

# A Dictionary of Botany

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# Preface

This dictionary contains about 5500 definitions of terms from all fields of botany and is written for students at all levels of expertise. It differs from other botanical dictionaries in several respects: a majority of the definitions included have been revised or have been rewritten from original sources; a number of new terms are included which appear for the first time in a dictionary; archaic and seldom used terms have mostly been omitted; terms which differ slightly in ending but which have the same basic meaning (e.g., calcicole, calcicolous, calciphilous), are defined together; most taxonomic names and common names have been omitted as these words are extensively compiled in other sources; and structural formulas of chemical compounds have not been included.

In an effort to decide which terms to include and which to exclude, a survey was made of approximately one hundred sources of botanical literature including textbooks, specialized works, journals, glossaries and indices. In writing a new dictionary of botany, this approach was taken to determine how often a given term occurs, to identify new terms which ought to be included, and to compare definitions of terms as used by different authors, since definitions of a given term can vary considerably.

Authors also vary in their choice of essentially synonymous terms, some preferring one version, whereas others prefer another. We have attempted to indicate as many synonymous and opposite terms as possible. Other terms which are related in some manner to a given word are indicated by *compare* or *contrast*. Thus, a great many terms can be cross referenced by one or more means. This can provide the reader with an insight into similarities and differences between closely related terms.

The illustrations were prepared especially for this volume; many were drawn from fresh material or slides. Illustrations that depict more than one term are cross referenced in the text by a letter and number. For example, A-18 denotes the eighteenth figure in the A's, the archegonium. Thus A-18, which follows the definition of venter, indicates where this term is illustrated.

We would like to thank the many individuals who have provided criticisms, suggestions and support during the preparation of this book. We would particularly like to thank Cynthia Little for her extensive compilations of reference material and for help in proofreading. We appreciate the help of Margaret Maas, Karen Bell and Beverly Casey in typing the manuscript. A special thanks is also due to our illustrator, Ray Smith, for his many fine drawings.

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# A

**a-**. A prefix meaning without, or not.

**A.** 1. Mass number of an atom. 2. A haploid set of autosomes.

**Å.** See *angstrom*.

**ab-**. A prefix meaning from.

**abaxial.** Situated facing away from the axis of the plant, as the undersurface of a leaf. *Syn.* dorsal. *Opp.* ventral.

**aberrant.** Differing more or less widely from the accepted type; abnormal.

**abiogenesis.** The doctrine that living things originated from nonliving matter; spontaneous generation. Contrast biogenesis.

**abiotic.** Pertaining to nonliving things.

**abiotic selection.** Selection resulting from the interaction of an organism and its physical environment.

**abjection.** The shedding or throwing of spores from a sporophyte.

**abjoint.** To delimit by a septum or joint; to separate at a joint.

**abney level.** A small, handheld instrument used for determining the degree of slope.

**abortive.** Imperfectly developed, defective, barren.

**abrupt.** Terminating suddenly as though cut off.

**abscisic acid.** A plant growth regulator which promotes leaf abscission, prevents flowering of certain species, promotes flowering of others, and inhibits germination of several with nondormant seeds.

**absciss, abscission.** To fall off, as with leaves, flowers, fruits, or other plant parts.

**absciss layer, abscission layer, abscission zone.** One or more layers of cells that undergo transverse divisions in a zone extending across the petiole resulting in the shedding of the plant part. Layer occurs near the point of attachment of organ to plant. (*See* fig. A-1).

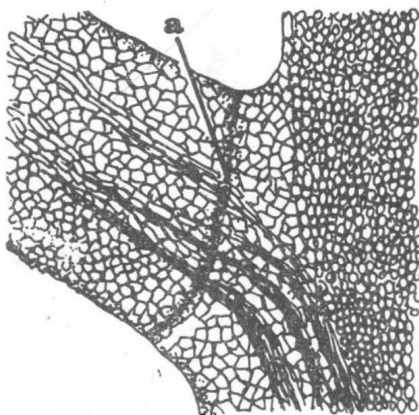


Fig. A-1. Abscission layer.

in a coordinate system; represents the distance of a point measured parallel to the x-axis.

the number of releves (sample plots) in which a given

**absolute requirement.** Said of plants which will remain vegetative indefinitely and will not flower unless exposed to a required interval of low temperature.

