

GLOSSARY

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See also: Malcolm, B. & Malcolm, N. (2006), *Mosses and other Bryophytes, an Illustrated Glossary*, Second Edition. Micro-Optics Press, Nelson.

abaxial: *of the side or surface of an organ*, facing away from the axis. cf. **adaxial**.

acaulescent: lacking a stem.

acrocarpous: with the gametophyte producing the perichaetia at the end of the stem or main branch. Most acrocarpous mosses grow erect in tufts, and they are not or only sparsely branched. cf. **pleurocarpous**.

acumen: a slender, tapering point. adj. **acuminate**.

acute: terminating in a distinct but not protracted point, the converging edges separated by an angle of 45–90°.

adaxial: *of the side or surface of an organ*, facing towards the axis. cf. **abaxial**.

alar cells: specialised cells at the basal angles of a leaf, often distinctive in their size, shape, colour or ornamentation.

amphigastria (sing. **amphigastrium**): leaves that grow in a row on the lower side of a stem and which are usually smaller and have a different shape to other leaves.

amphithecium: the outer embryonic tissue of an embryonic capsule surrounding the central **endothecium**; gives rise to all tissues from the epidermis to the outer spore sac; also produces the spore sac in *Sphagnum*.

amplexicaul: clasping a stem.

analogous: structures or organs with similar functions that do not have a common phylogenetic origin; e.g. stomata and air pores. cf. **homologous**.

androecium (pl. **androecia**): the “male gametoeonium” consisting of antheridia, paraphyses and surrounding bracts. See also **perigonium**.

aneuploidy: having a chromosome number that differs from the basic euploid number by the loss or addition of 1 or more chromosomes, e.g. in mosses the haploid number is $n + 1$ or $n - 1$, as opposed to polyploidy where the chromosome number is a multiple of the haploid number, e.g. $2n$, $3n$, $4n$.

anisomorphic: describing related structures that exhibit more than one distinct type of size or shape.

anisophyllous: having dissimilar stem and branch leaves. e.g. in *Sphagnum* and *Thuidium*; or bearing two distinct types of leaves on the same stem, e.g. in *Hypopterygium* and *Racopilum*.

annual: a plant that completes its life history within one year.

annular: shaped like a ring; leaves or branches arranged in a circle, e.g. *Philonotis*.

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annulus: one or more rings of enlarged, specialised cells between the mouth of the capsule and operculum, aiding in dehiscence.

antheridium (pl. **antheridia**): the male gametangium; a multicellular stalked, structure with a jacket of sterile cells and producing large numbers of antherozoids (male gametes); globose to broadly cylindrical in shape.

antherozoid: a motile male gamete; in mosses propelled by two flagellae.

anticlinal: oriented perpendicular (rather than parallel) to the surface. cf. **periclinal**.

apical cell: a single cell at the apex of a shoot, leaf or other organ that divides repeatedly to produce new leaves, stems or other organs.

apiculus: a short, abrupt point; adj. **apiculate**.

apophysis (pl. **apophyses**): a differentiated sterile neck at base of the capsule, between the seta and urn; sometimes swollen, expanded or elongated (= **hypophysis**).

apoplastic movement: the movement of water into a cell via the protoplast, being controlled by osmosis.

appendiculate: having short, thin transverse projections, e.g. on the endostomial cilia of the peristome (see **trabeculae**).

appressed: closely applied, as for leaves lying closely or flat against the stem.

archegonium (pl. **archegonia**): the female gametangium; a multicellular, flask-shaped structure consisting of a stalk, a swollen base (venter) containing the egg and a neck through which the antherozoid swims to fertilise the egg.

arcuate: curved like a bow.

areolate: with small angular areas forming a network; the cellular pattern of the moss leaf is often termed **areolation**.

arista: the hard awn or bristle at the tip of a leaf, usually formed by an excurrent costa. adj. **aristate**.

arthrodontous: *of a peristome*, of triangular or linear teeth/segments consisting of differentially thickened wall-pairs. The teeth/segments are formed of part cells, in contrast to a **nematodontous** peristome in which they are formed of whole cells.

ascending: sloping or curved upwards.

attenuate: tapering gradually.

auricle: a small bulge or ear-like lobe at the basal margin of a leaf, e.g. in *Papillaria* and *Calyptothecium*; adj. **auriculate**.

autoicous: with male and female gametoecia on separate stems or separate branches of the same plant (**monoicous**). cf. **synoicous**, **paroicous**, **dioicous**, **phylloidioicous**, **pseudautoicous**.

awn: an arista or hairpoint, usually hyaline and formed of a projecting costa.

axil: the angle between the stem and any organ originating from it, e.g. a leaf or branch. adj. **axillary**.

axillary hair: a hair originating in a leaf axil, usually inconspicuous and often concealed by the leaf base.

axis: the main stem; the conceptual line around which leaves, branches and other organs develop.

basal membrane: *part of the peristome*: a delicate or robust membrane at the base of the endostome, often bearing segments and cilia (= **basement membrane**).

basement membrane: see **basal membrane**.

bifurcate: forked into \pm equal parts.

bistratose: consisting of two cell layers, e.g. a leaf lamina two cells thick.

border: *of leaves or the edges of peristome teeth*, a margin that is differentiated in shape, size, colour or thickness. adj. **bordered**.

