

GLOSSARY

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1n: having only one set of chromosomes

2n: having two sets of chromosomes

2,4-D: 2,4-dichlorophenoxyacetic acid; herbicide that mimics IAA

>>: much greater

♀: sign meaning female, *i.e.* bearing archegonia

♂: symbol meaning male



A horizon: dark-colored soil layer with organic content and minerals intermixed

ABA: abscisic acid; plant hormone (growth regulator) associated with water stress, growth inhibition, stomatal closing, and seed dormancy in some plants; known from mosses

abandoned land: land having previous human use

abscission: process where plant organs are shed; *e.g.* deciduous leaves in autumn

absent: missing

acaulescent: provided with a very short stem

accessory pigment: pigment that captures light energy and passes it to chlorophyll *a*

acrescent: continuing to grow after reproduction

-aceae: suffix denoting family in Plant Kingdom

acetylcholine: chemical formed by choline and acetyl group; neurotransmitter in nervous system used to transmit nerve impulses

achlorophyllous: lacking chlorophyll

achlorophyllous: without chlorophyll

acicole: growing on or among needles of conifers

acid: substance with pH less than 7.0

acid precipitation: precipitation having pH less than 5.4

acidicline: preferring weakly acidic substratum

acidophile: plant growing best on acidic substrate

acidiphilous: growing on acidic substrates

acrocarp: moss species that produces sporophyte at apex of stem or main branch

acrocarpous: gametophyte producing sporophyte at apex of stem or main branch; generally upright mosses with terminal sporangia, usually unbranched or sparsely branched

acrogynous: in many leafy liverworts, sporophyte growing at top of stem (from apical cell), *e.g.* *Mesoptychia collaris* [ant. anacrogynous]

actinomorphic: having radial symmetry, like spokes of a wheel

adaptation: genetic change, arrived at through process of natural selection, which enables organism to compete more effectively under given set of conditions (L. *adaptare* = to fit in)

adaxial: on side toward axis (stem) of plant, such as upper surface of leaf [ant. abaxial]

adenine: nitrogenous base; one member of base pair adenine-thymine in DNA

adherent: strongly attached to the substratum *e.g.* *Frullania dilatata*

adnate: said of two fused structures, *e.g.* peristome and epiphragm of *Atrichum undulatum*

adsorption: fixation of elements on the surface

adventitious: growing on an atypical place *e.g.* adventitious rhizoids on costa in *Conardia compacta*

adventive: introduced

aerenchyma: in some thallose liverworts, loose parenchyma, with empty spaces between groups of cells

aerohaline: subject to influence of salty sea spray

aerohygrophyte: plant growing in habitats having high air humidity

Abbreviations

aff. related to

auct. Latin, author

c.: Latin « circa » meaning « around, about »

cf.: Latin confer, compare with

cf. (c. fr.) (*franç. cfr. (c. fr.)*) Latin « cum fructibus » meaning « with sporophytes »

cm (*franç. cm*) meaning « centimeter »

det. (*franç. det.*) Latin « determinavit » meaning "determined by".

e.g. (*franç. e.g.*) Latin « exempli gratia » meaning « for example »

fo. (*franç. f.*) Latin « forma » meaning « form »

ibid. (*franç. ibid.*) Latin « ibidem » meaning « in the same book »

IPL (*franç. IPL*) meaning « inner peristomial layer »

leg. (*franç. leg.*) Latin « legit » meaning « collected by »

µm (*franç. µm*) de « micrometer » or « micron », length unit = 1/1000 mm.

n (*franç. n*) chromosome number (haploid).

op. cit. (*franç. op. cit.*) Latin « opus citatum » meaning « mentioned, cited above »

OPL (*franç. OPL*) meaning « outer peristomial layer »

PPL (*franç. PPL*) meaning « primary peristomial layer »

s.d. (*franç. s.d.*) Latin « sine die » meaning "without date"

sensu (*franç. sensu*) Latin « sensu » meaning « in the sense (of) »

s.l. (*franç. s.l.*) Latin « sensu lato » meaning « in a broad sense »

s.n. (*franç. s.n.*) Latin « sine numero » meaning « without a number »

s.s. (*franç. s.s.*) Latin « sensu stricto » meaning « strict sense »

sp. (*franç. sp.*) meaning « species »

spp. (*franç. spp.*) meaning « more than one species »

ssp. (*franç. ssp.*) meaning « subspecies »

var. (*franç. var.*) meaning « variety »

abortive: having development that is incomplete, abnormal, stopped before maturity

abscisic acid: ABA; plant hormone (growth regulator)

- aerophyte:** plant growing on aerial parts of another
- agg.:** for "aggregate," designating group of species which are difficult to distinguish from one another
- aggregate:** clustered together
- air chamber:** in some thallose liverworts, specialized air-containing cavity
- air pore:** in some thallose liverworts, opening of air-chamber
- alanine:** non-polar amino acid that is relatively insoluble in water
- alar cell:** cell at basal angle of moss leaf, usually different in size and shape from other leaf cells
- ales:** suffix applied to order of plants or algae (*e.g.* Dicranales, Orthotrichales)
- alginate:** viscous gum; general term for salts of alginic acid, especially sodium but also calcium or barium ions; composed of guluronic and mannuronic acids
- alkaline:** rich in bases, having a pH of more than 7
- alkaloid:** basic organic compound containing nitrogen; toxic
- allele:** particular form of gene
- allelopathic:** having ability to inhibit growth of another organism through secondary metabolite
- allelopathy:** condition in which one organism makes environment chemically unsuitable to another through secondary metabolism
- allopatric:** said of two species which have separate areas of distribution
- alluvium:** deposit of clay, silt, sand, and gravel left by flowing water in river valley or delta, usually as fertile soil
- alpestrine:** subalpine; growing to the tree line
- alpine:** habitat above treeline of mountain
- alternation of generations:** alternating cycle of sporophyte ($2n$) and gametophyte ($1n$) generations
- alveola:** more or less polygonal surface depression
- alveolate:** with depressions on the surface
- amensalism:** interaction in which one species is harmed by other while other is neither harmed nor benefitted
- amidon:** macromolecule composed of glucose constituents; starch; (*L. amyllum* = complex carbohydrate)
- amorphous:** without definite form
- amphigastrium** (pl. **amphigastria**): underleaves of leafy liverworts; few mosses where upper or lower leaves are differentiated from lateral leaves and smaller, as in *Racopilum*
- amphithecium:** outer layer of embryonic capsule that gives rise to capsule tissues
- amyloid:** waxy translucent substance of various complex proteins in combination with polysaccharides and staining blue with iodine (like starch) deposited in tissues in different disease processes and tissue degeneration; builds up inside tissue in amorphous way
- amyloplast:** colorless plastid that forms starch granules in plants
- anacrogynous:** designating a sporophyte growing in lateral position on a stem, branch or thallus (*e.g.*, thallose liverworts like *Pellia endiviifolia*)
- analogous:** said of structures not having a common phylogenetic origin but having a similar function
- anastomosis:** condition of union of one structure with another, usually crisscrossing; interconnecting; may be applied to irregularly divided peristome teeth (*e.g.* endothecium of *Anthelia juratzkana*) or river with islands and meanders
- anophile:** plant living in canyon forests
- ancophilous:** living in canyon forests
- Andreaebryopsida:** class of mosses in **Bryophyta**
- Andreaeopsida:** class of mosses in **Bryophyta**
- androcyte:** cell that will give rise to antherozoid
- androecial branch:** specialized branch bearing antheridia and bracts
- androecium:** male inflorescence; antheridia and surrounding bracts
- androgametophyte:** male gametophyte
- androgynous:** male and female organs in same inflorescence, monoicous
- androgynogametophyte:** autoicous or synoicous gametophyte
- anemochory:** dispersal by wind, such as a spore, gemma, or other propagule
- anhydrobiosis:** strategy of surviving a dehydrated state or extreme temperature conditions, reviviscence
- anisophyllous:** having two types of leaves on same stem; stem leaves and branch leaves morphologically different, as in *Sphagnum* [ant. isophyllous]
- anisosporous:** having bimodal distribution of spore sizes with smaller spores generally producing males
- anisospory:** condition having bimodal distribution in spore size; genetically determined condition of two spore sizes
- annotinous:** with yearly growths
- annual shuttle:** species that requires small disturbances that last 1-2 years; survive severe stress periods
- annual:** plant that germinates, reproduces, and dies all within one year [ant. perennial]
- annular:** ring-shaped
- annulus:** zone of differentiated cells between capsule urn and operculum, facilitating opening of capsule
- anterior:** dorsal, abaxial [ant. posterior]
- anterior whiplash flagellum:** thin whiplike structure on front end of cell (*L. flagellum* = whip)
- antheridiophore:** specialized antheridium-bearing branch
- antheridium** (pl. **antheridia**): male gametangium found in all sexual plants except seed plants; sperm container, multicellular globose to broadly cylindric stalked structure producing sperm
- antherozoid:** spermatozoid, male gamete
- Anthocerotophyta:** phylum of hornworts, characterized by thallose gametophyte with hornlike sporophyte having continued growth at its base
- anthocyanin:** water-soluble blue, purple, or red flavonoid pigment found in cell vacuole of plants, especially flowers and autumn leaves
- anthracine:** coal black
- anthropochorous:** dispersal of propagules associated with human activities
- anthropogenic:** relative to an ecosystem, resulting from action of humans
- antical:** relative to a surface of thallus, upper side [ant. postical]
- antrorse:** forward, upward, toward the tip, *e.g.* antrorse teeth in *Dichodontium pellucidum* [ant. retrorse]
- aperture:** opening, hole, orifice
- aperturate:** with an opening
- apex:** tip; end farthest from point of attachment or from base of organ (*L. apex* = point)
- aphyllous:** without leaves
- apical:** at tip or apex

- apical cell:** single meristematic cell at apex of shoot, thallus, or other organ that divides repeatedly
- apiculate:** with a short and abrupt point
- apiculus:** short point, *e.g.* leaf tip of *Entodon concinnus*
- apogamous:** condition of producing sporophyte without union of gametes
- apogamy:** asexual multiplication, without fusion of gametes [syn. apomixis]
- apomixis:** asexual multiplication, without fusion of gametes [syn. apogamy]
- apophysis:** strongly differentiated sterile neck at base of capsule, *e.g.* *Splachnum rubrum* [syn. hypophysis]
- apoplastic:** outside cell membrane, such as cell walls and dead cells
- aposporous:** producing gametophyte from sporophyte tissue without meiosis
- appressed:** referring to leaves lying closely or flat against stem or plant to substrate [*Frullania dilatata*]
- aquatic:** pertaining to water habitat
- arable land:** land used for or suitable for growing crops
- arachnoid:** covered with fine and tangled hairs, *e.g.* *Marchantia polymorpha* ssp. *montivagans* archegoniophore
- arboreal:** growing on trees
- arbuscule:** finely branched organ produced by endomycorrhizal fungi inside host cells; interface at which fungus and plant exchange phosphorus and photosynthates
- archegoniophore:** specialized archegonia-bearing branch
- archegonium** (pl. **archegonia**): multicellular egg-containing structure that later houses embryo; female gametangium; flask-shaped structure consisting of stalk, venter, and neck present in **Bryophyta** and all tracheophytes except flowers
- archesporium:** layer of cells which give rise to spores
- Arctic:** present in areas around North pole
- area:** region of distribution
- arenicolous:** growing on sand
- areola** (pl. **areolae**): small, angular or polygonal surface area differentiated on thallus and overlying chamber, forming pattern or network, as in *Conocephalum*
- areolate:** divided into chambers
- areolation:** cellular network of leaf or thallus
- argillicolous:** growing on clay soils
- arid:** having little or no rain
- arista:** awn; hair point, *e.g.* leaf tip of *Syntrichia caninervis*
- aristate:** ending in awn, *e.g.* *Syntrichia ruralis* leaves
- arginine:** amino acid with basic group, alkaline in solution
- arthrodontous:** having lateral walls of peristome teeth eroded with uneven thickenings (*arthro* = jointed; *don* = tooth), *e.g.* peristome of *Orthotrichum cupulatum*
- ascending:** pointing obliquely upward, away from substrate
- aseptic:** free of disease-causing microorganisms
- asexual:** referring to reproduction without union of gametes, such as gemmae in *Marchantia*
- asl:** above sea level
- aspect:** compass direction a slope faces
- astomous:** without stomata (capsule); capsule that doesn't open
- atratous:** turning black
- auct.:** Latin abbreviation for "auctor" meaning author
- auricle:** earlike lobe, sometimes at base of moss leaf or liverwort underleaf; in *Blasia* houses the Cyanobacterial partner
- auroxanthin:** diepoxy carotenoid pigment known in *Fontinalis*
- austral:** of the Southern Hemisphere
- author(s):** name(s) of bryologist(s) (sometimes abbreviated) who contributed to taxonomic description and nomenclature of taxon
- autoclave:** oven-like equipment capable of high temperatures for heat sterilization
- autoicous:** having male and female reproductive organs in separate clusters on same plant
- autopolyploidy:** all chromosomes derived from same species, frequently same individual; in bryophytes, having more than 1 set of homologous chromosomes in gametophyte
- auxin:** plant growth-regulating hormone, usually referring to hormone indoleacetic acid (IAA); influences cellular elongation, among other things
- awn:** hair-point, *e.g.* leaf tip of *Cirriphyllum piliferum*
- axenic:** pure culture, without other organisms
- axial strand:** column formed of elongated cells and located in center of some stems or thalli; central strand in mosses
- axil:** angle formed where leaf joins stem
- axillary:** forming in axis between stem and leaf
- axis:** main stem
- bank:** land along side body of water
- ## B
- B horizon:** dark soil layer of accumulated transported silicate, clay, minerals, iron, and organic matter, having blocky structure
- bar:** scientific unit of measurement of pressure; 1 bar \approx 1 atmosphere of pressure (0.986923 atm) \approx 14.503 psi = 750 mm Hg = 99.992 kPa
- barbate:** with tufts of long hairs, beard-like
- bark:** outermost layer of stems and roots of woody plants; surrounding wood of tree or shrub
- basal cells:** group of cells located at base, in proximal part of leaf
- basal membrane:** short cylinder at base of peristome (single peristome) or at base of endostome (double peristome) supporting segments and cilia
- basic:** alkaline, containing a base, having pH higher than 7
- basionym:** original name on which the current taxon name is based
- basiphile:** preferring basic habitats (limestone, sandstone, chalk, dolomite, *etc.*) [ant. acidophile]
- basipetally:** tissue or organs developing or maturing from apex toward base
- bet hedger:** organism that uses combination of two or more strategies, thus never having optimal adaptations to extremes but being prepared to lesser degree for most circumstances; plant that seems to have both good sexual reproduction and means of vegetative reproduction, *e.g.* bryophyte that produces frequent capsules but also produces gemmae, as in *Tetraphis pellucida* and *Marchantia polymorpha*
- bicostate:** with two nerves
- bicuspidate:** with two points, *e.g.* leaves of *Cephalozia lunulifolia*
- bidentate:** with two teeth (different from double teeth)
- biennial:** cycle of two season's duration (generally less than two years)
- bifarious:** on two opposite rows, distichous
- biflagellate:** having two flagella; functions in cell motility

binding site: site for attachment, usually referring to ions; can occur on cell walls, soil particles, glass containers, *etc.*

bioassay: use of living organism for assessing effects of biologically active substances

bilobate: divided into two lobes or segments, *e.g. Lophocolea bidentata*

biomass: quantitative estimate of total mass of organisms or parts being considered

binomial: expression used to designate species; formed of two Latin terms: a generic and a specific term; by convention this binomial is written in italics

biocenosis: association of different organisms living together in habitat

biotope: ensemble of physical, chemical and climatic conditions of habitat; biotope plus biocenosis form ecosystem

bipinnate: twice pinnately branched, *e.g. Thuidium tamariscinum*

bipolar: said of a species found at both polar regions

bisexual: having both sexes on the same individual; monoicous (gametophyte) or monoecious (sporophyte)

bistratose: having two layers of overlapping cells

blade: portion of leaf excluding stalk (*Plagiomnium*)

bloom: powder covering some capsules or leaves, *e.g. leaves of Saelania glaucescens*

bog: acidic, wet area in which nutrients are received by rainfall and groundwater flow is negligible; consists mostly of decaying moss and other plant material

bog moss: usually meaning *Sphagnum*

bole: main trunk of tree

border: land at edge of habitat

border: edge; margin (cells of different shape, size, or color than other cells of structure), *e.g. leaf of Mnium thomsonii*

boreal: pertaining to north; life zone bounded on south by growth-season accumulated temperature above 6.1°C of 5538°C and mean daily temperature of 18°C for six hottest weeks (*L. boreas* = north)

boreal forest: predominantly conifer forest extending across northern North America and parts of Europe and Asia

