

The Mexican Species of *Tectaria*

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The genus *Tectaria* has not attracted pteridologists, and consequently it is one of the lesser-known of the larger fern genera. Some 200 species are attributed to it, but the actual number must be very much smaller. Like most ferns, these plants are exceedingly variable and many of the variations have received specific names. Many segregate genera have also been proposed, mostly on characters of venation, among them being *Sagenia*, *Pleocnemia*, *Dictyopteris*, *Bathmium*, *Dryomenis*, *Podopeltis*, *Cardiochlaena*, and *Arcypteris*. These have long been recognized as synonyms, but two of them (*Pleocnemia* and *Arcypteris*) have recently been recognized by Holttum (1951a, 1951b) as distinct genera, chiefly on venation characters. Some additional segregates may possibly be recognized among the Old World species, but it does not appear practicable or necessary to segregate any American species.

This genus was long known under the name *Aspidium* Swartz, and it was so treated in the Index Filicum. However, *Aspidium* Swartz was an illegitimate (superfluous) name when published, and it attained a wide usage in different senses (for *Dryopteris*, *Polystichum*, or *Nephrolepis*, in addition to *Tectaria*) and was thus a source of confusion. A proposal to conserve it in the sense of *Tectaria* was rejected by the Pteridophyta Subcommittee of the International Committee on Nomenclature in 1954.

Because of the proliferation of specific and generic names, the synonymy is extremely confused and complicated. An attempt to determine the correct names of the Mexican species has resulted in the following paper. Fortunately, the best-known species have proved to have correct names, but two of the lesser-known species require name changes. The study has brought to light a number of variations the significance of which remains to be determined. These should be studied cytologically when material becomes available. So far as can be judged from herbarium material, none of them are hybrids, although they may

prove to be eventually. I have supplied names for some of these, as subspecies, varieties, or forms as seems appropriate, considering their morphology and distribution. Specimens cited without indication of herbarium are in the United States National Museum.

KEY TO THE MEXICAN SPECIES

Indusia peltate, without sinuses or lobes, coriaceous, persistent, the margins inrolled at maturity, or sometimes apparently absent; blades entire or once-pinnate.

Fronds simple and unlobed; indusia often apparently absent.

1. *T. plantaginea*

Fronds trilobed, trifoliate, or 5-foliolate, the lowermost pair of pinnae stalked, mostly with an acute basiscopic lobe. Upper leaf surface not pubescent except on the veins, the sinuses of the lobes not ciliate; areoles often with a free included veinlet. 2. *T. heracleifolia*

Indusia reniform, attached at a sinus, the basal lobes often overlapping, thus closing the sinus and making the indusia appear peltate; blades simple to bipinnate-pinnatifid.

Stipes much longer than the blades, the latter small, usually merely lobed, the larger fronds with a pair of basal, subsessile or partly adnate pinnae, these with several rounded lobes on the basal side, not with an elongate, acute basal auricle-like lobe; rhizomes creeping, slender, 2-3 mm in diameter. 3. *T. lobata*

Stipes shorter than or about equaling the blades, the larger fronds fully pinnate to subtripinnate at base, if simply pinnate the basal pinnae normally with a single, elongate, acuminate, auricle-like basal lobe (or with several elongate lobes in *T. incisa* subsp. *transiens*); rhizomes thick, 8-20 mm in diameter.

Blades simply pinnate, with 3 pairs of pinnae or more, the basal pinnae with an elongate, acuminate basal auricle-like lobe or rarely with several acute basiscopic lobes; rhizomes erect; areoles often with a free included veinlet; margins of the pinnae essentially eciliate; stipe scales not pubescent on the back at the base.

4. *T. incisa*

Blades bipinnate-pinnatifid or subtripinnate at base, the basal pinnae basiscopically developed, with several elongate, pinnatifid basal pinnules; rhizomes creeping; areoles mostly without included veinlets; margins of the pinnae ciliate, especially in the bases of the lobes; stipe scales pubescent on the back at the base. 5. *T. mexicana*

1. *TECTARIA PLANTAGINEA* (Jacq.) Maxon, Contr. U. S. Nat. Herb. **10**: 494. 1908.

Polypodium plantagineum Jacq., Coll. **2**: 104, *t.3, f.1*. 1788.

Polypodium latifolium Vahl, Eclog. Amer. **3**: 50. 1807, *non* Forst., 1786.

TYPE: Montserrat, *Ryan* (not seen).

Dryomenis plantaginea (Jacq.) J. Smith, Bot. Voy. Herald 229. 1854.

Aspidium plantagineum (Jacq.) Griseb., Abhandl. Ges. Wiss. Goett. **7**: 268. 1857.

Bathmium plantagineum (Jacq.) Fourn., Bull. Soc. Bot. France **19**: 254. 1872.

Rhizomes repent, 3–10 cm long, ca. 3 mm in diameter, excluding the roots and stipe bases, scaly, the scales dark, lanceolate, long-attenuate, scarcely 4 mm long, not ciliate; leaves 2-ranked, erect, 25–60 cm long, the stipe shorter than the blade, 5–15 cm long, provided with numerous, brown, spreading, subulate-lanceolate scales 4–6 mm long, 1–1.6 mm broad; leaf blades herbaceous, dark green, simple, not at all lobed or pinnate, 20–50 cm long, 4.5–11 cm wide, oblong to oblanceolate or pointed-elliptic, the apex usually emarginate and proliferous, the base strongly decurrent, the margins entire or sinuate, the costa sulcate above and glabrous, beneath dark, elevated, minutely pilosulous with hyaline, acute, 1-celled hairs, obviously paleaceous, the scales similar to those of the stipe, sometimes at length deciduous, the leaf-surfaces and veins glabrous above, the veins sometimes minutely pilosulous beneath, the margins not ciliate; costules more or less straight, 7–10 mm apart; areoles in 4 or 5 rows between the costules, often with a free, included veinlet; sori round, small (1 mm diam.) or large (up to 2.5 mm diam.), in 2 rows between the costules, compital, not borne on the apices of the included veinlets, the lowest 2 borne on the outer angles of the costal areole (or sometimes of the 2 costal areoles); indusia lacking.

