

## POLYBOTRYA IN NICARAGUA

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Literature on the flora of Nicaragua is very scattered and sometimes difficult to obtain, usually to be found only in large botanical libraries. Specimens likewise are few and far between. For these reasons, it is especially desirable to publish results of studies in the flora of that country.

A good example of the scarcity of literature and specimens is a genus of Ferns, Polybotrya of the Polypodiaceae. As species not formerly known in Nicaragua are frequently found, it is advisable to include on such a study all the species known to occur in Central America. Having had occasion to study the specimens themselves in several herbaria named below, it may be helpful to pass on some of our notes. The following data we hope will make more accessible a means of identifying specimens from Nicaragua.

We wish to express our thanks to the following for the privilege of studying specimens in their herbaria and consulting their libraries. Dr. Reed C. Rollins, Director of the Gray Herbarium; Dr. Richard A. Howard, Director of the Arnold Arboretum; and Dr. Daniel B. Ward, Director of the Herbarium of the University of Florida. We express our thanks to Dr. Ward and to Dr. David B. Lellinger of the United States National Herbarium for important information.

A brief description of the genus, POLYBOTRYA Humboldt & Bonpland, following Copeland. Stem climbing. Rootstock creeping, with linear, needle-like, castaneous paleae, their margins toothed. Stipes remote, long, scaly at least at base, setose or glabrescent. Fronds pinnate to tripinnate. Fertile blade very different from the sterile blade, the segments of fertile blade being much narrower. Veins usually free but in some species joining near the margin. Sporangia covering the lower surface and sometimes found on the upper surface also.

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## ARTIFICIAL KEY TO SPECIES OF POLYBOTRYA

Known to occur in Central America

1. Pinnae of sterile fronds simple, glabrous; stipe straw-colored 2.
2. Veins of sterile frond rarely branched except near costa and margin; sterile pinnae entire; pinnae of fertile frond simple or pinnate; stipe of sterile frond straw-colored, scaly near base or glabrous . . . . . 1. P. cervina
2. Veins of sterile frond branched 2-4 times; sterile pinnae serrate to entire; pinnae of fertile frond pinnate to pinnatifid 3.
3. Stipes naked, straw-colored; on sterile frond, pinnae subentire; on fertile frond, longest pinnules 12-16 mm long . . . . . 2. P. Kalbreyeri
3. Stipes scaly, densely so at base 4.
4. Pinnae on sterile frond serrate; on fertile frond, longest pinnules 5-6 mm long; on sterile frond, veins frequently rejoining; stipes straw-colored . . . . . 3. P. serratifolia
4. Pinnae on sterile frond entire or crenate; on fertile frond, longest pinnules about 3 mm long; stipes golden-brown; on sterile frond, veins never rejoining . . . . . 4. P. salicifolia
1. Pinnae (at least basal ones) pinnately compound 5.
5. Blades hairy beneath; rachis densely pubescent 6.
6. Blades finely pubescent on veinlets of lower surface, soft and fuzzy to the touch; upper surface of pinnae smooth; segments toothed . . . . . 5. P. villosula
6. Blades sparingly hairy beneath, almost glabrous above; segments entire . . . . . 6. P. costaricensis
5. Blades smooth on upper and lower surfaces; pubescent sometimes on rachis and midvein of pinnae, or very slightly on the midveins of pinnules 7.
7. Fronds small; sterile fronds 14 cm wide, 25-30 cm long; segments denticulate . . . . . 7. P. gracilis
7. Fronds larger; sterile fronds sometimes 25-30 cm wide, 50 cm long or longer 8.
8. Pinnules cut not quite to axis, pinnatifid 9.
9. Rachis and midveins usually hairy beneath; rootstock 1-2 cm thick; segments close together, touching . . . . . 8. P. osmundacea
9. Rachis glabrous; sterile fronds 25-30 cm wide, up to 50 cm long . . . . . 9. P. Aucuparia
8. Pinnules cut to axis; pinnae pinnate 10.

