

## Glossary of Botanical Terms Used in this Volume

Accepted terms are indicated by **boldface**.

Within the definitions, *italics* (when not names of genera) indicate terms that are defined in this glossary.

(Most definitions have been taken or adapted with permission from Lellinger, D. B. 2002.

*A modern multilingual glossary for taxonomic pteridology*. Pteridologia 3. [Washington, D.C.]: American Fern Society, Inc.)

**acroscopic** - facing or directed toward the apex of the axis on which the structure is borne; cf. *basiscopic*.

**acrostichoid** - of *sori*, producing *sporangia* apparently or actually spread across the surface of the fertile *lamina*, usually densely so.

**actinostele** (adjective **actinostelic**) - a radially arranged, lobed *protostele* (as seen in cross section) associated with *microphylls*, commonly found in the Lycopodiaceae.

**aerophore** - a spot, swelling, or fingerlike projection of thin-walled cells found along the *stipe* or in the *pinna* or *pinnule* axils of some *ferns*, especially Thelypteridaceae; more prominent on young fronds.

**alate** - of *spores*, with the outer wall (*exospore* or *perispore*) raised in a pattern of narrow, winglike ridges surrounding depressions.

**alete** - of *spores*, spherical, lacking a *laesura*, and containing more sets of chromosomes than normal *spores*, found regularly or occasionally in some *apomictic ferns*.

**anadromous** - with the basal *pinnule* and/or vein group of the *pinna* directed toward the *frond* apex; cf. *catadromous*.

**anisophyllous** - bearing *fronds* or *microphylls* of unequal size, but of a single shape.

**annulus** (plural **annuli**, adjective **annular**) - a row or patch of partially or entirely thick-walled cells of the capsule of the *leptosporangium* which contracts and forces the capsule to open and to discharge its *spores*.

**antheridium** (adjective **antheridial**) - the male sex organ of *pteridophytes* borne on the *gametophyte* and producing *spermatozoids*.

**apomixis** (adjective **apomictic**) - the formation of a *sporophyte* from a *gametophyte* by direct, asexual development, rather than by fertilization of gametes.

**apophysis** (plural **apophyses**) - a swelling on which a sorus is located.

**archegonium** (plural **archegonia**) - the female sex organ of *pteridophytes* borne on the *gametophyte* and producing eggs.

**areole** (adjective **areolate**) - an area surrounded by anastomosing veins.

**baculate** - of *spores*, bearing cylindrical projections more than 1  $\mu\text{m}$  long and less in diam., and usually with an obtuse to rounded apex.

**basiscopic** - facing or directed toward the base of the axis on which the structure is borne; cf. *acroscopic*.

*blade* - see *lamina*

*bud* - see *bulbil*

**bulbil** (adjective **bulbiliferous**) - a small, usually persistent,  $\pm$  globose, usually hairy or scaly, asexual propagule borne on a root, *rhizome*, or frond and capable or not capable of forming a plantlet, as in, e.g., certain *Asplenium*, *Bolbitis*, *Diplazium*, *Dryopteris*, *Huperzia*, *Polystichum*, *Tectaria*, and

*Woodwardia* species; synonyms *bud*, *bulblet*; see also *gemma* and *proliferous*.

*bulblet* - see *bulbil*

**capsule** - the part of a *sporangium* that contains the *spores*.

**catadromous** - with the *basiscopic pinnule* and/or vein group of the *pinna* the first to depart from its axis; cf. *anadromous*.

**clypeate** - shaped like a rounded shield.

**coenosorus** (plural **coenosori**) - a compound *sorus* composed of several contiguous *sori* fused end-to-end.

**commissure** (adjective **commissural**) - place where a commissural vein joins parallel, otherwise free veins along the *lamina* margin and often underlies a continuous, marginal *coenosorus*.

**costa** (plural **costae**, adjective **costal**, **costate**) - the major axis of a *pinna*; synonyms *midrib*, *midvein*.

**costate** - of *scales*, with a central line of cells different (usually darker) from the more marginal cells, as in certain Aspleniaceae and Dryopteridaceae; of *spores*, with the outer wall (*exospore* or *perispore*) raised in a pattern of relatively broad ridges with rounded crests.

**costule** (adjective **costular**, **costulate**) - the major axis of a *pinnule*; synonyms *midrib*, *midvein*, *rachilla*.

*crozier* - see *fiddlehead*

**ctenitoid** - of hairs, with adjacent cells collapsed at right angles to each other and often the end walls of the cells thickened or dark-colored, as on some *fronds* of *Ctenitis*.