TYPE: Martinique (not seen).

RANGE: Puerto Rico, Lesser Antilles, Trinidad, Tobago, British Honduras and Honduras south to Peru and Brazil. Very likely to be found in southern Mexico (Yucatan, Tabasco, Campeche, or Quintana Roo).

ILLUSTRATIONS: Hook. Exot. Fl. **2**, *t. 114*. 1825; Ettingsh. Farnkr. Jetztw. *t. 130*. 1865; Mart. Fl. Bras. **1**(2): *t. 31*. 1870.

Typical *T. plantaginea*, described from Martinique, has discrete, minute, round, exindusiate sori, hardly over 1 mm in diameter. The form occurring in Central America is similar, ex-

cept that the sori are larger, sometimes as much as 2.5 mm in diameter; there appear to be no other differences, and specimens with small sori are also found in Central America. A more significant variation is found in Trinidad, Tobago, and Puerto Rico, and perhaps elsewhere. In this, some of the lower sori are confluent, and the sporangia are borne along an elongate receptacle. The meaning of this variation is far from clear; it suggests the admixture of another species, perhaps not even of this genus. Still, in other respects the plants do not suggest hybridity. In order that this plant may have a name, it may be called:

10667 1a. *TECTARIA PLANTAGINEA* (Jacq.) Maxon var. **confluens** Morton, var. nov.

Sori infimi plurimi confluentes, receptaculo elongato incrassato nigricante; indusium nullum.

TYPE: Trinidad, *L. H. & E. Z. Bailey T 15*, March 13, 1921 (US no. 1,058,555).

SOME ADDITIONAL COLLECTIONS EXAMINED:

Puerto Rico: Sierra de Luquillo, Jan. 31, 1926, *E. E. Dale, s. n.* **Trinidad:** *Fendler 118*. **Tobago:** Main Ridge, Roxborough-Parlatuvier Road, *Cowan 1435*. Englishmans Bay, *Broadway 4700*.

10665 1b. *TECTARIA PLANTAGINEA* (Jacq.) Maxon var. **macrocarpa** (Fée) Morton, comb. nov.

Bathmium macrocarpon Fée, Gen. Fil. 288. 1852.

?*Bathmium sinuatum* Fée, *loc. cit.* TYPE: French Guiana, *Leprieur* (not seen).

?*Aspidium sinuatum* (Fée) Moore, Ind. Fil. 104. 1858, *non* Labill., 1824.

?*Podopeltis sinuata* (Fée) J. Smith, Hist. Fil. 199. 1875.

TYPE: French Guiana, *Poiteau* (not seen).

RANGE: Known only from the Guianas.

SPECIMENS EXAMINED:

Surinam: Brownsberg Mountain, summit, June 25, 1924, For. Bur. [Surinam] 6540. Nassau Mountain, *Lanjouw & Lindeman 2316*. Almost surely belonging here, although no indusia are still present, are *Maguire 24128* and *24829*, from Tafelberg. **British Guiana:** Pacatorit, Potaro River, March 1907, *Jenman*.

This extremely interesting variation, apparently found only in the Guianas, has a large, circular, centrally-attached indusium, conspicuous in young plants and sometimes more or less

persistent. This may very well represent the primitive form of the species; throughout the rest of the range the indusium seems to have been wholly lost. The species *B. sinuatum* was supposed to differ in having sinuate-lobate margins, but this may have been a casual variation. No indusium was seen by Fée, but it may have been deciduous. An additional character shown by var. *macrocarpa* is that the costules are manifestly flexuous or zigzag, and are perhaps somewhat more distant than in var. *plantaginea*, in which the costules are often essentially straight.

2. *TECTARIA HERACEIFOLIA* (Willd.) Underw. Bull. Torrey Bot. Club **33**: 200. 1906.

Aspidium heracleifolium Willd. in L. Sp. Pl. ed. 4, **5**: 217. 1810.

Polypodium cordifolium Mart. & Gal. Mém. Acad. Brux. 15: 31. *t.4, f.2.*

1842, *non* L., 1753. TYPE: Antigua, Veraacruz, Mexico, *Galeotti 6313* (BR, Morton photograph 5175). Juvenile.

Bathmium heracleifolium Fée, Gen. Fil. 287. 1852.

Aspidium trifoliatum [subsp.] *heracleifolium* Clute, Fern Bull. **16**: 82. 1908..

Tectaria trifoliata var. *heracleifolia* Farw. Amer. Midl. Nat. **12**: 261. 1931.

Tectaria trifoliata sensu Millsp. Field Mus. Publ. Bot. **3**: 3. 1903, *non* Cav., 1802.