bract: one of the specialised leaves surrounding and protecting archegonia and/or antheridia and, occasionally, gemmae or other propagules.

bryophyte: a non-vascular, green plant with a gametophyte generation that is free-living and a comparatively ephemeral sporophyte; a collective name for mosses, liverworts and hornworts.

bulbil: a small deciduous, bulb-shaped, axillary, vegetative propagule or rhizoidal gemma; often with rudimentary leaves.

bulbiform: bulb-shaped.

caducous: falling readily or early.

caespitose: tufted, growing in dense cushions or turfs.

calcicole: a plant that grows best in habitats or on substrata with high levels of calcium. adj. **calcicolous**.

calcifuge: a plant that cannot tolerate habitats or substrata with high levels of calcium. adj. **calcifugous**.

calyptra (pl. **calyptrae**): a membranous or hairy hood or covering that protects the maturing sporophyte; derived largely from the archegonial venter.

campanulate: shaped like a bell; here referring to a calyptra that is elongated and somewhat cylindrical; a campanulate-cucullate calyptra is split on one side only, whereas a campanulate-mitrate calyptra is undivided or equally lobed at the base.

capitulum (pl. **capitula**): a head-like mass of crowded branches at the apex of the stem, e.g. in *Sphagnum*.

capsule: the terminal, spore-producing part of a moss sporophyte.

carinate: folded along the middle, like the keel of a boat; V-shaped in cross-section.

caulonema: a secondary, bud-generating part of the filamentous moss **protonema**, typically reddish brown with few chloroplasts and consisting of long cells with oblique end walls.

central strand: the column of elongated cells, sometimes with thicker walls, in the centre of a stem.

cernuous: nodding or drooping.

channelled: *of a leaf*, hollowed out like a gutter and semicircular in cross-section.

chloronema: the filamentous part of the protonema that contains chloroplasts.

cilia (sing. **cilium**): a delicate, hair-like or thread-like structure, usually one cell thick and unbranched; in peristomes, a structure that occurs singly or in groups alternating with the segments of the inner endostome; hair-like appendages fringing leaves or calyptrae. adj. **ciliate**.

cladocarpous: having perichaetia terminal on lateral branches with juvenile leaf development similar to that on vegetative branches, in e.g. *Macromitrium* and *Schlotheimia*. cf. **acrocarpous**, **pleurocarpous**.

clavate: club-shaped.

cleistocarpous: *of a capsule*, lacking an operculum and, therefore, opening irregularly.

clone: population of genetically identical plants produced vegetatively from a single propagule or spore.

cochleariform: round and deeply concave, like the bowl of a spoon.

collenchymatous: cells with walls that are thickened at the corners, e.g. exothecial cells or cortical cells of stems seen in cross section.

columella: the sterile, central tissues of a moss capsule.

commissure: the margin of a hyaline cell which adjoins that of a chlorophyllose cell in the leaves of *Sphagnum* spp.

comose: stems tips with leaves that are larger and crowded into tufts (**comae**), e.g. in *Bryum* and *Campylopus*.

compensation point: the point at which energy lost through cellular respiration equals that gained through photosynthesis.

complanate: a leafy shoot that is more-or-less flattened into one plane.

complicate: folded lengthwise.

concolorous: having the same colour.

conduplicate: folded lengthwise along the middle.

conspecific: belonging to the same species.

constricted: abruptly narrowed.

contracted: abruptly narrowed or shortened.

convolute: *of leaves or bracts*, rolled together to form a sheath, e.g. the perichaetial leaves of *Holomitrium*.

cordate: heart-shaped, as in leaves attached at the broad end.

coriaceous: leathery in texture.

cortex: the outermost layer or layers of cells in a stem immediately below the epidermis, often differentiated from the central cylinder. adj. **corticcate**, **cortical**.

corticulous: growing on bark.

costa (pl. **costae**): the thickened midrib or nerve of a leaf; when present, can be single or double. adj. **costate**.

crenate: *of a leaf margin*, having rounded teeth.

crenulate: *of a leaf margin*, having minute, rounded teeth formed from bulging cell walls.

crisped (or **crispate**): wavy; often used loosely to include curled, twisted and contorted.

cristate: having a crest-like ridge.

cucullate: hooded or in the shape of a hood; applied to leaves that are concave at the tips and to calyptrae that are conical and split up one side.

cushion: a more-or-less hemispherical or rounded moss colony, with stems generally erect and tightly clustered but radiating somewhat to form a tuft.

cuspidate: ending in a stout, rigid point, like a tooth.

cuticle: a non-cellular coating on the outer surface of cells in contact with the environment, often variously roughened or ornamented.

cygneous: curved downwards in the upper part like the neck of a swan, e.g. setae of *Campylopus*.

cylinder: the central strand in stem. adj. **cylindrical**.

cylindrical: shaped like a cylinder, e.g. a capsule.

cymbiform: concave and boat-shaped.

deciduous: falling off, lost at maturity, e.g. the operculum.

decumbent: tips ascending from a prostrate base.

decurrent: applied to the margins of leaves which extend down the stem, as ridges or narrow wings, below the insertion of the leaf.

decurved: curved downward.

deflexed: bent downward.