**dictyostele** (adjective **dictyostelic**) - a *siphonostele* with more than one parenchymatic gap at a single level (as seen in cross section).

**echinate** - of *spores*, with the outer wall (*exospore* or *perispore*) raised in a pattern of long spines.

**episore** - a particular, outer, sporopollenin layer of the *spore* wall that is external to, but partially attached to, the *exospore* in some *heterosporous ferns* and *Equisetum*.

*exine* - see *exospore*

**exospore** - the principal sporopollenin layer of the *spore* wall internal to the *perispore*; synonym *exine*.

**false indusium** - an introrse, reflexed or revolute, often modified *lamina* margin that protects young *sporangia*.

**false vein** - an elongate series of thickened cells appearing to be a vein, but not connected to true veins and not functioning as a vein; found in the *laminae* of certain Aspleniaceae, Hymenophyllaceae, Marattiaceae, Pteridaceae, and Selaginellaceae.

**ferns** - the *pteridophytes* excluding the Isoëtaceae, Lycopodiaceae, and Selaginellaceae.

**fiddlehead** - the young, unexpanded, circinate apex of a *fern frond*; synonym *crozier*.

**frond** - the photosynthetic organ of *ferns*, usually consisting of a *stipe* and *lamina*; synonyms *leaf*, *megaphyll*.

**gametophyte** - an inconspicuous, non-vascular stage in the life cycle of a *pteridophyte* that bears gametangia with gametes. In *homosporous pteridophytes*, they are either surficial, thin, chlorophyllous, and various in shape (filamentous, ribbonlike, heart-shaped, or somewhat stellate) or subterranean, massive, achlorophyllous, and globose, cylindrical, or branched. In *heterosporous pteridophytes*, they are much reduced structures borne (and partially developing) within *spore* walls; synonyms *prothallium*, *prothallus*.

**gemma** (plural **gemmae**, adjective **gemmaiferous**) - a structurally specialized, asexual propagule found on some *gametophytes* that detaches and forms a new *gametophyte*; also used in the sense of *bulbil* in some African or European fern literature.

**goniopteroid** - of veins, a system of excurrent veinlets connected to more distal vein unions, or to a translucent line leading to a sinus, thus forming oblique rhomboid *areoles*.

**hemitelioid** - shaped like a shallow saucer or fan, usually firm and fully or partially surrounding the *sorus*, typical of certain Cyatheaceae.

**heterosporous** (antonym **homosporous**) - producing *spores* of two sizes, each of which develops *gametophytes* having gametangia of a single sex.

**hydathode** - a dark or sometimes pale area of the epidermis on the adaxial surface of the *lamina* that coincides with the endings of the veins and exudes water, salts, etc.

**indusium** (plural **indusia**, adjective **indusiate**) - a usually thin, often scalelike, epidermal membrane subtending and/or covering the *sorus*, that partially or fully protects the young *sporangia*.

**intrastelar canal** - a channel occurring within a *stela*.

**isodromous** - with the basal *pinnules* and/or vein groups of the *pinnae* strictly opposite.

**isophyllous** - having *fronds* or *microphylls* of a single size and shape.

**laesura** (plural **laesurae**) - the simple, elongate or triradiate, scar on the surface of *pteridophyte spores*; synonym *suture*.

**lamina** (plural **laminae**, adjective **laminated**) - the expanded portion of a *frond*, usually consisting of a *rachis* or *costa*, other axes or lateral veins, and expanded *lamina* tissue; synonym *blade*.

*leaf* - see *frond*

**leptosporangium** (adjective **leptosporangiate**) - a thin-walled, thin-pedicelled *sporangium* bearing usually 64 *spores* (32 in apomixises of the Dryopteridaceae, 128-512 in the Osmundaceae, and 256 in the Schizaeaceae) and formed usually from a single epidermal initial cell.

**ligule** (adjective **ligulate**) - a small, tongue-like, often triangular appendage located near the *microphyll* base (just distal to the *sporangium* on the adaxial surface of the *microsporophyll*); it is persistent in *Isoetes*.

**lophate** - of *spores*, with the outer wall (*exospore* or *perispore*) raised in a pattern of ridges (lophae) surrounding depressions.

**lumen** (plural **lumina**) - the central cavity of a cell, especially applied to the cells of clathrate *rhizome* scales.