Rhizome erect, 6–11 mm in diameter, excluding the stipe bases, densely scaly, the scales small, 2–3 mm long, lanceolate, acuminate, slightly fimbriate, blackish and shining, with a narrow brown margin; leaves mostly 9–13, subfasciculate, erect, 30–70 cm long, the stipes longer than the blades, 20–45 cm long, stramineous, the base darker, shining, strongly angulate, deeply sulcate adaxially, glabrous essentially even when young, sparsely scaly near the base, the scales rather large, many cells broad, slightly fimbriate, glabrous on the back; leaf-blades papyraceous, deltoid-ovate, (14) 20–45 (50) cm long, 14–40 cm wide, pentagonal, the juvenile merely trilobate, the mature trifoliolate or 5-foliolate, the basal pair of pinnae much the largest, 12–20 cm long, deltoid, petiolulate, the petiolules 3–13 mm long, 2- or 3-lobed, the basiscopic lobe elongate, 5–7 cm long, entire or sinuate, the acroscopic lobe (if present) small, the apex acuminate, subentire or sinuate or shallowly lobate, the costae septate-puberulous above, the veins often puberulous beneath, the leaf-surfaces glabrous on both sides, the margins not ciliate, even in the sinuses, the second pair of pinnae (if present) oblong-lanceolate, long-attenuate, subsessile or short-petiolulate, subentire or slightly lobed, occasionally with a more or less prominent basi-

scopic lobe, the apex deltoid, acuminate, trilobed at base or sometimes with additional lobes, not or not much decurrent on the rhachis; venation complexly reticulate, a single costal areole present between the costules, this with several, free, included veinlets arising from the outer margin, these sometimes uniting to form secondary areoles, the other areoles in 9-12 rows between the costa and the margin, in ca. 4 rows between the costules, pentagonal or hexagonal, often with a single, free, included veinlet; sori compital, in 2 rows along the costae, large, 2-3.5 mm wide; indusia orbicular, flat when young, centrally attached, entire, persistent, at maturity thick, 4-angled from the strongly incurved margins.

✓**TYPE:** Hispaniola (ex Plumier, Tract, Fil. Amer. 126, t. 147. 1705) and Philippine Islands. No specimen in Willdenow Herbarium.

RANGE: Florida, West Indies; Mexico to Peru. The "Philippine Islands" must have been an error.

ILLUSTRATIONS: Small, Ferns Southeast. States 205. 1938 (not typical).

SPECIMENS EXAMINED:

Nuevo Leon: Guajuco, 1880, *Palmer 1457*. Sierra Madre near Monterrey *Pringle 1983*. Haujuco Canyon, *Clausen 7543*. Hacienda Vista Hermosa, *Harvey 1037*. **Tamaulipas:** Victoria, 1907, *Palmer 184, 568*. Gómez Farías, 1907, *Palmer 294*. Rancho de las Calabazas, Río Sabinas, *Sharp et al. 5038*. **San Luis Potosí:** Without special locality, *Parry & Palmer 976*. **Nayarit:** María Magdalena Island, *Maltby 162*. María Madre Island, *Maltby 136, Nelson 4280*. **Jalisco:** Barranca Río Blanco, near Guadalajara, *Rose & Painter 7506*. **Veracruz:** Pueblo Viejo, 1910, *Palmer 574*. Orizaba, *Seaton 306, Bourgeau 1939, Mohr s. n.* Teocelo Falls, *Rhoads*. Motzorongo, *J. C. Smith 62*. Fortín, *Fisher 35378*. Atoyac, *Kerber 196*. Jalapa, *C. L. Smith 2007*. San Juan de Dios, Jan. 30, 1893, coll.? [*J. G. Smith ?*]. Colipa, *Liebmann*. Huatusco, *Mohr, s. n.* Zacuapan, *Purpus 1978, 16602*. Tezonapa, *Orcutt 3119, Leeds 222*. Zapoapan, SE of Catemaco, *Dressler & Jones 84*. Vicinity of Córdoba, *Finck 63*. **Puebla:** Falls of Necaxa, Sept. 10, 1905, *Roby s. n.* **Morelos:** Cuernavaca, *Reko 4653, Rose & Painter 6868, 10198, Storer 101*. **Michoacán:** Aquila, *Hinton 16026*. **Colima:** Colima, 1891, *Palmer 1126, 1127; Ibid., 1897, Palmer 47*. San Marcos, *Jones 503*. **Guerro:** Ashotla, *Mexía 8894*. **Oaxaca:** Cafetal Concordia, *Morton & Makrinus 2554, 2659*. Chiltepec, *Martínez-Calderón 746*. Lacava, *Reko 4085*. Cafetal Nueva Esperanza, *Conzatti, Reko, & Makrinus 3078*. **Tabasco:** Retiro, Tenosique, *Matuda 3416*. **Chiapas:** Corcega, Comaltitlán, *Matuda 17899*. Los Lagos, *Carlson 1771, 1847*. Palenque, *Seler 5473*. San Quentin, *Sohns 1588, 1691*. Ona, near Yxtacomitan, *Rovirosa 77*.

Juvenile forms are ovate or elliptic, cordate or lobed at base, the sinus rounded or acute, the basal lobes rounded or acute. Slightly older leaves are pentagonally lobed. Sometimes juvenile leaves are fertile.

2a. *TECTARIA HERACLEIFOLIA* var. **trichodes** Morton, var. nov.

A var. typica laminis foliorum supra perspicue et persistenter hirsutis differt. Plantae saepe simplices trilobatae, lobis basilibus obtusis vel acuminatis, saepe parvae, vel interdum pinnatae, pinnis 1-jugis, basaliter unilobatis, lobo elongato acuminato, indusia peltata.

✓TYPE: Cerro de Agua Tortuga (Sahococ), in the vicinity of Cubilgüitz, Department of Alta Verapaz, Guatemala, 350–450 m elev., March 4, 1942, *J. A. Steyermark 44586* (US no. 1,916,929).

ADDITIONAL COLLECTIONS EXAMINED:

Guatemala, Department of Alta Verapaz: Chamá, 300 m, *Johnson 389*. Limestone cliff, Finca Mocca, *Johnson 148*. Languin, 600 m, in 1875, *Salvin*. Sinaju, Finca Sepacuite, *Cook & Griggs 483, 484*. Finca Sepacuite, *Cook & Griggs 56*.

