

FERNS

P. Acevedo-Rodríguez

BLECHNACEAE

A nearly cosmopolitan family of 24 genera and ~265 species of terrestrial ferns, with erect, creeping, scrambling or trunk-like rhizomes. In the Neotropics, the family is represented by ~12 genera and 117 species, of which only the genera *Blechnum* and *Salpichlaena* have a few climbing ferns. For the most part, these are found in moist to wet forests.

Diagnosics: Root-climbing or twining ferns; leaves ascending or spreading, dimorphic, pinnatisect or 1-pinnate; pinnae in fertile leaves narrower than those of sterile leaves; sporangia in linear sori along both side of the midvein.

General Characters

1. CLIMBING MECHANISMS. Rhizomes elongated, with adventitious roots (root-climbers) or twining primary leaf rachis.
2. LEAVES. Dimorphic, pinnatisect, 1-pinnate or bipinnate; pinnae opposite in bipinnate leaves, alternate or opposite in 1-pinnate leaves, with entire margins, sometimes revolute.
3. SORI. Linear along both sides of midvein, with linear indusia opening inwardly (toward midvein).

Key to the genera of climbing Blechnaceae

1. Plants climbing by long rhizomes with adventitious roots; leaves 1-pinnate or pinnatifid;
rhizome scales denticulate*Lomaridium*
1. Plants climbing by long, twining leaf rachis; leaves bipinnate; rhizome scales entire.....
.....*Salpichlaena*

LOMARIDIUM C. Presl, Abh. Königl. Böhm. Ges. Wiss., ser. 5, 6: 514. 1851.

Terrestrial, slightly woody ferns, with erect, creeping or climbing rhizomes. Climbing



Lomaridium fragile, photo by R. Moran.

species with elongated, stout, rhizomes with adventitious roots, reaching 2 or more m in length and densely covered with bicolored, subulate, undulate, denticulate or ciliate scales. Leaves dimorphic. Sterile leaves glabrous, pinnatisect or mostly pinnate in lower half and distally pinnatifid with acuminate or caudate apex, the base acute, with pinnae gradually reduced in size toward the base; pinnae adnate to the rachis or nearly sessile, 25–75 pairs, oblong or oblong-deltate, the apex acuminate, the margins entire, slightly revolute, sometimes with

minute callus-like projections; veins free or bifurcate, numerous, parallel; stipe stout, long, blackish or brown. Fertile leaves with much narrower pinnae than the sterile ones; pinnae 28–41 pairs, linear; sori linear, parallel to the midvein, indusia half as wide as the pinna.

Distinctive features: Root-climbing ferns with elongated, densely clothed rhizome with denticulate scales; leaves 1-pinnate, dimorphic.

Distribution: A pantropical genus of ~16 species, six of which are climbers that occur in the Neotropics and reach at least 2 m in length; Mexico to Bolivia and SE Brazil and the West Indies; wet forests; 0–1,200 m.

SALPICHLAENA J. Smith, J. Bot. (Hooker) 4: 168. 1841.

Terrestrial climbing ferns with twining frond rachides; rhizomes creeping, elongated,



Salpichlaena volubile, photo by P. Acevedo.

non-stoloniferous, clothed with chestnut brown, lanceolate, scales.

Leaves bipinnate, with indeterminate growth, rachis elongate, twining, reaching 5–15 m in length; pinnae dimorphic (sterile and fertile), opposite, stipitate; pinnules opposite to alternate, elliptic-lanceolate with entire or

crenulate margins, petiolulate; secondary veins numerous, parallel, simple or forked, perpendicular to the midvein and collected into a marginal vein. Fertile pinnae with much narrower pinnules than the sterile pinnae; sori linear, parallel to midvein; indusia linear, tubular, breaking away in strips from the midvein to expose the spores.

Distinctive features: Vines with twining leaf rachis with indeterminate growth; leaves bipinnate; pinnae once-pinnate, opposite; pinnules petiolulate, opposite to alternate, with entire or crenulate margins.

Distribution: A neotropical genus of four species; Belize, Honduras to Bolivia, Paraguay and SE Brazil; wet forests; 400–800 m.

DRYOPTERIDACEAE

A pantropical family of 40 to 45 genera and ~1,700 species of terrestrial, epiphytic, epilithic, erect or rarely climbing ferns. In the Neotropics, the family is represented by 19 genera and ~955 species, of which only the genera *Cyclodium*, *Mickelia* and *Polybotrya* have ~6 species of root-climbing ferns. For the most part, they are found in moist or wet, lowland forests.