BOREAS: climate model for boreal region

botryoid: like a bunch of grapes, *e.g. oil bodies of Calypogeia suecica*

bract: modified leaf associated with gametangium or gemmae-cup

bracteole: modified underleaf associated with gametangium in liverworts

branch: lateral subdivision of a stem or a axis

broadleaved tree: tree with expanded leaf blades, not needles or scales

brood body: generalized term for, propagulum, gemma, bulbil, tuber, reduced branch; asexual reproductive structure

brook: stream, rivulet, small river (precise meanings are often local)

brush: undergrowth of small trees and shrubs; cut brushwood

Bryobiotina: subkingdom name to include **Marchantiophyta**, **Anthocerotophyta**, and **Bryophyta**; some people also include Lycopodiophyta

Bryophyta: phylum of mosses (previously defined to include liverworts); have embryos and lack organized, lignified vascular tissue; have alternation of generations with dependent sporophyte

bryophyte: member of phylum **Bryophyta**; also used to refer collectively to mosses, liverworts, and hornworts

bryophyte association: group of bryophytes growing together in same ecological conditions

Bryophytina: old subdivision/subphylum name originally to include mosses, hornworts, and liverworts

Bryopsida: class of **Bryophyta** including majority of mosses, all except **Sphagnopsida**, **Takakiopsida**, **Andreaeopsida**, **Andreaebryopsida**, and **Polytrichopsida**

bud: structure produced by protonema that will give rise to stem or branch

buffer zone: zone between two biogeographical or habitat entities

bulbil: vegetative bud-like propagule, *e.g. axillary bulbils of Pohlia andrewsii*

bulbiform: describes swollen cells found in some grass leaves, such as wheat, that provide mechanical means to roll up or move

bulbil: small, bulb-like axillary vegetative propagule

bulliform: describes enlarged parenchyma cells of grasses that permit leaves to spread or roll; expansion cell

bunch grass: clumped, non-rhizomatous or non-stoloniferous growth form of some grasses

bush: shrub

bushy: growing thickly and resembling a bush

burrow: hole or tunnel dug by an animal



c.: Latin abbreviation "*circa*" meaning "about;" also *ca.*

C horizon: soil layer of weathered parent (rock) material with little structure, comprised of mineral material

C₃ photosynthetic pathway: photosynthetic pathway in which CO₂ is immediately put into photosynthesis, initially forming a 3-carbon compound; pathway of all bryophytes

ca.: Latin abbreviation for "*circa*" meaning "about;" also *c.*

caducous: deciduous

caespitose: growing in cushions or tufts, *e.g. growth habit of Grimmia pulvinata*

caesious: bluish grey

calcareous: mostly or partly composed of calcium carbonate (lime)

calcicole: growing on limy substratum [ant. calcifuge]

calcifuge: growing on acidic (or base-poor) substratum [ant. calcicole]

calciphile: growing on substrates rich in calcium

callose: complex, branched polysaccharide

calmodulin: (CaM) receptor protein for Ca⁺⁺ located within cytoplasm of target cells; appears to mediate effects of this ion on cellular activities

calyptra (pl. **calyptrae**): in bryophytes, haploid envelope covering developing sporophyte; developed from archegonium; covering over moss capsule (Gr. *kalyptra* = covering)

canal (cells): in the neck of an archegonium, central row of cells (the sperm uses this channel to join the egg)

canaliculate: channeled

cancellate: lattice-like

cancellinae: large, empty basal leaf cells, usually hyaline; may serve as water storage cells

canescent: whitish or hoary, *e.g. Racomitrium canescens*

- capillary water:** refers to water held loosely by soil particles and therefore readily available for uptake by roots or rhizoids
- capitulum:** terminal dense cluster of branches in *Sphagnum* in which stem has not yet elongated; head
- capsule:** sporangium of bryophyte; terminal spore-producing part of sporophyte
- carboxyl (-COOH):** chemical group occurring at end of many biological molecules, causing that molecule or that end of molecule to act as acid
- carinate:** keeled, *e.g.* leaves of *Fontinalis antipyretica*
- carneous:** flesh-colored
- carotenoid:** fat-soluble pigment group that includes xanthophyll and carotene; 8-isoprene unit terpene synthesized by most plants (*L. carota* = carrot)
- carrying capacity:** maximum quantity of standing crop that can be maintained indefinitely on area
- castaneous:** chestnut-colored
- catenulate:** chain-like
- cation exchange capacity (CEC):** ability of soils and plants to give up certain positively charged ion in return for different one; usually hydrogen is traded for nutrient or metal
- cation:** positively charged ion
- caulescent:** with caulidium, stem [ant. acaulescent]
- caulidium:** stem
- cauline:** relative to leaf, inserted on stem
- caulis:** stem
- caulonema:** secondary portion of protonema that develops later and gives rise to buds and upright gametophores; has longer cells with slanting cross walls, usually brownish cell walls, and fewer, less evenly distributed, smaller spindle-shaped chloroplasts compared to chloronema (Gr. *caulo* = stem or stalk, *G. nema* = thread)
- caulonema-specific protein:** CSP; proteins involved in ability of caulonema to respond to cytokinin and produce buds
- cave:** large underground chamber, typically of natural origin, in hillside or cliff
- cavernicolous:** preferring caves and cavities
- cavernose:** with cavities
- CD:** conservation dependent (IUCN)
- CEC (cation exchange capacity):** ability of soils and plants to give up certain ion in return for different one; usually hydrogen is traded for nutrient or metal
- cell:** microscopic (usually) element of living tissue; in bryophytes, having nucleus (containing genetic material), cytoplasm, and organelles, surrounded by cell membrane and cell wall
- cellular:** relative to a cell
- cellulose:** polysaccharide of glucose units that constitute main part of cell walls in plants
- central cells:** guide cells
- central stand:** small group of elongate cells forming central axis in some stems and thalli; also called axial strand
- cereus:** waxy, *e.g.* leaves of *Saetania glaucescens*
- cernuous:** drooping
- cf.:** Latin abbreviation "*confer*" meaning "compare with"
- cfr. (c. fr.):** Latin abbreviation "*cum fructibus*" meaning "with sporophytes"
- chalk:** limestone
- channelled:** hollowed, keeled
- character:** criterion; descriptor
- charophytes:** algae in phylum Charophyta; highly advanced group of algae with chlorophylls *a* & *b*, starch storage, and antheridia and archegonia encased in multicellular covering
- chasmocolous:** growing in crevices or cracks
- chelator:** organic compound that binds metal by forming ring structure around it
- chersophilous:** growing on poor and dry habitats
- chionophilous:** growing in habitats with long cover of snow, snow beds
- chledophilous:** growing in disturbed habitats
- chlorenchyma:** parenchyma cells with chlorophyll, *e.g.* photosynthetic cells inside thallus of *Marchantia polymorpha*
- chlorocyst:** chlorophyllose cell (hyalocyst is a non-chlorophyllose cell), *e.g.* photosynthetic leaf cells of *Sphagnum* and *Leucobryum*
- chloronema:** younger part of protonema, with perpendicular crosswalls, short cells, numerous chloroplasts, colorless cell walls, and irregular branching; primary photosynthetic part of protonema (Gr. *chloros* = grass green, *nema* = thread)
- chlorophyll:** green pigment present in some cells (role in photosynthesis)
- chlorophyll a:** chlorophyll found in all green plants, algae, and Cyanobacteria; primary photosynthetic pigment found in plants; absorbs light maximally at 430 and 662 nanometers
- chlorophyll b:** chlorophyll found in all green plants and some algae phyla, but not Cyanobacteria; bluish-green pigment that absorbs light maximally at 453 and 642 nanometers
- chlorophyllose:** having chlorophyll, as in photosynthetic cells of *Sphagnum* leaf
- chloroplast:** organelle (plastid) containing chlorophyll found within cells of plant leaves and stems; organelle where photosynthesis occurs
- chlorosis:** yellowing of plant tissue caused by loss of chlorophyll
- chlorotic:** yellow-looking (Gr. *chloros* = grass green, *osis* = condition)
- chorology:** study of geographical or spatial distribution of species
- chromatography:** type of analysis of the chemical constituents
- chromosome:** dense mass of chromatin containing DNA and bearing genes needed for reproduction; visible during cell division (Gr. *chroma* = color, *soma* = body)
- ciliate:** with cilia, fringed, *e.g.* leaf of *Ptilidium pulcherrimum*
- cilium:** delicate, hair-like structure mostly one cell wide and unbranched
- cineraceous:** ash-colored
- circinate:** curved, very arched, almost in a circle, *e.g.* leaves of *Sanionia uncinata*
- circumboreal:** widespread in the higher latitudes of the Northern Hemisphere
- circumpolar:** present in areas located between 75° and 90° north and south latitude.
- circumtropical:** present in tropical areas around the world.
- cirrate, cirrose:** curled, wavy (appendages)
- clade:** group of taxa having common ancestor
- cladistics:** science of comparison of taxa according to proportion of measurable characteristics they have in common, based on shared derived characteristics that can be traced to a group's most recent common ancestor and are not present in more distant ancestors
- cladocarpous:** describes form of pleurocarpous moss in which sporophytes are borne terminally on short lateral branches

cladoicous: having archegonia and antheridia on different stems of the same clone, *i.e.* with stems adjoined by stolons/rhizomes

class: next major classification level below phylum

clay: heavy, sticky material from the earth that hardens when dry or baked

clear: transparent

clearing: having no forest cover

cleistocarpous: indehiscent; capsule lacking regular mechanism for opening, opening by disruption of tissues of capsule wall

cliff: precipice, bluff, steep rock face

cliff ledge: narrow horizontal surface projecting from cliff

-cline: suffix meaning "preferring to"

cline: degree or nuance of variation

clone: aggregate of individuals produced asexually from single parental individual; created by fragmentation, specialized asexual reproductive units, or apomictic seeds (Gr. *klon* = twig or slip)

cm: abbreviation of centimeter

CO₂ compensation point: point (concentration) at which CO₂ release during respiration balances CO₂ intake during photosynthesis

coastline: boundary between land and ocean or lake

coelocaul: in some leafy liverworts, fleshy organ located at base of young sporophyte (type of perigynium)

-colous: suffix meaning "growing"

cohort: group of individuals with same starting point

collenchymatous: cell walls thickened at angles (named trigones in liverworts), *e.g.* leaf cells of *Mnium marginatum*

colline: small hill or mound

colloid: substance having particles (100-10,000 nm diameter) that remain dispersed in solution, intermediate between true solutions & suspensions

colonist: species that lives where habitat start is unpredictable and habitat lasts at least several years after disturbance; makes habitat suitable for perennial stayers

colony: population

columella (pl. **columellae**): central sterile portion in sporogenous region of capsule in mosses, hornworts, and some fungi

commissural: said of some *Sphagnum* pores, located along margins of hyalocysts

commissure: in *Sphagnum* tissue, margin of hyalocysts, junction between hyalocysts and chlorocysts

common: relative to species - widespread

common garden: where different populations are grown together under same conditions

compensation point, CO₂: point (concentration) at which CO₂ release during respiration balances CO₂ intake during photosynthesis

compensation point, light: irradiance level (PAR) at which CO₂ release during respiration balances CO₂ intake during photosynthesis

compensation point, water: moisture level at which CO₂ release during respiration balances CO₂ intake during photosynthesis

competition: tendency of neighboring plants to utilize same resource – quantum of light, ion of mineral nutrient, molecule of water, or volume of space

complanate: flattened into one plane, *e.g.* leafy branches of *Entodon*

complex thallus: multilayered thallus with differentiated internal structures

complementation: two traits that complement or help each other

compressed: flattened, *e.g.* perianth of *Radula complanata*

compound pore: opening in thallus surrounded by multiple layers of cells

concave: not plane, curved inwards, *e.g.* leaf of *Nyholmella obtusifolia* [ant. convex]

conducting strand: in bryophytes, the leptoids and hydroids that provide a conduit for sugars and water, respectively

concolorous: of same color

conduplicate: folded lengthwise, *e.g.* leaf of *Fontinalis antipyretica*

confluent: merging together, *e.g.* leaves of *Schistostega pennata*

congeneric: said of two taxa belonging to same genus

connate: said of two similar fused structures

conjoint: converging but non-fusing, *e.g.* leaf lobes of *Cephalozia connivens*

conservation designations (IUCN)

CR: Critically Endangered
DD: Data Deficient
EN: Endangered
EX: Extinct
LC: Least Concern
NE: Not Evaluated
NT: Near Threatened
IUCN: International Union for Conservation of Nature
VU: Vulnerable

conspecific: said of taxa belonging to same species

contiguous: relative to two adjacent non-merged parts

contorted: twisted

convex: outward-curved surface, *e.g.* leaves of *Gymnomitrium convolutum*

convoluted: inrolled and forming sheath

coppi: area of woodland in which trees or shrubs are, or formerly were, periodically cut back to ground level to stimulate growth and provide firewood or timber, a practice that encourages suckering

cortex: stem tissue located between central strand and epidermis; in liverworts can refer to outer rind of differentiated stem cells

cortical: relating to cortex cells

corticulous: growing on tree bark

cosmopolitan: present in almost all parts of the world

costa (pl. **costae**): non-vascular midrib of moss leaf, always more than one cell thick; may facilitate water movement but lacks tracheids and vessels

costate: having costa (moss version of midrib)

cotransport: process of bringing the oppositely charged ion along through a membrane; two substances crossing the cell membrane together through a single channel complex

CR: critically endangered (IUCN)

crag: steep or rugged cliff or rock face

crenophilous: dwelling in or near spring

crevasse: deep open crack, especially in glacier

crevice: narrow opening or fissure

crispate: variously curled, twisted, or contorted

crisped: wavy, variously curled or twisted

crista (pl. **cristae**): inner projection or fold on inner membrane of mitochondrion

cross fertilization: transfer of sperm from antheridium of one plant to egg of different plant