In its aspect, peltate indusia, and many other characters this variety resembles typical *T. heracleifolia*, appearing to be a small, merely trilobate form. However, the upper leaf-surface is not glabrous as in var. *heracleifolia* but is densely hirsute, and this is such a peculiar character, not shown by dozens of other specimens of the species that I have examined from various parts of the West Indies and continental North and South America, that it appears worthy of some recognition. It is evidently an extremely local variation, being known only from the Department of Alta Verapaz, Guatemala. Such collections as have been named previously have been called *T. trifoliata*, to which there is no near alliance; that species differs in having laterally attached indusia (rather than peltate), sori in more than two rows, and in other ways.

2b. *TECTARIA HERACLEIFOLIA* var. **maxima** Morton, var. nov.

Lamina foliorum basi bipinnata, pinnis 4-jugis, basalibus longe petiolulatis (3.6 cm) pinnatis, pinnulis 1-jugis, pinnula basiscopica ca. 19 cm longa, breviter petiolulata, profunde lobata, lobo basali ca. 7 cm longo et 2 cm lato, pinnula acroscopica

lanceolata, ca. 10 cm longa, basi plus minusve lobata, apice elongato ca. 17 cm longo, profunde lobato, attenuato, pinnis ceteris magnis, usque ad 20 cm longis, inferioribus manifeste petiolulatis, apice laminae trilobato, lobis basalibus elongatis, marginibus lobatis.

✓TYPE: In dense wet tropical forest on steep limestone slopes near Pueblo Nuevo, Veracruz, Mexico, alt. 95 m, Aug. 12, 1953, J. R. & C. G. Reeder 1975 (US no. 2,084,827, Isotype YU). The collectors note that the plant is frequent on the forest floor.

Because of the bipinnate blade, I at first thought that this plant was a form of *T. dilacerata*, but the peltate indusia and other characters show that it is allied with *T. heracleifolia*. However, its size, four pairs of pinnae, and bipinnate division is outside the normal range of variation of typical plants, and so I describe it as a variety. Because of a certain irregularity of frond form, however, it may very well represent a cross with *T. dilacerata*; it shows a number of abortive sporangia.

- 17072 3. **TECTARIA lobata** (Presl) Morton, comb. nov.
Polypodium lobatum L. C. Richard ex Willd. in L. Sp. Pl. ed. 4, 5: 164. 1810, non Hudson, 1762.
 2827 *Sagenia lobata* Presl, Tent. Pterid. 87. 1836. A new name for *Polypodium lobatum* Rich., non Hudson, 1762.
Tectaria minima Underw. Bull. Torrey Club 33: 199. 1906. TYPE: In hammocks near the homestead road, between Cutler and Longview Camp, Florida, Nov. 9–12, 1903, Small & Carter s. n. (Isotype US).
Aspidium trifoliatum [subsp.] *minimum* Clute, Fern Bull. 16: 82. 1908.
Aspidium minimum Brick, in Just. Bot. Jahesber. 34(3): 399. 1908.
Tectaria trifoliata var. *minima* Farwell, Amer. Midl. Nat. 13: 261. 1931.

Rhizome creeping, 1–5 cm long, 2–3 mm in diameter excluding roots and stipe-bases, paleaceous, the scales brown, lanceolate-subulate, ca. 3 mm long, 0.15 mm wide at base, long-attenuate, not ciliate, not pubescent on the back, 7–10 cells wide, the cells elongate, rather thin-walled; leaves ca. 5, clustered near the apex of the rhizome, erect; stipes stramineous, much longer than the blades, 9–18(28) cm long, slender, 0.5–0.9(1.5) mm thick, scaly only at base, the scales similar to those of the rhizome but slightly larger, channelled on the upper side and septate-pilose, rounded and glabrate on the lower side; leaf-blades deltoid or deltoid-pentagonal, lobate or once-pinnate at base in the largest leaves, 5.5–15(21) cm long, 6–10(18) cm wide; merely lobed

blades deeply cordate at the base or subexcavate, the apex acuminate, the lobes 3-7 on either side, gradually decreasing in size to the apex of the blade, joined by a broad wing 5-10 mm wide, the lowest lobes the largest, somewhat unequal-sided, more prominently lobed on the lower side but without a prominent basal auricle, these secondary lobes 3-5 on the lower side, 0-3 on the upper side, rounded, the middle and upper lobes of the blade subentire or slightly lobed, mostly rounded; pinnate blades with 1 pair of pinnae (rarely 2 in the largest leaves, the second pair, if present, fully adnate throughout), these not petiolulate (or very rarely subpetiolulate), usually slightly adnate at the distal base, excavate at the proximal base, 6-9 cm long, 2.4-2.7 mm wide at base, slightly unequal-sided, lobed on both sides, the basal lobe the largest (but the pinnae not auriculate), the lobes 5-8, obtuse; blades thin-membranous, light green, septate-pilulous on the costae and veins of both sides, the leaf-surface essentially glabrous or sometimes with a few, lax, flaccid, septate hairs on the upper surface near the margin; costal areoles of the lobes (or pinnae) elongate, solitary between the costules, sometimes with 1 or 2 short, free, included veinlets from the outer margin; areoles usually ca. 4 between the costa and sinus and between costule and margin, mostly elongate-pentagonal, mostly without a free included veinlet, although some free veinlets present; sori large, in 2 rows along the costa (or in free pinnae along the costules), mostly borne at about the middle of the outer margin of the costal areoles at the base of a short, outwardly extending spur or veinlet; indusia persistent, circular, appearing peltate but actually with a narrow sinus, this closed by the overlapping lobes, at maturity the margins inrolled but not coriaceous and thickened as in *T. heracleifolia*.

TYPE: Bahama Islands. Apparently no type in Willdenow Herbarium. The holotype probably in Paris.

RANGE: Florida, Bahama Islands, Cuba, Hispaniola, and Yucatán.

ILLUSTRATIONS: Small, Ferns Southeast. States 207. 1938 (as *T. minima*).