dehiscent: of capsules, splitting open by means of an annulus, operculum or valves (as opposed to **indehiscent**).

dendroid: with the habit of a tree, branching from a main stem, e.g. *Hypnodendron* and *Hypopterygium* (cf. **frondose**).

dentate: with teeth directed outward.

denticulate: with fine teeth.

depauperate: stunted or poorly developed.

depressed: flattened, as viewed from above.

descending: directed gradually downward.

determinate: of growth in which the terminal bud forms a structure, e.g. a perichaetium, and growth is achieved by means of lateral buds giving rise to additional stems or innovations. See **sympodial**.

diaspore: an agent of dispersal; any structure that becomes detached from the parent plant and gives rise to a new individual.

dichotomous: with two equal forks or branches.

differentiation: the morphological and physiological changes that occur between initiation and maturation of a cell, tissue or organ.

dimorphic: of two distinct forms, e.g. leaves, male and female plants.

dioicous: with archegonia and antheridia borne on separate plants.

diploid: a cell, individual or generation with two sets of chromosomes ($2n$); the typical chromosome level of the sporophyte generation.

diplolepidous: a form of arthrodontous peristome having two concentric rings of teeth, with the outer ring (**exostome**) derived from thickening of the contiguous walls of the outer and primary peristomial layers and the inner ring (**endostome**) derived from the thickening of the contiguous walls of the primary and inner peristomial layers. The exostome is generally more heavily thickened than the endostome. One or both rings may be absent or reduced (cf. **haplolepidous**).

discoid: flattened and shaped like a disc, e.g. certain gemmae, perichaetia or perigonia.

distal: away from the base or point of attachment; the converse of **proximal**.

distant: widely spaced, e.g. leaves with space between adjacent leaves.

distichous: leaves alternating in two opposite rows on a stem, as in *Fissidens*.

divergent: spreading in opposite directions.

dorsal lamina: part of the leaf blade opposite the sheathing base, at the back of the costa and below the apical lamina in *Fissidens*.

dorsiventral: flattened with distinct upper and lower surfaces.

dwarf male: a minute male gametophyte borne on the female plant.

echinate: bearing spiny projections.

ecostate: lacking a costa.

ectohydric: having water transport essentially external by surface flow, including capillary motion between leaves or through surface papillae. cf. **endohydric**.

efibrillose: without fibrils.

ellipsoidal: a solid with an elliptical profile.

elliptical: having the shape of an ellipse, oblong but convex at the sides and ends.

emarginate: broad at the apex with a shallow notch, deeper than **retuse**.

embryo: the developing sporophyte phase normally generated from a zygote; in mosses it usually consists of a foot, seta and capsule.

emergent: partly exposed, as a capsule only partly protruding from among the perichaetial leaves. cf. **exserted**, **immersed**.

endemic: restricted to one country or one floristic region.

endohydric: having water transport essentially internal. cf. **ectohydric**.

endostome: the inner ring of a diplolepidous peristome, formed from contiguous periclinal wall-pairs of the primary and inner peristomial layers; typically a weak membranous structure consisting of a basal membrane bearing **segments** and **cilia**; homologous with the single peristome of haplolepidous mosses.

endothecium: in most mosses, the inner embryonic tissue of a capsule which gives rise to all tissues interior to the outer spore sac. In *Sphagnum* it also produces the columella.

entire: with a smooth outline, not toothed or lobed.

ephemeral: short-lived.

epidermis: the outer layer of cells at the surface of an organ, e.g. **exothecium**.

epiphragm: a circular membrane, positioned horizontally over the capsule mouth of some mosses, attached to the tips of the peristome teeth and partially closing the mouth of an inoperculate capsule, e.g. *Funaria*, *Polytrichum*.

epiphyllous: a plant that grows on the living leaves of another plant.

epiphyte: a plant that grows on the surface of another plant.

equidistant: regularly separated or spaced.

erect: *of leaves*, almost or quite parallel to the stem, but not appressed; *of branches or stems*, in a \pm vertical position with respect to stem or substratum; *of capsules*, upright.

erecto-patent: spreading at an angle of less than 45°. cf. **spreading** or **patent**.

eukaryote: any cell or organism composed of cells that possess a membrane-bound nucleus, a number of chromosomes, cellular organelles and accomplishes cell division by mitosis and meiosis. adj. **eukaryotic**.

exannulate: lacking an annulus.

excavate: hollowed out.

excurrent: *of a costa*, extending beyond the leaf apex.

exine: the outermost wall layer of the spore.

exostome: the outer circle of the diplolepidous peristome, consisting of teeth formed from contiguous periclinal wall-pairs of the outer and primary peristomial layers; absent or rudimentary in the haplolepidous peristome.

exothecium: the epidermis or superficial layer of cells (**exothecial** cells) of the capsule wall.

exserted: exposed, as in a capsule protruding beyond the perichaetial leaves. cf. **emergent**.

failing: *of a costa*, terminating below the leaf apex.

falcate: curved like a sickle.

falcate-secund: strongly curved and turned to one side.

fascicle: a group, bunch or tuft of branches, e.g. in *Sphagnum*. adj. **fasciculate**.

fastigiata: with branches erect and of similar length.

fenestrate: pierced with broad openings resembling windows.

fibril: a fine, fibre-like wall thickening. adj. **fibrillose**.

