



# ILLUSTRATED PLANT GLOSSARY

ENID MAYFIELD





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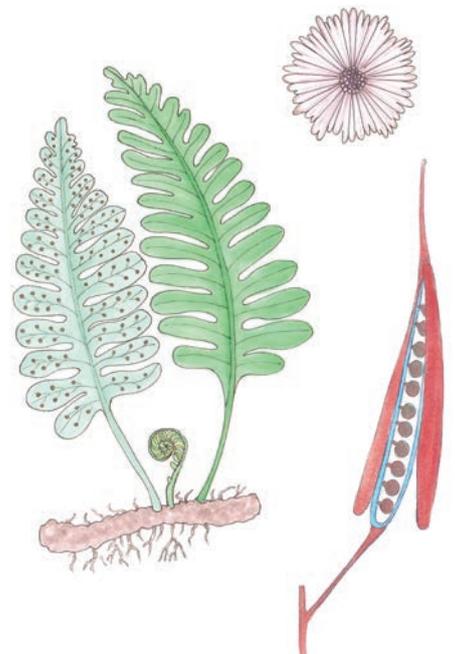
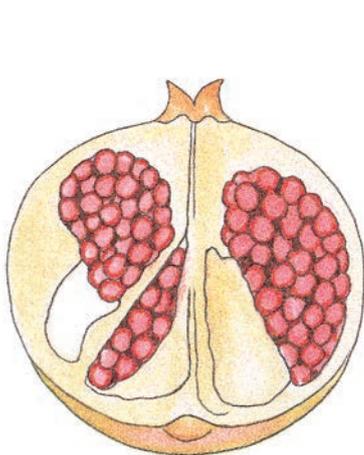
*For my family.*

*For the families of plants and animals and the families of the people who have custody of this Earth.*



# ILLUSTRATED PLANT GLOSSARY

ENID MAYFIELD



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A catalogue record for this book is available from the National Library of Australia.

ISBN: 9781486303533 (pbk)  
ISBN: 9781486303540 (epdf)  
ISBN: 9781486303557 (epub)

Published in print in Australia and New Zealand, and in all other formats throughout the world, by CSIRO Publishing.

CSIRO Publishing  
Locked Bag 10  
Clayton South VIC 3169  
Australia

Telephone: +61 3 9545 8400  
Email: [publishing.sales@csiro.au](mailto:publishing.sales@csiro.au)  
Website: [www.publish.csiro.au](http://www.publish.csiro.au)

**Sign up to our email alerts: [publish.csiro.au/earlyalert](http://publish.csiro.au/earlyalert)**

A catalogue record for this book is available from the British Library, London, UK.

Published in print only, throughout the world (except in Australia and New Zealand), by CABI.

ISBN 9781800620674

CABI  
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UK

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All illustrations are by the author.

Cover design by Cath Pirret  
Printed in China by Leo Paper Products Ltd

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# FOREWORD

Enid Mayfield's new plant book provides the reader with a remarkably comprehensive glossary including more than 4000 scientific and botanical terms, beautifully and accurately illustrated by her alone. This book will be invaluable to anyone with an interest in understanding plants, who may be frustrated when using other glossaries that can be incomplete, contradictory or lack 'instantly informative' illustrations (when a picture is worth a thousand words).

This particular glossary stands out in the way the material was researched and assembled under themes and sub-topics, finally arranged alphabetically with very useful cross-referencing. The themes include: anatomy, angiosperms, bryophytes, chemistry, cytology, ferns and fern allies, family specific terms, flowers, fruit, genetics, grasses, rushes and sedges, gymnosperms, habit and growth, habitat and ecology, indumentum, inflorescence, leaves, orchids, reproduction, roots, seeds and systematics. Enid researched scientific areas beyond those found in many traditional plant glossaries, including DNA-based terminology, palynology and modern systematics.

Also unique is Enid's own illustrations of terms using familiar examples – often diagrammatic but often easily identifiable plants including many Australian species. The use of drawings of plants and plant structures, rather than photographs, allows the author to emphasise the salient features to convey clearly the meaning of a botanical term. Enid's diagrammatic illustrations of the various (and at times bewildering) terms used to describe the various inflorescences of flowering plants (used in keys to identify species) are a good example of where she has achieved accurate, understandable definitions with common plant examples.

Enid's background is in education, discovering a talent for illustrating plants later in life, spending time in the National Herbarium of Victoria, and contributing artwork to the *Flora of Victoria* publications. She became interested in the botany of her local area: researching and publishing two illustrated books on the flora of the Otway Plain and Ranges when she lived in Geelong. She now resides in Queensland and is interested in plants of the Sunshine Coast and hinterland near her Noosa home.

Enid has shown quite extraordinary discipline and commitment over seven years, working closely with her scientific editor, Neville Walsh, Senior Botanist, Royal Botanic Gardens Victoria, and CSIRO Publishing. The result is this excellent and widely accessible *Illustrated Plant Glossary* that will be used by botanists, horticulturalists, ecologists, teachers, students and plant enthusiasts alike.

Professor Emeritus Pauline Ladiges AO FAA  
The University of Melbourne

# ACKNOWLEDGEMENTS

Neville Walsh is Senior Conservation Botanist at the Royal Botanic Gardens Victoria and editor of the four volume *Flora of Victoria*. He has an exceptional mind, a vast knowledge of plant sciences and a wonderful wit. It has been my privilege to have him as Scientific Editor for this publication.

Both Susan Howells and Jenny Stein gave many hours of invaluable work to this project in its early days.

I would also like to acknowledge the wonderful relationships I have had with staff in the Science Division of Royal Botanic Gardens Victoria during my time as an Honorary Associate.

The journey over the last seven years, however, has been largely a solitary one. Each theme was researched thoroughly, the terms defined and decisions made as to how best elucidate them with thousands of illustrations. All of this was then inserted into the text, ready to pass on to the publisher as a print-ready document. It has been a many-faceted project, always engaging and endlessly enjoyable.

If this work expands the knowledge of plant sciences and brings its many aspects into finer focus for my readers, then I am very happy.

## ABOUT THE AUTHOR

Enid Mayfield's career as a teacher was varied. She worked part time as she had a young family. At secondary level her interest was innovative curriculum design and development for which she was recognised with awards. She also tutored at Deakin University in the Institute of Koorie Education.

When she discovered she could draw she studied Botanical Illustration at Burnley Horticultural College. She then illustrated for the *Flora of Victoria* at the Royal Botanic Gardens Victoria, in the Department of Plant Sciences (now Science Division). She contributed to the *Flora of Australia* project and many other publications. Her association with the Gardens was ongoing and she became an Honorary Associate there.

Her base was a studio and office space in the Geelong Botanic Gardens where she had a close relationship with the horticultural staff. For 12 years she went into the field to collect plants to illustrate for her two-volume *Flora of the Otway Plain and Ranges*.

Her skill is in being able to research complex scientific topics and write and illustrate them so that they are accessible to a wide audience.

She is married to Rob and they have two children, Anne who is married to Mark and David who is married to Rebecca. They have six grandsons, Darcy, Samuel, Julian, Jules, Raiph and Lachlan. Plants and planet are the forces that have guided her journey.

# INTRODUCTION

The *Illustrated Plant Glossary* is the culmination of a seven-year journey. I have always been interested in developing innovative approaches to the material that I work with. In this publication, I was able to use my expertise as a scientific illustrator that, together with my writing style, as well as my approach to the text, enabled me to simplify a complex scientific subject and make it easier to understand and enjoy for a wide community of people. I also designed the layout of the publication in InDesign and inserted the text and illustrations in a way that looks accessible and inviting.

A major element of this project was to determine what needed to be covered. To ensure it was fully comprehensive, I consulted numerous texts on plant sciences, including university texts, glossaries and many other sources. Ultimately the references for this work were so extensive that it proved impossible to provide a full list. I researched and defined terms in relation to each other under topic and sub-topic. Once done, I then listed them alphabetically. Much like the plants themselves, I found that the list was constantly growing, as addressing one term would inevitably mean referencing another. Ultimately this resulted in a list of over 4000 terms. I have always wanted to 'save the Earth' and my work has been deeply inspired by this personal intention. Indeed, when my first child was born, I wrote her a letter saying I would only ever have two children because the world was over-populated and pollution was destroying our planet! By learning more about plants we begin to understand what it means to nurture our planet.

I wanted this work to be exceptional, excellent and the very best available – exemplary even. My aim in this has been to provide a glossary that is exceptionally thorough and useful for any individual who works in, researches or is passionate about plants, no matter their level of knowledge or where they are in the world. I hope that *Illustrated Plant Glossary* meets these expectations.

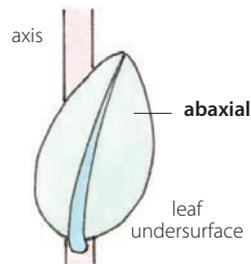


**2n** The number of chromosomes in a somatic cell as opposed to a sex cell.  
 A diploid species, such as corn, has two sets of 10 chromosomes, so that  $n = 10$  and  $2n = 2x = 20$ .  
 A hexaploid species, such as wheat, has six sets of seven chromosomes so that  $n = 7$  and  $2n = 6x = 42$ .  
 see **chromosome set, ploidy**

**a-, an-** A prefix meaning absent.

**ab-** A prefix meaning away from.  
 cf. **ad-**

**abaxial** The side of an organ that is facing away from the axis.  
 The undersurface of an erect leaf with respect to the vertical stem.  
 see also **resupinate**  
 cf. **adaxial**



**abbr.** Abbreviation.

**abbreviation, abbr. abbr.** A shortened form of a word, phrase or name of an authority after a taxon name. The scientific name of the smooth blackberry is *Rubus canadensis* L., with the authority L. referring to Carl Linnaeus who named the species.

**aberrant** Unusual or atypical. Different from the usual form. Abnormal, as an aberrant chromosome or aberrant plant growth.

**abiotic** Non-living, including wind, water, sunlight, soil and minerals.  
 In an ecosystem, relating to or resulting from the non-living components.  
 cf. **biotic**

**abortion** Failure to develop properly or to develop to completion, as the mericarps of some woodruffs (*Asperula*).

**abort** To be checked in normal development so as to partially develop or completely fail to develop.

**abortive** Of an arrest or failure of development. Imperfectly formed or developed.  
 cf. **rudimentary, vestigial**

### Abortion



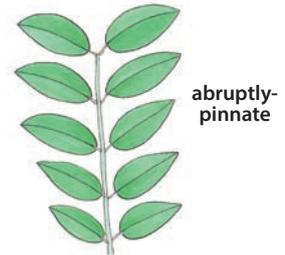
**abrupt** Appearing cut off at the base or the apex. Terminating suddenly.  
 = **truncate**

leaf tip **abrupt**



### abruptly-pinnate

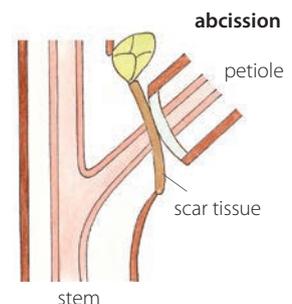
Of a pinnate leaf with leaflets arranged in pairs and terminating with a pair of leaflets.  
 = **even-pinnate, paripinnate**



**abscise** Separate by abscission, fall off.

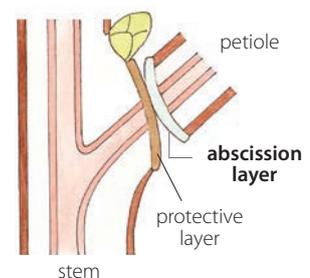
**abscisic acid** A plant hormone associated with seed and bud dormancy, functioning of the stomata and responses to environmental stresses like drought. It is associated with the fall of leaves in evergreen and deciduous plants.  
 see **phytohormone**

**abscission** The natural shedding of plant parts, typically leaves and fruit, caused by the breakdown of cells at the base of the structure. Protective scar tissue (periderm) develops at the point of abscission.



### abscission layer

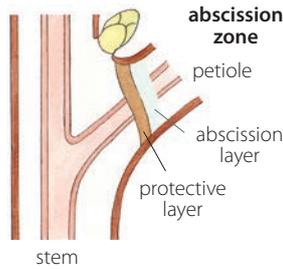
A layer of cells that disintegrates to facilitate the fall of a plant part, as a leaf or fruit. It forms in the abscission zone of some plants.  
 = **separation layer**



**abscission zone**

The zone, as at the base of a leaf, where shedding occurs. It includes the protective layer and the abscission layer.

= **separation zone**



**absorption** The process by which one substance takes in another substance, as roots that absorb dissolved nutrients from the soil.

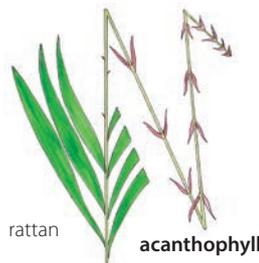
**acantha** A thorn, spine or prickle.

**acanthaceous** Thorny, spiny or prickly.

**acanthoid** Shaped like a spine, thorn or prickle.

**acanthophyll**

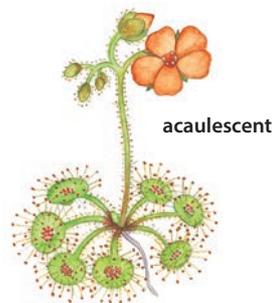
A spine derived from a leaflet, as those at the tip of the leaf in rattans and at the base of the frond of the Canary Island date palm (*Phoenix canariensis*).



**acarpic, acarpous** Producing no fruit, sterile.

**acaulescent** Lacking an above-ground stem except for the inflorescence axis and bearing most leaves at ground level, as some sundews (*Drosera*).

= **acaulous**  
cf. **caulescent**



**acaulous** Another name for acaulescent.

**accepted** The published and correct scientific name of a plant.

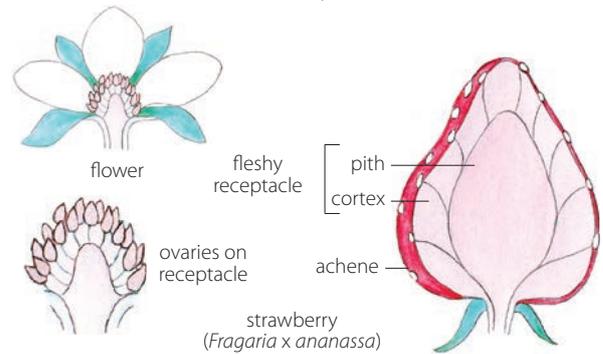
**accessory** Additional to the usual. Having a secondary or supplementary function to another organ.

**accessory bud** An additional bud that occurs in the leaf axil beside, above or below the usually solitary bud.

**accessory fruit** A fruit derived from a simple ovary or compound ovary and some additional non-ovarian tissue like the receptacle. A strawberry has the true fruits (achenes derived from the ovaries) embedded in the fleshy receptacle. Other accessory fruits include hips, pomes and pineapples.

= **false fruit, pseudocarp**

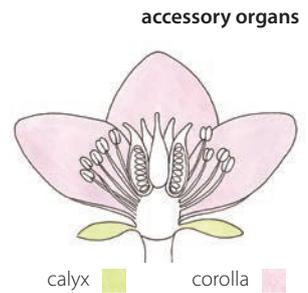
**Accessory fruit**



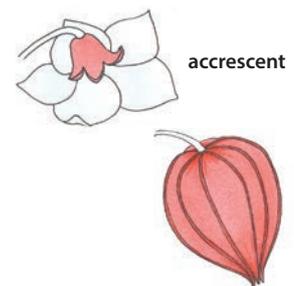
**accessory organs**

Organs that assist the functioning of another organ, as the calyx and corolla of a flower that do not take part in the actual process of reproduction but assist by providing protection or attracting pollinators.

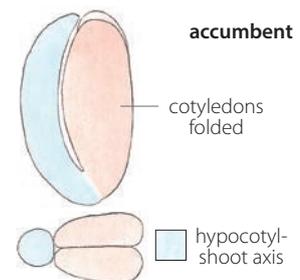
cf. **essential organs**



**accrescent** Increasing in size with age and continuing to grow beyond what is normal, as the calyx of the Chinese lantern (*Physalis alkekengi*) that continues to grow after the corolla has fallen.



**accumbent** Of a plant part lying or folded against another part. Of cotyledons in a seed that are folded so that both lie against the hypocotyl-shoot axis, as bitter cress (*Barbarea sisymbrium*).



**-aceous** A suffix denoting resemblance, belonging to or of the nature of.

**aceriform** Having leaves similar to those of maple (*Acer*) trees.

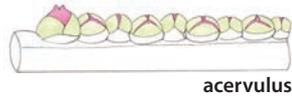
**acerose** Needle-shaped. Slender, stiff and pointed.  
= **acicular**



acerose

**acervulus, pl. acervuli**

Of palms (Arecaceae), a group of flowers borne in a line.



acervulus

**acetolysis** Decomposition of an organic molecule through the action of acetic acid or acetic anhydride.

The technique is used to isolate pollen for study.

**achene** A dry indehiscent fruit with one seed attached to the fruit wall (pericarp) at one point only.

Derived from a one-carpelled superior ovary, as buttercups (*Ranunculus*).

cf. **caryopsis, cypsel, diclesium**

**achenoid** Of or like an achene.

#### Achene



buttercup (*Ranunculus*)

pericarp  
seed coat  
seed  
attachment

**achenecetum**

An aggregate fruit composed of a cluster of achenes, as the buttercup (*Ranunculus*).



achenes

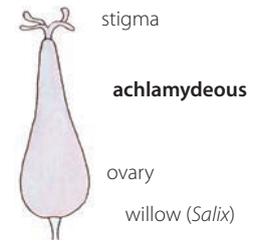
achenecetum

**achenocarp** A general name for a dry indehiscent fruit.

**achlamydeous** Having no perianth (petals or sepals).

Naked, as the female flower of willows (*Salix*).

cf. **chlamydeous**



stigma

achlamydeous

ovary

willow (*Salix*)

**achlorophyllous** Having no chlorophyll.

**acicula, pl. aciculae,**

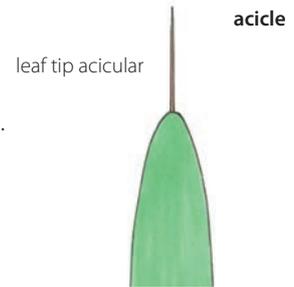
**acicle** A slender, stiff needle-like projection.

A needle-like prickle.

**acicular** Needle-shaped. Slender, stiff and pointed.

= **acerose**

**aciculate** Marked as if with pin pricks or needle scratches.



acicle

leaf tip acicular

**acid** Any of a class of substances with a sour taste. An acid has the ability to turn blue litmus paper red (indicating a pH of 0 to 6), and to react with bases and certain metals to form salts.

**acidic** Having a high concentration of acid.

Of a substance with a pH of 0 to 6.

see **litmus test**

**acidity** Refers to the concentration of acids in a substance.

**acidophile** A plant that has a preference for or grows exclusively on acidic soils that have a pH of less than 7.

**acidophilous** Thriving in an acidic environment, as bogs and marshes.

cf. **basiphilous**

**acidophyte** A plant growing only on acid soils with a pH of less than 5.0.

**acidophytic** Growing on acid soils.

**acinaceous**

Having many small seeds like a grape (*Vitis vinifera*).



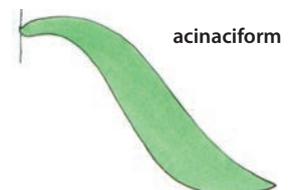
acinaceous

grape

**acinaciform**

Shaped much like a scimitar.

Of a leaf with a curved blade that broadens towards the tip.



acinaciform

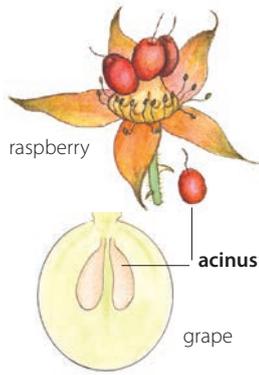
**acinus, pl. acini**

One of the small berries that make up some fruits, as the raspberry (*Rubus*). The stone or seed within the small berry.

A grapeseed.

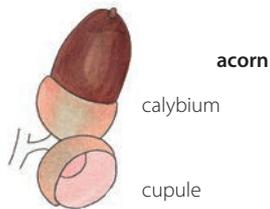
**acinose** Composed of acini.

Resembling a bunch of grapes.



**acondylose, acondylous** Having stems without joints or nodes.

**acorn** The fruit of the oak (*Quercus*) that is a nut (calybiium) partly or completely enveloped at the base by a cupule.

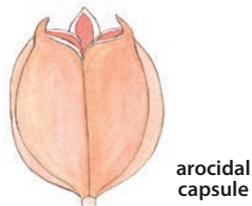


**acotyledonous** Having no cotyledons. Of flowering plants, embryos without cotyledons, as some orchids like cattleya (*Cattleya*) and dodder (*Cuscuta*).

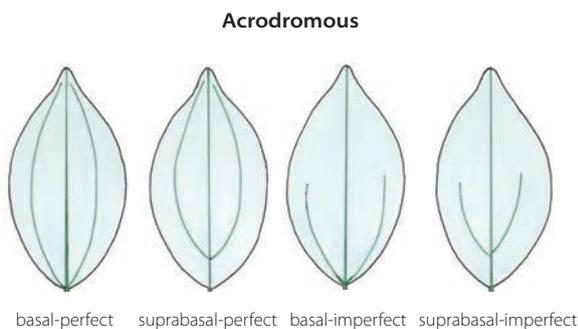
cf. **cotyledonous**

**acquired character** A feature of an organism that occurs as a result of the environment and that is not transferred from one generation to the next. cf. **inherited character**

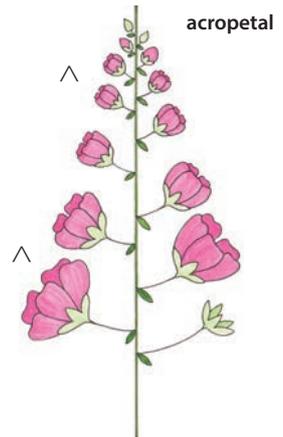
**acrocidal capsule** A capsule that splits open through slits at the tip, as bladderwort (*Staphylea*).



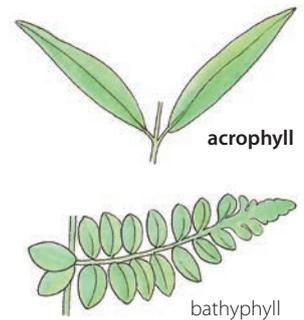
**acrodromous** Of leaves with two or more main veins running in arches towards the apex.



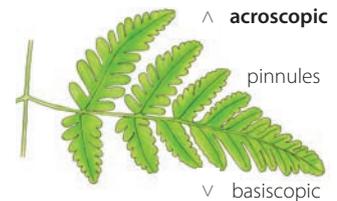
**acropetal** Developing in sequence from the base to the apex, as the racemose inflorescence of Persian fritillary (*Fritillaria persica*). Flowers at the bottom open first and buds near the top opening last. = **ascending inflorescence** see also **centripetal**, **centrifugal** cf. **basipetal**



**acrophyll** One of the mature fronds on the upper part of a climbing fern that is usually different from the basal fronds, as the climbing fern *Teratophyllum clemensiae*. cf. **bathyphyll**



**acroscopic** Facing or directed towards the apex, as the pinnules of some ferns. cf. **basiscopic**

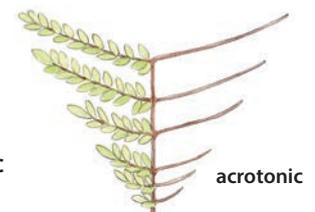


**acrospire** In grasses (Poaceae), the coleoptile.

**acrostichoid** With sporangia covering the lower surface of a fern frond, usually densely so, as the genus *Elaphoglossum*.



**acrotonic** Having growth strongest in the upper part of the plant. cf. **basitonic**, **mesotonic**

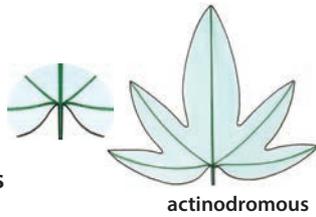


**actino-** A prefix meaning with radiating parts.

**actinodromous**

Of leaves with three or more primary veins diverging radially from a single point.

cf. **palinactinodromous**



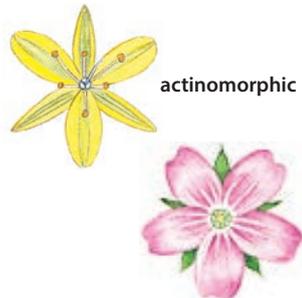
actinodromous

**actinomorphic**

Of flowers with radial symmetry that divide through the centre into two or more like halves. Regular.

see **polysymmetric**

cf. **zygomorphic**



actinomorphic

**activator**

A chemical substance that promotes a growth process, as an auxin that caused the apex of a stem to grow.

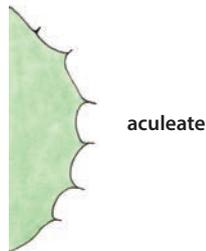
cf. **inhibitor**

**aculeate**

Having stiff sharp prickles. Prickly, as the margins of American holly (*Ilex opaca*).

cf. **aculeolate**

**aculeiform** Prickle-shaped.



aculeate

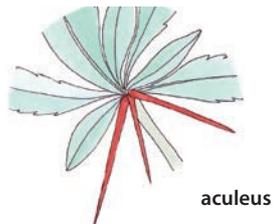
**aculeolate**

Minutely prickly.

cf. **aculeate**

**aculeus, aculei**

A stiff, sharp-pointed outgrowth, as a spine or a prickle.

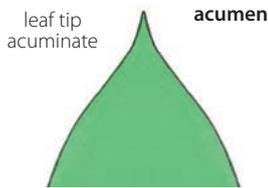


aculeus

**acumen**

A somewhat elongated terminal point.

**acuminate** Gradually tapering to a sharp point and forming concave sides along the point.



acumen

**acute**

Tapering to a pointed tip or base, with the margins having an angle of less than 90°.

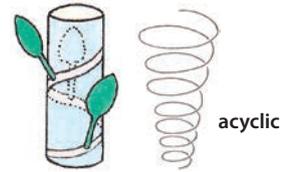
cf. **obtuse**



leaf tip acute

**acyclic**

Arranged in spirals and not in whorls, as leaves on a stem.



acyclic

**ad-**

A prefix meaning toward.

cf. **ab-**

**adaptation**

The process by which a plant's genetic make-up is modified in order for it to better fit its environment.

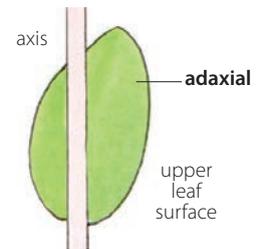
**adaxial**

The side of an organ facing towards the axis.

The upper surface of an erect leaf with respect to the vertical stem.

see also **resupinate**

cf. **abaxial**

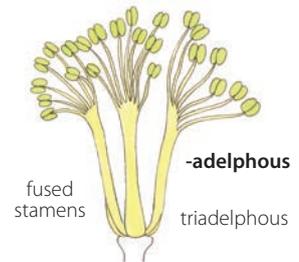


adaxial

upper leaf surface

**-adelphous**

A suffix indicating the number of fused stamens in a flower. It is preceded by an indication of the number, as mona-, dia-, tria- and poly-.



-adelphous

triadelphous

**adenosine triphosphate, ATP**

A molecule,

found in all living things, that stores chemical energy and releases it to fuel processes in a cell.

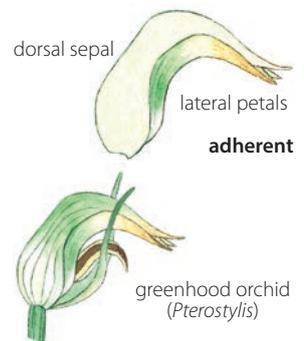
It is made up of adenine, the sugar ribose and three phosphate groups.

see **dephosphorylation, mitochondrion**

**adherent**

Of unlike parts joined, but only superficially, and easily separated, as the dorsal sepal and lateral petals that adhere to form a hood in greenhood orchids (*Pterostylis*).

cf. **coherent**



adherent

greenhood orchid (*Pterostylis*)

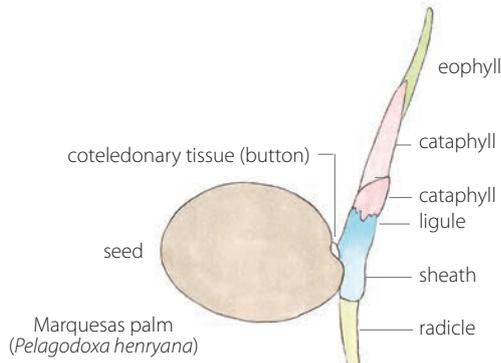
**adjacent**

Of parts that are next to each other but not overlapping or touching.

cf. **fused**

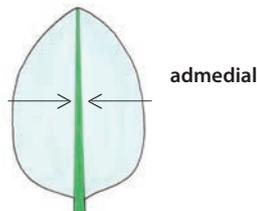
**adjacent-ligular germination** Of palms, one of three types of germination, as Marquesas palm (*Pelagodoxa henryana*). The cotyledonary petiole forms a button of tissue beside the seed and elongates very little. The radicle and plumular leaves emerge from the ligular sheath and develop next to the seed.  
 see also **remote-ligular germination**, **remote-tubular germination**

**Adjacent-ligular germination**



**admedial, admedian**

Of venation, running toward the midline of the leaf lamina.  
 cf. **exmedial**

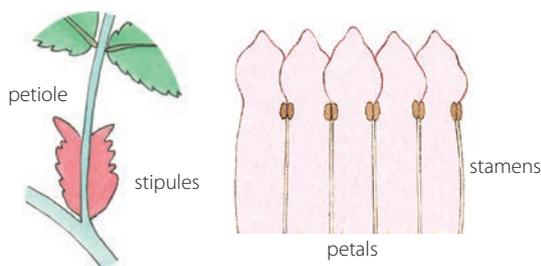


**admissible** In nomenclature, a name allowed under the rules of the International Code of Nomenclature.

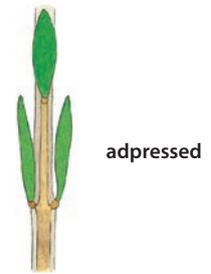
**admixture** A collection containing plant material other than that intended by the collector.

**adnate** Of unlike parts fused to one another, as the stamens fused to the corolla tube of common heath (*Epacris impressa*) or stipules fused to a petiole.  
 cf. **connate**

**Adnate**



**adpressed** Pressed closely against but not fused, as leaves or hairs against a stem. Pressed at an angle of at most 15° from the vertical.  
 = **appressed**



**adult** Fully grown.  
 The mature phases of a plant's life or plant part.  
 cf. **juvenile**

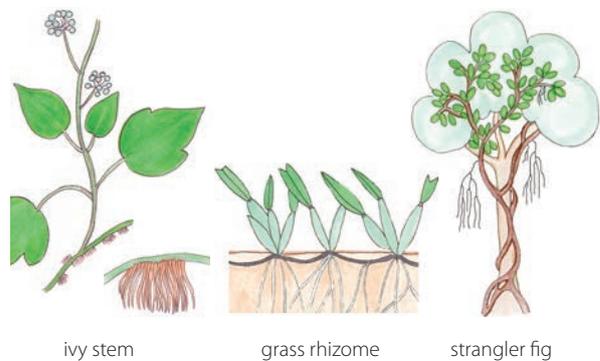
**advanced** In phylogenetics, exhibiting a notable, but not necessarily superior, change from the original condition.  
 Apomorphy or derived are preferred terms.

