-creeping to compact, often branched. **Leaves** ca. 20–60 cm long, petiole deciduously or persistently pubescent-scaly, rachis similar. **Lamina** broadly linear to elongate-triangular and 1-pinnate or deltoid to deltoid-ovate and 2-pinnate, with the pinnate pinnae few. **Entire pinnae** and pinnules oblong to long-triangular, strongly asymmetrical at the base, green, usually shining abaxially, sterile margins unevenly biserrate. **Indusia** several, short to long-oblong, straight or arcuate, more numerous on the upper than on the distal side.

In dense forests or on wooded slopes, 250–1500 m, San Martín to Cuzco and Madre de Dios.

Tropical America.

Plants with 2-pinnate leaves may be within the variation of *Adiantum obliquum*, or they may be, at least in part, hybrids of *A. obliquum* with 2-pinnate species. Those with a very large terminal pinna are the most likely to be hybrids.

**San Martín:** Prov. Mariscal Cáceres, Tocache Nuevo, *J. Schunke V. 7046* (F, MO). **Loreto:** Río Itaya, near Iquitos, *Tryon & Tryon 5201* (BM, F, MO, U, US, USM). **Huánuco:** Tingo María, *Tryon & Tryon 5253* (BM, F, MO, U, US, USM). **Pasco:** Prov. Oxapampa, cerca a Puerto Bermúdez, *León et al. 294* (GH, USM). **Junín:** Chanchamayo valley, *C. Schunke 101* (F), 763 (US). **Cuzco:** Prov. La Convención, Puerto Capiro, Río Apurímac, *Davis et al. 1294* (F, UC). **Madre de Dios:** Prov. Tambopata, Tambopata Nature Reserve, *Barbour 4763* (F, MO). Maldonado, *López 4585* (GH).

26. *Adiantum alarconianum* Gaud., Voy. Bonite Bot. t. 99. 1846. TYPE: Ecuador, (Guayas),

Guayaquil, April, 1836, *Gaudichaud* (holotype, p!; isotype, b!; frag., us!; photo, US of FI).

*Adiantum incisum* Presl, Reliq. haenk. 1: 61, t. 10, f. 3. 1825, not Forssk. 1775. LECTOTYPE (designated here): Ecuador, Guayaquil, *Haenke 10*, PR or PRC?, not seen; ISOLECTOTYPES: BM!, w!, LECTOPARATYPE: *Haenke 9* (not seen).

**Stem** moderately stout, short-creeping, scales iridescent. **Leaves** ca. 30–50 cm long, petiole glabrous or slightly pubescent-scaly on the adaxial side, rachis similar but definitely pubescent-scaly on the adaxial side, usually glabrous elsewhere. **Lamina** linear to broadly linear and 1-pinnate or broadly ovate-oblong and 2-pinnate. **Entire pinnae** or pinnules oblong-falcate to long-triangular, strongly asymmetrical at the base, alternate, glabrate abaxially, sessile or subsessile. **Indusium** single, long, borne on the upper side.

In woods, ca. 650 m, Tumbes. Ecuador and adjacent Peru.

This is a distinctive species with iridescent stem scales and the indument of the rachis usually confined to the adaxial side. In leaves with a 2-pinnate lamina, only the basal or lower pinnae are 1-pinnate.

**Tumbes:** Prov. Zarumilla, Bosque Nacional de Tumbes, *J. Schunke V. 2385* (F, GH, US). Between Cancho and Cotrina, *Coronado 218* (GH, UC). Tumbes to Cancho, *Coronado 228* (UC).

27. *Adiantum mathewsianum* Hooker, Sp. fil. 2: 35. 1851. TYPE: Peru, (Amazonas), Chachapoyas, *Mathews 3296* (holotype, k!; photo, US; frag. ex k, NY!).

**Stem** stout, short-creeping. **Leaves** usually large, to 1 m or more long, petiole glabrous, rachis similar. **Lamina** broadly ovate-triangular, to 4-pinnate. **Pinnae** widely alternate, the basal very large, ultimate segments mostly oblong to trapeziform, bluntly acute (the terminal one acute to acuminate) glabrous, short-stalked, articulate, the dark color of the stalk not entering the segment, the inner edge often overlaying the axis. **Indusia** many, borne on the upper and often the distal side, short-oblong to lunate.

In forests, 450–1300 m, Amazonas, San Martín, and Junín.

Peru to Paraguay.

This is a glabrous species with mostly blunt ultimate segments. The stalks of the segments are short and articulate.

**Amazonas:** Prov. Bagua, above Cascadas de Mayasi, *Wurdack 2024* (GH, US). Prov. Bagua, ca. 5 km S of La Peca, *Barbour 4315* (MO). Prov. Bongará, Dist. Sipabamba, *Young & Eisenberg 320* (F). **San Martín:** Tabalosos, *Stübel 1084* (B). **Junín:** La Merced, *Soukup 1116* (F). Chanchamayo, 1918. *Esposito* (USM).

28. ***Adiantum platyphyllum*** Sw., Kongl. Vetensk. Akad. Handl. 1817: 74, t. 3, f. 6. 1817. TYPE: Brazil, Minas Gerais, Villa Rica, *Freyreis* (holotype, Herb. Sw., s-PA!; frag., US!).

**Stem** moderately stout, short-creeping. **Leaves** up to ca. 0.7 m long, petiole glabrous, rachis similar. **Lamina** broadly triangular to ovate-triangular, 2-pinnate, or small ones oblong, 1-pinnate. **Pinnae** widely alternate, the basal largest, ultimate segments ovate-lanceolate, cuneate, long-acute to long-acuminate, glabrous, decidedly glaucous abaxially, long-stalked, not articulate, the dark color of the stalk entering the base of the segment beneath, large. **Indusia** borne on the upper and distal sides (the inner and lower sides not well defined), numerous, mostly long-oblong, often arcuate.

In forests, 350–1700 m, San Martín to Madre de Dios.

Ecuador to Bolivia and Brazil.

The long-stalked, large, glaucous and long-acuminate ultimate segments combine to make this a distinctive species. The dark color of the stalk enters the base of the segments, while in the following two species, the stalk is articulate at its apex and the dark color does not enter the segment base.

**San Martín:** Zepelacio, near Moyobamba, *Klug 3490* (F, GH, MO, NY, US). San Roque, *Ll. Williams 7446* (F, US). **Huánuco:** Pozuzo, *Macbride 4570* (F, US). **Junín:** Chanchamayo valley, *C. Schunke 4, 1366, 1368* (F, US). **Madre de Dios:** Prov. Tambopata, *Vargas 18674* (GH).

29. ***Adiantum peruvianum*** Klotzsch, *Linnaea* 18: 555. 1845. SYNTYPES: Peru, (Junín), Vitoc, *Ruíz 25* (B!); Peru, Chachavani, *Ruíz 27* (B!). Frag. ex B, *Ruíz & Pavón 25* (US!).

**Stem** large and massive, very short-creeping. **Leaves** to 1 m long, petiole glabrous, rachis similar. **Lamina** broadly ovate-triangular, to 3-pin-

nate, or small ones elongate-triangular or oblong, 1–2-pinnate. **Pinnae** widely alternate, the basal largest, ultimate segments mostly ovate-trapeziform, bluntly acute or rounded (the terminal bluntly acute), glabrous, long-stalked, articulate, the dark color of the stalk not entering the segment, large. **Indusia** many, borne on the upper and distal sides, few if any on the inner side, roundish to short-oblong or lunate.

In rich humus in forests, or on rocky slopes or canyon sides in forests, 750–2800 m, Huánuco to Cuzco.

Ecuador to Bolivia.

The bluntly acute ultimate segments distinguish this species from the related *Adiantum anceps*. Small fertile leaves may be 1-pinnate, in larger ones they are 2–3-pinnate.

**Huánuco:** Puente Durand, north of Huánuco, *Stork & Horton 9448* (F, GH, UC, US). Gorge of Río Chinchao, *Tryon & Tryon 5313* (BM, F, MO, U, US, USM). **Pasco:** Prov. Oxapampa, a Oxapampa, *León 475* (USM). **Junín:** Puente San Felix, *Cerrate 2869* (GH, USM). 10 km W of San Ramón, *Tryon & Tryon 5450* (BM, F, MO, USM). **Ucayali:** Boquerón de Padre Abad, 1943, *Ridout* (USM). **Cuzco:** Santa Rosa, Urubamba valley, *Cook & Gilbert 1714* (US).

30. ***Adiantum anceps*** Maxon & Morton, *Amer. Fern J.* 24: 15. 1934. TYPE: Peru, Junín, La Merced, *Killip & Smith 24069* (holotype, US!; isotype, NY!).

**Stem** large and massive, short- or very short-creeping. **Leaves** to 1.5 m long, petiole glabrous, rachis similar. **Lamina** broadly ovate-triangular, to 3-pinnate, or small ones elongate-triangular or oblong, 1- or 2-pinnate. **Pinnae** widely alternate, the basal largest, ultimate segments mostly ovate-cuneate concavely acuminate, glabrous, long-stalked, articulate, the dark color of the stalk not entering the segment, large. **Indusia** borne on the upper and distal sides (the inner and lower sides not well defined), numerous, roundish to short-oblong or lunate.

In forests, on steep forested slopes, less often at the edge of forests or among wet rocks, 200–2000 m, Amazonas to Cuzco.

Colombia, Ecuador, and Peru.

The concavely acuminate, rather than bluntly acute, ultimate segments separate this species from the related *Adiantum peruvianum*.

**Amazonas:** Prov. Bagua, above Cascadas de Mayasi, *Wurdack 1885* (F, GH, US). **San Martín:** Juan Jui, Alto Río Huallaga, *Klug 4255* (BM, F, GH, MO, NY, UC, US, USM). Pongo de Cainarachi, Río Cainarachi, *Klug 2688* (BM, F, GH, MO, NY, US). **Huánuco:** Tingo María, *Tryon & Tryon 5288* (BM, F, GH, MO, NY, U, UC, US, USM). **Pasco:** Prov. Oxapampa, near confluence of Río Palcazú and Río Iscozacín, *D. Smith 1957* (MO). **Junín:** La Merced, *Killip & Smith 23478* (F, GH, NY, US). **Ucayali:** Vicinity of Aguaytía, *Croat 20997* (MO), *Mathias & Taylor 3589* (F). **Cuzco:** Prov. La Convención, Quellouno, *Vargas 13556* (GH).

31. *Adiantum lucidum* (Cav.) Sw., Syn. fil. 121. 1806.

*Pteris lucida* Cav. Descr. pl. 266. 1802. TYPE: Ecuador, (Bolívar), Guaranda, *Née* (holotype, MA?; isotype, s!).

**Stem** moderately stout, short-creeping. **Leaves** mostly 30–60 cm long, petiole deciduously pubescent-scaly, rachis similar. **Lamina** oblong, 1- or 2-pinnate at the base. **Entire pinnae** asymmetrically ovate-lanceolate to long-triangular, unequalledly cuneate, alternate, glabrous or slightly scaly abaxially, not articulate, the dark color of the stalk not or hardly continuing into the base of the pinna, midvein indistinct or lacking in the apical half. **Indusia** single, long, on each side of the pinna.

In forests, 300–700 m, San Martín to Madre de Dios.

Panama; Trinidad and Tobago; Guianas to Colombia and south to Peru.

Jerry and Walker (Bull. Brit. Mus. (Nat. Hist.), Bot. 13: 173–175. 1985) consider *Adiantum lucidum* to be a 1-pinnate sexual diploid species in Trinidad. Peruvian plants that have a 2-pinnate lamina may be hybrids with a 2-pinnate species, or they may be part of the variation of *A. lucidum*.

**San Martín:** Prov. Mariscal Cáceres, Tocache Nuevo, *J. Schunke V. 4320* (F, GH, US). **Huánuco:** Prov. Pachitea, Bosque Nacional de Iparia, *J. Schunke V. 1373* (F). **Junín:** Prov. Chanchamayo, Pichanaki, *van der Werff et al. 8620* (MO). Río Satipo, 1940, *Ridoutt* (US, USM). **Madre de Dios:** Prov. Tambopata, Río Piedras, *Vargas 18628* (GH).

32. *Adiantum poeppigianum* (Kuhn) Hieron., Hedwigia 48: 231. 1909.

*Adiantum lucidum* var. *poeppigianum* Kuhn, Jahrb. Königl. Bot. Gart. Berlin, 1: 340. 1881. TYPE:

Peru, (Loreto), Prov. Maynas, *Poeppig 2268* (holotype, B!; isotypes, BM!, GH!, LE!, US!).

**Stem** rather slender, long-creeping. **Leaves** ca. 30–50 cm long, petiole deciduously pubescent-scaly, rachis similar. **Lamina** roundish-ovate to ovate-oblong, usually 1-(rarely 2)-pinnate at the base. **Entire pinnae** lanceolate-cuneate to ovate-lanceolate and subcordate, broadest at or near the base, especially the terminal one, subopposite to alternate, glabrous or slightly scaly abaxially, not articulate, the dark color of the stalk continuing into the base of the pinna, midvein distinct to the apex. **Indusia** single, very long, on each side of the pinna or pinnule.

In dense, or sometimes in rather open, forests, 135–500 m, Amazonas and Loreto to Madre de Dios.

Endemic to Peru.

This species is distinguished from the somewhat similar *Adiantum lucidum* by the dark color of the stalk of the segment continuing well into the base of the segment. It is perhaps closer to *Adiantum phyllitidis*, which is not known from Peru but may occur there. Characters of the two species are mentioned in **Comments**.

**Amazonas:** Prov. Bagua, entre Aramango y Montenegro, *López et al. 4227* (GH). **San Martín:** Prov. Mariscal Cáceres, Dist. Campanilla, *J. Schunke V. 4222* (F, US). Juan Jui, *Ferreya 4525* (GH, USM). **Loreto:** Puerto Arturo, below Yurimaguas, *Killip & Smith 27724* (F, NY, US). Yurimaguas, *Killip & Smith 28013* (F, NY, US). **Huánuco:** Prov. Pachitea, Bosque Nacional de Iparia, *J. Schunke V. 1243* (F, GH, US), *1911* (F, GH, US). **Junín:** Satipo, 1940, *Ridoutt* (GH, USM). Río Negro to Satipo, *Woytkowski 5843* (UC, US). **Madre de Dios:** Parque Nacional de Manú, *M. S. Foster P-84-97* (MO).

33. *Adiantum scalare* Tryon, Amer. Fern J. 47: 141, t. 15. 1957. TYPE: Peru, Loreto, Río Santiago, *Mexia 6162* (holotype, UC!; isotypes, BM!, F!, GH!, K!, MO!, PH!).

**Stem** moderately stout, short-creeping. **Leaves** ca. 60–75 cm long, petiole deciduously scaly, rachis persistently scaly. **Lamina** ovate or oblong-ovate, 1-pinnate, the basal pinnae rarely with a large basal, basicopic segment. **Pinnae** closely alternate, very narrowly long-triangular, entire, often auriculate, with long brown trichomes abaxially. **Indusia** single, very long, on each side of the pinna.

In dense forests, 200–400 m, Amazonas to Madre de Dios.

Endemic to Peru.

This is a very distinctive species, with long, narrowly triangular pinnae that are pubescent abaxially and usually have a small, basal, acroscopic auricle.

**Amazonas:** Prov. Bagua, above Cascadas de Mayasi, *Wurdack 2000* (GH, US). **San Martín:** Prov. Mariscal Cáceres, Dist. Campanilla, *J. Schunke V. 4253* (F, GH, US). **Loreto:** Prov. Maynas, Pébas and vicinity, *Plowman et al. 7034* (F, GH). **Huánuco:** Prov. Pachitea, Bosque Nacional de Iparia, Puerto Inca, *J. Schunke V. 2975* (F, GH). **Pasco:** Cahuapanas, on Río Pichis, (as Junín), *Killip & Smith 26741* (F, GH, NY, US). **Ucayali:** Prov. Coronel Portillo, San Alejandro, *Espinoza 281* (USM). **Prov. Coronel Portillo,** Bosque Nacional de Iparia, Iparia, *J. Schunke V. 2647* (F, GH). **Madre de Dios:** Manú National Park, *Gentry et al. 27208* (MO).

34. *Adiantum macrophyllum* Sw., Prodr. 135. 1788. TYPE: Jamaica, Swartz (holotype, Herb. Swartz, s!).

**Stem** moderately stout, short to moderately creeping. **Leaves** mostly 30–60 cm long, petiole glabrous, rachis similar. **Lamina** oblong-acute or elongate-triangular, 1-pinnate. **Pinnae** essentially opposite, rarely some alternate, entire, long-triangular to ovate-triangular, broadly cuneate, occasionally auriculate or biauriculate, acute to acuminate, glabrous, glaucous or dull abaxially, sessile, not articulate, the dark color of the short stalk entering the base of the pinna, large. **Indusia** single, long, borne on each side of the pinna, rarely 2 or 3 on some pinnae.

- a. Terminal pinna entire, ovate-acuminate to rather narrowly ovate-acute, subcordate to broadly cuneate at the base, broadest at or near the base; the lateral entire pinnae similar; or sometimes the apical pinna with 1 or 2 prominent basal auricles . . . . . **A. poeppigianum**
- a. Terminal pinna entire, lanceolate to elliptical, cuneate to narrowly rounded at the base, broadest well above the base; the lateral entire pinnae similar . . . . . **A. phyllitidis**

## XV. Pteris

*Pteris* L., Sp. pl. 1073. 1753; Gen. pl. 484. 1754.  
TYPE: *Pteris longifolia* L. **Figure 15.**

**Terrestrial.** **Stem** erect or short- to long-creeping, bearing scales. **Leaves** usually monomorphic, borne at intervals or in a cluster, the petiole with 1–2 (more?) vascular bundles near the base. **Lam-**

In woods, in dense forests, on shaded banks, and in rocky places, especially along streams, or in disturbed vegetation, 200–2500 m, Amazonas to Puno.

Tropical America.

This is one of the distinctive species of *Adiantum*. It has a 1-pinnate lamina, commonly opposite pinnae that are glabrous or glaucous abaxially, and the fertile pinna usually has a single long indusium on the upper and lower sides.

**Amazonas:** Prov. Bagua, 5 km S of La Peca, *Barbour 4316* (F, MO, USM). **San Martín:** Tarapoto, *Woytkowski 35247* (MO, UC), *Soukup 5127* (GH). **Loreto:** Río Marañón, above Pongo de Manseriche, *Mexia 6179a* (UC). **Huánuco:** Hacienda Mercedes, *Mexia 8186* (F, GH, MO, UC, US). **Pasco:** Pichis Trail, between San Nicolás and Azupizu, *Killip & Smith 26112* (F, NY, US). **Junín:** La Merced, *Soukup 1111* (F). **Ayacucho:** Estrella, between Huanta and Río Apurímac, *Killip & Smith 23056* (F, GH, NY, US). **Cuzco:** Potrero, *Tryon & Tryon 5388* (BM, F, MO, U, US, USM). **Madre de Dios:** Alto Madre de Dios, *Rauh P1667* (B). **Puno:** Prov. Sandia, Chunchosmayo, *Weberbauer 1267* (B).

## Comments

*Adiantum phyllitidis* John Sm., London J. Bot. 1: 197. 1842. TYPE: British Guiana, *Schomburgk 300* (BM or K).

This species occurs in the Guianas where it is rather common, westward to Colombia, and it may occur in Peru. It is very close to *Adiantum poeppigianum* and the following key will serve to distinguish these two similar species:

ina 1–5-pinnate, with pinnate or pedate architecture, the basal pinnae often with enlarged basis-copic segments, usually glabrous or somewhat scaly or pubescent abaxially, veins free to wholly anastomosing without included free veinlets. **Sori** on a marginal commissure connecting the vein ends, covered by a well-differentiated marginal indusium, paraphyses absent or rarely present. **Spores** tetrahedral-globose or globose, usually with an equatorial flange, tuberculate to reticulate.



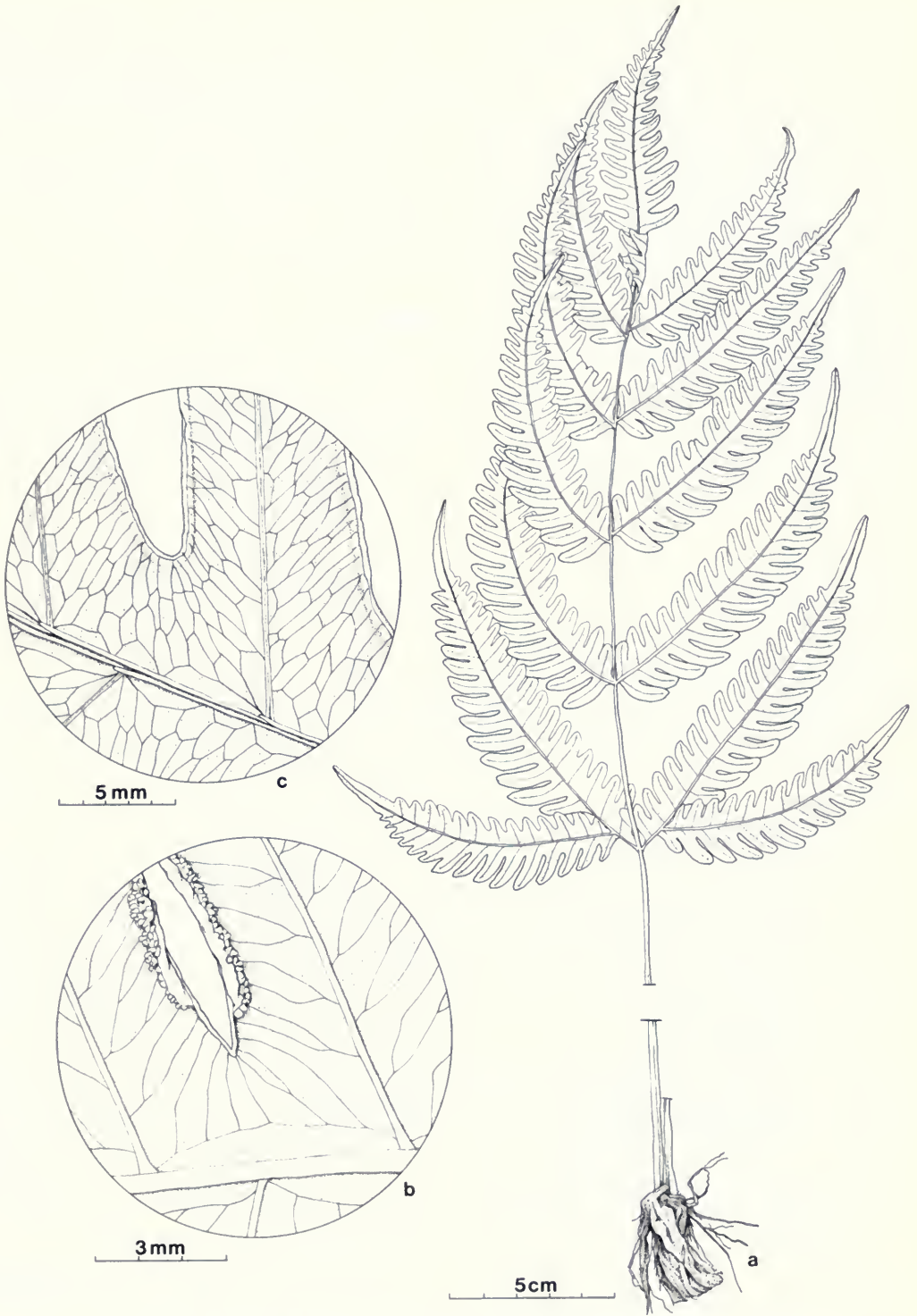


FIG. 15. *Pteris biaurita*: a, habit; b, portion of fertile pinna, abaxial side. *Pteris altissima*: c, portion of pinna, adaxial side. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)

*Pteris* is a pantropical genus of about 200 species, a few of them temperate. Twenty-three species are in Peru, and three of these, *Pteris cretica*, *P. tripartita*, and *P. vittata*, are adventive.

It is difficult to place the species of *Pteris* into natural groups. In this treatment the species with less derived lamina architecture (more complex and pinnate) are followed by those with a derived architecture (less complex or not pinnate), and free-veined species precede those with areolate veins.

The stem and leaves of species with very large leaves such as *Pteris livida*, *P. tripartita*, and *P. podophylla* are poorly represented in herbaria, and consequently fragmentary specimens may be difficult or impossible to determine with certainty. Adequate specimens of these species are much desired.

Most species of *Pteris* have awns on the adaxial side of the costa of the penultimate segments at

the base of each costule. A few species such as *Pteris lechleri* and *P. decurrens* lack these awns, and some such *Pteris speciosa* have them on some costae and not on others. The genus is notable for the often enlarged basal pinnae with elaborated segments on the basispicose side.

The treatment of *Pteris* in Tryon (1964) has been somewhat modified through the study of new collections.

### References

TRYON, R. 1964. *Pteris*, pp. 188–210, in *The ferns of Peru*. *Contr. Gray Herb.*, **194**: 1–253.  
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### Key to Species of *Pteris*

- a. Veins free (rarely areolae may be present) . . . . . b
- b. All pinnae, or those above the base, entire . . . . . c
  - c. Lamina with the basal pinnae usually with a single large pinnule, rarely entire; pinnae 1–5 pairs, cuneate or decurrent, the basal largest or nearly so . . . . . 22. **P. cretica**
  - c. Lamina 1-pinnate; the pinnae 10 to many pairs, subcordate, the basal ones reduced . . . . . 23. **P. vittata**
- b. All pinnae pinnatifid or more complex, rarely reduced apical ones are entire . . . . . d
- d. Basal pinnae 1-pinnate or more complex beyond the basal pinnules . . . . . e
  - e. Penultimate segments 1-pinnate, except sometimes toward the apex; ultimate segments mostly narrowed at the base, at least on the acroscopic side . . . . . f
    - f. Basal pinnae the largest but each much smaller than the remaining portion of the lamina which is 1–3-pinnate at the base; ultimate segments very coriaceous . . . 3. **P. coriacea**
    - f. Basal pinnae very large, lamina nearly tripartite, 5-pinnate at the base; ultimate segments herbaceous . . . . . 18. **P. bakeri**
  - e. Penultimate segments deeply pinnatifid or 1-pinnate only at the base; ultimate segments broad at the base . . . . . g
    - g. Costa of the penultimate segments (and other axes) smooth abaxially, with deciduous trichomes, rarely scales; segments usually herbaceous . . . . . 1. **P. deflexa**
    - g. Costa of the penultimate segments shortly muriculate to muriculate-spiculate abaxially (the other axes usually similar), with a caducous scale, rarely a trichome, borne at the apex of each process; segments coriaceous . . . . . 2. **P. muricata**
- d. Basal pinnae deeply pinnatifid beyond the 1 (rarely 2 or more) enlarged, basal, inferior, pinnatifid pinnule(s) . . . . . h
  - h. Veins arising from the costules of the ultimate segments, or near their base . . . . . 4. **P. quadriaurita**
  - h. One or 2 veins, especially in the basal portion of the penultimate segment, arising from the costa of the penultimate segment about halfway between adjacent costules . . . . . 5. **P. pungens**

- a. Venation areolate or predominantly so, or at least a row of areolae along the costa of the penultimate segment . . . . . i
- i. Pinnae irregularly lobed or some of them entire . . . . . 17. **P. petiolulata**
- i. Pinnae all entire or regularly pinnatifid or pinnate . . . . . j
- j. Nearly all ultimate segments (usually pinnae or pinnules) stalked, entire, mostly 15–40 cm long . . . . . k
- k. Costal areolae very long and narrow, diverging from the costa; lamina 1-pinnate; margins of the sterile pinnae entire back of the apex . . . . . 15. **P. grandifolia**
- k. Many costal areolae not, or not much, longer than their breadth along the costa . . . . . l
- l. Lamina 2-(rarely 3-)pinnate at the base, or 1-pinnate in small leaves; most or many of the longer areolae 4 times or more longer than broad; margins of the sterile pinnae serrate back of the apex . . . . . 14. **P. haenkeana**
- l. Lamina 1-pinnate, or rarely with an enlarged basal inferior pinnule on the basal pinnae; most of the longer areolae about twice as long as broad; margins of the sterile pinnae entire back of the apex . . . . . 16. **P. splendens**
- j. Ultimate segments joined at the base, or sessile, or lobed . . . . . m
- m. Leaves pinnate, the basal pinnae pinnatifid or pinnate or with a single (rarely more) enlarged basal inferior pinnule . . . . . n
- n. Leaves dimorphic, the sterile with segments ca. 3 times as broad as the fertile; ultimate segments mostly more than 10 cm long; few stalked pinnae below the large, deeply pinnatifid apical portion . . . . . 13. **P. fraseri**
- n. Leaves monomorphic or nearly so; ultimate segments mostly 2–5 cm long, sometimes a few to ca. 10 cm long; several to many stalked pinnae below the pinnatifid apical portion . . . . . o
- o. Two or more costal areolae with their long axis parallel to the costa of the penultimate segment between adjacent costules; the costa awned on the adaxial side at the base of the costule . . . . . 7. **P. altissima**
- o. A single costal areola, or none, with its long axis parallel to the costa of the penultimate segment between adjacent costules, or if with 2 long areolae then the costa not awned on the adaxial side . . . . . p
- p. Basal pinnae 1-pinnate-pinnatifid . . . . . 6. **P. propinqua**
- p. Basal pinnae pinnatifid or with 1 (rarely more) enlarged basal inferior pinnule . . . . . q
- q. Lamina glabrous or very slightly pubescent . . . . . r
- r. Veins mostly free, only basal areolae present . . . . . 10. **P. biaurita**
- r. Veins copiously areolate . . . . . s
- s. Apical segment (pinna) of the lamina long-decurrent . . . . . 11. **P. decurrens**
- s. Apical segment (pinna) of the lamina cuneate or broadly so at the base, not decurrent . . . . . t
- t. Petiole and rachis reddish to dark reddish; leaf tissue coriaceous; apex of sterile segments sharply serrate . . . . . 8. **P. speciosa**
- t. Petiole and rachis stramineous; leaf tissue herbaceous; apex of sterile segments nearly entire to crenulate-serrate . . . . . 9. **P. transparens**
- q. Lamina hirsute on both surfaces, especially on the costa of the penultimate segments. . . . . 12. **P. lechleri**
- m. Leaves ternate, or pedate and the basal pinnae twice branched, with 3 main axes, each axis 1-pinnate-pinnatifid beyond a branch . . . . . u
- u. Lamina ternate; apex of ultimate segments crenulate to crenulate-serrate; ultimate segments usually ca. 6–10 cm long . . . . . 19. **P. livida**
- u. Lamina pedate; ultimate segments ca. 2 cm long or less . . . . . v
- v. Apex of ultimate segments sharply serrate . . . . . 20. **P. podophylla**
- v. Apex of ultimate segments crenulate . . . . . 21. **P. tripartita**

1. *Pteris deflexa* Link, Hort. berol. 2: 30. 1833.