- cross-section:** slice through object perpendicular to its long axis
- crosswall:** cell wall that goes perpendicular to long axis of plant organ
- crymocolous:** growing in tundra or polar regions
- cryophile:** preferring cold habitats
- cryptopore:** capsule guard cells hidden by exothecial cells, sunken, *e.g.* in capsule of *Orthotrichum alpestre* [ant. phaneropore]
- cryopreservation:** freezing living material at very low temperatures to be "brought back to life" later (*crypto* = hidden)
- cryptic species:** literally, hidden species; populations that differ physiologically but not morphologically within a species, restricting them to different growing conditions
- cryptobiosis:** state of organism when no sign of life is visible; metabolic activity is immeasurable (*crypto* = hidden; *bios* = life)
- cryptochrome:** light-sensitive yellow pigment capable of sensing photoperiod; flavoprotein that regulates elongation, germination, and photoperiodism in plants (*crypto* = hidden, Gr. *chroma* = color)
- cryptogam:** plant or alga with "hidden" gametes; non-seed plants, algae, and lichens
- cryptogamic crust:** tightly bound mesh of various Cyanobacteria, lichens, bryophytes, and fungi on soil, especially in deserts and dry prairie; function to hold soil and prevent erosion
- CS:** transverse section; cross section
- cushion:** growth form with stems more or less erect, tightly clustered and somewhat radiating at edges, half-sphere shaped
- cuticle:** extracellular fatty or waxy covering that forms from cutin on outermost layer of plant; in bryophytes, mostly fatty
- Cyanobacteria:** photosynthetic group of bacteria
- cyanophycean:** referring to member of **Cyanobacteria**
- cytokinin:** plant hormone (growth regulator) that promotes growth by stimulating cell division
- cytoplasm:** all protoplasm of cell except nucleus
- D**
- DD:** data deficient (IUCN)
- debris:** scattered pieces of waste, remains, or broken rock
- deciduous:** condition in which plant sheds its leaves during certain season [syn. caducous, fugacious]
- decumbent:** prostrate towards base but with ascending tips, *e.g.* habit of *Orthothecium rufescens*
- decurrent:** basal leaf margins extend down stem past leaf insertion as ridges or narrow wings
- dedifferentiation:** process involved in return of cell to its embryonic (undifferentiated) state
- deficiency:** lack of something, such as having insufficient iron or other nutrient
- defoliate:** having lost its leaves
- degree days:** unit of measure calculated as product of time (days) and temperature (°C), usually averaged over growing season or activity season for organism in question; number of degree-days that occur in one day is determined from average temperature for that day minus base temperature, which is minimum temperature above which activity occurs
- dehisce:** to split apart, as in liverwort capsule
- dehiscence:** splitting apart
- dehiscent:** capsule opening regularly by means of annulus and operculum or valves
- delayed fitness:** possessing trait that is not immediately expressed, *e.g.* recessive trait in heterozygous condition
- deliquescent:** liquefying in atmosphere; capable of absorbing atmospheric moisture and liquefying, as in *Sphagnum* pseudopodium
- dendroid:** tree-like; branched above and distinct trunk-like stalk, *e.g.* *Climacium*, *Hypnodendron*, *Hypopterygium*, *Leucolepis*, *Pleuroziopsis*, *Symphogyna hymenophyllum*
- dendrophilous:** preferring tree habitats
- dentate:** with teeth
- denticulate** with small teeth, *e.g.* leaf margins of *Platyhypnidium riparioides*
- denuded:** referring to stem without leaves
- denitrification:** process by which nitrogenous compounds are degraded and nitrogen is returned to gaseous form
- deoperculate:** having lost its operculum
- depauperate:** not well developed
- desiccation tolerant:** able to withstand periods of dry conditions
- desiccation:** process of drying out (L. *desiccare* = to dry up)
- det.:** Latin abbreviation for "*determinavit*" meaning "determined by"
- determinate growth:** growth of limited duration, characteristic of many acrocarpous mosses where production of splash cups or seta and capsule terminates growth of stem
- detoxification:** clearing of poisons (Gr. *toxicon* = poison)
- deuter cell:** guide cell; large cell with thin walls and large lumina present across the stem of many mosses, part of conducting cells of parenchyma, *e.g.* some stem cells in *Tortula atrovirens*
- dextrorse (seta):** referring to seta that is twisted to right, clockwise when looking from seta apex (capsule base) to seta base (sporophyte insertion), *e.g.* seta of *Crossidium squamiferum* or *Antitrichia curtipendula* [ant. sinistrorse]
- diad:** grouping of two, as in two spores that remain stuck together
- diagnosis:** definition of characteristics of a species
- diaphanous:** transparent
- diaphragm:** epiphragm; membrane of capsule stretched across peristome teeth and covering opening, *e.g.* membrane in *Polytrichum*
- diaspore:** agent of dispersal; any structure that becomes detached from parent plant and gives rise to new individual, *e.g.* spore, propagulum, gemma
- diatom:** single-celled or filamentous alga with silica shell made of two overlapping portions called valves
- dichotomous:** branching into two parts; describes forked branching, as in veins of fern and *Ginkgo* leaves or thallus of *Marchantia* (Gr. *dicha* = in two, *temnein* = to cut)
- dichotomous key:** tool that uses pairs of choices for identifying things
- dicranoid:** describing haplolepidous peristome with 16 forked teeth, *e.g.* peristome of *Fissidens*, *Leucobryum*
- didymous:** divided in two, in pairs
- digitate** with finger-like lobes
- dictyosome:** Golgi apparatus; series of organelles consisting of stack of membrane-lined vesicles
- dimorphic:** occurrence of organism in two forms
- dioecious:** having male and female reproductive structures on different plants; applied to sporophytes of tracheophytes

dioicous: having male and female reproductive structures on separate gametophyte individuals; corresponds to dioecious in sporophytes

dipeptide: compound consisting of two amino acid units joined together by single peptide bond, linking amino (-NH₂) group of one with carboxylic acid group (-COOH) of other

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

diplolepidous: describing arthrodontous peristome, double peristome with two distinct rings of teeth, *e.g.* peristome of *Orthotrichum striatum* [ant. haplolepidous]

discoid: rounded and flattened, disc-shaped, *e.g.* gemmae of *Marchantia palacea*

disjunct: separated; of a species, separated from its main geographic distribution

dispersal: spreading out; process of dissemination

distal: located at top, in terminal position, in remote part from base [ant. proximal]

distant: having spaced leaf disposition

distinct: different

distichous: having leaves arranged in two opposite rows on stem, *e.g.* leaf arrangement of *Distichium capillaceum*

ditch: narrow channel dug in ground

disturbance: partial or total destruction of plant biomass arising from herbivores, pathogens, human activity, wind damage, frost, desiccation, erosion, or fire.

diterpene: one of class of hydrocarbons produced by many plants; major component of resin and turpentine produced from resin

divaricate: divergent (about 90° angle)

divergent: gradually spreading in opposite directions

diversity: measure of number of different entities and distribution of individuals in system

DM: dry mass

DNA (deoxyribonucleic acid): molecule that carries genetic information

doline: sink or sinkhole; cylindrical, conical, bowl- or dish-shaped closed depression draining underground in karst areas

domatium (pl. domatia): modified part of plant for sheltering bacteria, insects, mites or fungi, such as *Nostoc* auricles of *Blasia*

dominant generation: generation in which species spends most active time; in bryophytes, gametophyte is dominant

dominant allele: allele that is always expressed, even in presence of different sister allele

dominant: life cycle strategy of species that become major species in ecosystem, like *Sphagnum*; have large spores and long life expectancy

dormant: in state of reduced physiological activity

dorsal: side directed away from axis; in liverworts, upper side of thallus

dorsiventral: having top-bottom orientation

drought hardening: process of increasing resistance drought in plants

duff: partly decayed organic matter on forest floor

dull: lacking luster [ant. shiny]

dune: ridge of sand created by the wind, especially in deserts and beaches

dwarf male: nannandrous male; male plant that is considerably smaller than female and typically grows epiphytically on the female

E

e-: prefix meaning "without"

E horizon: light-colored soil horizon with low organic content due to high degree of water transport

ecostate: ribless; lacking costa (midrib) in leaf, as in many mosses, *e.g.* leaf of *Hedwigia ciliata*

ecosystem: interacting community of organisms and their environment

ectohydric: having water conduction predominantly on outside of plant

edaphic: character relative to soil, *e.g.* pH, humidity

edentate: without teeth

e.g.: abbreviation for "*exempli gratia*" meaning "for example"

egg: non-motile female gamete that is larger than motile sperm

elaiosome: oil body used to attract animal dispersal agent

elater: dead, elongate cells with coiled thickenings in liverworts; sensitive to humidity; unequal wall thickenings cause twisting during drying; help disperse spores

elaterophore: in liverworts, sterile tissue bearing elaters

elimbate: lacking border/margin

elongation: lengthening

emarginate: notched at the apex, *e.g.* leaf of *Marsupella emarginata*

embryo (pl. embryos): multicellular developing organism in archegonium or seed; characteristic of plant kingdom

embryogenesis: formation of embryo

embryophyte: plant having zygote that divides to form embryo retained in archegonium or seed

emergent: projecting out of something, as aquatic plant out of water or capsule out of perichaetial leaves

EN: endangered (IUCN)

endemic: growing in a well-defined geographical area, generally small

endodermis: layer of tissue one cell thick between vascular cylinder of root and cortex; serves as filter that forces substances to go through cells, hence through cell membranes, before going to the xylem

endogenous: produced within the organism [ant. exogenous]

endohydric: having water conduction predominantly on inside of plant [ant. ectohydric]

endoplasmic reticulum: complex system of membranous stacks involved in membrane production in cell

endopolyloid: condition in which cells have developed multiple sets of chromosomes

endosporic germination: early development of several mitotic divisions within spore wall

endosporic: early development of several mitotic divisions within spore wall

endostome: in arthrodontous mosses, inner peristome, *e.g.* inner peristome of capsule of *Sanionia uncinata*

endothecium: inner part of the embryonic capsule

enervate: without nerve; lacking costa

entire: without teeth on margins, smooth, *e.g.* leaf margin of *Marsupella sphacelata*

- ephemeral:** short-lived, such as desert plants that germinate from seed and bloom within few weeks; plants having more than one generation per year
- epidermis:** layer of superficial cells; in bryophytes, outer layer of stem or thallus
- epigaeous:** growing on or close to ground [ant. hypogaeous]
- epigonium:** protective envelope of embryo before separation into two parts (basal part – vaginula, upper part - calyptra)
- epilithic:** growing on rock [syn. saxicolous, petrocolous]
- epinasty:** leaf and stem curling
- epiphragm:** circular membrane positioned horizontally over capsule mouth of some mosses, *e.g.* uniting capsule teeth of *Polytrichum* [syn. diaphragm]
- epiphyll:** plant that grows on leaf of another plant
- epiphyllous:** growing on leaves of other plants [syn. foliicolous]
- epiphyte:** plant or alga that grows upon another plant without deriving nutrients from it
- epiphytic:** growing on another plant but not a parasite
- epitype:** specimen designated as model (holotype, lectotype, or neotype) in event of ambiguity of type
- equidistant:** at equal distance
- equilateral:** with equal sides
- erect:** almost vertical
- erect-spreading:** forming angle about 45° with stem
- erect-squarrose:** forming angle less than 45° with stem, *e.g.* erect-squarrose leaves of *Meesia triquetra*
- erose:** scraped, notched, corroded, gnawed
- eremophilous:** growing in deserts and steppes
- et al.:** abbreviation for Latin for "*et alii*" or "*et aliae*" meaning "and others"
- ethylene:** C₂H₄; gaseous plant hormone (growth regulator) that modifies growth form, responds to wounding, and other physiological responses; responsible for suppression of growth in liverwort underleaves
- etiolation:** abnormal elongation of stems in response to insufficient light
- etum:** suffix indicating "association"
- eutrophic:** relative to habitat rich with mineral nutrients [ant. oligotrophic]
- evergreen:** persistent; green year-round
- evanescent:** relative to rib which ends just before apex of leaf, fading, disappearing
- evacuolate:** lacking vacuoles
- evapotranspiration:** loss of water through evaporation from among plants and from plants themselves (transpiration)
- evergreen:** condition where plant remains green and retains its leaves for full year or longer
- evolution:** series of genetic changes (changes that are heritable) that causes organisms to change through time (L. *evolutio* = unrolling)
- EX:** extinct (IUCN)
- ex:** in case of validation after formation of name, *e.g.* *Straminergon stramineum* (Dicks. ex Brid.) Hedenäs
- ex-:** prefix meaning "sans," "non"
- excavate:** hollowed, concave
- exchange site:** location on plant cell wall or soil particle where ions are traded, such as replacement of hydrogen from -COOH by Ca⁺²; when charge of new ion is greater than that of one it replaces, it is shared by more than one exchange site
- exchanger:** organism capable of replacing one ion for another, usually replacing hydrogen with cation such as Ca⁺²
- excurrent:** relative to rib, beyond apex of leaf, *e.g.* leaf costa of *Fissidens taxifolius*
- exine:** outer layer of spore
- exogenous:** growing or originating from outside organism, *e.g.* fungus can be source of IAA for protonema
- exogenous:** generated by outside source
- exohydric:** having water transport essentially external by surface flow; including capillary flow between leaves or through surface papillae
- exosporic:** condition in which first mitotic division occurs outside spore after rupture of spore wall, typical of most bryophytes
- exostome:** outer peristome of arthrodontous capsule, *e.g.* outer peristome of *Orthotrichum striatum*
- exothecial:** relative to exothecium
- exothecium:** relative to a capsule, outermost layer
- exotic:** foreign; introduced from foreign country (L. *exoticus* = foreign)
- explant:** portion of plant transplanted to artificial medium
- explerent:** non-competitive species that fills spaces between others
- exserted:** relative to a capsule, that far exceeds the perichaetial leaves, *e.g.* capsules of *Orthotrichum anomalum*
- exsiccatum, pl. exsiccata:** distributed and labelled reference specimen
- extant:** existing today [ant. extinct]
- extensin:** glycoprotein thought to be involved in cell wall extension
- extern:** relative to surface of leaf, dorsal face, abaxial face
- extinct:** no longer present on Earth [ant. extant]
- extinction rate:** rate of disappearance of species
- extrorse:** turned outwards

F

♀: sign meaning female, in bryophytes bearing archegonia

face: side

facies: general appearance (habit of species), or appearance of plant community dominated by a taxon or small number of taxa

facultative: not occurring regularly; occurring optionally in response to circumstances rather than by nature

facultative aquatic: having some degree of tolerance to desiccation and xerophytic conditions

falcate: sickle-shaped

falcate-secund: sickle-shaped and turned towards only one side of stem

falcation: condition of being curved like a sickle, *e.g.* leaves of many *Dicranum* species

fallow land: plowed and harrowed but left unsown for a period

false anisospory: condition of having small, non-viable spores found among dimorphic spores in certain species of bryophytes due to factors such as spore abortion; non-genetic condition of more than one spore size

family: subdivision of an order – next major classification level; ending in "aceae"

fan: on vertical substrate, usually where there is lots of rain; creeping, with branches in one plane and leaves usually flat; *e.g.* **Neckeraceae**, **Pterobryaceae**, **Thamnobryum**, some **Plagiochila**

farinaceous: farinose, covered with a white bloom

fascicle: small tuft or cluster of fibers, leaves, branches, or flowers; in *Sphagnum*, clump of branches on stem

fasciculate: arranged in fascicles

fastigate: with branches erect, nearly parallel and nearly same length

fault: break in rocks that make up Earth's crust, rocks on each side have moved past each other

fecundity: number of offspring produced by organism during its lifetime

fecundity-advantage model: need of species needs to produce large number of eggs

female: organism that produces egg

fen: minerotrophic peatland or moss-dominated ecosystem that gets its nutrients primarily from ground water or surface water

fenestrate: pierced, perforated with openings like windows, e.g. peristome of *Grimmia crinitoleucophaea*

ferruginous, ferruginous: rust colored

fertile: producing sex organs (antheridia, archegonia), bearing sporophytes [ant. sterile]

fertilization: fusion of gametes resulting in formation of zygote; act of adding nutrients by applying fertilizer to improve plant growth

fibrilla (pl. fibrillae): thickened bands across hyaline cells of *Sphagnum*, strengthen cell walls

fibrillose: with fibrils, e.g. leaf hyaline cells of *Sphagnum*

field: area of open land, especially one planted with crops or pasture

fire place: construction in which to build a fire

flank: in some thallose liverworts, zone between median groove and margin of thallus, e.g. thallus of *Riccia*

fleshy: soft and thick

floristic list: list of species present on site

flagellate: possessing flagellum

flagelliform: whiplike, gradually tapering from base to tip of branch

flagellum (pl. flagella): slender, whip-like appendage that enables cells to move through liquids; differs from cilia in having only one or two per cell; found on most sperm

flavonoid: group of plant pigments that absorb UV light and include anthocyanins

fluorescence: emission of light of longer wavelength due to absorbance of light from outside source; due to excited electrons returning to ground state