filamentous: thread-like.

filiform: slender and elongate, thread-like.

fimbriate: fringed, generally eroded with radiating cell walls of partly eroded marginal cells. cf. **laciniate**.

flabellate: shaped like a fan.

flaccid: soft and limp.

flagelliform: whip-like; a branch with a gradual attenuation from ordinary leaves at the branch base to vestigial-branched tip. cf. **stoloniferous**.

flagellum (pl. **flagella**): a slender, tapering branch; also the organs of locomotion in an antherozoid; adj. **flagellate**.

flexuose: slightly bent, wavy or twisted.

foliose: leafy or leaflike; covered with leaves.

foot: the organ at the base of a seta which is embedded in the gametophyte.

fringed: with a short-ciliate margin or edge.

frond: the branched or leafy part of an erect stem, including branches of a dendroid moss. adj. **frondose**.

fruit: archaic term for the capsule or sporophyte.

fugacious: quickly or readily falling or vanishing.

funiculate: rope-like, e.g. of leaf arrangement in some *Macromitrium* spp.

fusiform: narrow and tapering at each end, spindle-shaped.

gametangium (pl. **gametangia**): an **antheridium** or **archegonium**; a structure producing gametes (**ovum**, **spermatozoid**).

gamete: a haploid reproductive cell, e.g. **spermatozoid**, **ovum**.

gametoeceium: a gametangium together with its surrounding bracts (see **androecium**, **gynoecium**).

gametophore: loosely used for the leafy moss gametophyte plant developed from a protonema.

gametophyte: the haploid, sexual generation; in bryophytes the free-living, dominant generation.

gemma (pl. **gemmae**): uni- or multi-cellular, globose, clavate, filiform, cylindrical or discoid structures, borne on the aerial part of the plant (e.g. in leaf axils, on leaf surfaces or rhizoids) and functioning in vegetative reproduction.

gemmiferous: bearing gemmae.

geniculate: bent abruptly, as at the knee.

gibbous: swollen or bulging at one side.

glabrous: smooth, not papillose, rough or hairy.

glaucous: bluish green in colour or with a greyish or whitish bloom.

granulose: minutely grainy, roughened with minute blunt projections.

gregarious: growing close together in loose tufts or mats.

guard cells: specialised photosynthetic cells bordering the stoma on the capsule wall.

guide cells: large, rather thin-walled cells in the centre of the costa, usually best seen in transverse section.

gymnostomous: without a peristome, so that the mouth of the urn is naked.

habit: general appearance.

hairpoint: the hair-like and often colourless leaf tip, formed from an excurrent costa or a tapering of the leaf lamina.

haploid: a cell, structure or organism having a haploid set of chromosomes (n); e.g. the normal chromosome number of the gametophyte generation.

haplolepidous: a form of arthrodontous peristome having only one circle of teeth derived from thickening of the contiguous walls of the primary and inner peristomial layers.

hepatic: a member of Class Hepaticopsida; also known as liverworts.

heterochromatin: condensed regions of chromosomes that stain at interphase but are comparatively transcriptionally inactive.

heteroicous: having several forms of gametoeidia on the same plant; also called polygamous, polyoicous.

heterolepidous: a form of arthrodontous peristome thought by some to be intermediate between **haplolepidous** and **diplolepidous**, e.g. in *Encalypta*.

heteromallous: pointing in various directions. cf. **homomallous**.

heteromorphic: having two or more different shapes or phases.

hoary: greyish or whitish, appearing frosted from numerous massed hairpoints.

homologous: structures or organs with a common phylogenetic or developmental origin, but not necessarily similar in appearance and/or function. cf. **analogous**.

homomallous: pointing in the same direction. cf. **heteromallous**.

hornwort: a member of Class Anthocerotopsida.

Hoyer's solution: a water-soluble medium used for making semi-permanent, microscopic preparations.

hyaline: colourless and transparent; commonly used with reference to cells that lack chloroplasts.

hyalocyst: a large, hyaline, water-storage cell in Sphagnopsida.

hyalodermis: in *Sphagnum*, an cortex of large, empty, colourless cells. adj. **hyalodermal**.

hydroid: a non-lignified, water-conducting cell in the central strand and/or costa of some mosses, e.g. Polytrichales.

hydrome: a sheath of hydroid cells in the central strand and/or costa of some mosses, e.g. Polytrichales.

hypnoid: having a complete peristome; occasionally used to refer to a moss with a pleurocarpous habit.

hypophysis: see **apophysis**.

imbricate: closely appressed and overlapping.

immarginate: *of a leaf*, lacking a border.

immersed: submerged below the surface; immersed capsules occur below the tips of the perichaetial leaves; immersed stomata have guard cells that are sunken below the surrounding exothecial cells.

inclined: applied to a capsule that is tilted between the vertical and horizontal.

incrassate: thickened, or with thick walls.

incumbent: lying against or leaning on something.

incurved: curved upward and inward, the opposite of **recurved**; applied to leaf margins and tips.

indehiscent: *of capsules*, lacking a distinct opening mechanism; spores shed by irregular rupture or breakdown of capsule wall, e.g. in *Archidium*.

indeterminate: when a terminal bud continues to produce producing new growth. cf. **determinate**.

inflated: swollen, puffed up.