SPECIMENS EXAMINED:

Yucatán: Pozo de Guayma, Schott 780. Cenote de Santa Ana, Schott 780 bis.

The species *Polypodium lobatum* L. C. Richard has been considered as dubious, and it has been rejected from further con-

sideration also because it is an illegitimate later homonym. However, the species was transferred to *Sagenia* by Presl in 1836, and according to the International Code of Botanical Nomenclature this is considered as a valid publication of a new name rather than a new combination. The original description corresponds exactly with the species more recently described at *Tectaria minima* Underwood, and the identification is confirmed by the locality. *Polypodium lobatum* was described from a single specimen, which came from the Bahama Islands, and *T. minima*, which was described in part on material from the Bahamas, is the only species of *Tectaria* growing in these islands, which are now quite well known and extensively collected.

The larger specimens of *T. lobata*, which are pinnate at base rather than merely lobed as in the smaller, could be confused with small plants of *T. heracleifolia*, and the two species are mixed in Wright's no. 1802 from Cuba. The two may be distinguished as follows:

- Rhizome creeping, very slender, 2–3 mm in diameter; leaf-blades thin-membranous, flaccid; blades, if lobate, with rounded lobes, not auriculate, if pinnate, the basal lobe of the lowest pinnae rounded; costal areoles mostly without free included veinlets from the outer margin; sori rotund but attached at a sinus, this closed by the overlapping lobes, the margins inrolled at maturity but remaining thin, not coriaceous.....*T. lobata*
- Rhizome erect, 6–11 mm in diameter; leaf-blades papyraceous, firm; blades normally large and pinnate, with long-stalked basal pinnae, when juvenile and merely lobate, the basal lobes elongate and pointed, if slightly larger and pinnate the basal pinnae auriculate by an elongate acuminate basal lobe; costal areoles always with several free included veinlets arising from the outer margin, these sometimes uniting into secondary areoles; indusia orbicular, peltate (attached centrally, without a sinus, the margins becoming inrolled at maturity and coriaceous-thickened).....*T. heracleifolia*

4. TECTARIA INCISA Cav. Descr. Pl. 249. 1802.

Polypodium expansum Poir in Lam. Encycl. Méth. 5: 523. 1804. TYPE:

"Amerique" (holotype Lamarek Herb., P, Morton photograph 2664).

Aspidium martinicense Sprengel, Anleit. Kenntn. Gewächse 3: 133. 1804.

TYPE: said to be from Martinique, but actually supplied to Sprengel by

Rudolphi, the material collected in Santo Domingo by Poiteau.

Aspidium macrophyllum Rudolphi, Bemerkungen aus dem Gebiet der Naturgeschichte 2: 103. 1805 (*nota*). A renaming of *A. martinicense* Spreng. because of the incorrect locality stated by Sprengel and the

consequently inappropriate specific name "*martinicense*" for a plant from Santo Domingo [Republica Dominicana]; nevertheless, the name *macrophyllum* was superfluous and consequently illegitimate.

Polypodium repandum Vahl, Eclog. Amer. 3: 53. 1807, *non* Swartz, 1801.

TYPE: Montserrat, *Ryan* (not seen).

Aspidium longifolium Desv. Mag. Ges. Naturforsch. Freunde Berlin 5: 319. 1811. TYPE: Antilles. Probably based on a specimen, but cited also is *Aspidium macrophyllum sensu* Willd. in part, excl. syn. From the description it is typical *T. incisa*.

Aspidium bifidum Presl, Delic. Prag. 1: 173. 1822, *non* Carm., 1818.

TYPE: Brazil [Probably collected by Pohl] (not seen). From the description it is typical *T. incisa*.

Aspidium fraxinifolium Schrad. Goett. Gelehrt. Anzeig. 1824: 1868, *nom. nud.*

?*Polypodium hastatum* Vell. Fl. Flum. 11: t. 68. 1827; Arch. Mus. Nac. Rio Janeiro 5: 447. 1881, *non* Thunb., 1784

Polypodium variolatum sensu Mett. Abhandl. Senckenb. Naturforsch. Ges. Frankfurt 2: 406, 1858, *non* Willd. in L. Sp. Pl. ed. 4, 5: 192 1810.

Mettenius placed *P. variolatum* as an undoubted synonym of *Aspidium martinicense*, and so it may be presumed that he saw a specimen labeled *P. variolatum*, possibly in the Sprengel Herbarium. However, the holotype of *P. variolatum* Willd. (Herb. Willd., B, sheets 19685 [1-3], photograph of one sheet by Tryon US) is a species of true *Polypodium*, sect. *Goniophlebium*, closely allied to or identical with *P. menisciifolium* Langsd. & Fisch.

Rhizome erect, 1.5–2 cm in diameter, densely scaly, the scales castaneous, strongly fimbriate, lanceolate, 3–6 mm long, 1–2 mm wide; leaves several (3–6), fasciculate, erect, 70–150 cm long, the stipes about equalling the blades, 40–60 cm long; stramineous, deeply bisulcate on the adaxial side, rounded on the abaxial side, glabrous, scaly at the base only; leaf-blades membranous, oblong to ovate-oblong, 40–75 cm long, 20–50 cm wide, once-pinnate, the rhachis sulcate above, minutely septate-puberulous in the channel; pinnae 3–10 pairs, oblique, the basal pair petiolulate, with an elongate, acute basal lobe and a shorter proximal lobe, otherwise subentire or shallowly lobed, the other pinnae oblong, acuminate, mostly 20–25 cm long, 4–5 cm wide, the lower sessile, the upper adnate throughout, subentire or shallowly lobed, septate-puberulous on the costae and costules above, the apex composed of coadunate pinnae, acuminate, decurrent, the margins glabrous or subciliate but the sinuses not ciliate; areoles in numerous rows, the costal solitary or 2 between each costule, the proximal elongate parallel to the costa, the distal at right

angles and parallel to the costule, the others mostly pentagonal or hexagonal, in 7-9 rows between the costa and the margin, the major ones in 2-4 rows between the costules, subdivided into numerous minor areoles, often with a free, included veinlet; sori large, compital, in 2 rows on either side of the costae, borne on the outer margin of the costal areole at the base of an outwardly extending spur or veinlet; indusia persistent, reniform or circular, with a basal sinus, the lobes overlapping and closing the sinus, the indusia thus appearing peltate, the margins incurved at maturity.