Fm: maximum fluorescence of dark adapted material

fo.: abbreviation meaning "forma"

foliicolous: growing on leaves [syn. epiphyllous]

foliose: leaf-like, leafy

foot: basal portion of most bryophyte sporophytes, embedded in gametophyte

footpath: narrow path suitable for walking

forest: wooded habitat

forest gap: opening in forest canopy, often due to a fallen tree

forest track: something resembling a large wooded area, especially in density

fount: spring or fountain

fountain: natural spring of water

fovea: spore ornamentation, depression like a golf-ball

foveolate: pitted

fragmentation: breaking into fragments (pieces)

fresh: fresh state; in the presence of sufficient moisture

freshwater: not salt water

frieze: as an endive salad, e.g. thallus of *Anthoceros agrestis*

fringe: margin lined with cilia

frondose: habit that is densely branched, fern-like

fructification: analogy to vascular plants, synonymous term with sporophyte, considered by some authors as unsuitable

fruit inappropriate term by some authors, meaning sporophyte

fugacious: fleeting

fugitive: species that lives in unpredictable environment

fulvous: reddish yellow

fungus (pl. fungi): kingdom and common name for group of non-photosynthetic organisms; sometimes placed in kingdom Mycota; formerly classified as plants, but food reserves, cell wall components, and other biochemical differences have caused biologists to re-classify them into their own kingdom

funiform: like rope

furfuraceous: covered with scales

furrow: groove, e.g. in thallus of *Riccia sorocarpa*

furrowed: sulcate, grooved

fuscous: dark brown and somber color

fusiform: elongated, spindle-shaped

Fv: variable fluorescence of dark-adapted material

Fv/Fm: measure of chlorophyll fluorescence; <80% is considered a stress response

G

GA: gibberellic acid

GA3: gibberellin A₃; identical to gibberellic acid

galacturonic acid: organic acid that occurs in cell walls and has carboxyl group (-COOH) that provides cation exchange site; common in *Sphagnum* (peat moss), but less abundant in seed plants

galeate: helmet-shaped, e.g. lobe on ventral side of leaf of *Frullania tamarsci*

gametangiophore: specialized branch bearing gametangia (archegoniophore or antheridiophore)

gametangium (pl. gametangia): gamete-producing structure; e.g. archegonia, antheridia

gamete: sexual reproductive structure that has one set of chromosomes and must unite with another of same species but opposite strain to continue life cycle

gametogenesis: development of gametes

gametophore: gametangium-bearing stalk; used to refer to upright gametophyte plant produced from protonema

gametophyte: haploid (*1n*) generation that reproduces by gametes in plants; in bryophytes, dominant generation; generation that begins with meiospore and ends when it produces gametes that join; contains no lignified vascular tissue

gametophyte generation: haploid (*1n*) generation that reproduces by gametes in plants; in bryophytes dominant generation

gelatinose, gelatinous: jelly consistency

gemma (pl. gemmae): asexual reproductive structure; uni- or multicellular, filamentous, globose, or discoid brood bodies, serving in vegetative reproduction; occurs in some liverworts, mosses, and club mosses

- gemmae cup:** cup-like structure producing gemmae; found in *Marchantia*
- gemmate:** bud-like
- gemmiferous:** gemmiparous, bearing gemmae
- gemminate:** describing plants with short, bud-like branches
- genera:** plural of genus
- generation:** term applied to sporophyte ($2n$) and gametophyte ($1n$) phases of plant life cycle
- genet:** branching of gametophyte resulting from clonal growth of rhizome; free-living individual that develops from one original zygote, parthenogenetic gamete, or spore and that produces ramets vegetatively during growth
- genetic drift:** occurrence of random changes in gene frequencies, generally resulting in small, isolated populations and not due to mutation, migration, or selection
- geniculate:** bent like a knee, *e.g.* bent seta of *Tetraphis geniculata*
- genus:** subdivision of a family
- gibbosity:** bump, bulge
- genus (pl. genera):** taxonomic category for group of closely related species; category below family
- germination:** sprouting of seed or production of new growth stage from spore
- gibberellic acid:** carboxylic acid hormone; gibberellin A_3
- gibberellin:** carboxylic acid plant hormone (growth regulator) affecting stem elongation and seed germination; produced by plants and commonly secreted by fungi
- gibbous:** bulging on one side, *e.g.* capsule of *Diphyscium foliosum*
- glabrescent:** almost hairless
- glabrous:** smooth, without ornamentations, without papillae
- glacier:** slow-moving mass of ice formed by accumulation and compaction of snow on mountains or near poles
- glandular:** with one or more glands
- glaucous:** almost glaucous
- glaucous:** whitish, grayish, or bluish overcast, hue or color, like a plum
- globose:** spherical
- glossy:** shiny color
- glycine:** water-soluble amino acid
- glycoside:** plant ester containing sugar (glycol) and non-sugar (aglycone) component attached via oxygen or nitrogen bond and whose hydrolysis yields one or more sugars and non-sugar substance
- glyoxylate cycle:** pathway in which acetate and fatty acids can be used as sole carbon source, bypassing the CO_2 -evolving step of Krebs's cycle (citric acid cycle)
- glyoxysome:** organelle in plant or microorganism cell, containing catalase, where acetate and fatty acids can be used as sole carbon source (glyoxylate cycle); cycle bypasses CO_2 -evolving step of Krebs's cycle (citric acid cycle)
- gorge:** narrow valley between hills or mountains, typically with steep rocky walls and a stream running through it; canyon
- granulose:** minutely roughened
- granum (pl. grana):** stack of thylakoids within the chloroplast where light reactions of photosynthesis take place
- gravestone:** stone marker for grave
- gravitropism:** bending (directional growth) of plant or plant part in response to gravitational pull (*L. grave* = heavy, *trope* = turning)
- greenhouse:** glasshouse; structure with glass roof providing conditions suitable for growing plants
- gregarious:** growing together but not densely, *e.g.* tufts, mats
- grove:** small wood, orchard, or group of trees
- growth form:** structural architecture of individual plant
- guards cells:** specialized cell bordering stoma on capsule, *e.g.* on base of *Polytrichum* capsule
- guide cell:** large, conducting parenchyma cell with thin walls and large lumina present across stem of many mosses, *e.g.* stems of *Barbula bolleana*
- guttulate:** having cell lumen rounded like drops of oil
- gymnostomous:** referring to capsule without peristome, *e.g.* capsule of *Grimmia anodon*
- gynoeceum:** female inflorescence, female gametoeceum (archegonia, paraphyses, and surrounding bracts)
- gypsum:** soft white or gray mineral consisting of hydrated calcium sulfate
- gyrate:** circinate, spiral-like
- H**
- habit:** general appearance, aspect
- habitat:** physical aspect of place where organism naturally lives (as opposed to niche, which includes functional aspect as well)
- hair point:** awn or extension of tip of leaf into a hair
- halophilic:** salt-loving
- halophytic:** salt-tolerant
- hammock:** elevated tract of land rising above general level of marshy region
- hanging branch:** pendent branches, *e.g.* on stem of *Sphagnum*
- haploid:** cell, structure, or organism having single set of chromosomes; $1n$; *e.g.*, normal chromosome level of gametophyte generation
- haplolepidous, haploleptideous:** having simple peristome with only one row of teeth, *e.g.* **Dicranales** [ant. diplolepidous]
- hardening:** process of increasing resistance (to desiccation, cold, *etc.*) in plants
- haustorium:** cells at base of sporophyte foot; functions in absorption of nutrients from gametophyte to sporophyte
- heath, heathland:** area of open uncultivated land characterized by heather (*Calluna vulgaris*), heath (*Erica* species) and gorse (*Ulex* species)
- heather moor:** upland areas in temperate grasslands, savannas, and shrublands and montane grasslands and shrubland biomes, characterized by low-growing vegetation, including *Calluna vulgaris*, on acidic soils
- hedge:** fence or boundary formed by closely growing bushes or shrubs
- heliophilous:** growing in full sunlight habitat [syn. photophilous]
- hemicellulose:** long-chain polysaccharides; H-bonded to cellulose in plant cell walls; more soluble than cellulose
- hepatic:** plant belonging to phylum **Marchantiophyta**; liverwort
- Hepatophyta: Marchantiophyta:** alternate phylum name for liverworts that does not follow the type-based system
- herbaceous:** refers to above ground plants or plant parts that are not woody and do not persist (*L. herbaceous* = grassy)
- herbarium:** collection of dried and usually pressed plant specimens (bryophytes and lichens are usually not pressed) (*L. herba* = grass)
- heterocysts:** relatively large, thick-walled nitrogen-fixing cell produced within filaments of certain Cyanobacteria

- heterogeneous:** composed of dissimilar parts, *e.g.* leaf cells of *Mnium marginatum* [ant. homogeneous]
- heteroicous:** polyoicous, with several types of gametangia on same plant
- heterolepidous, heterolepideous:** simple or double (one or two pairs of teeth) peristome; form of arthroodontous peristome
- heteromallous:** pointing in all directions [ant. homomallous]
- heteromorphous:** dimorphic, having different shapes
- heterophyllous:** having different leaves (size, shape) on same axis, *e.g.* leaves of *Porella obtusata* [ant. isophyllous]
- heterosporous:** forming more than one kind of spore; having megaspores and microspores, as in *Selaginella*
- heterosporous:** bearing two kinds of spores, generally large female and small male spores, genetically determined
- heterothallic:** having male and female reproductive structures on separate thalli
- heterozygous:** individual containing two different allelic forms of same gene
- hillock:** mound, small hill
- Hill reaction:** light-driven splitting of water in Photosystem II of photosynthesis, releasing oxygen
- Holarctic:** species present in terrestrial areas north of Tropic of Cancer; Nearctic and Palaearctic regions combined
- hollow:** having hole or empty space inside, *e.g.* tree hole
- holotype:** single specimen used for typification of species
- holomorphy:** literally, whole form; entire aspect of organism as it appears in environment, resulting from their adaptations to their environments; *Gestalt*
- homogeneous:** composed of similar parts, *e.g.* leaf cells of *Mnium stellare* [ant. heterogeneous]
- homoiochlorous:** maintaining constant chlorophyll concentration, as in *Syntrichia ruralis* during desiccation
- homoiohydric:** state of hydration controlled by internal mechanisms in plant
- homologous recombination:** process in which cut pieces of DNA search for other homologous pieces and form an exchange with them
- homologous:** having alleles for the same kinds of traits; chromosomes that are capable of pairing
- homomallous:** pointing in same direction, *e.g.* leaves of *Kiaeria starkei* [ant. heteromallous]
- homosporous:** having only one kind of spore, *i.e.* spores for two sexes, if differentiated physiologically, do not appear different (Gr. *homo* + same, *spora* = seed)
- homozygous diploid:** organism ($2n$) having both alleles for same trait
- homozygous:** state of having two identical alleles of particular gene (*e.g.* AA, aa)
- hormogonium (pl. hormogonia):** short piece of Cyanobacterial filament that becomes detached and glides away, becoming an independent filament
- hormone:** organic compound active in very small amounts and normally produced in one part of plant and transported to another where its concentration exercises control in some phase of growth or development process (Gr. *hormaein* = to excite)
- hornwort:** common name for phylum of thallose plants (*Anthocerotophyta*) with photosynthetic, hornlike capsule
- host:** plant or animal that provides support for another organism; usually used for those supporting parasites or commensals, but also used for living substrate
- humicole:** plant growing on humus
- HPLC:** high-performance liquid chromatography
- hummock:** small, rounded or cone-shaped, low hill or surface of other small, irregular shapes; raised hump as found in bogs and fens
- humus:** organic component of soil
- hyaline:** colorless or transparent; used with reference to dead cells, such as water-holding cells of *Sphagnum*
- hyalocyst:** large, empty water storage cell in leaves of *Sphagnum*, *Leucobryum*, and in many endohyalocysts; hyaline cell
- hyaloderm, hyalodermis:** cortex composed of large, hyaline cells, *e.g.* stem of *Sphagnum subsecundum*, *Hamatocaulis vernicosus*
- hybrid:** offspring of two plants of different species or varieties
- hydration:** adsorption of water on or by hydrophilic (water-loving or water-attracting) surfaces (Gr. *hydro* = water)
- hydric:** wet, referring to habitat
- hydrochory:** mode of dispersal by water
- hydroid:** water-conducting cell of bryophyte; tracheid-like conductive cell in central strand
- hydrome:** collective term for hydroids in moss stem, often forming central strand
- hydrophilic:** water-loving, typically attracting moisture, as is done by the outer surface of peristome teeth
- hydroxyproline:** crystalline amino acid obtained from hydrolysis of gelatin or collagen; abundant in major glycoprotein of plant primary cell wall
- hygrophile:** growing in wet habitats, not in water
- hydrophilous:** growing on wet, submerged or aquatic habitats
- hydrophobic:** which doesn't absorb water, resisting wetting
- hydrophyte:** plant, always immersed or partly submerged
- hygrophytic:** of wet habitats, but not in water
- hygroscopic:** moving in response to moisture changes; absorbing water rapidly, as in moss leaves or elaters
- hypnaceous:** referring to complete peristome
- hypocotyl:** shoot of germinating seedling, located below cotyledons
- hypodermal:** one or more layers of differentiated cells beneath epidermis of stem
- hypogaeous:** growing below surface of soil [ant. epigaeous]
- hypophysis:** enlarged neck between seta and urn of capsule; **apophysis**

I

- IAA (indole-3-acetic acid):** $C_{10}H_9NO_2$; naturally occurring auxin that induces cell division and elongation and many developmental processes; synthesized from tryptophan; often works in consort with ethylene and other hormones
- idioblast:** specialized cell, ocellus, oil-cell
- i.e.:* abbreviation for Latin *id est*; "that is"
- imbibition:** uptake of water due to water adsorption by colloidal particles such as cellulose, cytoplasmic proteins, or pectin
- imbricate:** closely appressed and overlapping
- immediate fitness:** few haploid individuals possessing particular trait are able to exploit new situation
- immersed:** referring to moss or leafy liverwort capsule, referring to capsule exceeded by perichaetial leaves, *e.g.* sporophyte of *Hedwigia stellata*, or in thallose liverworts, included in thallus, *e.g.* sporophyte in *Riccia subbifurca*; referring to capsule stomata, beneath surface, cryptopore

immobile: unable to be translocated (moved) through plant or soil

included: enclosed

incrassate: thick-walled, *e.g.* cells of leaf of *Pterogonium gracile*

incubous: lying upon; oblique leaf insertion in which distal leaf margins are oriented toward dorsal stem surface; think of the liverwort growing **up** a tiled roof – if the leaves overlap the wrong way then the water would get in > insecure > incubous, but if leaves overlap the right way water is shed > secure > succubous (from Paul Richards); alternatively, arrangement of roof tiles from **top to bottom** is incubous, *e.g.* leaf arrangement of *Calypogeia fissa* and *Lepidozia reptans* [ant. succubous]

incurved: curved upwards and inwards

indehiscent: referring to capsule without distinct opening

indicator: that which indicates condition or presence of something else; chlorotic or unhealthy bryophytes can serve as indicators of air pollution

indigenous: born, growing, or produced naturally in country or region; native [ant. adventive, introduced]

indoleacetic acid (IAA): naturally occurring auxin that controls cell division and many developmental processes; often works in consort with ethylene and other hormones

inflexed: bending slightly upward and inward, *e.g.* leaf lamina of *Pottiopsis caespitosa*

inflorescence: reproductive organ group; gametoecium

inflorescence: structure composed of gametangia and (perichaetial and/or perigonal) leaves; term sometimes considered inappropriate, some authors retain it

infrageneric: within a genus

infraspecific: within a species

initial cell: specialized cell that divides repeatedly and will produce leaves or other tissues

inner: referring to a leaf face (side); ventral face = upper face = adaxial face

inner peristome: endostome

inner peristomial layer: IPL

innovation: new shoot; in acrocarpous mosses, new branch

inoperculate: lacking operculum or lid on capsule

inrolled: rolled inward

insertion: line of attachment

interwoven: mixed

intercalary: situated at bases of leaves or branches but not apical

intercellular: between cells

internode: distance between leaf or branch insertions

intine: innermost of two major layers of spore, lying under exine bordering surface of cytoplasm

intramarginal: referring to cells near margin, internal position relative to outermost row, *e.g.* in leaf of *Mnium thomsonii*

intricate: tangled

introrse: turned inward or toward

involutural bract(s): modified leaves surrounding the perianth, *e.g.* perianth of *Solenostoma hyalinum*

involute: protective sheath of tissue of thallus origin surrounding single antheridium, archegonium, or sporophyte, *e.g.* *Pellia*

ion: charged particle

-ion: suffix indicating "alliance"