TYPE: Brazil, hort. bot. berol. (holotype, Link Herb., B!; photo, GH).

*Pteris polita* Link, Hort. berol. 2: 30. 1833. TYPE: hort. bot. berol. (holotype, Link Herb., B!; photo, GH).

**Stem** moderately to very stout, to 6–8 cm in diameter, short-creeping or ascending. **Leaves** 0.5–3 m long. **Lamina** pinnate or ternate, 2–3-pinnate-pinnatifid at the base, the basal pinnae the largest, regularly 1-pinnate-pinnatifid or sometimes with 1 or 2 enlarged basal pinnules, pinnae deeply pinnatifid beyond the lower or basal ones. **Penultimate** segments deeply pinnatifid, glabrous, or slightly pubescent or scaly abaxially. **Veins** free.

In dense forests, 800–2300 m, Cajamarca and Amazonas south to Cuzco.

Tropical South America.

Differences between this species and the next, *Pteris muricata*, are discussed under that species.

Morton (Contr. U.S. Natl. Herb. 38: 75. 1967) erroneously considered specimens at Hamburg to typify *Pteris polita* Link, and consequently that name was used for *Pteris propinqua*. However, the holotype of *Pteris polita* at Berlin is clearly *Pteris deflexa*.

**Cajamarca:** Prov. Cutervo, Gruta San Andrés, *Mos-tacero et al.* 1676 (F, GH). **Amazonas:** Ca. 10 km W of Leimebamba, *Edwin & Schunke* 3701 (F). Prov. Bagua, E of La Peca, *Barbour* 2701 (MO, UC). **San Martín:** Tarapoto, *Spruce* 4326 (BM, GH, K, US). **Pasco:** Prov. Oxa-pampa, vicinity of Chequitavo, *D. Smith* 5273 (GH). **Junín:** Prov. Chanchamayo, Río Rundayacu, *Smith et al.* 2608 (F). Cerca a Huacapistana, *Ferreya* 503 (GH, USM). **Ucayali:** Prov. Coronel Portillo, Sinchono, entre Tingo María y Pucallpa, *Aguilar* 898 (GH, USM). **Ayac-ucho:** Ccarrapa, between Huanta and Río Apurímac, *Kil-lip & Smith* 22408 (F, GH, US). **Cuzco:** Quillabamba, *Pey-ton & Peyton* 1207 (GH).

2. *Pteris muricata* Hooker, Sp. fil. 2: 193, t. 123B.

1858. TYPE: Colombia, Antioquia, *Jervise* (holotype, K!).

**Stem** moderately stout, short- to long-creeping, decumbent to ascending. **Leaves** 0.5–2 m or more long. **Lamina** pinnate, ternate or pedate, 2–4-pin-nate-pinnatifid at the base, basal pinnae the larg-est, usually regularly 1-pinnate-pinnatifid or with 1 or more enlarged basal pinnules, deeply pinn-atifid to 2-pinnate-pinnatifid beyond the lower or basal pinnae. **Penultimate** segments deeply pin-

natid, rarely 1-pinnate at the base, shortly mur-icate to muricate-spiculate abaxially, deciduously scaly and rarely pubescent beneath. **Veins** free.

In forests and cloud forests, in moist ravines, at the edge of woods, and in moist, rocky places, 1700–4000 m, Cajamarca south to Puno.

Mexico south to Bolivia.

This species may be related to *Pteris bakeri* by the muricate processes on the costa beneath. It is evidently closer to the previous species, *Pteris de-flexa*, from which it differs in the firmer texture of the lamina segments and the muricate to mur-icate-spiculate costae abaxially. In addition, the processes of *Pteris muricata* bear caducous scales, while in *P. deflexa* there are deciduous trichomes abaxially. Rarely there are specimens that appear to be intermediate between the two species.

**Cajamarca:** Prov. San Miguel, Cerro Quillón, *Mos-tacero et al.* 1297 (F). **Huánuco:** Mito, *Macbride & Feath-erstone* 1619 (F, US). Muña, *Bryan* 465 (F, GH). **Pasco:** Quillasú, *Soukup* 3283 (GH). **Junín:** Between Palca and San Ramón, *Correll & Smith* P785 (GH). Huacapistana, *Killip & Smith* 24191 (US). **Huancavelica:** Prov. Taya-caja, cerca a Tocas, *Tovar* 2053 (USM). **Apurímac:** Prov. Abancay, arriba de Abancay, *Ferreya* 9808 (GH, USM). **Cuzco:** Machu Picchu, *Tryon & Tryon* 5398 (BM, F, GH). Tres Cruces, *Vargas* 1055 (GH, US). **Puno:** Prov. Caraba-ya, entre Ayapata y Kahualluyoc, *Vargas* 10751 (GH). Tabina, *Lechler* 2030 (B, K).

3. *Pteris coriacea* Desv., Mém. Soc. Linn. Paris

6: 300. 1827. TYPE: Peru, *Dombey* (holotype, Desvaux Herb., the complete leaf, P!; photo, GH; isotype, Herb. Gen., P!; photo, GH).

**Stem** moderately stout, short-creeping. **Leaves** 30–75 cm or more long. **Lamina** pinnate, 2–3-pin-nate at the base, basal pinnae the largest, regu-larly 1-pinnate beyond the often 1 or more en-larged basal pinnules, pinnae mostly 1-pinnate be-yond the lower or basal ones. **Penultimate** segmen-ts mostly 1-pinnate, smooth to muricate-spiculate and deciduously scaly abaxially. **Veins** free.

In woods and in rocky places, 2800–3900 m, Ancash south to Apurímac.

Ecuador and Peru.

The separate ultimate segments mostly nar-rowed at the base are characteristic of this species. It is related to the previous species, *Pteris muricata*, by the muricate-spiculate costae abaxially and may be a high-altitude derivative of that species. Most collections are from 3100–3900 m, while those of *P. muricata* are mostly from 3000 m or lower.

**Ancash:** Prov. Bolognesi, cerca a Llamac, *Cerrate* 2372 (GH, USM). **Huánuco:** Chasqui, *Macbride & Featherstone* 1755 (F, US). **Lima:** Between San Mateo and Parac, *Coronado* 312 (GH, UC). **Junín:** Prov. Huancayo, entre Huaytapallana y Chilifruta, *Tovar* 4290 (GH). Tarma, *Kunkel* 406 (GH). **Apurímac:** Prov. Abancay, Bosque de Ampay, *Vargas* 1062 (GH, US).

4. ***Pteris quadriaurita*** Retz., *Observ. bot.* 6: 38. 1791. TYPE: Ceylon, *König* (holotype, Retzius Herb., LD).

*Pteris edentula* Kunze, *Linnaea* 9: 75. 1834. (as *Pteris biaurita* var.? *P. edentula*) TYPE: Peru, (Huánuco), Pampayacu, *Poeppig* 233 (*Diar.* 1106) (holotype, LZ destroyed; isotype, v!; photo, GH; frag., us).

**Stem** moderately stout, decumbent or erect. **Leaves** ca. 0.5–2 m long. **Lamina** pinnate, 2-pinnate-pinnatifid at the base, basal pinnae regularly deeply pinnatifid beyond the usually single enlarged basal inferior pinnule, pinnae usually deeply pinnatifid beyond the basal ones. **Penultimate segments** deeply pinnatifid, glabrous or usually slightly pubescent abaxially. **Veins** free.

Dense forests, woods and thickets, sometimes in rocky places, 650–2200 m, Lambayeque south to Cuzco.

Tropical America; Old World.

In *Pteris quadriaurita* the veins of an ultimate segment arise from the costule, or near it, while in *Pteris pungens* there are one or two veins that arise from the costa, distant from the costule, especially in the basal portion of a penultimate segment.

**Lambayeque:** Km 32 on road from Olmos to Jaén, *Correll & Smith* P830 (GH). **Amazonas:** Prov. Bagua, Cordillera Colán, SE of La Peca, *Barbour* 4192 (MO). **Huánuco:** Río Huallaga, below Río Santo Domingo, *Macbride* 4233 (F, US). Pampayacu, *Macbride* 5043 (F, US). **Pasco:** Prov. Oxapampa, SE of Oxapampa, *D. Smith* 2898 (MO). **Junín:** La Merced, *Killip & Smith* 23473 (F, US), 23686 (F, US), *Cerrate* 2832 (GH, USM). **Cuzco:** Potrero, *Tryon & Tryon* 5367 (BM, F, GH, U, US, USM), *Vargas* 8236 (UC).

5. ***Pteris pungens*** Willd., *Sp. pl. ed.* 4, 5: 387. 1810. LECTOTYPE (designated by Proctor, *Flora Lesser Antilles* 2: 144. 1977): Hispaniola, Plumier, *Traité foug. Amér. t.* 14. 1705.

**Stem** moderately stout, decumbent or erect. **Leaves** ca. 0.5–2 m long. **Lamina** pinnate, 1-pin-

nate-pinnatifid to usually 2-pinnate-pinnatifid at the base, basal pinnae regularly deeply pinnatifid beyond the usually single enlarged, basal inferior pinnule, pinnae deeply pinnatifid beyond the basal ones. **Penultimate segments** deeply pinnatifid, glabrous or nearly so abaxially. **Veins** free.

Dense forests, 100–900 m, San Martín and Loreto south to Madre de Dios.

Mexico and the West Indies; northern South America, south to Bolivia.

The difference in the venation between *Pteris quadriaurita* and this species is mentioned under the former species.

**San Martín:** Tarapoto, *Spruce* 4750 (κ). Prov. San Martín, E of Tarapoto, *Woytkowski* 35215 (MO). **Loreto:** Yurimaguas, *Ll. Williams* 3865 (F, US). Balsapuerto, *Killip & Smith* 28517 (GH, US). **Huánuco:** Río Lullapichis, *Dudley* 12483 (GH), 12485 (GH). Prov. Pachitea, Bosque Nacional de Iparia, *J. Schunke* V. 1755 (F, GH). **Madre de Dios:** Prov. Tambopata, Río Tambopata, *Barbour* 4880 (MO).

6. ***Pteris propinqua*** Agardh, *Recens. spec. pter.* 65. 1839. LECTOTYPE (designated here): Jamaica, *Bancroft* (holotype, κ!). LECTOPARATYPE: Jamaica, *MacFadyen*, κ.

**Stem** moderately stout to stout, erect. **Leaves** 0.5–1.5 m long. **Lamina** pinnate, 2-pinnate-pinnatifid at the base, basal pinnae the largest, rather regularly 1-pinnate-pinnatifid, pinnae deeply pinnatifid beyond the lower or basal ones. **Penultimate segments** deeply pinnatifid, the base narrowly decurrent on its stalk or onto the next axis, glabrous or minutely pubescent abaxially. **Veins** partly areolate, 1 costal areola with its long axis parallel to the costa between adjacent costules.

In forests and along forest borders, 100–700 m, San Martín south to Pasco.

Tropical America.

The misapplication of the name *Pteris polita* to this species has been mentioned under *Pteris deflexa*.

The base of the penultimate segments is decurrent onto the stalk or onto the next axis.

**San Martín:** Prov. Mariscal Cáceres, Tocache Nuevo, *J. Schunke* V. 3378 (F, GH, US), 7038 (MO). **Loreto:** Gamitanacocha, Río Mazán, *J. Schunke* 282 (F, GH, UC, US). Paraíso, upper Río Itaya, *Ll. Williams* 3356 (F, US). **Huánuco:** Tingo María, (as San Martín), *Allard* 21920 (GH, US). **Pasco:** Puerto Bermúdez, (as Junín), *Killip & Smith* 26639 (US).

7. *Pteris altissima* Poiret in Lam., *Encycl.* 5: 722. 1804. TYPE: Porto Ricco (Puerto Rico), *Ledru* (holotype, Lamarck Herb., p!; photo, GH). **Figure 15c.**

*Pteris kunzeana* Agardh, *Recens. spec. pter.* 62. 1839. SYNTYPES: Peru, *Poeppig 225* is one of several collections cited. b!; photo, GH, as is Peru, *Mathews 1802*, k!; frag., NY.

**Stem** erect in young plants, becoming moderately stout and short- to rather long-creeping. **Leaves** 0.8–2.5 m long. **Lamina** pinnate or nearly ternate, 2-pinnate-pinnatifid at the base, basal pinnae the largest, 1-pinnate-pinnatifid toward the base, deeply pinnatifid beyond, pinnae pinnatifid beyond the lower or basal ones. **Penultimate segments** pinnatifid to deeply pinnatifid, glabrous or minutely pubescent abaxially. **Veins** copiously areolate, 2 or more costal areolae with their long axis parallel to the costa between adjacent costules.

In rain forests, montane forests, and in wet ravines, 100–1500 m, Amazonas south to Cuzco and Madre de Dios.

Tropical America.

This species is characterized by having two or more of the costal areolae with their long axis parallel to the costa between adjacent costules, and with awns on the costa above.

**Amazonas:** Prov. Bagua, Río Utcubamba, 40 km S of Bagua Grande, *Hutchison 1486* (GH, US). **San Martín:** Tarapoto, *Spruce 4061* (BM, K). Zepelacio, near Moyobamba, *Klug 3704* (F, GH, K, US). **Loreto:** Mouth of Río Santiago, above Pongo de Manseriche, *Mexia 6125* (F, GH, K, MO, UC, US), *6125a* (GH, K, UC, US). **Huánuco:** Tingo María, *Tryon & Tryon 5229* (BM, F, GH, U, USM). **Pasco:** Prov. Oxapampa, vicinity of Chequitavo, *D. Smith 5258* (GH). **Junín:** La Merced, *Soukup 1098* (F). **Ucayali:** Prov. Coronel Portillo, Bosque Nacional Humboldt, *Vásquez 3387* (F). **Ayacucho:** Near Kimpitiriki, Río Apurímac valley, *Killip & Smith 23039* (US). **Cuzco:** Prov. Paucartambo, Kosñipata, *Vargas 11260* (GH). **Madre de Dios:** Prov. Manú, Atalaya, *Foster & Wachter 7435* (MO).

8. *Pteris speciosa* Kuhn, *Linnaea* 36: 91. 1869. LECTOTYPE (designated here): Peru, St. Gaván (Río San Gabán), *Lechler 2326* (holotype, b!, Herb. Mett., photo, GH; frags., NY!, us!). ISOLECTOPARATYPES: Peru, (San Martín), Tarapoto, *Spruce 4759*, k!; photo, GH; Ecuador, *Spruce 4757*, BM!, k!; photo, GH of K).

*Pteris reticulata* Kuhn, *Linnaea* 35: 91. 1869, *ex char.*, not Desv. 1811. SYNTYPES: Peru, *Pavón*, Peru, *Spruce 4752* (4725?). Material of these collections at b! may be authentic).

*Pteris reticulatovenosa* Hieron., *Hedwigia* 48: 243. 1909, *nom. nov.* for *Pteris reticulata* Kuhn, not Desv., and with the same type.

**Stem** moderately stout, creeping. **Leaves** ca. 0.75–1.75 m long. **Lamina** pinnate, shallowly to deeply 1-pinnate-pinnatifid. **Pinnae** with the sterile or partly fertile ones rather shallowly pinnatifid and the fully fertile ones shallowly to deeply pinnatifid, glabrous or minutely pubescent abaxially, the ultimate segments falcate, coriaceous. **Veins** copiously areolate, 1 costal areola with its long axis parallel to the costa between adjacent costules.

In forests, ca. 1000–1800 m, San Martín south to Puno.

Colombia to Peru.

Kuhn cited *Spruce 4757* as from Ecuador, while the specimen at K has a label indicating Peru. The specimen of *Spruce 4759* at K has a pencil note indicating it to be *4757*. How many separate collections are involved is uncertain.

*Pteris speciosa* is especially separated from *P. transparens* by the reddish petiole and rachis of *P. speciosa* rather than the stramineous petiole and rachis of *P. transparens*. In addition, the apex of sterile segments is sharply serrate in *P. speciosa*, while it is nearly entire to crenulate-serrate in *P. transparens*. Some specimens of *P. speciosa* lack awns on the costa adaxially, while these are present in *P. transparens*.

Small portions of a leaf, usually pinnae, may be similar in *P. speciosa* and *P. livida*. These may be separated as follows. In *P. speciosa* the costule of the ultimate segments is prominently raised adaxially and rounded, or sometimes narrowly grooved with the two edges rounded. In *P. livida* the costule of the ultimate segments is grooved adaxially with thin, sometimes narrow wings, which may be somewhat appressed on either side of the costule.

**Pasco:** Dos de Mayo (as Junín), *Killip & Smith 25812* (US). **Cuzco:** Entre Quincemil y San Lorenzo, *Vargas 11724* (GH).

9. *Pteris transparens* Mett., *Ann. Sci. Nat. Bot.* V, 2: 221. 1864. TYPE: Colombia, (Cundinamarca) “Andes Bogotenses,” 1400 m, *Triana*, evidently 622 (holotype, LZ de-

stroyed; isotypes, B!, BM!, COL; frag., GH; pho-  
tos, GH of B, BM, COL).

*Pteris nuda* Copel., Univ. Calif. Publ. Bot. 19: 302.  
1941. TYPE: Peru, Huánuco, Ríochuela Chuntalagua, *Mexia* 8299 (holotype, UC; isotypes, F!, GH!, K!).

**Stem** rather stout, evidently short-creeping. **Leaves** ca. 1–1.5 m long. **Lamina** pinnate, 1-pinnate-pinnatifid at the base, or the basal pinnae regularly deeply pinnatifid beyond the sometimes present single enlarged basal inferior pinnule. **Pinnae**, above the basal ones deeply pinnatifid, essentially glabrous abaxially, ultimate segments patent or nearly so, nearly straight, herbaceous. **Veins** copiously areolate, 1 costal areola with its long axis parallel to the costa between adjacent costules.

Forested banks and rocky slopes, ca. 600 m, Huánuco and (probably) Junín.

Colombia and Peru.

The petiole and rachis is stramineous, rather than reddish as in *Pteris speciosa*. Also the apex of sterile segments is nearly entire to crenulate-serrate rather than sharply serrate. This species is evidently very rare, and although distinct among the Peruvian ones, it is a member of a complex in northern South America which requires clarification. Awns are present on the costa adaxially, these being absent in the otherwise similar *Pteris consanguinea* of Venezuela.

**Huánuco:** Pozuzo, *Macbride* 4718 (us). **Junín:** Pichita Caluga, *Walden* 56 (GH), and 80 (GH) are young plants, probably of this species.

10. *Pteris biaurita* L., Sp. pl. 1076. 1753. LECTOTYPE (designated by Proctor, Flora Lesser Antilles 2: 145. 1977): Plumier, Descr. pl. Amér. t. 14. 1693, and Traité foug. Amér. t. 15. 1705. LINN 1246.19 is this species. **Figure 15a-b.**

**Stem** moderately stout, decumbent to erect. **Leaves** ca. 0.5–1 m long. **Lamina** pinnate, 2-pinnate-pinnatifid at the base, basal pinnae regularly deeply pinnatifid beyond the single enlarged basal inferior pinnule, pinnae deeply pinnatifid beyond the basal ones. **Penultimate segments** deeply pinnatifid, glabrous or minutely pubescent abaxially.

**Veins** free, except for 1 costal areola with its long axis parallel to the costa between adjacent costules, or a few other basal veins joined.

In forests, in clearings and at the edge of forests, sometimes in rocky places, 100–1500 m, Huánuco south to Cuzco.

Tropical America; Old World.

The species is characterized by the areolae only along the costa, although there may be a few elsewhere.

**Huánuco:** Tingo María, *Tryon & Tryon* 5246 (GH, U, us). Pozuzo, *Macbride* 4596 (F). **Pasco:** Río Paucartambo, (as Junín), *Killip & Smith* 25277 (F, U, us). **Junín:** Chanchamayo valley, *C. Schunke* 24 (F). **Ucayali:** Boquerón Padre Abad, (as San Martín), *Allard* 22115 (us). **Cuzco:** Prov. La Convención, Chacanares, *Vargas* 13680 (us).

11. *Pteris decurrens* Presl, Delic. prag. 1: 183. 1822. TYPE: Brazil, (Guanabara), Rio de Janeiro and vicinity, collector and location not known.

*Pteris horizontalis* (Fée) Rosenst., Meded. Rijks-Herb. 19: 10. 1913.

*Litbrochia horizontalis* Fée, Crypt. vasc. Brésil 1: 48, t. 12, f. 1. 1869. TYPE: Brazil, *Glaziou* 2314 (holotype, P?; frag. ex Fée, NY!; photo, GH).

**Stem** stout, evidently erect. **Leaves** ca. 1–2.5 m long. **Lamina** pinnate, 2-pinnate-pinnatifid at the base, basal pinnae regularly deeply pinnatifid beyond the single enlarged basal inferior pinnule, pinnae deeply pinnatifid beyond the basal ones. **Penultimate segments** deeply pinnatifid, glabrous or minutely pubescent abaxially, the upper ones decurrent onto the rachis. **Veins** copiously areolate, 1 or 2 costal areolae with their long axis parallel to the costa between adjacent costules.

In wet woods and cloud forests, ca. 1800 m, Amazonas and Cuzco.

Venezuela, Peru, Bolivia, and Brazil.

The adaxial side of the costa lacks awns and the apical pinna of the lamina is long decurrent on its stalk.

**Amazonas:** Serranía de Bagua, E of La Peca, *Gentry et al.* 22864 (us). **Cuzco:** Prov. Paucartambo, valle de Pillahuata, *Herrera* 1621 (us).

12. *Pteris lechleri* Mett., Fil. lechl. 2: 13. 1859. TYPE: Peru, Dept. Puno, Prov. Carabaya, Tatanara, *Lechler 2533* (holotype, b!; photo, GH).

*Pteris vestita* Baker, Syn. fil. 169. 1867. TYPE: Peru, (San Martín), Tarapoto, *Spruce 4063* (holotype, k!; frag. & photo, US).

*Pteris killipii* Maxon, Amer. Fern J. 23: 107. 1933, *nom. superfl.* for *Pteris vestita* Baker and with the same type.

**Stem** small to moderately stout, erect. **Leaves** ca. 0.5–1.25 m long. **Lamina** pinnate, 2-pinnate-pinnatifid at the base, basal pinnae regularly deeply pinnatifid beyond the single enlarged basal inferior pinnule, pinnae deeply pinnatifid beyond the basal ones. **Penultimate segments** deeply pinnatifid, hirsute on both surfaces, especially on the costa. **Veins** copiously areolate, 1 costal areola with its long axis parallel to the costa between adjacent costules.

Montane forests, 850–1500 m, San Martín south to Puno.

Peru and Bolivia.

This is a very distinctive species because of the hirsute lamina and the lack of awns on the adaxial side of the costa.

**San Martín:** Zepelacio, near Moyabamba, *Klug 3680* (F, GH, K, US). **Huánuco:** Tingo María, (as San Martín), *Allard 21195* (US), *21201* (US), *21594* (US). Prov. Leoncio Prado, al este de Tingo María, *J. Schunke V. 10222* (F, MO, US). **Junín:** Near La Merced, *Killip & Smith 23962* (F, GH, US). La Merced, *Macbride 5713* (F, US). **Ayacucho:** Prov. La Mar, Cordillera Central, *Dudley 11946* (GH, US). **Cuzco:** Tocate, *Bües 1740* (US). **Puno:** Prov. Carabaya, a Sanari, *Vargas 17548* (GH).

13. *Pteris fraseri* Kuhn, Bot. Zeit. (Berlin) 26: 41. 1868. LECTOTYPE (designated here): Ecuador, *Fraser*, Herb. Mett. b!. LECTOPARATYPES: Ecuador, *Spruce 5139* and coll. *Hohenacker 42* (not located).

**Stem** stout, evidently erect. **Leaves** ca. 2 m long, dimorphic, the fertile taller than the sterile and with narrower, well-spaced segments. **Lamina** ternate, 2-pinnate-pinnatifid at the base, basal pinnae the largest, regularly deeply pinnatifid beyond the usually present enlarged basal inferior pinnule, pinnae deeply pinnatifid beyond the basal ones. **Ultimate segments** elongate, glabrous or minutely pubescent abaxially. **Veins** copiously areolate, 2

or more costal areolae with their long axis parallel to the costa between adjacent costules.

Rain forests and in a coffee plantation, 1500–1800 m, San Martín, Pasco, and Junín.

Ecuador and Peru.

This species is distinguished by its dimorphic leaves, the unusual lamina architecture with the ultimate segments long and entire and mostly widely spaced, and the lack of awns on the adaxial side of the costa. It seems close to *Pteris macrop-tera* Link of Brazil but that species is hardly dimorphic.

**San Martín:** Prov. Rioja, Pedro Ruiz-Moyobamba, *D. Smith 4421* (GH). **Pasco:** Prov. Oxapampa, Villa Rica, *van der Werff et al. 8296* (MO, UC). **Junín:** Prov. Chanchamayo, S of San Ramón, *Smith & Palacios 2645* (F).

14. *Pteris haenkeana* Presl, Reliq. haenk. 1: 55. 1825. TYPE: *Haenke*, probably Peru, Dept. Huánuco (holotype, PR?).

*Pteris ampla* Kunze, Linnaea 9: 74. 1834. TYPE: Peru, (Huánuco), Pampayacu, 1829, *Poeppig (Diar. 1154)* (holotype, probably LZ destroyed. ISOTYPES: k!, mo!).

**Stem** ca. 1 cm in diameter, long-creeping. **Leaves** 1–2 m long. **Lamina** pinnate, fully 2-pinnate at or toward the base, or rarely 3-pinnate, basal pinnae the largest, 1-pinnate beyond the lower or basal pinnae. **Pinnae** (or pinnules) large, simple, entire, short- to usually long-stalked, glabrate or with minute, straight, appressed trichomes abaxially. **Veins** copiously areolate, the costal areolae short and broad.

In forests, 100–1400 m, Amazonas south to Cuzco.

Colombia south to Bolivia.

This species has very large, entire ultimate segments. The differences from *Pteris grandifolia*, with which it is sometimes confused, are mentioned under that species.

**Amazonas:** Prov. Bongará, near Shillac, *Smith & Vásquez 4949* (GH). **San Martín:** Juan Jui, *Klug 4256* (F, GH, K, MO, UC, US). Zepelacio, near Moyabamba, *Klug 3492* (F, GH, K, MO, US). **Huánuco:** Pampayacu, *Kanehira 147* (GH, US). Cushi, *Bryan 724* (F, GH, US). **Pasco:** Prov. Oxapampa, Villa Rica, *van der Werff et al. 8289* (MO). **Junín:** La Merced, *Soukup 1091* (F). Perené, *Kunkel 505* (GH). **Ayacucho:** Ayna, between Huanta and Río Apurímac, *Killip & Smith 22717* (F, GH, US). **Cuzco:** Ccochayoc, *Bües 1726* (US).



15. ***Pteris grandifolia*** L., Sp. pl. 1073. 1753. LECTOTYPE (designated by Proctor, Flora Lesser Antilles 2: 143. 1977): Plumier, Descr. pl. Amér. t. 105 not 106, 1693; LINN 1246.1; photo, A, is this species.

*Pteris grandifolia* var. *campanae* Rosenst., Repert. Spec. Nov. Regni Veg. 7: 291. 1909. TYPE: Peru, (San Martín), Mt. Campana, Tarapoto, *Spruce* 4668 (holotype, location unknown; isotype, κ!).

**Stem** ca. 1 cm in diameter, rather extensively creeping. **Leaves** 1–5 m long. **Lamina** pinnate, 1-pinnate or rarely 2-pinnate at the base, 1-pinnate beyond. **Pinnae** large, simple, entire, short- to long-stalked, glabrate to minutely tortuous-pubescent abaxially, especially on the veins. **Veins** copiously areolate, the costal areolae very long, with their long axis divergent from the costa.

In forests, in thickets, along forest borders, and on stream banks, 135–1100 m, Lambayeque south to Cuzco.

Tropical America.

This species is similar to *Pteris haenkeana* but can be distinguished by the usually 1-pinnate lamina, the sterile margins of the pinnae that are entire back of the apex, and the tortuous minute pubescence on the pinnae abaxially. In *Pteris haenkeana* the lamina is 2- or 3-pinnate at the base, the sterile margins are sharply serrate back of the apex, and the minute pubescence abaxially is straight.

**Lambayeque:** Puerto Nazareth, 5 km to Olmos, *Ehlenberg* 3429 (GH). **Amazonas:** Prov. Bagua, entre Aramango y Montenegro, *López et al.* 4214 (GH). **San Martín:** Chazuta, Río Huallaga, *Klug* 4013 (F, GH, κ, MO, UC). **Loreto:** Río Marañón, above Pongo de Manseriche, *Mexia* 6182 (F, GH, κ, MO, UC, US). **Huánuco:** Tingo María, *Tryon & Tryon* 5287 (BM, F, GH, U, US, USM). **Pasco:** Oxapampa, (as Junín), *Soukup* 2349 (F, GH). **Junín:** La Merced, *Killip & Smith* 23693 (F, GH, US). Cerca a La Merced, *Cerrate* 2825 (GH, USM). **Ucayali:** Bosque Nacional von Humboldt, *Gentry et al.* 41412 (MO). **Cuzco:** Kosñipata, *Peralta* 12 (USM).

16. ***Pteris splendens*** Kaulf., Enum. fil. 186. 1824. TYPE: Brazil, *Chamisso* (holotype, probably LZ destroyed; isotype, LE!; photo, GH).

**Stem** stout, short-creeping or nearly erect. **Leaves** to ca. 2 m long. **Lamina** pinnate, 1-pinnate, the lower pinnae not or not much reduced, or the basal pinnae with an enlarged basal inferior pinnule, 1-pinnate beyond the base. **Pinnae** very long, large,

simple, entire, short- to long-stalked, glabrous abaxially. **Veins** copiously areolate, the costal areolae short and broad, the longer ones about twice as long as broad.

In forests, 780 m, Huánuco.

Peru and Brazil.

While this species has only recently been collected in Peru, it probably occurs south to Puno and also in Bolivia. The few collections from Peru have the pinnae about half as broad as in most Brazilian specimens. The pinnae are long and entire and have very conspicuous areolate venation.

**Huánuco:** Prov. Leoncio Prado, al este de Tingo María, *J. Schunke* V. 5211 (F, GH, US), 10113 (F, UC), E of Tingo María, *Croat* 21192 (MO, UC).

17. ***Pteris petiolulata*** Tryon, *Rhodora* 62: 9. 1960. TYPE: Peru, (Junín), La Merced, *Macbride* 5714 (holotype, US!; isotype, F!).

**Stem** rather small, erect. **Leaves** 0.75–1.5 m long. **Lamina** pinnate, 1–2-pinnate-pinnatifid at the base, with long, entire simple pinnae and those with irregularly spaced pinnatifid or lobed portions variously placed. **Pinnae** somewhat pubescent on both surfaces, at least on the costa and costules. **Veins** copiously areolate, 2 or more costal areolae with their long axis parallel to the costa between adjacent costules, when present.