TYPE: Puerto Rico, received by Cavanilles from Ventenat.

RANGE: Throughout the West Indies; Mexico to Bolivia and Brazil.

SPECIMENS EXAMINED:

Veracruz: Córdoba, *Conzatti & Gonzalez* 609. Tepinapa, *Liebmann s. n.* Santa Lucrecia, *Reko* 4634. **Oaxaca:** Río Concordia, *Conzatti, Reko, & Makrinius* 3055. **Tabasco:** Arroyo del Macayal, near San Juan Bautista, *Rovirosa* 514. **Chiapas:** Colonia Zintalapa, Escuintla, *Matuda* 18163. Finca Mexiquito, *Purpus* 6762. Esperanza, *Matuda* 17955.

The above synonymy, extensive as it is, is probably not complete, for there are several other names to be considered, which may turn out to be synonyms also when authentic material can be studied, an indication of the variability of the species. Fée (in his *Cryptogames Vasculaires du Brésil*) described eight varieties, and many others have been described since. The synonymy given lists only the basic names, most of which have been transferred at various times to *Nephrodium*, *Bathmium*, *Cardiochlaena*, *Dryopteris*, *Sagenia*, and probably other genera. Nevertheless, the species can be readily recognized among the Mexican species by its large size, several pairs of pinnae, the basal pair with a conspicuous, elongate, acuminate basal lobe.

8203 4a. *TECTARIA INCISA* Cav. forma **vivipara** (Jenm.) Morton, comb. nov.

8204 *Nephrodium macrophyllum* var. *viviparum* Jenm. Bull. Dept. Jamaica

3: 238. 1896. TYPE: British Guiana, *Jenman* (not seen).

Aspidium macrophyllum var. *biolleyanum* Christ in Pittier, Prim. Fl. Costa Ric. 3: 30. 1901. TYPE: Santa Clara, Costa Rica, *Cooper* 10274. (not seen).

?*Aspidium plumieri* var. *brasiliense* Rosenst. Hedwigia 46: 113. 1906.

SYNTYPES (all from Brazil): Passo Mansa, Blumenau, Santa Catarina,

Hadlich 124; Indaial, Santa Catarina, *Hadlich* 18; Itapocu, Santa Catarina, *Hadlich* 48. Joinville, Santa Catarina, *E. O. Müller* 30a, 88. Coast mountains, São Paulo, *Wacket* 54. Campinas, São Paulo, *Ulbricht* 127 (none seen).

Tectaria martinicensis var. *vivipara* Domin, Rozpravy Král. Čes. Spol. Nauk, Tr. Math., nov. rad. 2: 231. 1929.

Differs in the presence of buds, often bearing young plants, on the bases of some of the middle and upper pinnae on the adaxial side, or sometimes on the backs of the midribs of the pinnae.

TYPE: British Guiana, *Jenman* (not seen).

RANGE: Probably throughout the range of the species, but rare. Specimens are known from Mexico, Costa Rica, British Guiana, and Brazil.

SPECIMENS EXAMINED:

Veracruz: Sanborn, *Orcutt* 2979, 3011. Santa Lucrecia, *C. L. Smith* 2015.

669 4b. *TECTARIA INCISA* Cav. var. ***pilosa*** (Fée) Morton, comb. nov. *Aspidium puberulum* Gaud. in Freycinet, Voyage Uranie 242. 1828, non Desv., 1827. TYPE: Rio de Janeiro, Brazil, *Gaudichaud* (not seen).

10670 *Aspidium macrophyllum* var. *puberulum* Gaud. loc. cit. in syn.

106 *Cardiochlaena pilosa* Fée, Mém. Foug. 10: 45, t. 40, f. 4. 1866.

Nephrodium macrophyllum var. *pilosum* Jenman, Bull. Dept. Jamaica 3: 238. 1896.

Nephrodium macrophyllum var. *hirsutum* Rosenst. Hedwigia 43: 227. 1904.

TYPE: San Jose, Santa Catarina, Brazil, *von der Goltz* 31 (not seen).

Tectaria martinicensis var. *pilosa* Domin, Rozpravy Král. Čes. Spol. Nauk, Tr. Math., nov. rad. 2: 231. 1929.

Aspidium martinicense var. *puberulum* Suesseng. Revist. Sudamer. Bot. 1: 81. 1934.

Fronds obviously septate-pilose or hirsute on both surfaces, even at maturity.

TYPE: Rio de Janeiro, Brazil, *Weddell* 656 (not seen).

RANGE: Uncertain, but seemingly widespread but rare (Jamaica, Costa Rica, Colombia, Brazil).

SPECIMENS EXAMINED: None from Mexico.

The significance of this entity is problematical. From its scattered occurrence throughout much of the range of the species, it would seem not to represent a true variety. Still, the plant deserves a name of some sort. Normal plants of *T. incisa* are glabrous on the leaf-surfaces, especially on the upper surface, whereas in this the upper surface is strongly pubescent, perhaps

as a result of a mixture with some other species in which the upper surface is normally pubescent. Since this plant does occur sporadically, it may yet be found in southern Mexico.

7428 4c. *TECTARIA INCISA* Cav. subsp. **transiens** Morton, subsp. nov.