inflexed: bent upward (adaxially) and inward, the opposite of **reflexed**; applied to leaves, leaf margins and peristome teeth.

initial: an undifferentiated, meristematic cell that divides to produce discrete organs, e.g. rhizoid initial, stem initial or leaf initial.

innovation: a new shoot; in acrocarpous mosses a subfloral branch formed after differentiation of the sex organs, usually from the gynoeceium base.

inoperculate: lacking an operculum.

insertion: a line or point of attachment of a leaf, branch or peristome etc.

intine: the innermost wall of the spore.

intramarginal: submarginal; structures close to or associated with but not strictly on the margin.

intricate: tangled, interwoven.

involute: strongly rolled upward (adaxially) and tightly inward, opposite of **revolute**; applied to leaf margins.

isodiametric: about as long as broad and having the same dimensions in all directions; applied to square, rounded or hexagonal cells.

isomorphic: *of spores*, ±uniform in size.

isophyllous: having similar stem and branch leaves. cf. **anisophyllous**.

jacket cells: wall cells of the antheridium.

julaceous: smoothly cylindrical; applied to shoots with crowded, imbricate leaves.

juxtacostal: the part of a leaf lamina adjacent to the costa.

keeled: See **carinate**.

lacerate: deeply and irregularly cut or torn.

laciniate: dissected into fine, deep, often irregular divisions (**lacinae**); fringed with cilia.

lamella (pl. **lamellae**): a longitudinal chlorophyllose ridge or plate on the leaf blade of some mosses (e.g. Polytrichaceae); adj. **lamellate**; the plates of the secondary wall deposition occurring between trabeculae on the dorsal and ventral surfaces of an arthrodontous peristome.

lamina (pl. **laminae**): the blade of a leaf excluding the costa and leaf margin or border.

laminal cell: any cell of the lamina.

lanceolate: shaped like the blade of a spear, narrow and tapered from near the broader base.

lax: soft or loose, commonly referring to a tissue of large, thin-walled cells as well as the spacing of leaves.

lenticular: shaped like a double-convex lens.

leptoid: a conducting cell similar in form and function to a sieve tube in vascular plants; found in the central strand and setae of Polytrichales and in the setae of many mosses.

leptome: a tissue, similar to the phloem of vascular plants, consisting of leptoids and parenchymatous cells.

leucocyst: a large, empty hyaline cell in the leaves of Sphagnopsida and *Leucobryum* (= **hyalocyst**).

lid: operculum.

ligulate: strap-shaped, with parallel sides and an abruptly tapered apex.

limb: the upper part of the leaf, the lower part being the **base**.

limbidium: a differentiated leaf margin in e.g. *Fissidens*.

linear: very narrow and elongate, with the sides nearly parallel; narrower than **ligulate**.

lingulate: tongue-shaped; broad with the sides rarely parallel. cf. **ligulate**.

lumen (pl. **lumina**): the cavity of a cell.

m-chromosome: the smallest chromosome, less than half the length of other members of the chromosome complement; sometimes present in bryophytes.

macronema (pl. **macronemata**): a large, branched rhizoid produced around branch primordia and at the base of buds.

mammilla (pl. **mammillae**): a bulge on the surface of cell with a nipple-like tip. adj. **mammillose**.

mat: a densely interwoven, horizontal growth form, e.g. *Hypnum*, *Thuidium*.

median: central, in the middle; **median leaf cells** are those in the upper middle of the leaf or, in leaves with a costa, those located between the margin and costa about two-thirds of the way up the leaf.

meristem: a permanent or temporary zone of actively dividing undifferentiated cells which by, mitotic division, give rise to tissues and organs.

meiosis: the process of nuclear division by which a diploid nucleus yields 4 haploid nuclei; in mosses meiosis occurs in the spore sac of the capsule to produce 4 haploid spores.

mitrate: of a *calyptra*, conical and undivided or equally lobed at the base. cf. **cucullate**.

monoicous: bisexual, having antheridia and archegonia on the same plant; includes **autoicous**, **synoicous** and **paroicous**.

monopodial: with the terminal bud of the main stem having unlimited (indeterminate) growth, and giving rise to numerous, secondary, lateral shoots or stems.

mucro: a short, abrupt point at the apex of a leaf (adj. **mucronate**), as in a leaf with a short-excurrent costa; **apiculate** is somewhat longer, **cuspidate** is longer and stouter.

n: the haploid, gametophytic chromosome number of an organism.

naked: lacking covering structures or ornamentation; e.g. without hairs or papillae, referring to smooth, glabrous calyptra.

neck: the cylindrical upper part of an archegonium; also as **apophysis**, the sterile basal part of a moss capsule below the urn.

nematodontous: *of a peristome*, consisting of whole dead cells with \pm evenly thickened walls, e.g. as in Polytrichaceae. cf. **arthrodontous**.

nodose: knotted, with small knob-like thickenings; e.g. endostomial cilia in Bryaceae. dim. **nodulose**.

nutant: nodding or drooping.

ob-: a prefix indicating inversion, as in **obovate**.

oblate: *of leaf cell shape:* wider than long.

oblong: rectangular but, when applied to leaves, usually rounded at the corners.

obovate: with the profile of an egg, the broad end distal.