IPL: abbreviation meaning "inner peristomial layer"

isocitratase: enzyme of glyoxylate cycle

isodiametric: about as long as wide

isophyllous: stem leaves and branch leaves that are similar [ant. anisophyllous]

isospory: condition of having spores with unimodal distribution or similar size.

isotherm: line connecting points of equal temperature

isotype: duplicate specimen of type specimen (holotype)

involute: rolled inward, upward, toward adaxial face

IUCN: International Union for Conservation of Nature

J

julaceous: like a catkin; referring to leaves that form cylinder, *e.g.* branches of *Pterignandrum filiforme majus*

Jungermanniidae: subclass of mostly leafy liverworts in Jungermanniopsida

Jungermanniopsida: class including leafy liverworts and Metzgeriidae

K

K selection: characterized by slow growth rate, late reproduction, few, large offspring, and efficient use of resources; K strategist optimizes for high population density at environment's **carrying capacity**

keel: sharp ridge, as on the bow of a boat; seen in some moss leaves such as *Fontinalis antipyretica*

kinetin: N₆-furfuryladenine; synthetic cytokinin that acts as growth hormone, promotes cell division, and prevents senescence in plants; degradation product of DNA

kingdom: grouping of all divisions or phyla; plants belong to kingdom **Phyta**, also known as **Plantae**

KOH" potassium hydroxide, commonly known as potash

Kreb's cycle: citric acid cycle; tricarboxylic acid cycle; cycle that provides electrons for electron transport system where ATP is produced from ADP and inorganic cycle, thus being important in providing cellular energy

K-strategist: species that optimizes for high population density at environment's carrying capacity.

L

lacerate: having torn margins, *e.g.* leaves of *Sphagnum riparium*

laciniate: deeply divided into thin straps

lacuna: empty space, hole

lacunose: referring to spongy thallus with holes, *e.g.* thallus of *Sauteria alpina*

lagoon: small lake near larger one; shallow body of salt water close to sea but separated from it by narrow strip of land

LAI: leaf area index; percentage of ground area covered by leaves, hence **(total leaf area) / (area of ground)**


lake: large body of water surrounded by land

lamella (pl. lamellae): cellular membrane such as that of chloroplast or that separating cell walls from one another; in bryophytes, stack of cells forming flaplike plates (parallel photosynthetic ridges) of tissue on leaf or dorsal surface of thallus; in mushrooms, gills

lamina: cells of blade portion of leaf, exclusive of costa and border

lawn: area of short, mown grass in yard, garden, or park; in bog, relatively flat area of peat mosses

LC: Least Concern (IUCN)

- leach:** removal of ions through movement of water, as in the leaching of nutrients from the soil or of removal from cells by rainwater when membranes are damaged
- leachate:** solution formed when water percolates through permeable medium such as soil; may be derived from particles washed from canopy leaves
- leaf hair:** threadlike projection on leaf
- leaf trace:** branch of vascular tissue or hydroids in stem, extending to leaf
- leaf:** photosynthetic organ of plant; in bryophytes, phyllid; in tracheophytes, vascular structure with xylem on top and phloem on bottom – usually has palisade and spongy mesophyll
- lectotype:** specimen designated as nomenclatural type among several original specimens of taxon
- leg.:** abbreviation for *legit* meaning "one who has collected it"
- lenticular:** lens-shaped
- leptoid:** cell in outer layer of conducting cells of bryophyte, used primarily for assimilates; similar to sieve cell
- leptome:** (=leptom); phloem-like tissue consisting of leptoids and parenchymatous cells; collective term for leptoids in bryophytes
- leucocyst:** in *Sphagnum*, large, empty, hyaline cell [syn. hyalocyst]
- lichen:** symbiotic (mutualistic) organism composed of a fungus and a photosynthetic partner (algae or Cyanobacteria); classified as fungus
- lid:** operculum; top part of capsule of mosses that comes off for spore dispersal
- life cycle:** complete repeating sequence of reproductive events in life of plant necessary for continuation of species; series of stages needed for its complete development
- life form:** overall organization of growth form, branching pattern, and general assemblage of individuals or population as modified by environment; morphological characters
- life strategy:** life cycle characteristics and timing
- light compensation point:** irradiance level (PAR) at which CO₂ release during respiration balances CO₂ intake during photosynthesis
- light intensity:** unit of total energy or illumination, such as lux, foot candle, cal/cm²/min, μEinstein m⁻²s⁻¹
- light-saturated:** having obtained that intensity of light, or greater, at which photosynthesis is maximum
- lignicolous:** growing on lignin, on wood
- lignified:** reinforced with lignin
- lignin:** complex polymer of phenolic substances impregnating cellulose framework of certain plant cells; provides strength and rigidity to secondary plant cell walls
- ligulate:** strap-shaped
- limb:** upper part of leaf when leaf base is differentiated, *e.g.* leaf lamina of *Cyrtomium hymenophylloides*
- limbium:** in *Fissidens*, differentiated margin, often multistratose, *e.g.* leaf margin of *Fissidens crassipes*
- limestone:** hard, sedimentary rock, composed mainly of calcium carbonate
- limicolous:** growing in mud
- limnophilous:** growing standing water, fresh water, marshes, ponds
- limiting factor:** that aspect in environment that would increase plant productivity if more of it were added
- lithophytic:** growing on stony or rocky ground
- liverwort:** common name of **Marchantiophyta** (=Hepatophyta); group of bryophytes with dorsiventrally oriented leafy or thalloid plant bodies
- loam:** rich, friable soil containing mostly sand (particle size > 63 μm), silt (particle size > 2 μm), and smaller amount of clay (particle size < 2 μm) in proportion of 40%-40%-20%, respectively
- lobate:** divided; having lobes
- lobe:** division of leaf, thallus, or organ, *e.g.* thallus of *Marsupella sphacelata*
- lobule:** small lobe; *e.g.* smaller segment of unequally divided leaf in leafy liverworts, *e.g.* on leaf of *Frullania*
- locality:** geographic position, location
- loess:** sediment formed by accumulation of wind-blown silt, typically in 20-50 μm size range, with twenty percent or less clay and the balance equal parts sand and silt loosely cemented by calcium carbonate; unstratified usually buff to yellowish brown loamy deposit found in North America, Europe, and Asia
- log:** fallen tree trunk/bole
- Logistic population model:** mathematical model of population growth: $dN_1/dt = r_1N_1[1 - (N_1 + \alpha_{1,2}N_2)/K_1]$ and $dN_2/dt = r_2N_2[1 - (N_2 + \alpha_{2,1}N_1)/K_2]$, where K_1 and K_2 are carrying capacities of respective N population sizes of species 1 and 2; r_1 and r_2 are respective intrinsic growth rates; $\alpha_{1,2}$ is competition coefficient of effect of species 2 on species 1 and $\alpha_{2,1}$ is competition coefficient of effect of species 1 on species 2
- longevity:** long lifetime of species; life expectancy
- LSA:** whole-plant leaf surface area
- LT₅₀:** temperature at which 50% of cells die
- lucifugous:** avoiding light, growing in dark caves
- lumen:** central cavity of vesicles, ducts, chambers, cells, etc.
- lunularic acid:** plant hormone similar to abscisic acid; found in liverworts, causing growth inhibition and dormancy
- lurid:** having brown color tinged with red, as in flame seen through smoke
- lustrous:** shiny
- lutein:** orange-red carotenoid pigment with absorption at 470-500 nm (blue light); known to reduce the risk of macular degeneration and prevent damage from glare and bright light in humans
- luteus:** saffron yellow
- luticolous:** growing in mud or muddy places
- lux:** intensity of light from one candle on surface 1 meter square and 1 meter from source
- 
- ♂: symbol meaning "male"
- macro-:** prefix meaning "large"
- macronema:** large, branched rhizoid produced around branch primordia and base of buds [ant. micronema]
- macronutrient:** one of the nutrients needed in relatively large quantities, including C, H, O, P, K, N, S, Mg, Ca, and sometimes Fe
- male:** organism that produces sperm
- mamilla:** nipple-shaped protuberance; strongly bulging cell surface, *e.g.* leaf cells of *Cheilothela chloropus*
- mammillose:** having strongly bulging cell surface
- mannose:** hexose monosaccharide (6-carbon sugar) with structure very similar to glucose

- manure:** organic matter, mostly derived from animal feces
- marcescent:** withering without falling off
- Marchantiophyta:** = Hepatophyta, formerly Class Hepaticae; phylum of plants lacking lignified vascular tissue and having-dorsiventral organization, name based on type system
- Marchantiopsida:** class of thallose liverworts that is dichotomously forked and many cells thick
- margin:** edge of structure or area (often differentiated cells), *e.g.* leaf margin
- marginal:** located in margin
- marl:** calcium carbonate or lime-rich mud or mudstone which contains variable amounts of clays and silt; common in rich fens
- marsh:** area of low-lying land that is flooded in wet seasons; wetland that is dominated by herbaceous rather than woody plant species; can often be found at the edges of lakes and streams, where they form a transition between the aquatic and terrestrial ecosystems
- marshland:** land consisting of marshes; common usage - region, area, or district characterized by marshes, swamps, bogs, *etc.*
- marsupium:** in some leafy liverworts, fleshy pouch that encloses sporophyte, *e.g.* ventral pouch on *Targionia*
- mat:** densely woven, horizontal growth form
- maturation:** process of development and reaching reproductive stage
- meadow:** field habitat vegetated by grass and other non-woody plants
- median:** middle, central; in statistics, denoting value or quantity lying at midpoint of frequency distribution
- Mediterranean:** areas around Mediterranean Sea
- medulla:** central part of stem or seta
- megagamete:** female gamete; in bryophytes egg
- megasporocyte:** cell that will undergo meiosis to produce megaspores
- meiosis:** nuclear division that separates sets of chromosomes; reduction division; reduces $2n$ condition to $1n$ condition; nuclear process in which each of four daughter cells has half as many chromosomes as parent cell; in plants it produces meiospores or meiospore nuclei, in animals it produces gametes (Gr. *meioun* = to make smaller)
- meiospore:** $1n$ spore resulting from meiosis (Gr. *meioun* = to make smaller, *spora* = seed)
- meltwater:** water derived from snow or ice melt
- membranaceous:** transparent and thin
- membrane:** thin layer of proteins and lipids surrounding cells and most cellular organelles; controls passage of substances into and out of cell or organelle (L. *membrana* = skin covering separate members of body)
- meristem tissue:** collection of cells capable of active cell division, thereby adding to plant body; embryonic or undifferentiated cells
- meristem:** collection of cells capable of active cell division, thereby adding to plant body; embryonic cells; growth region (Gr. *meristos* = divisible)
- mesic:** describing habitat having moderate moisture or water supply
- mesophilous:** preferring moist habitats
- mesophyte:** plant growing in moderately humid habitats
- mesophytic:** living in continually moist habitats; water and habitat requirements between hygrophytic and xerophytic
- mesotrophic:** moderately rich in dissolved nutrients, often near to neutrality, neither basic nor acid
- messicole:** growing in harvested fields; annual or hardy plants often present in crops
- metabolism:** sum total of all chemical activities of living organism (synthesis and breakdown)
- metapopulation:** group of partially isolated local populations of same species, but connected by migration
- methionine:** amino acid that is relatively insoluble in water and has non-polar R group
- Metzgeriidae:** subclass of mostly thallose liverworts in Jungermanniopsida
- mica-schist:** medium-grade metamorphic rock with medium to large, flat, sheet-like grains in preferred orientation (nearby grains are roughly parallel), called mica schists when they include biotite or muscovite
- micro-:** prefix meaning extremely small
- microbial loop:** energy/carbon pathway wherein dissolved organic carbon re-enters food web through incorporation into bacteria
- microgamete:** male gamete; sperm in bryophytes; antherozoids
- microgametophyte:** male gametophyte
- micronutrient:** essential nutrient needed by plants in relatively small amounts (Fe, Mn, Cu, Zn, Mo, Ni, Cl, B)
- micron:** micrometer; unit of length, one-thousandth of millimeter (μm)
- micronema:** small, fine, sparsely branched rhizoid produced on stem between leaves, *e.g.* stem rhizoids of *Rhizomnium pseudopunctatum* and *Plagiomnium ellipticum* [ant. macronema]
- microphyllous:** having leaves smaller than normal leaves
- microspecies:** populations within species that differ physiologically but not morphologically, permitting them to occupy different growing conditions
- microstomous:** referring to capsule with small, narrow mouth
- microtubule:** essential protein filament of cell structural skeleton
- midrib:** single costa of leaf or rib of thallus
- mineral:** inorganic substance occurring naturally in earth and having consistent and distinctive set of physical properties
- minerotrophic:** powered by groundwater and runoff waters often richer in minerals than rain water
- minute:** very small
- mire:** swampy or boggy ground
- mitochondrion** (pl. **mitochondria**): cell organelle used during respiration
- mitosis:** nuclear division where two daughter cells are produced from one parent cell with no change in number of chromosomes
- mixohydric:** having both internal and external methods in water conduction
- μm :** abbreviation of "micrometer" or "micron," unit of length, one-thousandth of millimeter (0.001 mm)
- moist:** hydrated
- molluscicidal:** killing molluscs such as snails, slugs, or clams
- monad:** grouping of one, as in single spore
- monitor:** to watch or check on; instrument (including plant) used to check on conditions
- monoecious:** bisexual; having both male and female reproductive structures on the same plant; applied to sporophytes of tracheophytes
- monoicous:** bisexual; with antheridia and archegonia on same plant (including autoicous, synoicous, paroicous) [ant. dioicous]

monomorphic: having single form

monomorphism: both genders look the same; literally, one form

monophyletic: referring to group of organisms that includes most recent common ancestor of all organisms and descendants of that common ancestor; having common ancestor (Gr. *mono* = one; Gr. *phyl* = tribe)

monopodial: growth pattern with single continuous axis, e.g. growth pattern of *Eucladium verticillatum* [ant. sympodial]

moraine: mass of rocks and sediment carried and deposited by glacier

morphological: referring to characteristics of structure (Gr. *morphe* = form, *logos* = discourse)

morphology: discourse of form and structure (Gr. *morphe* = form, *logos* = discourse, doctrine); form or appearance of plant

morphose: manner of morphological transformation which is not due to heredity

mortar: workable binder, usually concrete, used to bind building blocks such as stones, bricks, and concrete masonry units together, fill and seal gaps between them, and sometimes add decorative colors or patterns in masonry walls; roughened bowl, used with pestle, to grind material

motile: in plants, capable of moving by means of flagellum

mountain: natural elevation of Earth's surface, rising more or less abruptly to summit, and attaining altitude greater than that of hill, usually greater than 610 meters