10. Rachis very hairy, increasingly toward apex; stipe glabrous; pinnae up to 20-40 cm long; pinnules petiolate, distinct from all others . . . . . 10. P. caudata
10. Rachis glabrous or slightly hairy 11.
11. Segments close together, touching, widely adherent to axis, decurrent, ovate-acute, unequal, subauriculate above . . . . . 11. P. scandens
11. Segments slightly separated by a space; free space near axis of pinnules also; upper and lower surfaces of pinnae nearly or quite glabrous; segments blunt 12.
12. Segments on lower side of pinnules shorter than those on upper side, 0.8 as long, blunt . 12. P. canaliculata
12. Segments on lower side of pinnules longer than those on upper side, 1.5 as long; blade glabrous or almost glabrous . . . . . 13. P. Alfredii

## COMMENTS

1. POLYBOTRYA CERVINA (L.) Kaulfuss, Enum. 55. 1824. Rhizome creeping, 1-2 cm thick. Stipe with many linear brown scales; scales 1-2 cm long and only 1 mm or less wide. Sterile blades simple pinnate, oblong to oval-oblong, 40-80 mm long, 20-30 cm across. Pinnae entire, 4-12 pairs, alternate, linear to oblong-linear, 15-25 cm long, about 37 cm across, glabrous, light-green, with entire margin. Veins forking once shortly after the midvein, joined at their apices by a vein running along the margin of the pinna. Fertile fronds longer, simply pinnate or bipinnate. Spores dark-brown, densely covering both the upper and lower surfaces of the pinnae. A fern of the tropical wet zones of mountain forests, growing either terrestrially or on tree trunks. Specimens from British Honduras, Guatemala, Honduras and Costa Rica (GH, FLAS), Porto Rico, Jamaica (FLAS), Cuba (FLAS), South America.

2. POLYBOTRYA KALBREYERI C. Chr., Ind. Fil. 12. 1905. 504. 1906. Acrostichum juglandifolium Baker, Journ. Bot. 207. 1881, non Kaulfuss 1824. Polybotrya juglandifolia Christ, Bull. Herb. Boiss. II. 4:965. 1904. . P. juglandifolia Baker, Icon. Plantarum VII, Filic. III, Pl. 1691, sub Acrosticho. The following is a copy of the original description of Acrostichum juglandifolium in English by Baker, Journ. Bot. 207. 1881. "Rhizome wide-scandent. Stipe of the barren frond a foot long, naked, stramineous. Barren frond oblong-lanceolate, simply pinnate, 1 1/2-2 feet long, subcoriaceous in texture, bright green and quite naked on both surfaces. Pinnae lanceolate, upper sessile,

lower shortly petioled, 5-6 in. long, 18-21 lin. broad, acuminate, subentire, rather cut away at the base in the lower half. Veins faint; main ones continuous from the costa of the pinnae to the margin about 1/4 in. apart, erecto-patent; veinlets 3-4-jugate, very ascending, simple, the groups regularly joining about a third of the way from the midrib to the edge. Fertile fronds bipinnate. Pinnae lanceolate, 4-6 in. long, 1-1 1/4 in. broad, the lower 1/2-3/4 in. long, growing gradually smaller towards the tip of the pinnae. --On trees in the forests, 5,000 feet. " Rootstock with long dark linear scales. On fertile blades, pinnules distant, oblong, blunt, longest 12-16 mm long. Type: Costa Rica, New Granada, Kalbreyer 1798. We have seen no specimen of this species. Distribution: Costa Rica.

3. POLYBOTRYA SERRATIFOLIA (Fée) Klotzsch, *Linnaea* 20: 430. 1847. Soromanes Fée, *Achrost.* 82. 1845. Rootstock with long reddish filiform scales. Stipe scaly, densely so at base. Pinnae serrate, attenuate. Sterile frond simply pinnate; lower pinnae stalked; stalks about 2 mm long. On fertile frond, pinnae pinnate. Pinnules distant, oblong, blunt, longest 5-6 mm long. Veins anastomosing in pairs. Similar to P. cervina, but in P. cervina, sterile pinnae are entire. Distribution: Costa Rica (FLAS), Venezuela, Fendler 261 (GH).