**absolute zero.** Approximately  $-273.16^{\circ}\text{C}$ . It is the hypothetical point on the Kelvin scale of temperature at which random molecular motion ceases. It represents the complete absence of heat.

**absorption.** The process of passing into, as in the absorption of water and dissolved minerals into a cell or root.

**absorption spectrum.** The spectrum of light waves absorbed by a particular substance, e.g., a pigment. It is measured by a spectrophotometer.

**abstriction.** The separation and discharge of a part as in the formation of spores or conidia in various fungi.

**abundance.** An estimation of the number of individuals of a species in a region.

**abyssal.** Pertaining to great depths. Usually used in reference to ocean depths 1829 meters (6000 feet) or more below the surface.

**acantha.** A spine, prickle, or thorn.

**acantho-**. A prefix meaning thorny or spiny.

**acanthocarpous**. Having fruit covered with spines, prickles, or thorns.

**acanthocephalous**. Having a hooked beak.

**acarodomatia hairs**. Hairs found in cavities; hairs found on leaves in the axils of the veins of the first and sometimes second or higher orders of ramification.

**acarophyta**. Plants which harbor mites.

**acarpelous**. Lacking carpels.

**acarpic, acarpous**. Lacking or not producing fruit.

**acaulescent**. Stemless, or apparently so; sometimes the stem is underground or protrudes only slightly; a descriptive rather than a morphological term. Contrast caulescent.

**accessory**. Additional to the usual numbers of plant organs, as in accessory buds, or accessory branches.

**accessory cell**. See subsidiary cell.

**accessory chromosome**. 1. A sex-determining chromosome. 2. B chromosome.

**accessory fruits**. 1. Parts not derived from the ovary but associated with it when it forms a fruit. 2. A fruit in which the major portion consists of tissue other than ovary tissue; e. g. apples, pears, strawberries.

**accessory organs**. The calyx and/or the corolla.

**accessory pigment**. A pigment that absorbs light energy and transfers it to chlorophyll *a*. Chlorophylls *b*, *c*, *d* are sometimes considered accessory pigments.

**acclimation, acclimatization**. The natural process of adapting to a climate which was harmful at first; the process of becoming acclimated.

**accrescent**. Increasing in size with age; especially any increase in calyx size after pollination.

**accumbent**. Lying against and face to face; lying in contact; reclining.

**accumbent cotyledons**. Cotyledons with edges lying against the embryo or the radicle.

**accumulation**. The process of active uptake of ions into the root system of a plant.

#### 4 -aceae

**-aceae.** A suffix used in names of plant families.

**acellular.** Lacking cells; not composed of cells.

**acentric.** Lacking a center or centromere, as in a chromosome or a chromatid.

**acephalous.** Lacking a head.

**acerate, acerose.** Having the shape of a needle; needlelike.

**acerb.** Sour, bitter, and harsh to the taste, as with unripe fruit.

**acervate.** Occurring or growing in tufts, heaps, clusters or cushions.

**acervulus, pl. acervuli.** 1. Discoid or pillow-shaped fruiting structures in certain fungi on which conidia are produced on conidiophores. (See fig. A-2). 2. A flower cluster which is only found in the chamaedoreoid group of palms; a form of a cincinnus.

**acetabuliform.** Shaped like a shallow saucer; used to describe fructifications of some lichens.

**acetyl coenzyme A.** A compound formed from pyruvic acid, which then enters the Krebs Cycle; it is used in the synthesis of fatty acids and many other metabolic products.

