**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.])

acrosopic - 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 axes 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 antheridal) - the male sex organ of pteridophytes borne on the gametophyte and producing spermatozoids.

apomixis (adjective apomiotic) - 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 μm 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. acrosopic.

blade - see lamina

bud - see bulbil

bulbil (adjective bulbiliferous) - a small, usually persistent, ± 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, bulbil; see also gemma and proliferous.

bulb - see bulbil

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

catatromous - 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 pinna; synonyms midrib, midvein, rachilla.

crozier - see fiddlehead

cotenoid - 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.

epispore - 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 gemmiferous) - 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.

goniapteroid - 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.

intraparallel canal - a channel occurring within a stipe.

isodromous - with the basal pinnae 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 laminate) - 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 Schizaceae) 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 Isoëtes.

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

megaspora - a large spore of the heterosporous pteridophytes Azolla, Isoëtes, Marsilea, Pilularia, Regnellidium, Selavinia, 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 pedicle.

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, Davalliaeae, 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 ± parallel plates (as seen in cross section), associated with *microphylls*, found in many Lycophytaeae.

**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., *Platyceurium*), 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 *prothalli*, *prothallia*) - 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 *sporangiostelae*.

**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 axes 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*.

**spematozoid** - 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 *sporophyll* 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 *Isoëtes*, an elongate *microphyll* bearing a *sporangium* within its base.

**stelte** (adjective *stellic*) - 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 *pinnula* 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 clasps 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 *sporangiofores*.

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