In forests, 500–1500 m, Huánuco, Junín, and Cuzco.

Venezuela, Colombia, and Peru.

The lamina architecture of this species is very irregular, and differs among the several collections. This is indicative of a hybrid origin, possibly between *Pteris splendens* and *Pteris lechleri*. It has the prominent venation and often long, entire pinnae, or entire portions of pinnae, of the former species and the hirsute costa and lack of awns on the costa of the latter one. However, it is sparsely but rather widely distributed and at the present time its putative parents are not known from several of its localities.

**Huánuco:** Prov. Leoncio Prado, al este de Tingo María, *J. Schunke* V. 5211 (F, GH, MO), 10113 (MO), both numbers are also *P. splendens*. **Junín:** San Ramón, *Killip & Smith* 24696 (F, GH, US). Chanchamayo, *Schunke* 965 (F). Prov. Tarma, Perené, *Esposito* (USM). **Cuzco:** Río Pachiri, *Bües* 1767 (US). Prov. Paucartambo, Kosñipata-Pilcopata, *Vargas* 14755 (GH).

18. *Pteris bakeri* C. Chr., Index fil. 593. 1906., *nom. nov.* for *Pteris decomposita* Baker, not Gaud., and with the same type.

*Pteris decomposita* Baker, Syn. fil., ed. 2, 479. 1874. TYPE: Peru, Dept. Huánuco, Muña, *Pearce* (holotype, K!; frag., NY!; Hooker's, Icon. pl. t. 1641.

**Stem** moderately stout, creeping. **Leaves** ca. 1 m long. **Lamina** pinnate, tripartite or nearly so, to 5-pinnate at the base, the basal pinnae much the largest, pinnae often 2-pinnate-pinnatifid beyond the basal ones. **Penultimate segments** deeply pinnatifid to 1-pinnate, muricate-spiculate and deciduously scaly abaxially. **Ultimate segments** usually lobed, often deeply so. **Veins** free.

In forests, 2300–3000 m, Huánuco, Pasco, Junín, and Cuzco.

Endemic to Peru.

The lamina is much divided with small ultimate segments. The muricate-spiculate axes suggest a relation to *Pteris muricata*.

**Huánuco:** Pozuzo, *Pearce 534* (K). **Pasco:** Prov. Oxapampa, Río San Alberto, *Foster et al. 10298* (F), *van der Werff et al. 8480* (MO, UC). **Junín:** Carpapata, above Huacapistana, *Killip & Smith 24488* (US). **Cuzco:** Prov. Urubamba, *Skog & Skog 5176* (US).

19. *Pteris livida* Mett., Ann. Sci. Nat. Bot. V, 2: 222. 1864. LECTOTYPE (designated here): Colombia, (Cundinamarca), Bogotá, Choachi, *Lindig 179*, B!, Herb. Mett.; photo, GH. ISOLECTOTYPES: BM!, GH!, P!, US!. LECTOPARATYPES: Colombia (Tolima), Quindío, *Triana*, and *Linden 1089* (not located).

**Stem** very stout in large plants. **Leaves** 2–6 m long. **Lamina** ternate, basal pinnae the largest, regularly 2-pinnate-pinnatifid, pinnae deeply pinnatifid beyond the lower or basal ones. **Penultimate segments** deeply pinnatifid or 1-pinnate at the base, glabrate to minutely pubescent abaxially, the ultimate segments long, entire. **Veins** copiously areolate, 1 costal areola with its long axis parallel to the costa between adjacent costules.

In wet forests and cleared forests, 900–2500 m, Amazonas south to Cuzco.

Costa Rica to Colombia, south to Bolivia.

This species has a very large, ternate lamina in large plants. The costae may bear awns adaxially at the base of the costules, or these may be lacking.

The ultimate segments are usually large and often narrowed toward, but not at, the base. The identification of small portions of the lamina (usually upper pinnae) has been discussed under *Pteris speciosa*.

**Amazonas:** Prov. Bagua, 12 km E of La Peca, *Barbour 2497* (F, MO). **San Martín:** Cerro de Escalera, between Yurimaguas and Moyobamba, *Ule 6885* (B). Prov. Mariscal Cáceres, N of Pulcache, *Plowman & Schunke 11630* (F, GH). **Huánuco:** Prov. Huánuco, Hacienda Mercedes, *Mexia 8219* (F, GH, K, UC, US). Prov. Huánuco, Mirador, Feb. 23, 1940, *Ridoutt* (GH, USM). **Pasco:** Prov. Oxapampa, Río San Daniel, *Smith et al. 7813* (F). **Cuzco:** Prov. La Convención, Cordillera Vilcabamba, *Dudley 11266* (GH).

20. *Pteris podophylla* Sw., J. Bot. (Schrader) 1800(2): 67. 1802, *nom. nov.* for *Lonchitis pedata* L. 1763, not *Pteris pedata* L. 1753, and with the same type.

*Lonchitis pedata* L., Sp. pl., ed. 2, 1536. 1763. TYPE: Jamaica, *P. Browne* (holotype, LINN. 1249.1; photo, A).

**Stem** very stout, short-creeping. **Leaves** to 2 m or more long. **Lamina** pedate, 2–5-pinnate-pinnatifid, basal pinnae much the largest, the central portion 1-pinnate-pinnatifid. **Penultimate segments** shallowly to deeply pinnatifid, ultimate segments glabrate, minutely pubescent or hirsute abaxially. **Veins** copiously areolate, 1 costal areola with its long axis parallel to the costa between adjacent costules.

Forests, cloud forests, and forest borders, 700–3000 m, Amazonas south to Cuzco.

Mexico and Central America; Greater Antilles; Venezuela and Colombia south to Bolivia.

The sharply serrate apex of the ultimate segments distinguishes this species from the adventive and also pedate *Pteris tripartita*.

**Amazonas:** Prov. Chachapoyas, eastern Calla Calla, *Wurdack 1754* (GH, US). Prov. Bagua, SE of La Peca, *Barbour 3746* (F, MO), *4193* (F). **San Martín:** Zepelacio, near Moyobamba, *Klug 3495* (F, GH, K, MO, US). **Huánuco:** Prov. Huánuco, Carpish, entre Huánuco y Tingo María, *Ferreya 1831* (GH, USM). **Pasco:** Oxapampa, (as Junín), *Soukup 2344* (F, GH). **Junín:** San Ramón, *Killip & Smith 24686* (F, US). **Ucayali:** Prov. Coronel Portillo, (as Loreto), Sinchono, cerca a La Divisoria, *Aguiar 844* (GH, USM). **Cuzco:** Prov. La Convención, Yupanqui to Río Apurímac, *Davis et al. 1228* (F, GH). San Miguel, *Cook & Gilbert 1114* (US).

21. ***Pteris tripartita*** Sw., J. Bot. (Schrader) 1800(2): 67. 1802. TYPE: evidently Java, *Thunberg* (holotype, UPS).

**Stem** stout, short-creeping. **Leaves** 0.5–2 m long. **Lamina** pedate, 2–5-pinnate-pinnatifid, basal pinnae much the largest, the central portion 1-pinnate-pinnatifid. **Penultimate segments** shallowly to deeply pinnatifid, glabrous to somewhat pubescent abaxially. **Veins** copiously areolate, 1 costal areola with its long axis parallel to the costa between adjacent costules.

Forests and partly disturbed forests, ca. 200–1000 m, Loreto and Ucayali.

Sporadically adventive in the American tropics; Old World.

The character of the apex of the ultimate segments that serves to distinguish this from the native *Pteris podophylla* has been mentioned under that species.

**Loreto:** Maynas, near Ramón Castilla, *McDaniel 11827* (GH). Quebrada Tahuayo, above Tamishiyaco, *Croat 19738* (MO). **Ucayali:** Prov. Coronel Portillo, Dist. Padre Abad, *Gómez 2* (US).

22. ***Pteris cretica*** L., Mant. pl. 130. 1767. TYPE: Crete (holotype, LINN 1246.7; photo, A).

**Stem** small to moderately stout, short-creeping. **Leaves** 0.15–1 m long. **Lamina** pinnate, usually 2-pinnate at the base, and sometimes beyond, the pinnae with 1 or rarely more enlarged pinnules, 1-pinnate beyond the lower or basal pinnae. **Pinnae** (and pinnules) elongate, simple, entire, sessile to very short-stalked, glabrous or sometimes slightly pubescent, especially on the costa abaxially. **Veins** free.

In forests or in mesic rocky places, ca. 1000–2200 m, Amazonas.

Adventive in scattered localities in tropical America; Old World.

The free veins and lamina architecture readily distinguish this species.

**Amazonas:** Poma Cocha, *Steere* (GH). Prov. Chachapoyas, 5 km below Chachapoyas, *Wurdack 776* (GH, US). Leimebamba, *Woytkowski 7677* (GH, MO). Prov. Chachapoyas, Río Utcubamba valley, *Smith & Vásquez 4974* (GH).

23. ***Pteris vittata*** L., Sp. pl. 1074. 1753. TYPE: China, *Osbeck* (holotype, LINN 1246.3; photo, A).

**Stem** stout, short-creeping. **Leaves** 0.05–1.5 m or more long. **Lamina** pinnate, 1-pinnate, narrowed at the base. **Pinnae** elongate, simple, entire, very short-stalked, glabrous or sparsely pubescent abaxially. **Veins** free.

In locally moist places, among rocks, and on sea cliffs, 10–1000 m, six localities in Lima.

Adventive in tropical and subtropical America; Old World.

The wholly 1-pinnate lamina with free veins distinguishes this species. It is sometimes confused with *Pteris longifolia* of the West Indies and adjacent regions. That species has articulate pinnae with the base somewhat enlarged, while in *Pteris vittata* the short pinna-stalk departs evenly and gradually from the rachis.

**Lima:** Miraflores, *Tryon & Tryon 5217* (BM, F, GH, U, UC, US, USM). Santa Eulalia, in Rímac river, *Coronado 2* (GH, UC, US). Choisica, *Soukup 2047* (F, US). Km 75, Carretera Central, *Saunders 371* (BM).

## XVI. *Acrostichum*

***Acrostichum*** L. Sp. pl. 1067. 1753; Gen. pl. ed. 5, 484. 1754. TYPE: *Acrostichum aureum* L. **Figure 16.**

**Palustral.** **Stem** erect or decumbent-ascending, bearing scales. **Leaves** borne in a cluster, slightly dimorphic, the fertile pinnae usually narrower and shorter than the sterile, borne in a cluster, the petiole with many vascular bundles near the base. **Lamina** 1-pinnate, the pinnae entire, glabrous or somewhat pubescent abaxially, veins anastomosing, without included free veinlets. **Sporangia** borne over the surface of the fertile pinnae, on and between the veins, interspersed with paraphyses. **Spores** tetrahedral-globose, trilete, minutely papillate or tuberculate.

*Acrostichum* is a pantropical genus of three, or perhaps more, species, with two of them in America and in Peru. It is known in Peru only from salt or brackish swamps in Tumbes at the southern limit of its range along the Pacific coast.



FIG. 16. *Acrostichum aureum*: a, portion of lamina; b, portion of sterile pinna, abaxial side. *Acrostichum dan-aeifolium*: c, sterile pinna; d, portion of sterile pinna, abaxial side. (From Stolze, Ferns & fern allies of Guatemala, 1981.)

## References

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## Key to Species of *Acrostichum*

- a. Pinnae spaced, glabrous abaxially, coriaceous; fertile pinnae only at the apical portion of the lamina; apical portion of the petiole with much reduced pinnae or spinelike processes . . . . . 1. **A. aureum**  
a. Pinnae crowded, usually pubescent abaxially, chartaceous; fertile pinnae extending to the base of the lamina or nearly so; petiole lacking reduced pinnae or spinelike processes . . . . . 2. **A. danaeifolium**

1. **Acrostichum aureum** L., Sp. pl. 1069. 1753.  
LECTOTYPE (designated by A. R. Smith, Fl. Chiapas 2: 16. 1981); Plumier, Descr. pl. Amér. t. 7. 1693. **Figure 16a–b.**

**Leaves** 1–3 m long, the petiole with large, brown, nearly bicolorous scales at the base, the apical portion with much reduced pinnae or spinelike processes, lamina 1-pinnate, with fertile pinnae only toward the apex. **Pinnae** large, simple, entire, usually well and often irregularly spaced, glabrous abaxially, coriaceous. **Paraphyses** mostly with many lobes.

Among mangroves, near sea level, Tumbes.  
Florida; Mexico and Central America; West Indies; mostly coastal in South America, south to northern Peru and Brazil.

**Tumbes:** Prov. Tumbes, near Río Tumbes, *Simpson & Schunke 605* (F, GH, US). Margen del Río Tumbes, *Angulo 596* (HUT).

2. **Acrostichum danaeifolium** Langsd. & Fisch., Icon. fil. 5, t. 1. 1810. TYPE: Brazil, (Santa Catarina), St. Catharina Island, *Langsdorff* (holotype, LE). **Figure 16c–d.**

**Leaves** 1.5–4 m long, petiole with large, brown, nearly bicolorous, often fimbriate, scales at the base, the apical portion lacking reduced pinnae or spinelike processes, lamina 1-pinnate, the fertile with a few sterile pinnae at the base or none. **Pinnae** large, simple, entire, closely spaced, often imbricate, usually somewhat pubescent abaxially, chartaceous. **Paraphyses** mostly with few or no lobes.

Swamps, near sea level, Tumbes.  
Florida; Mexico and Central America; West Indies; mostly coastal in South America, south to northern Peru and southern Brazil.

**Tumbes:** Prov. Tumbes, Corrales, *López & Sagástegui 4034* (GH, HUT).

## Family 14: VITTARIACEAE

**Vittariaceae** (Presl) Ching, Sunyatsenia 5: 232. 1940.

*Vittarieae* Presl, Tent. pterid. 164. 1836, as Vittariaceae. TYPE: *Vittaria* Sm.

**Stem** erect to rather long-creeping, bearing scales. **Leaves** small to ca. 1 m long, circinate in veneration, monomorphic, usually entire (furcate in *Hecistopteris* and 1-pinnate in *Rheopteris* of New Guinea), glabrous. **Petiole** lacking stipules, not articulate to the stem, veins free to usually anastomosing, the areolae without included free veinlets. **Sori** abaxial, usually long and more or less sunken, on a vein or on a submarginal commissure, except in *Anetium* with the sporangia mostly in scattered groups on and between the veins and superficial, exindusiate. **Sporangia** with a rather short, 1- or 2-rowed stalk, the annulus vertical, interrupted by the stalk.

The Vittariaceae are a family of six genera and about 100 species. Most species are epiphytes with

pendent leaves. The family has clathrate stem scales and unusual sclerids (spicular idioblasts) in the epidermis. The key to the genera and to the species of *Vittaria* have been adapted from Tryon and Tryon (1982).

### Key to Genera of Vittariaceae

- a. Veins free; lamina more or less dichotomously lobed or furcate ..... I. **Hecistopteris**
- a. Veins anastomosing; lamina entire ..... b
- b. Sporangia in short to long soral lines along the veins or along a submarginal commissure ..... c
- c. Two—several, or many, soral lines on each side of the costa ..... II. **Antrophyum**
- c. One very long soral line, or line of sori, on each side of the costa ..... III. **Vittaria**
- b. Sporangia single, or in scattered groups, on the veins and between them ..... IV. **Anetium**

### I. Hecistopteris

**Hecistopteris** John Sm., London J. Bot. 1: 193. 1842. TYPE: *Hecistopteris pumila* (Sprengel) John Sm. (*Gymnogramma pumila* Sprengel). **Figure 17.**

**Epiphytic.** Stem very small, short-creeping, scaly, the scales clathrate, bearing the leaves in a cluster. **Leaves** very small, furcate, glabrous, veins free. **Sporangia** superficial, borne along a portion of a vein, indusium absent, paraphyses present. **Spores** tetrahedral-globose, trilete, somewhat granulate.

An American genus of one species. The roots may bear proliferous buds that produce new plants.

1. **Hecistopteris pumila** (Sprengel) John Sm., London J. Bot. 1: 193. 1842. **Figure 17.**

*Gymnogramma pumila* Sprengel, Tent. suppl. Syst. veg. 31. 1828. TYPE: Surinam, *Weigelt* (holotype, not located; isotypes, B!, P!).

**Stem** scales brown, linear or sublinear, slightly iridescent. **Leaves** ca. 1–2 cm long, lamina thin, narrowly to rather broadly flabellate, variously dichotomously or subdichotomously branched or toothed, gradually tapering at the base. **Sporangia** borne in short to rather long lines on the veins.

Epiphyte, or on fallen trunks or branches of trees, 270–625 m, Huánuco and Ucayali.

Tropical America; widespread but not commonly collected.

### Reference

TRYON, R., AND A. F. TRYON. 1982. Vittariaceae, pp. 354–370, in *Ferns and allied plants*, Springer-Verlag, New York.

This small species is represented by rather few specimens throughout its range. This is probably a reflection of its size rather than of its true distribution.

**Huánuco:** Tingo María, *Allard 20490* (us). **Ucayali:** Bosque von Humboldt, *León 172* (usm), *Gentry et al. 36355* (F, MO).

### II. Antrophyum

**Antrophyum** Kaulf., Enum. fil. 197. 1824. TYPE: *Antrophyum plantagineum* (Cav.) Kaulf. (*Hemionitis plantaginea* Cav.). **Figure 18.**

*Polytaenium* Desv., Mém. Soc. Linn. Paris 6: 218. 1827. TYPE: *Polytaenium lanceolatum* (Sw.) Desv. (*Vittaria lanceolata* Sw.) = *Antrophyum lineatum* (Sw.) Kaulf.

**Epiphytic.** Stem small, short-creeping, scaly, the scales clathrate, bearing the leaves in a loose cluster. **Leaves** rather small, the lamina simple, entire, glabrous, veins anastomosing, forming a few to many rows of areolae on each side of the costa. **Sporangia** more or less sunken, borne in several long lines, or along most of the veins, indusium absent, paraphyses present or absent. **Spores** tetrahedral-globose, trilete, or ellipsoidal and monolete, smooth to somewhat echinate.

The Mexican and Central American *Antrophyum ensiforme* Hooker is a member of subgenus *Antrophyum*. All other American species belong to subgenus *Polytaenium* (Desv.) Benedict, which

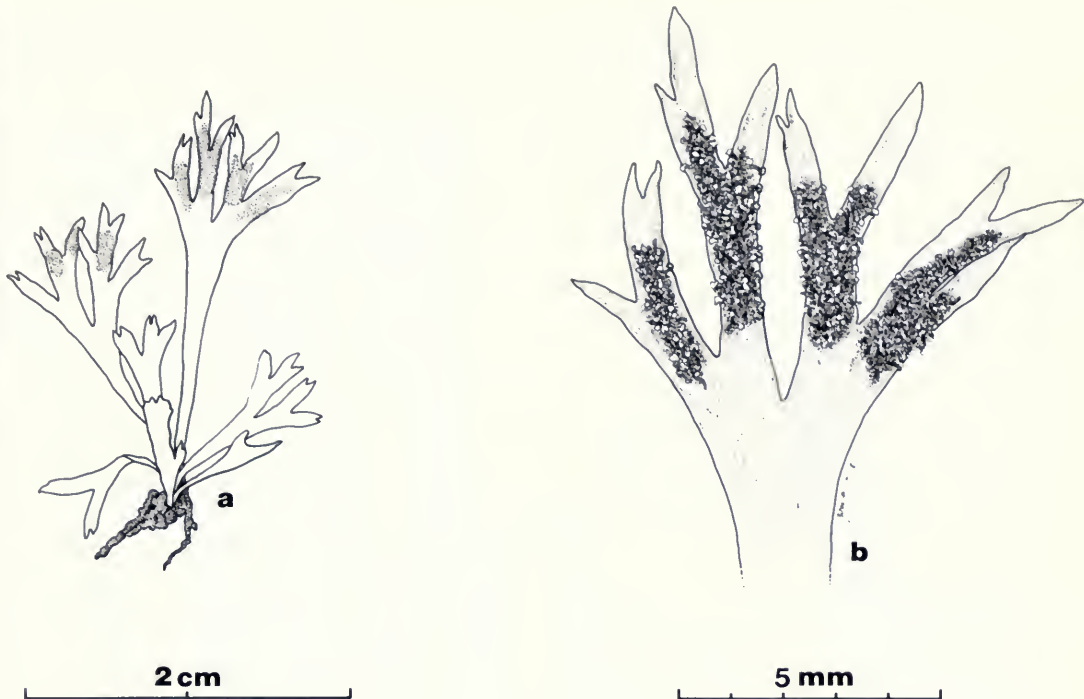


FIG. 17. *Hecistopteris pumila*: a, habit; b, apical portion of fertile leaf. (From *Haught 5328*, Colombia, F.)

has the lamina with a costa usually extending to the apex and lacks paraphyses. In subgenus *Antrophyum* a costa is absent or only poorly developed and paraphyses are present. In spite of these differences, there are some intermediate species, and the two groups are not clearly separable.

The generic name was spelled correctly as *Polytaenium* by Desvaux on p. 174 of his publication, although in the formal place of publication, on p. 218, it was misspelled *Polyaetnium*.

*Antrophyum* is a pantropical genus of about 40 species, with 18 in America and three in Peru.

#### Key to Species of *Antrophyum*

- a. Soral lines immersed between prominent lateral flanges of leaf tissue, mostly long and straight, 2–6, very rarely 1, on each side of the costa . . . . . 1. *A. lineatum*
- a. Soral lines superficial or somewhat immersed, lacking lateral flanges, more or less following the anastomosing veins, often short, or if long then rather flexuous and at an angle to the costa . . . . b
  - b. Lamina elliptical or with nearly parallel sides, usually papyraceous; petiole stramineous abaxially, narrowly alate . . . . . 2. *A. guayanense*
  - b. Lamina narrowly to broadly oblanceolate, papyraceous to coriaceous; petiole usually dark brown abaxially, usually strongly alate . . . . . 3. *A. cajenense*

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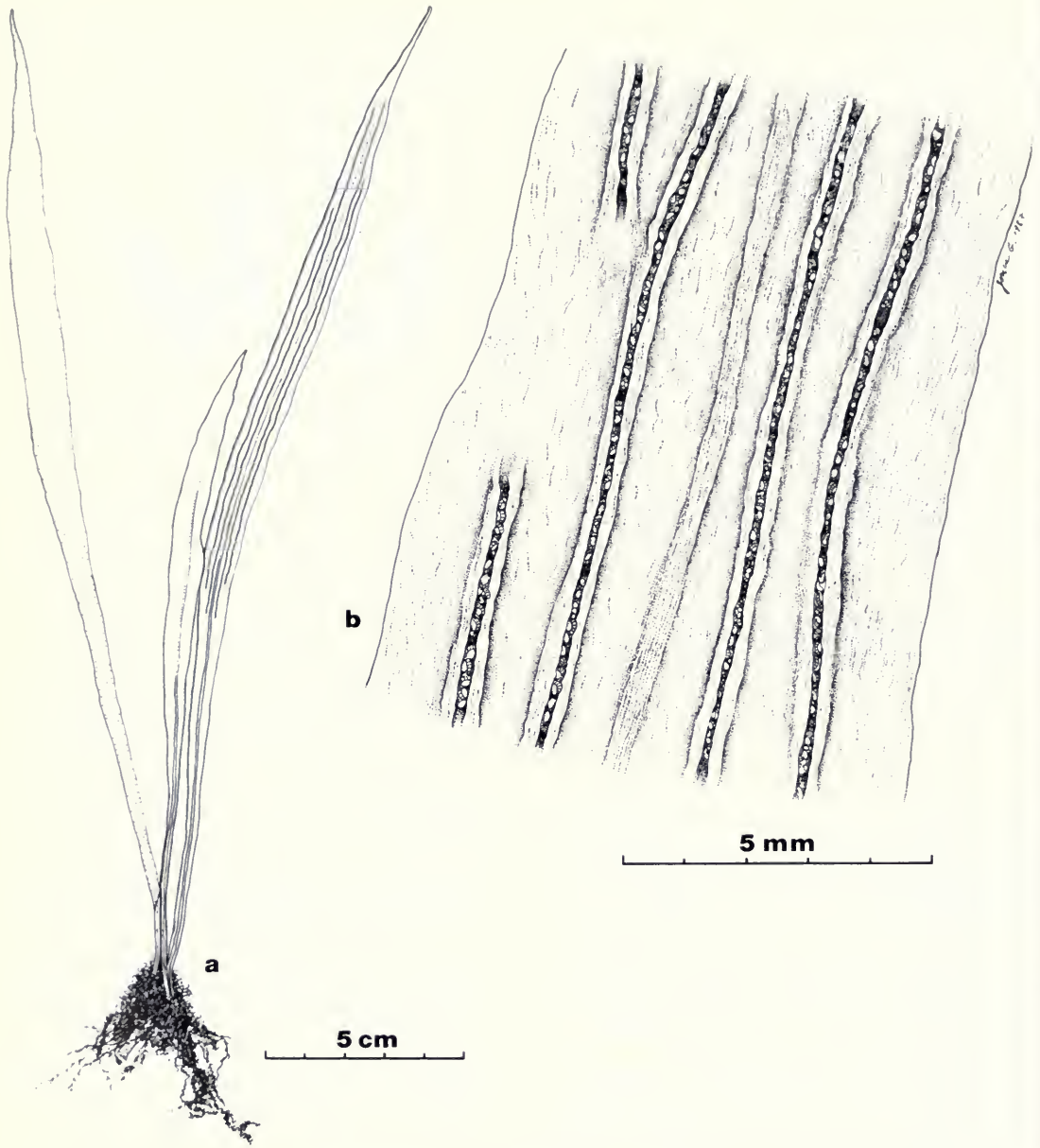


FIG. 18. *Antrophyum lineatum*: a, habit; b, portion of lamina, abaxial side. (From H. H. Smith 1119, Colombia, F.)

1. *Antrophyum lineatum* (Sw.) Kaulf., Enum. fil. 199. 1824. Figure 18.

*Hemionitis lineata* Sw., Prodr. 129. 1788. TYPE: Jamaica, Swartz (holotype, not located; isotype, v!, Herb. Willd. 20033; photo, GH).

*Vittaria lanceolata* Sw., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 2:

133. 1799, based on *Hemionitis lineata* Sw., not *Vittaria lineata* (L.) Sm.

*Polytaenium lanceolatum* (Sw.) Desv., Mém. Soc. Linn. Paris 6: 218. 1827.

Leaves ca. 8–40 cm long. Petiole strongly alate, stramineous to light green abaxially or drying darker, nearly concolorous with the adjacent leaf



tissue. **Lamina** linear to very narrowly elliptic-linear, more or less coriaceous. **Soral lines** few, long and parallel to the costa.

Epiphyte in woods, forests, and cloud forests, 400–2400 m, Cajamarca and Amazonas to Cuzco. Tropical America.

The lamina of *Antrophyum lineatum* is narrow and tapers gradually to the apex and base. It is broadest in the central portion where it is usually 1–1.5 cm wide, or not more than 2 cm wide and then the lamina is more than 25 cm long. In the other two species the lamina is 3–4 cm wide in the broadest portion, or somewhat less in small leaves with the lamina less than 25 cm long.

**Cajamarca:** Prov. Cutervo, San Andrés, *López & Sagástegui 5427* (F). **Amazonas:** Prov. Bagua, ca. 20 km E of La Peca, *Barbour 2806A* (F, MO). Prov. Chachapoyas, 5 km below Chachapoyas, *Wurdack 780* (F, GH, UC, US). **San Martín:** Prov. Mariscal Cáceres, between Mirador and La Playa, *Young & León 4928* (F). **Huánuco:** Muña, *Bryan 529* (F, US). Prov. Huánuco, Hacienda Mercedes, *Mexia 8220b* (UC). **Pasco:** Oxapampa, (as Junín), *Soukup 2352* (GH). **Junín:** Near La Merced, *Killip & Smith 23859* (US). **Ayacucho:** Near Kimpitiriki, *Killip & Smith 22869* (US). **Cuzco:** 2.5 km from Machu Picchu, *Peyton & Peyton 383* (GH, MO). Prov. La Convención, Huayopata, *Peyton & Peyton 891* (GH).

2. *Antrophyum guayanense* Hieron., Hedwigia 57: 212. 1915. LECTOTYPE (designated by Tryon, *Rhodora* 66: 113. 1964): Trinidad, *Fendler 151* (holotype, B!; isotype, GH!).

*Polytaenium guayanense* (Hieron.) Alston, Bull. Misc. Inform. 1932: 314.

**Leaves** ca. 10–30 cm long. **Petiole** narrowly alate, stramineous abaxially (or darker in drying but lighter than the adjacent leaf tissue). **Lamina** rather narrowly elliptical or with nearly parallel sides, subcoriaceous to usually papyraceous. **Soral lines** many, following nearly all of the veins.

Epiphyte in forests, 135–800 m, San Martín, Loreto, and Huánuco.

Southern Mexico; Guianas and Trinidad to Colombia and Peru; adjacent Brazil.

This species has often been called *Polytaenium* or *Antrophyum cajenense* (Tryon, 1964). The lamina shape distinguishes it from that species.

**San Martín:** Tarapoto, *Spruce 3993* (P). **Loreto:** Río Huallaga, below Yurimaguas, *Killip & Smith 28951* (GH, US). Prov. Maynas, Mishana, Río Nanay, *Díaz et al. 425*

(MO). Prov. Maynas, Estación Biológica Callicebus-Mishana, Río Nanay, *Vásquez et al. 661* (F, MO). **Huánuco:** Río Monzón, near Tingo María, *Tryon & Tryon 5300* (GH, U, US, USM).

3. *Antrophyum cajenense* (Desv.) Sprengel, Syst. veg. 4: 67. 1827.

*Hemionitis cajenense* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 311. 1811. TYPE: French Guiana (holotype, Herb. Desv., P!).

*Hemionitis brasiliana* Desv., Mém. Soc. Linn. Paris 6: 216. 1827. TYPE: Brazil (holotype, Herb. Desv., P!; photos, GH, US).

*Antrophyum brasilianum* (Desv.) C. Chr., Index fil. 59. 1905.

*Polytaenium cajenense* (Desv.) Benedict, Bull. Torrey Bot. Club 38: 169. 1911.

*Polytaenium brasilianum* (Desv.) Benedict, Bull. Torrey Bot. Club 38: 169. 1911.

**Leaves** ca. 10–35 cm long. **Petiole** usually strongly alate, stramineous to greenish abaxially (drying to light or usually dark brown), concolorous with, or darker or lighter, than the adjacent leaf tissue. **Lamina** narrowly to broadly oblanceolate, papyraceous to usually coriaceous. **Soral lines** many, following nearly all of the veins.