**lycophytes** - collectively the Isoëtaceae, Lycopodiaceae, and Selaginellaceae.

**massula** (plural **massulae**) - in *Azolla*, a structure derived from the contents of the *microsporocarp* that contains the *microspores* and has glochidia (minute barbed hairs) protruding from its surface.

**megagametophyte** - in *heterosporous pteridophytes*, a female *gametophyte* borne within a *megasporangium* and bearing one or more *archegonia*.

*megaphyll* - see *frond*

**megasporangium** (plural **megasporangia**) - a *sporangium* bearing *megaspores*.

**megaspore** - a large *spore* of the *heterosporous pteridophytes* *Azolla*, *Isoetes*, *Marsilea*, *Pilularia*, *Regnellidium*, *Salvinia*, and *Selaginella* that produces a female *gametophyte*.

**megasporocarp** - a *sporocarp* that bears *megasporangia*.

**megasporophyll** - a fertile *microphyll* bearing or subtending a *megasporangium*.

**microgametophyte** - in *heterosporous pteridophytes*, a male *gametophyte* borne within a *microsporangium* and bearing one or more *antheridia*.

**microphyll** - the photosynthetic organ of the *lycophytes*, Equisetaceae, and Psilotaceae, always lacking a *stipe*, often small and generally supplied with a single vascular bundle; usually associated with a *protostele* or *siphonostele*.

**microsporangium** (plural **microsporangia**) - in *heterosporous pteridophytes*, a *sporangium* bearing *microspores*.

**microsporocarp** - a *sporocarp* that bears *microsporangia*.

**microsporophyll** - a fertile *microphyll* bearing or subtending a *microsporangium*.

*midrib*, *midvein* - see *costa*, *costule*, and *rachis*

**monolete** - of *spores*, bilaterally symmetric with a linear, unbranched *laesura*.

**murus** (plural **muri**, adjective **muriform**) - of *spores*, an elongate, wall-like protuberance.

**paraphysis** (plural **paraphyses**) - a minute, unicellular or multicellular (resembling a simple hair), usually elongate and sometimes glandular structure borne on the *soral receptacle*, on the *sporangium* capsule or pedicel.

*perine* - see *perispore*

**perispore** - the outermost, sporopollenin layer of the *spore* wall that is deposited on the *exospore*; synonym *perine*.

**phyllopodium** (plural **phyllopodia**) - in *ferns* with articulate *stipes*, that portion of the *stipe* proximal to the articulation that remains attached to the *rhizome*. Phyllopodia are especially prominent and stipelike in, e.g., *Elaphoglossum* and *Oleandra* but low and more like the *rhizome* and knoblike in *Adiantum*, Davalliaceae, and many Polypodiaceae.

**pinna** (plural **pinnae**, adjective **pinnate**) - a stalked or sessile, primary division of a compound *lamina* that is at least narrowed at the base.

**pinnule** - a stalked or sessile division of a *pinna* that is at least narrowed at the base.

**plectostele** (adjective **plectostelic**) - a vascular cylinder with the vascular tissue appearing to be  $\pm$  parallel plates (as seen in cross section), associated with *microphylls*, found in many Lycopodiaceae.

**primordium** - a part (e.g., a *frond*) in its most rudimentary form or stage of development.

**proliferous** - forming *bulbils* or plantlets, often on parts that normally have another function such as roots (e.g., *Platynerium*), stems and branchlets (e.g., *Huperzia*), *rachises* (e.g., most *Bolbitis*, *Diplazium*, *Dryopteris*, some Hymenophyllaceae, *Polystichum*, *Tectaria*, and *Woodwardia*) or *lamina* margin (e.g., some *Asplenium*).

*prothallium*, *prothallus* (plural *prothallia*, *prothalli*) - see *gametophyte*

**protostele** (adjective **protostelic**) - a simple vascular cylinder that lacks a pith of parenchyma in the center and is without parenchymatic gaps.

pteridophytes - non-seed-bearing vascular plants; *ferns* and *lycophytes* collectively.

**pulvinus** (plural **pulvini**) - a swollen structure at the base of a *frond* or at the base of *pinnae*, particularly common in the Marattiaceae.

*rachilla* - see *costule*

**rachis** - the principal, central axis of a pinnatifid or more compound *lamina*.

**receptacle** - the point or region of the *lamina* tissue, often thickened and amply supplied by one or more veins, that produces *sporangia* and sometimes *paraphyses* and/or sporangia.