**adventitious** Of a plant part growing in an unusual location, as roots on a stem that originate from stem tissue.

**adventitious embryony** Of flowering plants (angiosperms), the production of an embryo directly from cells of the nucellus or integuments in the ovule.  
 A form of agamospermy.  
 = **sporophytic apomixis**

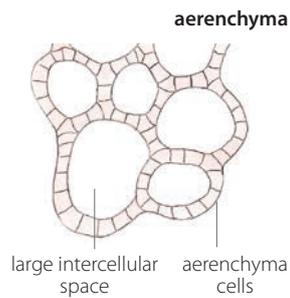
**adventitious roots** Of monocotyledons and some eudicots, roots that do not derive from the seed root, as a taproot. Adventitious roots grow in unusual places, as those on the stems of ivy (*Hedera helix*), on underground stems (rhizomes) and on the branches of strangler figs (*Ficus*)  
 see also **fibrous roots**

**Adventitious roots**

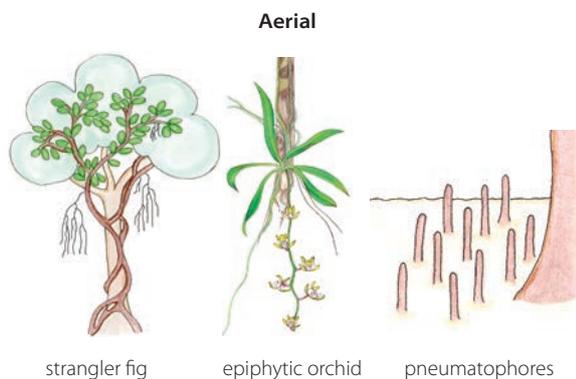


**adventive** Of a species new to a region that is not yet fully naturalised but is beginning to spread.

**aerenchyma** A form of parenchyma in which the cells enclose large intercellular spaces that support gas exchange and buoyancy. Found in the stems, roots and/or leaves of some aquatic plants.



**aerial** Growing or borne above the ground or water, as the aerial roots of strangler figs and epiphytic orchids and the pneumatophores of mangroves.

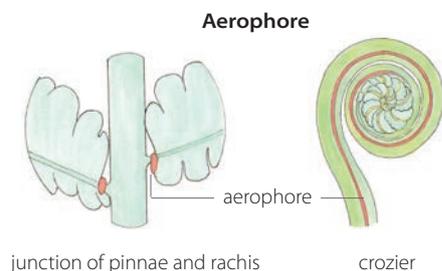


**aero-** A prefix meaning of or related to the air.

**aerobic respiration** The release of energy from organic compounds that takes place in the presence of oxygen.

*cf.* **anaerobic respiration**

**aerophore** Of most ferns, a small outgrowth depression or line bearing stomata.



**aerophyte** A plant that grows on another plant for support but not for nutrients, as an orchid or staghorn on a tree.

= **air plant, epiphyte**

*cf.* **parasite**

**aestival** Of or produced in summer.

*cf.* **autumnal, hibernal, vernal**

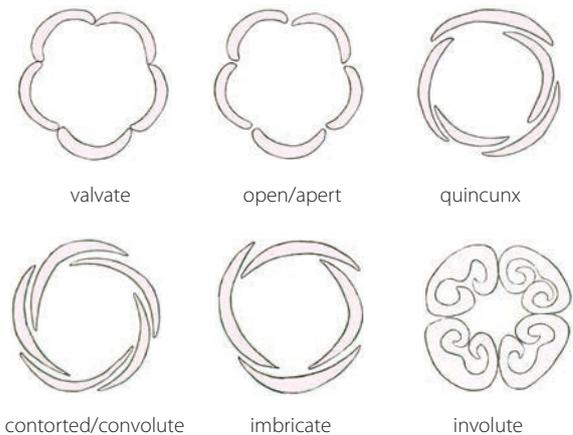
**aestivation** Of flowers, the way in which petals and sepals are arranged relative to one another in the bud before it opens. Sepals and petals in the same flower can have different aestivation.

Dormancy in summer, as some grasses like tall fescue (*Festuca arundinacea*).

*cf.* **vernation**

**aestivate** To pass the summer in a dormant state.

**Some types of floral aestivation**



**aff.** An abbreviation for affinis.

**affinis, abbr. aff.** Having an affinity with but not identical to.

Of an undescribed species that is similar to or related to a known species, as the undescribed species *Geranium retrorsum* sp. aff. *retrorsum* and the described species *Geranium retrorsum*.

**afoliate** Leafless.

**agamospecies** A species that produces embryos and seeds in the absence of fertilisation.

A species in which sexual reproduction does not occur.

**agamospermy** Any form of reproduction that involves cells in the ovule but takes place without fertilisation or meiosis.

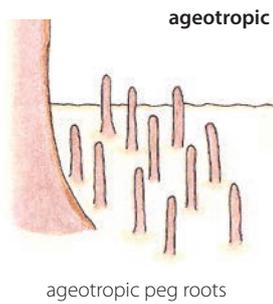
The formation of embryos and seeds in the absence of fertilisation.

Agamospermy includes parthenogenesis, diplospory, apospory, adventitious embryony, apogamy and gametophytic apomixis.

*see* **apomixis**

**agamosprous** Exhibiting agamospermy.

**ageotropic** Of or relating to ageotropism. Of plant parts that would be expected to grow downwards but instead grow upwards against the influence of gravity, as the peg roots of mangroves.



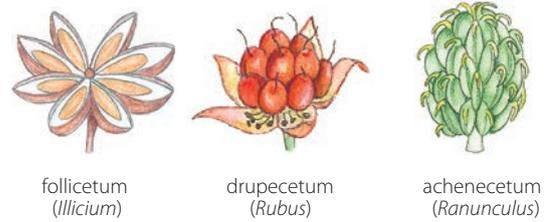
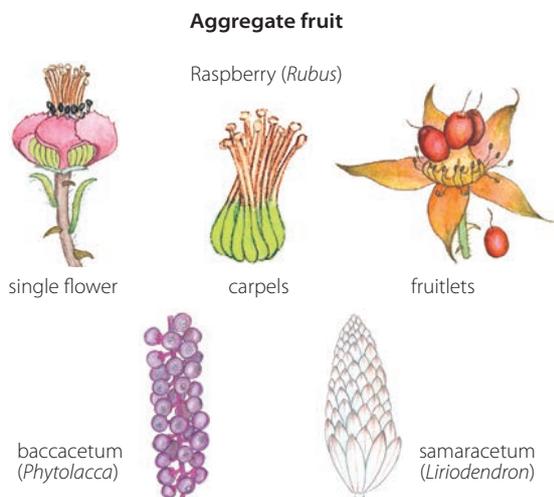
**ageotropism** Not reacting to gravity and instead turning upwards away from the earth. Negative geotropism. *see* **gravitropism** *cf.* **apogeotropism**

**agglomerated** Crowded in a dense cluster but not cohering, as pincushion flowers (*Brunonia*). = **aggregated**



**agglutinated** Glued together, as pollen in the pollinia of some orchids (Orchidaceae).

**aggregate fruit** Fruit formed from the unfused carpels of a single flower, with the carpels becoming fruitlets. A cluster of berries is a baccacium, of follicles a follicetum, of drupes a drupeccium, of achenes an achenecium and of samaras a samaracium. = **etaerio** *see* **compound fruit** *see also* **apocarp**

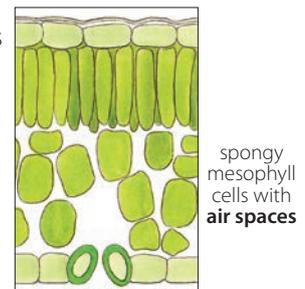


**aggregated** Crowded in a dense cluster but not cohering, as pincushion flowers (*Brunonia*). = **agglomerated**

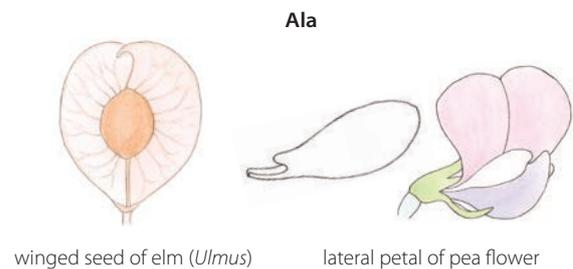


**air plant** A plant that grows on another plant for support but not for nutrients, as an orchid or staghorn on a tree. = **aerophyte, epiphyte** *cf.* **parasite**

**air spaces** Intercellular spaces, between the cells of the spongy mesophyll in a leaf, that are saturated with water vapour. They allow the diffusion of carbon dioxide out of the leaf and oxygen into the leaf. *see also* **stoma**

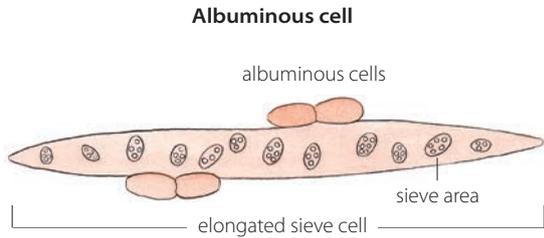


**ala, pl. alae** A wing-like structure, as the wing-like extension on the seeds of elms (*Ulmus*). One of two clawed lateral petals of a pea flower. **alate** Winged or having wing-like appendages.

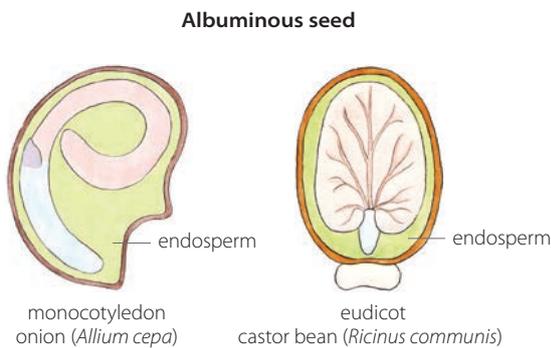


**albumin** Of plants, one of the proteins in the endosperm of a seed, as wheat (*Triticum*). It is broken down during germination to provide nitrogen and sulfur for the developing seedling. **albuminous** Of, like or containing albumin.

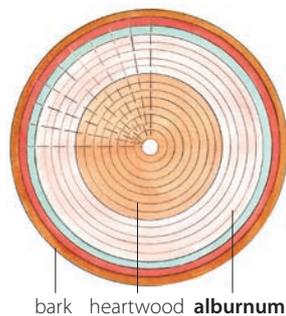
**albuminous cell** A parenchyma cell associated with a sieve cell in the phloem of gymnosperms and lower vascular plants. It moves sugar into and out of sieve cells and is considered to be the counterpart of a companion cell in angiosperms.



**albuminous seed** One having endosperm persisting in the mature seed as the main source of nourishment for the embryo, as most monocotyledons. Some eudicots, as castor bean (*Ricinus communis*), have endosperm and are albuminous. All gymnosperm seeds are albuminous.  
= **endospermic seed**  
cf. **exalbuminous seed**



**alburnum**  
The younger layers of wood between the heartwood and the bark. It contains the functioning vascular tissue in which the sap flows.  
= **sapwood**



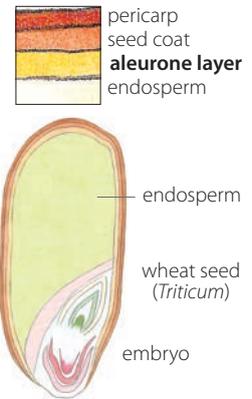
**-ales** A suffix forming the names of orders of plants.

**alete** Of a spore without laesurae.  
cf. **inaperturate, monolete, trilete**

**aleurone** A granular protein in the outermost layer of endosperm in grasses (Poaceae) and some eudicots.

**aleurone layer**

The outermost layer of endosperm in grasses (Poaceae) and some eudicots, as the legume fenugreek (*Trigonella foenum-graecum*). It functions to release enzymes that digest starch in the endosperm for embryo and seedling growth.



**alga, pl. algae** Simple nonvascular plant-like organisms that lack roots, stems and leaves but have chlorophyll for photosynthesis. They occur in fresh or salt water and range in size from microscopic and single-celled diatoms to macroscopic and multi-celled, as the seaweed kelp. They are members of the taxonomic kingdom Protista (protists) and are a diverse collection of organisms containing many distinct groups that are not related as they do not share a common ancestor.

**algal** Relating to or like algae.



**algal bloom** The excessive multiplication of algae in either a saltwater or freshwater system. It is harmful when it produces toxins or reduces oxygen in the water.  
see **eutrophic**

**alien** Of plants in a region where they do not occur naturally.  
 Non-native species introduced from another place, often another country.  
 = **exotic**

**aliferous** Having wings.  
**aliform** Wing-shaped.

**alkali** An hydroxide of one of the alkali metals, as lithium, potassium, rubidium, caesium and sodium, that turns litmus paper from red to blue, indicating a pH of 8 to 14.  
**alkaline** Of a substance with a pH of 8 to 14.  
*see* **litmus test**

**alkalinity** Refers to the concentration of alkalis in a substance.

**alkaloids** Organic compounds, containing nitrogen, that are often poisonous, as nicotine that is found in the nightshade family (Solanaceae).

**allautogamy** A plant having both cross-pollinating and self-pollinating flowers.  
**allautogamous** Of or relating to allautogamy.

**allele** Any one of the alternative forms of a particular gene that can be located at the same position (locus) on a chromosome.  
*see* **heterozygous, homozygous**

**alliaceous** Smelling or tasting like garlic.

**alogamy** Pollination between flowers of the same species, especially between flowers on different plants.  
*see* **cross-pollination, geitonogamy, outcrossing, xenogamy**  
*cf.* **autogamy**

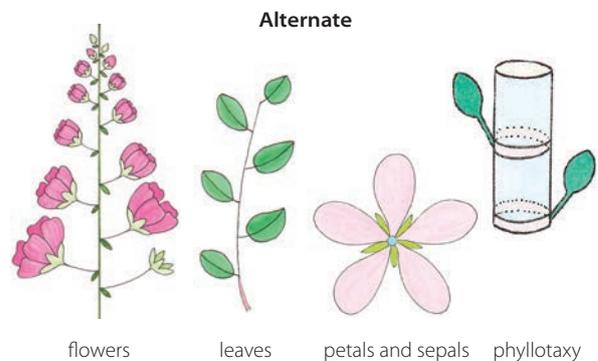
**allopatric** Of distribution, occurring in separate non-overlapping geographical areas.  
*cf.* **parapatric, sympatric**

**allopolyploid, allopolyploidy** Having multiple chromosome sets from different species.  
*see* **polyploidy**  
*cf.* **autopolyploidy**

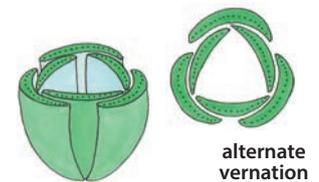
**allotetraploid** A new species formed by having a diploid set of chromosomes derived from parents of two separate species.  
 = **amphidiploid**  
*see* **ploidy**

**alpine** Of high mountain areas above the natural treeline.

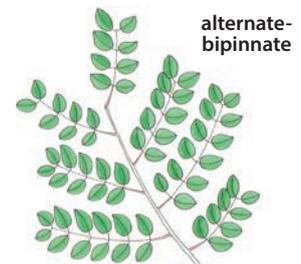
**alternate** Of plant parts, as leaves and flowers, arranged in two rows and not opposite.  
 Of plants parts, as petals and sepals, occurring in succession one after another.  
 Of phyllotaxy, leaves or shoots occurring singly at a node and on opposite sides of a stem. The simplest form of a spiral arrangement.  
*cf.* **distichous, opposite, superposed, whorled**



**alternate vernation**  
 Of young leaves in the unopened leaf bud arranged in alternating whorls of three.



**alternate-bipinnate**  
 Of a bipinnate leaf with the primary divisions arranged alternately on opposite sides of the rachis.  
*see also* **pinnate**



**alternate-pinnate**  
 Of a pinnate leaf with leaflets arranged singly on opposite sides of the rachis.



**alternation** One following another in turns.

see **alternation of generations**

Having parts between organs, as stamens borne between the petals of a flower.

cf. **superposition**

**alternation of generations** In the life cycle of a plant, the alternation of a haploid gametophyte phase that reproduces sexually, with a diploid sporophyte phase that reproduces vegetatively.

see **angiosperms, ferns, gymnosperms,**

**hornworts, liverworts, mosses**

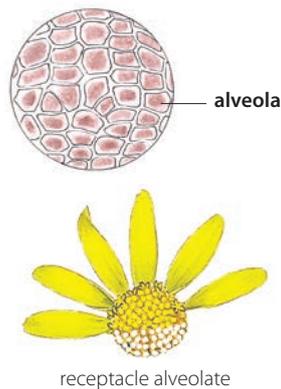
**alveola**, pl. **alveolae**,  
**alveole**,

**alveolus**, pl. **alveoli**

A small thin-walled angled cavity or pit on a surface. Often arranged in a honeycomb pattern.

**alveolate** Pitted, as the receptacle of a daisy flower when the florets are removed.

cf. **foveate, foveolate**



**AM** Arbuscular mycorrhiza.

**amber** The fossilised resin of some species of extinct trees.

cf. **copal**

**amensalism** An association between organisms of two different species in which one is inhibited or destroyed and the other is unaffected, as a shade tree that inhibits the growth of a plant beneath it.

see **symbiosis**

cf. **parasitism**

**ament, amentum**

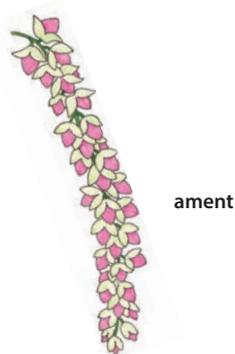
A spike or raceme of unisexual, usually apetalous flowers on a pendulous flower stem, as the flowers of the walnut (*Juglans regia*).

A racemose inflorescence.

= **catkin**

**amentaceous** Bearing, resembling or consisting of an ament or aments.

**amentiferous** Bearing aments or catkins.



**amino acid** One of the small units that are the building blocks of proteins. They are variously attached to each other by peptide bonds, forming chains that make up proteins.

**amorphic, amorphous** Having no defined shape.

Lacking halves that are mirror images on any plane.

see **asymmetric**

cf. **symmetric**

**amphibious** Of plants living both in water and on land, as those in seasonally inundated habitats.

cf. **aquatic, terrestrial**

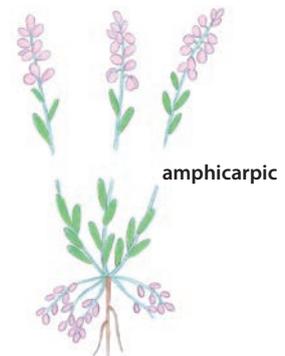
**amphicarpic,**

**aphicarpous** Of a

plant with two kinds of inflorescence that produce two kinds of fruit, as the milkwort (*Polygala polygama*).

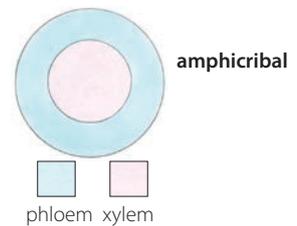
Aerial fruit ripens above ground and a self-fertilised subterranean fruit ripens below ground.

cf. **amphigeal,**  
**heterocarpous**



**amphicribal** Of a concentric vascular bundle with phloem encircling the xylem, as spike moss (*Selaginella*).

cf. **amphivasal**



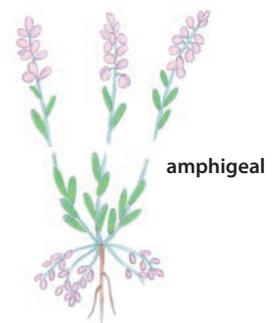
**amphidiploid** A new species formed by having a diploid set of chromosomes derived from parents of two separate species.

= **allotetraploid**

see **ploidy**

**amphigeal** Of a plant with two kinds of flowers, the upper from the stem and the lower from the root or rootstock, as the milkwort (*Polygala polygama*).

cf. **amphicarpic**

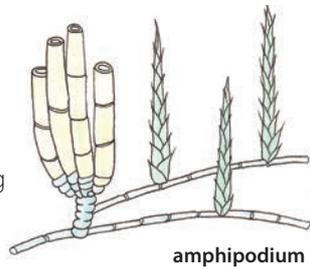


**amphimixis** Reproduction resulting from the union of a male and female gamete. Sexual reproduction.  
*cf.* **apomixis**

**amphipodium**

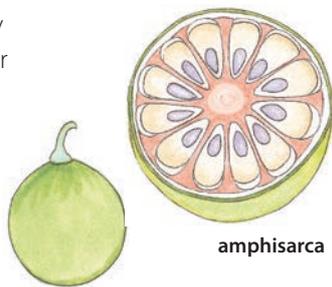
A rhizome system that has both monopodial and sympodial branching.

**amphipodial** Relating to an amphipodium.  
*cf.* **leptomorph**, **pachymorph**



amphipodium

**amphisarca** A pulpy fruit with a firm hard or woody rind, as Indian bael (*Aegle marmelos*). Derived from a many-carpelled septate superior ovary.  
*cf.* **pepo**

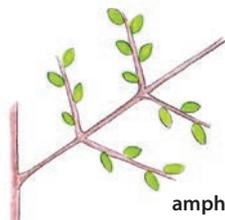


amphisarca

**amphistomatous** Of leaves with stomata on both the upper and lower surfaces.  
*cf.* **epistomatous**, **hyperstomatous**

**amphitony**

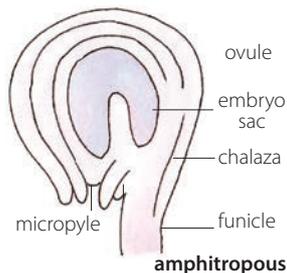
Development of lateral growth on the upper and undersides of the main shoot.  
*cf.* **epitony**, **hypotony**



amphitony

**amphitropous**

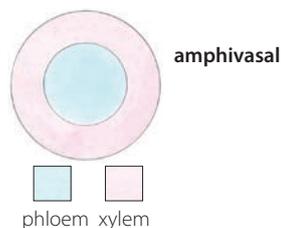
Of ovule orientation, with the ovule curved and at a right angle to the funicle. The micropyle and chalaza are near each other.  
*see* **ovule orientation**



amphitropous

**amphivasal**

Of a concentric vascular bundle with xylem encircling the phloem, as begonia (*Begonia*).  
*cf.* **amphicribal**



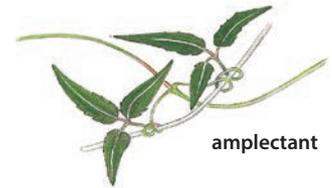
amphivasal



phloem xylem

**amplectant**

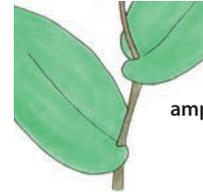
Clasping a support, as the twining petioles of mountain clematis (*Clematis aristata*).



amplectant

**amplexicaul**

Clasping the stem but not completely encircling it, as the base of some leaves.



amplexicaul

**ampliate**

Enlarged or swollen, as the corolla tube of eyebright (*Euphrasia*).



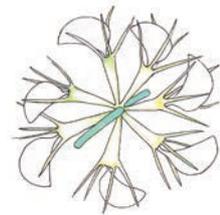
corolla tube

ampliate

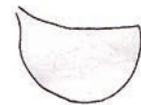
**ampulla, pl. ampullae**

An organ shaped like a squat, rounded flask or bladder.

A small membranous float attached to the roots or leaves of some aquatic plants, as the waterwheel plant (*Aldrovanda vesiculosa*), containing a watery fluid and a small bubble of air.



waterwheel plant (*Aldrovanda vesiculosa*)



ampulla

**ampullaceous**

Inflated and swelling out towards the base like a short flask or bladder.

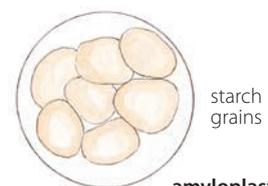
**ampulliform** Shaped like an ampulla.

**amylaceous** Of, relating to or resembling starch.  
*see* **amylum**

**amylase** A group of enzymes that catalyse the hydrolysis of starch into sugars in plants, animals and microbes. Alpha amylase and beta amylase are present in plants.

**amylolysis** The conversion of stored starch to sugars by the action of enzymes or acids.  
*see* **amylum**

**amyloplast** A leucoplast that converts glucose into starch and stores it as starch grains.



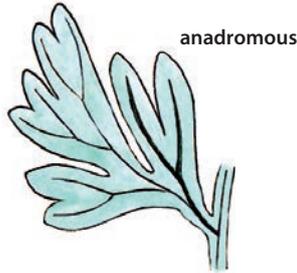
starch grains

amyloplast

**amylum** Starch, a complex carbohydrate produced by most green plants as a form of energy storage. Found in seeds, fruits, tubers, roots etc.

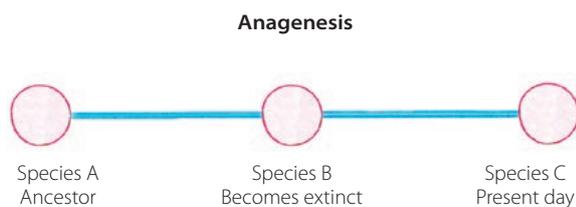
**anabolism** The use of energy to build larger complex molecules from simple molecules, as simple sugar molecules (monosaccharides) that are joined together to make disaccharides and polysaccharides.  
cf. **catabolism**

**anadromous, anadromic** Of fern venation, having the first lateral veins in a segment arising apically from the midrib.  
cf. **catadromous, isodromous**



**anaerobic respiration** The release of energy from organic compounds that takes place in the presence of little or no oxygen.  
cf. **aerobic respiration**

**anagenesis** One of two main ways in which speciation occurs in response to the environment. Anagenesis is linear, with a slow accumulation of change. At a certain point, species A becomes species B, and species A becomes extinct.  
cf. **cladogenesis**  
**anagenetic** Of or relating to anagenesis.

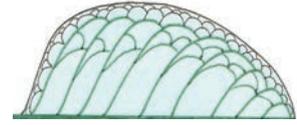


**analogous** In phylogenetics, of similar characters that have evolved from different ancestral sources, as the wings of birds and bats.  
see **homoplasy**  
cf. **homologous**

**anandrous** Having no stamens, as female flowers.

**anantherous** Of stamen filaments that lack an anther.

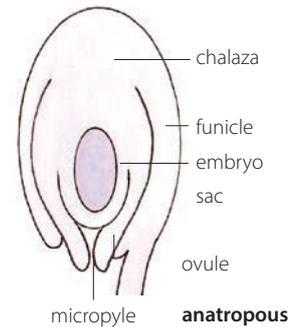
**anastomosis,**  
pl. **anastomoses**  
Of veins in a leaf connecting together to form a network of loops.  
= **closed venation**



**anastomosis**

**anatomy** The study of the internal structure of plant tissues and organs at a microscopic level.  
= **phytotomy**  
cf. **morphology**  
**anatomical** Of or relating to anatomy.

**anatropous** Of ovule orientation, with the ovule turned at 180° so that it lies along its funicle and in line with the chalaza at the top and the micropyle, facing downwards, at the base. The ovule is fused to the funicle.  
see **ovule orientation**



**anauxotelic** Of an inflorescence axis having growth stop with an aborted vegetative bud, as the female flower of scrub sheoak (*Allocasuarina paludosa*).  
cf. **auxotelic, monotelic**

**ancestor** An actual or hypothetical entity from which another entity is descended.  
see **phylogenetic taxonomy**  
**ancestral** Primitive. Of a characteristic belonging to or inherited from an ancestor.  
cf. **derived character**

**ancipital, ancipitous** Flattened and two-edged instead of round, as the stems of certain sedges.

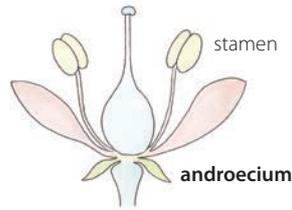
**androclinum** Another term for clinandrium.

**androdioecious** Of a species with staminate (male) and bisexual flowers on different plants.  
see also **andromonoecious**  
cf. **gynodioecious**

**androecious** Of a plant having only male flowers.  
see also **staminate**  
cf. **gynoecious**

**androecium**

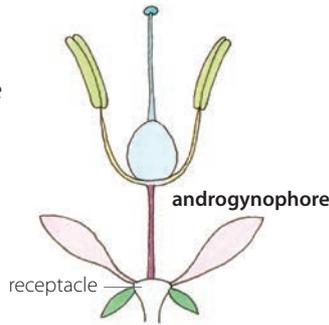
The male reproductive organ of a flower.  
The stamens collectively.  
*cf.* **gynoecium**



**androgynomonoeious** Of a species with staminate (male) flowers, pistillate (female) flowers and bisexual flowers on the same plant.  
*see also* **andromonoecious, gynomonoeious**  
*cf.* **trioecious**

**androgynophore**

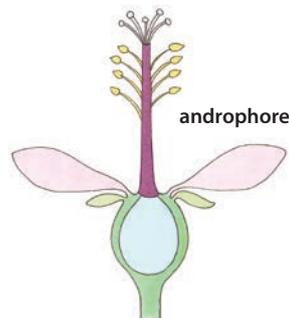
An elongated stalk (stipe), inserted on the receptacle, that bears the stamens and pistil of a flower above the corolla and calyx.  
= **gonophore, gynandrophore**



**androgynous** Of an inflorescence with both male and female flowers.  
*see* **perfect**  
*see also* **bisexual**

**andromonoecious** Of a species with staminate (male) and bisexual flowers on the same plant.  
*see also* **androdioecious**  
*cf.* **gynomonoeious**

**androphore** A tube, formed by the united filaments of stamens. It bears the anthers above the petals and sepals and is inserted on the receptacle.  
Typical of the mallow family (Malvaceae).



**andropolygamous** Of a species with staminate and bisexual flowers either on one plant or on a different plants within the same species.  
*see also* **andromonoecious**  
*cf.* **gynodioecous**

**anemochore** A plant whose seeds, spores or fruits are dispersed by wind.

**anemochory** Dispersal of seeds, spores and fruit by wind.

**anemochorous** Of or relating to anemochory.

**anemogamy** Dispersal of pollen and pollination by wind.

= **anemophily**

*cf.* **anemochory**

**anemogamous** Of or relating to anemogamy.

**anemophile** A plant that is pollinated by wind.

**anemophily** Dispersal of pollen and pollination by wind.

= **anemogamy**

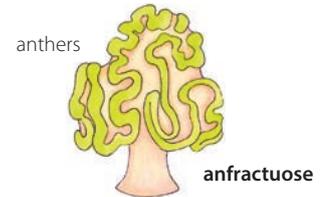
*cf.* **anemochory**

**anemophilous** Pollinated by wind-blown pollen.

**aneuploidy** Having an abnormal number of chromosomes, as a cell that does not contain an exact multiple of the haploid number of chromosomes.  
Having too many or too few chromosomes after cell division.

**anfractuose**

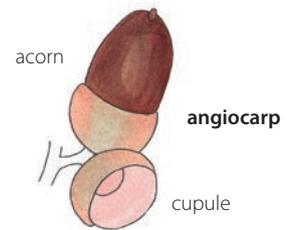
With twists and turns.  
Convolved, as the anthers of the gourd  
*Lagenaria*.



**angiocarp**

A fruit that is partially or entirely enclosed in a shell, involucre or husk, as an acorn in its cupule.

**angiocarpous** Of or relating to an angiocarp.



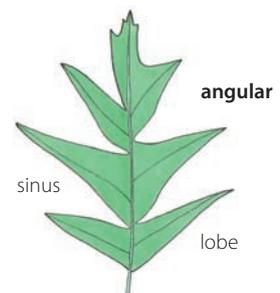
**angiosperms** *see* pages 16–17

**angular, angulate**

An outline having sharp angles.

Sharply pointed instead of curved, as a ridged stem.

A leaf having the sinuses and lobes with margins meeting at a point.

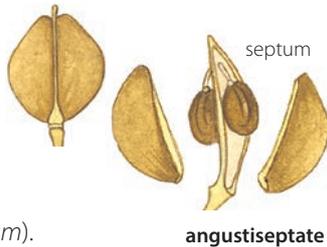


**angular collenchyma** Collenchyma cells with thickenings located in the corners of the cells and no intercellular spaces.

**angusti-** A prefix meaning narrow.

**angustiseptate**

Of a fruit flattened with a narrow internal partition (septum), as the silicula of hairy shepherd's purse (*Microlepidium pilosulum*).



angustiseptate

**aniso-** A prefix meaning unlike or not equal.

**anisocotlyly** Of eudicots, having one cotyledon visibly larger than the other.

see also **macrocotyledon, microcotyledon**

cf. **isocotlyly**

**anisomerous** Having whorls with a different number of parts, as a flower with a whorl of sepals, petals, carpels and/or stamens differing in number from the rest.