Epiphyte in dense forests, 100–2040 m, Amazonas to Cuzco.

Southern Mexico to Panama; Greater Antilles; Guianas to Colombia, south to Bolivia; Brazil.

*Antrophyum brasilianum* is so similar to *A. cajenense* that it is evidently a variation of that species. The oblanceolate lamina is characteristic of *A. cajenense*.

**Amazonas:** Prov. Bagua, Quebrada Miraná, *Wurdack 1916* (F, GH, US). **San Martín:** Ad Saposa, *Woytkowski 7322* (GH, MO, US). Prov. Mariscal Cáceres, Tocache Nuevo, *J. Schunke V. 7589* (F, MO). **Loreto:** Gamitani-cocha, Río Mazán, *Schunke 283* (F, GH, US, USM). **Huánuco:** Tingo María, *Ferreira 10230* (GH, USM), *Woytkowski 1097* (GH, USM). **Pasco:** Paujil, near Puente Bermúdez, *León 289* (USM). **Ucayali:** Prov. Coronel Portillo, Río Chino, *J. Schunke V. 9204* (MO). **Cuzco:** Hacienda Potrero, near Quillabamba, *Coronado 120* (GH, US). Prov. La Convención, Tupitari, *Vargas 3446* (UC).

## Comments

*Antrophyum lanceolatum* (L.) Kaulf., Enum. fil. 198. 1824.

*Hemionitis lanceolata* L. Sp. pl. 1077. 1753. LECTOTYPE (designated by Proctor, Ferns of Ja-

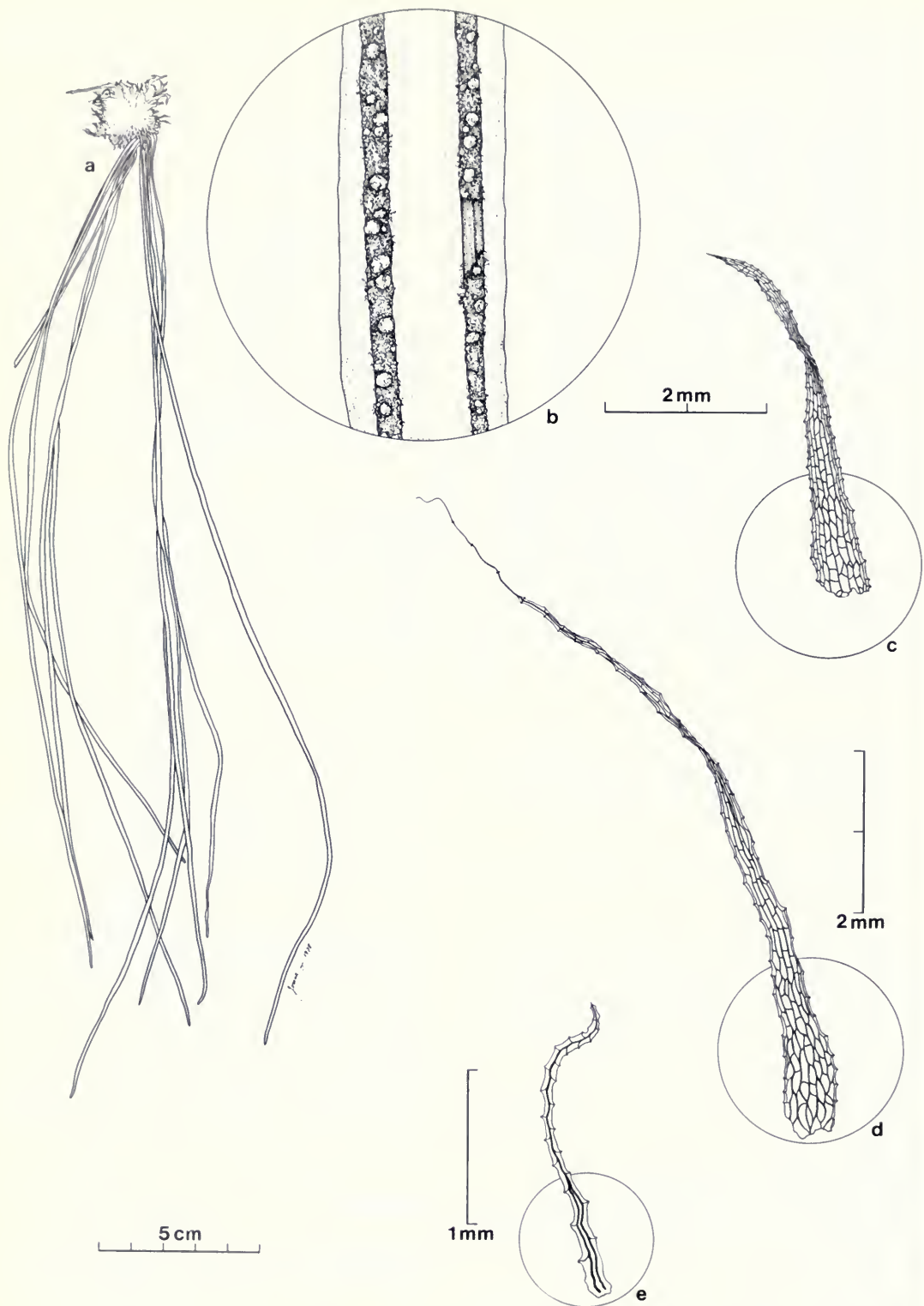


FIG. 19. *Vittaria graminifolia*: a, habit; b, portion of lamina, abaxial side; c, stem scale. *Vittaria lineata*: d, stem scale. *Vittaria stipitata*: e, stem scale. (From Stolze, Ferns & fern allies of Guatemala, 1981.)

maica 258. 1985): St. Vincent, Plumier, *Traité foug. Amér, t. 127, f. C. 1705.*

This species is reported from northern South America and may occur in Peru. It has a long, very narrow lamina that gradually tapers to the apex and base, as in *Antrophyum lineatum*, but has superficial soral lines lacking lateral flanges.

### III. *Vittaria*

*Vittaria* Sm., *Mém. Acad. Roy. Sci. (Turin)* 5: 413. 1793. TYPE: *Vittaria lineata* (L.) Sm. (*Pteris lineata* L.). **Figure 19.**

*Ananthacorus* Underw. & Maxon, *Contr. U.S. Natl. Herb.* 10: 487. 1908. TYPE: *Ananthacorus angustifolius* (Sw.) Underw. & Maxon (*Pteris angustifolia* Sw.) = *Vittaria costata* Kunze.

**Epiphytic.** Stem small, erect or short-creeping, scaly, the scales clathrate, bearing the leaves in a cluster or somewhat spaced. **Leaves** small or of medium size, the lamina simple, entire, glabrous, veins anastomosing, forming 1 row, or 2 to a few rows, of areolae on each side of the costa. **Sporangia** borne, on each side of the costa, in a con-

tinuous, more or less sunken line along a submarginal commissure, indusium absent, paraphyses present. **Spores** tetrahedral-globose, trilete, or ellipsoidal and monolete, smooth or slightly granulate.

A pantropical genus of 50 or more species, with perhaps 10 in America, and eight in Peru. The sometimes accepted genus *Ananthacorus*, represented by *Vittaria costata*, differs only in the venation of two or a few rows of areolae on each side of the costa, rather than a single row as in other species of *Vittaria*.

Some of the characters of the species are provided in the descriptions; other special characters are mentioned in the discussions.

### References

BENEDICT, R. C. 1914. A revision of the genus *Vittaria* J. E. Smith. I. The species of the subgenus *Radiovittaria*. *Bull. Torrey Bot. Club*, **41**: 391-410.  
TRYON, R. 1964. Taxonomic Fern Notes, IV. Some American vittarioid ferns. *Rhodora*, **66**: 110-117.

### Key to Species of *Vittaria*

- a. Lamina with 2 or more rows of areolae on each side of the costa ..... 1. *V. costata*
- a. Lamina with a single row of areolae on each side of the costa ..... b
- b. Petiole wholly or mostly narrowly alate, flattened throughout, firm to rather soft, often irregularly wrinkled when dry ..... c
- c. Paraphyses slender, the apical cell not or hardly enlarged; soral lines in deep grooves, more or less covered by a flange of leaf tissue on each side; stem scales usually with a long, uniseriate, filiform tip ..... 2. *V. lineata*
- c. Paraphyses with an enlarged, usually dark-colored apical cell ..... d
- d. Petiole lighter in color than the green lamina or concolorous with the brownish lamina when darkened by age or drying ..... 3. *V. graminifolia*
- d. Petiole darker than the lamina, usually dark brown to atropurpureous ..... e
- e. Stem scales mostly dark brown to atropurpureous, definitely clathrate with dark, sclerotic lateral walls; lamina narrow or gradually tapering to the apex ..... f
- f. Lamina narrowly elliptical to linear-elliptical, often falcate ..... 4. *V. gardneriana*
- f. Lamina narrowly linear or narrower, rather straight ..... 5. *V. ruiziana*
- e. Stem scales light brown, subclathrate; lamina elliptical, rather abruptly reduced to the apex ..... 6. *V. latifolia*
- b. Petiole not alate, usually terete or oval, or flattened only at the base, indurated ..... g
- g. Stem scales mostly 6 or more cells wide; each soral line in a shallow groove ..... 7. *V. moritziana*
- g. Stem scales 2 cells wide or sometimes 3 cells wide at the base; each soral line in a deep groove ..... 8. *V. stipitata*

1. **Vittaria costata** Kunze, *Linnaea* 9: 77. 1834. TYPE: Peru, (San Martín), Huallaga, Tocache, Jun. 1830, *Poeppig* (holotype, LZ destroyed; isotype, w!). At b!, Kunze, *Analecta peridogr. t. 18, f. 2* is mounted in the herbarium and has the same data as the holotype written on it; probably the figure was prepared from the holotype at LZ.

*Pteris angustifolia* Sw., *Prodr.* 129. 1788. TYPE: Jamaica and Hispaniola (Fl. Ind. Occid. 3: 1599), *Swartz* (holotype, not located), not *Vittaria angustifolia* Blume, *Enum. pl. Javae* 199. 1828.  
*Ananthacorus angustifolius* (Sw.) Underw. & Maxon, *Contr. U.S. Natl. Herb.* 10: 487. 1908.

Stem scales brown to atropurpureous, usually short-ciliate. Leaves ca. 10–50 cm long, lamina narrow, tapering gradually to the apex and base. Petiole narrowly alate, rather flattened, firm, darker than, or nearly concolorous with the adjacent lamina tissue when dry. Soral lines sunken, continuous or irregularly discontinuous.

Epiphyte in forests, 500–650 m, San Martín, Huánuco, and Cuzco.

Tropical America.

This species is characterized by two or more rows of areolae on each side of the costa. All of the other species have a single row.

**San Martín:** Prov. Mariscal Cáceres, Puerto Pizana, *J. Schunke V. 4600* (F, US). Prov. Mariscal Cáceres, Dist. Tocache Nuevo, *J. Schunke V. 7797* (MO). **Huánuco:** Supte river, N of Tingo María, *Stork & Horton 9598* (F, UC, US). Junction of Río Monzón and Río Huallaga, *Asplund 12678* (US). **Cuzco:** Prov. Quispicanchi, entre Machiche y Inambari, *Vargas 16456* (GH).

2. **Vittaria lineata** (L.) Sm., *Mém. Acad. Roy. Sci. (Turin)* 5: 421. 1793. **Figure 19d.**

*Pteris lineata* L., *Sp. pl.* 2: 1073. 1753. TYPE (designated by Tryon, *Contr. Gray Herb.* 194: 213. 1964): Santo Domingo. Plumier, *Traité foug. Amér. t. 143.*

*Vittaria filiformis* Cav., *Descr. pl.* 270. 1802. TYPE: Peru, *Née, MA*; photos, F, NY, US; seen by C. Chr. (*Dansk Bot. Ark.* 9(3): 24. 1937) and placed here with some doubt, the type has no stem or petiole base.

Stem scales dark brown to atropurpureous, shortly dentate. Leaves ca. 10–100 cm long, lamina very narrow. Petiole narrowly alate, rather flattened, firm, lighter than the lamina or concolorous with it. Soral lines sunken, continuous.

Epiphyte in forests and cloud forests, or on rotting tree trunks, 100–2600 m, Amazonas to Junín. Tropical America.

The stem scales have unusually long, uniseriate tips and the soral lines are in deep grooves with a pronounced laminar flange on each side. The light-colored paraphyses with the apical cell not or hardly enlarged also serve to distinguish this species.

The combination *V. lineata* is sometimes credited to Swartz (*Syn. fil.* 109. 1806); however, J. E. Smith cited *Pteris lineata* L. under *Vittaria* and *Vittaria lineata* in the caption to Figure 5.

**Amazonas:** Prov. Bagua, 25 km E of La Peca, *Barbour 2976* (MO). Serranía de Bagua, *Gentry et al. 22895* (F, MO, US). **San Martín:** Tarapoto, *Ll. Williams 6321* (F, US). Prov. Mariscal Cáceres, Puerto Pizana, *J. Schunke V. 4695* (F, GH, MO, US). **Loreto:** Prov. Maynas, Río Itaya, *Revilla et al. 2590* (F, MO). Near mouth of Río Itaya, *Croat 19670* (F, UC). **Huánuco:** Tingo María, *Asplund 12356* (US). *Croat 19670* (F, UC). **Pasco:** Prov. Oxapampa, Río San Alberto Valley, *Smith & Pretel 8036* (F). **Junín:** La Merced, *Weberbauer 1914* (B).

3. **Vittaria graminifolia** Kaulf., *Enum. fil.* 192. 1824. TYPE: Brazil (holotype, LZ destroyed; isotype, Herb. Greville, Kaulfuss misit, 1827, e!). **Figure 19a-c.**

*Vittaria filifolia* Fée, *Mém. foug.* 3: 20, t. 3, f. 6. 1852. LECTOTYPE (designated by Tryon, *Rhodora* 66: 114. 1964): Guadeloupe, *L'Herminier*, Herb. Cosson, pl.

Stem scales brown, shortly dentate or ciliate or not. Leaves ca. 10–50 cm long, lamina very narrow. Petiole usually narrowly alate, rather flattened, soft, lighter in color than the lamina or concolorous with it dry. Soral lines hardly sunken, continuous.

Epiphyte in forests, in cloud forests, sometimes on fallen trunks or on cliffs, 1200–3100 m, Cajamarca to Cuzco.

Tropical America.

*Vittaria graminifolia* may be distinguished from all other Peruvian species by its trilete spores; the others have monolete spores.

**Cajamarca:** Prov. Contumazá, Cascas Contumazá, *López et al. 9088* (GH). Prov. San Miguel, Taulis Recorco, *Mostacero et al. 1178* (F). **Amazonas:** 1–2 km W of Molinopampa, *Wurdack 1491* (F, GH, UC, US). Serranía de Bagua, *Gentry et al. 23017* (F, MO). **Huánuco:** Prov. Leoncio Prado, Dist. Hermilio Valdizán, *Plowman & Schunke 11744* (F). **Junín:** La Merced, *Macbride 5637*

(F, US). **Cuzco**: Prov. Urubamba, Machu Picchu, *Ilis et al.* 1097 (GH).

4. **Vittaria gardneriana** Fée, Mém. foug. 3: 15, t. 3, f. 1. 1852. LECTOTYPE (Designated by Benedict, Bull. Torrey Bot. Club 41: 401. 1914): Brazil, *Gardner 147* (holotype, not located; isotypes, B!, BM!, K!, P!, US!; photo, GH of B).

*Vittaria remota* Fée, Mém. foug. 7: 26, t. 20, f. 1. 1857. TYPE: Colombia, (Norte de Santander), Prov. Ocaña, *Schlim 611* (holotype, not located).

**Stem** scales brown to atropurpureous, shortly dentate or long-ciliate. **Leaves** ca. 5–30 cm long, lamina linear-elliptical or somewhat broader, gradually tapering to the apex and base, often falcate. **Petiole** narrowly alate, flattened, rather soft, darker than the lamina. **Soral lines** hardly sunken, continuous.

Epiphyte in dense forests, in cloud forests, or on fallen, rotting tree trunks, 850–2400 m, Amazonas to Cuzco.

Costa Rica and Panama; Greater Antilles; Surinam to Colombia, south to Bolivia; Brazil.

Although sometimes recognized as a distinct species, *Vittaria remota* grades into *V. gardneriana*. The venation characters, among others, employed to separate the two are not constant in the newer collections studied. Some specimens with a rather broad lamina have been misidentified as *V. latifolia*, but the lamina gradually tapers to the apex as in *V. gardneriana* rather than being rather abruptly reduced as in *V. latifolia*.

**Amazonas**: Prov. Bagua, Cordillera Colán, *Barbour 3977* (MO, USM), *3596* (MO). **Huánuco**: Cerros del Sira, *Dudley 13050* (GH), *13221A* (GH). **Pasco**: Yapas, Pichis Trail, (as Junín), *Killip & Smith 25552* (F, GH, US). Prov. Oxapampa, *van der Werff et al. 8331* (MO, UC), *8424* (MO, UC). **Cuzco**: Prov. Urubamba, Machu Picchu, *Peyton & Peyton 1303b* (GH, MO). Prov. Paucartambo, Aguada de Asunción, *Vargas 7353* (UC).

5. **Vittaria ruiziana** Fée, Mém. foug. 3: 16, t. 3, f. 3. 1852. TYPE: Peru, *Ruíz* (holotype, not located; authentic specimen, Peru. *Dombey*, det. Fée, B!; photo, GH).

*Pteropsis vittarioides* Desv., Mém. Soc. Linn. Paris, 6: 219. 1827. TYPE Peru, (holotype, Herb. Desv., P!, a single leaf evidently taken from [Junín] Hu-

asi-Huasi, 1779, *Dombey P!*). A duplicate of *Dombey* is in Herb. Kunth, B!; photo, GH).

*Vittaria vittarioides* (Desv.) Weath., Contr. Gray Herb. 114: 34. 1936, not (Thouars) C. Chr., Index fil. 655. 1907.

**Stem** scales dark brown to atropurpureous, shortly dentate to entire. **Leaves** ca. 15–100 cm long, lamina narrow to very narrow, rather straight. **Petiole** mostly narrowly alate, flattened, firm, usually darker than the lamina. **Soral lines** sunken or hardly so, continuous.

Epiphyte in forests or rarely on rocks, 1800–3450 m, Amazonas to Cuzco.

Venezuela to Colombia, south to Bolivia.

The lamina is narrowly linear or narrower and rather straight, in contrast to that of the previous species *Vittaria gardneriana* in which the lamina is narrowly elliptical to linear-elliptical and often falcate.

**Amazonas**: Cerros Calla Calla, *Hutchison & Wright 5688* (F, GH). **San Martín**: Prov. Mariscal Cáceres, Río Abiseo, *Young 1622* (USM). **Huánuco**: Near Muña, *Macbride 4136* (B, F, GH, US). **Cuzco**: Prov. Paucartambo, near Achirani, *Vargas 11157* (F, GH, US). Cerro Chuyapi, *Bües 444* (GH, US).

6. **Vittaria latifolia** Benedict, Bull. Torrey Bot. Club 41: 403, t. 17. 1914. Type: Bolivia, (Franz Tamayo), Santa Bárbara, *R. S. Williams 1337* (holotype, NY!; isotypes, GH!, US!).

**Stem** scales light brown, long-ciliate. **Leaves** ca. 5–30 cm long, lamina elliptical, rather abruptly reduced to the apex, gradually narrowed to the base. **Petiole** narrowly alate, flattened, firm, usually darker than the lamina. **Soral lines** hardly sunken, continuous.

Pasco.

Peru and Bolivia.

Although this rare species is rather close to *Vittaria gardneriana*, it is distinguished by the elliptical lamina that is rather abruptly reduced to the apex. The scales are subclathrate and their light brown color sometimes also occurs in *V. gardneriana*, as do the long-ciliate scale margins.

**Pasco**: Oxapampa, (as Junín), *Soukup 2351* (GH).

7. **Vittaria moritziana** Mett., Ann. Sci. Nat. Bot. V, 2: 207. 1864. TYPE: Colombia, Canoas,

*Lindig 319* (holotype, LZ destroyed; isotype, B!).

**Stem** scales dark brown to atropurpureous, mostly shortly dentate. **Leaves** ca. 20–100 cm long, lamina narrow. **Petiole** terete or oval, or flattened only at the base, not alate, indurated. **Soral lines** hardly sunken, continuous.

Epiphyte in forests, 2400–3100 m, Amazonas and Pasco.

Costa Rica; Hispaniola; Venezuela to Colombia and south to Bolivia.

**Amazonas:** Prov. Chachapoyas, 2 km W of Molinopampa, *Wurdack 1480* (F, UC, US). Prov. Chachapoyas, Calla Calla slopes, *Wurdack 1344* (GH, US). **Pasco:** Prov. Oxapampa, Cordillera Yanachaga, *D. Smith 7665* (F).

8. **Vittaria stipitata** Kunze, *Linnaea* 9: 77. 1834. TYPE: Peru, (Huánuco), Pampayacu, Jul. 1829, *Poeppig (Diar. 1121)* (holotype, LZ destroyed; evidently illustrated in Kunze, *Analecta pteridogr. t. 18, f. 1*; isotype, P!; authentic specimen, *Poeppig*, B!, K!; photo, GH of B). **Figure 19e.**

**Stem** scales dark brown to atropurpureous, somewhat shortly dentate to entire. **Leaves** ca. 10–75 cm long, lamina narrow. **Petiole** terete or oval, or flattened only at the base, not alate, indurated. **Soral lines** sunken, continuous.

Epiphyte in forests and cloud forests, rarely on rocks, 600–2000 m, Amazonas to Cuzco.

Guatemala to Panama; Greater Antilles; Venezuela to Colombia and south to Bolivia; Brazil.

This species and the previous, *Vittaria moritziana*, are characterized by their indurated, terete or oval and nonalate, usually dark-colored petiole. They may be distinguished by their stem scales, which are short and mostly two cells wide in *V. stipitata*, while they are longer and mostly six or more cells wide in *V. moritziana*.

**Amazonas:** Prov. Bagua, 12 km E of La Peca, *Barbour 2566* (F, MO, UC). Mendoza, *Woytkowski 8312* (GH, MO, UC). **San Martín:** Mt. Guayrapurina, near Tarapoto, *Spruce 4773* (K, P). **Huánuco:** Tingo María, *Allard 21932* (US). **Pasco:** Prov. Oxapampa, Chequitavo, *D. Smith 5184* (GH). **Junín:** Above San Ramón, *Schunke A146* (GH, US), *Killip & Smith 24587* (F, US). **Cuzco:** Prov. La Convención, Ichiquiata, *Vargas 14492* (GH).

#### IV. **Anetium**

**Anetium** (Kunze) Splitg., *Tijdschr. Natuurl. Gesch. Physiol.* 7: 395. 1840. **Figure 20.**

*Acrostichum* sect. *Anetium* Kunze, *Beibl. Flora* 1839: 1: 47. TYPE: *Acrostichum citrifolium* L. = *Anetium citrifolium* (L.) Splitg.

*Pteridanetium* Copel., *Gen. fil.* 224. 1947, based on *Anetium* Splitg., not *Anetia* Endl. which is not a homonym as Copeland considered it to be.

**Epiphytic.** **Stem** slender, rather long-creeping, scaly, the scales clathrate, bearing the leaves at intervals. **Leaves** small to rarely large, the lamina simple, entire, glabrous, veins anastomosing, forming many rows of areolae on each side of the costa. **Sporangia** borne superficially and often sparingly along the veins and also between them, indusium and paraphyses absent. **Spores** tetrahedral-globose, trilete, with irregular strands.

*Anetium* is an American genus of one species.

1. **Anetium citrifolium** (L.) Splitg., *Tijdschr. Natuurl. Gesch. Physiol.* 7: 395. 1840. **Figure 20.**

*Acrostichum citrifolium* L., *Sp. pl.* 1067. 1753. TYPE: Martinique, Plumier, *Traité foug. Amér. t. 116.* 1705.

*Pteridanetium citrifolium* (L.) Copel., *Gen. fil.* 224. 1947.

**Stem** scales brownish, mostly broadly ovate-attenuate, iridescent. **Leaves** herbaceous-fleshy (papyraceous in drying), pendent, 10 to usually 15–30 to 100 cm long, the lamina elliptical to oblanceolate to ligulate, narrow to broad, nearly or quite sessile to short-petioled (especially in large leaves), apex obtuse to acute or abruptly acuminate.

Epiphyte in dense forests, on fallen tree trunks, or rarely on wet rocks, 100–800 m, San Martín to Cuzco and Madre de Dios.

Tropical America.

**San Martín:** Prov. Mariscal Cáceres, Quebrada de Challuayacu, *J. Schunke V. 10752* (GH, MO, UC). Prov. Mariscal Cáceres, Nuevo Progreso, *J. Schunke V. 3162, 3203* (F, GH, US). **Loreto:** Puerto Arturo, Río Huallaga, below Yurimaguas, *Killip & Smith 27900* (F, GH, US). Río Mazán, *Schunke 301* (F, GH, UC, US). **Huánuco:** Río Monzán, near Tingo María, *Tryon & Tryon 5300½* (GH). **Cuzco:** Río Apurímac, below Puerto Capiro, *Davis et al. 1290* (GH). **Madre de Dios:** Prov. Tambopata, *León & Bahorquez 888* (USM). Alto Madre de Dios, *Rauh & Hirsch 1644* (USM).

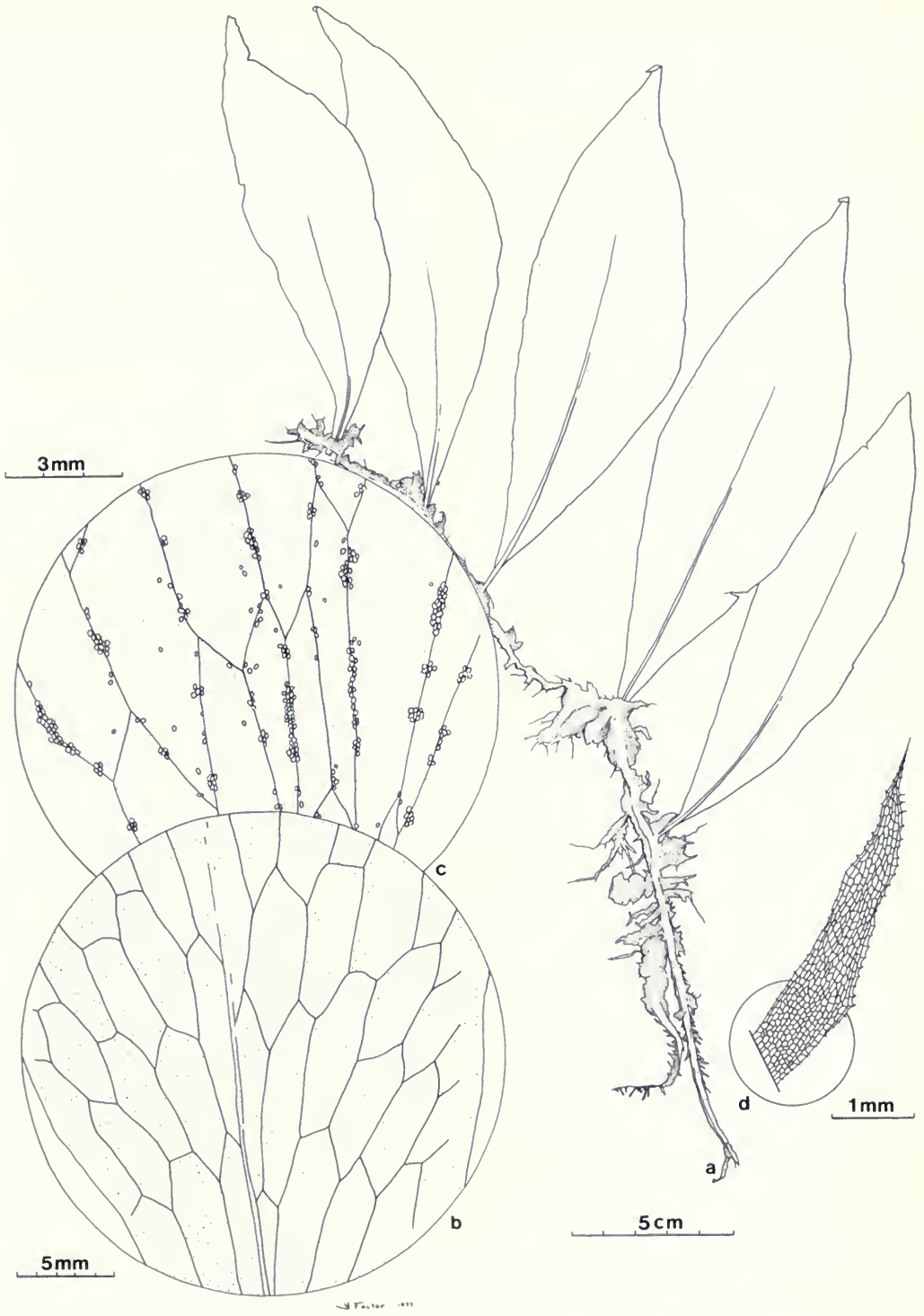


FIG. 20. *Anetium citrifolium*: a, habit; b, portion of lamina near base, adaxial side; c, portion of fertile lamina, abaxial side; d, stem scale. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)

**Family 15: DENNSTAEDTIACEAE**

**Dennstaedtiaceae** Pic.-Ser., *Webbia* 24: 704. 1970.  
 TYPE: *Dennstaedtia* Moore.

**Stem** erect, to short- or very long-creeping, bearing trichomes or scales or both. **Leaves** small or to 7 m long, circinate in veneration, monomorphic or rarely somewhat dimorphic, usually pinnate, rarely simple, glabrous, glandular, pubescent, or rarely slightly scaly. **Petiole** lacking stipules, not articulate to the stem. **Veins** free to fully anastomosing, the areolae without included free veinlets. **Sori** marginal, submarginal, or rarely abaxial, at a vein end or on a vascular commissure connecting vein ends, indusiate, the indusium cup- or purse-shaped, or formed by the modified recurved margin, or abaxial, or (in *Hypolepis*) sometimes ex-indusiate. **Sporangia** with a short to long, 1-3-rowed stalk, annulus vertical to slightly oblique, the indurated portion interrupted by the stalk.

The Dennstaedtiaceae are a family of about 20 genera and 175 species. It is a widely distributed family through the World and, although basically pantropical, some elements are in boreal or south temperate regions. The family is diverse in its morphology and cytology and therefore is evidently old. It may be characterized by long-creeping stems bearing trichomes and large, decom-pound leaves, indusiate and marginal or submarginal sori, and the frequent presence of epipetiolar buds.

The key to genera has been adapted from Tryon and Tryon (1982).