4. POLYBOTRYA SALICIFOLIA Lellinger, *Amer. Fern Journ.* 62:54, figs. 3, 4, 10. 1972. The following description consists of excerpts from the original description. Rootstock climbing, 0.5-1(-2?) mm thick, densely scaly; scales up to 2 mm wide, 1.5 cm long, golden-brown. Stipes 25-75 cm long, straw-colored, densely scaly. Rachis pilosulous in grooves, sparsely scaly. Sterile pinnae (1) 1.5-4 cm wide, (6) 1<sup>2</sup>-23 cm long, margin entire or crenate. Veins branching, not rejoining. Fertile pinnae 0.5-2 cm wide, up to 12 cm long. Segments 1-2 mm wide, 1-12 mm long. This description is translated from the Latin. We have seen no specimen of this species. Type: Colombia, Dept. Santander, Puerto Berrio, Haught 1757 (US). Distribution: Costa Rica, Colombia, Venezuela.

5. POLYBOTRYA VILLOSULA Christ, *Bull. Herb. Boiss.* II, 6:168. 1906. Rootstock creeping. Rachis villous. Sterile blade simply pinnate and pinnae lobed; or pinnae pinnate and pinnules lobed. Fertile segments narrower than the sterile. Like the other species of this genus, either terrestrial or climbing on tree trunks. It can be confused with no other species of Polybotrya because of the great amount of its pubescence. It is

extremely fuzzy, predominantly on the veinlets. The hairs are very short and fine. Distribution: British Honduras, Guatemala, Costa Rica, Panama (GH, FLAS). Type in Herb. Christ.

6. POLYBOTRYA COSTARICENSIS Brade, Bradea 1(1):11, tab. 1, fig. 1. 1969. Rootstock 12 mm thick. Scales of rootstock lanceolate, acute, 0.5-1.8 mm wide, 12-14 mm long. Sterile frond 80 cm long, 70 cm wide, bipinnate at base; pinnae short-stalked, 35 cm long, 16 cm wide; pinnules, sometimes basal ones, subbipinnatifid, rounded at tip, up to 8 cm long, 2.2 cm wide, lobed; lobes rounded at tip, above subglabrate, below sparsely hirsute. Rachis and midribs rather densely puberulent and very sparsely hirsute. Fertile fronds bipinnate; pinnules linear, up to 8 cm long, [1-1.5 cm wide]. Translation of excerpts from original description. We have seen no specimen of this species. Holotype: Costa Rica, regio litoral atlantica, Finca Hundresser, coll. A. & A. C. Brade 374 (Herb. Brade).

7. POLYBOTRYA GRACILIS Brade, Bradea 1(1):14, tab. 1. fig. 3 & tab. 3. 1969. Rootstock 4 mm thick, its scales lanceolate-acuminate, 0.5-1 mm wide, up to 5 mm long. Sterile frond 25-30 cm long, 14 cm wide, bipinnate; pinnae short-petioled, the larger 7 cm long, 2 cm wide; pinnules, the lowest, up to 1.2 cm long, 0.6 cm wide, with few teeth; rachis and midvein of pinnae puberulent below. Fertile fronds 25 cm long, 10 cm wide, bipinnate-tripinnatifid; pinnae up to 5 cm long, 1.2 cm wide, pinnate-pinnatifid. . . . Translated excerpts from the original description. We have seen no specimen of this species. Holotype: Costa Rica, Tablazo, A. & A. C. Brade 554 in Herb. Brade. Distribution: Costa Rica.

8. POLYBOTRYA OSMUNDACEA H. & B. ex Willd., Sp. 5:99. 1810. Rhizome creeping, 1-2 cm thick, with stipes growing out at intervals. Scales of stipe thin, brown, very linear, generally located at the base of the stipe, but also scattered up the length of it. Blades smooth on both surfaces, pubescent sometimes on rachis, midvein of pinnae or very slightly on the midvein of pinnules. Sterile blade tripinnatifid; lower pinnules deeply lobed. Fertile blade similar but segments narrower. The most distinguishing characteristic occurs on the lower pinnae; here the lowest pair of pinnules is reduced in size; the very lowest pinnule is drastically smaller, broad-elliptic in shape. On fertile pinnules, spores appear on the outer edges, becoming denser, shivering the pinnules until there are long lines of mass-

ed spores with only knobs to indicate where the pinnules are. Climbing on tree trunks in wooded ravines. Distribution: Honduras, Nicaragua, Costa Rica and Panama. Costa Rica (FLAS). Nicaragua, Castillo, Shimek, as *Acrostichum*.