Diagnostics: Root-climbing ferns; rhizomes slightly flattened; leaves ascending or spreading, dimorphic, 1-pinnate or 2-pinnate; pinnules serrate or serrulate; pinnae in fertile leaves narrower than those of sterile leaves; sporangia indusiate or not indusiate.

General Characters

1. CLIMBING MECHANISMS. Scrambling, *root-climbing* rhizomes, reaching 4–5 (15) m.
2. LEAVES. Dimorphic, 1-pinnate to 3-pinnate (e.g., *Polybotrya*); pinnae alternate with serrate or serrulate margins; veins pinnate or forking, free or variously anastomosing.
3. SORI. Sporangia in rounded sori or covering the entire abaxial surface.

Key to the genera of climbing Dryopteridaceae

1. Sporangia in rounded indusiate sori.....*Cyclodium*
1. Sporangia variously arranged, without indusia.....2
2. Sporangia covering the entire abaxial surface of pinnae*Mickelia*
2. Sporangia in round, oblong or linear sori, or occupying both surfaces of caudate pinnules
.....*Polybotrya*

CYCLODIUM Presl, Tent. Pterid. 85. 1836.

Terrestrial or hemiepiphytic ferns with short to long creeping rhizomes, *Cyclodium*



Cyclodium akawaiorum, from D. Clark 12054 (US).

akawaiorum A.R. Sm. is the only species with a climbing habit that has rhizomes which climb by means of adventitious roots and reach 5m in length. Rhizomes densely clothed near the apex with lanceolate or denticulate scales. Leaves dimorphic, 1-pinnate (in climbing species); pinnae with serrulate margins. Sterile leaves with 6–14 pairs of lateral asymmetrical pinnae, distal pinna gradually reduced to a pinnatifid apex; rachis and costae adaxially grooved; veins free except for the basal pair of a group that meet at or near the margin. Fertile leaves

with up to 9 pairs of pinnae that are much narrower than the pinnae in sterile leaves. Sori in (1)2 rows along both sides of the midvein, discrete or confluent; indusium reddish brown, entire, peltate, glabrous or glandular-ciliate on the margin, often caducous before the sporangia mature, sporangia long-stalked, often abscising at the tip of the stalk.

Distinctive features: Root-climbing ferns with elongated rhizomes that are densely clothed with lanceolate or denticulate scales; leaves dimorphic, 1-pinnate; fertile pinna about $\frac{1}{3}$ as wide as the sterile pinnae; sori rounded, indusiate, in 2 rows between the midvein and the margin.

Distribution: A neotropical genus of 10 species of which *C. akawaiorum* is the only climbing species; Venezuela and Guyana; wet montane forests; 1,000–1,500 m.

MICKELIA R.C. Moran, Labiak & Sundue, *Brittonia* 62: 338. 2010.

Hemiepiphytic or terrestrial ferns, creeping or climbing. Rhizomes 2–5 m long, climbing



Mickelia scandens, photo by A. Popovkin.

by means of adventitious roots, densely clothed or with few scattered, brown to blackish scales near the apex. Leaves dimorphic, 1-pinnate, distal pinna similar to the lateral pinnae, articulate or continuous with rhizome; pinnae alternate, petiolulate, articulate and serrate (in climbing species); veins polygonal-areolate without free veinlets (in climbing species). Fertile leaves with much narrower pinnae and longer petioles than the sterile leaves. Sori covering the entire abaxial surface of pinnae.

Distinctive features: Root-climbing ferns with elongated, compressed rhizome; leaves dimorphic, 1-pinnate, fertile leaves densely covered with sporangia.

Distribution: A neotropical genus of 11 species, with only four species of climbers. Among these, *Mickelia guianensis* (Aubl.) R.C. Moran, Labiak & Sundue, is more widely distributed; found in Cuba, Hispaniola, Puerto Rico, and northern South America south to Bolivia and SE Brazil, the other three species (*M. pradoi* R.C. Moran et al., *M. scandens* (Raddi) R.C. Moran et al. and *M. x atrans* R.C. Moran et al. are found in S.E. Brazil; wet forests; 0–800 m.

POLYBOTRYA Humboldt & Bonpland ex Willdenow, *Sp. Pl.* 5: 99. 1810.