**Reference**

TRYON, R. M., AND A. F. TRYON. 1982. *Dennstaedtiaceae*, pp. 370-432, in *Ferns and allied plants*, Springer-Verlag, New York.

**Key to Genera of Dennstaedtiaceae**

- a. Indusium cup- or purse-shaped, the adaxial and abaxial portions joined ..... **II. Dennstaedtia**
- a. Indusium abaxial, the opposed margin not or hardly modified, flat or nearly so; or indusium formed by the modified margin or a separate abaxial indusium may also be present; or indusium absent ..... b
- b. Indusium abaxial, the opposed margin not or hardly modified, flat or nearly so ..... c
- c. Stem with trichomes and no scales ..... **I. Microlepia**
- c. Stem with scales or sometimes also with trichomes ..... d
- d. Each sorus served by 1 vein; indusium nearly cuneate, attached on both sides ..... **III. Saccoloma**
- d. Each sorus elongate, served by 2 or more veins, these connected by a vascular commissure; indusium elongate, attached on the inner side ..... **X. Lindsaea**
- b. Indusium formed by the modified margin, or a separate abaxial indusium may also be present; or indusium absent ..... e
- e. Each sorus served by 1 vein ..... **VI. Hypolepis**
- e. Each sorus served by few to many veins ..... f
- f. Sterile segments and sterile portions of fertile segments with a modified margin similar to the indusium but not as broad ..... **IV. Pteridium**
- f. Only the fertile portion of a segment with a modified marginal indusium ..... g
- g. Abaxial indusia present ..... **V. Paesia**
- g. Abaxial indusia absent ..... h
- h. Lamina more or less pubescent, not glaucous abaxially ..... i
- i. Stem decumbent to erect, indurated; veins fully anastomosing ... **VII. Blotiella**
- i. Stem short-creeping, succulent; veins free or casually anastomosing ..... **VIII. Lonchitis**
- h. Lamina glabrous or nearly so, usually glaucous abaxially; stem long-creeping, slender, indurated ..... **IX. Histiopteris**



## I. *Microlepia*

**Microlepia** Presl, Tent. pterid. 124. 1836. TYPE: *Microlepia polypodioides* (Sw.) Presl (*Dicksonia polypodioides* Sw.) = *Microlepia speluncae* (L.) Moore. **Figure 21.**

*Dennstaedtia* Bernh., J. Bot. (Schrader) 1800(2): 124. 1802. TYPE: *Dennstaedtia flaccida* (Forster) Bernh. (*Trichomanes flaccida* Forster) = *Microlepia flaccida* (Forster) Fée.

**Terrestrial.** **Stem** usually slender, long-creeping, bearing trichomes or rarely bristles. **Leaves** usually widely spaced, to 7 m long, sometimes scandent on other vegetation. **Lamina** 1–4-pinnate, usually pubescent, veins free. **Sori** abaxial to nearly marginal, sometimes paraphysate, covered by an abaxial indusium that is attached at its sides or base, the leaf tissue beyond the sorus unmodified. **Spores** tetrahedral-globose, trilete, the surface finely echinate.

The nomenclature of this genus is discussed under *Dennstaedtia*. It is not known from Peru, but the single American species *Microlepia speluncae* undoubtedly occurs there, since it is known from Ecuador and Bolivia. It should be sought in Peru in moist or wet forests on mountain slopes.

1. ***Microlepia speluncae*** (L.) Moore, Index fil. xciii. 1857. **Figure 21.**

*Polypodium speluncae* L., Sp. pl. 1093. 1753. TYPE: Ceylon, *Hermann* (holotype, BM).

**Stem** trichomes rather soft, several cells long, mostly catenate. **Leaves** ca. 0.5–1.5 m long, long-petioled. **Lamina** lanceolate to broadly lanceolate, pinnae broadest at or near the base, acuminate, softly pubescent beneath and less so above. **Indusium** pubescent.

Greater Antilles; widely scattered in South America; Old World.

The only species in America; to be expected in Peru.

The sorus and indusium of *Microlepia speluncae* are similar to those in *Saccoloma inaequale*, but *M. speluncae* has a creeping stem bearing trichomes, while *S. inaequale* has an erect stem bearing scales. The lamina architecture and pubescence

of *M. speluncae* are similar to those of *Dennstaedtia cicutaria* but the sori of *M. speluncae* are back of, or close to, the margin, while in *D. cicutaria* they are truly marginal.

## II. *Dennstaedtia*

**Dennstaedtia** Moore, Index fil. xcvii. 1859. TYPE: *Dennstaedtia cicutaria* (Sw.) Moore (*Dicksonia cicutaria* Sw.). **Figure 22.**

*Sitobolium* Desv., Mém. Linn. Soc. Paris 6: 262. 1827. TYPE: *Sitobolium punctilobulum* (Michx.) Desv. = *Dennstaedtia punctilobula* (Michx.) Moore.

**Stem** usually slender and widely creeping, bearing trichomes. **Leaves** large to very large, to 7 m long, sometimes scandent on other vegetation. **Lamina** 1-pinnate to 4-pinnate-pinnatifid, glabrous or pubescent, veins free. **Sori** marginal, sometimes paraphysate, the adaxial and abaxial indusia joined to form a cylindrical, globose, or purse-shaped indusium that is bilabiate or not. **Spores** tetrahedral-globose, trilete, the surface verrucate, tuberculate, reticulate, or ridged.

*Dennstaedtia* is a tropical and extratropical genus of about 45 species, with 12 in America and all but two of them in Peru: *Dennstaedtia distenta* of Mexico, Central America, and the Greater Antilles, and *D. punctilobula* of eastern North America.

The name *Dennstaedtia* is used here from a later publication than that of Bernhardt (see *Microlepia*) and with a different type, as in Tryon and Tryon (1982). The type species of *Dennstaedtia* Bernh. is *D. flaccida*, which has the echinate spores of *Microlepia*. We are unwilling to make about 90 new combinations and to designate *Microlepia* as *Dennstaedtia* and *Dennstaedtia* as *Sitobolium*, as would be required by the International Code of Botanical Nomenclature.

## References

- TRYON, R. 1960. A review of the genus *Dennstaedtia* in America. Contr. Gray Herb., 187: 23–52.
- TRYON, R. M., AND A. F. TRYON. 1982. *Dennstaedtia*, pp. 377–383, in Ferns and allied plants, Springer-Verlag, New York.

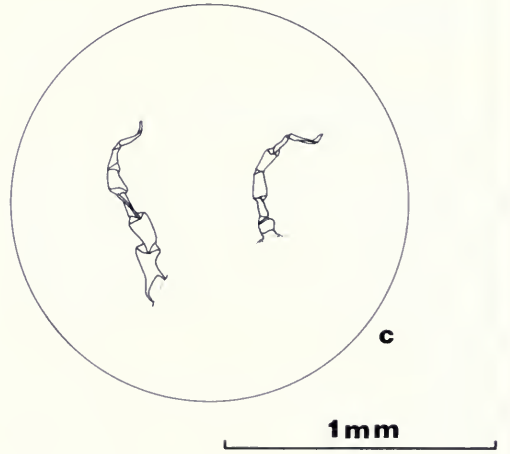


FIG. 21. *Microlepidia spelunca*: a, pinna; b, penultimate segment, abaxial side; c, laminar trichomes. (From Clute 227, Jamaica, F.)

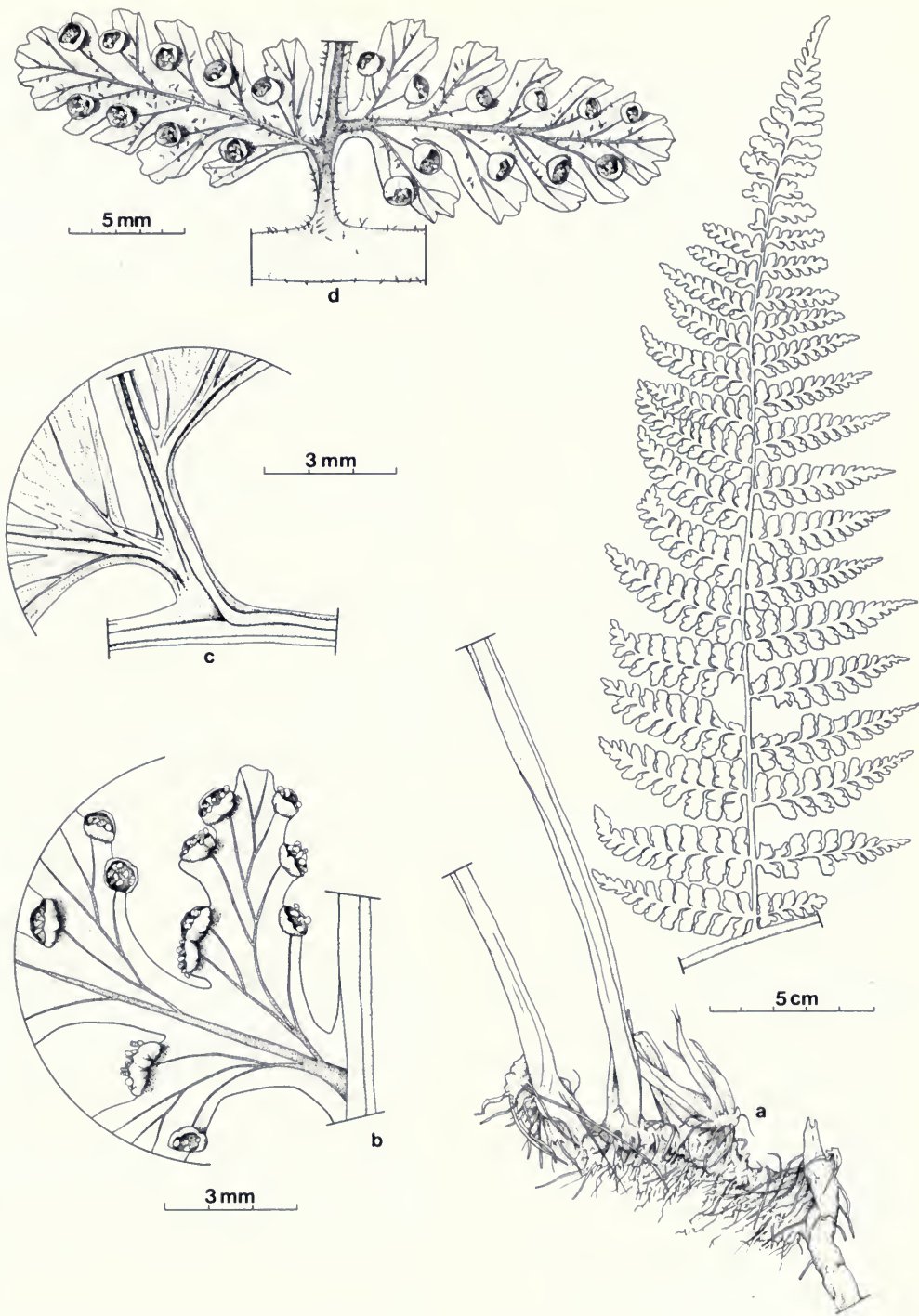


FIG. 22. *Dennstaedtia dissecta*: a, stem and one pinna; b, base of pinnule, abaxial side. *Dennstaedtia bipinnata*: c, portion of rachis and pinna-rachis, adaxial side. *Dennstaedtia globulifera*: d, base of pinna, abaxial side. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)

Key to Species of *Dennstaedtia*

- a. Axis of the penultimate segments on the adaxial surface bordered on each side by a pronounced herbaceous wing perpendicular to the plane of the segment, the wing on the basiscopic side decurrent onto the axis of the next order, either as an herbaceous wing or as a pronounced ridge; trichomes on the abaxial surface of the pinnules wholly clear brown or tan (rarely subopaque or whitish) . . . . b
  - b. Basal segments of the pinnules of the central pinnae definitely alternate, quite unequal in size, the inferior one ascending to strongly ascending; indusium cylindrical to subcylindrical, rarely globular; lamina lanceolate-ovate to ovate . . . . . 3. **D. bipinnata**
  - b. Basal segments of the pinnules of the central pinnae usually subopposite to nearly opposite, rather or quite equal in size, the inferior one not or slightly ascending; indusium globular or less often subglobular or rarely cylindrical; lamina deltoid . . . . . 4. **D. globulifera**
- a. Axis of the penultimate segments on the adaxial surface lacking perpendicular herbaceous wings, or these present but the one on the basiscopic side not decurrent onto the axis of the next order; trichomes on the abaxial surface of the pinnules, when present, whitish to brownish and usually subopaque . . . . . c
  - c. Sterile vein tips on the adaxial surface slender; pinnules abaxially glabrous or with sparse to dense, rather spreading trichomes . . . . . d
    - d. Many or most of the sori borne in a sinus; pinnules abaxially more or less pubescent; lamina deltoid . . . . . 1. **D. cicutaria**
    - d. All or most of the sori terminal on a lobe; pinnules abaxially glabrous or nearly so; lamina ovate- to deltoid-lanceolate . . . . . 2. **D. glauca**
  - c. Sterile vein tips on the adaxial surface enlarged, clavate to punctate (rarely slender in *D. dissecta*); pinnules abaxially glabrate to usually with subappressed, ascending trichomes . . . . . e
    - e. Lamina 1-pinnate-pinnatifid or more complex . . . . . f
      - f. Sterile veins ending well away from the glabrous margin . . . . . g
        - g. Pinnules 1-pinnate to 1-pinnate-pinnatifid; apical segments of the pinnae separate or nearly so to the prolonged tip, the separate ones closest to the tip obtuse . . . . . 5. **D. dissecta**
        - g. Pinnules entire to deeply pinnatifid; apical segments of the pinnae confluent back of the prolonged tip, the separate ones closest to the tip acute . . . . . 6. **D. arborescens**
      - f. Sterile veins nearly reaching the persistently pubescent margin . . . . . 7. **D. sprucei**
    - e. Lamina 1-pinnate, the pinnae entire . . . . . 8. **D. wercklei**

1. **Dennstaedtia cicutaria** (Sw.) Moore, Index fil. xcvi. 1857.

*Dicksonia cicutaria* Sw., J. Bot. (Schrader) 1800(2): 91.1801. TYPE: Jamaica, Swartz (holotype, s!; frag., us!; photo, us!; isotype, b!, Herb. Willd. 20156; photo, GH).

*Dicksonia rubiginosa* Kaulf., Enum. fil. 226. 1824. TYPE: Brazil, (Guanabara), Rio de Janeiro, Mertens (holotype, LE!; photo, GH).

*Dennstaedtia rubiginosa* (Kaulf.) Moore, Index fil. xcvi. 1857.

Leaves ca. 1–4 m long. Lamina deltoid, 3-pinnate to 4-pinnate-pinnatifid. Axes of the penultimate segments without herbaceous ridges or wings on the adaxial surface, sterile vein tips on the adaxial surface slender, ending well away from the glabrous to sparingly pubescent margin. Pinnules more or less pubescent adaxially and abaxially,

with whitish to brownish usually dimorphic trichomes, some 1-celled, short, acicular, rigid, others (rarely the only kind) multicellular, longer, sometimes lax and subtortuous. Sori mostly borne in a sinus, mature indusia saucer- to purse-shaped.

In dense or open forests, at the borders of clearings, along roads through forests, 200–1700 m, Amazonas south to Puno.

Central Mexico to Panama; Greater Antilles; Venezuela and Colombia to Bolivia and southern Brazil.

In addition to the characters mentioned in the key, this species and the following one, *Dennstaedtia glauca*, may often be separated by the color of the major axes. In *D. cicutaria* they are usually brownish, and in *D. glauca* they are usually straw-colored.

**Amazonas:** Prov. Bagua, ca. 5 km S of La Peca, *Barbour* 4312 (MO). **San Martín:** Near Tarapoto, *Spruce* 4338 (GH, K). Zepelacio, near Moyobamba, *Klug* 3553 (F, GH, K, US). **Loreto:** Near mouth of Río Santiago, *Mexia* 6128 (BM, F, GH, K, MO, UC, US). **Huánuco:** Dist. Churubamba, Cotirarda, *Mexia* 8218 (F, GH, MO, UC, US). Pozuzo, *Macbride* 4605 (F, US). **Pasco:** Quillasú, *Soukup* 3513 (GH, US). **Junín:** La Merced, *Killip & Smith* 23699 (F, GH, US). Satipo, Aug., 1940, *Ridoutt* (GH, US). **Ayacucho:** Estrella, between Huanta and Río Apurímac, *Killip & Smith* 22440 (GH, US). **Cuzco:** Potrero, 8 km W of Quillabamba, *Tryon & Tryon* 5372 (BM, F, GH, U, US, USM). **Puno:** Churumayo, *Soukup* 871 (F). Prov. Carabaya, *Vargas* 16129 (GH).

2. **Dennstaedtia glauca** (Cav.) Looser, Rev. Hist. Geog. Chile 69: 184. 1932.

*Davallia glauca* Cav., Deser. pl. 278. 1802. TYPE: Chile, Cordillera de Planchon, *Née* (holotype, MA; frag., BM); Looser, *op. cit.*, and C. Chr. in Dansk. Bot. Ark. 9(3): 28. 1937, discuss the identity of the type).

**Leaves** ca. 0.5–2 m long. **Lamina** ovate- to deltoid-lanceolate, 3–4-pinnate-pinnatifid. **Axes** of the penultimate segments with an herbaceous ridge on the adaxial surface, sterile vein tips, on the adaxial surface, slender, ending well away from the glabrous margin. **Pinnules** glabrous or nearly so. **Sori** predominantly terminal on lobes, mature indusia usually purse-shaped.

In moist, shrubby or rocky ravines and on banks, 2900–3700 m, Cuzco and Puno.

Chile, northeast to adjacent Argentina, to Bolivia and southern Peru.

Specimens of *Dennstaedtia cicutaria* that are only slightly pubescent may be confused with *D. glauca*. All of the characters mentioned in the key under heading **d** must be employed for certain identification.

**Cuzco:** Prov. Quispicanchi, Hacienda Chiraura, *Herrera* 2623 (UC, US). Prov. Paucartambo, near Paucartambo, *Plowman & Davis* 4915 (F, GH). San Jerónimo, *Vargas* 2320 (MO, UC, US). **Puno:** Cuyocuyo, *Weberbauer* 934 (B). Prov. Sandia, cerca a Cuyocuyo, *Ferreya* 16614 (GH).

3. **Dennstaedtia bipinnata** (Cav.) Maxon, Proc. Biol. Soc. Wash. 61: 39. 1938. **Figure 22c.**

*Dicksonia bipinnata* Cav., Deser. pl. 174. 1802. TYPE: Porto Rico, *Ventenat* (holotype, MA; isotype, B), *Herb. Willd.* 20165-1; photo, GH; frag., us).

**Leaves** ca. 1–3 m long. **Lamina** ovate to lanceolate-ovate, 3–4-pinnate-pinnatifid. **Axes** of the penultimate segments bordered on each side, on the adaxial surface, by a pronounced herbaceous wing perpendicular to the plane of the segment, the wing on the basiscopic side decurrent onto the axis of the next order, sterile vein tips on the adaxial surface usually slender, ending well away from the glabrous margin. **Pinnules** usually slightly pubescent abaxially, the trichomes often nearly confined to the base of the tertiary segments, trichomes wholly clear brown to tan (rarely subopaque or whitish), rather straight and rigid. **Sori** mostly borne in a sinus, mature indusia cylindrical to rarely globular.

In forests, 135–1800 m, San Martín and Loreto to Cuzco and Madre de Dios.

Southern Florida; Mexico and Central America; Greater Antilles; Trinidad to Colombia, south to Peru and Bolivia.

The lamina in *Dennstaedtia bipinnata* is usually coriaceous or firmly herbaceous and shining abaxially, and the ultimate segments are acutely to subacutely dentate. In *D. globulifera* the lamina is usually softly herbaceous and dull abaxially, and the ultimate segments are entire to usually bluntly dentate.

**San Martín:** Monte Campana, Tarapoto, *Spruce* 4690 (A, K). San Roque, *Ll. Williams* 7179 (F). **Loreto:** Mouth of Río Santiago, *Mexia* 6127 (BM, F, GH, K, MO, UC, US). **Huánuco:** Sinchono, *Aguilar* 940 (USM). **Junín:** Satipo, Aug., 1940, *Ridoutt* (GH, USM). Chanchamayo valley, *C. Schunke* 947 (F, US). **Ucayali:** Prov. Coronel Portillo, Bosque Nacional de Iparia, *J. Schunke* V. 2713 (F, GH, US). **Ayacucho:** Near Kimpitirki, Apurímac valley, *Killip & Smith* 22875 (F, US), 22987 (BM, US). **Cuzco:** Prov. La Convención, *Dudley* 10239 (GH). **Madre de Dios:** Prov. Tambopata, Tambopata Nature Reserve, *Barbour* 5331 (F, MO). Prov. Manú, Río Palotoa, *Terborgh & Foster* 6796 (F).

4. **Dennstaedtia globulifera** (Poir.) Hieron., Bot. Jahrb. Syst. 34: 455. 1904. **Figure 22d.**

*Polypodium globuliferum* Poir. in Lam., Encycl. 5: 554. 1804. TYPE: Santo Domingo, Plumier, *Traité foug. Amér. t. 30.* 1705.

**Leaves** ca. 1–3 m long. **Lamina** deltoid, 3-pinnate to nearly 4-pinnate. **Axes** of the penultimate segments bordered on each side on the adaxial surface by a pronounced herbaceous wing perpendicular to the plane of the segment, the wing on

the basicopic side decurrent onto the axis of the next order, sterile vein tips on the adaxial surface usually slender, ending well away from the glabrous margin. **Pinnules** more or less pubescent abaxially, the trichomes wholly clear brown or tan (rarely subopaque or whitish), rather straight and rigid. **Sori** borne in a sinus or at the apex of a lobe, mature indusia globular to rarely cylindrical.

In forests, 1000–2800 m, Cajamarca to Cuzco. Texas; Mexico and Central America; Greater Antilles; Venezuela and Colombia south to Bolivia, Argentina, and southern Brazil.

Additional characters, useful for the separation of *Dennstaedtia globulifera* and *D. bipinnata* are discussed under the latter species.

**Cajamarca:** Prov. Hualgayoc, *Soukup 3809* (F, US). **Amazonas:** Prov. Bagua, Cordillera Colán, *Barbour 3981* (MO). **Pasco:** Oxapampa, *Soukup 2357* (F). Pichis Trail, Yapas, (as Junín), *Killip & Smith 25473* (F, GH, US). **Junín:** Above San Ramón, *Killip & Smith 24648* (F, US). Chanchamayo valley, *C. Schunke 12* (F, US). **Cuzco:** Valle de Occobamba, *Bües 879* (US). Prov. Urubamba, *Chávez 3424* (GH).

5. *Dennstaedtia dissecta* (Sw.) Moore, Index fil. 305. 1861. **Figure 22a-b.**

*Polypodium dissectum* Sw., Prodr. 134. 1788, not Forster, 1786.

*Dicksonia dissecta* Sw., J. Bot. (Schrader) 1800(2): 1802. TYPE: Jamaica, Swartz (holotype, s!; frag., us!; photo, us).

*Dicksonia obtusifolia* Willd., Sp. pl. ed. 4, 5: 483. 1810. TYPE: Venezuela, (Dist. Federal), Caracas, *Bredemeyer* (holotype, b!, *Herb. Willd. 20163*; photos, GH, US; frag., lE!).

*Dicksonia erosa* Kunze, Linnaea 9: 88. 1834. TYPE: Peru, (Huánuco), Pampayacu, July, 1829, *Poeppig* (*Diar. 1127*), (holotype, LZ destroyed; isotypes?, *Poeppig 169*, b!, p!, lE!; photo, GH of B).

*Dennstaedtia obtusifolia* (Willd.) Moore, Index fil. 306. 1861.

*Dennstaedtia erosa* (Kunze) Moore, Index fil. 306. 1861.

**Leaves** ca. 2–3 m long. **Lamina** deltoid to lanceolate, 2-pinnate-pinnatifid to 4-pinnate. **Axes** of the penultimate segments without perpendicular herbaceous wings on the adaxial surface, or with them but the wing on the basicopic side not decurrent onto the axis of the next order, sterile vein tips on the adaxial surface clavate to punctate (rarely slender), ending well away from the glabrous margin. **Pinnules** glabrate to usually pubescent abaxially, especially on the axes, the brownish

trichomes subappressed, ascending, more or less curled. **Sori** borne in a sinus or at the apex of a lobe, mature indusia purse- to cup-shaped.

In forests and cloud forests, 500–2100 m, Amazonas south to Cuzco and Madre de Dios.

Mexico and Central America; Antilles; Trinidad to Colombia, south to Bolivia, Paraguay, and southern Brazil.

Although *Dennstaedtia obtusifolia* is sometimes recognized as a distinct species, it is very similar to *D. dissecta* and the two are probably variations of one species. The shape of the mature indusia is from purse- to cup-shaped, and this variation includes the usually cup-shaped indusia of *D. obtusifolia*.

**Amazonas:** Prov. Bagua, 12 km E of La Peca, *Barbour 2498* (F, GH, MO, UC). **San Martín:** Near Tarapoto, *Spruce 4246* (GH). Prov. Rioja, Pedro Ruiz-Moyobamba, *Smith & Vásquez 4693* (GH). **Huánuco:** Puente Durand to Exito, *Mexia 8248* (F, GH, UC, US). **Pasco:** Pichis Trail, (as Junín), *Killip & Smith 25550* (US). **Junín:** Near La Merced, *Killip & Smith 23915* (BM, F, US). **Ucayali:** La Divisoria, (as Huánuco), *Aguilar 851* (GH, USM). **Ayacucho:** Estrella, between Huanta and Rio Apurímac, *Killip & Smith 22647* (F, GH, US). **Cuzco:** Prov. La Convención, Cordillera Vilcabamba, *Dudley 11268* (GH). **Madre de Dios:** Prov. Manú, Cerro de Pantiacolla, *Foster et al. 10909* (F).

6. *Dennstaedtia arborescens* (Willd.) Maxon, Proc. Biol. Soc. Wash. 43: 88. 1930.

*Davallia arborescens* Willd., Sp. pl. ed. 4, 5: 470. 1810. TYPE: Santo Domingo, Plumier, *Traité foug. Amér. t. 6, 1705*.

*Davallia concinna* Presl, Reliq. haenk. 1: 66. 1825, not Schrader, 1818. SYNTYPES: “Chile”, 1790, *Haenke* (2 sheets, PR; photos, GH, US). The species is not known from Chile, and Presl was undoubtedly correct in later (Epim. bot. reprint 102) citing the Haenke collections from Peru.

*Deparia mathewsii* Hooker, Sp. fil. 1: 85, t. 30B. 1844. TYPE: Peru, *Mathews 1782* (holotype, x!; frag., p!, us!; isotypes, BM!, us!).

*Dennstaedtia concinna* (Presl) Moore, Index fil. xcvi. 1857.

*Dennstaedtia mathewsii* (Hooker) C. Chr., Index fil. 218. 1905.

**Leaves** ca. 1.5–3 m long. **Lamina** ovate to lanceolate, 2–3-pinnate. **Axes** of the penultimate segments without perpendicular herbaceous wings on the adaxial surface, or with them but the wing on the basicopic side not decurrent onto the axis of the next order, sterile vein tips on the adaxial surface clavate to punctate, ending well away from the glabrous margin. **Pinnules** glabrate to usually

pubescent beneath, the trichomes brownish, subappressed, ascending, more or less curled. **Sori** mostly borne at a nearly entire margin, often contiguous, mature indusia purse-shaped to usually cup-shaped.

In forests, 600–2150 m, Amazonas to Puno.

Mexico and Central America; Greater Antilles; Venezuela to Colombia, south to Bolivia.

The shape and size of the ultimate segments are quite variable in this species. Sometimes it has proliferous buds in the axils of the pinnae, a character also present in *Dennstaedtia dissecta*.

**Amazonas:** Prov. Bagua, Cordillera Colán, *Barbour 4138* (F, MO). **San Martín:** Tarapoto, *Spruce 4346* (BM, GH, US). Prov. Rioja, Pedro Ruíz-Moyobamba, *Smith & Vásquez 4699* (GH). **Huánuco:** Huacachi, near Muña, *Macbride 4176* (F, US). Cushi, *Macbride 4842* (F, US). **Junín:** Above San Ramón, *Killip & Smith 24642* (F, GH, US). **Cuzco:** Prov. La Convención, Amaibamba, *Vargas 9805* (UC). Prov. La Convención, Cordillera Vilcabamba, *Dudley 10165* (GH). **Madre de Dios:** Prov. Manú, Atalaya, *Foster & Wachter 7425* (MO). **Puno:** San Gabán, *Lechler 2157* (B).

7. *Dennstaedtia sprucei* Moore, Index fil. 308. 1861. TYPE: Ecuador, *Spruce 5350* (holotype, Herb. Hooker, K!; photo, US; isotypes, GH!, P!; frag., US!; photo, US of C).

**Leaves** ca. 1–2 m long. **Lamina** lanceolate, pinnate-pinnatifid to 2-pinnate-pinnatifid. **Axes** of the penultimate segments without herbaceous wings on the adaxial surface, sterile vein tips on the adaxial surface clavate to punctate, nearly reaching the persistently pubescent margin. **Pinnules** and pinnae pubescent abaxially, especially on the axes, the trichomes brownish, curled. **Sori** borne at the nearly entire margin, mostly contiguous, mature indusia purse- to cup-shaped.

Dense forests, 1700–1900 m, Pasco. Ecuador and Peru.

*Dennstaedtia sprucei* is evidently a rare species and adequate material has not been available to determine variation, if there is any, in the shape of the lamina. The persistently pubescent margin with the vein ends extending very nearly to the margin are distinctive characters of *D. sprucei*.

This species was originally described and figured by Hooker (Sp. fil. 1: 74, t. 26A) under the name *Dicksonia pavonii*. That name, however, is technically a *nom. nov.* for *Davallia arborescens* Willd., not *Dicksonia arborescens* L'Hér.

**Pasco:** Oxapampa, (as Junín), *Soukup 1826* (GH, US). Dos de Mayo, (as Junín) *Killip & Smith 25848* (BM, GH, US). **Dept. Unknown:** Peru (F no. 809472).

8. *Dennstaedtia wercklei* (Christ) Tryon, Contr. Gray Herb. 187: 50. 1960.

*Saccoloma wercklei* Christ, Bull. Herb. Boissier, II, 4: 1100. 1904. TYPE: Costa Rica, *Wercklé 320* (holotype, P!; photo in Amer. Fern J. 48: t. 13–14. 1958).

**Leaves** ca. 0.5–1.5 m long. **Lamina** lanceolate, 1-pinnate. **Pinnae** entire, sometimes subauriculate, sterile vein tips on the adaxial surface clavate to punctate, ending near the glabrous margin, slightly pubescent beneath, especially on the costa, the trichomes brownish, subappressed, ascending, more or less curled. **Sori** contiguous along the entire margin, mature indusia purse-shaped, contiguous, and often joined.