Cororia Bush, near Bilwaskarma, Atwood 3711 (VT).

9. POLYBOTRYA AUCUPARIA Christ, Bull. Herb. Boiss. II, 6:166. 1906. Similar to P. serratifolia (Fée) Klotzsch. The following is a translation of excerpts from the original description in Latin by Christ, l.c. Rhizomatous. Stipe near base with subulate brown opaque hairy scales, otherwise whole plant glabrous. Frond bipinnatifid, wide at base, oblong, caudate-acuminate, up to 50 cm long, 25-30 cm wide. Pinnae remote, the lower 7 cm distant, petioled; petioles up to 4 cm long; lower pinnae 23 cm long, 11 cm wide, ovate-acuminate, lowest pinnules reduced; lowest and middle pinnules 1-1.5 cm distant, narrowly lanceolate, somewhat or very obtuse, very slightly crenate-dentate or entire. Nerves mostly simple. We have seen no specimen of this species. Type in Herb. Christ. Distribution: Costa Rica.

10. POLYBOTRYA CAUDATA Kunze, Linnaea 9:23. 1834. Rootstock large, woody, 1m long. Stipe glabrous. Fronds up to 7 dm long. Rachis hairy, increasingly toward the apex. Both the stipe and the rachis grooved, as is the midvein of the pinnules but not the veins of the lobes. Upper surface of the pinnae glabrous; sometimes a little pubescence on the midveins of the lower surface of the pinnules. Pinnules light-green with short tapering lobes cut to the midvein. Frond leathery in texture. Stipes appearing when fresh, almost succulent. Sterile frond bipinnate. Climbing on forest tree trunks. Distribution: Costa Rica, Panama and Canal Zone.

11. POLYBOTRYA SCANDENS (Raddi) Christ, Bull. Herb. Boiss. II, 4:965. 1904. Aspidium scandens Raddi, Pl. Bras. 1: 34, t. 49. 1825. P. acuminata Kaulfuss, Link Hort. Berol. 2: 135. 1833. Rootstock with long reddish filiform scales. Sterile frond bipinnate. Pinnae divided into distinct short-stalked attenuate pinnules at base. Rachis almost glabrous. Stipe sparsely scaly above, densely so at base. Fertile frond tripinnate, its segments worm-like, linear, 1 cm long. Stipe and rachis as on sterile fronds. Pinnules of lower pinnae pinnate. Ultimate segments oblong, obtuse, 3-6 mm long. Pinnules of lower pinnae of sterile frond stalked, attenuate, coarsely serrate, largest 2.5 cm wide, 7 cm long. We have seen no specimen of this species. Distribution: Costa Rica, Brazil.

12. POLYBOTRYA CANALICULATA Klotzsch, *Linnaea* 20:429. 1847. Closely resembling the preceding in all characteristics except the degree of lobing of the pinnules; lower pinnules of most of the lower pinnae cut down to the midvein. (This occurs for nearly half of the length of the pinnule.) Segments blunt instead of tapering to a tip. Fronds 1 m long. Distribution: Panama, Venezuela. Reported in Nicaragua, Camp Menocal, Shim-ek, as Acrostichum canaliculatum (Klotzsch) Hk.

13. POLYBOTRYA ALFREDII Brade, *Bradea* 1(1):12, tab. 1, fig. 2. 1969. Rootstock 6 mm thick. Scales of rootstock lanceolate, long-acuminate, 1-1.5 mm wide, 8-14 mm long. Sterile blade on both surfaces glabrous or subglabrous, about 65 cm long, 35-40 cm wide, bipinnate-tripinnatifid; pinnae very short-stalked, up to 23 cm long, 8 cm wide; pinnules pinnatifid, lowest pinnate, acuminate at tip, up to 4 cm long, 1.8 cm wide; rachis and midveins puberulent. Fertile blades slightly smaller; pinnae 15-18 cm long; segments oblong or rounded. Translation of excerpts of original description. We have seen no specimen of this species. Holotype: Costa Rica, Tablazo, coll. A. & A. C. Brade 98 (Herb. Brade).

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