= **heteromerous**

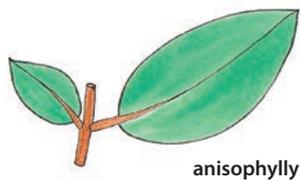
cf. **isomerous**

**anisophylly** Having paired leaves that differ in shape and size.

cf. **isophyllous**

**anisophyllous**

Relating to anisophylly.



anisophylly

**anisospory** Having spores of two kinds produced in the same sporangium, smaller spores that produce male gametophytes and larger spores that produce female gametophytes. Occurs in bryophytes but is unusual.

cf. **heterospory, homospory**

**anisosporous** Producing both male and female spores in the same sporangium.

**anisostemonous**

With stamens different in number to the petals.

cf. **isostemonous**



anisostemonous

**annual** A plant living, reproducing and dying in one growing season.

cf. **biennial, perennial**

**annular, annulate** Ring-shaped. Having an annulus.

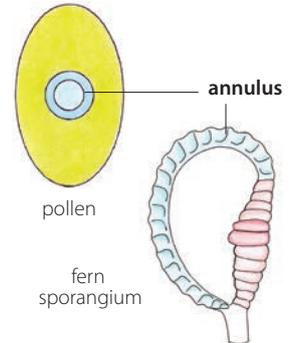
**annular collenchyma** Collenchyma having intercellular spaces and the cell wall with uniform thickening that is ring-like in cross-section.

**annulus, pl. annuli**

Of pollen, a ring-like thickening of the pollen wall surrounding a pore or ulcus.

cf. **margo**

Of ferns, the thick-walled hygrosopic cells in the wall of the sporangium.



**anomalous secondary growth**

The production of cambium in a monocotyledon. A condition that is not commonly seen and is present in only a limited number of families or genera, as yucca (*Yucca*).

**anomaly** A marked deviation from the normal standard.

**anomalous** Inconsistent with what is usual, normal or expected.

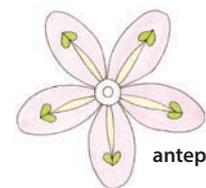
see **anomalous secondary growth**

cf. **atypical**

**ante-** A prefix meaning before.

**antepetalous, antipetalous**

Directly in front of the petals, as stamens that are opposite rather than alternate with the petals.



antepetalous

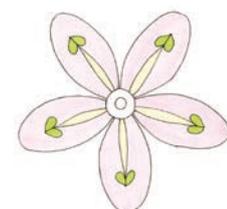
**anteponition**

The placement of one part above another on the same radius, as stamens borne above the petals of a flower.

**anteposed** Situated vertically on or above another part.

= **superposition**

cf. **alternation**

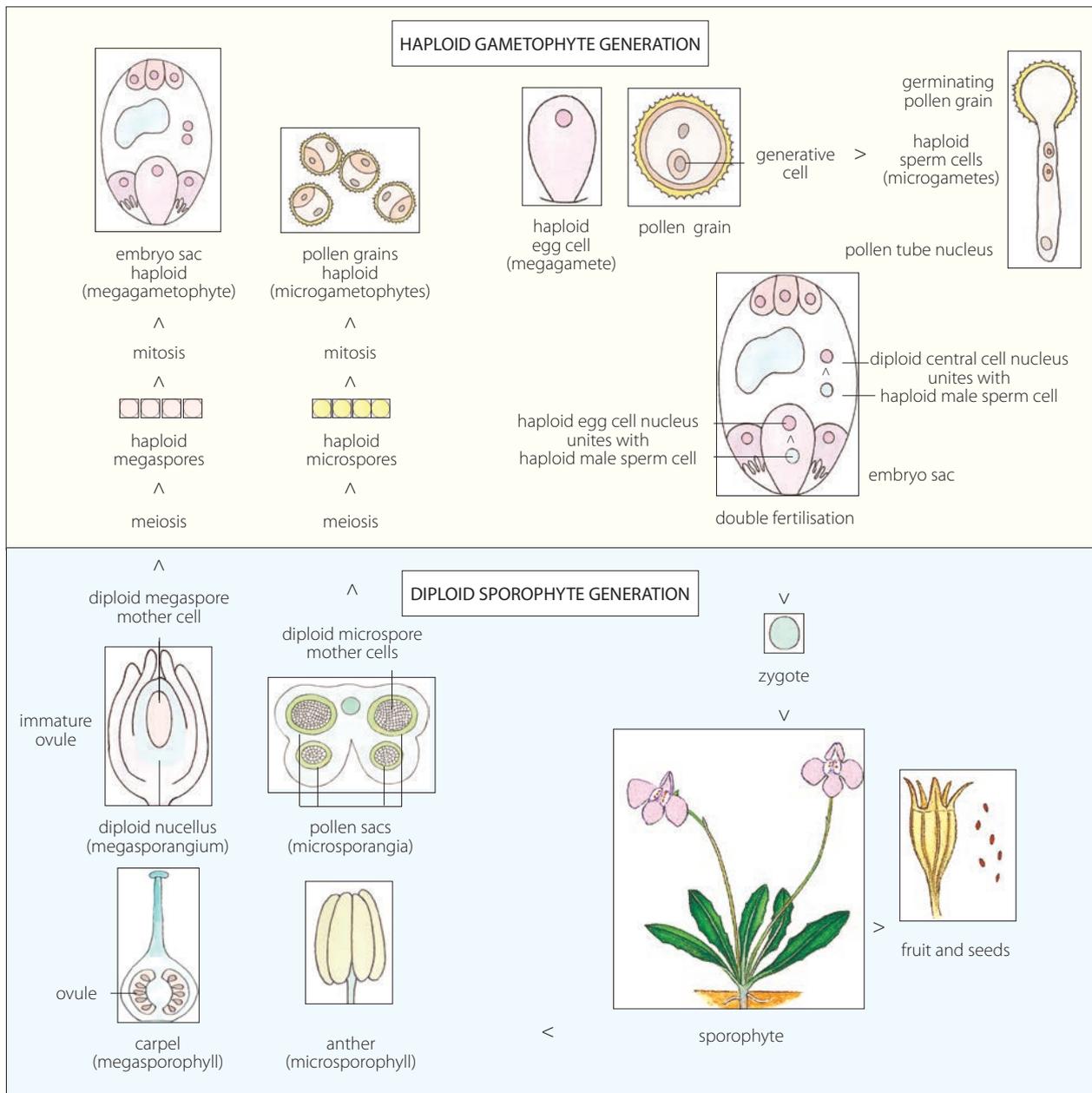


anteponition

**angiosperms** Flowering, seed-bearing plants. They include herbaceous plants, shrubs, grasses and trees. Currently angiosperms are divided into several groups, the larger groups being Eudicots (75%), Monocotyledons (22%), Amborellales, Nymphaeales, Austrobaileyales, Chloranthales, Ceratophyllales and Magnoliids. The reproductive structure is the flower and comprises an ovary with ovules and anthers with pollen. Seeds develop enclosed in an ovary that becomes a fruit. Characteristics include double fertilisation and triploid nutritive material (endosperm) in the seed. Eudicot seeds have usually two seed leaves (cotyledons) and monocotyledons have one. Angiosperms have a life cycle alternating between a haploid sexual gametophyte generation and a diploid asexual sporophyte generation. The sporophyte generation is the larger familiar green plant. The gametophyte generation is microscopic and lives on the sporophyte.

see also **seed**  
cf. **gymnosperm**

### Alternation of Generations

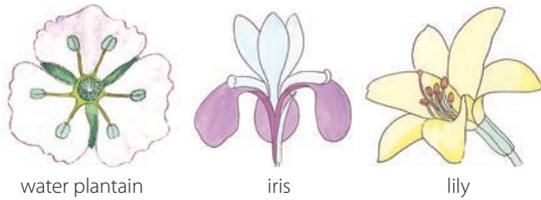


# Angiosperms

## MONOCOTYLEDONS



One seed leaf (cotyledon).  
Endosperm that persists.

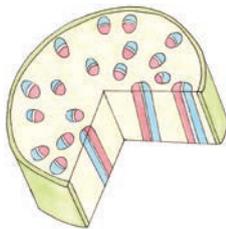


Usually in multiples of three.  
Sepals often same colour and shape as petals.



A single pore or furrow.

Main veins parallel.

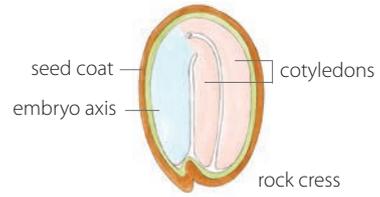


Vascular bundles scattered.



Usually herbaceous plants that lack side shoots.  
Root system usually fibrous, never a taproot.

## EUDICOTS



Two seed leaves (cotyledons).  
Endosperm usually absorbed by developing seed.

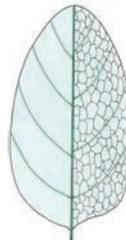


In multiples of four or five.  
Sepals and petals usually distinct.



Typically with three pores or three furrows.

Veins reticulated.



Herbaceous eudicot with vascular bundles in a ring.

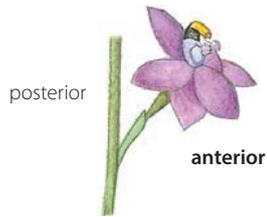


Herbaceous or woody plants.  
Root system often a taproot.

**anterior** Away from the axis.

The side of a flower facing away from the stem.

cf. **posterior**



**antesepalous, antisepalous**

Directly in front of the sepals, as stamens that are opposite rather than alternate with the sepals.



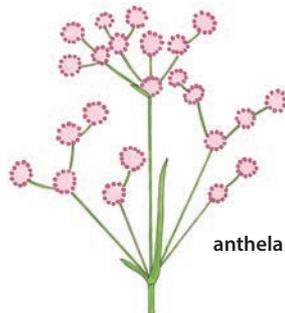
**antheций, anthoecium** Of grasses (Poaceae), strictly the lemma and palea of a single floret, but often taken to include the reproductive parts and lodicules, and, occasionally, the attached rachilla. Particularly applied to members of the tribe Paniceae in which only the terminal floret is fertile.

**anthela, pl. anthelae**

An umbel-like inflorescence in some rushes (Juncaceae) and sedges (Cyperaceae) in which the primary branches arise more or less from the same point.

cf. **digitate inflorescence**

**anthelate** Umbel-like.



**antherodium**

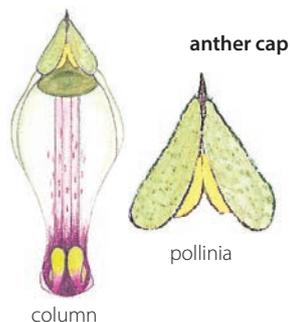
A corymb-like inflorescence in some sedges (Cyperaceae), with branches ending in spikelets rather than individual flowers.



**anther** see page 19

**anther cap**

Of some orchids, the cap-like anther that terminates the column and covers the pollinia, as spider orchids (*Caladenia*).

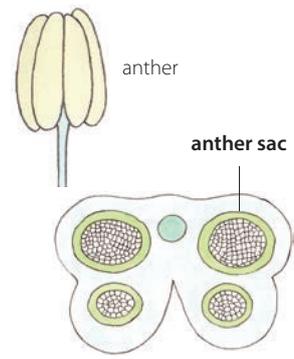


**anther sac**

The chamber (locule) in the anther of a flowering plant (angiosperm) in which pollen is produced.

= **microsporangium**

see **pollen sac**



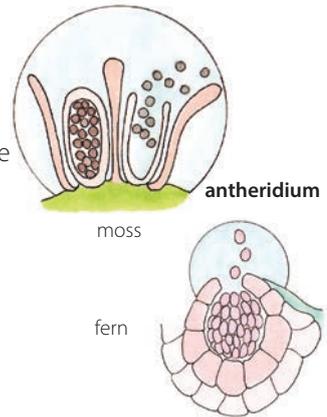
**antheridium,**

pl. **antheridia**

The male, sperm-producing reproductive organ of bryophytes, ferns and fern allies.

cf. **archegonium**

**antheridial** Relating to the antheridium.



**antheriferous** Bearing anthers.

**antherozoid, pl. antherozoa** A motile male gamete, that moves by means of whip-like hairs (flagellae).

In bryophytes and ferns it is produced in the antheridia.

Also found in some gymnosperms, where it is formed in the pollen tube prior to fertilisation.

= **spermatozoid**

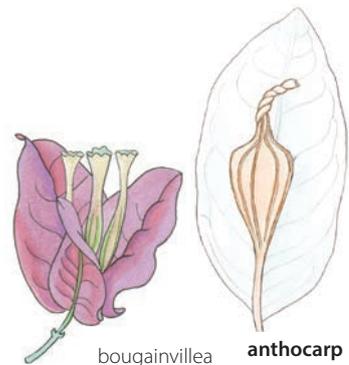
cf. **oosphere**

**anthesis** The period of flowering from opening of the bud to the withering of the stigma and stamens.

**anthocarp**

A dry indehiscent one-seeded fruit enclosed by one or more flower parts. Characteristic of the four o'clock family (Nyctaginaceae), as bougainvillea (*Bougainvillea*).

see **accessory fruit**

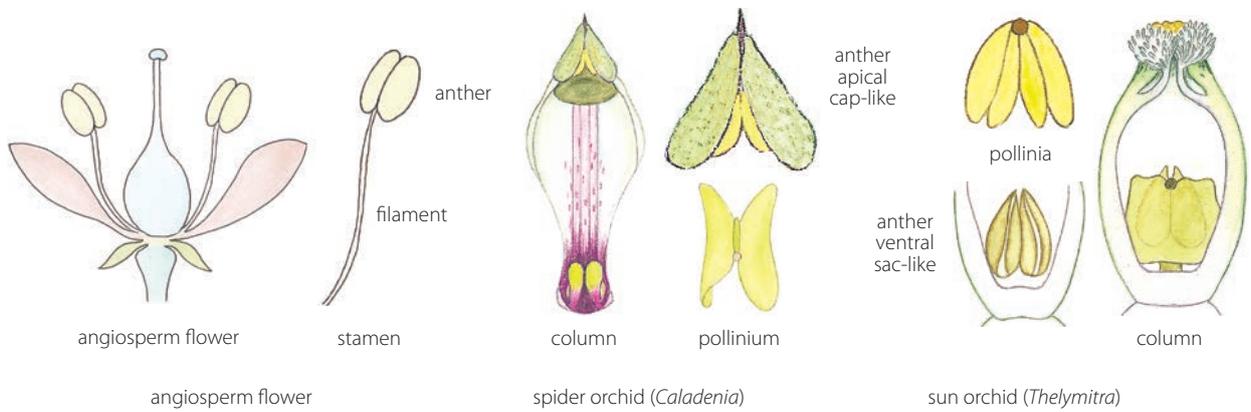


**anther** Of flowering plants, the part of the stamen in which pollen is produced.

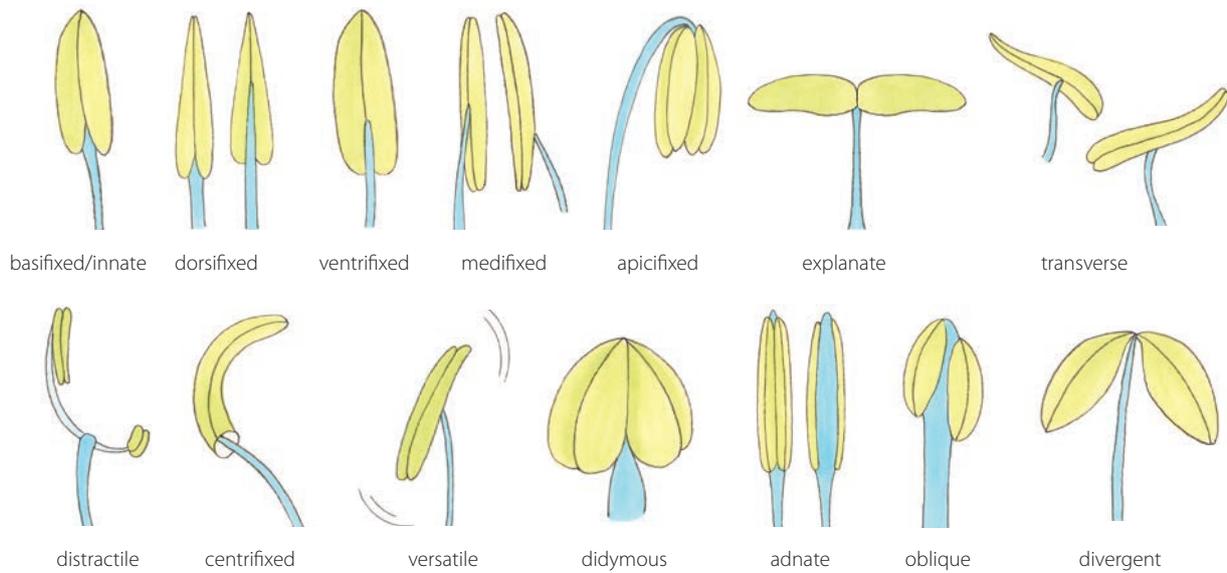
It is usually on a stalk-like filament.

Of orchids, the structure housing the pollinia and situated apically or ventrally on the column and either cap-like in form or two sacs opening by longitudinal slits.

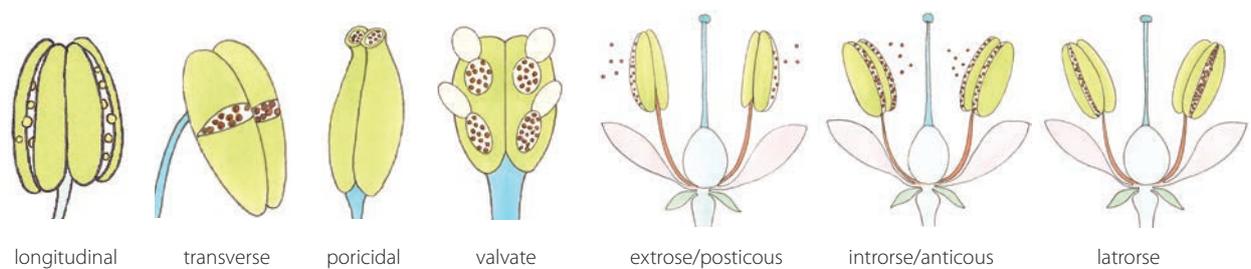
### Anther



### Anther attachment



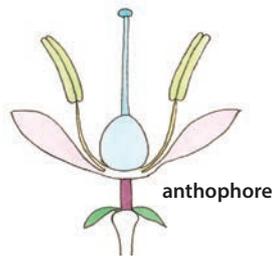
### Anther dehiscence



**anthocyanins** A group of plant pigments that give brilliant colours ranging from pink through to scarlet, purple and blue. Found in fruits like purple grapes and blackberries. It acts as visible signals on flower petals and fruit to attract insects, birds and animals for pollination and seed dispersal.  
see **flavonoids**

**anthophily** Love of flowers.  
**anthophilous** Flower-loving. Applied to an animal that can be a pollinator.

**anthophore**  
An elongated stalk (stipe) inserted on the receptacle, bearing the corolla, stamens and pistil of a flower above the calyx.



**anthotaxis, anthotaxy** The pattern of growth in an inflorescence. Growth may be either monopodial (racemose) or sympodial (cymose).

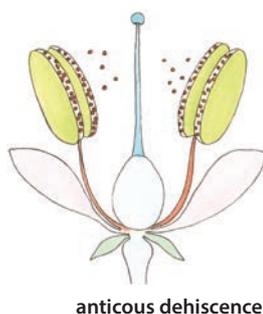
**anthotelic** Of growth or branching with the tip of the stem ending in a flower or an aborted floral bud, as a determinate or definite inflorescence.  
see **cymose inflorescence**  
cf. **blastotelic**

**anti-** A prefix meaning against, away or opposite.

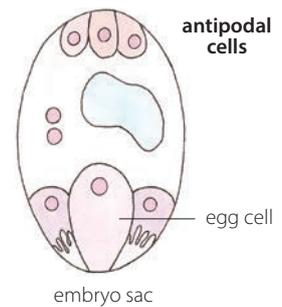
**anticlinal** Of the cell division plane, or any lines generally, at right angles to the surface of the plant body.  
cf. **periclinal**

**anticous** Facing towards the axis.  
= **introrse**  
cf. **extrorse, latrorse**

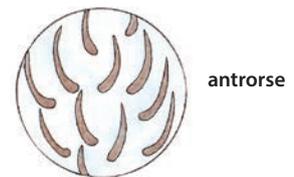
**anticous dehiscence**  
Of anthers, facing inwards and opening longitudinally to release pollen towards the centre of the flower, as the daisy family (Asteraceae).  
= **introrse dehiscence**  
see also **anther dehiscence**



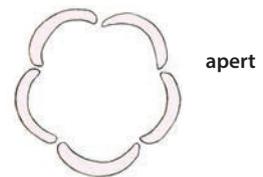
**antipodal cells**  
In angiosperms, three cells in the embryo sac positioned at the end opposite the egg cell. These cells degenerate prior to fertilisation and their function is uncertain.



**antrorse** Curved or bent forward or upward towards the apex, as hairs or spines.  
cf. **retrorse**



**apert** Without touching neighbouring parts, as petals in some buds.  
see **aestivation**

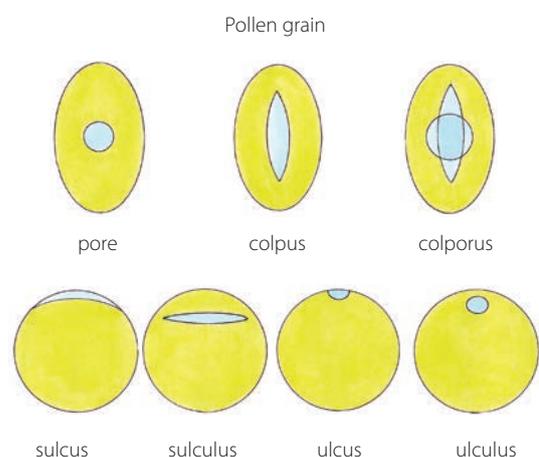


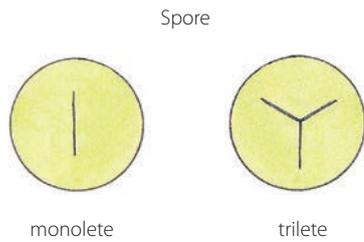
**aperture** A variously shaped, thinner region on the wall of pollen grains in seed plants (angiosperms and gymnosperms) and of spores in lower plants (cryptogams).

see **germinal aperture, laesura, leptoma**  
An aperture present in one layer of the wall (ectoaperture) is described as simple. An aperture formed in more than one layer of the wall (endoaperture) is termed compound or composite.

**aperturate** Having one or more apertures. Pollen wall apertures are recognised by their number (mono-, di-, tri-, tetra-, penta-, hexa-, poly-), their position (panto-, zono-, polar) and their shape (colpate, colporate, porate, sulcate).  
cf. **inaperturate**

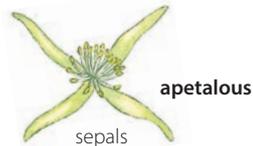
#### Aperture





**apetalous**

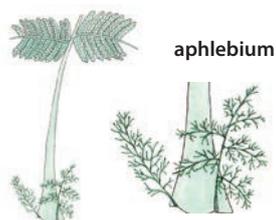
Of a flower having no petals, as the flowers of clematis (*Clematis*).



**apex** The tip of an organ or structure.

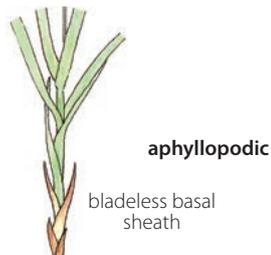
**aphlebiom pl. aphlebia**

An atypical pinna at the base of the frond of some fossil ferns and the forest tree fern (*Hemitelia capensis*).



**aphyllopodic**

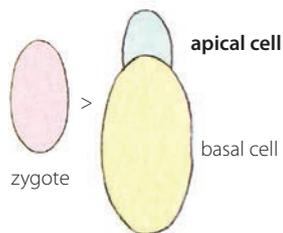
Referring to the annual flowering stems of sedges in the genus *Carex* that have bladeless basal sheaths.



**aphyllous** Lacking leaves.

**apical** At, of or on the apex or tip.  
*cf.* basal

**apical cell** Of eudicot embryogenesis, the first division of the zygote. The smaller apical cell rests on the larger basal cell. It gives rise to the hypocotyl, shoot apical meristem and cotyledons.  
*see* embryogenesis

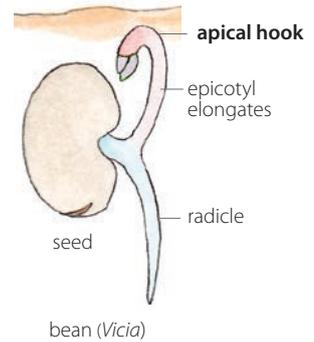


**apical dominance** Plant growth that suppresses lateral growth from axillary buds and concentrates growth in buds at the apex or tip of the plant.

**apical hook** The hook-like curve of the epicotyl found in seedlings that germinate buried in the soil.

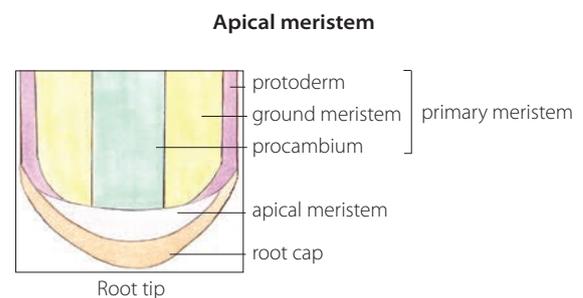
It protects the shoot from damage as the seedling is pushing upwards towards light.

= plumular hook  
*see* hypogeal germination



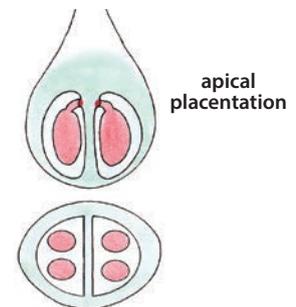
**apical meristem** A region at the tips of roots and shoots with continuously dividing cells that elongate and increase the length of the plant. These cells can differentiate into three kinds of primary meristem. The protoderm that gives rise to the epidermis. Ground meristem gives rise to parenchyma, collenchyma and sclerenchyma. Procambium gives rise to primary xylem and primary phloem and produces two secondary meristems, the cork cambium and the vascular cambium.

*cf.* intercalary meristem, lateral meristem

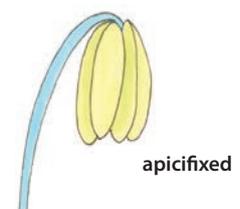


**apical placentation**

Having one or few ovules develop on a placenta at the top of a simple ovary or on placentas at the top of a compound syncarpous ovary.  
*see* placentation



**apicifixed** Of a stamen filament attached to the upper end of the connective of an anther.  
*cf.* basifixed  
*see* anther attachment

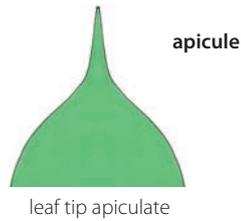


**apicule, apiculus,**

*pl. apiculi*

A short, pointed tip, as at the apex of a leaf or floral segment.

**apiculate** Tipped with an apicule.



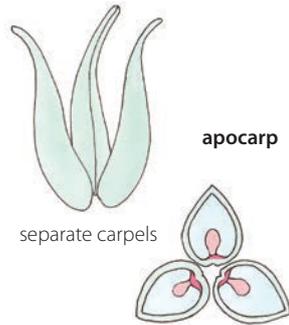
**apo-** A prefix meaning lacking or separate.

**apocarp** A fruit formed from the separate carpels of a single flower, as columbine (*Aquilegia vulgaris*).

*see aggregate fruit,*

**apocarpous**

*cf. multiple fruit, syncarp*



**apocarpous**

Of a compound gynoecium with two or more separate carpels.

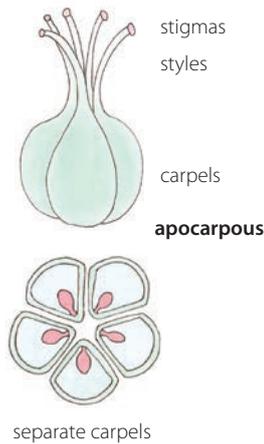
Of a fruit formed from two or more separate carpels, as columbine (*Aquilegia vulgaris*).

= **choricarpous**

*see apocarp*

*cf. syncarpous*

**apocarp** The condition of being apocarpous.



**apogamy** Absence of sexual reproduction.

A form of vegetative reproduction.

In flowering plants (angiosperms), the formation of an embryo from cells in the embryo sac other than the egg cell.

Of ferns and mosses, a haploid gametophyte (prothallus) producing buds asexually that develop into a haploid sporophyte, as lip ferns (*Cheilanthes*).

*cf. agamospermy, apospory*

**apogamous** Exhibiting apogamy.

**apogeotropism** Turning away from the earth, as stems and leaves that grow upwards from the soil.

Negative geotropism.

*see tropism*

*cf. ageotropism*

**apogeotropic** Of or relating to apogeotropism.

**apolar** Having no poles.

Of pollen grains and spores without distinct polarity.

**apomict** A plant that reproduces by apomixis.

*see facultative ~*

**apomictic** Reproducing without meiosis or fertilisation of gametes.

**apomixis** The production of viable seed from the ovule without fertilisation or meiosis.

A form of cloning.

*see gametophytic apomixis, sporophytic*

**apomixis, vegetative apomixis**

*cf. amphimixis*

**apomorph, apomorphy** In cladistics, a derived character.

A character that has evolved and become modified from one present in an ancestral form.

*cf. autapomorph, autapomorphy,*

**plesiomorph, plesiomorphy**

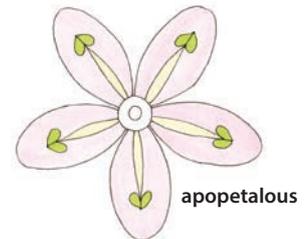
**apomorphic** In cladistics, derived.

**apopetalous**

With petals free from each other.

= **choripetalous, dialypetalous, polypetalous**

*cf. gamopetalous, sympetalous*



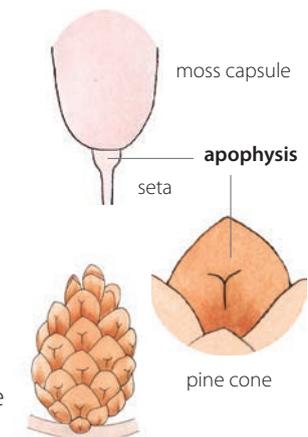
**apophysis,**

*pl. apophyses*

A natural swelling or enlargement, as the enlarged neck between the base of the capsule and the top of the seta in mosses.

= **hypophysis**

Of some conifers, the part of the cone scale that is exposed when the cone is closed.



**apoplastic pathway** Diffusion of water, through the cellulose cell walls and intercellular spaces, from one cell to another.

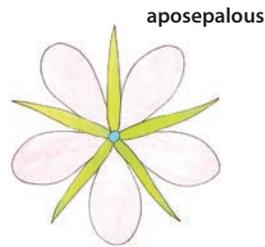
One of the pathways of movement of water and solutes radially from the root epidermis through the endodermis to the vascular cylinder where it will be transported vertically in the xylem.

see also **apoplast, symplastic pathway**

**aposepalous**

With sepals free from each other.

= **chorisepalous, dialysepalous, polysepalous**  
cf. **gamosepalous, synsepalous**



**apospory**

In flowering plants (angiosperms), the development of an embryo from a diploid somatic cell positioned next to the megaspore mother cell.

Of ferns and mosses, the development of a gametophyte directly from sporophyte tissue without meiosis and spore production so that both sporophyte and gametophyte have the same number of chromosomes, as severed parts of the fronds of bracken (*Pteridium aquilinum*) that reproduce vegetatively this way.