**achene.** A simple, dry, one-celled, one-seeded, indehiscent fruit; seed coat is not attached to the pericarp.

**achenecetum.** An aggregation of achenes, as in *Ranunculus*.

**achenodium,** A double achene, as the cremocarp of the umbel family (*Apiaceae*).

**achlamydeous.** Lacking a perianth; without calyx or corolla.

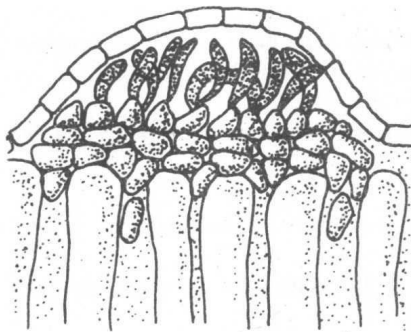


Fig. A-2. Acervulus.



**achromatic apparatus, achromatic figure.** In mitosis, the spindle fibers and cell centers, which do not stain readily.

**acicula, pl. aciculae.** A needlelike spine or bristle, as in the bristlelike continuations of the rachilla of grasses.

**acicular.** Needle-shaped, as an acicular leaf; having needlelike projections. as an acicular crystal.

**aciculate.** Marked with fine lines, usually randomly arranged.

**acid.** A substance having a pH below 7.0; dissociates and releases hydrogen ( $H^+$ ) ions. Compare base.

**acid plant.** Plants which grow particularly well in acid soil.

**acid soil.** Soil which has a pH less than 7.0.

**acorn.** The fruit of the oak tree (*Quercus*), composed of a nut and its cup or cupule.

**acquired characteristics.** According to Lamarck's Theory of Use and Disuse, changes in environment cause modifications of structure or function in organs and resulting changes are inheritable. There is no evidence, however, to support this theory.

**acra-.** A prefix meaning at the apex.

**acrandry.** Where antheridia are found at the apex of the stem, as in bryophytes.

**acranthous.** Having an inflorescence borne at the tip of the main axis.

**acrasin.** A chemotactically active substance produced by amoebae of cellular slime molds which causes their aggregation.

**acrid.** Sharp, irritating or biting to the taste.

**acritarchs.** Name applied to microfossils whose affiliations are unknown; many acritarchs are probably fossil algae.

**acro-.** A prefix meaning topmost; the tip.

**acrocarpic, acrocarpous.** A growth form in which the gametophyte is erect and the sporophyte terminates the main axis, as in certain mosses. Compare pleurocarpous.

**acrocaulous.** At the tip of a stem, as a flower or fruit.

**acrocentric.** A chromosome or chromatid having a nearly terminal centromere.

## 6 acrocidal capsule



Fig. A-3. Acrodromous.

**acrocidal capsule.** A capsule that dehisces through terminal slits.

**acrodrome, acrodromous.** A leaf with the main veins parallel and united at the apex, as in plantain (*Plantago*). (See fig. A-3).

**acrogamous.** Plants in which the egg apparatus is produced at the summit of the embryo sac, as in most angiosperms.

**acrogen.** A plant of the highest class of cryptogams, including the ferns, mosses, and liverworts, which have the growing point at the summit or apex.

**acrogenous.** Growing from the apex (as the stems of ferns and mosses); borne at the tips of hyphae.

**acrogynous.** Developing at the tip of the main shoot, with reference to the archegonia of certain scale mosses.

**acrolaminar.** Ethereal oil glands located near the base of leaves.

**acropetal, acropetal development.** Ascending; developing or blooming in succession from a basal position toward the apex. Said of organs (e.g. leaves, flowers), tissues or cells which develop successively on an axis so that the youngest arise at the apex. *Opp.* basipetal.