obtuse: broadly pointed, at an angle of greater than 90°; sometimes used loosely to indicate blunt.

ochraceous: brownish yellow.

operculum (pl. **opercula**): the lid covering the mouth of most moss capsules, becoming detached at maturity; usually separated from the mouth by an annulus. adj. **operculate**.

ovate: with the profile of an egg, the base broader than the apex and about twice as long as wide.

ovoid: a solid with an ovate profile.

palmate: having radiating branches originating from a single point.

panduriform: shaped like the body of a violin.

papilla (pl. **papillae**): a minute, solid protuberance from the surface of a cells (especially of leaves and spores) of various forms, commonly domed or spinous, simple or branched. adj. **papillose**. See also **mammilla**, **prora**.

paraphyllum (pl. **paraphyllia**): a small, green, filiform, lanceolate or leaf-like scale borne superficially on the stems between branches of many pleurocarpous mosses, e.g. *Thuidium*; see also **pseudoparaphyllia**.

paraphyses (sing. **paraphysis**): sterile hairs composed of uniseriate cells, coloured or hyaline, associated with antheridia and sometimes archegonia.

parenchyma: tissue of undifferentiated cells, usually isodiametric and thin-walled, usually not overlapping; adj. **parenchymatous**.

paroicous: with antheridia and archegonia in the same gametoeecium but not mixed, the antheridia immediately below the perichaetium in the axils of leaves.

patent: used for leaves spreading at an angle of about 45°.

patulous: used for leaves spreading at an angle of 45–90°.

pellucid: clear, transparent or translucent.

pendant: drooping or hanging down, e.g. the capsules of *Bryum*; or stems that hang, e.g. *Papillaria*. (= **pendulous**).

percurrent: *of a costa*, extending up to but ceasing at the apex of a leaf.

perfect: a complete peristome; applied to diplolepidous peristomes with an endostome having both segments and cilia.

perforate: *of peristome teeth*: split into two parts joined only at intervals, e.g. *Trematodon*.

perichaetial leaf: one or more modified leaves (bracts) surrounding the archegonia.

perichaetium: the female gametoeonium, consisting of the sex organs and the perichaetial leaves surrounding them.

periclinal: oriented parallel (rather than perpendicular) to the surface. cf. **anticlinal**.

perigonial leaf: a modified leaf (bract) associated with and surrounding the antheridia.

perigonium: the male gametoeonium, consisting of the sex organs and the perigonial leaves associated with them.

peristome: a circular structure generally divided into 4, 8, 16 or 32 teeth arranged in single or double (rarely multiple) rows around the mouth of the capsule and visible after dehiscence of the operculum. See **arthrodontous**, **diplolepidous**, **haplolepidous**.

peristomial formula: an equation indicating the peristomial number from the outer peristomial layer (OPL) to the inner peristomial layer (IPL), and indicating relative degree of wall thickening and any lateral displacement of the IPL and prostomial development, e.g. 4:2:2-4 or 4:2:6-8 in *Pohlia*; e.g. 4:2:3 for **haplolepidous**, 4:2:4 to 4:2:14 for **diplolepidous**.

peristomial number: the number of cell columns in the outer, primary and inner peristomial layers per 45° arc (one-eighth of the peristome), so that a 4:2:4 formula means there are 32, 16 and 32 cells in the OPL, PPL and IPL, respectively.

peristomial cylinder: the three innermost layers of amphithecial tissue in an arthrodontous moss capsule which produce the peristome. The inner peristomial layer is proximally continuous with the outer spore sac; the middle and outer layers represent the primary and outer peristomial layers, respectively.

phaneropore: a superficial stoma in a capsule wall having the guard cells on the same level as the exothecial cells. adj. **phaneroporous**.

phylloidioicous: with dwarf male plants growing on the leaves or tomentum of much larger female plants. cf. **pseudautoicous**.

piliferous: with a long hairpoint.

pinnate: with spreading branches on either side of a stem, rather like a feather.

pitted: *of a cell wall*, having small depressions or pores.

placenta: the interface between the gametophyte and sporophyte, usually containing numerous transfer cells. adj. **placental**.

plane: flat, not curved or wavy, as in leaf margins.

pleurocarpous: having sporophytes produced laterally on short, usually specialised branches rather than from the apex of the main stem; mosses with stems usually prostrate, creeping and freely branched, growing in mats rather than tufts. cf. **acrocarpous**.

plica: a lengthwise fold or pleat. adj. **plicate**.

plumose: closely and regularly pinnate and feathery in appearance.

polymorphic: having more than one form, variable.

polyploid: a plant or tissue with more than 2 complete sets of chromosomes.

polysety: having more than one sporophyte produced from a single gametoeonium, each from a separate archegonium with its own calyptra, e.g. *Dicranoloma dicarpum*. adj. **polysetose**.

pore: a pit or opening in a cell wall. adj. **porose**.

primordial utricle: the collapsed contents of a cell that have separated from the cell wall.

process: the main divisions of a diplolepidous peristome (also called **segments**).

procumbent: prostrate, spreading.

prolate: longer than wide. cf. **oblate**.

propagule: a reduced bud, branch or leaf functioning in vegetative reproduction.

prora: a mammillose projection formed by protusion of the end of a prosenchymatous cell. adj. **prorate**; dim. **prorulate**.