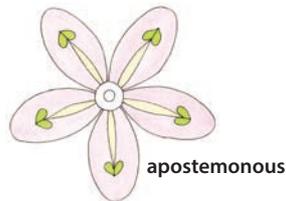
cf. **apogamy**

**aposporous** Exhibiting apospory.

**apostemonous**

With stamens separate from one another.

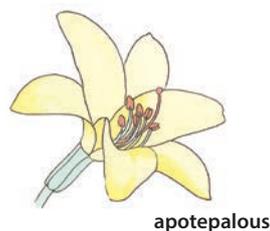
cf. **diadelphous, monadelphous, syngenesious**



**apotepalous**

With tepals free from each other, as day lilies (*Haemerocallis*).

= **choritepalous, polytepalous**  
cf. **gamotepalous, synsepalous**

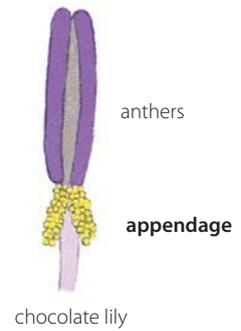


**appendage** A part attached to a main structure, as that below the anthers of chocolate lily (*Arthropodium strictum*).

**appendicular** Relating to an appendage.

**appendiculate**

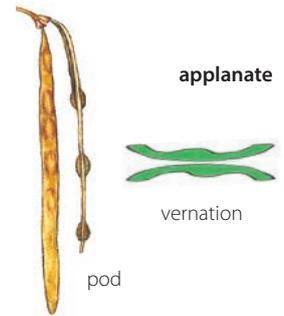
Bearing an appendage.



**applanate** Flattened, as the pods of some acacia (*Acacia*).

**applanate vernation**

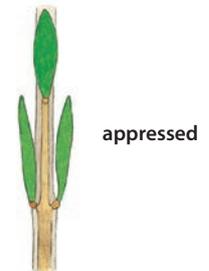
Of pairs of leaves in bud flattened opposite each other, as some snowdrops (*Galanthus*).



**appressed** Pressed closely against but not fused, as leaves or hairs against a stem.

Pressed at an angle of at most 15° from the vertical.

= **adpressed**



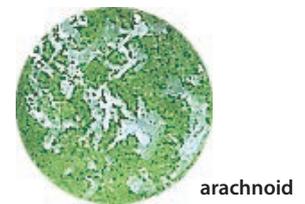
**approximate** Close together but not united. Closely resembling, almost exact or correct.

**aquatic** Of or relating to water, as an aquatic habitat like a lake.

cf. **amphibious, terrestrial**

**arachnoid** Covered with fine loosely entangled whitish hairs, resembling a spider's web, as some leaves.

= **cobwebbed**



**arboreal** Pertaining to or growing on trees, as some mosses.

**arboreous** Wooded, especially heavily wooded.

**arborescent** Tree-like in growth structure or appearance, as tree ferns.



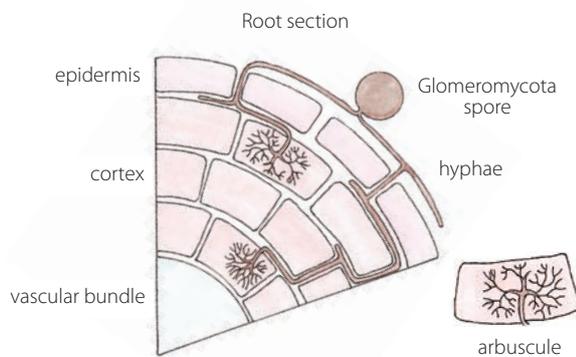
**arbuscular mycorrhiza**

A mutually beneficial symbiosis formed between Glomeromycota fungi and the roots of many vascular plants.

A network of hyphae where growth on the outside of the root is limited and hyphae penetrate the cells of the root cortex and form arbuscules. One of the endomycorrhizas.

see **mycorrhiza**

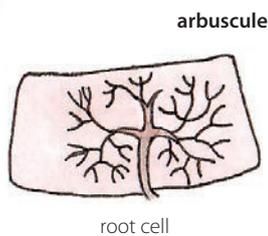
**Arbuscular mycorrhiza**



**arbuscule** A branching tree-like structure.

Of fungi, a tuft of branching hyphae, formed by some types of mycorrhiza, in the root cells of a host plant.

**arbuscular** Branched like a tree.



**archegone, archegonium, pl. archegonia**

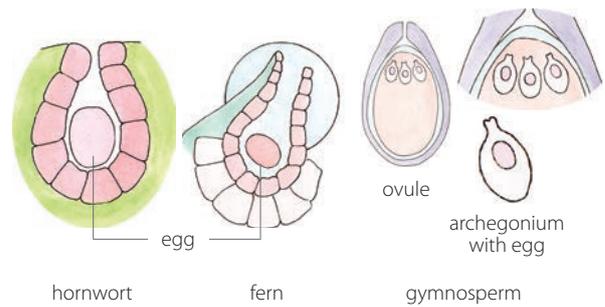
The flask-shaped female, egg-producing reproductive organ of bryophytes, ferns and fern allies and some gymnosperms, like cycads and conifers.

see **venter**

cf. **antheridium**

**archegonial** Relating to the archegonium.

**Archegonium**



**archespire, archesporium,**

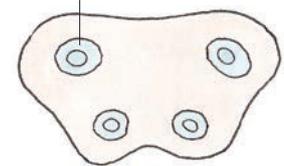
pl. **archesporia**

One of the cells in the immature pollen sac of a developing anther that give rise to a microspore mother cell.

**archesporial** Of or relating to an archespire.

**archespire**

immature pollen sac

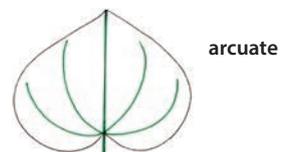


immature anther

**arching** Curving gently downwards, usually more freely than arcuate and less markedly than pendent, as the branches of arching shrubs.



**arcuate** Curved like a bow, as the veins of some leaves.



**arenicolous** Growing in sand.

**arenophile** A plant that thrives in or requires a sandy environment to grow.

**areola, pl. areolae, areole, pl. areoles**

A space between the lines of a net-like pattern.

A depression or a raised area on a cactus stem bearing flowers and/or spines.

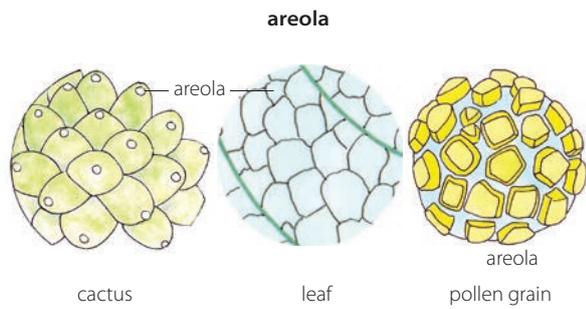
One of the small spaces defined by a network of veins on a leaf.

One of the raised areas surrounded by grooves forming a network on a pollen grain.

**areolate** Of the spaces between the lines of a net-like pattern.

Of a network with raised areas surrounded by grooves, as on some pollen grains.

cf. **faveolate, foveate, foveolate, reticulate**

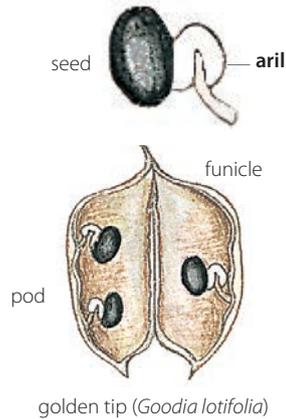


**aril** A fleshy appendage of various origins that partially or completely envelops the seed of some gymnosperms and angiosperms.

Specifically, the fleshy structure that develops from the funicle, as the pea family (Fabaceae), and attracts dispersal agents like ants.

**arillate** Bearing or related to an aril.

*cf.* **arillode**



**arillode** A fleshy structure, partially or completely enveloping a seed.

It develops from parts other than the funicle, as a caruncle that develops from the micropylar region of the seed coat or a strophiole that develops from the raphe.

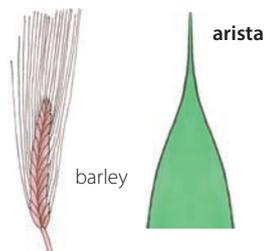
= **false aril**

*cf.* **aril**

**arista** An awn or bristle.

**aristate** Tapered to a very narrow, elongated bristle-like point, as a leaf tip.

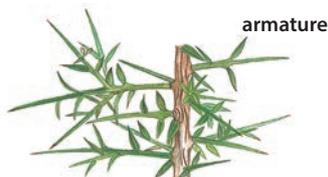
Bearing an awn or awns, as the beard of barley.



**aristulate** Having a small awn or bristle at the tip.

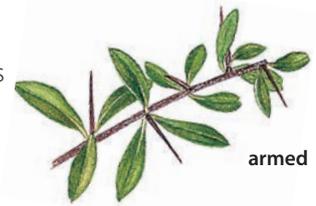
**armature**

A protective covering of thorns, spines, barbs or prickles



**armed** Bearing protective spines, thorns and prickles that deter herbivory.

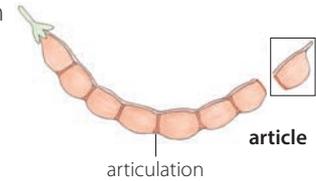
*cf.* **inermous, unarmed**



**aromatic** Producing volatile oils that are distinctively fragrant or spicy.

**article** Part of an organ that breaks away easily at a joint or articulation.

A segment of a jointed stem or fruit.

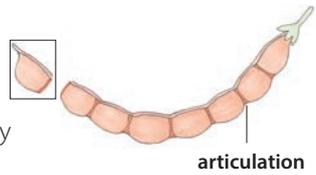


**articulation** A joint.

A point of separation.

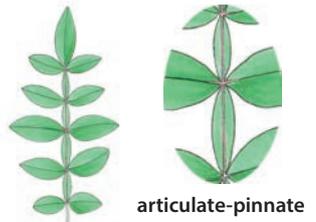
**articulate, articulated**

Jointed. Separating freely at the joints (nodes).



**articulate-pinnate**

Of a pinnate leaf with the rachis between the leaflets jointed.



**artificial selection** The active breeding of traits that are considered desirable, as selective breeding of disease resistant crop plants.

Controlled crosses between parents result in desirable traits being passed on to offspring.

*cf.* **natural selection**

**arundinaceous** Resembling a reed or cane.

**ascending** Proceeding from a lower to a higher part. Gradually going upward.

Of leaves on a stem, spreading horizontally or obliquely then becoming erect.

*cf.* **descending**

**ascending axis** The stem of a plant along which the above-ground parts are arranged.

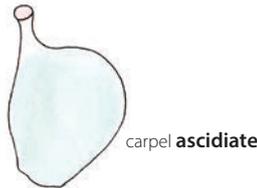
**ascending inflorescence**

Having the lower flowers on the axis and branches opening first.

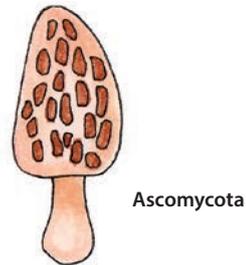
= **acropetal**  
cf. **descending inflorescence**



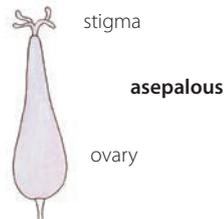
**ascidiate** Of carpels, shaped like a symmetrical or asymmetrical vase or an urn, as the pepper family (Piperaceae).



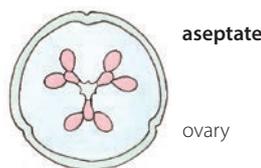
**Ascomycota** A phylum that accounts for 75% of all described fungi, commonly known as sac fungi, truffles or moulds. Some species form mycorrhizal relationships with the heath family (Ericaceae) and other plants.  
see **fungus, mycorrhiza**



**asepalous** Of a flower having no sepals, as the female flower of willows (*Salix*) that lacks both sepals and petals.



**aseptate** Lacking partitions or walls dividing a cavity, as an aseptate ovary or fruit.  
cf. **septate**

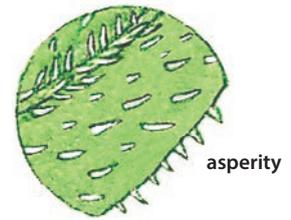


**asexual** Having no sex organs, as the asexual sporophyte of a fern. Independent of sexual processes, as a plant that reproduces vegetatively.

**asexual reproduction** The production of new individuals, without the fusion of gametes, by apomixis or vegetative reproduction. Asexual reproduction can occur naturally, as new plants generated from agamospermy, stolons and rhizomes, or artificially, as new plants generated from cuttings, grafting and layering.  
see also **micropropagation**  
cf. **sexual reproduction**

**asperity** A protuberance that gives a surface a rough texture.

= **scabrosity**  
**asperate, asperous**  
Rough with hairs or hard points.



**asperulate, asperulous** Minutely rough with short hard projections or points.

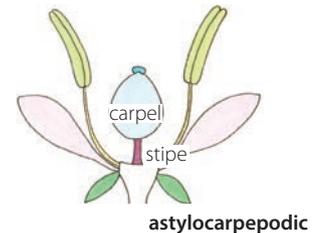
**assurgent** Growing upward and curved, as the stems of balsam (*Impatiens assurgens*).



**astylous** Of a carpel without a style and supporting stalk (stipe).  
cf. **stylocarpellous**  
see **astylous**



**astylous** Of a carpel without a style and with a supporting stalk (stipe).  
cf. **stylocarpellous**  
see **astylous**



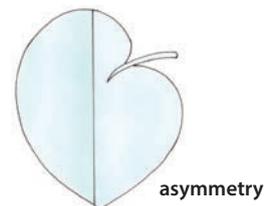
**astylous** Of a carpel lacking a style, with the stigma sessile on the ovary, as some members of the poppy family (Papaveraceae).



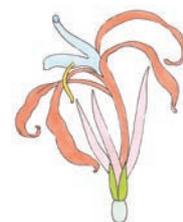
**asymmetry** The quality of being made up of unlike parts facing each other.

cf. **symmetric**  
**asymmetric, asymmetrical** With any plane through the centre producing unlike halves, as the leaf of a begonia (*Begonia*) and the flower of a canna lily (*Canna*).

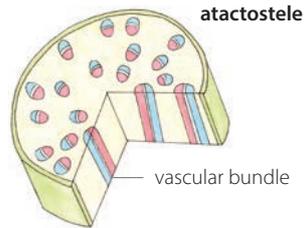
see **amorphic**  
cf. **symmetric**



begonia (*Begonia*)



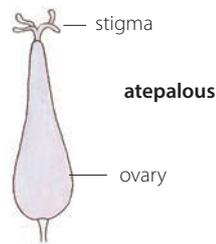
**atactostele** Stele with vascular bundles usually scattered. Characteristic of the stems of monocotyledons.  
cf. **eustele**



**atavism** The reappearance of a character of a distant ancestor after several generations. A throwback.

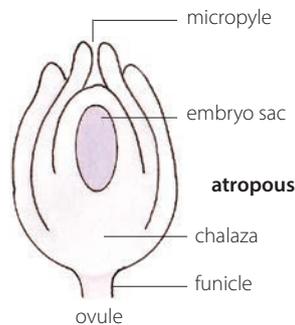
**ategmic** Of an ovule, lacking integuments surrounding the nucellus.  
cf. **bitegmic**, **unitegmic**

**atepalous** Of a flower having no tepals. Without a perianth, as the female flower of willows (*Salix*).  
= **achlamydeous**, **naked flower**



**ATP** Adenosine triphosphate.

**atropous** Of ovule orientation, with the chalaza at the base, the micropyle at the top and facing upwards and the embryo sac between, with all aligned with the funicle on a straight axis. The most primitive ovule orientation.  
= **orthotropous**  
see **ovule orientation**



**attenuate** Gradually tapered to a slender base or apex.



**attractant** Nectar, pollen or pseudopollen, but especially a substance that is a pheromone, that attracts an insect or other pollinator to a flower.

**atypical** Not representative of the normal standard, unusual or irregular.  
cf. **anomalous**

**auct., auctoris, pl. auctt., auctorum**  
According to the author(s).

**auct. non, auctoris non, pl. auctt. non, auctorum non**

Placed after a plant name to show that it has been used incorrectly by one or more authors.

**auctoris, abbr. auct. pl. auctorum, abbr. auctt.**  
According to the author(s).

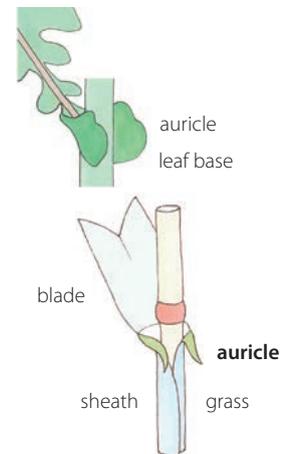
**auctoris non, abbr. auct. non pl. auctorum non, abbr. auctt. non**

Placed after a plant name to show that it has been used incorrectly by one or more authors.

**auricle**

An ear or ear-shaped appendage or lobe, as that at the base of some leaves.

**auriculate** Possessing an auricle or auricles, as the ear-like extension of the collar region between the leaf blade and the leaf sheath in grasses (Poaceae).



**autapomorph, autapomorphy** In cladistics, a character derived from an ancestor that is found only in one species.

An apomorphy that is restricted to just one species.

**autapomorphic** Relating to an autapomorphy.

**author** In nomenclature, the first person to publish the name and description of a new taxon.  
see **author citation**

**author citation** Any reference to the author who first effectively published a taxon name.

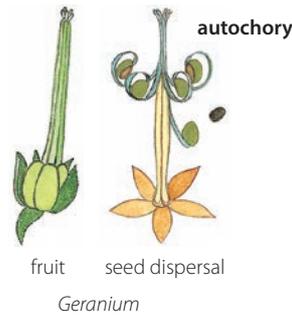
In nomenclature, each author's name is given a unique abbreviation that is attached to the name of the taxon, as *Rubus* L.

The abbreviation L. refers to Carl Linnaeus who first described this genus.

**authority** in nomenclature, the person whose name is abbreviated and cited after the taxon name, as *Rubus canadensis* L., with the L. refers to Carl Linnaeus who first described this species.

**autochory**

Of plants with a mechanism for self-dispersal of seeds, as the fruits of geraniums (*Geranium*) that dehisce explosively and release their seeds over a wide area.



**autochthonous** Of the earliest known flora.

**autogamy** Pollination of a flower with its own pollen.

= **self-pollination, selfing**

cf. **alogamy**

**autogamous** Of a flower that is self-pollinating.

**autonym** In nomenclature, an automatically created name for certain subdivisions of a genus or species that are based on the type specimen for that genus or species.

The genus name or specific epithet is retained, such as *Rubus* subgenus *Rubus* and *Geranium robertianum* subspecies *robertianum*.

Autonyms do not exist above the rank of genus.

**autopolyploid, autopolyploidy** Having multiple chromosome sets derived from a single species.

see **polyploidy**

cf. **allopolyploid**

**autotroph** An organism capable of synthesising its own food from inorganic substances using light or chemical energy. Plants are the most familiar autotrophs.

see **chemoautotroph, photoautotroph**

cf. **heterotroph**

**autotrophic** Of or relating to an autotroph.

see **trophic**

**autumnal** Of or appearing in autumn.

cf. **aestival, vernal**

**auxins** Plant hormones produced in the growing tips of shoots and roots.

Their influences include water absorption, cell division, inhibition of side shoots above ground thus resulting in growth at the apices and promotion of lateral and adventitious root growth below ground.

see **phytohormone**

**auxotelic** Of an inflorescence axis in which growth continues beyond the flowering region into a leafy shoot so that it appears to be inserted between the leaves, as most species of tea-tree (*Melaleuca*).

see **intercalary**

cf. **anauxotelic**

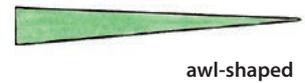


**avowed substitute** New name. A replacement name.

= **nomen novum**

**awl-shaped** Narrowly triangular and tapering gradually to a fine point.

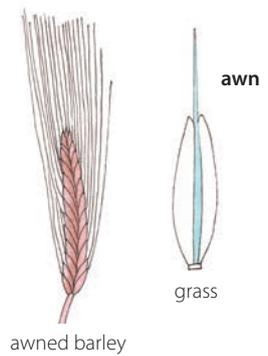
= **subulate**



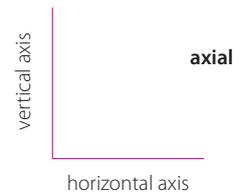
**awn** A slender stiff bristle-like appendage or prolongation. Sometimes a continuation of the primary vein, as on the glume, lemma or palea of grasses (Poaceae).

**awned** Aristate, bristled. Bearing one or more awns as a head of barley.

see **beard**



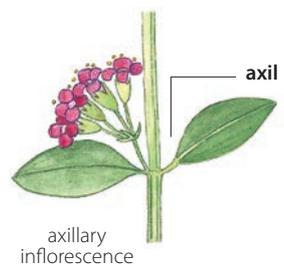
**axial** Of or belonging to an axis. In the direction of or along an axis. Situated on an axis.



**axil** The upper angle between a leaf and a stem or a branch and a trunk.

**axillary** Borne in an axil, as a bud, flower or inflorescence in the angle between a leaf and the stem.

cf. **intercalary, terminal**



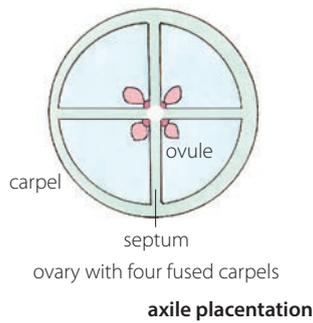
**axile** Attached to the axis of a structure, as ovules attached to placentas on the central axis of the ovary.

cf. **parietal**

**axile placentation**

With carpels fused creating a multilocular ovary and ovules arranged along the central axis in the bell peppers (*Capsicum annuum*).

see **placentation**



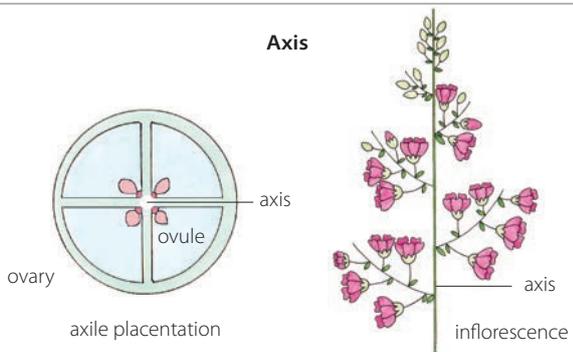
**axillary bud** A bud in the axil of a leaf that is capable of developing into a stem, branch or flower. On the crown of grasses, it gives rise to tillers, stolons or rhizomes.

**axis, pl. axes** An imaginary or real straight line used as a reference to determine position, symmetry and rotation.

The stem along which the above-ground parts of a plant are arranged is commonly called the ascending axis and the root the descending axis. The central part around which organs or plant parts are arranged, as ovules in axile placentation.

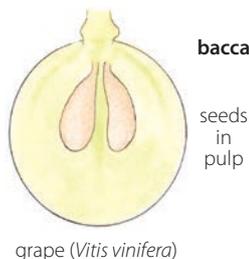
see **polar axis**

cf. **plane**



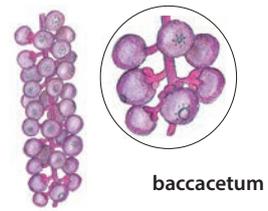
**bacca** A fleshy indehiscent fruit with the seeds immersed in pulp, as grapes and tomatoes. = **berry**

**baccate** Berry-like. Bearing berries. Pulp like a berry.



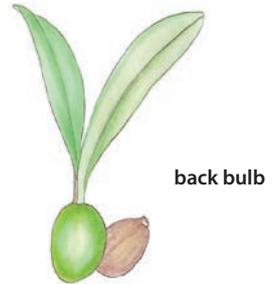
**baccetum**

An aggregate fruit composed of a cluster of berries, as pokeweed (*Phytolacca americana*).



**back bulb** Of some orchids, an old leafless, pseudobulb that remains after the terminal growth is finished.

If it is alive and has a bud at the base, it can be used for propagation.

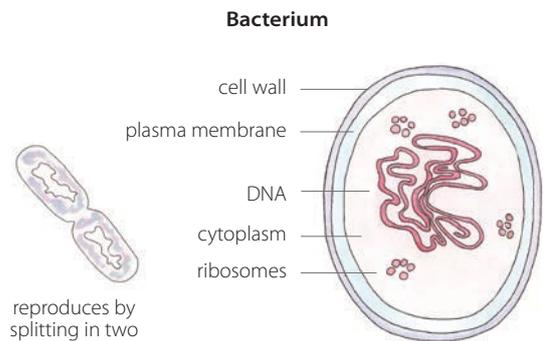


**backcross** The cross between a hybrid and one of its parents.

**bacterium, pl. bacteria** Microscopic single-celled organisms that reproduce by splitting into two. There is a cell wall but no nucleus and there are no organelles. DNA floats freely in the cytoplasm.

see **prokaryote**

**bacterial** Of or relating to bacteria.

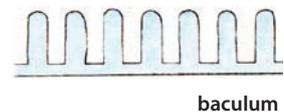


**baculum, pl. baculi**

A rod-shaped sculpturing element on a pollen grain or spore.

**baculate** With rod-shaped projections.

**baculiform** Rod-like.



**Bakerian mimicry** A female flower, lacking pollen or nectar rewards, mimics the male flower of the same species to attract a pollinator.

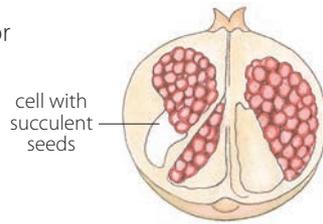
cf. **Dodsonian mimicry, Pouyannian mimicry, Vavilovian mimicry**

**balausta** A fruit with a leathery pericarp that encloses a number of irregular cells containing seeds with a succulent testa.



Derived from an inferior ovary.

The fruit is tipped with the lobes of the persistent calyx, as pomegranate (*Punica granatum*).

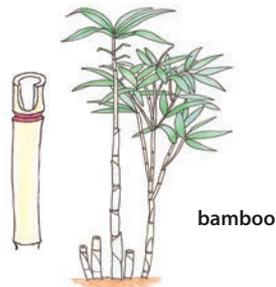


**balsam** A sweet-smelling oil or resin derived from various plants.

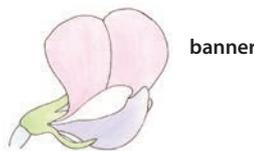
A plant producing this substance, as pine (*Pinus*).

**balsamiferous** Producing balsam.

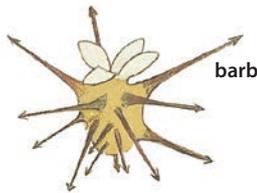
**bamboo** A usually tall, tree-like grass in the subfamily Bambusoideae of the grass family (Poaceae), characterised by woody, hollow, jointed, cylindrical stems.



**banner** The large upper petal of a pea flower (Fabaceae).  
= **standard, vexillum**



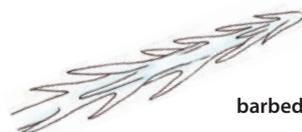
**barb** A short sharp hooked bristle or stiff hair-like projection, as on the spines of the fruit of sheep's burr (*Acaena*).  
A beard.



**barbate** Bearded.  
Having long thin hairs, as the corolla lobes of beard-heath (*Leucopogon*).



**barbed** Jagged with hooks or points, as the pappus bristles of many daisies (Asteraceae).  
Bearded.  
cf. **barbate**



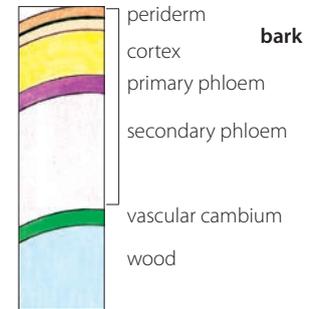
**barbella, pl. barbelleae** A short stiff hair.

**barbellate** With short stiff hairs.

**barbule** A minute barb or beard.

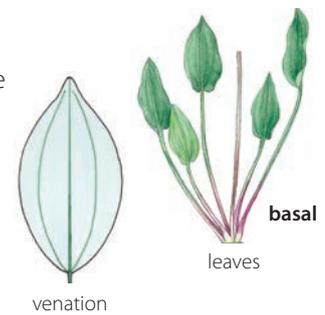
**barbulate** Finely or minutely barbed or bearded.

**bark** The tough outer covering of stems, branches and roots of woody plants that is composed of all tissue outside the ring of vascular cambium.

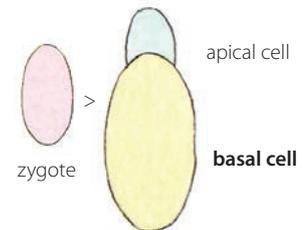


**basal** At or near the base or arising from the base, as leaves at the base of a stem or veins at the base of a leaf.

= **proximal**  
see also **suprabasal**  
cf. **apical, terminal**

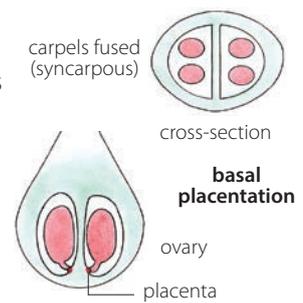


**basal cell** Of eudicot embryogenesis, the first division of the zygote in eudicots, the larger of the two cells below the smaller apical cell.  
It gives rise to the hypophysis and suspensor.

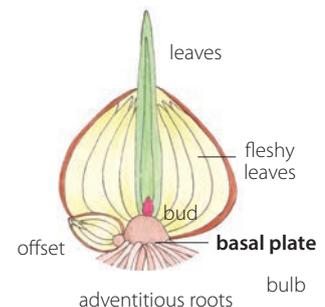


**basal placentation**

Having one or few ovules develop on a placenta at the base of a simple ovary or on placentas at the base of a compound syncarpous ovary.  
see **placentation**



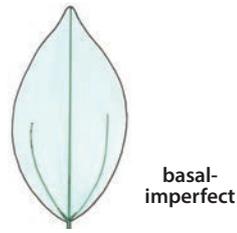
**basal plate** The modified compressed stem at the base of a bulb or corm.  
It has meristem tissue that gives rise to leaves, the flower bud, adventitious roots and offsets.



**basal-imperfect**

Having veins from the base of a leaf and lateral veins that extend for less than two-thirds of the leaf surface.

see **acrodromous**



**basal-perfect** Having veins from the base of a leaf and lateral veins that extend for at least two-thirds of the leaf surface.

see **acrodromous**



**basi-** A prefix meaning positioned at the base.

**basical capsule**

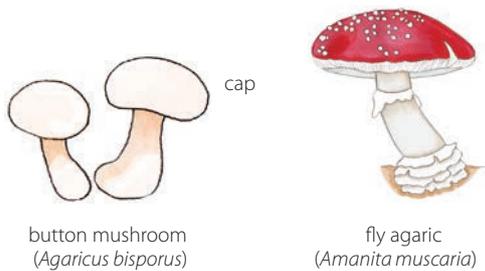
A capsule that splits at the base, as the birthwort genus (*Aristolochia*).



**Basidiomycota** The phylum of fungi known as club fungi that produce spores in the cap on a microscopic club-shaped fruiting body called a basidium.

Includes mushrooms, puffballs and rusts. They form mycorrhizal relationships with orchids and forest trees.  
see **atropous, fungus, mycorrhiza**

**Basidiomycota**

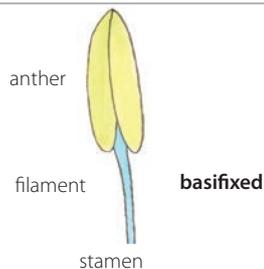


**basifixed**

Attached at or by the base, as a stamen filament attached to the base of the anther.