**acropetalous.** An indeterminant inflorescence.

**acropetiolar.** Referring to ethereal oil glands found near the apex of a petiole.

**acrophytes.** Plants of alpine areas.

**acroramous.** Leaves positioned terminally, near the apex of a branch.

**acroscopic.** Facing towards the apex.

**acrospire.** The first shoot or sprout of a germinating seed.

**actinomorphic.** Flowers which are radially symmetrical; i. e. capable of being bisected into identical halves along more than one axis, forming mirror images. *Syn.* regular, radial symmetry. *Opp.* zygomorphic.

**actinostele.** A protostele with vascular tissue arranged in radiating star-shaped arms interspersed with parenchyma.

**action spectrum.** The range of light waves that elicit a particular plant response.

**active absorption.** Absorption of water and other materials involving an expenditure of cellular energy. Compare imbibition and diffusion.

**active buds.** Those which are actively growing, in contrast to dormant buds.

**active site.** The site on the surface of an enzyme molecule where substrate molecules are transformed into reaction products.

**active transport.** An energy-requiring process by which a cell moves a substance (e.g. nutrients) across the plasma membrane, often against a concentration gradient, replacing what is used in food manufacturing or other respiratory activities. (*See* fig. A-4).

**active trap.** In carnivorous plants, a trap in which at least a portion moves during the trapping process. Contrast passive trap.

**active water absorption.** The absorption of water by roots, brought about by osmotic pressure resulting from a high solute concentration in the xylem sap and permeability of the living root cells.

**aculeate.** Prickly, thorny, armed with spines.

**aculeus.** A prickle or spine, such as on a rose; a sharp epidermal emergence.

**acumen.** A tapering point.

**acuminate.** Having a long, slender, sharp point with a terminal angle less than 45°; margins straight to convex.

**acute.** Sharp-pointed, with a terminal angle between 45° and 90°; margins straight to convex.

## 8 acyclic

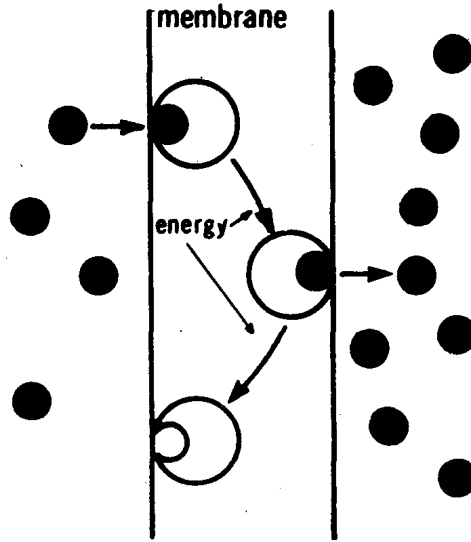


Fig. A-4. Active transport.

**acyclic.** Arranged in spirals, not in whorls.

**ad-.** A prefix meaning to, or toward.

**adaptation.** The process by which an organism becomes modified by a change in structure, form or function which enables it to better survive under given environmental conditions; also the result of this process.

**adaptive peak.** The highest degree of adaptation exhibited by an organism to a particular set of environmental parameters.

**adaptive radiation.** An important evolutionary process, wherein due to disruptive selection processes, a population acquires a new complex of adaptive characters which enable it to more efficiently compete for existing habitats or newly created ones, as on an island.

**adaptive value.** *See* fitness.

**adaptive zone.** The habitat or niche of an organism.

**adaxial, adaxial surface.** The side toward the axis; the surface of a leaf that faces the stem during development, e. g. the upper side of the leaf. *Syn.* ventral. *Opp.* dorsal.

**adelphous.** Having stamens united by their filaments.

**adenine.** A purine base found in DNA, RNA and nucleotides such as ATP and ADP.

**adenosine diphosphate (ADP).** A nucleoside diphosphate of adenosine which is involved in the transfer of energy during respiration.

**adenosine monophosphate (AMP).** A compound formed by the hydrolysis of adenosine diphosphate (ADP).

**adenosine triphosphatase, ATPase.** The enzyme that hydrolyzes ATP to form ADP and inorganic phosphate and catalyzes the reverse reaction of ATP formation.