Fronde magnae, pinnis basalibus ca. 35 cm longis vel majoribus, 20 cm latis (lobis inclusis), basiscopice lobatis, lobis magnis 2 vel 3 et lobis plurimis minoribus, pinnis medialibus 2 vel 3, magnis, usque ad 28 cm longis et 8 cm latis, utrinque latere sublobatis, pinna terminali trilobata.

✓TYPE: Córdoba, Veracruz, Mexico, April 1889, *Hugo Finck* 57 (US no. 831,525).

PARATYPE: Córdoba, Veracruz, Mexico, January 1890, *Finck* 171 (US no. 831,328-9).

Throughout much of its range *T. incisa* is quite uniform in its frond shape, the basal pair of pinnae having a single, elongate, acute basiscopic lobe. In the two Mexican specimens cited above the basal pinnae have several basiscopic lobes, and also several low lobes on the upper side; the middle pinnae are also slightly lobed. Some similar plants apparently occur in Guatemala and elsewhere in Central America. The significance of this form is doubtful, but it appears to be transitional to some of the more compound species. However, it does not appear to be a sterile hybrid, for the sporangia and spores are normally developed.

7425 5. *TECTARIA mexicana* (Fée) Morton, comb. nov.

17079 *Aspidium latifolium* Presl. Rel. Haenk. 1: 30. 1825, non *T. latifolia* (Forst.) Copel., 1907. TYPE: Mexico, *Haenke* (not seen). Presl's description does not agree in every detail with the species here treated, and it is conceivably different. It will be necessary to see the type.

7426 *Sagenia mexicana* Fée, Gen. Fil. 313. 1852.

Aspidium cicutarium auctt., non *Polypodium cicutarium* L.

Tectaria dilacerata sensu auctt., non *Aspidium dilaceratum* Kunze.

Rhizomes creeping, 9-16 mm long or more, 8-20 mm in diameter excluding roots and stipe-bases, densely paleaceous at the apex, the scales lanceolate-subulate, 7-9 mm long. 0.7-1 mm wide at base, dark brown, the margin paler, shining, ciliate, not pubescent on the surfaces, the cells elongate, with thickened, dark walls; leaves distichous, few at a time, erect, 50-100 cm long;

stipes shorter than or about equalling the blades, 25–60 cm long, stramineous to brown, deeply bisulcate on the adaxial side, rounded on the abaxial side, pilose with numerous, spreading hairs 0.4–0.6 mm long, these flaccid, septate, 3–6 cells long, the cross walls dark, or rarely glabrate, scaly at base, the scales large, many cells broad, densely pilose on the outer surface at base or nearly throughout; rhachis densely pubescent or glabrate, not gemmiferous, free, only the upper pinnae decurrent; leaf-blades bipinnate-pinnatifid or subtripinnate at base, deltoid, 25–50 cm long, the pinnae 3–5 pairs; basal pair of pinnae deltoid, 16–33 cm long, 12–27 cm wide, long-petiolulate, the petiole 1.8–4 cm long, slender, often densely pubescent, 0.7–1.5 mm thick, slightly anadromous, the distal basal pinnule borne first, but very close to the proximal pinnule, the pinnules ca. 5 pairs below the acuminate, pinnatifid apex, the basal proximal pinnule the largest, up to 22 cm long, 5–9 cm wide at the middle, narrowed somewhat toward the base, deeply pinnatifid or subpinnate at base, the segments 10–15 pairs below the acuminate, lobed apex, the lowest inferior segment nearly free in the largest leaves, the others joined along the costa by a wing 3–4 mm wide, the largest segments 3–5 cm long, 9–13 mm wide, acuminate, lightly lobed, the costa septate-puberulous above, septate-pilose beneath, the second and upper pinnules deeply pinnatifid but without any free segments, gradually decreasing in size toward the apex of the pinnae; second pair of pinnae and superior ones catadromous throughout, the basal pinnule coming off from the rhachilla before the proximal pinnule, pinnate-pinnatifid or the upper merely pinnatifid or lobed, the second pair usually short-petiolulate (or merely sessile), the upper sessile and the uppermost adnate at base; blades membranous or herbaceous, dark green, the upper surface mostly with a single septate hair in each areole or at least in the marginal areoles, the margins septate-ciliate, especially in the sinuses of the lobes, beneath glabrous except on the veins and veinlets, here septate-pilosulous; costal areoles 2, the proximal elongate along the costa, the distal at right angles along the costule; areoles 7–10 along the costules of the larger segments of the basal pinnae, \pm elongate parallel to the costule; areoles in 3 rows between the costa and the sinus between the segments, in 3 or 4 rows between the costules and the margin of the segments, varied in shape but mostly elongate-pentagonal, without free, included veinlets; sori in 2 rows, one on either side of the costules, or in the largest leaves with a partial second row, the primary ones borne on the outer margin of

the elongate costular areole at the base of an outwardly extending veinlet, the secondary (if present) compital, none borne terminally on included veinlets; indusia persistent, rotund, with a deep sinus and rounded, overlapping lobes, thus appearing peltate, remaining membranous and not thickened at maturity, ruffled at maturity but without strongly incurved margins, ciliate when young.

SYNTYPES: Etlapa, Mexico, *Galeotti* 6484; Oaxaca, Mexico *Galeotti* 6542.

RANGE: Mexico to Colombia.

SPECIMENS EXAMINED:

Nayarit: Tepic, 1892, *Palmer* 1946. Zopelote, *Lamb* 572. Mina Esperanza, *Ortega* 6659. **Jalisco:** San Sebastian, *Mexia* 1493. Ravine 11 miles SSW of Autlán *Wilbur* 2333. Quimixto, *Mexia* 1234. **Veracruz:** Santa Lucrecia, *C. L. Smith* 2014. Córdoba, *Orcutt* 3210. Zacuapan, *Purpus* 4341. Mirador, *Purpus* 16644. **Michoacán:** Aguila, Distr. Coahuacan, *Hinton* 16039. **Guerrero:** Tibor, *Langlassé* 291. **Oaxaca:** Calvario, *Makrinius* 487. Cafetal Concordia, *Morton & Makrinius* 2332. Yaveo, Distr. Choapam, *Mexia* 9180. Along Trans-Isthmian Highway 13 km S of Matías Romero, *King* 890.