MPa: unit of measure equal to 10^6 Newtons per m^2 or 1 N per mm^2 or 10 bars

mRNA: messenger RNA, used during protein synthesis

mucilage: polymer of galactan which yields hexose sugar galactose on hydrolysis; any thick, sticky substance secreted by cell

mucous: containing slime

mucro: short point, clearly marked

mucronate: ending in a mucro, e.g. leaf of *Barbula unguiculata*

mud: soft, sticky matter resulting from the mixing of earth and water, causing water to lose its clarity

mudflat: stretch of muddy land left uncovered at low tide

multicellular: having plant body composed of more than one cell wherein cells do not act as independent organisms

multicellular reproductive structure: characteristic of reproductive structures of plant kingdom

multicostate: with several nerves, e.g. costae in leaf of *Antitrichia curtipendula*

multifid: divided several times, e.g. the thallus of *Riccardia multifida*

multi papillose: with several papillae per cell, e.g. leaf cells of *Syntrichia calcicola*

multi-ranked: having leaves coming from more than two sides of stem

multistratose: having multiple layers of cells

muricate: with rough surface caused by many small asperities (like bumps on tongue)

muticous: without awn, hair-point or mucro

mutualism: interaction between organisms in which both partners benefit, such as alga and fungus of lichen (L. *mutuus* = reciprocal)

mutualistic: benefitting each other

mycorrhiza (pl. **mycorrhizae**): fungal association with root (or anchoring structure); characteristic of *Lycopodium*

gametophyte and most pine roots (Gr. *mykes* = fungi, *riza* = root)

N

n: number of chromosomes in a set ($1n$ = haploid; $2n$ = diploid)

naked: without ornamentations, without hairs, or without perichaetial leaves

natural area: area where species is considered to be native

naturalized: introduced species which naturally reproduces in its new territory

NE: Not Evaluated (IUCN)

neck canal cell: cell of archegonium neck that will disintegrate and liquefy when archegonium is mature

neck canal: entry canal through neck to egg in base of archegonium

nematodontous: having peristome consisting essentially of whole dead cells, usually with thickened walls, non-jointed

nematogon: initial cell that will produce rhizoid

nematogonous: filamentous

nemoral: living in open woodland

neoteny: condition in which juvenile characters retained in adults

Neotropical: of geographic regions including Central America, Antilles, large part of northern part of South America and the Galapagos Islands

neotype: specimen designated as type of taxon in absence of any original material

neoxanthin: hydrophilous carotenoid pigment

niche (ecological): role of species in its ecosystem

nitidous: bright shiny appearance

nitrocline: depth in water column where nitrate concentration differences are $> 0.5 \mu\text{g L}^{-1} \text{ depth}^{-1}$

nitrogen fixation: conversion of gaseous nitrogen (N_2) to ammonia and its incorporation into organic nitrogenous compound in cell; carried out by some bacteria and Cyanobacteria

nitrophilous: preferring substrates rich in nitrogen compounds

node: location of leaf or branch junction with stem

nodular: having small masses of solid tissue

nomenclature: codified set of terms used for denomination of species

Plant Nomenclatural Classification Endings

Kingdom:	-ae
Phylum/Division:	-phyta
Class:	-opsida
Order:	-ales
Family:	-aceae
Genus	various
Species	various

non-tracheophyte: plant lacking tracheids, e.g. bryophytes

non-translocatable: adjective to describe nutrients or other substances that do not usually move from original site of storage in plant

NT: Near Threatened (IUCN)

nuclear condition: number of sets of chromosomes, usually haploid ($1n$) or diploid ($2n$)

nucleolus (pl. **nucleoli**): apparent body on nucleus where extensive RNA formation is occurring

nucleus (pl. **nuclei**): cell organelle bounded by two membranes and containing DNA; occurs in most living eukaryotic cells (L. *nucleus* = kernel of nut)

nunatak: mountain top or rocky outcrop escaping glaciation regional glaciation

nutatation: spiral or circular growth pattern

nutrient: element or compound useful to plant when in proper quantities (see **macronutrient**, **micronutrient**)

nutrient deficiency: condition in which some nutrient is not available in sufficient quantity for plant to function properly

nutrient sink: natural or artificial reservoir that accumulates and stores a nutrient; these may include continually transporting nutrients to new tissues, storing them in older tissues, or binding them in incalculant compounds

O

O horizon: organic soil layer including litter layer (**O1**), fermentation layer (**Of**), and humified layer (**Oh**)

objective: in microscope, series of lenses that produce magnified image of specimen and project it up into focal plane of ocular

obligate aquatic: having little or no tolerance to drought conditions

oblique: in protonemata; end wall is oriented on slant compared to axis of filament

oceanic: parts of West of temperate Europe; often used to refer to climate influenced by ocean

ocellus: in liverworts, differentiated cell, large size, which includes one or more large oil bodies, *e.g.* in leaf cells of *Frullania tamarsci*

oil body: membrane-bound, terpene-containing organelle unique to liverworts, *e.g.* in leaf cells of *Radula complanata* and *Leiocolea turbinata*

oil cell: in thallose liverworts, idioblastic cell with single large oil body, *e.g.* some thallus cells of *Ricciocarpos natans*

oligotrophic: referring to a soil, mineral-poor, poor in nutrients so having little fertility

ombrophilous: referring to plant tolerant of wet conditions, *i.e.* much rain

ombrotrophic: receiving nutrients primarily from rainfall

open-field: relating to system of agriculture widely practiced in medieval Europe and based upon dividing arable land into unenclosed strips usually subject to 3-year rotation; prevalent agricultural system in much of Europe during Middle Ages and lasting into 20th century in parts

operculate: having operculum (lid)

operculum (pl. **opercula**): in mosses, lid of capsule (spore-container) that comes off for spore dispersal (L. *operculum* = lid)

opportunistic: plant that takes advantage of most abundant or easily obtainable site of occupancy; one taking immediate advantage

-opsida: suffix applied to class of plants, *e.g.* **Bryopsida**, **Sphagnopsida**

orchard: area planted with fruit trees

order: next major subdivision of class, ending in "ales," *e.g.* order **Bryales**

Ordovician: geologic period of the Palaeozoic era dating ~441-504 million years ago

organelle: cellular subunit with structure and function

orophyte: plant of the mountains

osmiophilic: refers to lipid-containing bodies in chloroplast; plastoglobuli

osmiophilic globule: lipid-containing body in chloroplast

osmiophilic layer: lipid layer; plastoglobuli

outcrop: rock surface that appears above soil surface

outcrossing: outbreeding; crossing individuals of different populations or less closely related than average pairs in the population

overhang: part of something that sticks out or hangs over another thing

overwintering: persisting throughout winter

P

pachyphyllous: with thick leaves

paleaceous: having the consistency of straw

palisade mesophyll: columnar cells of inner leaf tissue

paludification: process of becoming marsh-like

paludicolous: growing in marshes, in swamps

papilla (pl. **papillae**): projection from cell or structure, as in cells of some mosses

papillose: with one or several papillae per cell, *e.g.* leaf cells of *Aulacomnium palustre*, *Syntrichia calcicola*

PAR: photosynthetically active radiation, expressed as $\mu\text{mol m}^{-2} \text{s}^{-1}$, or as **watts** per meter square (W m^{-2})

paraphyllum: leaflike appendage between leaves, *e.g.* along stem of *Thuidium delicatulum*

paraphysis (pl. **paraphyses**): hyaline or yellowish, usually uniseriate, non-reproductive hair often associated with antheridia and archegonia in mosses; occur in fungi, algae, and bryophytes (Gr. *para* = beside, *physis* = a growth)

parasite: organism that derives nourishment from another species of living organism without benefitting other organism (Gr. *parasitos* = one who eats at table of another)

parasitic: living on or in and gaining nutrients from another living organism, to detriment of host organism

paratype: specimen cited in original description, but different from type specimen

parenchyma: tissue composed of living cells with thin primary walls and no secondary walls, such as cortex cells; usually have large vacuoles (Gr. *parenkheim* = to pour in beside)

parenchymatous: relative to cell, isodiametric and thin-walled, *e.g.* leaf tissue of *Mnium stellare* [ant. prosoenchymatous]

paroicous: monoicous with antheridia and archegonia in single gametoeccium but not mixed, antheridia in axils of bracts just below those bracts surrounding archegonia

pasture: land covered with grass and other low plants suitable for grazing

path: road, way, or track made for particular purpose; narrower than road

pavement: hard surface of road, street, or sidewalk; sometimes used to describe flat slab of natural rock bed

patient: tolerant species

peat: mass of semicarbonized plant tissue; often considered synonymous with *Sphagnum*, but actually includes grasses, sedges, and other plant types; accumulation of partially decayed vegetation or organic matter that is unique to natural areas called peatlands, bogs, or mires

peat-forming: producing peat

peatland (*s.l.*): natural area with accumulation of partly decomposed vegetable matter

peaty: containing peat

pebble: small, usually rounded stone, especially when worn by action of water

peg: scaled, inward protrusions of cell wall, *e.g.* in rhizoid of *Marchantia*

pellucid: transparent, translucent

pendant: epiphyte with long main stem hanging down, with short side branches

pendent: hanging, pendulous

perennating: lasting from year to year

perennial: plant that overwinters and continues to grow for many years (*L. perennis* = lasting whole year through)

perennial shuttle: species that requires stable environments, such as epiphytes, where end of habitat is predictable

perennial stayer: species that becomes established and remains for many years

perianth: organ of foliar origin enclosing archegonia in most leafy liverworts

perichaetial leaf: modified leaf among those surrounding female organs

perichaetium (pl. perichaetia): modified leaves enclosing female reproductive structures; ensheathing cluster of modified leaves or underleaves and perianth, if present, enclosing archegonia

perigonium (pl. perigonia): androecium; in strict sense, modified leaves enclosing male reproductive structures

perigynium: in some leafy liverworts, tubular structure +/- fleshy which surrounds archegonium and subsequently the sporophyte

perine: sporoderm layer situated around exine of many spores

periphyton: organisms attached to submerged surfaces

peristomate: having peristome

peristome: in mosses, fringe of teeth around opening of capsule (spore container); involved in spore dispersal (*peri* = around; *stoma* = mouth, opening)

peristome tooth: one unit of peristome

permafrost: permanently frozen ground in arctic and subarctic

permeability: ability of membrane, cell, or cell system to permit substances to diffuse (*L. permeabilis* = that which can be penetrated)

peroxisome: microbody containing catalase in plant cell that carries out photorespiration

persistent: not falling, not deciduous

petrocolous: growing on stones or rocks

petrophilous: preferring stone habitats

pH: negative log of hydrogen ion concentration; measure of acidity

phanerogam: seed plant

phanerogamic: referring to seed plants

phaneropore: relative to stomate, guard cells of stomate are at same level as adjacent exothelial cells, *e.g.* location of capsules pores in *Orthotrichum acuminatum*

phenolic compound: similar to lipid, but more soluble in water and less soluble in non-polar organic solvents; appears to be by-product of metabolism with no known use to plant's own metabolism; many may serve as deterrents to predation by insects

phenology: discourse of life cycle events (growth & reproduction), or series of events themselves, as they relate to seasonal events; natural phenomena that occur periodically (Gr. pheno = appear, *logos* = discourse, doctrine)

phenotype: total appearance of organism

-phile: suffix meaning "that likes," "that prefers"

phlobaphene: flavonoid (anthocyanin) pigment formed by oxidation of tannic compounds

phloem: sugar-conducting cells of lignified vascular plants (tracheophytes)

phloem loading: movement of sugars from a source to a sieve element; cells in a sugar source "load" a sieve-tube element by actively transporting solute molecules into it

phorophyte: plant bearing epiphytic species

photoinhibition: decreased photosynthetic activity due to excess illumination

photonegative: in tropisms, bending away from light

photoperiod: plant response to duration and timing of day and night

photophilous loving well-lit habitats

photophyte: plant of well-lit habitats

photosynthate: product of photosynthesis

phototropism: growth in which direction of light is determining factor in orientation; turning or bending in response to light

phycobilisomes: cellular organelle located on surface of thylakoids of chloroplasts and in which biliprotein pigments (phycocyanin, phycoerythrin) are present

phyllid (phyllidium): non-vascular leaf, as in mosses and liverworts

phyllodioicous: having dwarf male plants growing on leaves of female plants

phyllodioicy: spore germination on leaves of female plant

phylloid: leaflike

phyllotaxy: spiral arrangement of leaves on stem

phylogenetic: referring to evolutionary relationships between groups of organisms

phylogeny: evolutionary history of group of organisms

phylum: highest major category below kingdom of plants and animals; also known as division in plants

physiological races: populations within a species that differ physiologically but not morphologically, permitting them to occupy different growing conditions (microspecies, cryptic species)

Phyta: Latinized name for plant kingdom (Gr. *phytum* = plant)

-phyta: suffix applied to phylum name of plant kingdom (*e.g.* Bryophyta)

-phytic: suffix meaning "plant"

phytochrome: photosensitive pigments involved in photoperiodism, seed germination, and leaf formation; absorbs red and far-red light

PHYTOSOCIOLOGICAL CLASSIFICATION

from Weber *et al.* 2000

RANK	TERMINATION
Association	-etum
Alliance	-ion
Order	-etalia
Class	-etea
Subassociation (see Art. 13)	-etosum
Suballiance	-enion
Suborder	-enalia
Subclass	-enea