**adenosine triphosphate (ATP).** The nucleoside triphosphate of adenosine closely related to ADP. A high energy intermediate in energy transfer reactions, and a major source of useable chemical energy in metabolism. Most frequently found in mitochondria.

**adherent.** A condition where two dissimilar organs or parts touch each other conni-  
vently but are not grown or fused together. Compare adnate.

**adhesion.** 1. The growing together or union of organs or parts which are normally separate. 2. The attraction of unlike molecules to each other, e. g. water to cellulose.

**adiabatic.** Refers to a thermodynamic process during which no heat is added to or taken from the body or system involved. No heat exchange occurs between the system and the environment.

**adiabatic cooling.** The cooling of warm, low elevational air as it rises and expands; a factor contributing to cooler alpine temperatures.

**adnate, adnation.** The union of unlike parts; organically united or fused with another dissimilar part, e. g. an ovary to a calyx tube, or stamens to petals. Compare adherent.

**ADP.** See adenosine diphosphate.

**adsorption.** Adhesion of the molecules of a gas, liquid or dissolved substance to a solid surface or interface; it consists of an interfacial concentration of molecules, and occurs in colloidal and noncolloidal systems.

**advanced.** A term applied to an organism or part of an organism which implies considerable difference or modification from the ancestral condition.

**adventitious.** Plant organs produced in an unusual or irregular position, or at an unusual time of development, as in adventitious buds, roots or shoots. (See fig. A-5).

**adventitious embryo, embryony.** An embryo formed without fertilization, which de-

10 **adventive**



Fig. A-5. Adventitious roots: A. originate at base, B. originate at nodes, C. originate between nodes.

velops directly from the ovular tissue of the parental sporophyte, usually from the integument of the nucellus.

**adventive.** Introduced but not well established; recently or incompletely naturalized, or temporarily established.

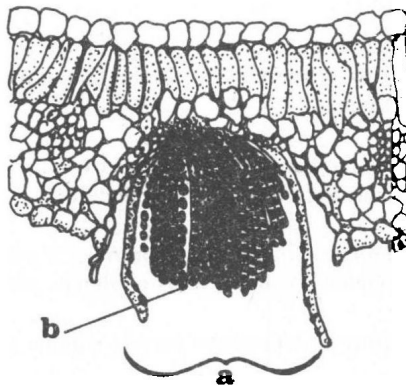


Fig. A-6. Aecium in leaf cross section: a. aecium, b. aeciospores.

**aecial initial.** A coil of hyphae produced by the haploid mycelium resulting from the germination of a basidiospore of some rust fungi.

**aeciospore.** A spore formed in an aecium; a binucleate spore of a rust fungus. (See fig. A-6).

**aecium, pl. aecia.** A cup-shaped structure consisting of dikaryotic hyphal cells produced by some rust fungi on certain host plants. (See fig. A-6).

**aerating roots.** Roots which arise from the soil surface as from mud. Such roots have loose corky tissue (aerenchyma) with conspicuous intercellular spaces thought to function in aeration.

**aerating tissue.** See aerenchyma.

**aeration.** The entrance of air; the mixing with air, or being supplied with air.

**aerenchyma.** Parenchyma tissue characterized by particularly large intercellular spaces; respiratory tissue formed by the phellogen. *Syn.* aerating tissue.

**aerial.** Living above the surface of the ground or water.

**aerial plants.** Plants not rooted in soil, such as epiphytic plants; e.g. bromeliads (*Tillandsia*), and some tropical orchids.

**aerial roots or stems.** Roots or stems growing from adventitious buds into the air; roots which develop partly or entirely above the ground, as the roots of orchids.