= **innate**

see **anther attachment**

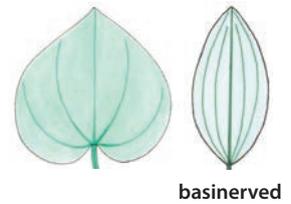


**basilar** Relating to or situated at the base.  
= **basal**

**basinerved**

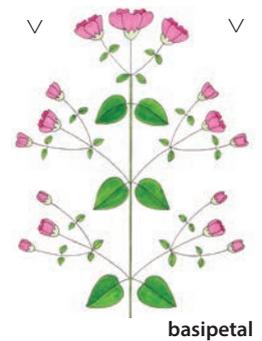
With veins arising from the base.

cf. **pinnate venation**



**basionym** In nomenclature, an earlier valid scientific name of a species that has since been renamed and from which the new name is partially derived, as the name *Geranium dissectum* var. *australe* (Nees) Benth. is derived from the basionym *Geranium australe* Nees.

**basipetal** Developing, in sequence, from the apex to the base, as a cymose inflorescence. The flowers at the top open first and those at the base open last.  
= **descending inflorescence**  
see also **centrifugal, centripetal**  
cf. **acropetal**



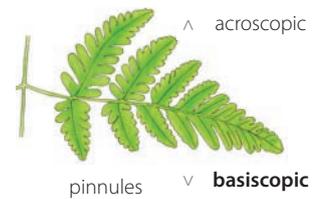
**basiphile** A plant that has a preference for, or grows exclusively on, alkaline soils that have a pH of more than 7.

**basiphilous** Thriving in an alkaline environment, as plants growing on some sand dunes.  
see also **calcicole**  
cf. **acidophilous**

**basiscopic**

Facing or directed towards the base, as the pinnules of some ferns.

cf. **acroscopic**



**basitonic**

Having growth strongest in the basal part of the plant.

cf. **acrotonic, mesotonic**

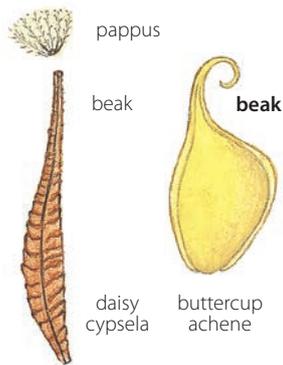


**bast** The commercial or trade name for phloem fibres used in manufacture of cords, ropes and weaving, as flax bast that is used to make linen. Also applied to any fibres from the outer parts of a plant.

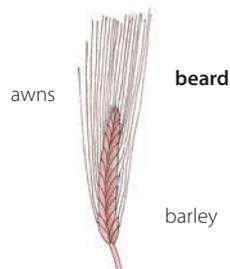
**bathyphyll** One of the first basal fronds of a climbing fern that is usually different from mature fronds produced on the upper part of the plant, as the climbing fern *Teratophyllum clemensiae*.  
cf. **acrophyll**



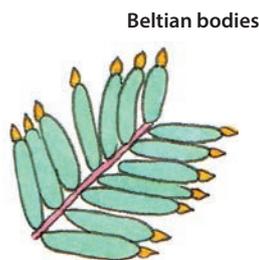
**beak** A usually firm and slender tapering extension, as that between the cypsela and the pappus of some daisies (Asteraceae) and the persistent style on the achene of buttercups (*Ranunculus*).  
see also **rostrum**  
**beaked** Having a beak.



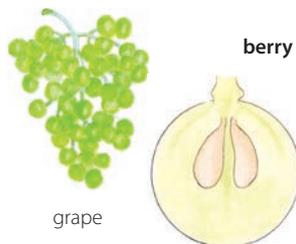
**beard** The long hair-like awns of barley and wheat.  
**bearded** In grasses (Poaceae), with long hair-like awns, as barley.  
= **barbate**



**Beltian body** A protein- and lipid-rich detachable tip on the leaflets of some *Acacia* species. It acts as a food body for ants that in turn protect the plant.  
see **myrmecophyte**



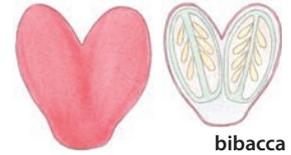
**berry** A general term for a fleshy indehiscent fruit with the seed or seeds immersed in pulp, as grapes (*Vitis vinifera*) and tomatoes (*Solanum lycopersicum*).



**betalains** A group of yellow and violet pigments that replace anthocyanins in most plant families of the Caryophyllales. They act as visible signals on flowers and fruit to attract insects, birds and animals for pollination and seed dispersal.

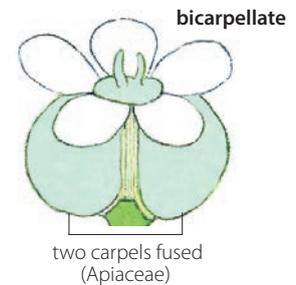
**bi-** A prefix meaning two.

**bibacca** A fused double berry, as honeysuckle (*Lonicera*).  
see **composite fruit**

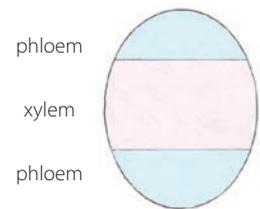


**bicarinate** Having two keels or ridges along the centre of the lower surface, as the palea of grasses.  
cf. **carinate**

**bicarpellary, bicarpellate** Of a flower having a gynoecium with two free or fused carpels, as the carrot family (Apiaceae).  
cf. **polycarpellary, unilocarpellate**



**bicollateral vascular bundle** With phloem in two groups, one on the outside of the xylem and one on the inside of the xylem.



Characteristic of some angiosperm families, as the cucumber family (Curcubitaceae). A type of conjoint vascular bundle.

**bicollateral vascular bundle**

**bicolour, bicoloured, bicolourous** Having two colours.

**biconcave** Concave on both sides.

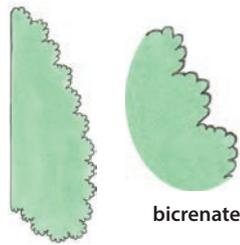


**biconvex** Convex on both sides.



**bicrenate** Of a margin with crenate teeth that are themselves crenate, as the margins of some leaves.

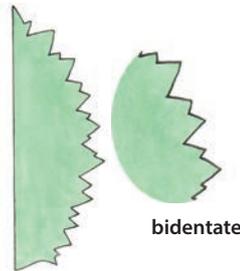
= **doubly crenate**  
cf. **crenate, crenulate**



**bidentate** Having two teeth.

Doubly toothed, as the margins of some leaves with tooth-like projections that are themselves toothed.

= **doubly dentate**



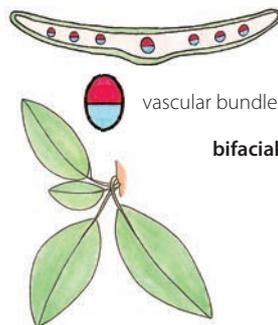
**biennial** A plant that completes its life-cycle in two years, producing only vegetative growth in the first year then flowering, fruiting and dying in the second year.

cf. **annual, perennial**

**bifacial** Having structurally different upper (adaxial) and lower (abaxial) surfaces, as the leaves of most dicotyledons.

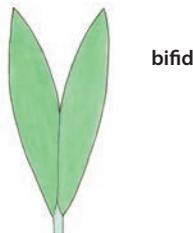
Typical of leaves that orient themselves at an angle to the main axis.

= **dorsiventral**  
cf. **equifacial, unifacial**



**bifid** Split into two parts from the tip.

Split to about half its length to form two pointed lobes, as leaves of some palms of the species *Chamaedorea*.



**bifoliate** With two leaves, as the green bird orchid (*Chiloglottis cornuta*).

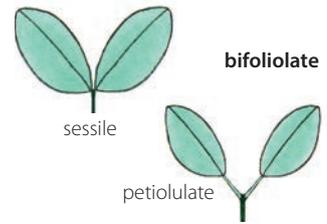
see **foliate**  
cf. **trifoliate, unifoliate**



**bifoliolate**

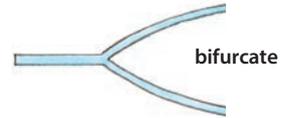
Of a compound leaf with two leaflets. Leaflets may be sessile or petiolulate.

cf. **bifoliate**



**bifurcate** Divided into two more or less equal branches or prongs. Forked.

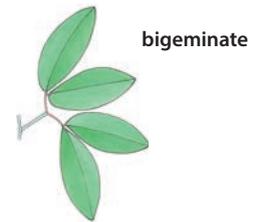
see **furcate**



**bigeminate**

Of a compound leaf having a forked petiole and a pair of leaflets at the end of each branch.

see **geminate**

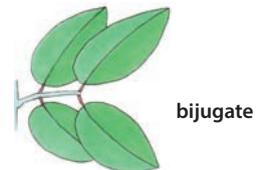


**bigeneric hybrid** Of a hybrid resulting from a cross between species of different genera.

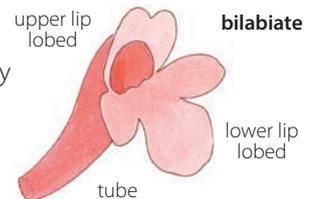
= **intergeneric hybrid**

**bijugate** Of a pinnate leaf having two pairs of leaflets.

see **jugate**



**bilabiate** Having a tubular corolla with a two-lipped limb that may or may not be lobed, as the corolla of the mint family (Lamiaceae).



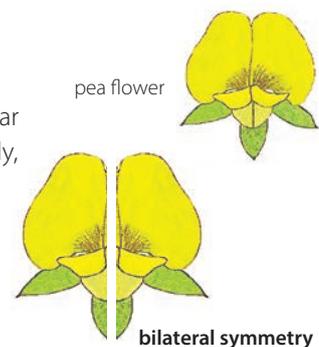
**bilateral** Having identical parts on the left and right sides of an axis, especially when of equal size.

cf. **unilateral**

**bilateral symmetry**

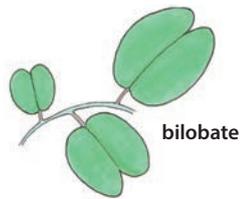
The quality of being divisible through the centre into exactly similar halves on one plane only, as flowers in the pea family (Fabaceae).

see **monosymmetric, zygomorphic**  
cf. **actinomorphic**

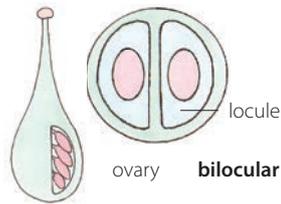


**bilobate, bilobed**

Having two lobes, as the bilobed leaf of orchid trees (*Bauhinia*).

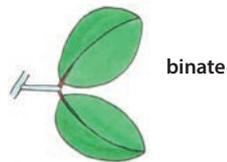


**bilocular** Of an ovary, anther or fruit, having two locules or cavities for ovules, pollen or seeds.  
cf. **plurilocular, unilocular**



**binary key** A key that offers two contrasting characters or couplets at each step. By selecting one option each time an unknown plant can be identified.  
= **dichotomous key**

**binate** Growing in pairs, as a petiole having two leaflets.  
= **geminate**



**bine** The flexible twining stem of some plants, as hops (*Humulus lupulus*) and bindweed (*Convolvulus*). Any plant with such a stem.  
cf. **vine**



**binomial** Having two names.

**binomial nomenclature** The system, devised by Linnaeus in 1753, in which plants have a two word name, the first is the genus name and the second the species name (specific epithet), as *Geranium robertianum* commonly known as herb Robert. The basic unit of naming in botany. The genus and species names are usually derived from Latin or Greek.

**biodiversity** The variety of plant and animal life in a particular place on earth or on earth as a whole.

**biome** see page 35

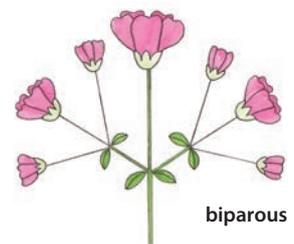
**biota** Flora, fauna and other forms of life, as fungi and microbes, that inhabit a given area.

**biotic** Living or once living, including plants, fungi and animals.  
In an ecosystem, relating to or resulting from living organisms.  
see also **community**  
cf. **abiotic**

**biotope** The smallest region of a habitat characterised by uniform environmental conditions and populated by characteristic flora and fauna.

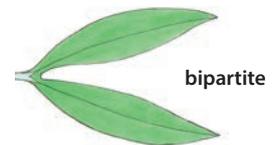
**biotype** A population in which all individuals have the same genotype.

**biparous** Of a cymose inflorescence forming two stems at each branching point, as a biparous cyme.  
see also **dichasium, dichotomous**  
cf. **multiparous, uniparous**



**biparous cyme** Another name for dichasium.

**bipartite** Divided almost to the base into two lobes, as a bipartite leaf.



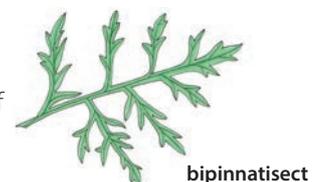
**bipinnate** Of a pinnate leaf with the primary divisions (pinnae) themselves divided into leaflets (pinnules). A twice pinnately divided compound leaf.  
see **alternate-bipinnate, opposite-bipinnate**  
see also **pinnate**



**bipinnatifid** Twice pinnatifid.

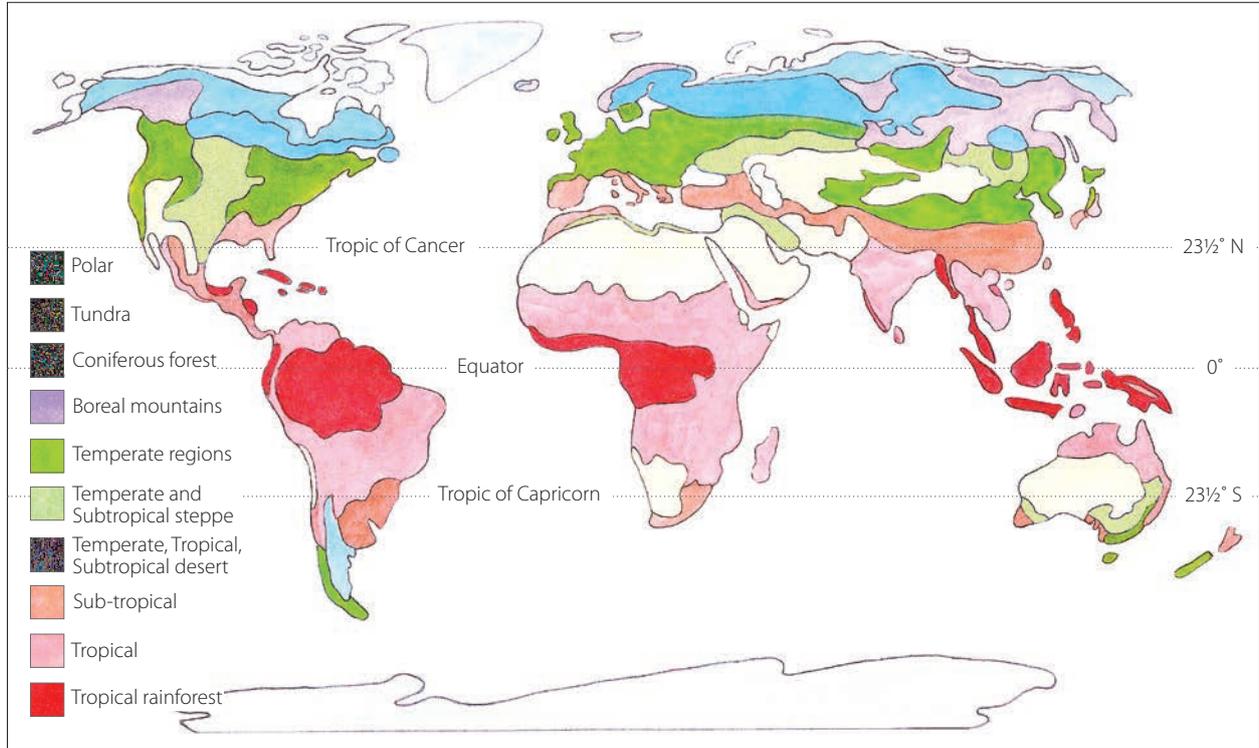
**bipinnatipartite** Twice pinnatipartite. Of a pinnately lobed leaf with lobes and lobules pinnatipartite.

**bipinnatisect** Twice pinnatisect. Of a pinnately lobed leaf with lobes and lobules pinnatisect.



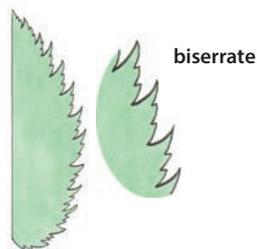
**biome** An ecological concept, closely related to an ecosystem but on a larger and often global scale, including aspects of climate, geography and the organisms living in it. There are terrestrial and aquatic biomes. A biome includes examples across the globe. The tropical rainforest biome extends from South America to Southeast Asia, whereas the tropical rainforest of the Amazon Basin is an ecosystem.  
 cf. **community, ecosystem, habitat, population**

**Biomes of the world**



**biseriate** Arranged in two rows or whorls.  
 see also **seriate**

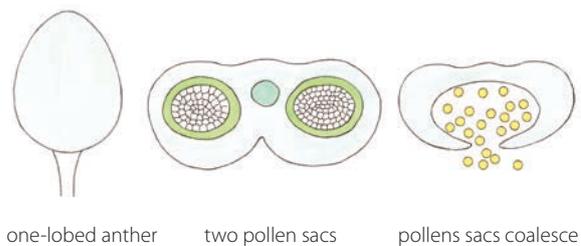
**biserrate** Of a margin with saw-like teeth that are themselves toothed, as the margins of some leaves.  
 = **doubly serrate**  
 cf. **serrate, serrulate**



**bispecific hybrid** A hybrid between two different species belonging to the same genus. *Geranium x cantabrigiense* is a hybrid between *G. macrorrhizum* and *G. dalmaticum*.  
 = **interspecific hybrid**

**bisporangiate** Of an anther having a single lobe (monotheical anther) with two pollen sacs. The pollen sacs coalesce before dehiscence.  
 cf. **tetrasporangiate, unisporangiate**

**Bisporangiate**

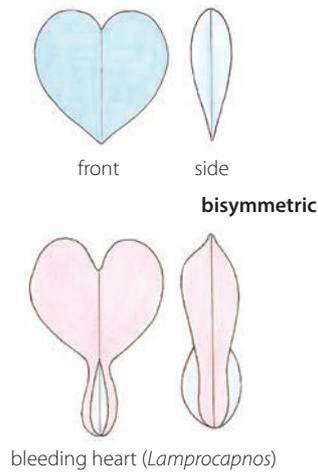


**bisexual** Of a flower with both stamens and a pistil or pistils fertile.  
 = **hermaphrodite, perfect**  
 Of an inflorescence, having all flowers with both stamens and pistils fertile and/or flowers with either stamens or pistils fertile.  
 cf. **neuter, unisexual**

**bisymmetric, bisymmetrical**

Divisible through the centre into two exactly similar halves that are at right angles to each other, as the flowers of bleeding heart (*Lamprocapnos*).

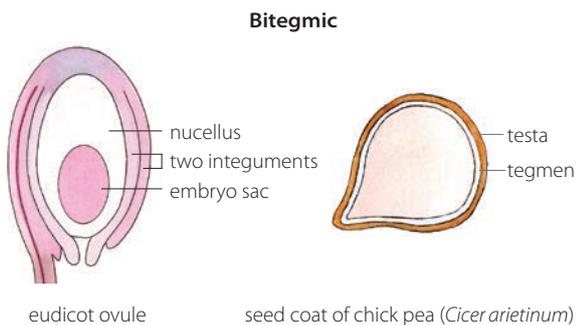
cf. **bilaterally symmetrical, monosymmetric, polysymmetric**



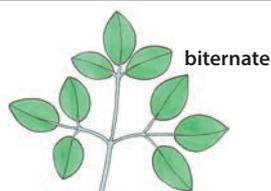
**bitegmic** Of an ovule, with two integuments surrounding the nucellus, as monocotyledons and most eudicots.

Of a seed coat having two integuments, the outer integument being the testa and the inner integument being the tegmen, as monocotyledons and most eudicots.

cf. **ategmic, unitegmic**



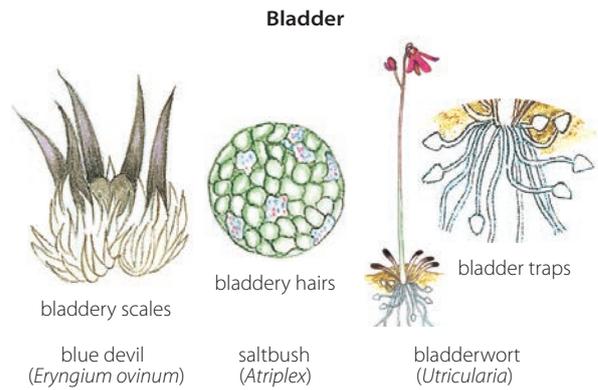
**biternate** Consisting of three parts, with each part again divided into three, as a biternate leaf.



**bivalent** In meiosis, said of a chromosome that is paired with its homologous chromosome during synapsis.

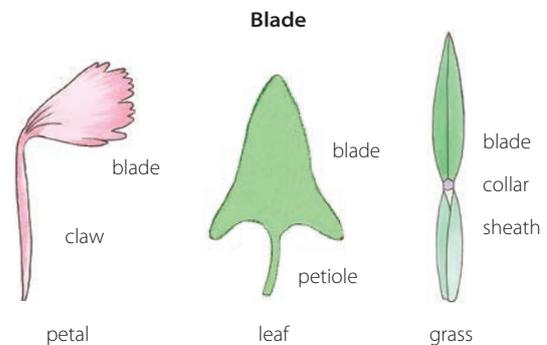
**bladder** An inflated membranous sac-like structure, as the traps of bladderworts (*Utricularia*).

**bladdery** Thin-walled and inflated like a bladder. Resembling a bladder, as the bladdery scales on the fruit of blue devil (*Eryngium ovinum*) or the bladder-like hairs on saltbush (*Atriplex*).



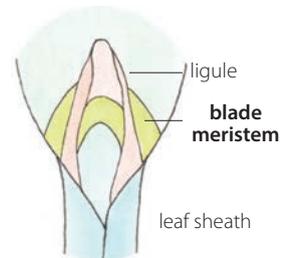
**blade** The flat expanded part of a leaf or petal. = **lamina**

Of grasses (Poaceae), the long narrow part of the leaf above the sheath. The blade and sheath are connected by the collar.



**blade meristem** Of grasses (Poaceae), a band of meristematic tissue between the leaf sheath and the leaf blade that generates growth of the leaf blade.

= **collar**



**blastotelic** Of growth or branching with the the tip of the stem ending in a vegetative bud so that it has the potential to grow indefinitely, as an indeterminate or indefinite inflorescence.

see **racemose inflorescence**

cf. **anthotelic**

**blind** Lacking flower buds, or buds failing to develop into a flower.

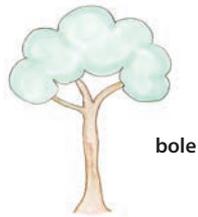
**bloom** A flower or the flowering time of a plant.  
A white-grey coating on the surface of some fruits, leaves and stems.  
*see also* **algal bloom, glaucous, pruinose**

**blossom** A flower or mass of flowers. To bloom.

**blotch** A patch of colour of an irregular shape.  
**blotched** Having distinct, irregularly shaped patches of colour.

**bog** A freshwater wetland with poorly drained peaty soil and vegetation that typically includes peat mosses (*Sphagnum*), sedges and heaths.  
*cf.* **marsh, swamp**

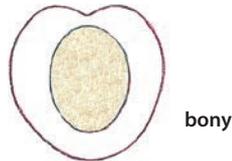
**bole** The trunk of a tree below the lowest branch.  
*cf.* **crown, trunk**



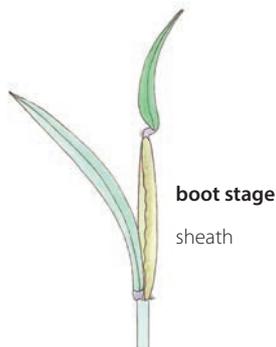
**boll** A dry, rounded capsule that splits into segments, especially of cotton (*Gossypium*) and flax (*Linum usitatissimum*).



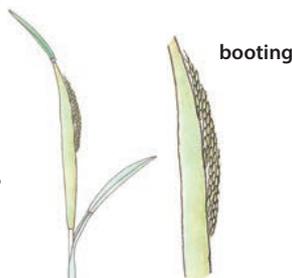
**bony** Hard and tough, as the stone in the fruit of olives (*Olea europaea*).  
= **osseous**



**boot stage** Of grasses (Poaceae), the transitional phase between the vegetative phase and the reproductive phase. The swelling of the developing inflorescence inside the enclosing sheath of the flag leaf.  
*see* **booting**

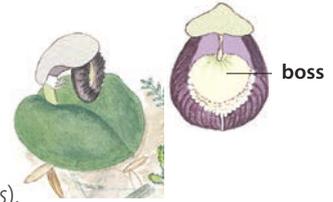


**booting** Of grasses (Poaceae), the inflorescence beginning to push through the uppermost sheath on the culm.  
*see* **boot stage, heading**

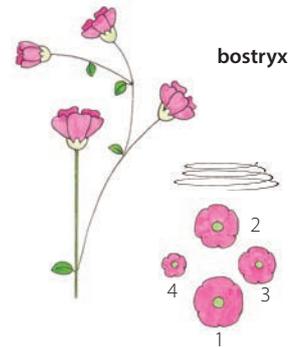


**boreal** Relating to the northern biotic area that forms a nearly continuous belt across North America and Eurasia. It is characterised by coniferous forests, long harsh winters and short summers.  
*see* **biome, taiga**

**boss** A rounded protruberance, as the prominent mound on the labellum of a helmet orchid (*Corybas*).



**bostryx** A flattened spirally coiled cymose inflorescence. A single new stem develops repeatedly on the same side of the axis.  
= **helicoid cyme**  
*see also* **monochasium**  
*cf.* **cincinnus**



**botryoidal, botryose** Having the form of a cluster of grapes.

**botuliform** Shaped like a sausage.

**brachiate** Applied to branches that are widely spreading and paired on alternate sides of the stem, as mint (*Mentha*).  
*cf.* **decussate**



**brachy-** A prefix meaning short.

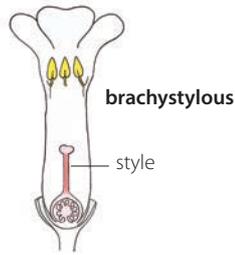
**brachyblast** A short lateral branchlet, with very short internodes, often bearing leaves in clusters, as some pines (*Pinus*).  
*see* **sterigma**



**brachystylous**

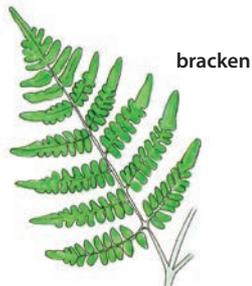
Of heterostylous flowers, those having short styles, as the cowslip (*Primula vulgaris*).

cf. **dolichostylous, isostylous**



**bracken** The bracken family (Dennstaedtiaceae) comprises twelve genera of mostly terrestrial ferns with a creeping or erect rhizomes and fronds that are usually large and much-divided.

see **fern**



bracken (*Pteridium*)

**bract** A modified or reduced leaf, typically differing in shape, size or colour from other leaves. It may be associated with a flower or a compound inflorescence, a cone or a grass spikelet (the glumes, lemmas and paleas are bracts).

Bracts may protect an inflorescence in bud.

They form an involucre surrounding the inflorescence of daisies (Asteraceae).

Some are large and showy as the bracts of poinsettia (*Euphorbia pulcherrima*).

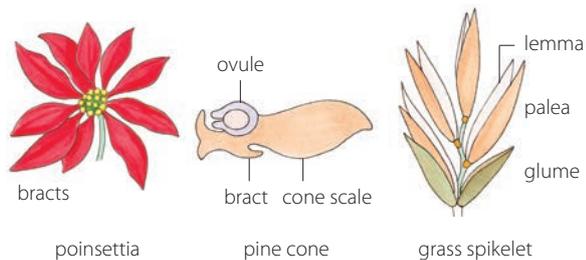
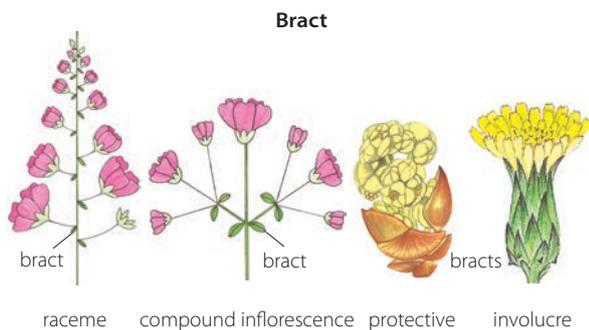
Fertile bracts subtend flowers, as those in a raceme.

Infertile bracts are those not associated with flowers.

Cones, as those of pines, have a bract, subtending the cone scale, that bears the ovules.

**bracteate** Having bracts.

**bractiform** Having the appearance of a bract.

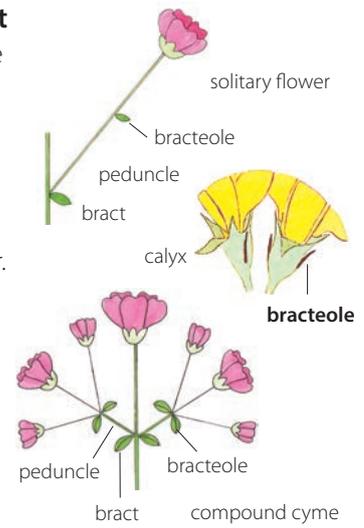


**bracteole, bractlet**

A small bract, borne singly or in pairs, on the peduncle of a solitary flower, or in a compound inflorescence, or on the calyx of a flower.

A small bract subtending a cyme unit in a compound cyme.

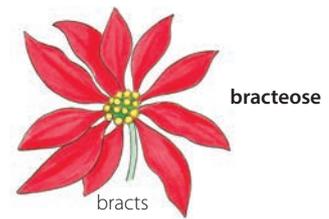
**bracteolate** Having bracteoles.



**bracteose**

With many bracts.

With showy bracts, as the bracts of poinsettia (*Euphorbia pulcherrima*).



**bramble**

Any plant in the bramble genus *Rubus*. Typically with prickly stems called canes and edible fruit, as blackberries, raspberries and boysenberries.

Any rough, usually wild, tangled or prickly shrub.



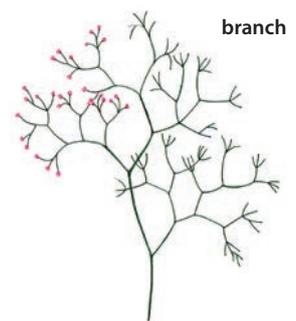
**branch**

A division or subdivision of a stem or axis, as a tree, shrub or inflorescence.

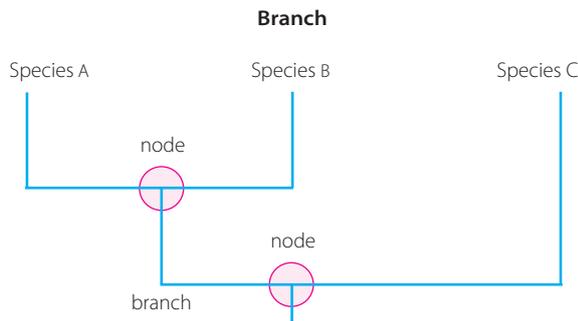
**branching** The organisation of the branches, including branching patterns.

see **acrotonic, basitonic, mesotonic**

**branchlet** A small branch.



**branch** Of phylogenetics, the line connecting two nodes on a phylogenetic tree.  
see **cladogram**



**branch complement**

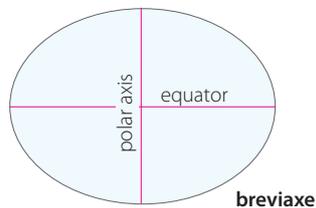
Of bamboos, a branch or branch clusters arising from a mid-culm node. The number and arrangement of branches in a cluster can help identify a species.



**breakaway** A steep-sided rocky slopes, as those of some scarps, particularly those of mesas.

**brevi-** A prefix meaning short.

**breviaxe** Of a pollen grain that is oblong in shape due to having a polar axis that is shorter than its equatorial diameter.