prosenchyma: a tissue consisting of narrow, elongate cells with overlapping ends. adj. **prosenchymatous**.

prostome: a rudimentary structure outside and usually adhering to the main peristome teeth; e.g. in Pterobryaceae.

prostrate: lying flat on ground; creeping.

protandrous: maturation of the antheridia prior to the archegonia.

protogynous: maturation of the archegonia prior to the antheridia.

protonema (pl. **protonemata**): a filamentous, globose or thallose structure resulting from spore germination and including all stages up to production of one or more gametophores. The protonema varies in the amount of chlorophyll present and the degree of obliqueness of its end walls, and in its branching.

protuberant: projecting.

proximal: the end or part nearest to the base or place of origin. cf. **distal**.

pseudautoicous: having dwarf male plants epiphytic on the female.

pseudoparaphyllium (pl. **pseudoparaphyllia**): structures resembling paraphyllia but restricted to the bases of branches and branch buds in some pleurocarpous mosses.

pseudopodium: an elongation of the stem of the gametophore, e.g. below the sporophyte in *Sphagnum* and *Andreaea*, to give a false seta; also an extension of the stem tip bearing clusters of gemmae, e.g. in *Trachyloma*.

pseudopore: a pore-like structure with a thin membrane that is revealed by staining; e.g. in the hyalocysts of some Calymperaceae; in *Sphagnum* leaves consisting of fibril rings without an interior perforation.

pulvinate: cushion-like.

punctate: minutely dotted.

pyrenoid: a usually spherical or ellipsoidal structure within the chloroplast visible under the light microscope; acts as a centre for carbohydrate (e.g. starch) synthesis.

pyriform: pear-shaped, e.g. the capsules of *Bryum*.

quadrate: *usually of cells*, appearing square or approximately so in two dimensions.

rachis: the axis of a pinnate or umbellate frond.

radiculose: covered with rhizoids.

ramification: branching.

ramose: richly branched.

recurved: curved down (abaxially) and inward, the opposite of **incurved**; in leaves referring to margins, apices or marginal teeth; in the peristome, teeth curved outward and \pm downward.

reflexed: bent backwards (abaxially) and under, the opposite of **inflexed**; generally referring to leaf margins or leaves of a stem.

reniform: kidney-shaped.

resorbition: the digestion or erosion of cell walls in the leaves of some species of *Sphagnum*.

resorbition furrow: a groove along the leaf margins of some species of *Sphagnum* caused by erosion of the outer cell walls.

reticulate: forming a network.

retort cells: cortical cells in some species of *Sphagnum*, with a downwardly projecting neck ending in a pore.

retuse: a slight indentation or notch in a broad, rounded apex.

revolute: *of leaf margins*, rolled downward (abaxially) and backward.

rhizautoicous: autoicous, with the male gametocium on a short branch (dwarf male) attached to the female plant by rhizoids and so appearing to be separate. cf. **pseudautoicous**.

rhizoid: a hair-like structure that anchors a moss to the substratum; multicellular with oblique cross walls, often pigmented, and sometimes clothing the stem.

rhizome: a slender horizontal, subterranean stem giving rise to erect secondary stems; e.g. in *Dawsonia* and *Rhodobryum*.

rhombic: diamond-shaped.

rhomboidal: longer and narrower than rhombic, oblong-hexagonal.

rostellate: *of an operculum*, with a short beak.

rostrate: *of an operculum*, with an apical beak that is narrowed to a slender tip or point.

rosulate: resembling a rosette, with leaves enlarged and crowded at the tips of stems.

rugose: with irregular, roughly transverse wrinkles or undulations; e.g. the leaves of *Neckera*.

rugulose: minutely or somewhat wrinkled transversely.

saxicolous: growing on rock.

scabrous: rough.

scleroderm: a tissue of thick-walled cells in the central cylinder of stems and branches of *Sphagnum*.

secund: bent or turned to one side.

segment: *of a peristome*, a single, tooth-like component of the endostome.

seriate: in rows (uni-, bi-, tri- or multiseriate); applied either to adjacent rows of leaf cells, or to ranks of leaves on a stem. cf. **stratose**.

serrate: regularly toothed like a saw; leaves with marginal teeth pointing forward.

serrulate: minutely serrate.

sessile: without a stalk, e.g. of sporophytes with greatly reduced setae.

seta (pl. **setae**): the elongated portion of the sporophyte between the capsule and the foot.

setaceous: bristle-like.

sheathing: surrounding or clasping a stem, seta or capsule.

shoulder: the distal part of the leaf base where it is abruptly narrowed to the upper lamina or limb.

sigmoid: S-shaped.

sinuose: having a wavy wall or margin.

sinus: a gap between two lobes of a leaf.

spathulate: having the shape of a spatula, narrow below and gradually broadening above.

spermatozoid: a male gamete; bearing two flagella.

spiculose: sharply and minutely toothed or papillose.

spinose: having sharply pointed teeth.

spinulose: with minutely sharply pointed teeth.

splash-cup: a cup-shaped perigonium in which the dispersal of antherozoids is aided by the action of falling raindrops.

spore: a minute, usually spherical, haploid cell produced in the capsule as a result of meiosis; its germination gives rise to the protonema.

spore sac: a spore-containing cavity in a moss capsule.