pigment: substance that absorbs visible light and hence appears colored

- pinnate:** relative to habit, feathery; in bryophytes, having branches arranged on either side of the stem, *e.g.* *Ptilium crista-castrensis*
- pioneer:** species able to colonize substrata not yet suitable for other species
- pioneer land:** pioneer heath
- pit field:** location of pit that connects two cells through middle lamella and thin primary cell wall, but lacking secondary cell wall; location of concentrated plasmodesmata; known from moss *Hookeria lucens*
- pK:** pH at which equal concentrations of acidic and basic forms of substance are present; negative log (base 10) of dissociation constant of electrolyte
- placenta:** gametophyte-sporophyte interface
- plain:** large area of flat land with few trees
- plane:** relative to leaf margin, flat, non-curved, *e.g.* leaf margin of *Dicranella subulata*
- plasmalemma:** cell membrane
- plasmodesma** (pl. **plasmodesmata**): tiny, membrane-line channel between adjacent cells
- plasmolysis:** separation of cytoplasm from cell wall due to removal of water from protoplast (Gr. *plasma* = something with form, *lysis* = loosening)
- plasmolyze:** condition of cell protoplasm shrinking away from cell wall
- plasticity:** capacity of organism to vary its morphology, physiology, or behaviour in response to environmental fluctuations
- plastid:** class of organelles, including chloroplasts, containing pigments, and amyloplasts, containing starch (Gr. *plastis* = builder)
- plastoglobulus:** globular structure found in plastids, containing primarily lipids
- pleiomorphous:** nearly identical in form, showing primitive characters
- pleurocarpous:** producing sporangia on short, specialized lateral branches or buds and typically prostrate, forming freely branched mats
- plicate:** fan-folded like a Japanese fan (WW), describing leaves of some mosses
- plumose:** regularly pennate, appearance of feather
- poikilohydric:** having state of hydration controlled by external environment
- poikilothermic:** having body temperature controlled by external environment
- pollutant:** unnatural human-related substance that is introduced to environment (L. *polluere* = to dirty, *lutum* = mud)
- pollution:** contamination of environment by unnatural human-related substance(s) (L. *polluere* = to dirty, *lutum* = mud)
- polygamous:** heteroicous; having some male branches, some female, and some both
- polyol:** group of chemical compounds (polymers or monomers) with hydroxyl functional groups; include polyethers and polyesters, including glycerin
- polymorphous:** with variability of forms
- polyphenolic:** polyhydroxy phenol; group of plant chemical substances characterized by presence of more than one phenol group per molecule; cause coloring in some plants, including some autumn leaf coloring
- polyploidy:** plant, tissue, or cell with more than two complete sets of chromosomes
- polysomes:** two or more ribosomes joined by molecule of messenger RNA during protein synthesis
- polysporangiate:** having multiple sporangia on one sporophyte
- Polytrichopsida:** class of mosses containing **Polytrichaceae**, **Tetraphidaceae**, **Buxbaumiaceae**, and **Oedipodiaceae**; characterized by nematodontous (non-jointed) peristome teeth
- population:** group of interacting individuals of same species or lower taxon in common spatial arrangement with potential for gene flow
- pore:** small aperture, opening in wall of some cells; space or opening; in upper surface of thallose liverworts
- potamocolous:** growing in rivers, streams
- PPFD:** photosynthetic photon flux density, measured as $\mu\text{mol m}^{-2} \text{s}^{-1}$, or as **watts** per meter square (W m^{-2})
- precocious germination:** cell division occurs while spore still within capsule
- primitive:** taxonomic trait thought to have evolved early in time (L. *primus* = first)
- primordium:** earliest stage in development of plant part
- procumbent:** prostrate, *e.g.* horizontal growth habit of *Plagiomnium*
- productivity:** measure of new organic matter produced by group of organisms over period of time
- proliferous:** growth continues by development of new leafy stems or innovations
- propagule:** see propagulum
- propaguliferous:** bearing propagules
- propagulum** (pl. **propagula**): propagule; diaspore that has apical cell and can grow directly into leafy shoot if apical cell is reactivated; reduced bud, branch, or leaf serving in vegetative reproduction
- prorate:** referring to cell having papilla or mamilla located at distal end, *e.g.* leaf cells of *Pterigynandrum filiforme*
- prosenchymatous:** referring to narrow, elongated, tapering cells overlapping at ends [ant. parenchymatous]
- prostrate:** lying flat on ground or other substrate; creeping
- protandrous:** describes condition in which male parts of individual plant reach maturity before female parts do, such as in fern prothalli and some bryophytes; helps insure cross-fertilization [ant. protogynous]
- protandry:** condition in which maturation of antheridia occurs before that of archegonia
- protocooperation:** interaction between organisms that is mutually beneficial but not required
- protogynandry:** maturation of archegonia before antheridia on same plant
- protogynous:** having archegonia mature before antheridia on same plant
- protonation:** instance of substance gaining a proton, *i.e.* being acidified
- proton pump:** ATP-driven active transport of H^+ ions from cell into intercellular matrix, permitting cations to enter cell by charge gradient.
- protonema** (pl. **protonemata**): green, branched filaments produced from germinating spores, giving rise to leafy plant; literally "first thread"
- protoplast:** protoplasm of single cell
- proximal:** located at base near point of attachment
- pruinose, pruinose:** covered with bluish or whitish powdery granules or bloom

PS II: photosystem II of photosynthesis; system of molecules and enzymes in plant chloroplasts that absorbs energy of red light with wavelength of 680 nm, and uses it to produce ATP and to split water into protons and oxygen

psammophile: growing on or in the sand

pseudautoicous: dioicous, but with male plant growing (epiphytically) on female plant

pseudodistichous: highly compressed, with leaves in spiral arrangement, but appearing to lie in two rows

pseudoelater: false elater; one, two, or four-celled sterile filament developed after several mitotic divisions and subsequent differentiation of diploid pseudoelater mother cell among spores in capsules of hornworts; outnumber spores

pseudoparaphyllium: rudimentary leaf present at branch base in some pleurocarpous mosses

pseudoperianth: in some thallose liverworts, tissue produced by thallus that surrounds archegonia and subsequent sporophytes, *e.g.* tissue surrounding perianth of *Preissia quadrata*

pseudopodium: in *Sphagnum*, watery gametophyte stalk that supports sporophyte; sporophyte foot is imbedded at apex

pseudothallose: said of gametophyte resembling a thallus

pterygodont: in some **Polytrichaceae**, type of nematodontous peristome, teeth provided with longitudinal ridge or wing [ant. leiodont]

puddle: small pool of liquid, usually caused by rainwater in depression

pulvinate: cushion-shaped

pyrenoid: proteinaceous body serving as nucleus for starch storage and common in green algae and Anthocerotophyta



Q₁₀: ratio of ending to beginning reaction rates for a 10°C rise in temperature

quadrat: sampling plot

quadrate: square

quadrant: one-fourth of something; quarter

quagmire: soft boggy area of land that gives way underfoot

quaking bog: floating mat in bog

quarry: typically large, deep pit from which stone or other materials are or were extracted



r and K selection: selection for life cycle strategy based on high reproductive potential (r) or long life and high carrying capacity (K)

r strategy: life cycle strategy characterized by rapid growth rate, early reproduction, numerous, small offspring (spores or seeds in plants), and high resource uptake

radially symmetric: symmetric around central axis

radiolabel: to tag with radioactive tracer such as ¹⁴C or ¹⁵N

ramet: individual member of clone

ravine: deep, narrow gorge with steep sides

receptacle: disc located on thallus or on stipe and bearing sex organs, *e.g.* flattened platform on top of archegoniophore in *Marchantia polymorpha* of antheridial area on thallus of *Conocephalum conicum*

recessive allele: trait that only shows when both alleles of gene are same

recurved: curved inward and downward

reduced: incomplete, rudimentary

reed bed: area of water or marshland dominated by tall plants that grow in clusters

refugium (pl. refugia): area that has climate representative of past and different from that of surrounding area

rehydrin: protein involved in rehydration, thought to be responsible for production of anti-oxidants

relevé: sampling method for stand of vegetation to collect data on presence, cover, density; list of species in an area, often collected by searching with no particular pattern (see Department of Natural Resources, State of Minnesota 2013)

relict: persistent species remnant of former widespread species in some isolated areas or habitats

relictual: relative to plant that survives in favorable but limited space

reproduction: formation of similar offspring

resorption: to absorb (re-absorb) a tissue after it has been made

resorption furrow: groove due to partial resorption of marginal cells, *e.g.* stem leaf of *Sphagnum fimbriatum*

respiration: process by which sugars and other stored organic molecules are oxidized and broken down, with energy captured in formation of ATP

reverse genetics: genotype-driven technique in which genes are either knocked out or added to see the effect on phenotypic expression

reviviscence: renewal of life; state of being revived

revolute: rolled outward, toward abaxial, dorsal, external face [ant. involute]

rheophilous: growing in flowing creeks and rivers

rhizoid peg: cell wall protrusion into cell; found in Marchantiales

rhizoid: non-vascular anchoring and absorbing structure, one cell thick and one cell long in liverworts and hornworts, multicellular, generally with oblique end walls in mosses; found in gametophytes of **Marchantiophyta**, **Anthocerotophyta**, and **Bryophyta** (Gr. *rhiza* = root, *oides* = like)

rhizoidosphere: area immediately surrounding rhizoids; comparable to rhizosphere of tracheophytes

rhizome: horizontal (usually) underground stem, such as those connecting *Polytrichum* clones (Gr. *rhiza* = root)

rhizosphere: soil immediately around roots; root zone

ribosome: organelle where protein synthesis occurs in cell

rill: small stream

riparian: growing along river

river: large body of flowing water

river ecosystem: large body of flowing water and its organisms

river bed: bottom of river

rock: solid mineral material forming part of surface of Earth, exposed on surface; boulder

rock face: bare vertical side of a rock

root nodule: outgrowth on root that houses nitrogen-fixing bacteria

rosette: referring to habit, cluster of leaves at same level, thalli radiately spreading, *e.g.* rosette growth form of *Riccia sorocarpa*

rotting stump: decaying remains of tree base

rotten wood: decaying tree, log, or stump

r-selected species: organism characterized by rapid growth rate, early reproduction, numerous, small offspring (spores or seeds in plants), and high resource uptake

r-strategist: organism characterized by rapid growth rate, early reproduction, numerous, small offspring (spores or seeds in plants), and high resource uptake

RUBISCO: enzyme that catalyzes carbon fixation in plants

ruderal: referring to plant living on field or wasteland in built up areas

runoff: draining away of water from land surface

rupestral: growing on the rocks

rut: long deep track made by repeated passage of vehicular wheels

S

sabulicolous: growing in gravel or sand

salt marsh: coastal wetland that is flooded and drained by salt water brought in by tides

sample: specimen

sand: loose granular substance, typically pale yellowish brown, resulting from erosion of siliceous and other rocks

sandstone: sedimentary rock consisting of sand or quartz grains cemented together, typically red, yellow, or brown in color

sand pit: quarry from which sand is excavated

saprolignicolous: growing on decaying wood

saprophyte: plant that grows on dead organic matter

saprophytic: growing on dead organic matter

saxicolous: living on rock [syn. epilithic, rupestral]

scabrous: rough

scarce: few localities are known

scarification: abrasion process in which one "scars" the seed coat by scratching or nicking it; used to break dormancy in seeds with hard seed coats; mechanical means of breaking outer covering of propagule such as seed or spore for germination

sciophilous, sciaphilous: preferring shady habitats

sciophyte: plant growing in shady habitats

sciophytic: growing in shady habitats

scleroderm: internal tissue made of cells with thickened walls and small lumen

sclerenchyma: cell with thick walls that provides mechanical support to plant

sclerophyll: plant with stiff, leathery, evergreen leaves

scree: accumulation of loose, small stones that form or cover slope on mountain

scrobiculate: with numerous depressions, pitted

scrubland: plant community characterized by vegetation dominated by shrubs, often also including grasses, herbs, and geophytes

s.d.: abbreviation for "*sine die*" meaning "without date"

secondary compound: chemical manufactured by plant that protects it; not used in any essential metabolic pathway

secondary growth: growth derived from lateral meristem, as in most trees; plant growth that does not occur at tips of stems or tip of roots; in seed plants, secondary growth produces bark and wood

sedge swamp: highly productive freshwater marsh, sedge meadow or swamp; forested wetland with sedges as the predominant ground cover

seepage: process by which water, usually groundwater, reaches Earth's surface

SEM: scanning electron microscope

semi-aquatic emergent: being in locations where plants are partly in the water and partly out of it, but usually moist

senescence: process of aging

sensu: Latin meaning "in sense of"

sensu lato: in broad sense

sensu stricto: in strict or narrowest sense

serine: amino acid with polar R group and soluble in water

sessile: without seta, without stalk

seta (pl. **setae**): stalk that supports moss or liverwort capsule; elongated portion of sporophyte between capsule and foot

sex chromosome: one pair of chromosomes that are different in two sexes and are involved in sex determination

sexine: outer layer of exine, *e.g.* in spore

sexual reproduction: reproduction that requires meiosis, formation of haploid state (having one set of chromosomes), formation of gametes, and union of gametes to complete life cycle

sexual: in plants, any reproductive stage involving meiospores or gametes

shady: having full shade

shaly rocks: sedimentary rocks, including conglomerate, sandstone, siltstone, shale, limestone, and coal forming a finely stratified or laminated structure

sheath: tissue that surrounds base of stem, seta, or capsule, *e.g.* vaginant lamina in *Fissidens*

sheathing: surrounding a stem, seta, capsule or other structure, *e.g.* in *Hyophila involuta*

sheet metal: metal formed into thin sheets or plates, typically by rolling or hammering

shoot: stem + leaves and other structures

shoot apex: tip, usually growing tip, of plant

shoot: combination of stem and leaves of plant

shore: land bordering a usually large body of water; coast

short-lived shuttle: species that doesn't avoid periods of severe stress; habitat lasts 2-3 years

shrub: woody plant with several main stems arising from base and smaller than tree

shuttle species: one that moves from place to place, occupying short-lived environments

sieve cell: long, enucleate conducting cell of phloem

siliceous: acidic, composed of silica (silicon dioxide, SiO₂), which occurs in nature as chert, quartz, flint, and agate

silicicolous: growing on sandstone or siliceous rock

Silurian: geologic period of the Palaeozoic era dating ~400-440 million years ago

sink: natural or artificial reservoir that accumulates and stores something

sylvicolous: growing in forests

sinistrorse: referring to seta that is twisted to left, counterclockwise, when looking from seta apex (capsule base) to seta base (sporophyte insertion), *e.g.* seta of *Weissia brachycarpa* [ant. dextrorse]

s.l.: abbreviation for "*sensu lato*" meaning "in the broad sense"

slate: fine-grained, usually bluish-gray rock that splits into thin, flat layers or plates, formed by metamorphosis of clay, shale, *etc.*

sleeve: dense mat that surrounds base of tree trunks essentially in alluvial forests, *e.g.* *Anomodon viticulosus* around tree base

slime papilla: mucilaginous projection on stem of liverwort

s.n.: Latin abbreviation for "*sine numero*" meaning "without number"

snow bed: depression where snow collects, causing shorter growing season than its surroundings

soil, ground: although often treated as synonyms, they are different: soil = complex mixture of minerals, water, air, organic matter, and organisms; ground = top part of the Earth's surface that people walk on

soil degree days: (SDD); unit of measure calculated as product of time (days) and temperature (°C) of soil, usually averaged over growing season or activity season for organism in question; number of degree-days that occur in one day is determined from average temperature for that day minus base temperature, which is minimum temperature above which activity occurs

Soil Descriptors

bare soil: soil with no visible plants growing on it
gravelly soil: soil containing unconsolidated rock fragments
loose soil: soil having a loose and large-grained consistency
peaty soil: soil material consisting of partially decomposed organic matter, usually found in swamps and bogs
top soil: thin, rich layer of soil where most nutrients for plants are located

solifluction: slow, downhill movement of soil and other materials in areas typically underlain by frozen ground; slump; mudflow

somatic mutation: mutation that does not affect gametes; mutation in body cells; usually non-heritable change

somatic: any (cell) except reproductive cells; vegetative (cell)

sp.: Latin abbreviation meaning "species"

sphagnoid: cellular tissue consisting in a network of chlorocysts and hyalocysts, resembling that in *Sphagnum*

sphagnum: peat-moss, often used as a common name

species (pl. species): taxonomic unit denoting those organisms that can potentially interbreed, yet are unable to breed with other groups; group of entities recognizably different from other entities but seeming to represent group with common characters (L. *species* = kind)

species diversity: measure of number of different species and distribution of individuals in system

species richness: measure of number of different species in system without regard to number of individuals in each species

specimen: example, part, individual

sperm: male gamete that is smaller than female and motile

spermatocyte: cell that becomes converted into sperm

spermatogenesis: formation of sperm

spermatogenous: giving rise to sperm

Sphagnophyta: phylum name sometimes used for *Sphagnum* and *Ambuchanania* when separating them from the Bryophyta