In forests and cloud forests, 1700–2040 m, Amazonas, San Martín, and Huánuco.

Costa Rica, Colombia, and Peru.

The 1-pinnate lamina makes this a very distinctive species. It is rarely collected and has an unusual, disjunct distribution.

**Amazonas:** Prov. Bagua, 12 km E of La Peca, *Barbour 2572* (F, MO, UC). **San Martín:** Prov. Rioja, Pedro Ruíz-Moyobamba, *Smith & Vásquez 4593* (GH). **Huánuco:** Pozuzo, *Bryan 674* (US).

### III. *Saccoloma*

*Saccoloma* Kaulf., Berlin Jahrb. Pharm. 1820: 51. TYPE: *Saccoloma elegans* Kaulf. **Figure 23.**

**Terrestrial.** **Stem** moderately stout, erect to decumbent, bearing scales. **Leaves** borne in a cluster, to ca. 2.5 m long. **Lamina** 1–5-pinnate, glabrous or nearly so, veins free. **Sori** marginal or nearly so, not paraphysate, covered or not by an abaxial indusium attached at its sides, the leaf-tissue beyond the sorus unmodified or slightly modified. **Spores** tetrahedral-globose, trilete, the surface with long, nearly parallel ridges.

*Saccoloma* is a tropical genus of about 10 species, with three of them in America, and two in Peru.



FIG. 23. *Saccoloma inaequale*: a, apical portion of lamina; b, portion of pinnule, abaxial side. *Saccoloma elegans*: c, silhouette of leaf apex; d, fertile pinna margin, abaxial side. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)



In the 1-pinnate *Saccoloma elegans* the sori are often confluent at maturity or laterally joined, the margin may be recurved and somewhat modified, and the abaxial indusium is sometimes poorly developed.

## Reference

TRYON, R. 1962. The genus *Saccoloma* Kaulf., in Taxonomic fern notes, III. Contr. Gray Herb., 191: 100–106.

## Key to Species of *Saccoloma*

- a. Lamina 2-pinnate or more complex ..... 1. *S. inaequale*  
 a. Lamina 1-pinnate, the pinnae entire ..... 2. *S. elegans*

### 1. *Saccoloma inaequale* (Kunze) Mett., Ann. Sci. Nat. Bot. IV, 15: 80. 1861. **Figure 23a–b.**

*Davallia inaequalis* Kunze, Linnaea 9: 87. 1834. TYPE: Peru, (Loreto), Maynas, Yurimaguas, Dec. 1830, Poeppig *Diar.* 2113 (holotype, LZ destroyed; isotypes, B!, GH!; frag., ex B, US!; photo, GH of B).

*Microlepia inaequalis* var. *nigrescens* Mett., Fil. lechl. 1: 22. 1856. TYPE: Peru, St. Gavan, (Río San Gabán), Lechler 2293 (holotype, probably LZ destroyed; isotype, B!; photos, GH, US).

*Saccoloma inaequale* var. *caudata* Hieron., Hedwigia 47: 207. 1908. TYPE: Peru, (Loreto), near “Yquitos” (Iquitos) and Cocha Stübel 1129 (holotype, B).

**Stem** quite erect. **Leaves** ca. 1–1.5 m long, long-petioled. **Lamina** 2–4-pinnate, deltoid to long-triangular, the apex gradually reduced, veins more or less evident beneath. **Sori** distant, indusium glabrous.

In woods, dense forests, and cloud forests, 100–1760 m, Amazonas to Puno.

Tropical America.

This is a rather commonly collected species. There is considerable variation in the size of the ultimate segments and the degree of dissection of the lamina.

**Amazonas:** Prov. Bagua, above Cascadas de Mayasi, Wurdack 1968 (GH, US). Prov. Bagua, 12 km E of La Peca, Barbour 2626 (F, MO, UC). **San Martín:** Prov. Mariscal Cáceres, Dist. Tocache Nuevo, J. Schunke V. 3925 (F, GH, US). Tarapoto, L. Williams 6007 (F, GH). **Loreto:** Prov. Maynas, Dist. Iquitos, McDaniel & Rimachi 17091 (F, GH). Mishana, Río Nanay, Solomon 3574 (F, MO). Iquitos, Killip & Smith 30687 (F, US). **Huánuco:** Tingo María, Tryon & Tryon 5223 (BM, F, GH, U, US, USM), Ferreyra 10320 (GH, USM). **Pasco:** Prov. Oxapampa, cerca de Puerto Bermúdez, León 304 (USM). Puerto Yessup, (as Junín), Killip & Smith 26368 (F, US). **Junín:** Near La Merced, Killip & Smith 23988 (F, GH, US). Above San Ramón, C. Schunke A232 (GH, US). **Ucayali:** Prov. Co-

ronel Portillo, Parque Nacional von Humboldt, Puerto Inca, Croat 51053 (MO, UC). Cerro de Canchyuaya, Río Ucayali, (as Loreto), McDaniel 14155 (F, GH). **Ayacucho:** Prov. La Mar, Cordillera Central, Dudley 11940 (GH). **Cuzco:** Prov. La Convención, Cordillera Vilcabamba, Dudley 10604 (GH), 10141 (GH). Prov. Quispicanchi, entre Machiche y Inambari, Vargas 16464 (GH). **Madre de Dios:** Prov. Manú, Cerro de Pantiacolca, Foster et al. 10700 (GH). Prov. Tambopata, Tambopata Nature Reserve, Barbour 5169 (F, MO). **Puno:** Sandia, Weberbauer 1263 (B).

### 2. *Saccoloma elegans* Kaulf., Berlin Jahrb. Pharm. 1820: 51. TYPE: None cited, but in Enum. fil. 224. 1824, Kaulfuss cited *Sello*, Brazil, which may be accepted as the type; two sheets of this collection are at B!; photo, GH. **Figure 23c–d.**

**Stem** erect to decumbent with age. **Leaves** ca. 1–2.5 m long, long-petioled. **Lamina** 1-pinnate, ovate-oblong, apex with a conform terminal pinna, pinnae simple, long- to oblong-elliptical, veins prominent beneath. **Sori** very numerous along the margin, mostly contiguous, indusium glabrous.

In woods and dense forests, 100–1700 m, San Martín to Puno.

Central America; Greater Antilles; tropical South America.

This is a very distinctive species and not closely related to any others in the genus.

**San Martín:** Prov. Lamas, Lamas, Belshaw 3429 (GH, US). Prov. San Martín, Dist. Tarapoto, Rimachi 5766 (F). **Loreto:** Iquitos, Killip & Smith 27121 (F, NY, US). **Huánuco:** Prov. Pachitea, Bosque Nacional de Iparia, J. Schunke V. 2856 (F, GH, US). **Pasco:** San Nicolás, Pichis Trail, (as Junín), Killip & Smith 26072 (F, GH, NY, US). **Junín:** Above San Ramón, Killip & Smith 24574 (GH, NY, US). La Merced, Soukup 1090 (F). **Puno:** San Gabán, Lechler 2416 (B).

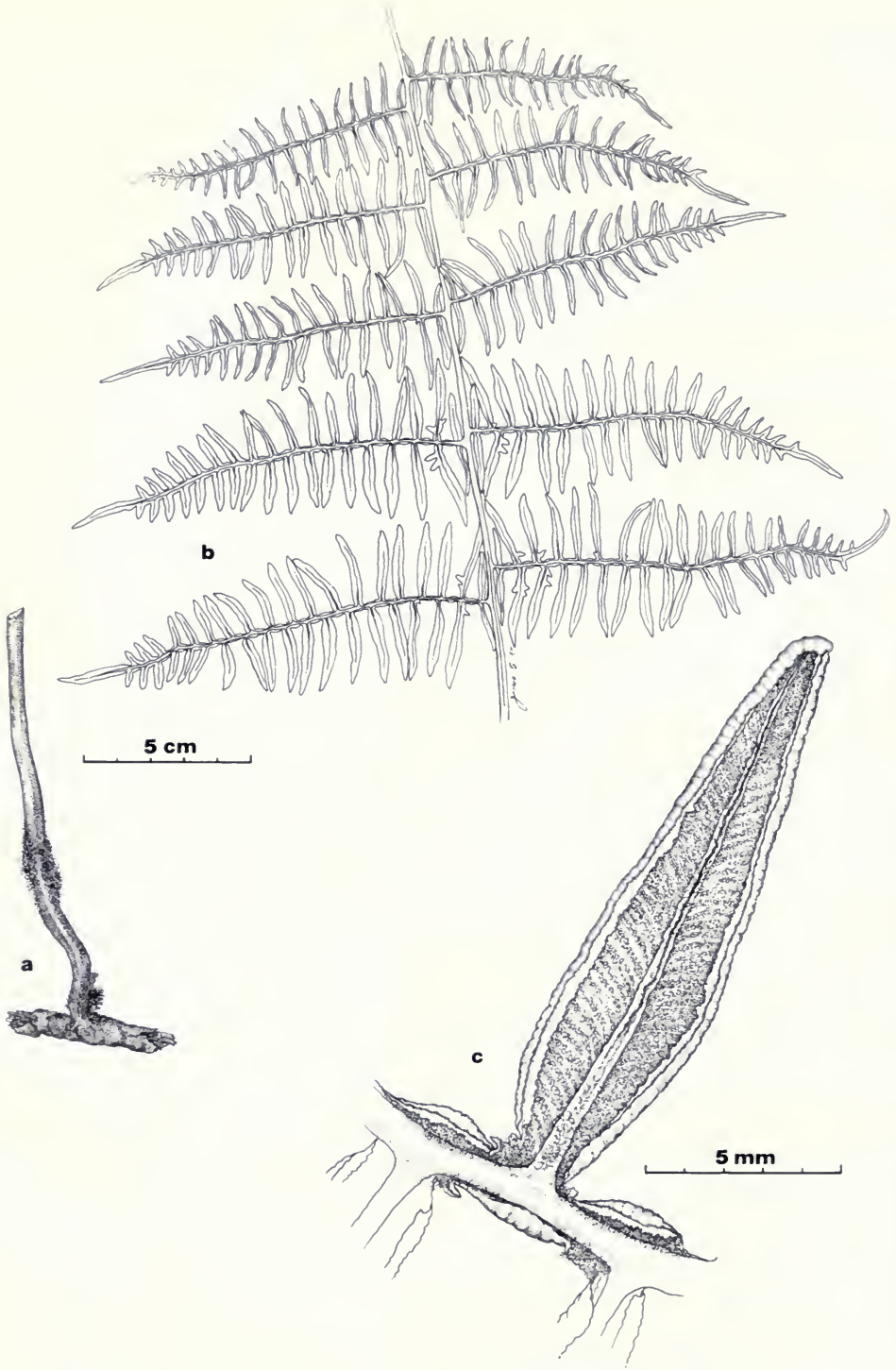


FIG. 24. *Pteridium aquilinum* var. *arachnoideum*: a, portion of stem with petiole base; b, portion of pinna; c, ultimate segment, abaxial side. (a from Macbride & Featherstone 1671, F; b, c, from Macbride 4507, F.)

#### IV. Pteridium

**Pteridium** Scop., Fl. carniol. 169. 1760. TYPE: *Pteridium aquilinum* (L.) Kuhn (*Pteris aquilina* L.). **Figure 24.**

**Terrestrial.** Stem slender, long-creeping, frequently branched, bearing trichomes. **Leaves** widely spaced, to ca. 7 m long, sometimes scandent on other vegetation. **Lamina** 2-pinnate-pinnatifid to 4-pinnate, pubescent to rarely glabrous, sterile margins with an indusium similar to that of the fertile ones, veins free. **Sori** marginal, not paraphysate, covered by a well-modified marginal indusium, the sporangia borne on a long vascular commissure connecting the vein ends, an abaxial indusium present or absent or poorly developed. **Spores** tetrahedral-globose, trilete, irregularly granulate.

*Pteridium* is a genus of one species and 12 geographic varieties, distributed nearly throughout the world. There are six of the varieties in America and two of them in Peru.

#### Key to Varieties

- a. Free lobes absent on the axis between the ultimate or penultimate segments, the base of the ultimate segments, especially toward the apex of a penultimate segment, definitely decurrent ..... 1a. var. **caudatum**  
a. Free, or nearly free, lobes present on the axis between the ultimate or penultimate segments ..... 1b. var. **arachnoideum**

1a. **Pteridium aquilinum** var. **caudatum** (L.) Sad-  
beck, Jahrb. Hamb. Wiss. Anst. 14, Beiheft  
3: 5. 1897.

*Pteris caudata* L., Sp. pl. 1075. 1753. TYPE: LINN  
1246.15!; photo, A.

*Pteridium caudatum* (L.) Maxon, Proc. U.S. Natl. Mus.  
23: 631. 1901.

In woods and borders of pastures, 1250–2300  
m, Cajamarca, Amazonas, and San Martín.

Mexico and Central America; West Indies; Ven-  
ezuela, Colombia to Peru, and northern Brazil.

**Cajamarca:** Prov. San Miguel, Niepos, *Llatas 1546*  
(F). **Amazonas:** Prov. Bagua, 5 km S of La Peca, *Barbour*  
*4311* (F, MO). Prov. Chachapoyas, entre Ingenio y Po-  
macocha, *López et al. 4313* (GH). **San Martín:** Prov.  
Lamas, Dist. Lamas, *Belshaw 3449* (GH, UC, US).

A special feature of the genus is the development  
of a sterile indusium on the sterile margins of seg-  
ments. This is similar to the indusium that covers  
the sorus but is usually narrower.

#### Reference

TRYON, R. M. 1941. Revision of the genus *Pteri-  
dium*. *Rhodora*, **43**: 1–31, 37–67, and *Contr.*  
*Gray Herb.*, **134**: 1–70.

1. **Pteridium aquilinum** (L.) Kuhn in Decken, Re-  
isen Ost-Afrika 3(3): 11. 1879.

*Pteris aquilina* L., Sp. pl. 1075. 1753. TYPE: Figure  
of *Filix femina* Fuchs, *Hist. stirp.* 596 (misprinted  
as 569. 1542).

The two varieties in Peru may be separated by  
the following key. However, some specimens are  
rather intermediate between the varieties, while  
rarely others depart from the varieties in one char-  
acter or another.

1b. **Pteridium aquilinum** var. **arachnoideum**  
(Kaulf.) Brade, *Zeitschrift Deut. Ver. Wissen.*  
*Kunst*, São Paulo 1: 56. 1920. **Figure 24.**

*Pteris arachnoidea* Kaulf., *Enum. fil.* 190. 1824. TYPE:  
Brazil, *Chamisso* (holotype or isotype, LE!; photo,  
GH).

*Pteridium arachnoideum* (Kaulf.) Maxon, *J. Wash.*  
*Acad. Sci.* 14: 89. 1924.

Open slopes, pastures, thickets, rocky places,  
and cleared land, 400–3000 m, Piura to Puno.

Primarily in South America; less common in  
Mexico, Central America, and the West Indies.

The species *Pteridium aquilinum* is a serious  
weed in many parts of the world, and in Peru var.  
*arachnoideum* is often an unwelcome pioneer. It  
is especially a serious pest in newly cleared land  
intended for agricultural crops. The main stem is

usually deep in the soil, and it sends forth branches that bear the leaves. These also bear latent buds, and cutting the leaves or burning only has the effect of increasing the number of leaves.

**Piura:** Prov. Huancabamba, Huancabamba-Cuello del Indio, *López et al. 8916* (F). **Cajamarca:** Prov. San Miguel, Llapa-Uchuquiña, *Sagástegui et al. 8887* (F, HUT, MO). NW of Hualgayoc, *Stork & Horton 10027* (F, UC). **Amazonas:** Prov. Chachapoyas, alrededores de Chachapoyas, *López et al. 4342* (GH). **La Libertad:** Prov. Trujillo, Cerro Campana, *Sagástegui & Cabanillas 8352* (MO). **San Martín:** Tarapoto, *Ll. Williams 5641, 5971* (F). **Huánuco:** Cerro de Chinchao and Puente Durand, *Coronado 92* (GH, US). 5 km NE of Acomayo, *Tryon & Tryon 5224* (BM, F, MO, U, US, USM). **Lima:** Prov. Chancay, Lachay, *Ferreyra 9767* (GH, USM). **Pasco:** Prov. Oxapampa, near confluence of Río Palcazú and Río Iscozacín, *Smith & Franzen 1942* (F). **Junín:** Huacapistana, *Ferreyra 307* (GH, USM). Carpapata, *Cerrate 2796* (GH, USM). **Ayacucho:** Estrella, *Killip & Smith 23095* (F, NY, US). **Cuzco:** Cerro de Cusilluoc, *Pennell 13936* (F, GH, NY, US). Prov. Urubamba, Machu Picchu, *Ferreyra 2705* (GH, USM). **Madre de Dios:** Planchón, *Gutte & Müller 8307* (USM). **Puno:** Prov. Sandía, San Juan del Oro, *Soukup & López 14699* (GH).

## V. *Paesia*

***Paesia* St.-Hil.,** Voy. distr. diam. 1: 381. 1833.

TYPE: *Paesia viscosa* St.-Hil. = *Paesia glandulosa* (Sw.) Kuhn. **Figure 25.**

**Terrestrial.** Stem slender, long-creeping, bearing trichomes. Leaves well spaced, to 2.5 m long, sometimes scandent on other vegetation. Lamina to 4-pinnate-pinnatifid, essentially glabrous, glandular-pubescent, or pubescent, veins free. Sori marginal, not paraphysate, the sporangia borne on a short to long vascular commissure connecting the vein ends, covered by a well-modified marginal indusium, an abaxial indusium also present. Spores ellipsoidal, monolete, somewhat to coarsely rugose.

*Paesia* is a mostly tropical genus of about 12 species, with two of them in America and one in Peru. The other American species is *Paesia anfractuosa* (Christ) C. Chr. of Costa Rica.

1. ***Paesia glandulosa*** (Sw.) Kuhn, Festschrift 50 jähr. jub. Real. Berlin 347 (Chaetopt. 27). 1882. **Figure 25.**

*Cheilanthes glandulosa* Sw., Kongl. Vetensk. Akad. Handl. 1817: 77. TYPE: Brazil, (Minas Gerais),

Villa Rica, *Freyreis* (holotype, s!; photo, GH; isotype, s!; photo, GH).

*Paesia viscosa* St.-Hil., Voy. distr. diam. 1: 381. 1833.

TYPE: Brazil, Minas Gerais, Serra da Piedade, *St. Hilaire 2260* (holotype, p!; isotype, GH!).

*Pteris amazonica* Christ, *Hedwigia* 44: 364. 1905.

TYPE: Peru, Loreto, Cerro "Vonasa", (Ponasa), *Ule 6899* (holotype, Herb. Christ, p!; isotypes, v!, k!; photos, GH, US of v, k; frag., us!, ex v).

*Paesia amazonica* (Christ) C. Chr., Index fil. 476. 1906.

**Stem** trichomes rigid, terete or flattened in age. **Leaves** 0.5 to ca. 2.5 m long, long-petioled. **Lamina** elongate-elliptic to long-triangular, the rachis flexuous, pinnules with the basal segment on the acroscopic side, usually rather abundantly, sometimes sparsely, glandular-pubescent. **Adaxial indusium** thin, very well-modified.

Shrubby slopes, edge of forests, rocky places in woods, elfin forests and cloud forests, 1400–3600 m, Amazonas to Puno.

Uncommon in tropical America.

The identity of *Cheilanthes glandulosa* Sw. has been in doubt, and erroneously determined as a species of *Hypolepis*. A careful study of the partially fertile holotype at s clearly indicates that it is the species previously called *Paesia viscosa*.

**Amazonas:** Prov. Chachapoyas, Río Ventilla, W of Molinopampa, *Wurdack 1466* (F, GH, US). **San Martín:** Prov. Rioja, Pedro Ruíz-Moyobamba, *D. Smith 4797* (GH). Tarapoto, *Spruce 4666* (GH, K, NY, P, US). **Huánuco:** SW slope of Río Lullapichis watershed, *Dudley 13374* (GH). Playapampa, *Macbride 4501* (F, GH, US). **Pasco:** Prov. Oxapampa, Cordillera Yanachanga, *van der Werff et al. 8472* (MO, UC). Prov. Oxapampa, Cordillera San Gutardo, *León 518* (USM). **Cuzco:** Prov. La Convención, Cordillera Vilcabamba, *Dudley 10714* (GH). **Puno:** Tatanara, *Lechler 2536* (B).

## VI. *Hypolepis*

***Hypolepis* Bernh.,** J. Bot. (Schrader) 1(2): 34. 1806.

TYPE: *Hypolepis tenuifolia* (Forster) Presl (*Lonchitis tenuifolia* Forster). **Figure 26.**

**Terrestrial.** Stem rather slender, long-creeping, bearing trichomes. Leaves well spaced, to ca. 7 m long, sometimes scandent on other vegetation. Lamina 2–4-pinnate-pinnatifid, nearly glabrous to usually pubescent, veins free. Sori marginal or nearly so, not paraphysate, served by 1 vein, covered by a poorly to well-modified marginal indusium, or exindusiate and the leaf-tissue beyond the sorus not modified. Spores more or less ellip-

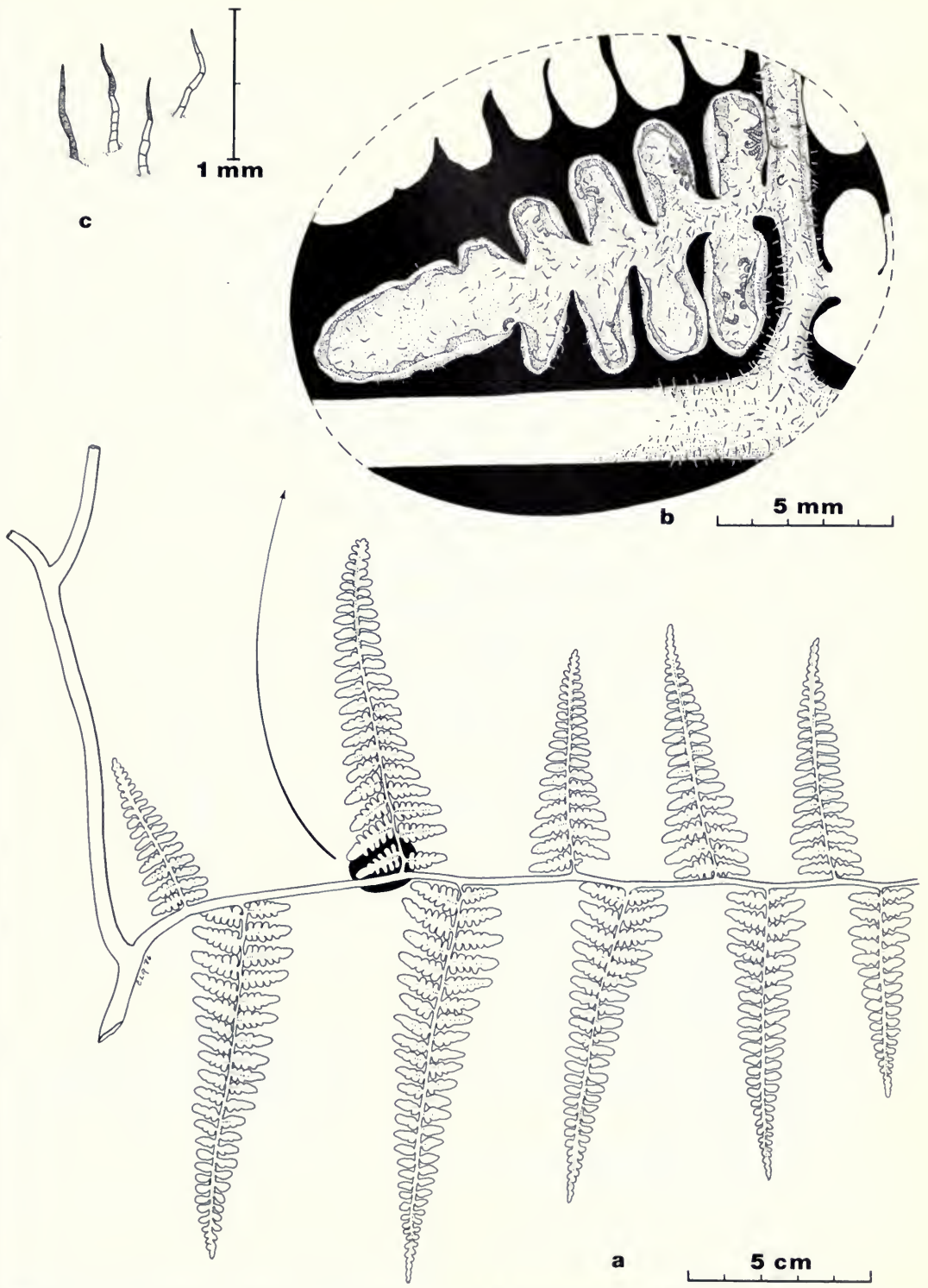
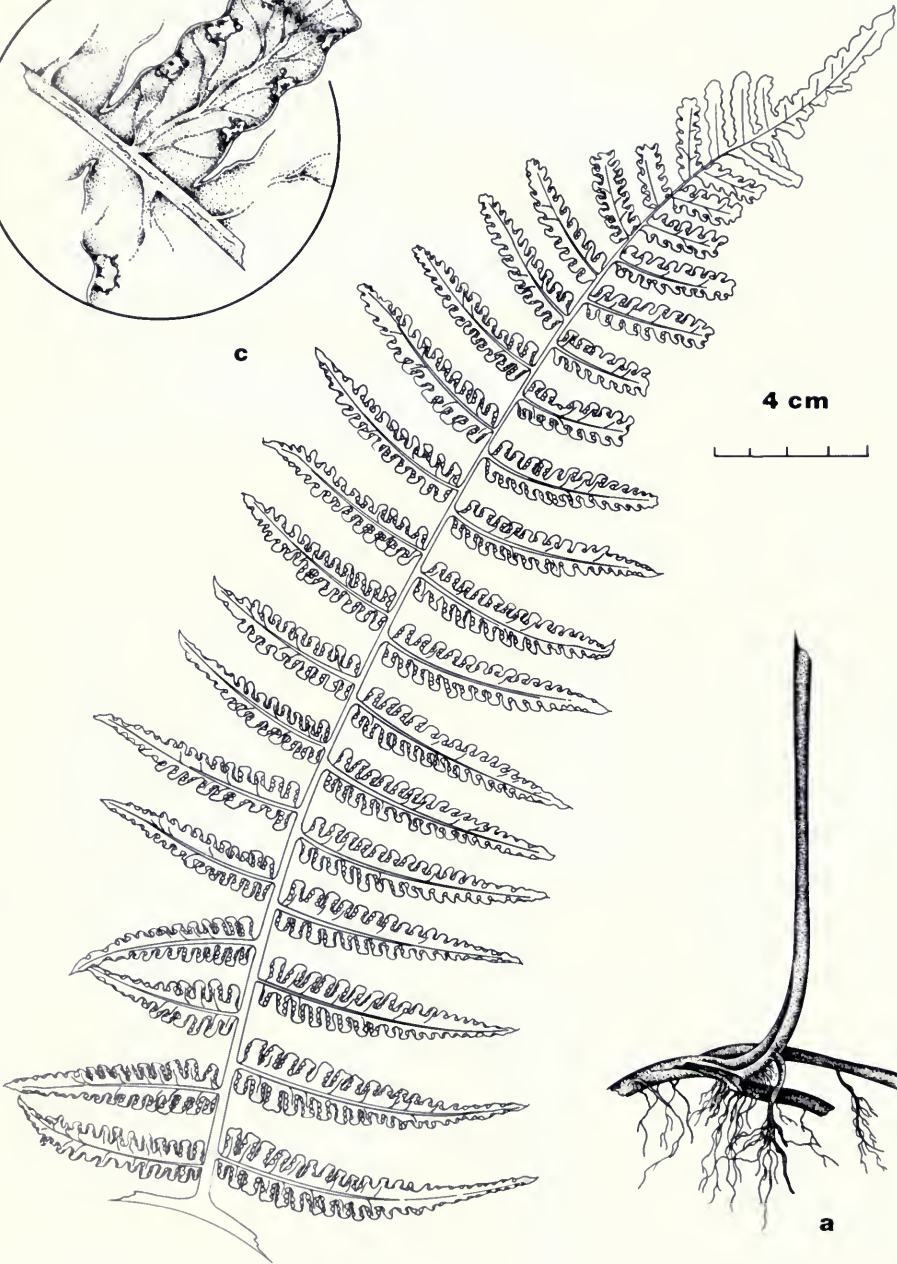


FIG. 25. *Paesia glandulosa*: a, portion of rachis and pinna; b, fertile pinnule; c, lamina trichomes. (From Wurdack 1466, F.)

4 mm



c



4 cm

b

a

FIG. 26. *Hypolepis parallelogramma*: a, portion of stem with petiole base; b, pinna; c, fertile ultimate segment, abaxial side. (From *Mexia* 8149, F.)

soidal, monolete, somewhat reticulate-echinate to echinate.

*Hypolepis* is a tropical and extratropical genus of perhaps 40 species, with about 15 in America

and six in Peru. It has the general habit and mode of growth of *Pteridium*, although it rarely becomes a serious weed. The American species are in need of a modern taxonomic revision.

### Key to Species of *Hypolepis*

- a. Indusium long-ciliate with few-celled trichomes; petiole, rachis, and pinna-rachises aculeolate or very sparingly so ..... 1. **H. stuebelii**
- a. Indusium glabrous, smooth on the edge to erose-fimbriate ..... b
  - b. Ultimate segments, or many of them, squarish or very bluntly obtuse; abaxial surface of the segments glabrous or very slightly pubescent; rachis and pinna-rachises aculeolate, especially abaxially ..... 4. **H. parallelogramma**
  - b. Ultimate segments rounded at the apex ..... c
    - c. Axis of the penultimate segments grooved adaxially, with an herbaceous wing on each side nearly perpendicular to the segment surface, the groove connecting to that of the next axis ..... 2. **H. nigrescens**
    - c. Axis of the penultimate segments not grooved adaxially, or grooved but either lacking herbaceous perpendicular wings or the groove not connecting to that of the next axis ..... d
      - d. Abaxial surface of the segments very slightly to densely pubescent, the trichomes various but some gland- or clavate-tipped; rachis and usually the pinna-rachises aculeolate ..... 3. **H. hostilis**
      - d. Abaxial surface of the segments with multicellular, often long, tortuous and moniliform trichomes with a pointed apex, these sometimes forming a tomentum; rachis and pinna-rachises not aculeolate ..... e
        - e. Rachis flexuous with alternate pinnae, especially at the base of the lamina; lamina nearly deltoid; basal pinnae 3-pinnate-pinnatifid, or more complex, much larger than those above, inequilateral ..... 5. **H. bogotensis**
        - e. Rachis straight, the basal pinnae often opposite or nearly so; lamina usually elongate to lanceolate (very rarely deltoid); the basal pinnae 1–2-pinnate-pinnatifid, not or not much larger than those above, equilateral ..... 6. **H. obtusata**

1. **Hypolepis stuebelii** Hieron., *Hedwigia* 48: 230, *t. 10, f. 8*. 1909. TYPE: Ecuador, Prov. Manabí, near San Florencia, *Stübel 796* (holotype, B!; frag., US!; isotype, GH!).