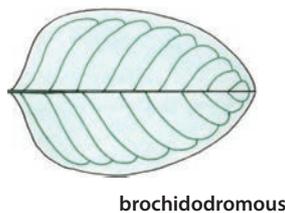
**brevisulcate** A pollen grain with a very short sulcus.

**bristle** A stiff hair. In grasses, the upper part of a twisted awn.

**bristled** Bearing bristles, as the margins of some leaves.



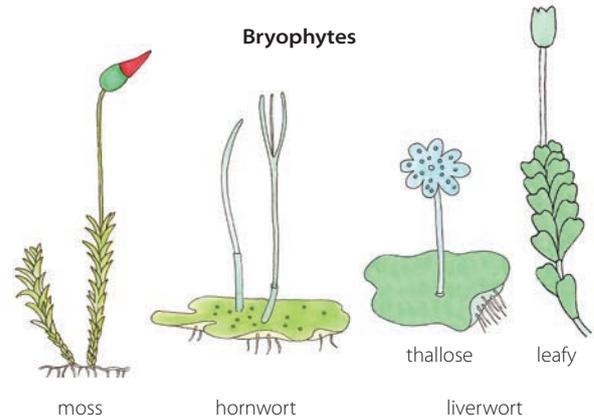
**brochidodromous** Of leaves with secondary veins not reaching the margin but joining to form a series of prominent arches.



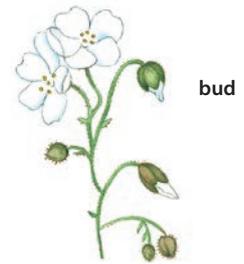
**bryophytes** Mosses, hornworts and liverworts. Nonvascular, simple, low-growing plants that lack true leaves, flowers and roots and produce spores rather than seeds.

They may be dioecious, with separate male and female plants, or monoecious, with male and female parts on the same plant.

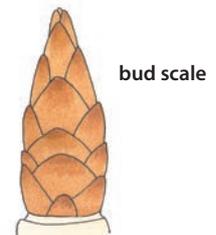
A larger gametophyte generation alternates with a smaller dependent sporophyte generation.



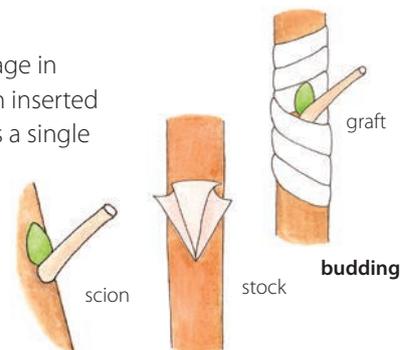
**bud** An undeveloped shoot, usually in the axil of a leaf or on a stem. A vegetative bud develops into leaves or branches and a reproductive bud produces flowers.



**bud scale** A modified leaf that acts as a protective covering and tightly encloses the developing flower or leaf bud of some plants, as the leaf bud of sugar maple (*Acer saccharum*). = **perule**



**budding** A form of graftage in which the scion inserted into the stock is a single bud.  
cf. **grafting**



**bulb** A short thick underground stem (basal plate), with fleshy modified leaves (scales) surrounding next seasons bud. The scales develop from the base of the stem as do the roots.

The scale leaves have food reserves that support the bulb during dormancy and the resumption of active growth.

A bulb may be tunicate or imbricate.

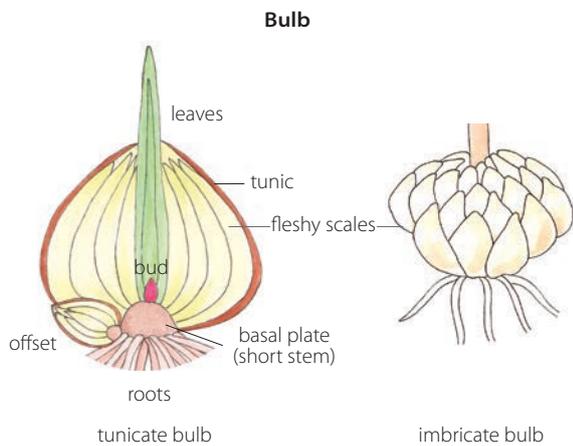
Tunicate bulbs usually have fleshy cylinder-like leaves, arranged in concentric circles, that are covered by a sheath (tunic) of dry membranous scale leaves, as onions (*Allium*).

Imbricate or naked bulbs have fleshy overlapping leaves that lack a tunic, as the lily genus (*Lilium*).

cf. **corm**

**bulbiferous, bulbous, bulbous** Producing bulbs. Resembling a bulb.

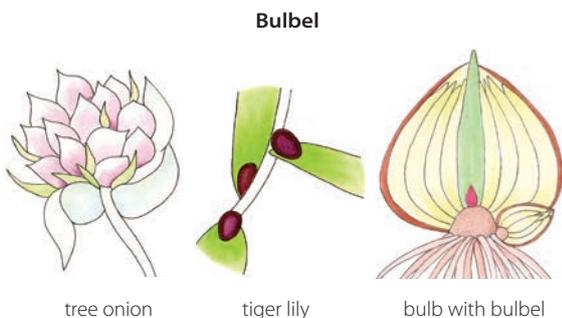
**bulbiform** Having the shape of a bulb.



**bulbel, bulbil, bulblet** A small bulb, often arising from the axil of a leaf, as tiger lilies (*Lilium tigrinum*), or on an above-ground stem in place of a flower, as tree onion (*Allium cepa* var. *proliferum*), or at the base of a mature bulb.

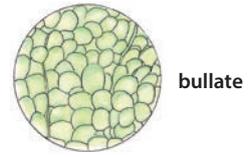
All have the ability to develop into a new plant.

**bulbiliferous** Having or resembling a bulbil.



**bulbotuber** A corm.

**bullate** With blister-like swellings on the surface, as the leaves of some begonias (*Begonia*).



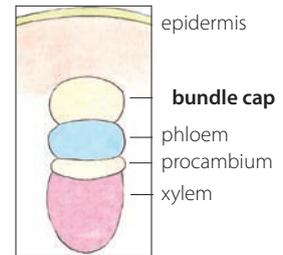
**bulliform cell** A bubble-shaped cell that is mostly water and may play a role in the hygroscopic opening and closing of leaves to prevent water loss in dry weather. Usually in the epidermis of the leaves of monocotyledons like grasses.

**bunch grass** Any of various grasses that grow in clumps or tufts rather than in a continuous mat. cf. **mat grass**



**bundle cap**

Of herbaceous dicot stems, a cluster of sclerenchyma fibres towards the outside of the phloem in a vascular bundle that helps strengthen the stem.

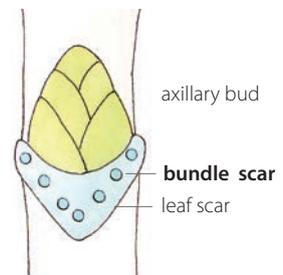


**bundle scar**

The healing layer that forms on vascular tissue after a leaf falls.

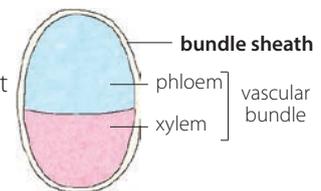
The arrangement and number of bundle scars on a leaf scar is used for plant identification.

see also **abscission**



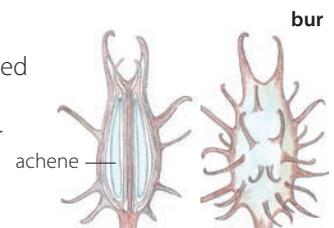
**bundle sheath**

A sheath of supporting sclerenchyma fibres that surrounds a vascular bundle in stems of monocotyledons.

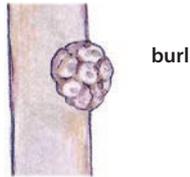


**bur, burr** A multiple fruit of achenes enclosed in a persistent prickly involucre, as cocklebur (*Xanthium*).

see **accessory fruit**

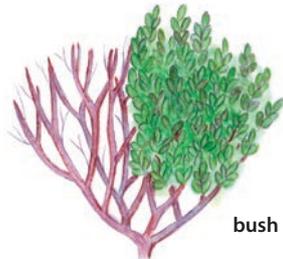


**burl** A usually rounded knotty growth filled with dormant buds on the trunk, roots or branches of some trees.



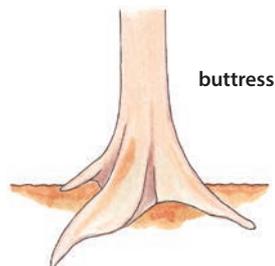
**bursicle** Of some orchids, a membranous covering over the viscidium that is easily broken when touched, thereby exposing the sticky viscidium, as in the genus *Orchis*.

**bush** A low woody perennial plant with several stems and no distinct trunk.  
= **shrub**

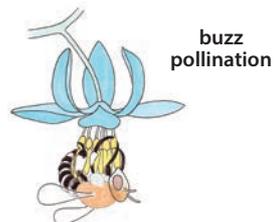


**bush** In Australia, New Zealand and South Africa, uninhabited mostly dry sclerophyll forests, woodland, or open grassland communities.

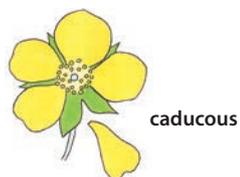
**buttress** A thickened flared support at the base of a tree. It provides stability and may extend many metres from the trunk. Found in some mangroves and figs.



**buzz pollination** Vibration from buzzing, as by a bee claspng an anther to shake pollen free from the flower of a flax lily (*Dianella*).



**caducous** Falling off prematurely or easily, as the petals of some flowers.



**caespitose, cespitose** Forming small dense tufts, as some grasstrees (*Xanthorrhoea*).

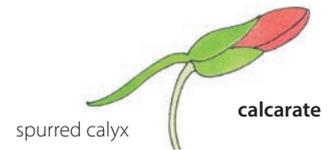


Of grasses (Poaceae), with tillers joined together at the base by very short stems or apparently stemless.

= **tufted**  
cf. **mat grass**

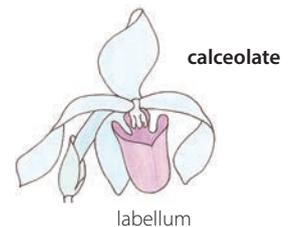


**calcarate** Spurred, as the calyx of nasturtium (*Tropaeolum*).



**calcareous** Mostly or partly composed of calcium carbonate, as some soils.

**calceolate, calceiform** Slipper-shaped. Resembling a round-toed shoe, as the labellum of the lady's slipper orchid genus (*Paphiopedilum*).



**calcicole, calciphile** A plant that cannot tolerate acidic soils and grows only on or mainly on alkaline soils containing lime.

cf. **calcifuge**  
**calcolous** Growing in soils rich in lime.  
cf. **acidophilous, calcareous**

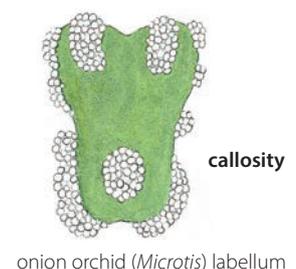
**calcifuge** A plant that cannot tolerate lime and grows only on or mainly on acidic soils.  
cf. **calcicole, calciphile**

**calciphyte** A plant tolerating a soil pH of 8 or higher.  
**calciphytic** Tolerating a soil pH of 8 or higher.

**callose** A complex plant polysaccharide commonly associated with sieve areas of sieve elements and present in pollen tubes. Also produced in response to wounding and infection.

**callosity** A raised hardened or thickened mass, as that on the labellum of an onion orchid (*Microtis*).  
cf. **callus**

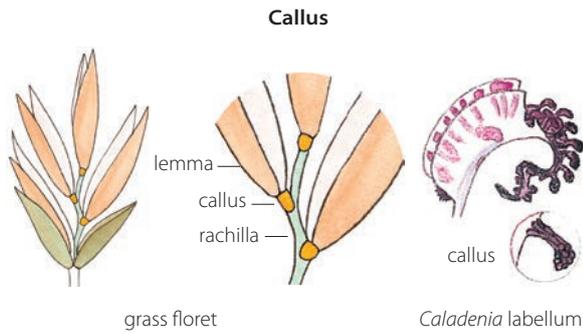
**callose** Hard and thick in texture. Bearing callosities.



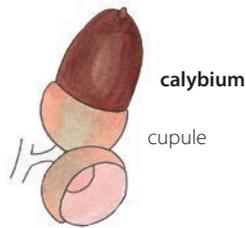
**callus, pl. calli** A projection or outgrowth of thickened tissue, as on the lip of the orchid genus *Caladenia*.

The toughened tissue that develops over a wound. In some grasses (Poaceae), a hard, sometimes bristly and/or sharp-pointed projection at the base of a floret, formed from the rachilla joint and/or the base of the lemma.

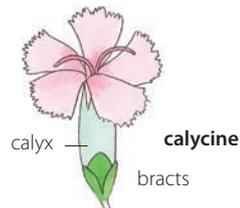
**callused** Having a callus.



**calybiium** A hard one-seeded nut derived from a one-loculed inferior ovary, as the nut part of an oak acorn (*Quercus*) that is partly surrounded by a cupule.



**calycine** Relating to, attached to or resembling a calyx, as the calycine bracts on carnations (*Dianthus*). Like a cup.



**calyche, calicle, calyculus, pl. calyculi**

A whorl of free or fused bracts that look like a second calyx, as hibiscus (*Hibiscus*).

A row of bracts immediately subtending the involucre bracts in some daisies, as fireweed (*Senecio*).

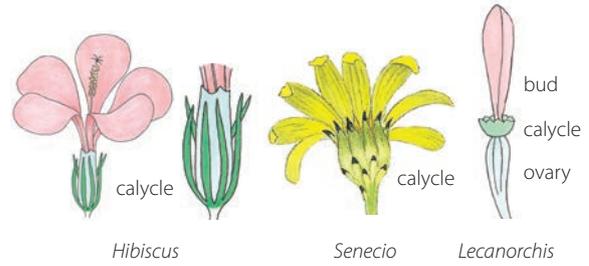
A small cup-shaped structure, as that below the calyx of the orchid *Lecanorchis*.

= **epicalyx**

**calycular, calyculate** Cup-like.

Having a whorl of free or fused bracts that looks like a second calyx.

**Calyche**



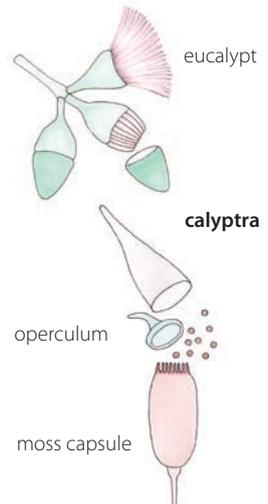
**calyptra, pl. calyptrae**

A hood or lid. Of some flowering plants, a deciduous cap, formed by fusion of the perianth, that covers the stamens and carpels in bud, as eucalypts.

A deciduous cap-like structure partly covering the capsule of mosses.

cf. **operculum**

**calyptrate** Relating to, bearing or resembling a calyptra.



**calyx, pl. calyces**

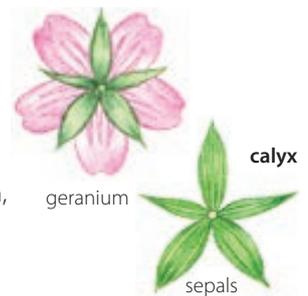
The sepals of a flower that surround the flower parts in bud. Sepals can be free or united.

The calyx is usually green, but in monocotyledons, like lilies, it is mostly the colour and texture of the petals.

**calyciform, calycoid**

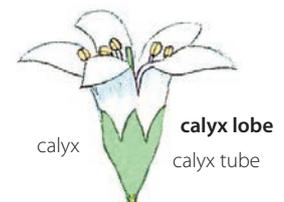
Having the form or appearance of a calyx.

cf. **corolla**

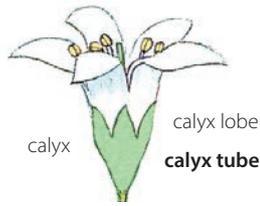


**calyx lobe** The upper free part of a sepal when the lower parts of the sepals are united into a tube.

see **calyx tube**



**calyx tube** The part of a calyx below the lobes with the sepals united to some extent.  
 see **calyx lobe**, **gamosepalous**



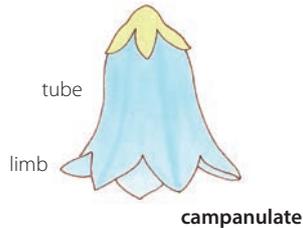
**CAM, crassulacean acid metabolism**

A carbon fixation pathway that occurs when the stomata open at night to admit carbon dioxide while minimising water loss. Found in many xeric plants like cacti. Named after the stonecrop family (Crassulaceae) in which this pathway was first studied.  
 cf. **photosynthesis**

**cambium, pl. cambia, cambiums** Meristematic tissue that is responsible for secondary growth. There are two kinds: cork cambium and vascular cambium.  
 see **lateral meristem**

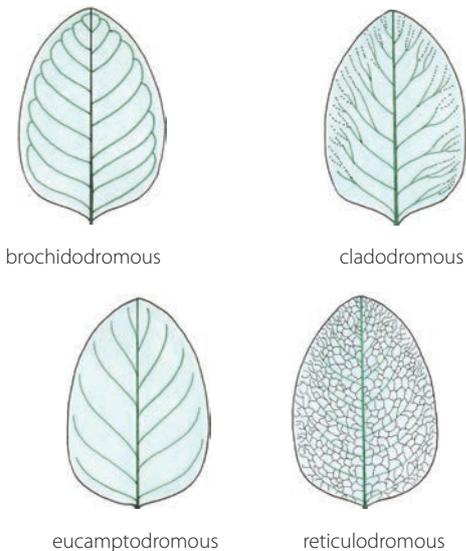
**campanulate**

Bell-shaped. Of a corolla having a broad tube terminating in a flared limb, as the flowers of bluebells (*Wahlenbergia*).



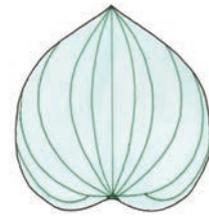
**camptodromous** Of leaves with secondary veins not terminating at the margins.

**Camptodromous**



**campylodromous**

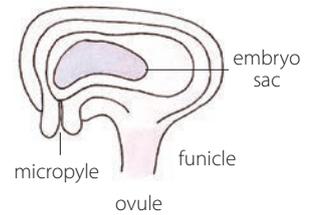
Of leaves with several primary veins that originate at the base and run in strongly curved arches that converge towards the apex.



campylodromous

**campylotropous**

Of ovule orientation, with the ovule curved and at more or less 90° to the funicle, and the micropyle bent downwards.  
 see **ovule orientation**



campylotropous

**canaliculate**

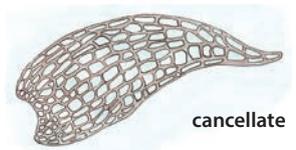
Having one or more longitudinal grooves or channels, as some leaves.  
 = **channelled**



canaliculate

**cancellate**

Lattice-like, as the scales of the spleenwort fern (*Asplenium*).  
 = **clathrate**



cancellate

**candelabriform**

Having the shape of a tall branched candlestick, as candelabra tree (*Euphorbia candelabrum*).



candelabriform

**cane**

A strong, slender, often jointed, stem of various plants such as sugarcane, bamboo, rattans, raspberries and grapevines.

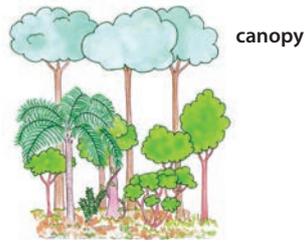


cane

**canescent**

Pale silvery-grey. Covered with a greyish to whitish layer of very short, closely interwoven fine hairs.  
 = **hoary**

**canopy** Of a single tree, its crown. In a forest, the uppermost layer formed by the crowns of the trees.



**cantharophile** A plant pollinated by beetles.

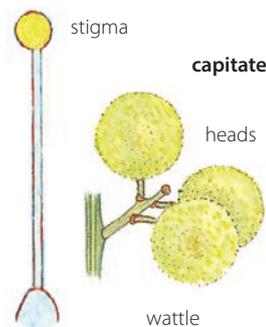
**cantharophily** Dispersal of pollen and pollination by beetles.

**cantharophilous** Pollinated by beetles.

**capillary** Very slender and hair-like. Similar to filiform but more delicate.



**capitate** With a knob-like head. Of an inflorescence, with flowers sessile and in a dense cluster, as some wattles (*Acacia*). Of a stigma, shaped like the head of a pin, as that of lesser loosestrife (*Lythrum hyssopifolia*).



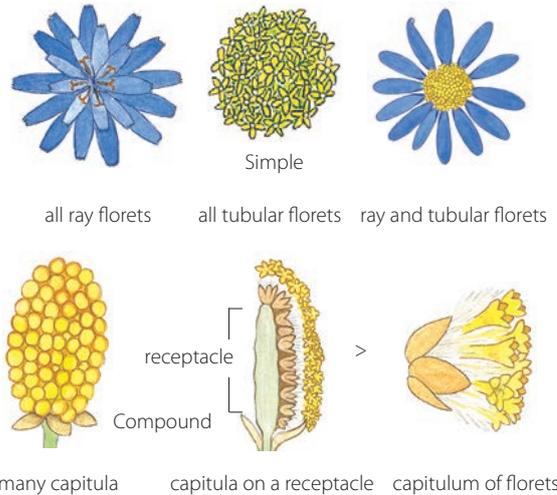
**capitellate** Minutely knob-shaped. Terminating in a very small knob, as the stigmas of some flowers. Grouped to form a capitulum.

**capitular** Of or relating to a capitulum as the papery, petal-like capitular bracts surrounding the capitulum of golden everlasting (*Xerochrysum bracteatum*).



**capitulum, pl. capitula** A dense cluster of sessile or almost sessile small flowers (florets) arranged on a flattened or rounded receptacle. A capitulum may be simple or compound. It may be indeterminate (racemose), as the typical inflorescence of the daisy family (Asteraceae), made up of ray florets and/or tubular florets. It may be determinate (cymose), as the bushmint genus (*Hyptis*). see **head**

**Capitulum (Asteraceae)**



**caprifigation** Transfer of pollen from the native caprifig flowers, by a fig wasp, to some cultivated figs.

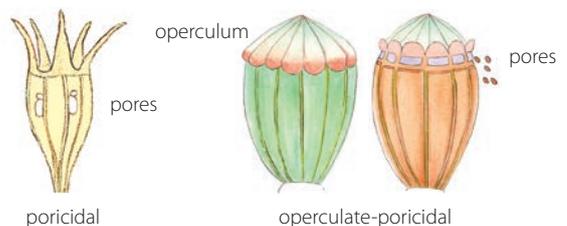
**capsule** A mostly dry fruit that splits open to release seeds in angiosperms and spores in bryophytes. It is composed of cavities (locules), separated by walls (septa), that contain seeds or spores. In angiosperms, it is derived from a syncarpous inferior or superior ovary with two or more carpels. see **capsule dehiscence**  
**capsular** Of or pertaining to a capsule.

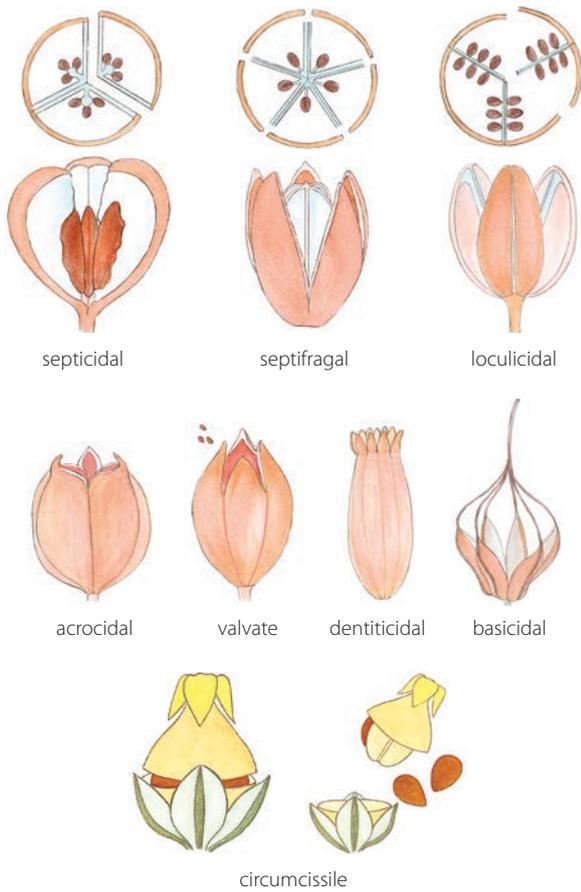
**Capsule (angiosperms)**



**capsule dehiscence** A capsule is described according to how it splits open at maturity.

**Capsule dehiscence**



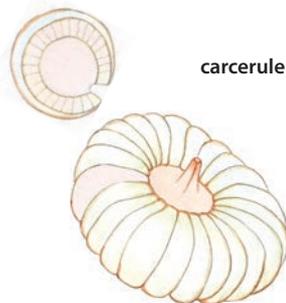


**carbohydrate** Any member of a group of chemical compounds containing carbon, hydrogen and oxygen, including sugars, starches and cellulose. It is produced by green plants from carbon dioxide in the atmosphere and water during photosynthesis.

**carbon, (C)** A non-metallic chemical element, having the symbol C, that occurs in many inorganic and all organic compounds. Plants take carbon from the atmosphere in the form of carbon dioxide during photosynthesis. It is converted into simple sugars to build starches, carbohydrates, cellulose, lignin and protein.

**carcerule, carcerulus**

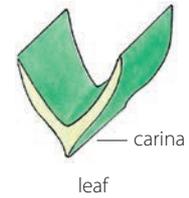
A dry schizocarpic fruit that splits at maturity into four or more nutlets, as hollyhock (*Alcea*). Derived from a multicarpellary syncarpous superior ovary.



**carina** A ridge along the centre of the lower surface like that on the bottom of a boat. The two lower petals of a pea flower, united along their lower margin to form a keel that encloses the stamens and pistil.



**carinate** Shaped like the keel of a boat or having a keel, as some leaves.

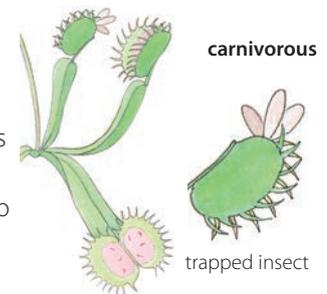


= **keeled**

**carneous, carnose** With the texture of flesh. Fleshy, flesh-coloured, pale red.

**carnivorous**

Of plants, adapted to trap and digest small animals, especially insects, as insectivorous plants with modified leaves like Venus fly trap (*Dionaea muscipula*).



cf. **herbivorous**

**carotene**

A red, yellow or orange pigment in the chromoplasts of plants cells that absorbs ultra-violet, violet and blue light in photosynthesis. see **carotenoids**

**carotenoids**

A group of yellow, orange or red pigments synthesised by many plants that provide fruit and flowers with bright colours. They are grouped into carotenes and xanthophylls. There are about 500 in all and examples are beta-carotene that gives carrots and other vegetables their orange colour and lycopene that gives tomatoes their red colour. They act as visible signals on flower and fruit to attract insects, birds and animals for pollination and seed dispersal. They interact with chlorophyll inside chloroplasts and help in light absorption for photosynthesis.

**carpel** The female reproductive unit of a flower, typically consisting of a stigma, style and ovary with ovules.

A simple pistil has only one carpel and the terms carpel, pistil and gynoecium are then synonymous.

A compound pistil has more than one carpel.

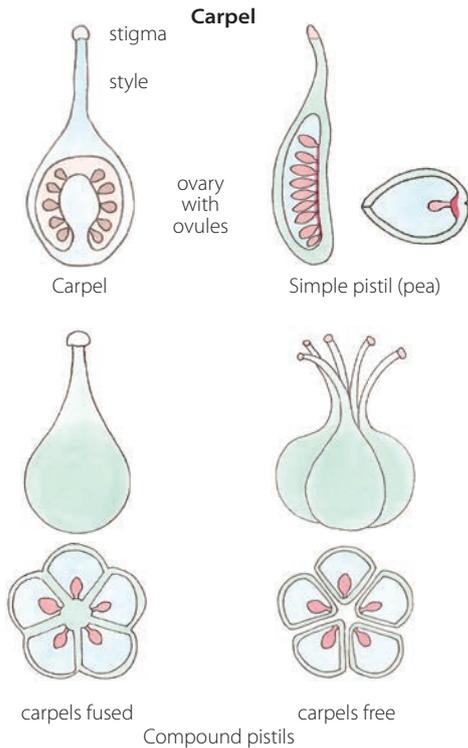
see **megasporophyll, ovuliferous scale**

see **gynoecium, pistil**

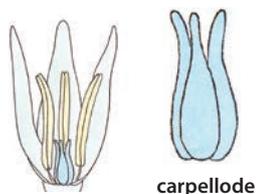
see also **apocarpous, syncarpous**

**carpellary** Of or like a carpel.

**carpellate** Bearing carpels.

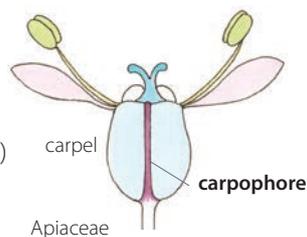


**carpellode**  
A sterile carpel, as in the male flower of coconut (*Cocos nucifera*).



**carpellody** The development of misshapen fruit caused by the fusion of the stamens to the ovary, as papaya (*Carica papaya*).

**carphophore**  
A slender continuation of the flower stalk that bears the carpels in the parsley family (Apiaceae) and geranium family (Geraniaceae).



**carpopodium** In the daisy family (Asteraceae), the distinct short thickening at the base of some cypselas.

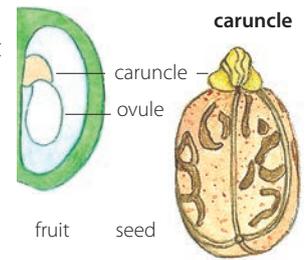
The point of attachment of the cypselas to the receptacle.



**cartilagineous, cartilaginous** Hard, tough and gristly.

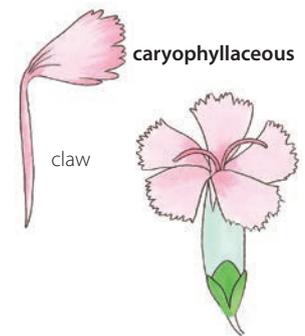
**caruncle** A fatty food body on some seeds that attracts dispersal agents, as the appendage on the seed of coast bitter bush (*Adriana quadripartita*).

**carunculate** Bearing or related to a caruncle.



**caryophyllaceous**

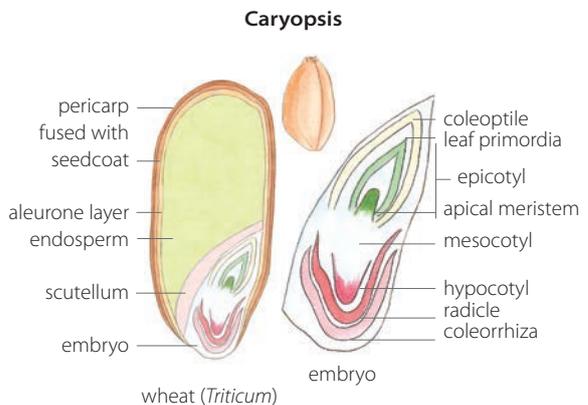
Of, relating to or belonging to the carnation family (Caryophyllaceae). Typically with a five-petalled corolla and each petal with a long erect claw and a spreading lamina.



**caryopsis** A dry indehiscent fruit with one seed fused to the fruit wall (pericarp).

Derived from a one-carpelled superior ovary. Characteristic of grasses (Poaceae), as wheat (*Triticum*).