Hemiepiphytic or terrestrial ferns, creeping or climbing. Climbing ferns, terrestrial, with



Polybotrya caudata, from B.R. Chambi et al. 694.
Atrium.

rhizomes 2–5 (15) m long, climbing by means of adventitious roots, densely clothed with variously colored, translucent, peltate scales with denticulate or erose margins. Leaves strongly dimorphic, 1-pinnate, 1-pinnate-pinnatifid to 3-pinnate. Sterile leaves with distal portion of blade and sometimes of pinnae, pinnatifid, long-petiolate; pinnae alternate, petiolulate, contiguous with the rachis, crenate to serrate; pinnules serrulate; veins pinnate or bipinnate, sometimes anastomosing to neighbor clusters of veins. Fertile

leaves commonly further pinnate, with much narrower pinnae and longer petioles than the

sterile leaves; pinnae reduced to a narrow tissue along the primary veins. Sori indusiate, round, oblong or linear by coalescence, or occupying both surfaces of caudate pinnules

Distinctive features: Root-climbing ferns; rhizomes densely covered with variously colored, translucent, peltate scales with denticulate or erose margins; leaves strongly dimorphic, 1- to 3-pinnate; fertile leaves with very narrow, short pinnules; cross section of rhizomes with 5–12 circularly arranged meristemes that are sheathed by a black sclerenchymatous tissue.

Distribution: A neotropical genus of 35 species most diverse in the Andes, and the Atlantic Forest in SE Brazil. All species except for *P. fractiserialis* (Baker) J. Sm. and *P. sorbifolia* Mett.

are reported as climbers; southern Mexico to SE Brazil, Cuba, Jamaica and Hispaniola; 0–2,500 m.

LINDSAEACEAE

A pantropical family of six genera and ~242 species of terrestrial, erect or less often scrambling ferns. In the Neotropics, the family is represented by three genera and ~67 species, of which only the genus *Odontosoria* has species of scrambling ferns. Since *Odontosoria* is the only genus in the family with climbers, the current treatment is solely based on this genus. For the most part, they are found in moist to wet forests.

Diagnosics: Scrambling ferns 2–5 m long, leaves often armed with prickles, pinnae alternate, sori in marginal pockets, containing three sporangia without indusia.

General Characters

1. CLIMBING MECHANISMS. Scrambling or twining leaves with indeterminate growth, sometimes aided by prickles.
2. LEAVES. Monomorphic, 2–5-pinnate; pinnae alternate; pinnules flabellate.
3. SORI. In apical pockets.

ODONTOSORIA Fée, Mém. Fam. Fougères 5 (Gen. Filicum): 325. 1852.

Clambering or twining ferns, terrestrial with short, slender, creeping rhizomes, covered



Odontosoria aculeata, photo by P. Acevedo.

with scales. Leaves with indeterminate growth, monomorphic, elongate, clambering, usually armed with prickles and often reaching 2–5 m in length; blades narrowly triangular to linear, 2–5-pinnate; pinnae and pinnules forming a right angle with the axis or rachis; pinnules linear to

flabellate. Sori in marginal pockets, containing three sporangia; indusia absent.

Distinctive features: Scrambling or twining ferns often armed with prickles, pinnae alternate and sori in marginal pockets.

Distribution: A pantropical genus of 32 species, 11 of which are distributed in the Neotropics from Mexico to Colombia and the West Indies. Most species are scrambling although sometimes less than 2 m in length; moist or wet forest; 400–2,800 m.

LOMARIOPSIDACEAE

A pantropical family of four genera and ~69 species of terrestrial, scrambling or less often erect ferns. In the Neotropics, the family is represented by 3 genera and ~16 species, of which only the genus *Lomariopsis* has species of climbing ferns. Since *Lomariopsis* is the only genus in the family with climbers, the current treatment is solely based on this genus. For the most part, they are found in lowland, moist to wet forests.

Diagnostics: Root-climbing ferns; rhizomes slightly flattened; leaves ascending or spreading, dimorphic, 1-pinnate; pinnae in fertile leaves narrower than those of sterile leaves; sporangia covering the entire abaxial surface of pinnae.

General Characters

1. CLIMBING MECHANISMS. Root-climbing rhizomes.
2. LEAVES. Dimorphic, 1-pinnate; pinnae alternate with serrate or serrulate margins and free, simple or bifurcate venation.
3. SORI. Sporangia covering the entire abaxial surface.

LOMARIOPSIS Fée, Mém. Fam. Fougères 2 (Hist. Acrostich.): 10. 1845.