Leaves to 2 m (or more?) long, more or less erect. Lamina 3-pinnate-pinnatifid to 4-pinnate, rachis straight, it and the pinna-rachises aculeolate or sparingly so. Segments pubescent abaxially with mostly moderately long, rigid, terete, pointed trichomes, a few shorter gland-tipped ones may also be present, ultimate segments broadly rounded to subacute. Indusium long-ciliate.

In pastures, disturbed sites, rocky open places, and in rocky woods, 1450–2300 m, Pasco, Junín, and Cuzco.

Greater Antilles; Venezuela and Colombia, south to Peru.

The long-ciliate indusium provides a distinguishing character for this species.

Pasco: Prov. Oxapampa, Villa Rica, *van der Werff et al. 8297* (MO, UC). Junin: Chanchamayo valley, *C. Schunke 689* (F), *942* (F, US). Cuzco: Cerro de Cusilluyoc, *Pennell 14025* (F, GH). Prov. La Convención, Chaquellouanca, *Vargas 12936* (GH). Prov. Paucartambo, Pllawata, *Vargas 16694* (GH).

2. **Hypolepis nigrescens** Hooker, *Sp. fil.* 2: 66, *t. 90C*. 1852. LECTOTYPE (designated by Proctor, *Ferns of Jamaica* 179. 1985): Jamaica, *N. Wilson*, (holotype, K; ISOLEC-TOTYPE: BM).

Leaves to 5 m long, erect to scrambling. Lamina 3–4-pinnate-pinnatifid, rachis straight, it and the pinna-rachises aculeolate. Segments slightly pu-

bescent abaxially, with few, mostly moniliform trichomes, ultimate segments broadly rounded. **Indusium** entire to somewhat lobed.

Disturbed areas in ceja de la montaña, 2400 m, Huánuco.

Mexico and Central America; Greater Antilles; Venezuela and Colombia, south to Bolivia.

This species often has a lamina architecture similar to that of *Paesia glandulosa*. It is distinguished in the genus by the herbaceous wings on the adaxial side of the penultimate segments and the groove that connects with the groove of the next axis.

**Huánuco:** Huánuco-Tingo María road, *Gentry et al.* 19308 (F, MO).

3. *Hypolepis hostilis* (Kunze) Presl, Tent. pterid. 162. 1836.

*Cheilanthes hostilis* Kunze, *Linnaea* 9: 86. 1834. TYPE: Peru, (San Martín), Mission Tocache, upper Huallaga, July, August, 1830, *Poeppig (Diar. 1957)* (holotype, presumably destroyed at LZ; Peru, 1829, *Poeppig*, K!; photo and frag., us!, is probably authentic.

**Leaves** to ca. 2 m long, erect or nearly so. **Lamina** 4-pinnate to 4-pinnate-pinnatifid, rachis straight, it and usually the pinna-rachises aculeolate. **Segments** very slightly to densely pubescent abaxially, mostly with short, more or less moniliform, gland- or clavate-tipped trichomes, or sometimes a few trichomes with pointed tips, ultimate segments rounded to subacute at the apex. **Indusium** nearly smooth on the edge to definitely erose-fimbriate.

In dense forests or along forest borders, or in cut-over or cultivated areas, 100–2100 m, Loreto to Puno.

Costa Rica; Venezuela and Colombia, south to Bolivia; Brazil.

The ultimate segments of *Hypolepis hostilis* are usually quite small, ca. 1.5–2 mm long. The usually numerous gland- or clavate-tipped trichomes on the abaxial surface of the segments are also characteristic.

**Loreto:** Mishuyacu, near Iquitos, *Klug* 469, 1389 (F, US). **Valseca-Rudolpho,** *McDaniel & Marcos* 11059 (GH). **Huánuco:** Tingo María, *Tryon & Tryon* 5240 (BM, F, GH, U, US, USM). **Fundo San Miguel,** *Ferreyra* 12774 (GH, USM). **Junín:** Chanchamayo valley, *C. Schunke* 48 (F, US). **Carpapata,** *Kunkel* 550 (GH). **Ucayali:** La Divisoria,

*Ferreyra* 1048 (BM, US). **Puno:** Prov. Sandia, cerca de San Juan del Oro, *Ferreyra* 16691 (GH, USM).

4. *Hypolepis parallelogramma* (Kunze) Presl, Tent. pterid. 162. 1836. **Figure 26.**

*Cheilanthes parallelogramma* Kunze, *Linnaea* 9: 85. 1834. TYPE: Peru, (Huánuco), Pampayacu, July, 1829, *Poeppig* (holotype, presumably destroyed at LZ; frag. ex Kunze, LE!; photos, GH, US).

**Leaves** to 7 m long and scandent. **Lamina** 3-pinnate to 3-pinnate-pinnatifid, rachis more or less straight, it and the pinna-rachises aculeolate. **Segments** glabrous abaxially, to somewhat pubescent with rigid, terete, or moniliform trichomes with a pointed or rarely gland-tipped apex, ultimate segments squarish or very bluntly obtuse, or many of them so. **Indusium** glabrous, smooth on the edge, somewhat lobed, or slightly fimbriate.

In forests, at the border of forests, and in cloud forests, 550–2100 m, San Martín to Cuzco and Madre de Dios.

Venezuela and Colombia, south to Bolivia; Brazil.

This species often has an exceptionally long leaf that is scandent on shrubs or small trees, or the apical portion may be pendent from the lower branches of trees. The numerous squarish or bluntly obtuse and usually glabrous ultimate segments serve to distinguish this species.

**San Martín:** Prov. Rioja, Pedro Ruíz-Moyobamba, *Smith & Vásquez* 4694 (GH). **Huánuco:** Prov. Huánuco, Dist. Churubamba, *Mexia* 8149 (BM, F, GH, MO, UC, US, USM). **Pasco:** Prov. Oxapampa, Chequitavo, *D. Smith* 5186 (GH). **Eneñas,** Pichis Trail, (as Junín), *Killip & Smith* 25760 (F, GH, US). **Junín:** Above San Ramón, *C. Schunke* A182 (GH, US). **Prov. Chanchamayo,** Mina Pichita, *van der Werff et al.* 8669 (MO, UC). **Ayacucho:** Cordillera Central, *Dudley* 11955 (GH). **Cuzco:** Prov. Paucartambo, entre Piliopata y Villa Carmen, *Vargas* 13356 (GH). **Prov. La Convención,** *Bües* 2086, 2092 (US). **Madre de Dios:** Prov. Manú, Shintuya, *Chávez* 858 (MO).

5. *Hypolepis bogotensis* Karsten, Fl. Columb. 2: 91, t. 147. 1865. TYPE: Colombia, (Cundinamarca), “Cordillerae Bogotensis,” 2900–3000 m, *Karsten* (holotype or isotype, LE!, B!; photo, GH of LE).

*Hypolepis flexuosa* Sodiro, Crypt. vasc. quit. 634. 1893. TYPE: Ecuador, (Pichincha), Volcán el Corazón, 2900 m, *Sodiro* (holotype or isotype, P!; photo, GH).



**Leaves** to 3 m (or more?) long, erect or somewhat scandent. **Lamina** to 4- or 5-pinnate-pinnatifid, rachis flexuous, subdichotomous toward the base, it and the pinna-rachises not aculeolate. **Segments** densely tomentose to slightly pubescent abaxially with multicellular, usually long and tortuous, moniliform, pointed trichomes, these shorter and straighter when the segment is slightly pubescent, ultimate segments mostly rounded to narrowly rounded. **Indusium** entire to slightly lobed to moderately and irregularly erose-fimbriate.

At the edge of woods, in dense forests, and in cloud forests, 2400–4060 m, San Martín, Ancash, Huánuco, and Pasco.

Costa Rica; Jamaica; Venezuela and Colombia, south to Bolivia.

The flexuous rachis which is subdichotomous, especially toward the base of the lamina, is characteristic of this species. A discussion of it in relation to *Hypolepis obtusata* is provided under that species.

**San Martín:** Bagazán, *Stübel 1071* (B). Dist. Huallaga, 30 km above Jucusbamba, *Hamilton & Holligan 547* (US). **Ancash:** Prov. Huari, Huascarán National Park, *Smith et al. 12655* (F, GH). **Huánuco:** Tambo de Vaca, *Macbride 4381* (F, US). 15 miles NE of Huánuco, *Macbride & Featherstone 2199* (F, NY, US). **Pasco:** Prov. Oxapampa, Cordillera de Yanachaga, *van der Werff et al. 8443* (MO, UC).

6. *Hypolepis obtusata* (Presl) Kuhn, Festschrift 50 jähr. jub. Real. Berlin. 347 (Chaetopt. 27). 1882.

*Cheilanthes obtusata* Presl, Reliq. haenk. 1: 64, t. 11, f. 1. 1825. TYPE: Mountains of Peru, Haenke, PR.

*Polypodium fulvescens* Hooker & Grev., Bot. Misc. 2: 239. 1831. TYPE: Peru, (Pasco), near Pasco, Huaylluy, *Cruckshanks* (holotype,  $\kappa$ ; photo and frag., us!; isotype, GH!).

*Plecosorus peruvianus* Fée, (Mém. foug. 5) Gen. fil.: 151. 1852. TYPE: Peru, *Pavón* (holotype, not located; isotype,  $\kappa$ !; photos, GH, US).

*Hypolepis pteroides* Mett., Fil. lechl. 1: 17, t. 3, f. 7–13. 1856. TYPE: Peru, St. Gavan (Rio San Gabán), *Lechler 2152* (holotype, B!; photo, GH; frag., us!; isotype,  $\kappa$ !; photos, GH, US).

**Leaves** ca. 8–100 cm long, erect. **Lamina** 2–3-pinnate-pinnatifid, rachis straight, it and the pinna-rachises not aculeolate. **Segments** moderately to rather densely pubescent abaxially with tortuous, moniliform, pointed trichomes, ultimate

segments rounded at the apex. **Indusium** nearly smooth on the edge to moderately lobed or erose-fimbriate.

Among rocks and in moss in open places, 2800–4600 m, Ancash to Puno.

Colombia to Peru.

The elongate, mostly narrowly lanceolate, lamina of *Hypolepis obtusata* with a straight rachis is readily distinguished from the rather deltoid lamina of *H. bogotensis* with a flexuous rachis especially toward the base. In addition, the lamina of *H. obtusata* is 2-pinnate-pinnatifid at the base, while that of *H. bogotensis* is usually 4-pinnate-pinnatifid at the base.

However, there are some collections of *H. obtusata* (*Saunders 1075* and *Smith et al. 12676*) that have a broad lamina that is 3-pinnate or 3-pinnate-pinnatifid at the base. These may be intermediates between *H. obtusata* and *H. bogotensis* and the relationship of the two (or one) species needs further study.

**Ancash:** Prov. Yungay, Huascarán National Park, *Smith et al. 10404* (GH). Prov. Huaylas, Huascarán National Park, *Smith & Valencia 9974* (GH). Prov. Huari, Huascarán National Park, *Smith et al. 12676* (F, GH). **Pasco:** Prov. Oxapampa, Cordillera San Gutardo, *León 535* (USM). **Junín:** Prov. Concepción, Dist. Comas, *Saunders 1075* (GH). **Cuzco:** Prov. La Convención, paso Panticalla, *Vargas 23310* (GH). Ccaocco, *Bües 1399* (US). **Puno:** Prov. Carabaya, Achopampa, *Vargas 6976* (UC). Tabina, *Lechler 2094* (B).

## VII. *Blotiella*

*Blotiella* Tryon, Contr. Gray Herb. 191: 96. 1962.

TYPE: *Blotiella glabra* (Bory) Tryon (*Lonchitis glabra* Bory). **Figure 27.**

**Terrestrial. Stem** erect to decumbent, stout, bearing trichomes. **Leaves** borne in a crown or cluster, to 6 m long, sometimes scandent on other vegetation. **Lamina** 1–2-pinnate-pinnatifid, more or less pubescent, veins partially to usually wholly anastomosing, without included free veinlets. **Sori** marginal, paraphysate, the sporangia borne on a vascular commissure connecting the vein ends, covered by a well-modified marginal indusium. **Spores** ellipsoidal, monolete, granulate to usually echinate.

*Blotiella* is an American and African-Madagascaran genus of about 15 species. There is a single species in America and Peru. The distinction of

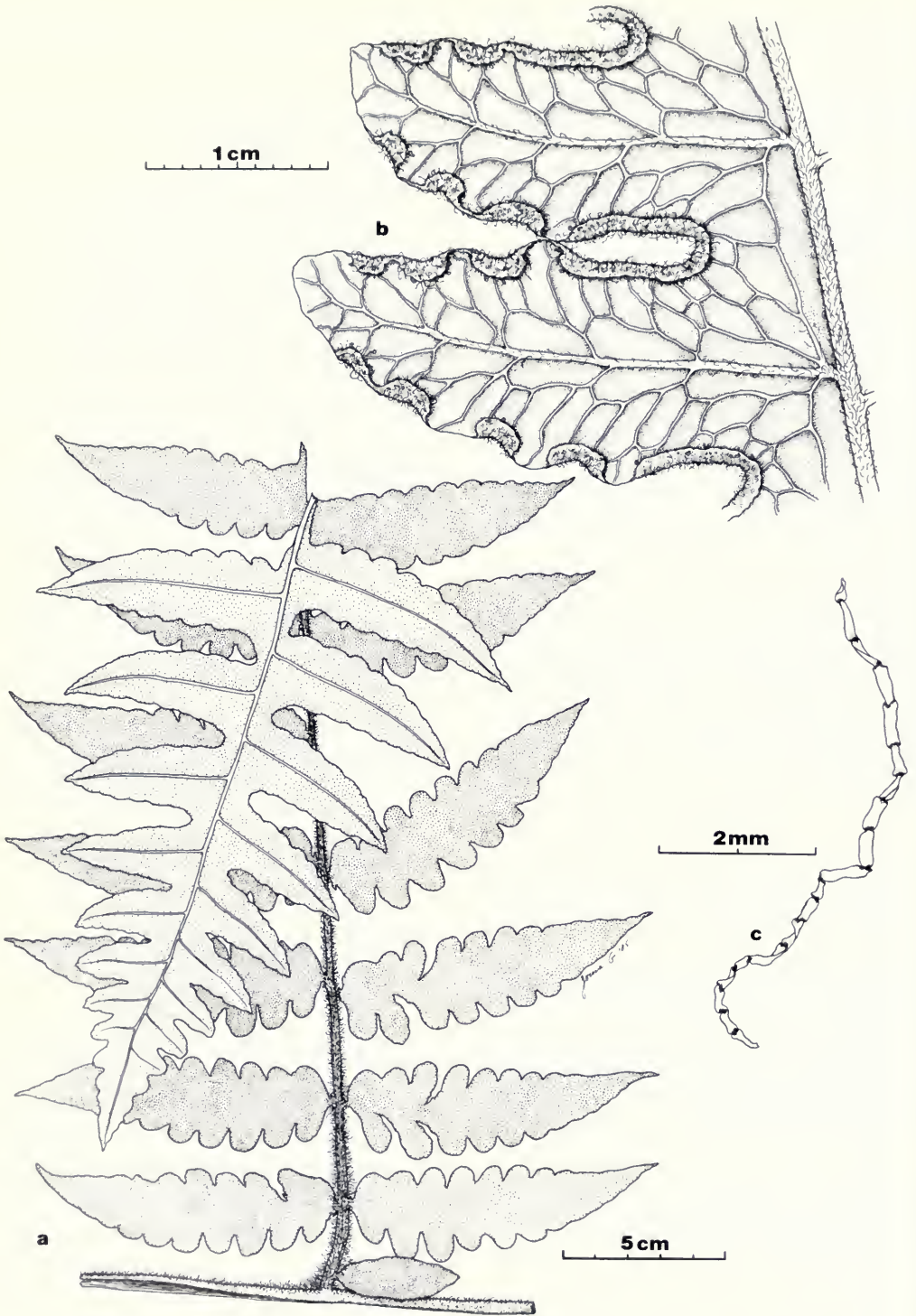


FIG. 27. *Blotiella lindeniana*: a, pinna; b, fertile ultimate segments, abaxial side; c, stem trichome. (a, b from Maguire 28554, F; c from Maguire 59851, F.)

*Blotiella* from *Lonchitis*, with which it was confused, is mentioned in Tryon (1962).

## Reference

TRYON, R. 1962. The genera *Lonchitis* and *Blotiella*, in Taxonomic fern notes, III. Contr. Gray Herb., 191: 93–100.

1. *Blotiella lindeniana* (Hooker) Tryon, Contr. Gray Herb. 191: 99. 1962. **Figure 27.**

*Lonchitis lindeniana* Hooker, Sp. fil. 2: 56, t. 89A. 1851. Venezuela, (Dist. Federal), Caracas, *Linden 543* (holotype, K!; photos, GH, US; isotypes, BR, US!; photos, GH of BR).

*Lonchitis lindeniana* var. *decomposita* Christ, Bull. Herb. Boissier, II, 6: 190. 1906. TYPE: Costa Rica, valle del Río Navarro. *Wercklé* (not located).

**Stem** trichomes long, multicellular. **Leaves** to ca. 5 m long. **Lamina** to 2-pinnate-pinnatifid, pinnae (with rare exceptions) sessile or short-stalked, the basal pinnules usually reduced, especially on the lower pinnae, pinnules entire to pinnatifid, obtuse to acute, all parts of the lamina more or less pubescent with long, acicular trichomes that may be gland-tipped or not. **Indusium** more or less pubescent.

Wet rain forests and cloud forests, 1280–2080 m, Huánuco and Cuzco.

Widely distributed in tropical America but uncommon.

This is the only American species of a predominantly African genus. Long leaves are scandent on other vegetation. The fully anastomosing veins are distinctive for this species.

**Huánuco:** SW slope of Río Lullapichis watershed, *Dudley 13203* (GH), *13219* (GH, US). Between Huánuco and Pampayacu, *Kanehira 140* (GH, US). **Cuzco:** Prov. La Convención, Cordillera Vilcabamba, *Dudley 11247* (GH).

## VIII. *Lonchitis*

*Lonchitis* L., Sp. pl. 1078. 1753; Gen. pl., ed. 5, 485. 1754. TYPE: *Lonchitis hirsuta* L. **Figure 28.**

**Terrestrial.** **Stem** rather stout, more or less short-creeping, bearing flattened trichomes. **Leaves** rath-

er closely spaced, to ca. 2.5 m long. **Lamina** 2–3-pinnate-pinnatifid, more or less pubescent, veins free or partially anastomosing without included free veinlets. **Sori** marginal, sometimes paraphysate, the sporangia borne on a vascular commissure connecting the vein ends, covered by a well-modified marginal indusium. **Spores** spheroidal, trilete, somewhat granulate.

Tryon (1962) indicated the type of the genus *Lonchitis* as *L. hirsuta* L.; a more definitive choice of the same species is presented by Lellinger (1977). *Lonchitis* is unusual in having a fleshy stem with large, strongly flattened trichomes. There is one species of the genus in tropical America and another, *L. occidentalis* Baker, in tropical Africa and Madagascar.

## References

LELLINGER, D. B. 1977. The identity of *Lonchitis aurita* and the generic names *Anisosorus* and *Lonchitis*. Taxon, 26: 578–580.

TRYON, R. 1962. The genera *Lonchitis* and *Blotiella*, in Taxonomic fern notes, III. Contr. Gray Herb., 191: 93–100.

1. *Lonchitis hirsuta* L., Sp. pl. 1078. 1753. TYPE: Martinique, Plumier, *Traité foug. Amér. t. 20*, 1705. **Figure 28.**

*Pteris lonchitoides* Desv., Mém. Soc. Linn. Paris 6: 301. 1827. TYPE: Peru, Herb. Desv., p.

**Stem** trichomes large, mostly flattened. **Leaves** ca. 1–2.5 m long, long-petioled. **Lamina** with the pinnae and pinnules often subopposite, most pinnules adnate, larger ones sessile or short-stalked, pubescent with scattered, whitish, soft, large, multicellular trichomes. **Indusium** membranous, sparingly pubescent, usually erose-crenulate.

In forests, 500–2000 m, Amazonas, San Martín, Pasco, and Junín.

Mexico and Central America; Venezuela and Colombia, south to Bolivia.

This species is widely distributed but uncommon in tropical America.

**Amazonas:** Río Marañón, above Cascadas de Mayasi, *Wurdack 1889* (US). **San Martín:** Tarapoto, *Spruce 4667* (GH, K). Prov. Mariscal Cáceres, N of Pulcacha, *Plowman & Schunke 11629* (F). **Pasco:** Yapas, Pichis Trail. (as

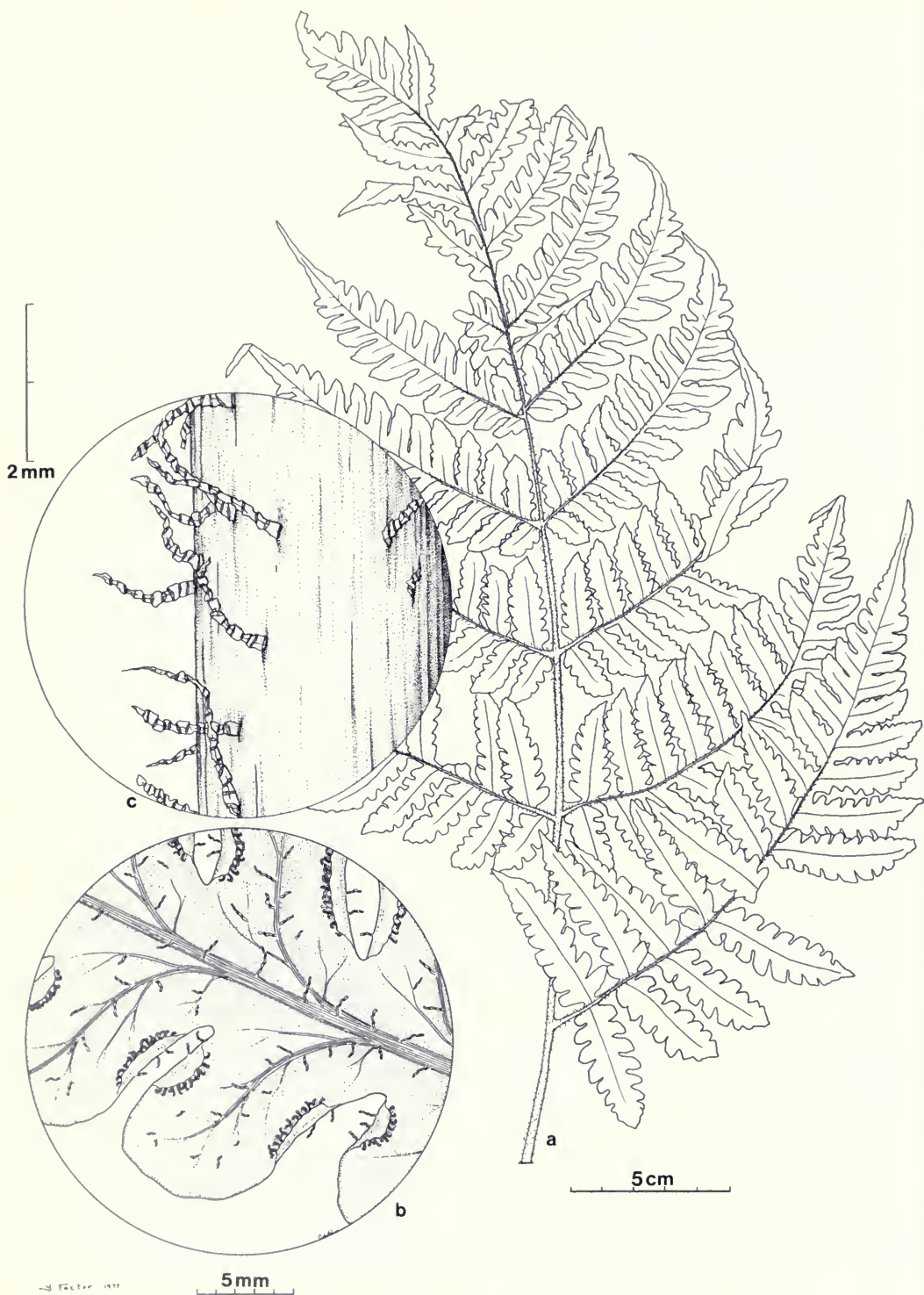


FIG. 28. *Lonchitis hirsuta*: a, apical portion of lamina; b, portion of fertile pinnule, abaxial side; c, portion of rachis with trichomes. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)

Junin), Killip & Smith 25438 (GH, US). **Junin:** La Merced, Macbride 5652 (US). Prov. Tarma, Perené, Esposito (USM).

## IX. Histiopteris

**Histiopteris** (Agardh) John Sm., Hist. fil. 294. 1875. **Figure 29.**

*Pteris* sect. *Histiopteris* Agardh, Recens. spec. pter. 76. 1839. TYPE: *Pteris vespertilionis* Labill. (*Histiopteris vespertilionis* (Labill.) John Sm.) = *Histiopteris incisa* (Thunb.) John Sm.

**Terrestrial.** Stem slender to rather stout, long-creeping, bearing scales and sometimes also trichomes, or only trichomes. **Leaves** widely spaced, to 12 m long, sometimes scandent on other vegetation. **Lamina** 2–4-pinnate essentially glabrous, veins free to usually anastomosing without included free veinlets. **Sori** marginal, paraphysate, sporangia borne on a vascular commissure connecting the vein ends, covered by a well-modified marginal indusium. **Spores** ellipsoidal, monolete, prominently tuberculate or rugose.

*Histiopteris* is a pantropical and temperate genus of one, or perhaps a few, species. There is a single species in America and in Peru.

1. **Histiopteris incisa** (Thunb.) John Sm., Hist. fil. 295. 1875. **Figure 29.**

*Pteris incisa* Thunb., Prodr. fl. cap. 171. 1800. TYPE: Cape of Good Hope, 1775, *Thunberg* (holotype, not located; isotype, s!).

**Stem** scales brown, more or less clathrate, trichomes (when present) brownish, long, and rather soft. **Leaves** ca. 0.5–3 m long, rarely to 12 m long and scandent on other vegetation. **Lamina** ovate to long-triangular, pinnae opposite, the basal pinnae reduced, especially toward the base of the lamina of large leaves, where they become stipule-like, pinnules often opposite, glaucous abaxially and glabrous or with scattered, brownish, large trichomes. **Indusium** membranous, glabrous, entire to crenulate.

Shrubby slopes and dense forests, 1000–3750 m, Cajamarca to Puno.

Tropical and south temperate America; Old World.

The venation as well as the stem indument are unusually variable in this species. The veins are

usually partly anastomosing, but sometimes may be wholly anastomosing or wholly free.

**Cajamarca:** Prov. Contumaz, Cascas-Contumaz, López et al. 9105 (F, HUT, MO). **Amazonas:** Prov. Bongará, Pomacochas-Vilcaniza, Sagástegui 6007 (GH, HUT). **Ancash:** Prov. Huari, Huascarán National Park, Smith et al. 12742 (GH). **Huánuco:** Carpish, Gentry & Smith 44862 (F). Panao, Macbride 3603 (F, US). **Pasco:** Prov. Oxapampa, 19 km W of Oxapampa, D. Smith 2701 (MO). Prov. Oxapampa, Cordillera San Gutardo, León 509 (USM). **Junin:** Villa Amoreti, G. Kunkel 637 (GH). **Cuzco:** Valle de Pillahuata, Herrera 3337, 3341 (US). **Puno:** Sandia, Weberbauer 714 (B).

## X. Lindsaea

**Lindsaea** Sm., Mém. Acad. Roy. Sci. (Turin) 5: 413. 1793. TYPE: *Lindsaea trapeziformis* Dry. = *Lindsaea lancea* (L.) Bedd. (*Adiantum lancea* L.). **Figure 30.**

**Terrestrial**, rupestral or epiphytic. **Stem** decumbent and moderately stout to slender, to long-creeping and slender, bearing scales that usually intergrade to rigid trichomes. **Leaves** borne in a cluster or at intervals, to ca. 1 m long. **Lamina** simple to 4-pinnate, glabrous, veins free or anastomosing without included free veinlets. **Sori** marginal, not paraphysate, but often with trichomes similar to those on the lamina, served by 2–many veins, sporangia borne on a vascular commissure connecting the vein ends (in Peruvian species), covered by an abaxial indusium, the leaf-tissue beyond the sorus not modified. **Spores** usually spheroidal and trilete, sometimes ellipsoidal and monolete, smooth to granulate or with irregular surface strands.

*Lindsaea* is a large pantropical and extratropical genus of about 150 species, with only 11 of them in Peru. The American species have been monographed by Kramer (1957), and this treatment is based on that work, on the treatment of *Lindsaea* for Peru in Tryon (1964) which was prepared with the aid of Kramer, and on a review of the present treatment by Kramer.

## References

- KRAMER, K. U. 1957. A revision of the genus *Lindsaea* in the New World. Acta Bot. Neerl., 6: 97–290.  
TRYON, R. 1964. The ferns of Peru. Contr. Gray Herb., 194: 1–253.