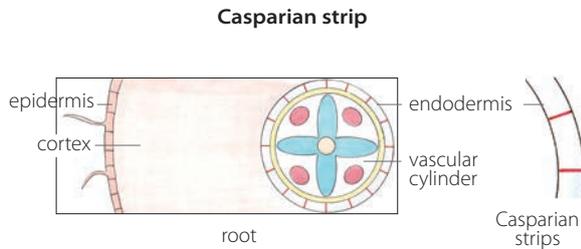
cf. **achene, cypselas, diclesium**  
= **grain**



**Casparian strip** Of the endodermis in roots, a waxy, waterproof band of material embedded in the sides of cells where they abut.

It prevents soil water and nutrients from diffusing through the endodermal cell walls and forces it to pass through the plasma membrane and cytoplasm to reach the vascular cylinder.

see also **apoplastic pathway, symplastic pathway**

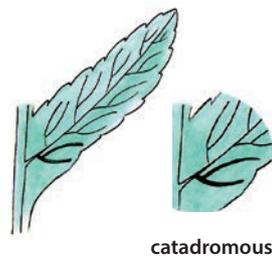


**castaneous** A deep reddish-brown colour like that of a chestnut (*Castanea*).

**casual** Of an alien plant that has not become naturalised.

**catabolism** The release of energy during the breakdown of larger complex molecules into smaller molecules, as the conversion of glucose during respiration to produce carbon dioxide, water and energy that is stored as adenosine triphosphate.  
cf. **anabolism**

**catadromous, catadromic** Of fern venation, having the first lateral veins in a segment extending toward the posterior margin.  
cf. **anadromous, isodromous**

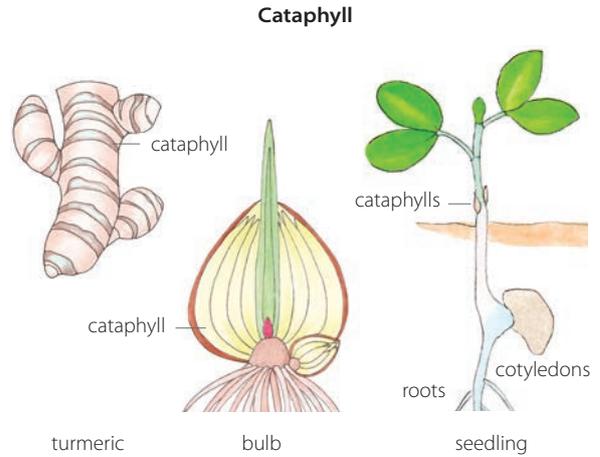


**catalyst** A substance capable of initiating or speeding up a chemical reaction.  
see also **enzyme**

**cataphyll** Any of several leaves that are not photosynthetic and function as protection, as the scale leaves that protect the buds of silver birch (*Betula pendula*), or for storage, as the fleshy scales of a bulb. They may be present on aerial parts, as those at the base of rushes (*Juncus*) or underground parts, as those on the rhizomes of the turmeric family (Zingiberaceae).

When cataphylls occur on a seedling they are the first leaves after the cotyledon.

see also **plumular leaves**



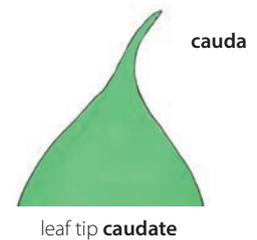
**catkin** A spike or raceme of unisexual, usually apetalous, flowers on a pendulous stem, as the flowers of the walnut (*Juglans regia*).  
= **ament**



**cauda, pl. caudae** A slender tail-like appendage.

**caudate** Having a slender tail-like appendage.

**caudiform** Shaped like a tail.



**caudex, pl. caudexes, caudices**

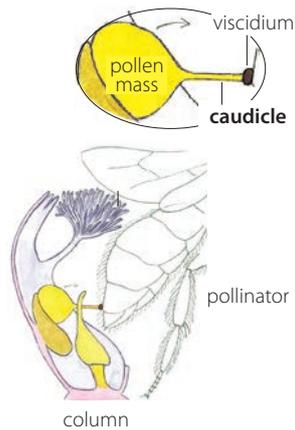
A stout swollen or succulent trunk-like stem, as that of pachycaul plants.

The main stem of a cycad, palm or tree fern. An underground stem that is the rootstock for some herbaceous perennials, as trillium (*Trillium*).

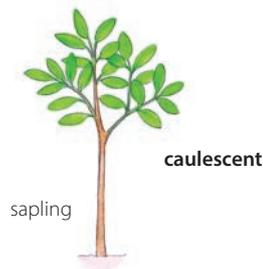
**caudiciform** Having the form of a caudex.



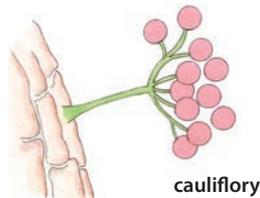
**caudicle** Of orchids (Orchidaceae) and milkweeds (Asclepiadaceae), the slender elastic extension of the pollen mass that connects it to the sticky viscidium. It attaches to a pollinator and helps separate the pollen mass from the anther.  
*cf.* **stipe**



**caulescent** Having a well-developed above-ground stem, as a sapling. Includes shrubs, trees and herbs with aerial shoots and leaves.  
*cf.* **acaulescent**



**cauliflory** The production of flowers on the older branches or trunks of woody plants, as the watermelon tree (*Syzygium moorei*).  
**cauliflorous** Exhibiting cauliflory.



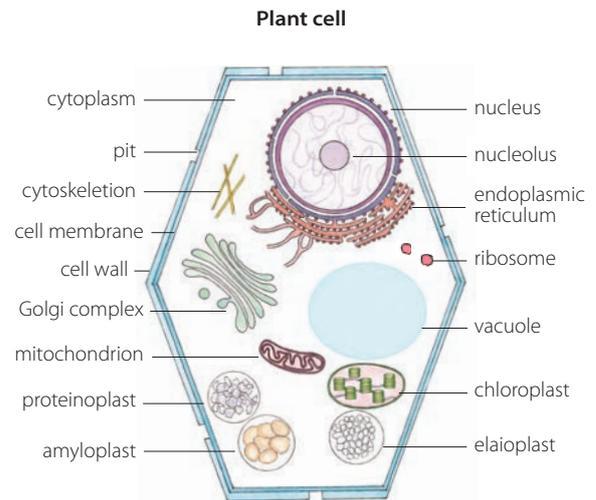
**cauline** Growing on a stem, having a stem. Of leaves growing on a stem.  
*cf.* **basal, terminal**



**caulome** The stem structure of a plant considered as a whole.  
*cf.* **phyllome**

**cecidium, pl. cecidia** A gall.

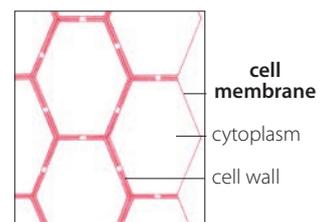
**cell** The microscopic structural and functional unit of all living organisms, consisting of a nucleus, cytoplasm, organelles, cell membrane and, in plants, a cell wall.  
*see* **eukaryote, prokaryote**  
**cellular** Of, relating to or consisting of cells.



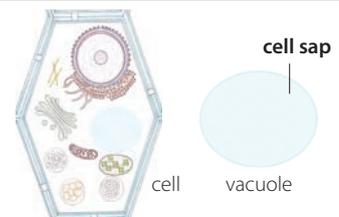
**cell membrane**

A thin semipermeable layer of tissue enclosing the cytoplasm of a cell and, in plants, surrounded by the cell wall. It allows movement of some substances into and out of the cytoplasm.  
 = **cytoplasmic membrane, plasma membrane**

**Cell membrane**

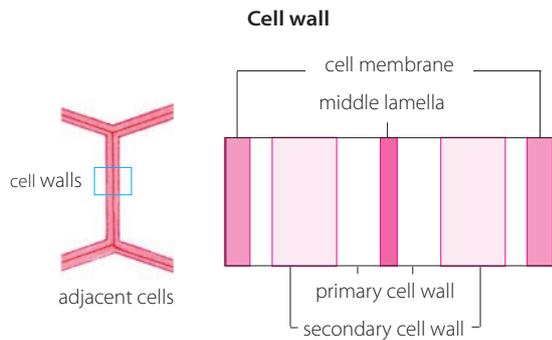


**cell sap** The watery fluid in a plant cell vacuole that is made up of water, salts and sugar.



**cell wall**

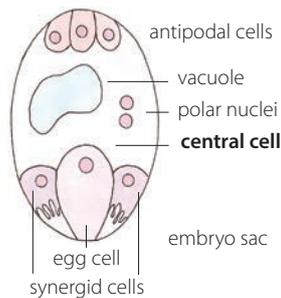
The outer surface of a plant cell that surrounds the cell membrane. It has up to three layers: a mainly cellulose layer next to the cell membrane (the primary cell wall), a pectin layer (the middle lamella) that is adhesive and helps adjacent cell walls bind to one another and, in some cells, a rigid lignin-rich strengthening layer (the secondary cell wall).



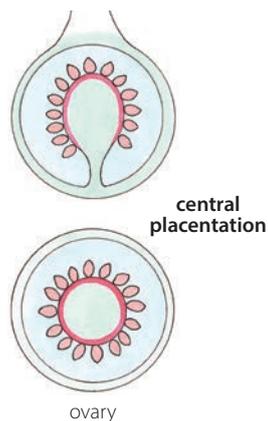
**cellular respiration** The pathway by which cells release energy from nutrients like glucose. The energy released is trapped in the form of adenosine triphosphate for use in cell processes. *see also aerobic respiration, anaerobic respiration, glycolysis, Krebs cycle*

**cellulose** A complex carbohydrate, composed of glucose units, that is the main component of the cell walls of plants.

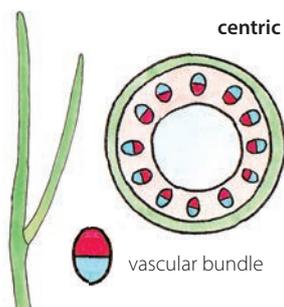
**central cell** The largest cell in the embryo sac with two nuclei (the polar nuclei). It is typically highly vacuolated and rich in food reserves. *see double fertilisation*



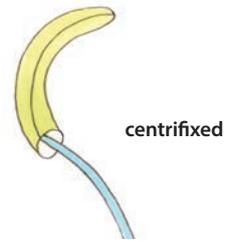
**central placentation** Carpels are fused but the internal walls (septa) are lacking, creating a unilocular ovary. The ovules are arranged along a central column (axis) that does not reach the top of the ovary, as primrose (*Primula*). = **free central placentation** *see placentation*



**centric** Having one usually cylindrical surface, as the leaf of an onion (*Allium cepa*) with no distinct upper and lower surfaces. = **unifacial** *cf. bifacial, equifacial*



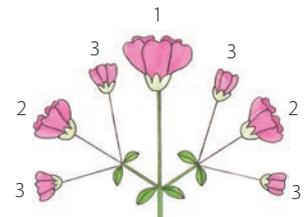
**centrifixed** Of anther attachment in which the slender filament tip is inserted into a hollow or pit at the base of the anther. *see anther attachment*



**centrifugal**

Flowering develops in sequence, from the centre towards the outer edge, as the cymose inflorescence of guelder rose (*Viburnum opulus*). Flowers at the centre open first and those on the outer side open last. *see also acropetal, basipetal* *cf. centripetal*

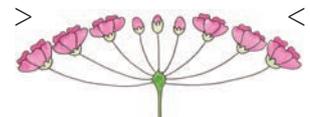
centrifugal



**centripetal**

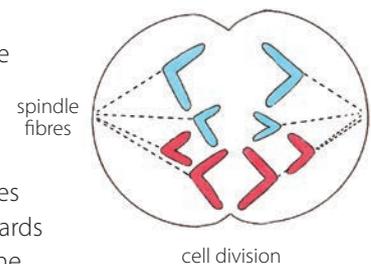
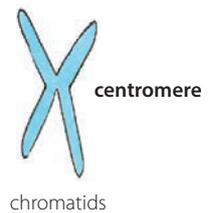
Flowering develops, in sequence, from the outer edge towards the centre, as the racemose inflorescence of St. Peter's wort (*Hypericum tetrapterum*). Flowers at the outer edge open first and those in the centre open last. *see also acropetal, basipetal* *cf. centrifugal*

centripetal



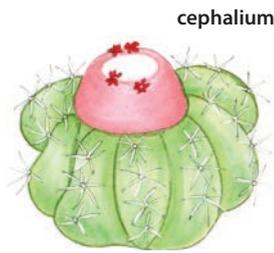
**centromere**

The point at which two chromatids touch. Each chromosome is copied during cell division and the copy is joined to the original at a centromere. A centromere is the attachment point for spindle fibres that separate the chromosome copies and pull them towards opposite ends of the cell before it divides.



**cephalium, pl. cephalia**

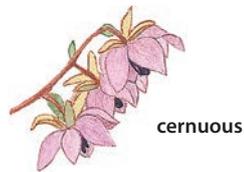
A woolly, densely bristled outgrowth at the top or side of some cactus species. Flowers and fruit form on the cephalium.



**ceraceous, ceraceus** Waxy in texture or appearance. A pale whitish-cream colour.

**cereal** Grass cultivated for grain for human or animal consumption, as maize, barley, wheat or oats.

**cernuous** Facing downwards, as some buds, flowers and fruit.



**cf.** Compare with.

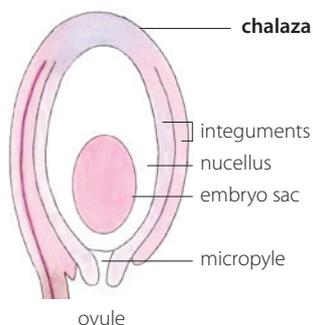
**chaff** Thin dry membranous scales or bracts, as the winnowed glumes, lemmas and paleas of grains and other grasses.

One of the bracts or scales on the receptacle of daisies (Asteraceae).

**chaffy** Covered with or consisting of chaff, resembling chaff.

see also **paleaceous**

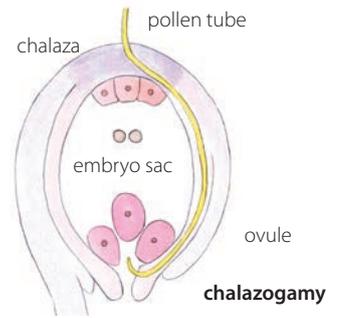
**chalaza** The region of an ovule opposite the micropyle where the integument(s) merge and are united with the nucellus. The funicule, chalaza, and raphe, when present, form a continuous tissue.



**chalazogamy**

Entrance of the pollen tube through the chalazal tissue of the ovule.

cf. **mesogamy, porogamy**



**chamaephyte** A plant to 25 cm high with perennating buds close to the soil surface and protected by leaf litter or snow in unfavourable conditions.

Includes subshrubs, cushion plants and plants with buds on stems that fall over, or ground covers on horizontal stems.

see also **cryptophyte, hemicryptophyte, phanerophyte, therophyte**

**channelled** Having one or more longitudinal grooves or channels, as some leaves.

= **canaliculate**



**chaparral** A dense semi-arid vegetation in California, with mainly tough woody evergreen shrubs to about two metres high. It has mild wet winters and summer droughts.

The chaparral is a Mediterranean-type ecosystem together with the garrigue and maquis in the Mediterranean Basin, the matorral in Chile, kwongan in southwestern Australia and fynbos in South Africa.

**character, characteristic** A structure, function or other attribute of a plant used to distinguish one taxon from another.

It may be inherited genetically or acquired in response to the environment.

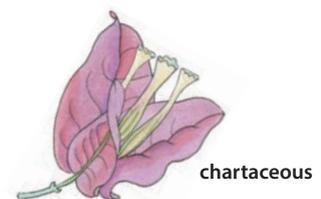
see **acquired character, inherited character**

**character state** Two or more forms of a character, as leaf shape which may be lanceolate, ovate etc.

**chartaceous**

Thin and dry like paper, as the colourful leaf-like bracts of bougainvillea (*Bougainvillea*).

= **papery**



**chasmogamy** Flowers that open and expose the anthers and stigmas for pollination.

*cf.* **cleistogamy**

**chasmogamous** Of a flower that opens for pollination. Of a plant producing such flowers.

**chasmophyte** A plant that grows in rocky fissures and clefts.

*cf.* **chomophyte, lithophyte**

**chemoautotroph, chemotroph** An organism that oxidises chemical compounds to synthesise its own energy.

Typically a bacterium or a protozoan living in a hostile environment.

*see* **autotroph**

**chemoautotrophic, chemotrophic** Of or relating to a chemoautotroph or a chemotroph.

*see* **trophic**

**chimaera, chimera** An organism having a mixture of genetically different tissues that originate from two or more different zygotes.

Formed by processes like fusion of early embryos and grafting.

*see* **graft chimaera, mosaic**

**chiropterochory** Dispersal of seeds by bats.

*cf.* **chiropterogamy**

**chiropterochorous** Relating to chiropterochory.

**chiropterogamy** Dispersal of pollen and pollination by bats.

= **chiropterophily**

*cf.* **chiropterchory**

**chiropterogamous** Relating to chiropterogamy.

**chiropterophile** A plant species that is pollinated by bats.

**chiropterophily** Dispersal of pollen and pollination by bats.

= **chiropterogamy**

*cf.* **chiropterchory**

**chiropterophilous** Pollinated by bats.

**chitin** A tough substance found in the outer skeleton (exoskeleton) of arthropods, like crabs, insects and spiders, and in the cell walls of fungi.

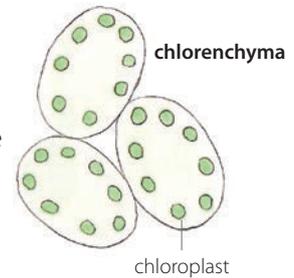
**chlamydeous** Having a perianth consisting of a calyx and/or a corolla.

*cf.* **achlamydeous, dichlamydeous, heterochlamydeous, homochlamydeous, monochlamydeous**

**chlrenchyma**

Photosynthetic parenchyma cells that contain chloroplasts.

Typically, it constitutes the mesophyll of a leaf, but it is also present in other green plant organs, as stems and unripe fruits.



**chlorophylls** A group of greenish pigments two of which, chlorophyll *a* and chlorophyll *b*, are found in plants.

Chlorophyll *b* is found in green algae and chlorophyll *a* is found in the chloroplasts of other plants.

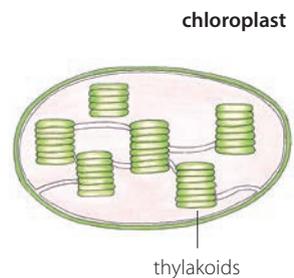
Chlorophylls absorb light energy for photosynthesis.

*see* **granum, thylakoid**

**chlorophyllous** Containing chlorophyll.

**chloroplast** The organelle in the cell that is responsible for photosynthesis in plants. It contains the greenish pigment chlorophyll in stacks of disc-shaped thylakoids that are the site of photosynthesis.

*see* **granum, stroma**



**chloroplast DNA, cpDNA** The small amount of DNA unique to chloroplasts.

Unlike nuclear DNA, cpDNA is arranged in rings.

**chlorosis** An abnormal condition resulting in green plants becoming yellowish due to a reduction of chlorophyll levels.

Its causes include mineral deficiency, disease or lack of light.

*see also* **etiolated**

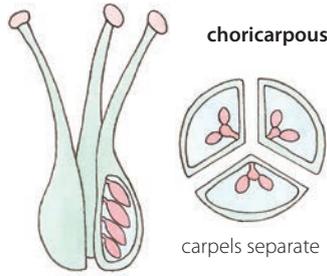
**chlorotic** Of or relating to chlorosis.

**chomophyte** A plant that grows in soil on rocky ledges.

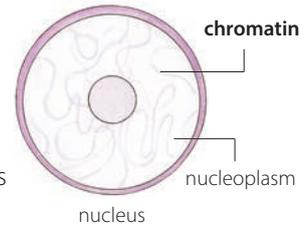
*cf.* **chasmophyte, lithophyte**

**choricarpous**

Of a compound gynoecium or fruit with two or more separate carpels.  
= **apocarpous**  
cf. **syncarpous**



**chromatin** Material composed of DNA and proteins in the nucleoplasm of the nucleus. It organises into visible chromosomes during cell division.

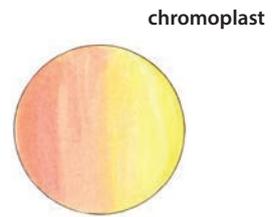


**choripetalous**

With petals free from each other.  
= **apopetalous**,  
**dialypetalous**,  
**polypetalous**  
cf. **gamopetalous**,  
**sympetalous**

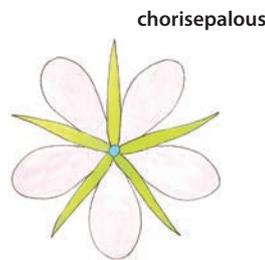


**chromoplast** A plastid containing pigments other than chlorophyll, especially red, orange or yellow carotenoids. Found in fruits, flowers, roots and senescent leaves.



**chorisepalous**

With sepals free from each other.  
= **aposepalous**,  
**dialysepalous**,  
**polysepalous**  
cf. **gamosepalous**,  
**synsepalous**



**chromosome** One of the pairs of tightly coiled thread-like structures of DNA located in the nucleus of plant and animal cells. It carries genetic information.

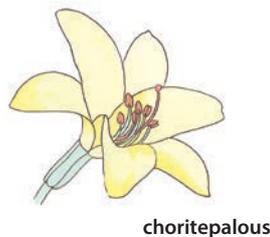
In unicellular organisms that lack a nucleus (prokaryotes), like bacteria, there is no nucleus and the DNA floats freely in the cell. The genetic information of each chromosome is transmitted from the parent cell to the daughter cells during cell division.

Each species has its own characteristic number of chromosomes.

see **chromatin**

**chorisis** The division or splitting of a leaf or floral organ, as some stamens, into two or more parts. It may be a normal or abnormal development.

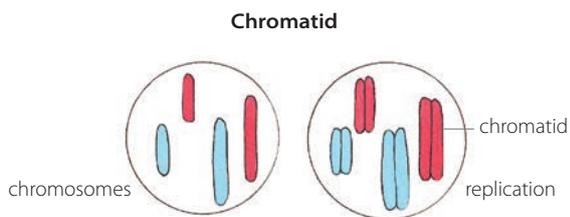
**choritetalous** With tepals free from each other, as day lilies (*Haemerocallis*).  
= **apotetalous**,  
**polytetalous**  
cf. **gamotetalous**,  
**synsepalous**



**chromosome set** The complement of chromosomes in the nucleus of a cell. It is constant for each species.

The basic set of chromosomes is called the monoploid set (x). A diploid species has two basic sets (2x), a triploid species has three basic sets (3x), and so on.

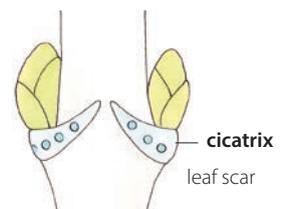
**chromatid** Either of the two strands of DNA formed when a chromosome makes an exact copy of itself (replication) before cell division.  
see **meiosis**, **mitosis**



**Chytridiomycota** The most primitive phylum of fungi known as chytrids. They are mainly aquatic and the only group having gametes with a flagellum that allows them to swim.

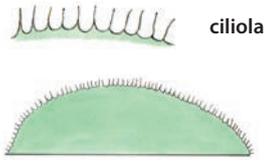
**cicatrice, cicatrix**,  
pl. **cicatrices**

A scar.  
The mark left by the separation of one part from another, as by a leaf from a stem.



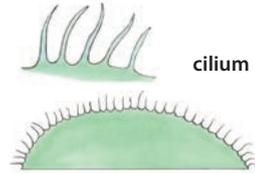
**ciliola** A small, fine eyelash-like hair.

**ciliolate** Bordered with small eyelash-like hairs, as the margins of some leaves.



**cilium, pl. cilia** A fine eyelash-like hair.

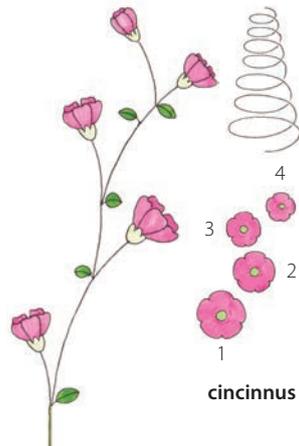
**ciliate** Bordered with eyelash-like hairs, as the margins of some leaves.



**cincinnus**

A spirally coiled cymose inflorescence with a single new stem developing from one axil only. Branching continues to alternate from one axil to the other so that the axis is zigzagged.

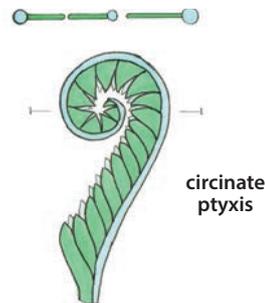
= **scorpioid cyme**  
see **monochasium**  
cf. **bostryx**



**cinereous** Resembling ashes. Grey with a coppery tint.

**circinate** Coiled in a flat spiral with the tip innermost, as an unopened fern frond.

**circinate ptyxis** Of a single leaf in bud that is flattened and spirally coiled, with the tip innermost.



**circinotropous**

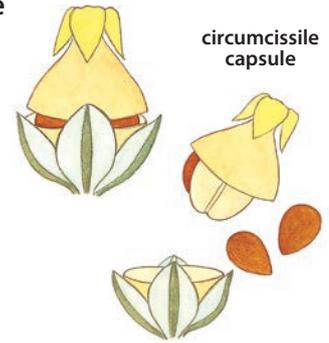
Of ovule orientation, with the ovule turned at more than 360° so that the funicle becomes coiled around the ovule.

see **ovule orientation**



**circumcissile capsule**

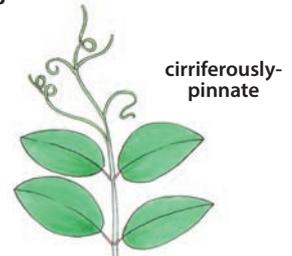
A capsule that dehisces around the circumference so that the upper part separates like a lid from the lower part, as plantain (*Plantago*). = **pyxis**



**circumscription** A description of what does and does not belong to a given taxon and of what sets it apart from others that are related to it. see **description, diagnosis**

**cirriferosly-pinnate**

Of a pinnate leaf with the terminal leaflet only, or the upper lateral leaflets also, reduced to tendrils.



**cirrus, cirrhus, pl. cirri, cirrhi**

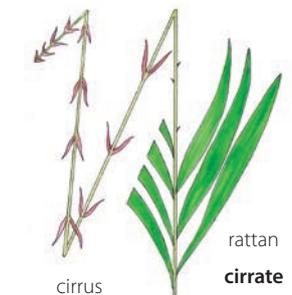
A tendril. Of climbing palms (rattans), a barbed whip-like extension of a leaf midrib.



**cirrose, cirrhose, cirrate** Ending in a long coiled tip. cf. **flagellum**

**cirrhiferous, cirriferous** Bearing a tendril or tendrils.

**cirriform** Resembling a tendril.



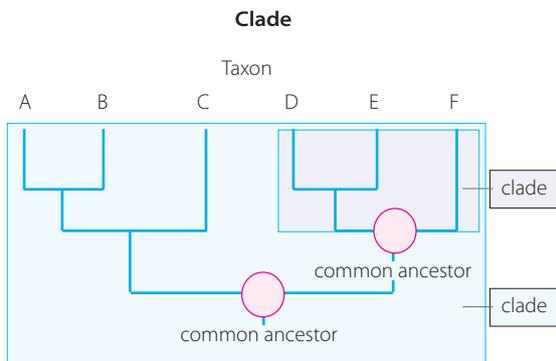
**cisterna, pl. cisternae**

A flattened membrane-bound sac. Occurs in the Golgi complex and the endoplasmic reticulum. see **dictyosome**



**clade** A group of organisms that includes a hypothetical common ancestor taxon and its descendants.

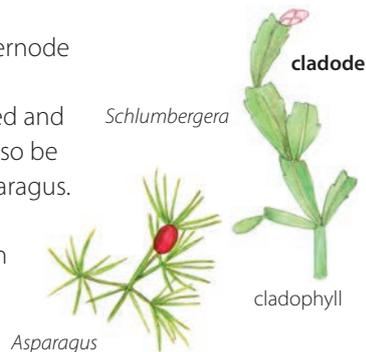
see **cladogram**



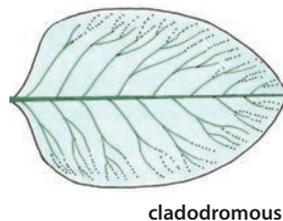
**cladistics** A method of hypothesising relationships among organisms by reconstructing evolutionary trees. The tree is the result of analysis of data about characters or traits of the organisms, as those related to anatomy, physiology, behaviour or genetic sequencing.

see **clade, cladogram**

**cladode** One internode on a cladophyll. It is usually flattened and leaf-like but may also be needle-like on asparagus. Sometimes used synonymously with cladophyll and phylloclade.



**cladodromous** Of leaves with secondary veins branching repeatedly and becoming indistinct before reaching the margin.

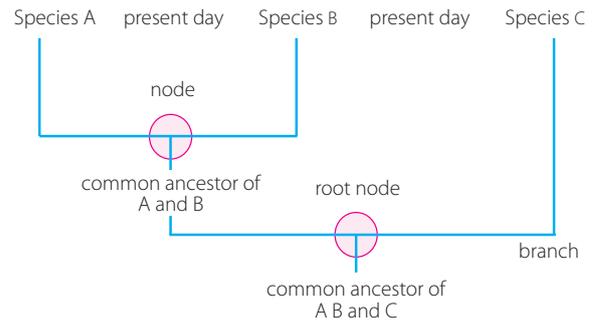


**cladogenesis** One of two main ways in which speciation occurs in response to the environment. Cladogenesis is branching, with an ancestral species separating into two or more new species.

see **cladogram**

cf. **anagenesis**

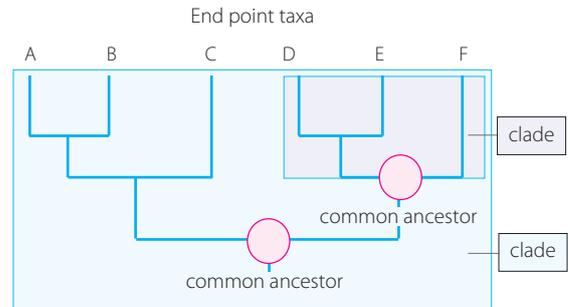
### Cladogenesis



**cladogram** A diagram showing evolutionary relationships within one or more clades.

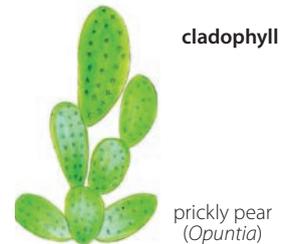
It shows a hypothetical ancestor, the lines of descent and the taxa that have evolved from it as the end-points.

### Cladogram



**cladophyll** A type of cladode that resembles leaf-like branches, as those in the cactus family. A term with variable definitions.

see **cladode**  
= **phylloclade**

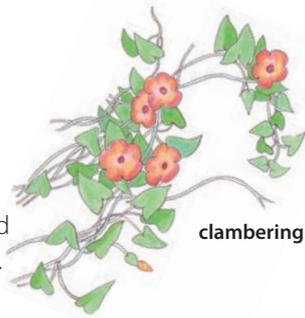


**cladoprophyll** A modified prophyll in some sedges, on the axis of lower paracladia, as the genus *Carex*. It may be tubular, scale-like or utricle-like and enclosing a flower.