**aerobe.** An organism which requires free oxygen for maintenance of life.

**aerobic.** Capable of living only in the presence of free oxygen.

**aerobic respiration.** Respiration occurring in the presence of oxygen.

**aerobiology.** The study of small organisms and their products present in the atmosphere; e.g. spores and pollen.

**aerocaulous.** Referring to plants with aerial stems.

**aerola, pl. aerolae.** Wall markings in certain diatoms, consisting of thin areas bounded by ridges of siliceous material and having an aggregation of many fine pores.

**aerophyllous.** Referring to plants with aerial leaves.

**aerophyte.** A plant that grows attached to an aerial portion of another plant, obtaining water from rain or dew, as an orchid; an epiphyte.

## 12 aestival

**aestival.** With flowers appearing in summer.

**aestivation, estivation.** 1. The arrangement of the perianth or its parts in the bud. Compare vernation. 2. Passing through a hot dry season in an inactive state.

**aethalium, pl. aethalia.** A sessile, rounded, generally pillow-shaped fructification formed by a massing of all or most of the plasmodium in some of the slime molds (*Myxomycetes*).

**affinis.** Closely related to another.

**affinity.** Similarity between entities in regard to morphological traits.

**afforestation.** To convert into a forest or woodland, usually where trees have not previously grown.

**after-ripening.** The metabolic changes that must occur in some dormant seeds before germination can occur.

**agamic, agamous.** Asexual; reproduction without union of sex cells.

**agamic complex.** An asexually (apomictically) reproducing population of plants.

**agamogenesis.** Asexual reproduction of any kind, e. g. by buds, gemmae, etc.; without formation of functional gametes; parthenogenesis.

**agamospecies.** An apomictic population believed derived from a common ancestor based on morphological, cytological and other data.

**agamospermy.** The production of seeds by asexual means, i. e. without fertilization.

**agar.** A non-nitrogenous, gelatinous mixture of polysaccharides obtained from certain red algae. Used extensively as a solidifying agent in laboratory culture media for bacteria, fungi and tissue cultures.

**agenesis.** Failure to develop.

**agents.** Organic or inorganic means which effect seed dispersal such as wind, water and animals; also vectors of pollination such as wind, insects, etc.

**aggregate.** 1. Clustered together to form a dense mass or head; usually applied to an inflorescence. 2. Gravel, crushed rock, or other coarse, inert material that can be mixed with soil to make it more porous.

**aggregate cup fruit.** A fruit derived from an apocarpous (free carpels), perigynous flower; fruit composed of fruitlets, each with its own pericarp.





Fig. A-7. Aggregate fruit: a. seed, b. follicle.

**aggregate free fruit.** A fruit derived from an apocarpous (free carpels), hypogynous flower; fruit composed of fruitlets, each with its own pericarp.

**aggregate fruit.** A fruit developed from a single flower by fusion of many separate carpels (pistils), all of which ripen together into one mass, as in blackberry, raspberry, and magnolia. (See fig. A-7).

**aggregate ray.** In secondary vascular tissues, a group of small rays arranged so as to appear to be one large ray.

**aggregation.** 1. The condensation of cell contents under some stimulus; the movement of protoplasm in tenacle or tendril cells of sensitive plants which causes the tendril to bend toward the point stimulated. 2. A group or mass of individuals. 3. The movement toward a single point of amoebae in some cellular slime molds (Acrasiomycetes) prior to pseudoplasmodium formation.

**agmatoploidy.** Used in reference to differences in the number of independently assorting pairs of chromosomal fragments which occur in a group of organisms. Characteristic of organisms lacking a localized centromere; i. e. they are polycentric.

**agricultural ecosystem.** An ecosystem based on the cultivation of plants and animals by man.

**agrobiolgy.** The study of plant nutrition, crop production, and growth in relation to soil control.

**agrology.** The branch of agricultural science which deals with the study of soils.

**agronomy.** The study and practice of field crop production and soil management.

**agrostology.** The branch of systematic botany dealing with the study of grasses.