Sphagnopsida: class of mosses with only one genus, *Sphagnum*

sphagnorubin: red pigment in cell walls of some *Sphagnum* species

spiral thickening: helical ridge on inner face of and part of secondary cell wall; found in elaters and secondary xylem tracheary elements or fibers

splash cup: container from which reproductive units (sperm, gemmae, spores) can be splashed by raindrops

sporadic: appearing irregularly

sporangium (pl. sporangia): container that produces spores; capsule (Gr. *spora* = seed, *angeion* = vessel)

spore: reproductive cell that develops into plant without union with another cell, usually 1-celled

sporeling: all structures developed between germination and formation of adult gametophore

spore mother cell: sporocyte; cell that will undergo meiosis to produce meiospores

spore sac: cavity located in urn of capsule and contains spores

sporocyte: spore mother cell; cell that will undergo meiosis to produce meiospores

sporogenesis: process of giving rise to spores, starting with meiosis in plants

sporophyte: diploid ($2n$) meiospore-bearing generation; initiated by fertilization of egg and ends with meiosis (Gr. *spora* = seed, *phyton* = plant)

sporophyte generation: diploid ($2n$) generation in plants that begins with zygote and ends with meiosis that produces $1n$ spores; dominant generation in all plants but bryophytes

sporopollenin: phenol-containing polymer that imparts high chemical resistance to exine (outer layer) of pollen

spp.: abbreviation meaning more than one species

spreading: patulous, relative to a habit of leaves or branches, more or less horizontal and perpendicular to axis (an angle of 45° or more with the axis), e.g. leaves of *Rhytidiadelphus triquetrus*

spreading branch: in *Sphagnum*, branch more or less horizontal, or arched

spruce forest: forest with *Picea* as dominant genus

spring mire: mire with a spring as its primary water source

squama (pl. squamae): part arranged like scale; broad, flat surface (L. *squama* = scale)

s.s.: Latin abbreviation for "*sensu stricto*" meaning "in the narrow sense" [ant. *s.l.* = *sensu lato*]

ssp.: abbreviation meaning "subspecies"

stalk: seta in mosses; structure that supports capsule in mosses, liverworts, and some fungi

statolith: type of amyloplast used in sensing gravity

stegocarpous: refers to capsule in which operculum is dehiscent, majority of cases in moss species [ant. cleistocarpous, astomous]

stem: main axis of plant; caulidium in bryophytes

stemflow: solution that flows down tree trunks during precipitation

stereid: slender, elongate, fiber-like cell found in costa or stem in some mosses

sterome: (= stereom); refers to entire system of stereids in mosses

sterile: in botany, refers to organisms without structures to reproduce sexually; free from living microorganisms [ant. fertile]

sterile jacket: term often applied to outer covering of sporangium; non-spore-producing tissue surrounding sporogenous tissue or spores

sterome: stereome; refers to entire system of stereids in mosses

stolon: stem that grows horizontally along ground

stoma (pl. stomata): minute opening in capsule wall of hornworts and capsule neck of mosses; surrounded by two guard cells (Gr. *stoma* = mouth)

stone: rock or particular piece or kind of rock, as a boulder or piece of agate

- stone quarry, stone pit:** surface excavation for extracting stone or slate
- storey, zone:** forest floor, layer, understory
- stratose:** in layers; denoting thickness of leaves
- stress:** external constraint that limits rate of dry matter production of all or part of vegetation
- stroma** (pl. **stromata**): colorless matrix of chloroplast in which packets of chlorophyll are embedded
- stubble:** basal part of herbaceous plants and especially cereal grasses remaining protruding from soil after cutting
- stump:** remains of base of tree after most of tree has fallen
- subarctic:** of regions localized immediately at south of Arctic
- subspecies:** subdivision of species; usually fairly permanent geographically isolated race
- substrate:** molecule that is acted upon by enzyme in enzymatically controlled reaction; solid medium on which plant grows
- succubous:** lying under; oblique leaf insertion in which antical (distal) margins are oriented toward ventral stem surface, *e.g.* leaf positioning of *Plagiochila asplenioides* [ant. incubous]
- sunfleck:** flashes or patches of sunlight on forest floor
- superficial:** on surface
- superoxide dismutase:** SOD; enzyme that destroys highly reactive superoxide; contains zinc and copper or manganese; known to enhance membrane integrity
- swampy meadow:** this term has mixed definitions, so authors should define it when they use it
- symbiont:** organism that lives in close association with another
- symbiosis:** close association of two species
- sympatric:** occurring in same geographic area
- symphoriont:** organism carried by and often dispersed by its host, *e.g.* protozoa living on tardigrades or on moss leaves
- symplastic:** through protoplasts and their intercellular connections (plasmodesmata)
- sympodial:** growth pattern where primary axis is superseded by succession of secondary axes
- synergism:** complementation or helping each other so result is greater than sum of parts
- synoecium:** synoecious inflorescence, including archegonia, antheridia and surrounding bracts
- synoecious:** archegonia and antheridia mixed in same gametoeccium
- syntype:** one of original set of samples of taxon used to describe and name it
- systematics:** classification of taxa
- T**
- taiga:** open forest, usually coniferous, bordering arctic tundra
- tail:** bryophyte growth form that occurs on trees and rocks, shade-loving; radially leafed, creeping, shoots stand away from substrate; *e.g.* *Cyathophorum*, *Leucodon*, *Spiridens*, some tropical *Plagiochila*
- Takakiopsida:** class of mosses with finely divided leaves and spirally valvate capsules
- tall-herb:** community with tall, linear vegetation such as grasses, reeds, cattails, bulrushes
- tapetum:** nutritive cell layer lining inside of capsule
- taxon** (pl. **taxa**): general term for any taxonomic rank (Gr. *taxis* = order)
- taxonomy:** science of classification of organisms
- teeth (peristome):** fringe of appendages about opening of sporangium in mosses
- teniola** (pl. **teniolae**): border-like row of differentiated cells, differing from true border by being intramarginal
- tensibility:** strength when pulled end-to-end
- temperate:** regions between tropics and polar circles
- terete:** in cross-section, round, cylindrical
- tepui:** flat-topped, sandstone mesas in Venezuela
- terminal:** tip; at end of stem or branch
- terminal bud:** bud located at tip of stem or branch
- terpenoid:** sometimes referred to as isoprenoids; class of naturally occurring chemicals similar to terpenes, derived from five-carbon isoprene units assembled and modified in thousands of ways; most are multicyclic structures which differ from one another not only in functional groups, but also in basic carbon skeletons
- terraforming:** technologies employed to convert a desert moon or planet into a habitable one
- terrarium** (pl. **terraria**): glass or plastic container in which plants are grown; often sealed and moisture recycles
- terrestrial:** pertaining to land
- terricolous:** growing on soil
- terril:** heap, especially of metallic ore or waste from mine
- tetrad:** group of four; in spores, these retain flat-face cell walls made when they cluster together as group
- tetraploid:** plant, organism with 4n chromosomes
- thalloid:** having flat, blade-like growth form
- thallose:** non-vascular plant body form; resembling thallus; describes group of liverworts that are not leafy
- thallus** (pl. **thalli**): non-vascular plant body, usually considered flat and dorsiventrally oriented, as in *Marchantia*; plant body lacking roots, stems, or leaves; body type of algae, fungi, some liverworts (non-leafy), and gametophytes of lower vascular plants
- thallus (complex):** thallus multistratose with marked differentiation of tissues, *e.g.* thallus of *Conocephalum salebrosus*
- thallus (simple):** undifferentiated thallus, unistratose or multistratose, *e.g.* thallus of *Metzgeria*
- thermophilous:** preferring warm places
- thicket:** dense group of bushes or trees
- thigmotactic:** responding to contact
- throughfall:** precipitation that comes through canopy
- thylakoid:** flattened, membranous vesicle containing chlorophyll; where photochemical reactions of photosynthesis occur
- TIBA:** 2,3,5-triiodobenzoic acid; polar auxin transport inhibitor
- tiled roof:** structure to keep out rain, traditionally made from locally available materials such as terracotta or slate
- tmema:** abscission cell; cell that ruptures to release moss gemmae, *e.g.* on gemmae of *Aulacomnium androgynum*
- tomentose:** woolly, fluffy, felted
- tomentum:** in bryophytes, dense woolly covering of rhizoids
- torrent:** stream of water flowing with great rapidity and violence
- toxicity:** poisonous quality or state
- trabecula:** horizontal appendage, lateral ridge on peristome tooth, *e.g.* on teeth of *Funaria hygrometrica*
- trace element:** micronutrient; element required by plant in very small quantities

tracheid: lignified vascular conducting unit of tracheophyte, usually having tapered ends and pitted walls without perforations

tracheophyte: plant with well-defined, lignified vascular system; any plant of Tracheophyta (Gr. *tracheia* = windpipe, *phyton* = plant)

tradeoff: losing one quality or aspect of something in return for gaining another quality or aspect

track: rough path or minor road, typically one created by use rather than constructed

transverse: perpendicular to the long axis

travertine: form of limestone deposited by mineral springs, especially hot springs

transfer cell: cells at gametophyte-sporophyte junction, found in foot of sporophyte and in adjacent gametophyte; endowed with extensive and complex wall labyrinth and intense enzyme activity

transition(al) mire: poor fen; natural wetland habitat with dense low growth of small sedges and other plants, developing on wet ground where water is fairly acidic and has very limited plant nutrients

transitivity: relation between three elements such that if it holds between first and second and it also holds between second and third it must necessarily hold between first and third, *i.e.* if a is part of b and b is part of c, then a is also part of c

translocatable: adjective to describe nutrients or other substances that move easily through plant (L. *trans* = across, *locare* = to place)

translocation: in plants, movement of organic substances from one location to another within plant; more generally used to refer to movement of any substance from one place to another in plant

transpiration: loss of water as vapor from plants

transplant: to move something from place where it is growing and placing it in another place to grow

transport system: in botany, system of cells used for directed movement of substances throughout the plant

transverse: across

tree: upright woody perennial plant with branches

trigone: generally triangular or circular intracellular wall thickening, found at point where three (or more) cells meet; common in leaves of leafy liverworts, *e.g.* leaf cells of *Mylia anomala*

trilete: referring to polar spore with convex distal face and proximal face with triradial ridge, *e.g.* spores of *Riccia beyrichiana*

tryptophan: essential amino acid, C₁₁H₁₂N₂O₂, formed from proteins

triterpene: one of class of hydrocarbons produced by many plants

tropism: orientation of direction of growth in organ of plant, guided by external stimulus such as light or gravity (Gr. *trope* = turning)

true starch: polysaccharide carbohydrate composed of two forms of glucose elements, amylose and amylopectin; principal storage compounds of plants

trunk: bole; main axis and support of tree

TS: transverse section, =cross section (cs)

tuber: in mosses, gemmae produced on rhizoids; in liverworts, a perennating structure produced by downward growing outgrowth of shoot apex

tuberculate: with peg-like projections of cell wall material into cell

tuberculate rhizoid: with peg-like projections of cell wall material into rhizoid cell in some thallose liverworts; pegged rhizoid, *e.g.* rhizoids of **Marchantiales**

tufa: porous limestone (CaCO₃) formed in streams and springs; rock formations resulting from carbonates built upon bryophytes and other plants due to addition of photosynthetic oxygen to dissolved minerals

tuft: relative to habit, clump with erect shoots, *e.g.* growth habit of *Tortella tortuosa*

turf: growth form with stems erect, parallel and close together; often covering extensive areas; grass and surface layer of soil held together by its roots; growth form of bryophytes with erect shoots close together, *e.g.* growth habit of *Bryum argenteum*

tumid: swollen, inflated

turgescence: swollen after hydration

turgid: swollen, distended; refers to cell that is firm and swollen due to water uptake (L. *turgidus* = swollen, inflated)

turgor: state of cell which has taken in maximum amount of water causing distention of protoplast

tussock: small area of grass that is thicker or longer than grass growing around it; hummock; small, rounded or cone-shaped, low hill or surface of other small, irregular shapes; raised hump as found in bogs and fens

twig: slender shoot of a tree or other plant

type: specimen attached to scientific name from which species has been described

U

ubiquitous: present in many types of distinct habitats; everywhere

ultraviolet light (UV): light waves less than 400 nm long; high energy light waves that are invisible (to humans)

underbrush: shrubs and small trees forming undergrowth in forest

underleaf: modified leaf on underside of plant, especially in leafy liverworts; amphigastrium, *e.g.* underleaves of *Frullania*

undifferentiated: refers to tissue that has not become specialized

undulate: wavy, *e.g.* thallus of *Moerckia flotowiana*, leaves of *Neckera pennata*

unequal: of different size, asymmetric

unicellular: having only one cell

unilateral: one-sided

unisexual: having male and female reproductive structures on different individuals; having only one sex on the individual; monoicous

unistratose: one-layered; comprised of single cell layer

upland: area of high or hilly land

upper: relative to moss leaf, face oriented towards axis of stem (=ventral, adaxial); relative to liverwort thallus, dorsal face; referring zone of leaf (upper leaf), distal third of leaf

urceolate: relative to a capsule : narrowed below the mouth

urn: spore-bearing portion of the capsule (= theca)

V

vacuole: space or cavity in protoplasm, filled with watery solution and enclosed by membrane

vaginate: sheathing

vaginula: sheath surrounding base of seta, *e.g.* at base of seta of *Orthotrichum stramineum*

valley: low area of land between hills or mountains, usually with stream or river flowing through it

valley (small): small, low area of land between hills or mountains, usually with stream or river flowing through it

valvate: separating into sections or flaps upon dehiscence

valve: in liverworts & some mosses, sections of capsule that split apart at maturity

var.: abbreviation meaning "variety"

variety: lowest level of classification

vector: in biology, carrier, such as flies that carry spores in *Splachnum*; in genetic engineering, bacterium, virus, or other organism used to deliver new gene to cell of different organism

vegetative leaf: leaves except those surrounding sexual organs

vegetative propagation: reproduction from non-sexual parts of plants, such as fragments

vegetative: asexual parts of plant

venter: swollen basal portion of archegonium, containing egg

ventral: lower or under surface; on leaves, upper surface

ventral canal cell: cell at base of neck of archegonium; disintegrates before fertilization

vernacular name: common name; name used locally instead of Latin name

vernalization: change in physiological state induced by chilling; requirement in germination in some plant species

vesicle: membranous sphere involved in transport or storage in cell

viability: durability; ability to survive, germinate, or resume growth

vineyard: plantation of grapevines

violaxanthin: xanthophyll pigment in plants, formed in dark and converted to zeaxanthin in red light

violent: aggressive species

violet: color between blue and purple; color of amethyst, lavender and beautyberries

vitrification: preservation at extremely low temperatures without freezing; involves formation of glassy or amorphous solid state which, unlike freezing, is not intrinsically damaging even to most complicated of living systems; *e.g.* when sucrose is cooled slowly it results in crystal sugar (or "rock candy"), but when cooled rapidly it can form syrupy "cotton candy" or lollipops

volatile: evaporating rapidly; diffusing freely into atmosphere, as attractant in *Splachnum* capsule

VU: vulnerable (IUCN)

W

wall: continuous brick or stone structure; partition surrounding cell

water: medium in lakes, ponds, pools, streams, rivers, etc; rainfall; freezes into snow or ice

wax: long chain hydrocarbon with little oxygen; contained in cuticle covering vascular plant surfaces

WC₅₀: percent water content at which 50% of the plants would recover if dried to their compensation point

weft: loosely interwoven, often ascending growth form

wetland drainage: area where water covers soil, or is present either at or near surface of soil, is drained by such mechanisms as ditches to create dry land

wheat field: agricultural field where wheat is or was grown

widespread: common over wide area

windfall: something (as a tree) blown down by wind

whiplash flagellum: type of flagellum that lacks lateral appendages

windthrow: fallen tree(s) resulting from wind

wooded bog: habitat with peat mosses and trees, with nutrients derived only from precipitation

weft: loose growth, with ascending shoots, *e.g.* habit of *Thuidium tamariscinum*

wood: substrate of lignified tissues from trees

woods/forest: ecosystem dominated by trees

woodland: tract of land dominated by trees

X

xanthophyll: yellow or orange carotenoid pigment found in algae and plants (Gr. *xanthos* = yellowish brown; *phyllos* = leaf)

xeric: very dry; referring to habitat

xeromorphic: adapted for dryness

xerophilous: growing in dry places

xerophyte: plant of dry places

xerophytic: describes plant adapted to dry habitat

xylem: vascular tissue that conducts water and mineral nutrients in lignified plants; composed of tracheids, and in flowering plants (and a few others) also vessels

Z

zeaxanthin: carotenoid pigment; one of xanthophyll pigments; able to deactivate antenna chlorophylls when there is surplus light energy

zygomorphic: bilaterally symmetrical [ant. actinomorphic]

zygospore: thick-walled resting zygote in some algae

zygote: product of fusion of two gametes; fertilized egg before it has undergone mitosis or meiosis (Gr. *zygon* = yoke)

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