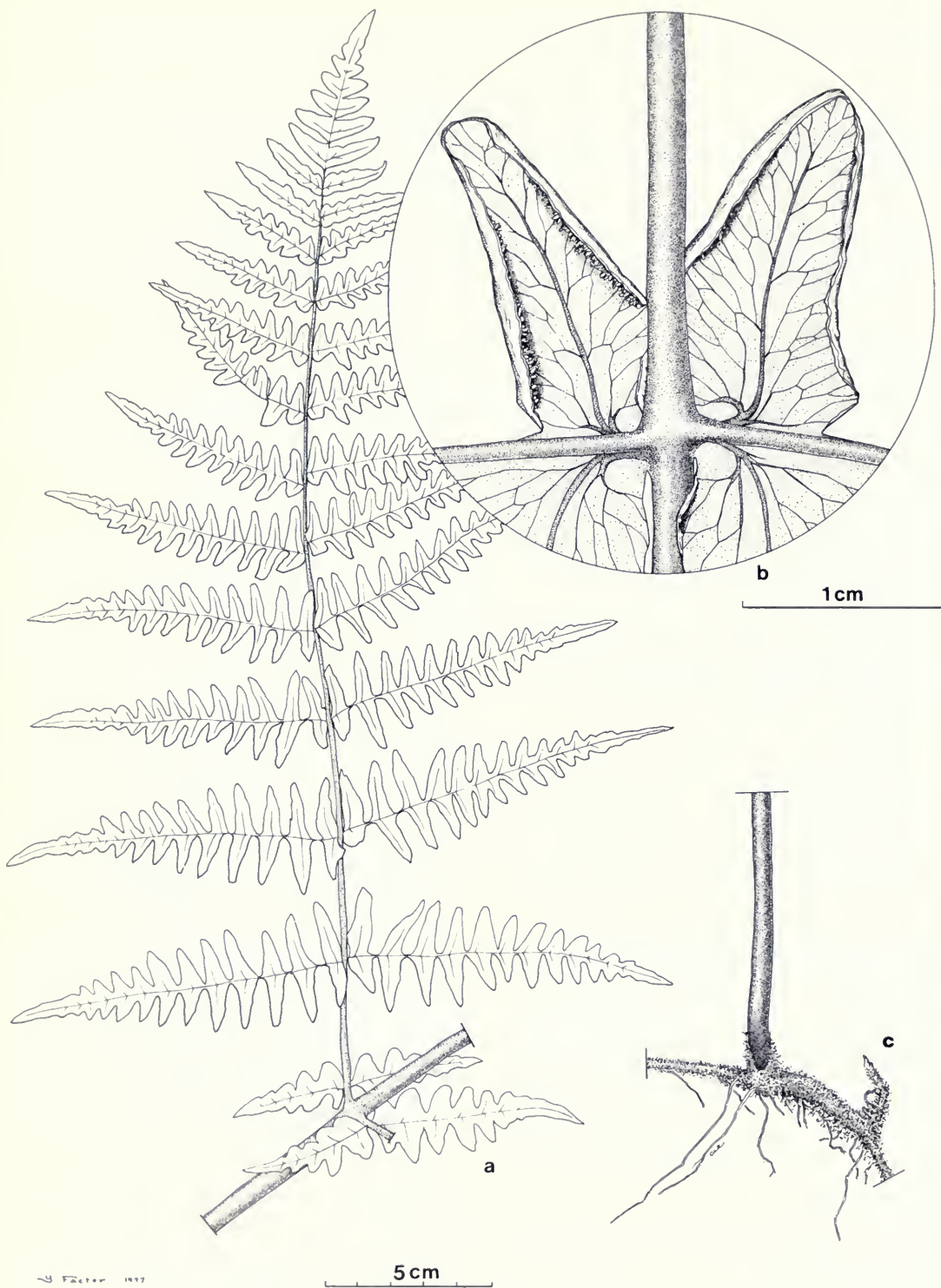


FIG. 29. *Histiopteris incisa*: a, pinna; b, rachis and bases of 2 fertile pinnae, abaxial side; c, stem and base of petiole. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)

**Key to Species of *Lindsaea***

- a. Lateral ultimate segments (pinnules) dimidiate only about in the basal half, the apical half equilateral, with a definite central midvein; sori on the upper and lower edges of the pinnules; lamina 2-pinnate ..... 3. ***L. taeniata***
- a. Lateral ultimate segments (pinnae or pinnules) wholly dimidiate, with a basal vein; sorus only on the upper edge or also continuous onto the outer edge ..... b
  - b. The apical portion of the pinnae of a 2-pinnate lamina, or the apical portion of the lamina of a 1-pinnate lamina, gradually and much reduced, with small segments or lobes ..... c
  - c. Lamina 2-pinnate and the pinna-rachises with lateral wings or angles on the abaxial side that are lighter in color than the pinna-rachis proper ..... d
    - d. Pinna-rachises with abaxial wings that are usually continuous beyond the base of the pinna-rachis; indusium ca. 0.10–0.15 mm wide ..... 4. ***L. divaricata***
    - d. Pinna-rachises with abaxial wings that are irregularly interrupted toward the base of the pinna-rachis; indusium ca. 0.3 mm wide ..... 6. ***L. portoricensis***
  - c. Lamina 1-pinnate, or 2-pinnate and the pinna-rachises lacking wings or angles on the abaxial side, or with them and they are then concolorous with the pinna-rachis proper ..... e
    - e. Ultimate segments (pinnae or pinnules) mostly 3 or more times as long as broad ..... f
      - f. Largest ultimate segments 15–35 mm long and 5–11 mm broad ..... 1. ***L. arcuata***
      - f. Largest ultimate segments 6–9 mm long and 2–2.5 mm broad ..... 2. ***L. spruceana***
    - e. Ultimate segments (pinnae or pinnules) mostly 2¼ times, or less, as long as broad ..... g
      - g. Indusium 0.15–0.20 mm wide; segments herbaceous, the veins evident abaxially, the lower edge mostly herbaceous or very narrowly thickened; 1-pinnate pinnae, when present, spreading ..... 5. ***L. guianensis***
      - g. Indusium 0.3–0.5 mm wide; lower edge of the segments definitely thickened; 1-pinnate pinnae, when present, strongly ascending ..... h
        - h. Segments firmly herbaceous to chartaceous; veins usually evident abaxially; indusium ca. 0.3 mm wide ..... 6. ***L. portoricensis***
        - h. Segments usually coriaceous, veins obscure abaxially; indusium 0.3–0.5 mm wide ..... 7. ***L. stricta***
  - b. The apical portion of the pinnae of a 2-pinnate lamina, or the apical portion of the lamina of a 1-pinnate lamina, abruptly and not or hardly reduced, with rather large segments or lobes ... i
    - i. Petiole rounded on the abaxial side; lamina 2-pinnate ..... 4. ***L. divaricata***
    - i. Petiole angular or winged on the abaxial side, at least toward its apex, rarely only slightly so ..... j
      - j. The terminal segment of the lamina, and of the pinnae in a 2-pinnate lamina subacute to acuminate; if the lamina 2-pinnate, the pinnules not or hardly narrowed toward their apex ..... 8. ***L. lancea***
      - j. The terminal segment of the lamina very obtuse to concave, or if the lamina 2-pinnate and the terminal segment of the lamina and of the pinnae subacute to acuminate, then the pinnules strongly narrowed toward their apex which is often turned upward ..... k
        - k. Terminal segment of the lamina flabellate; petiole mostly dark reddish brown to atropurpureous; lamina 1-pinnate; pinnae coriaceous ..... 9. ***L. schomburgkii***
        - k. Terminal segment of the lamina, and of the pinnae in a 2-pinnate lamina triangular-cuneate to crescent-shaped; segments herbaceous ..... l
          - l. Lamina 1- or 2-pinnate, when 1-pinnate the pinnae usually many, 10–30 or more, the broader ones mostly ca. 3–6 times as long as broad and the petiole mostly stramineous to reddish brown ..... 10. ***L. hemiglossa***
          - l. Lamina 1-pinnate, pinnae few, 4–15, the broadest ones 2 or 2½ times, or less, as long as broad; petiole mostly dark reddish brown to atropurpureous ..... 11. ***L. ulei***

1. ***Lindsaea arcuata*** Kunze, *Linnaea* 9: 86. 1834.  
 TYPE: Peru, (Huánuco), Pampayacu, *Poep-*

*pig 1133* (holotype, LZ destroyed; isotype?, B).  
**Figure 30c.**

**Petiole** stramineous to pale reddish brown, the abaxial side rounded to usually angular or sulcate. **Lamina** 1- or 2-pinnate, apical pinna (or apical pinnules of a 2-pinnate lamina) reduced to the small, terminal segment which is more or less confluent with the lateral segments adjacent to it. **Rachis** of a 1-pinnate lamina abaxially angular, sulcate, pinna-rachises abaxially rounded at the base, becoming concolorously angled beyond. **Ultimate segments** mostly 3 or more times as long as broad, herbaceous, the veins evident to rather obscure abaxially. **Indusium** ca. 0.2 mm wide, subentire.

Dense forests and somewhat open elfin forests, rarely on rocks, 100–1600 m, Amazonas to Cuzco. Mexico to Costa Rica; Greater Antilles; Venezuela to Colombia south to Bolivia; Brazil.

**Amazonas:** Mendoza, *Woytkowski 8214* (MO, UC). **San Martín:** Prov. Mariscal Cáceres, 50 km N of Tocache Nuevo, *Plowman & Schunke 11667* (F). **Loreto:** Tierra Doble, alto Río Nanay, *L. Williams 1071* (F, US). **Huánuco:** Pampayacu, *Kanehira 177* (GH, US). SW slope of Lullapichis watershed, *Dudley 13302* (GH, US). **Pasco:** Yapas, Pichis Trail (as Junin), *Killip & Smith 25522* (F, NY, US). **Junin:** Villa Amoretti, *Kunkel 578* (GH). **Cuzco:** Río Tocate, *Bües 1739* (US).

2. ***Lindsaea spruceana*** Kuhn, *Linnaea* 36: 79. 1869. TYPE: Peru (San Martín), Mt. Guayrapurima, Tarapoto, *Spruce 4023* (holotype, B; isotypes, BM, BR, F, G, GH!, K, LE, W; photos, US of BM, BR).

*Lindsaea tarapotensis* C. Chr., *Index fil.* 398. 1906, based on *Lindsaea spruceana* Kuhn (not *Lindsaea sprucei* Hooker, which is not an earlier homonym) and with the same type.

**Petiole** stramineous to reddish brown, the abaxial side rounded to sulcate. **Lamina** 1- or 2-pinnate, apical pinna (or apical pinnules of a 2-pinnate lamina) reduced to the small terminal segment which is more or less confluent with the lateral segments adjacent to it. **Rachis** of a 1-pinnate lamina abaxially angular, sulcate, pinna-rachis abaxially rounded at the base, becoming concolorously angled beyond. **Ultimate segments** mostly 3 times as long as broad, herbaceous, the veins rather obscure abaxially. **Indusium** ca. 0.2 mm wide, subentire.

Dense forests, one collection on rocks, 600–800 m, San Martín. This species differs from *Lindsaea*

*arcuata* in its generally smaller size, and the small ultimate segments have a rounded apex. In the larger *L. arcuata* the ultimate segments have the apex truncate or acute to caudate. While this may be a small form of *L. arcuata*, a second collection from the same Department as the type implies that it is a taxon and it is here treated as a species.

Endemic to Peru.

**San Martín:** Lamas, upper slopes of Cerro Isco, *Knapp et al. 8539* (MO, Z).

3. ***Lindsaea taeniata*** Kramer, *Acta Bot. Neerl.* 6: 208. 1957. TYPE: Colombia, Antioquia, Dos Quebradas, *Kalbreyer 1345* (holotype, B; isotype, K).

**Petiole** wholly or mostly stramineous, the abaxial side rounded to obtusely angled. **Lamina** 2-pinnate, the apical pinnules not much reduced, the rather large terminal segment more or less confluent with the lateral segments adjacent to it. **Pinna-rachises** abaxially concolorously winged or ridged, or with paler wings. **Ultimate segments** mostly 3–5 times as long as broad, herbaceous to subcoriaceous, the lateral veins evident or obscure abaxially. **Indusium** 0.15–0.20 mm wide, entire.

In forests, 600–700 m, San Martín and Loreto. Colombia and Ecuador, Peru and adjacent Brazil.

This species is characterized by the only partly dimidiate ultimate segments, the apical half being equilateral and with a definite midvein. The petioles are stramineous to pale brown, or sometimes darker at the base.

**San Martín:** Prov. Mariscal Cáceres, Tocache Nuevo, *J. Schunke V. 5697* (F, US). **Loreto:** Río Ampiyacu, Pucaurquillo, *Davis et al. 849* (F, UC).

4. ***Lindsaea divaricata*** Klotzsch, *Linnaea* 18: 547. 1845. TYPE: "British Guiana," *Schomburgk 368* (holotype, B). **Figure 30d.**

**Petiole** castaneous to nearly black, the abaxial side rounded. **Lamina** 2-pinnate, apical pinnules reduced, or not, to the small to moderately large, terminal segment which is more or less confluent with, or free from, the lateral segments adjacent to it. **Pinna-rachises** abaxially with continuous pale wings beyond the base. **Ultimate segments** ca. 2½ times as long as broad, herbaceous, the veins usu-



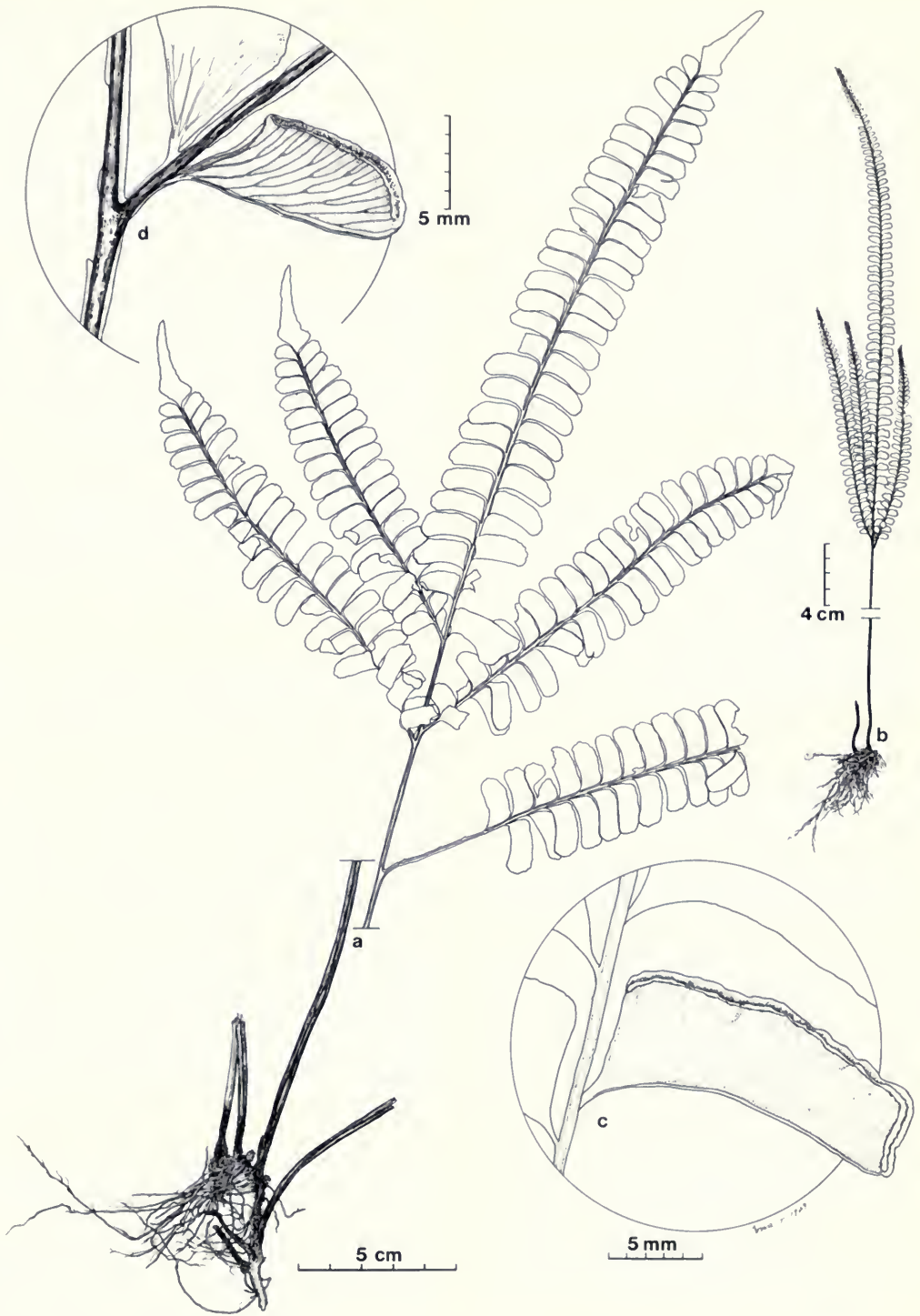


FIG. 30. *Lindsaea lancea*: a, habit. *Lindsaea stricta*: b, habit. *Lindsaea arcuata*: c, fertile ultimate segment, abaxial side. *Lindsaea divaricata*: d, portion of rachis and pinna base, abaxial side. (Adapted from Stolze, Ferns & fern allies of Guatemala, 1981.)

ally obscure abaxially. **Indusium** 0.10–0.15 mm wide, entire or subentire.

Dense forests, hillside forests, and partly cleared forests, 100–750 m, Amazonas and Loreto to Madre de Dios.

Mexico and Central America; Lesser Antilles; generally distributed in South America south to Bolivia and Paraguay.

This species is often characterized by the crenate apex of the sterile segments or the outer sterile edge of partly fertile segments. The narrow indusium and usually continuous abaxial wings of the pinna-rachis separate it from *L. portoricensis*. In addition, this species usually has spreading pinnae while *L. portoricensis* most often has strongly ascending pinnae.

**Amazonas:** Prov. Bagua, Chiriaco to Puente Venezuela, *Barbour 4421* (MO). **Loreto:** Above Pongo de Manseriche, *Mexía 6133b* (UC, US). Near Iquitos, *Klug 69, 1337* (F, NY, US). **Huánuco:** Tingo María, *Tryon & Tryon 5339* (F, U, USM). E of Tingo María, *J. Schunke V. 5166* (F, US). **Pasco:** Prov. Oxapampa, Valle de Palcazú, *León 686* (F). Prov. Oxapampa, Palcazú valley, *D. Smith 3738* (GH). **Ucayali:** Vicinity of Aguaytía, *Croat 20923* (MO). **Madre de Dios:** Prov. Tambopata, Tambopata Nature Reserve, *Barbour 5180* (F). Prov. Manú, Cerro de Pantiacolla, *Foster et al. 10698, 10819* (F).

5. *Lindsaea guianensis* (Aublet) Dry., Trans. Linn. Soc. London 3: 42. 1797, ssp. **guianensis**.

*Adiantum guianense* Aublet, Hist. pl. Guiane 2: 963. 1775. TYPE: French Guiana, *Aublet* (holotype, P?).

Petiole stramineous to rarely castaneous beyond the dark brown to blackish base, the abaxial side rounded. **Lamina** usually 2-pinnate, rarely 1-pinnate, apical pinnules (or apical pinna of a 1-pinnate lamina) reduced to the small terminal segment which is more or less confluent with the lateral segments adjacent to it. **Rachis** of a 1-pinnate lamina concolorously angled or winged, pinna-rachises abaxially rounded (always so at the base) to concolorously angled or sulcate. **Ultimate segments** ca. 2 times, or less, as long as broad, herbaceous, the veins evident abaxially. **Indusium** ca. 0.15–0.20 mm wide, entire to usually minutely erose-denticulate.

Hillside forests and forest borders, 550–1250 m, Amazonas, Huánuco, and Pasco.

Nicaragua; Lesser Antilles; Guianas to Colombia, south to Peru; northern Brazil.

There are two geographically distinct elements in *Lindsaea guianensis*. One is ssp. *guianensis* in Peru and northern South America. It has the pinnae long-acuminate (caudate) with minute apical segments. The other, ssp. *lanceastrum* Kramer, occurs in central, eastern, and southeastern Brazil and Paraguay. It has the pinnae acute to somewhat acuminate.

The pinna-rachis of *L. guianensis* is abaxially terete toward the base to angular or subterete beyond. In *L. portoricensis* it has paler, more or less interrupted angles or wings, except at the very base which is terete. Also the spreading pinnae of ssp. *guianensis* aid in separating it from *L. portoricensis* with usually strongly ascending pinnae.

**Amazonas:** Río Marañón, near Cascadas de Mayasi, *Wurdack 1942* (US). **Huánuco:** Tingo María, *Tryon & Tryon 5275* (F, U, USM), *5289* (BM, F, GH, MO, U, US, USM). **Pasco:** Prov. Oxapampa, Cordillera San Matías, *León et al. 325* (USM). Prov. Oxapampa, vicinity of Chequitavo, *D. Smith 5181* (GH).

6. *Lindsaea portoricensis* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 326. 1811. TYPE: Herb. Desvaux, P.

Petiole brownish red to dark brown, the abaxial side rounded. **Lamina** 1- or 2-pinnate, apical pinnules (or apical pinna of a 1-pinnate lamina) reduced to the small terminal segment that is more or less confluent with the lateral segments adjacent to it. **Rachis** of a 1-pinnate lamina and pinna-rachises abaxially with pale angles or wings that are irregularly interrupted toward its base. **Ultimate segments** ca. 2 times as long as broad, firmly herbaceous to chartaceous, the veins usually evident abaxially. **Indusium** ca. 0.3 mm wide, usually repand-erose.

In forests and in open woods, especially in sandy soil, 100–900 m, San Martín, Loreto, and Ucayali.

Mexico to Guatemala; Greater Antilles; Guianas to Colombia, south to Bolivia; Brazil.

In leaves with a 2-pinnate lamina, the pinnae of *L. portoricensis* are usually strongly ascending, while in other somewhat similar species such as *L. divaricata* and *L. guianensis* they are usually spreading. Other differences from *L. guianensis* are noted under that species.

**San Martin:** Soritor, *Woytkowski 6247* (MO, US). **Loreto:** Near Iquitos, *Tryon & Tryon 5180* (BM, F, MO, U, US, USM). **Bersalles,** *Vargas 11455* (GH). **Ucayali:** Bosque Nacional von Humboldt, *Gentry et al. 36222* (MO).

7. ***Lindsaea stricta*** (Sw.) Dry., Trans. Linn. Soc. London 3: 42. 1797. **Figure 30b.**

*Adiantum strictum* Sw., Prodr. 135. 1788. TYPE: Jamaica, *Swartz* (holotype, s).

**Petiole** stramineous to pale brown or reddish brown, the abaxial side rounded. **Lamina** 1- or 2- (rarely 3-)pinnate apical pinnules (or apical pinna of a 1-pinnate lamina) reduced to the small, terminal segment that is more or less confluent with the lateral segments adjacent to it. **Rachis** of a 1-pinnate lamina and pinna-rachises abaxially rounded to concolorously angled or sulcate. **Ultimate segments** roundish or to 1½ times as long as broad, herbaceous to usually coriaceous, the veins mostly obscure abaxially. **Indusium** 0.3–0.5 mm wide, usually strongly erose to lacerate.

Three varieties are recognized by Kramer (1957), with var. *stricta* (f. *stricta*) and var. *parvula* (Fée) Kramer cited from Peru.

In rocky woods, in wet sand, and in rocky sandstone areas, 840–2400 m, Amazonas to Puno.

Mexico and Central America; Greater Antilles; Trinidad and Guianas to Colombia, south to Bolivia; Brazil.

*Lindsaea stricta* is especially distinguished by its rather broad indusium and short, usually coriaceous ultimate segments.

**Amazonas:** Prov. Chachapoyas, just E of Chachapoyas, *Wurdack 728* (F, GH, US). **San Martin:** Zepelacio, near Moyobamba, *Klug 3418* (B, F, G, GH, K, MO, NY, S, US). **San Roque,** *Ll. Williams 7760* (F, GH). **Ucayali:** Prov. Coronel Portillo, Obenteni basin, *Chrostowski* (UC). **Cuzco:** Beatriz, Maranura, *Bües 894* (US). **Puno:** Sandia, *Vargas 11850* (GH).

8. ***Lindsaea lancea*** (L.) Bedd., Suppl. ferns Brit. Ind. 6. 1876. **Figure 30a.**

*Adiantum lancea* L., Sp. pl. ed. 2, 1557. 1763. LECTOTYPE (designated by Kramer, 1957): Surinam; Seba, Locupl. nat. thes. 2: t. 64, f. 7–8. 1735.

**Petiole** stramineous to nearly black, the abaxial side with sharp angles or wings, or obtusely angled,

at least at its apex. **Lamina** 1- or 2-pinnate, apical pinnules (or apical pinna of a 1-pinnate lamina) not or not much reduced, the large, or rather large, terminal segment free or nearly so from the lateral segments adjacent to it. **Rachis** of a 1-pinnate lamina and pinna-rachises abaxially with often pale ridges or wings (the pinna-rachises abaxially rounded at the base). **Ultimate segments** ca. 2–3 times as long as broad, herbaceous, the veins rather evident abaxially. **Indusium** 0.2–0.3 mm wide, entire.

Dense forests, hillside forests, rocky woods, moist, shrubby areas, and cloud forests, 100–1600 m, Amazonas and Loreto to Cuzco and Madre de Dios.

Tropical America.

Five varieties are recognized by Kramer (1957), with two of them in Peru: var. *lancea* and var. *falcata* (Dry.) Rosenst. These varieties do not have strong geographic correlations. As in several species, var. *lancea* has either a 1- or a 2-pinnate lamina. In plants with a 1-pinnate lamina, the upper pinnae are about half as long as the lower ones, which are more or less straight. In plants of var. *falcata*, the lamina is 1-pinnate, with the upper pinnae hardly reduced and the basal ones mostly strongly falcate.

**Amazonas:** Río Marañón, near Cascadas de Mayasi, *Wurdack 1941* (F, GH, UC). **Prov. Bagua,** Chiriaco to Puente Venezuela, *Barbour 4325* (MO). **Loreto:** Prov. Requena, Jenaro Herrera, *Vásquez et al. 2095* (MO). **Near mouth of Río Santiago,** *Mexia 6207a* (GH, UC, US). **Huánuco:** Tingo María, *Tryon & Tryon 5291, 5296* (BM, F, MO, U, US, USM). **Pasco:** Prov. Oxapampa, Puerto Laguna, *D. Smith 8423* (MO). **Junin:** Prov. Satipo, Pichanaki, *León 209* (F, USM). **Above San Ramón,** *Killip & Smith 24698* (NY, US). **Ucayali:** Bosque Nacional von Humboldt, *Gentry et al. 36223* (MO). **Cuzco:** Prov. Paucartambo, Cosñipata valley, *Wachter et al. 219* (F). **Madre de Dios:** Prov. Tambopata, Tambopata Nature Reserve, *Barbour 4964* (F). **Prov. Manú,** Cerro de Pantiacolla, *Foster et al. 10695, 10696* (F).

9. ***Lindsaea schomburgkii*** Klotzsch, Linnaea 18: 545. 1845. TYPE: "British Guiana," *Schomburgk 278* (holotype, B).

**Petiole** mostly reddish brown to atropurpureous, the abaxial side sharply angled or with protruding paler angles. **Lamina** 1-pinnate, apical pinnae not or slightly reduced, the large, flabellate terminal segment free. **Rachis** abaxially with often pale angles to sulcate. **Ultimate segments** ca. 2½

times as long as broad, firmly herbaceous to coriaceous, veins evident abaxially. **Indusium** 0.2 mm wide, entire to minutely erose-sinuate.

In wet, open sand, 150–1400 m, San Martín and Loreto.

Guyana southwest to Peru; Amazonian and central Brazil.

The lamina of this species is 1-pinnate, with the lateral pinnae usually coriaceous with prominent veins and the terminal segment flabellate. The dark petiole is angled or winged abaxially.

**San Martín:** Río Negro, *Woytkowski 6206* (GH, MO, US). Between Moyobamba and Chachapoyas, *Croat 58159* (F, MO). **Loreto:** 5 km from Río Nanay, on road to Arbolada de Peritos Forestales, *Croat 18558* (MO, UC).

10. ***Lindsaea hemiglossa*** Kramer, Acta Bot. Neerl. 6: 257. 1957. TYPE: Peru, (Junín), above San Ramón, Schunke Hacienda, *Schunke A234* (not *A324*) (holotype, UC; isotypes, GH!, US!).

*Lindsaea latifrons* Kramer, Acta Bot. Neerl. 6: 256. 1957. TYPE: Peru, Loreto, Balsapuerto, *Klug 2890* (holotype, US!; isotypes, B, BM, F, G, GH!, K, MO, NY, S).

**Petiole** stramineous to reddish brown, the abaxial side angled to palely ridged. **Lamina** 1- or 2-pinnate, apical pinna (or apical pinnules of a 2-pinnate lamina) little reduced, the large, triangular-cuneate to crescent-shaped terminal segment free. **Rachis** and pinna-rachises abaxially angled or ridged, often palely so. **Ultimate segments** 3–6 times as long as broad, firmly herbaceous, the veins mostly obscure abaxially. **Indusium** ca. 0.1–0.2 mm wide, entire.

Dense forests and borders of forests, cloud forests, 100–1800 m, San Martín and Loreto to Pasco and Junín.

Ecuador and Peru.

*Lindsaea latifrons* is treated as the same species as *L. hemiglossa* as tentatively suggested by Kramer (1957). Recent collections fail to support the differences of the two in color and altitude. The former species was originally characterized by

growing at ca. 1200–1800 m and with the dry pinnae dark olivaceous to brown, while the latter species grew at 150–350 m and had the dry pinnae bright green. The adopted name *L. hemiglossa* is chosen over *L. latifrons* because it is more appropriate and originally the species had a wider range and was represented by more collections.

Some of the 1-pinnate specimens are similar to *Lindsaea ulei* but have more and longer pinnae and a lighter petiole, as mentioned in the key to species. Some of the leaves with a 2-pinnate lamina may be confused with *L. lancea*; these are also separated in the key.

**San Martín:** Tarapoto, *Spruce* (K). **Loreto:** Near mouth of Río Napo, *Croat 20201* (MO, UC). Peña Negra, 25 km SW of Iquitos, *Croat 18663* (F, MO). Tierra Doble, alto Río Nanay, *L. Williams 1068* (F). Prov. Maynas, Mishana, *López et al. 8663* (HUT). **Huánuco:** SW slope of Río Lullapichis watershed, *Dudley 13006* (GH, US), *13061* (GH). **Pasco:** Prov. Oxapampa, vicinity of Chequitavo, *D. Smith 5189* (GH). **Junín:** Schunke Hacienda, above San Ramón, *Killip & Smith 24571* (F, NY, US). Chanchamayo valley, *Schunke 102, 806* (F, US).

11. ***Lindsaea ulei*** Christ, Hedwigia 44: 365. 1905. TYPE: Brazil, Amazonas, Río Juruá, *Ule 5756* (holotype, B; isotypes, G, K, L; photo, GH of L).

**Petiole** mostly dark reddish brown to atropurpureous, the abaxial side winged or angled, at least toward its apex. **Lamina** 1-pinnate, the large apical segment free, very obtuse to crescent-shaped or concave. **Rachis** abaxially with pale wings. **Ultimate segments** ca. 2½ times, or less, as long as broad, especially the broadest ones, more or less herbaceous, veins evident to obscure abaxially. **Indusium** ca. 0.2 mm wide, entire or nearly so.

Primary upland forests, ca. 150 m, Loreto. Northern South America and Peru.

Plants of *Lindsaea hemiglossa* with a 1-pinnate lamina have more and longer pinnae than *L. ulei* and a lighter petiole.

**Loreto:** Prov. Maynas, Río Ampiyacu, *Plowman et al. 7097* (F, GH, US).





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  *brevifrons* 15  
  
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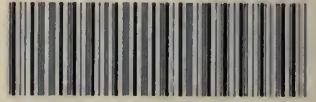
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