**rhizoid** - an elongate, non-vascularized, uni- or paucicellular structure that serves to anchor the *gametophyte* and to absorb water and nutrients from the substrate.

**rhizome** - in *pteridophytes*, a scaly or hairy (rarely glandular or glabrous) anchoring stem that bears roots and *fronds*.

**rhizophore** - a specialized, aerial root of *Selaginella* that arises in the axils of stems and branches repeatedly when in contact with the substrate; it may occasionally differentiate into a stem, rather than a root.

**rugate** - of *spores*, bearing *muri* that are wide, rounded, and non-anastomosing and that do not form *areoles*.

**sinus membrane** - an elongate translucent membrane below the sinus in a *pinnule*.

**siphonostele** (adjective **siphonostelic**) - a vascular cylinder that has a pith of parenchyma in the center and phloem on both the outside and inside of the cylinder, or (in the Osmundaceae) only on the outside of the cylinder.

**solenostele** (adjective **solenostelic**) - a *siphonostele* with only one parenchymatic gap at a single level (as seen in cross section).

**soriferous** - bearing *sori*.

**sorophore** - the gelatinous, *sporangium*-bearing ring produced by *sporocarp* (as in the Marsileaceae) during germination.

**sorus** (plural **sori**, adjective **soral**) - a cluster of *sporangia*.

**spermatozoid** - a motile male sex cell (gamete) produced in the *antheridium*.

**sporangiophore** - a greatly transformed, peltate *sporophyll* bearing a ring of ca. 6 *sporangia* facing the axis of the *strobilus* of *Equisetum*.

**sporangium** (plural **sporangia**) - the *spore*-producing structure of *pteridophytes*.

**spore** - a spherical, tetrahedral, or reniform, often elaborately ornamented, reproductive cell that is produced within the *sporangium* and germinates to form a *gametophyte*.

**sporocarp** - in *Marsilea*, the hard, short- to long-pedunculate, nutlike structure containing the *sporangia*, apparently a highly modified leaflet; in *Azolla* and *Salvinia*, a thin, short-stalked, globose structure containing the *sporangia*, apparently a modified *indusium*.

**sporophore** - the fertile portions of a hemidimorphic *frond* as in the Ophioglossaceae.

**sporophyll** - in *ferns*, a *frond* bearing *sporangia*; in the *lycophytes*, Equisetaceae, and Psilotaceae, a *microphyll* subtending a *sporangium*; in *Isoetes*, an elongate *microphyll* bearing a *sporangium* within its base.

**stele** (adjective **stelic**) - the vascular and associated tissues of a rhizome or other type of stem; see also *dictyostele*, *protostele*, *siphonostele*, and *solenostele*.

**stipe** (adjective **stipitate**) - the structure of a *frond* that connects the base of the *lamina* to the point of its attachment to the *rhizome*.

**stipicel** - a term sometimes used for the stalk of a *pinna* or *pinnule*.

**stipule** - in the Marattiaceae, each one of a pair of lateral, fleshy, starch-bearing, persistent, partially or entirely vascularized outgrowths of the *rhizome* that clasp the base of the *stipe* and that are capable of vegetatively reproducing the plants; in the Ophioglossaceae, merely the remnants of the older *stipe* base that originally enclosed and protected the younger, less developed *fronds*.

**strobilus** (plural **strobili**) - in the *lycophytes* and Equisetaceae, a compact reproductive structure borne at the tips of branches or axes consisting of a central axis bearing closely spaced, spirally arranged *sporophylls* or *sporangiophores*.

*suture* - see *laesura*.

**synangium** (plural **synangia**) - a group of *sporangia* partially or entirely fused laterally, as in *Psilotum* and Marattiaceae.

**trilete** - of *spores*, radially symmetric (spherical or tetrahedral) with a *laesura* with three radiating branches.

**trophophyll** - a vegetative, nutrient-producing *frond* or *microphyll*.

**trophopod** - the enlarged, persistent, basal portion of a *stipe* that functions as a storage organ.

**valve** - an involucre lobe, especially in *Hymenophyllum* and some Dicksoniaceae and Dennstaedtiaceae; also, each half of a *sporangium* that is divided into halves, as in the Lycopodiaceae and Osmundaceae.

**vascular bundle** - an elongate strand of conducting cells (xylem tracheids and phloem sieve cells) that serve to conduct water, mineral nutrients, and photosynthetic products.

**velum** - in *Isoetes*, the membrane covering part or all of the *sporangium*-containing cavity (fovea) in the base of a *microphyll*.