It is unfortunate that the earliest name for this species, *Aspidium latifolium* Presl (1825) cannot be adopted, but the epithet *latifolia* is preoccupied under *Tectaria*. In early works this species was usually referred to *Aspidium cicutarium* and more recently to *Tectaria dilacerata* (Kunze) Maxon. Apparently it was Maxon who revived the name *dilacerata* for this plant, after it had lain in synonymy for a long time; he assumed that the type was a Guatemalan plant. It is likely that he was partly right, for Kunze's (1850, p. 300) original citation of his material is as follows: "Specimina vidi spontanea e Guatemala, cultis minora," and (p. 226) "Guatemala. Chile? C. H. Makoy, H. V. Houtt. 1846. H. Lips. 1847." Kunze's species was thus based on a wild specimen collected in Guatemala and on cultivated material that he knew first hand in the botanical garden in Leipzig. It should be pointed out that the description is contained in Kunze's paper on the ferns cultivated in European botanical gardens. It appears likely that the material is a mixture. In his revision of *Aspidium*, Mettenius (1858, pp. 202-204), who

had access to Kunze's material, both the wild specimen and the cultivated one, referred the Guatemalan plant,¹ to *Aspidium latifolium* Presl var. *rufescens* Mett., indicating as a synonym: "*Aspidium dilaceratum* Kz. Linn. 23, 300 ex parte," but kept *A. dilaceratum* Kunze (ex parte) as a valid species (his no. 282), referring to it Jamaican material, material that belongs, it seems to me, to *Tectaria cicutaria* (L.) Copel., as it occurs in Jamaica. Thus cultivated material studied by Kunze evidently was material of *T. cicutaria*, probably originally from the West Indies. Mettenius' decision as to which element should retain the name (i.e. be chosen as lectotype) must be upheld. Actually he was undoubtedly right, for a careful reading of Kunze's description shows that it agrees in all respects with *T. cicutaria* from Jamaica, and does not agree with the Mexican plant that was called *dilacerata* by Maxon; in particular, Kunze indicates that the rhizome is erect, as it is in *T. cicutaria* (creeping in the Mexican plant), the blades pinnate-pinnatifid or bipinnate only at base, as in *cicutaria* (bipinnate throughout in the Mexican plant and subtripinnate at base), and the rhachis rufous-hirtous on the costae above (these hairs are much redder and longer in *cicutaria* than in the Mexican plant). Thus, *Aspidium dilaceratum* Kunze should again be placed as a synonym of *Tectaria* [*Aspidium*] *cicutaria*, as it was in the Index Filicum. The identity of the Friedrichsthal Guatemalan collection is uncertain, and can possibly never be determined, since Kunze's herbarium was destroyed in the war; however, it is essentially irrelevant, since it can not be considered the basis of the name *dilaceratum*. Mettenius was wrong in joining it with his *Aspidium latifolium* var. *rufescens*, which is based on *Sieber 187* from Trinidad. *Tectaria trinitensis* Maxon,² a species closely

¹Indicated as collected by Friedrichsthal.

²The synonymy is as follows:

TECTARIA TRINITENSIS Maxon, Amer. Fern J. **20**: 3. 1930.

Sagenia rufescens Presl, Tent. Pterid. 87. 1836, *nom. nud.* Based on *Sieber*, Syn. Fil. no. 187.

Aspidium latifolium Presl var. *rufescens* Mett. Abhandl. Senckenb. Naturforsch. Ges. **2**: 402. 1858. TYPE: Trinidad, *Sieber 187*.

allied to *T. mexicana*, is the same as var. *rufescens*, an isotype of which is in Leiden (Morton photograph 2292).

1067/ 5a. TECTARIA MEXICANA var. **pilosula** Morton, var. nov.

A var. typica superficiebus ambobus laminarum minute pilosulis, pilis minutis plurimis in quisque areolis.

✓TYPE: On banks at Panuco, on the Pacific slope of Sinaloa, Mexico, alt. 500–600 m, August 28–31, 1935, *Francis W. Pennell 20009* (US no. 1,685,393).

ADDITIONAL SPECIMENS EXAMINED:

Sinaloa: Mazatlán, in 1926, *Ortega 6182* (US). Near Colomas, foothills of the Sierra Madre, *J. N. Rose 1778* (US).

This plant is known only from three collections from Sinaloa which differ in having both surfaces of the blade minutely pilosulous, the hairs being numerous within each areole, this being most conspicuous on the upper (adaxial) surface. The upper surface in the usual plants of this species normally has, oddly enough, a single, elongate, flaccid, jointed hair in each areole, thus making the blade very sparsely pilose, and these hairs are often deciduous, or perhaps sometimes absent except in the marginal areoles. Very likely var. *pilosula* is a restricted local variant.

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Aspidium rufescens (Mett.) Hieron. *Hedwigia* 46: 353. 1907, non Blume, 1828. Attributed to "Kaulf." in error, *Aspidium rufescens* Kaulf. in Sieber, Syn. Fil. no 187, being a *nom nud.* in sched.

TYPE: Cascade Valley, St. Annes, Trinidad, *Homersley 326* (US).

RANGE: Trinidad and Colombia (Santa Marta, *H. H. Smith 1016*, *Stübel 360*, *fide* Hieron.).



Morton, C. V. 1966. "The Mexican Species of Tectaria." *American fern journal* 56, 120–137. <https://doi.org/10.2307/1547118>.

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