Terrestrial ferns, climbing by aerial roots, or less often erect and short. Rhizomes



Lomariopsis marginata, photo by A. Popovkin.

elongate reaching 2 to 15 m in length, somewhat compressed, covered with ferruginous scales; cross section with broad ventral meristele that is notched on its dorsal side (Moran 2000). Leaves short-stipitate, dimorphic, the fertile ones with narrower pinnae than the sterile ones, pinnate; pinnae membranaceous, with serrate or serrulate margins and free, simple or bifurcate venation; lateral pinnae alternate, deciduous by means of a basal articulation, the terminal

elongs reaching 2 to 15 m in length, somewhat compressed, covered with ferruginous scales; cross section with broad ventral meristele that is notched on its dorsal side (Moran 2000). Leaves



Cross section of *Lomariopsis* sp. rhizome showing meristemes with cat's-paw pattern, photo by P. Acevedo.

pinna not articulate. Fertile leaves densely covered with sporangia on the lower surface; indusia absent.

Distinctive features: Root-climbing ferns with elongated, compressed, densely clothed rhizome; leaves 1-pinnate, dimorphic, fertile leaves densely covered with sporangia. Cross section of rhizome showing a “cat’s-paw” pattern of meristeles where the ventral meristeles is broader and notched on its dorsal side.

Distribution: A pantropical genus of 45 to 60 species, with 15 species in the Neotropics, most of which are climbers that reach at least 2 m in length; Mexico to Bolivia and SE Brazil and the West Indies; wet forests; 0–1,200 m.

LYGODIACEAE

A tropical and subtropical family extending into subtemperate zones, with a single genus of twining ferns. Twenty-nine species worldwide, six of which are found in the Neotropics.

Diagnosics: Fern with twining leaf rachis and indeterminate growth; pinna bifurcate, pinnula alternate with sporangia on marginal projections of the blade.

General Characters

1. CLIMBING MECHANISM. Twining leaves with indeterminate growth, reaching 2–8 (20) m in length.
2. LEAVES. Monomorphic, or dimorphic, with indeterminate growth; pinnae bifurcate; secondary pinnules alternate, with free veins or areolate.
3. SPORANGIA. Pear-shaped, with an apical annulus, arranged in 2 rows on marginal projections of the blade.

LYGODIUM Swartz, J. Bot. (Schrader) 1800 (2): 7, 106. 1801 (nom. cons.).

Terrestrial climbing ferns, with twining frond rachides; rhizomes creeping, short,



Lygodium volubile, photo by P. Acevedo.

branched, pubescent. Leaves monomorphic or dimorphic, with indeterminate growth, bipinnate, rachis elongate, twining, reaching 2–8 (20) m in length; pinnae bifurcate, with a latent shoot at the apex of the petiolule; pinnules alternate, with free or areolate veins. Sporangia pear-shaped, with

an apical annulus, individual (not clustered in sori), borne at the apices of the veins, arranged in 2 rows on marginal projections of the blade.

Distinctive features: Twining ferns, sporangia marginal.

Distribution: A pantropical genus of 29 species, six (4 native, 2 exotic) of which are found in the Neotropics; Mexico to northern Argentina and the West Indies; moist habitats; 125–2,400 m.

OLEANDRACEAE

A pantropical family with a single genus. Twenty-five species worldwide, nine species in the Neotropics, moist or wet forests.

Diagnosics: Root-climbing ferns with elongated aerial rhizomes densely covered with scales; leaves simple, monomorphic, and articulate; sori rounded, adjacent to the veins.

General Characters

1. CLIMBING MECHANISM. Elongated rhizomes with adventitious roots.
2. LEAVES. Monomorphic, simple with entire or undulate margins; stipe articulate.
3. SPORANGIA. Pear-shaped, arranged in circular sori with a central, peltate, circular or reniform indusium, adjacent to the midvein and along secondary veins.

OLEANDRA Cavanilles, Anales Hist. Nat. 1: 115. 1799.

Epiphytic, root-climbing ferns, rarely terrestrial and erect. Rhizomes flexible, densely



Oleandra articulata, photo by P. Acevedo.

clothed with ferruginous awl-shaped scales, elongated in climbing species, reaching up to 5 m in length and ~5 mm in diam. Leaves monomorphic, pendulous, membranaceous, simple with entire or undulate margins and acute, acuminate or caudate apex; midvein abaxially prominent, secondary veins, numerous, free and parallel, forming an acute angle with midvein; stipe up to $\frac{1}{3}$ the length of the blade, sometime absent, articulate. Sori circular, light brown, distributed along both sides of the midvein; indusia circular or reniform, peltate.

Distinctive features: Root-climbing ferns with elongated densely clothed rhizomes; leaves hanging, simple with sori adjacent to the midvein.

Distribution: A pantropical genus of 25 species, 11 species in the Neotropics of which only eight are climbing epiphytes that sometimes reach 2–5 m in length; Mexico to SE Brazil, including the West Indies; moist forests; 300–1,800 m.