sporocyte: a diploid cell that undergoes meiosis in the capsule to produce 4 haploid spores; sometimes called a **spore mother cell**.

sporophyte: the spore-bearing generation; initiated by the fertilization of an ovum; consists of foot, seta and capsule; attached to and partially dependent on the gametophyte.

sporopollenin: a substance in moss spore walls similar to that found in pollen grains.

spreading: of leaves inserted at 46–90° to the stem; said to be widely spreading when close to 90°.

squarrose: *of leaves*, with the upper part strongly curved back at c. right angles to the leaf base.

squarrose-recurved: spreading at right angles, with the tips curved downwards.

stance: the manner in which the leaves are held in relation to the stem.

stegocarpous: a capsule with a differentiated, dehiscent operculum.

stereid: a slender, elongate cell with very thick walls present in groups (**stereid bands**) in the costa and stem of many mosses.

stipe: the erect, unbranched basal part of a stem in a dendroid or frondose moss. e.g. *Hypnodendron*.

stolon: a slender, elongate branch with leaves that are often smaller and have a different shape to those of the main stem. adj. **stoloniferous**.

stoma (pl. **stomata**): a pore involved in gas exchange, surround by two guard cells; in mosses restricted to the neck of the capsule.

stratose: in layers; denoting the thickness of leaves, i.e. uni-,bi- or multistratose.

stria (pl. **striae**): a fine line or ridge. adj. **striate**.

striolate: very finely ridged.

struma: a cushion-like swelling at one side of the base of a capsule. adj. **strumose.** e.g. *Trematodon*.

subula: a long, slender, needle-like point; adj. **subulate.**

substratum: the surface on which a moss grows, e.g. soil, bark or rock.

sulcate: with longitudinal folds or ridges, e.g. capsules of *Ulota*.

superficial: of *stomata*, having the guard cells in the same plane as the adjacent exothecial cells.

sympodial: having the terminal bud of the main stem of determinate growth, e.g. producing gametoecea, and further growth by innovations or lateral branches.

synoicous: having antheridia and archegonia mixed in the same gametoeceum.

systylious: of a capsule, the operculum remains attached to the tip of the columella after the capsule has opened.

teeth: divisions of a diplolepidous exostome or outer ring of the peristome; also serrations on leaf margins.

terete: smoothly cylindrical, round in cross-section.

tetrad: a group of four; e.g. the 4 spores derived from a single sporocyte by meiosis.

tetrahedral: a four-faced cell or spore.

theca (pl. **thecae**): the spore-bearing part of a moss-capsule.

tomentum: a felt-like or woolly covering composed of abundant rhizoids on some stems, rarely on leaves. adj. **tomentose.**

trabecula (pl. **trabeculae**): projecting cross-bars formed from the horizontal walls on either face of arthrodontous exostome teeth; also strands of cells bridging spaces within some capsules. adj. **trabeculate.**

transfer cells: specialised cells at the interface of the gametophyte and sporophyte which transfer nutrients from the former to the latter.

trigone: triangular intracellular wall thickenings found in the corners of three adjacent cells.

trilete spore: having a three-pronged scar on the wall (e.g. in *Sphagnum*), the scar being its area of contact with each of the three other spores in the tetrad.

triradiate ridge: a thickening on the proximal face of a spore caused by it being pressed against the three other spores of a tetrad.

tristichous: with leaves in three rows.

truncate: cut off abruptly or squarely at the apex.

tuber: a gemma borne on rhizoids, usually underground.

tufaceous: building up deposits of calcium carbonate, e.g. around the stems of *Gemmabryum clavatum*.

tuft: a growth form consisting of a group of ±erect plants.

tumid: swollen or inflated.

turf: a growth form with stems erect, parallel and close together and forming rather extensive patches.

turgid: swollen or plump.

umbellate: a frondose moss having all of its branches spreading from the apex.

umbonate: convex with an abrupt, rounded central point.

uncinate: hooked; with the tip bent to form a hook.

undulate: wavy.

urceolate: urn-shaped; used with reference to capsules that are constricted below a wide mouth, then abruptly narrowed to the seta.

urn: the spore-bearing part of the capsule.

utricle: a bladder-like structure.

vaginant: one of two clasping leaf laminae in *Fissidens* spp.; the adaxial part of the leaf that sheathes the stem and encloses the base of the leaf above it.

vaginula (pl. **vaginulae**): the sheath enveloping the base of the seta, derived from the basal part of the venter of the archegonium and surrounding stem tissue and persisting after the separation of the calyptra.

venter: the swollen basal part of an archegonium, containing the ovum.

vermicular: worm-like; long narrow and curving.

verrucose: irregularly roughened. dim. **verruculose**.

verticillate: whorled.

weft: a loosely interwoven growth, often somewhat ascending.

whorled: arranged in a ring or circle.

widespreading: *of leaves*, spreading from the stem at a wide angle (less than 90°).

xeromorph: a plant having specialised morphological characteristics, e.g. papillose cell surfaces, which enable it to survive under hot and dry conditions. adj. **xeromorphic**.

xerophyte: a plant that is adapted for survival in arid places. adj. **xerophytic**.

zygote: the product of the fusion of male and female gametes; the fertilized ovum before it undergoes mitosis or meiosis.