**cladoptosis** Of the cypress family (Cupressaceae), with dead foliage falling simultaneously with branches and stems.

**cladoptotic** Relating to cladoptosis.

**clambering** Of a plant with thin weak stems that climbs or sprawls across objects or other plants without the use of tendrils or aerial roots, as black-eyed Susan (*Thunbergia alata*).  
cf. **vine**



clambering

**clasping** Partially or completely surrounding an organ, as the leaf sheath of a grass clasps the culm.  
cf. **amplexicaul**

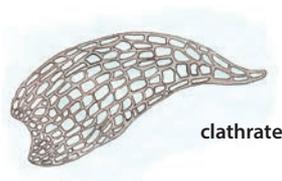


clasping

**class** In taxonomic classification, a rank below division or phylum and above order. Names of classes end in *-opsida*.  
see **taxonomic hierarchy**

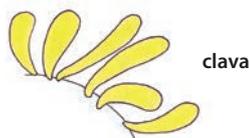
**classification** The systematic grouping of organisms, such as plants, animals, fungi and single-celled life forms, into categories according to their common attributes.  
see **phenetics, phylogeny, taxonomy**

**clathrate** Lattice-like, as the scales of the spleenwort fern (*Asplenium*).  
= **cancellate**



clathrate

**clava, pl. clavae** A club-shaped element.  
**clavate** Having clavae, club-shaped.

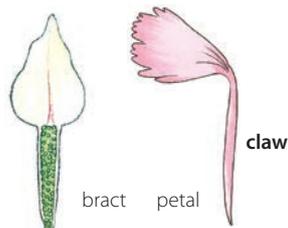


clava

**clavellate** Club-shaped, but smaller than clavate.

**clavuncle** The expanded part of the style just below the stigma in the dogbane family (Apocynaceae).

**claw** The stalk-like base of a petal, sepal or bract.  
= **unguis**  
**clawed** Having a claw.  
= **unguiculate**  
see **caryophyllaceous**

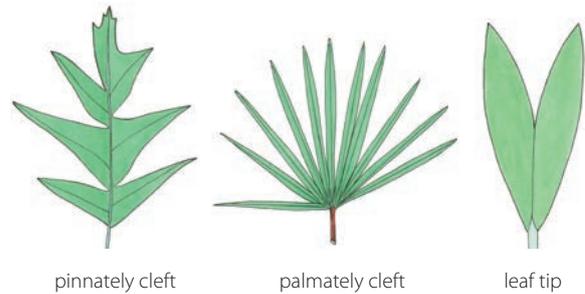


claw

**clay** Very fine-grained soil that is sticky and greasy when wet and hard when dry. The particles are less than 0.002 mm in diameter.  
Composed mainly of aluminium and silica.

**cleft** Split.  
Of a pinnatifid or palmatifid leaf with sharp sinuses so that the lobes are pointed rather than rounded.  
Of a leaf tip, split by a sharp sinus.  
cf. **forked**

#### Cleft leaves



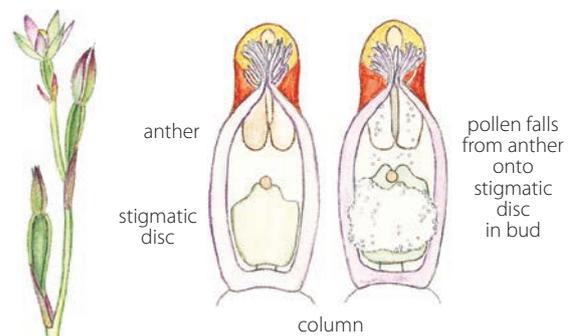
pinnately cleft

palmately cleft

leaf tip

**cleistogamy** Self-pollination within an unopened flower.  
see **autogamy**  
cf. **chasmogamy**  
**cleistogamous** Of flowers that self-pollinate in bud and remain closed, or self-pollinate before opening.  
In orchids pollen falls from the anthers onto the stigmatic disc in the unopened flower.

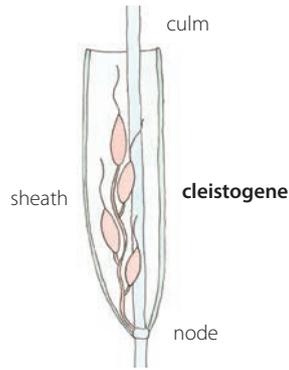
#### Cleistogamy



Slender sun orchid (*Thelymitra pauciflora*), self-pollination in bud.

**cleistogene**

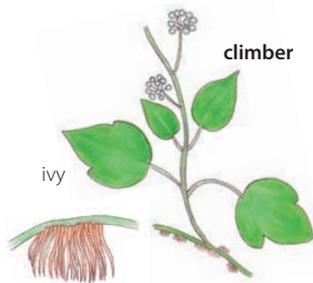
In some grasses, a modified spikelet with florets that remain closed and are self-fertilised. Usually located within the leaf sheaths at the lower nodes. *see also rhizanthogene*



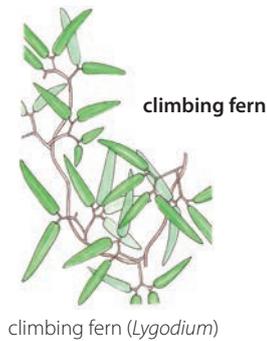
**climate** The average condition of the atmosphere, including temperature, precipitation, humidity, wind and seasonality, at a particular place over a long period of time. *cf. weather*

**climax community** The last stage in an ecological succession that sees a community of living things existing in equilibrium with its environment. *see also sere*

**climber** A plant, that grows vertically using tendrils or aerial roots, as ivy (*Hedera helix*), to attach itself to a support, usually another plant. *cf. twiner*

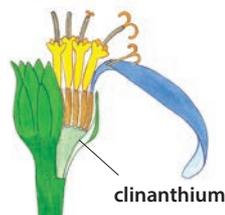


**climbing fern** The climbing fern family (Lygodiaceae) comprises one genus (*Lygodium*). Plants have subterranean creeping rhizomes and climbing, twining fronds with a wiry rachis. *see fern*



**clinandrium pl. clinandria** Of orchids, the depression or area on the column of a flower where the anther is situated. = **androclinum**

**clinanthium, clinum** The receptacle bearing the florets in the head (capitulum) of the daisy family (Asteraceae).



**cline** A gradual change in a character or feature of a species across its geographical range.

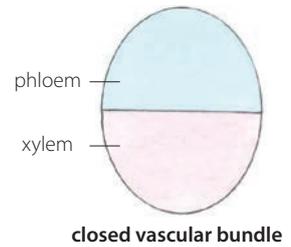
**clisere** A succession of climax communities in a given area over time. They are a result of changes in climate.

**clone** Fragments of a genet that can survive separately, as a nodes with roots from a strawberry (*Fragaria*). Individual fragments are genetically identical and are called ramets. A set of organisms produced from a genet by vegetative reproduction. *see genet*

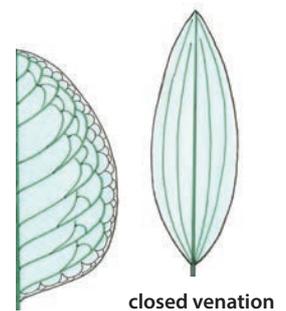
**clonal** Of or relating to a clone.

**clonal colony** Of plants, a group of genetically identical individuals (clones) that grow in a given location. They all originate vegetatively from a single ancestor. *see ramet*

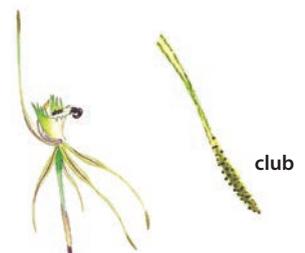
**closed vascular bundle** A vascular bundle that lacks a cambium layer between the xylem and phloem and has no secondary growth. Typical of monocotyledons. *cf. open vascular bundle*



**closed venation** Of veins in a leaf connected together to form a network of loops, or that run parallel from base to apex, as grass blades and leaves of other monocotyledons. *see anastomosis cf. open venation*



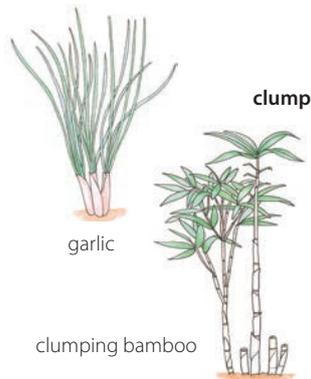
**club** Of orchids, the thickened apical part of a sepal or petal, often bearing osmophores, as that on some spider orchids (*Caladenia*).



**clubmoss** The clubmoss family (Lycopodiaceae) comprises four genera of vascular plants that reproduce by spores rather than seeds. They are terrestrial or epiphytic, with single-veined leaves and sporophylls sometimes arranged in cone-like strobili. Spores are of only one kind (homosporous). see **fern allies**



**clump** A group of similar things in a compact mass, as garlic (*Allium sativum*) or a clump of trees. **clumping** Not spreading. Non-invasive, as clumping bamboos. see **sympodium**

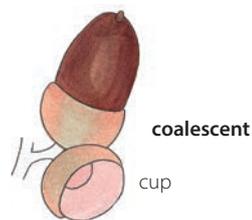


**cluster** A number of like things growing or collected together. **clustered** In a cluster, as leaves on a stem.

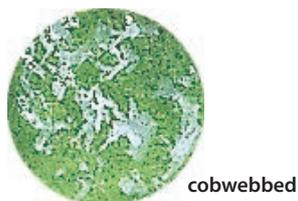


**co-** A prefix meaning together, mutually or in common.

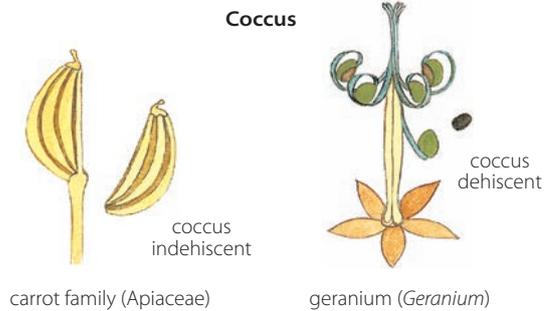
**coalescent** Of plant parts fused or grown together to form a single unit, as the bracts of the cup of an acorn (*Quercus*). cf. **contiguous**



**cobwebbed** Covered with fine loosely entangled whitish hairs, resembling a spider's web, as some leaves. = **arachnoid**



**coccus, pl. cocci** A single-seeded dry fruitlet of a schizocarp. It may be indehiscent, as the carrot family (Apiaceae) or dehiscent, as geranium (*Geranium*). see **carcerule, regma** = **mericarp**

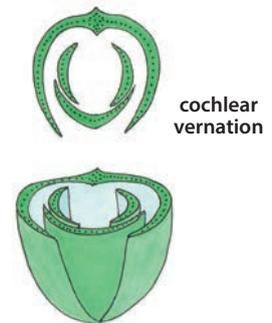


**cochlear, cochleate**

Spoon-shaped.

**cochlear vernation**

Of young leaves in the unopened leaf bud, with one leaf larger than the others and shaped like a bowl, and exterior to the other leaves. A form of imbricate vernation.



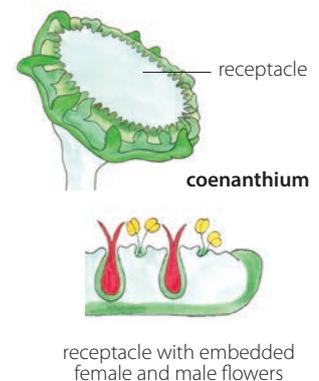
**codominance** Of a heterozygous individual, having both alleles of a gene equally dominant and expressed in the phenotype. cf. **epistasis, recessive**

**codon** A sequence of three DNA or RNA nucleotides that corresponds with a specific amino acid.

**coenanthium**

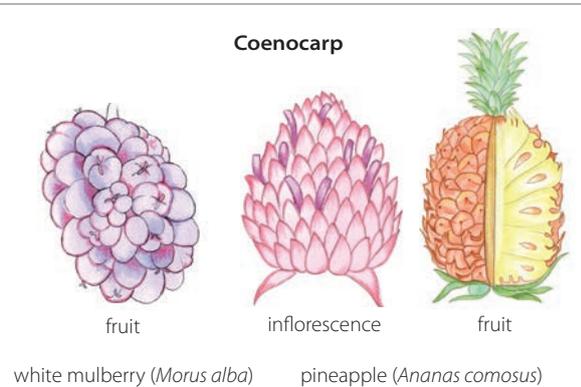
An inflorescence with a nearly flat receptacle having margins that are slightly curved upwards.

The flowers are embedded in the receptacle itself, as the genus *Dorstenia*.



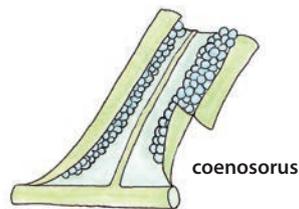
**coenocarp, coenocarpium** A fruit formed from an entire inflorescence and incorporating the bracts, perianth and axis, as pineapple (*Ananas comosus*) and white mulberry (*Morus alba*).

see **composite fruit**



**coenocarpous** Bearing a coenocarp. Of a gynoecium of two or more partly or entirely fused carpels. see **paracarpous, semicarpous, syncarpous**

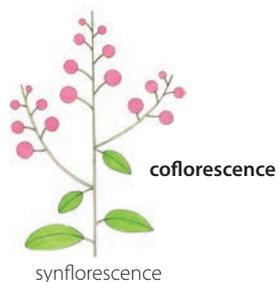
**coenosorus, pl. coenosori** Of ferns, a group or line of sporangia resulting from many sori coalescing into one, as brake ferns (*Pteris*).



**coetaneous** Maturing at the same time, as flowers developing at the same time as the leaves in some species of willow (*Salix*).

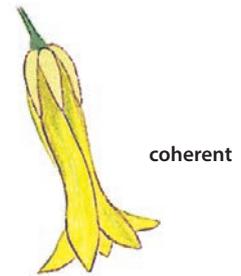
**coevolution** The process in which two or more species evolve in response to the traits of the other(s). The idea that interactions between species can drive adaptations, as the relationship between a hummingbird's bill shape and the shape of flowers it pollinates.

**coflorescence** A lateral inflorescence in a synflorescence. cf. **paraclade**



**coherent** Of like parts joined, but only superficially, and easily separated, as the petals of some appleberries (*Billardiera*) cohere above the middle.

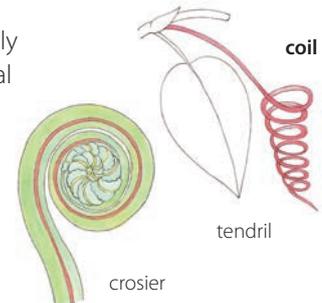
cf. **adherent**



**cohesion** The fusion of similar plant parts, as petals or sepals, that are usually separate.

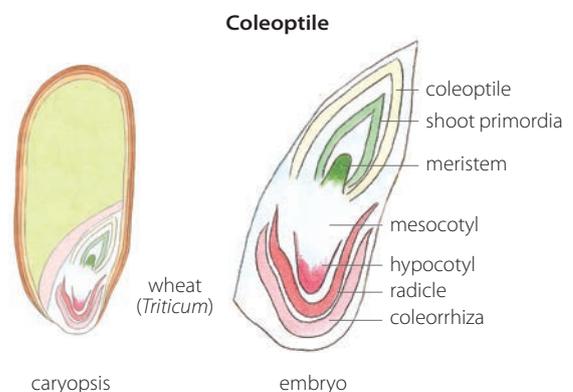
**coil** A series of regularly spaced flat or cylindrical loops.

**coiled** Curled or wound in concentric rings or spirals, as a tendril of the crosier of a fern.



**coleoptile** Of the single seed in a caryopsis, the fruit of grasses (Poaceae), the sheath-like structure around the epicotyl in the embryo. It provides protection during germination.

= **acrospire**  
cf. **coleorrhiza**

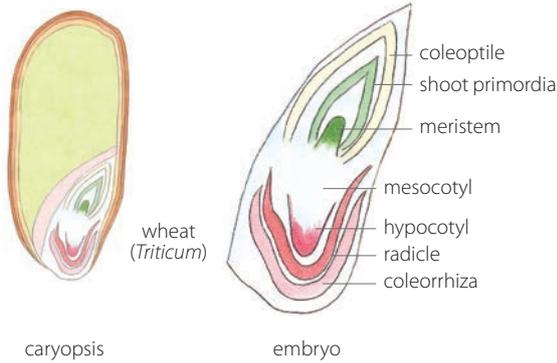


**coleorrhiza, pl. coleorrhizae**

Of the single seed in a caryopsis, the sheath-like structure around the radicle in the embryo. It provides protection during germination.

cf. **coleoptile**

**Coleorrhiza**

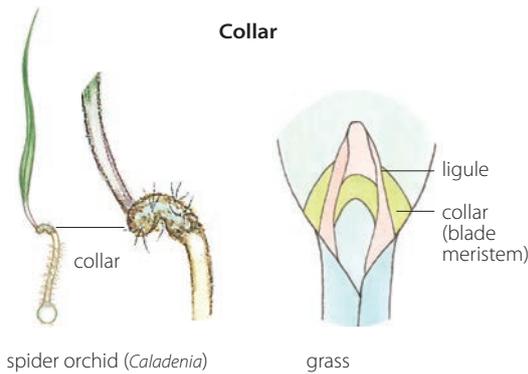


**collar** Of grasses (Poaceae), a band of meristematic tissue between the leaf sheath and the leaf blade that generates growth of the leaf blade.

= **blade meristem**

Of some deciduous terrestrial orchids, as spider orchids (*Caladenia*), the swollen region of the stem just below the soil surface that is colonised each growing season by mycorrhizal fungi.

**Collar**

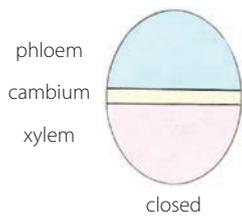


**collateral** Placed side by side.

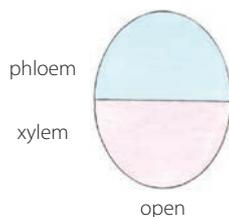
**collateral vascular bundles**

With xylem arranged towards the interior and phloem arranged towards the exterior of the vascular bundle. They may be open or closed depending on the presence or absence of cambium.

A type of conjoint vascular bundle. see **conjoint vascular bundles**



**collateral vascular bundles**



**collection** A plant specimen collected for study and preservation and usually lodged in a herbarium.

**collenchyma** Supporting tissue found in soft non-woody plants as they grow in length and is found mostly in leaves and stems. It is composed of elongated cells with unevenly thickened walls and thick corners. This tissue is flexible because it lacks lignin. Different kinds of collenchyma are identified by the nature of the thickening of the cell wall. see **angular ~, annular ~, lacunar ~, lamellar ~**

**colleter** A specialised trichome, commonly in groups or tufts, that secretes mostly mucilage, in the madder family (Rubiaceae). Also at the base of the petiole in most of the dogbane family (Apocynaceae).

**colliculate**

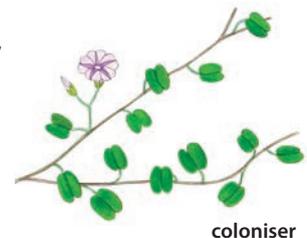
Covered with low rounded projections, as the seeds of blackseed glasswort (*Tecticornia pergranulata*).



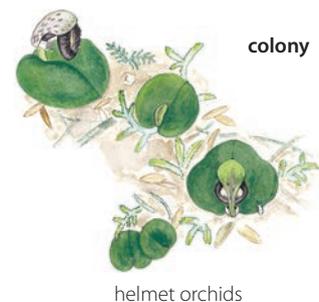
**colluviate** Covered in tiny bumps.

**colonisation** The process by which a species spreads to a new area or establishes on denuded ground.

**coloniser** A plant that establishes itself in a new area, as beach morning glory (*Ipomoea pes-caprae*) that colonises sand dunes. see also **pioneer species**



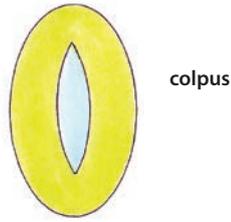
**colony** A group of plants, usually of the same kind, that live and grow together, as many mosses that grow in compact colonies and some orchids, as the helmet orchid (*Corybas incurvus*). see also **genet**



**colpus**, *pl. colpi* An elongated, longitudinal aperture on a pollen grain evenly distributed over its surface or located at the equator.

**colpate** Having a colpus.

*cf. colporus, pore, sulcus*



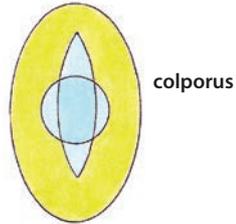
colpus

**colporus**, *pl. colpori*

An aperture on a pollen grain that is shaped like a colpus and has a circular pore-like region in the centre.

**colporate** Having a colporus.

*cf. colpus, pore, sulcus*



colporus

**columella**, *pl. columellae*

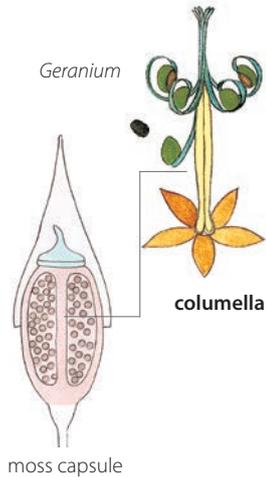
A small column.

A central axis.

The axis to which the carpels of some fruit are attached, as geranium (*Geranium*).

A central column of tissue in a moss capsule. One of the rod-like elements in the wall of a pollen grain that support the tectum layer.

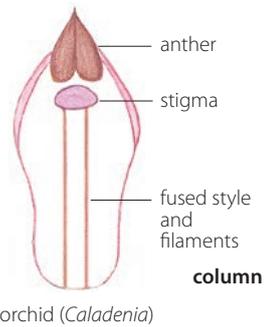
*see pollen wall*



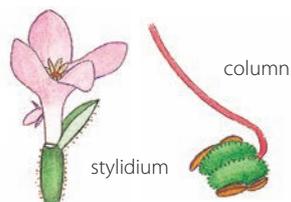
columella

**column** Of a flower, the male stamen and the female stigma and style fused together, as the central structure in an orchid flower (Orchidaceae), milkweed flower (Asclepiadaceae) and trigger plant flower (*Stylidium*).

= **gynandrium**, **gynostemium**

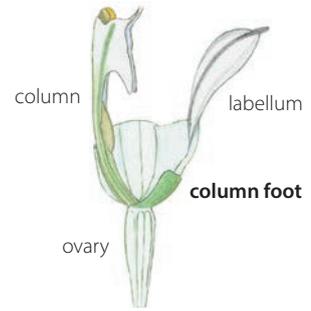


column



column

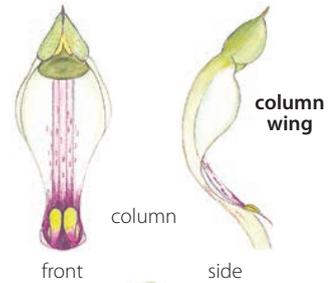
**column foot** Of many orchids, an extension at the base of the column to which the labellum, the bases of the lateral sepals and sometimes the bases of the petals are attached. Present in the greenhood genus *Pterostylis*.



column foot

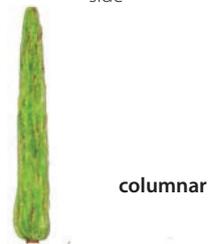
**column wing**

Of many orchids, an extension of the tissue of the column. Present in the spider orchid genus *Caladenia*.



column wing

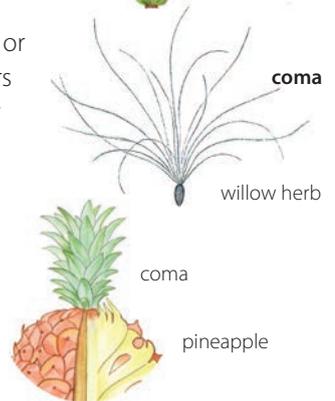
**columnar** Growing in the shape of a vertical cylinder, as the Italian pencil pine (*Cupressus sempervirens*).



columnar

**coma** A terminal tuft or cluster, as the silky hairs on the seeds of willow herbs (*Epilobium*). The tuft of bracts on a pineapple (*Ananas comosus*).

**comose** Bearing a coma or tuft. Growing in tufts.



coma

willow herb

coma

pineapple

**comb. nov., combinatio nova** A new name for a taxon that has the specific or infraspecific epithet used with a new genus or species name respectively.

= **new combination**

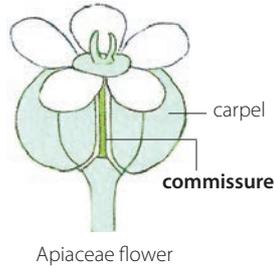
**combinatio nova**, *abbr. comb. nov.*

A new name for a taxon that has the specific or infraspecific epithet used with a new genus or species name respectively.

= **new combination**

**commensalism** A relationship between two organisms where one benefits but the other is neither helped nor harmed, as an epiphytic orchid that is helped by being supported and brought closer to sunlight by the branch of a tree.  
 see **symbiosis**

**commissure** The surface or face along which two structures are joined, as the carpels of the carrot family (Apiaceae).  
 see also **plicate**  
**commissural** Relating to or on the commissure.



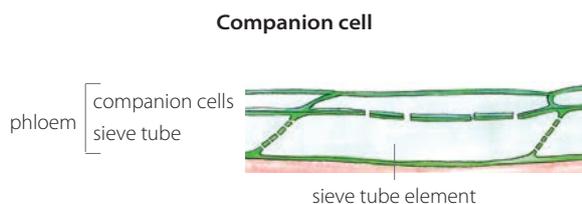
**common name** A local or popular name for a plant as opposed to the scientific name.  
*Caltha palustris* has many common names including marsh marigold and kingcup.

**community** All living organisms (biotic components) in a given area.  
 Biotic components include the producers that are mainly green plants, the consumers that are mainly animals and the decomposers that are mainly bacteria and fungi.  
 cf. **biome, ecosystem, habitat, population**

**compact** Closely clustered or packed together, as clusters of flower heads (capitula) in some daisies (Asteraceae).

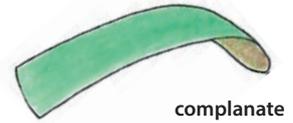


**companion cell** A parenchyma cell, associated with sieve tube elements in angiosperms, that moves sugar into and out of sieve tube elements. Considered to be a more advanced counterpart of albuminous cells in gymnosperms.

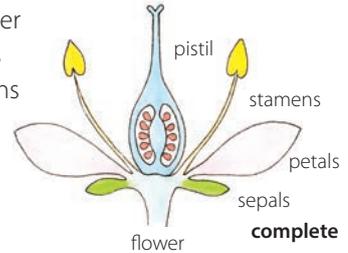


**compatible** Capable of self-fertilisation or cross-fertilisation.  
 Capable of forming a successful graft.  
 see **cross-compatible**  
 cf. **incompatible**

**complanate** More or less flattened in one plane, typical of a leaf lamina.

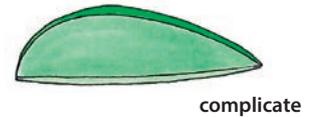


**complete** Of a flower having all four whorls (sepals, petals, stamens and a pistil or pistils).  
 cf. **incomplete**

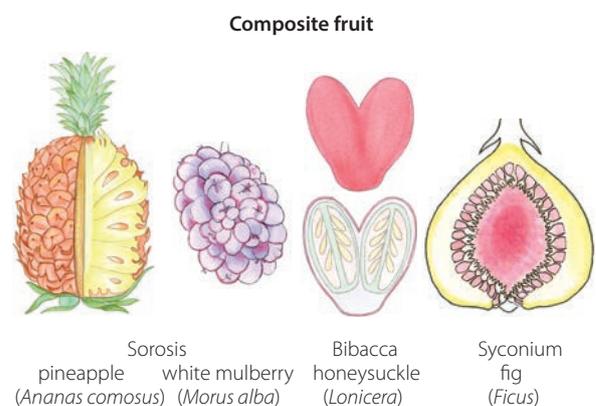


**complex tissue** Tissue composed of two or more different kinds of cell, as vascular tissue that is composed of xylem and phloem.  
 cf. **simple tissue**

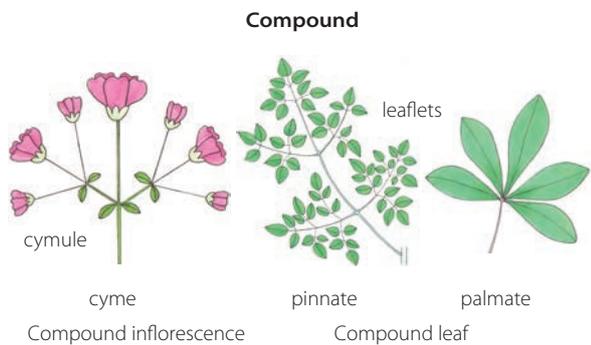
**complicate** Folded upon itself lengthwise, as some leaves.  
 = **conduplicate**



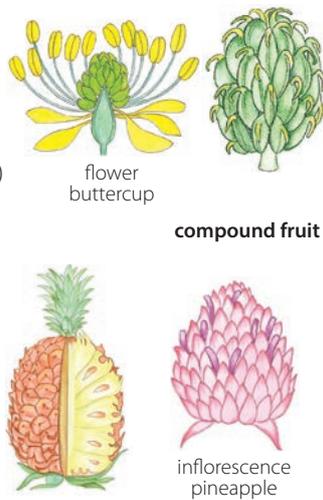
**composite fruit** A fruit derived from an entire inflorescence with more than one flower, as mulberry and pineapple (both a sorosis), honeysuckle (bibacca) or fig (syconium). It may incorporate parts of the flower other than the carpels.  
 = **multiple fruit**  
 see **coenocarp**  
 cf. **accessory fruit, aggregate fruit**



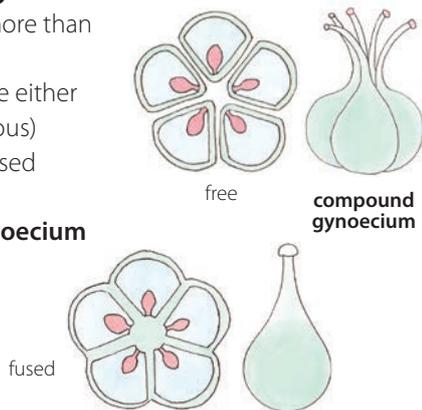
**compound** Composed of two or more similar parts, as a cyme composed of cymules or a leaf composed of leaflets.  
*cf.* **simple**



**compound fruit**  
 A fruit that develops from several carpels in a single flower, as buttercup (*Ranunculus*) or from several carpels in an inflorescence, as pineapple (*Ananas comosus*).  
*see* **aggregate fruit, composite fruit**  
*cf.* **simple fruit**



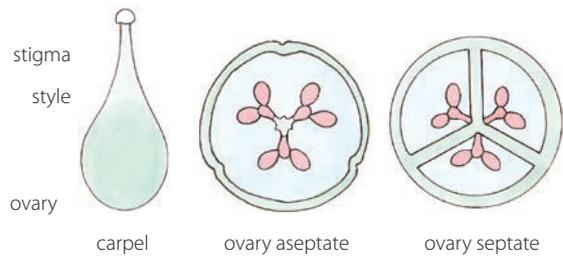
**compound gynoecium**  
 A pistil with more than one carpel. The carpels are either free (apocarpous) or variously fused (syncarpous).  
*cf.* **simple gynoecium**



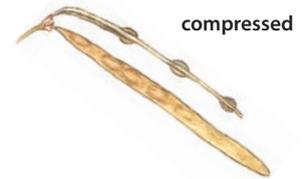
**compound leaf** *see* pages 63–64

**compound ovary** An ovary resulting from two or more carpels that are fused together. The ovary is multilocular if the carpel walls (septa) persist or unilocular if they break down.  
*cf.* **simple ovary**

**Compound ovary**



**compressed** Flattened in one plane, either from side to side (laterally) or from top to bottom (dorsally), as some pods, stems etc.



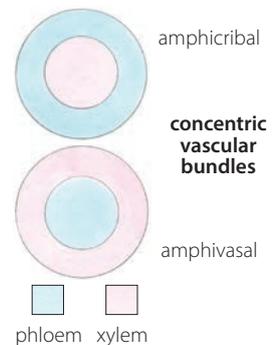
**compression wood** Structurally abnormal wood formed in response to stress. Found on the underside of a lean, the side under compression, of stems in gymnosperms.  
*see also* **reaction wood, tension wood**

**con-** A prefix meaning uniform or the same.

**concave** Of an outline or surface that curves inward.



**concentric vascular bundles**  
 With either phloem encircling the xylem, as spike moss (*Selaginella*), or xylem encircling the phloem, as begonia (*Begonia*).  
*see* **amphicribal, amphivasal, conjoint vascular bundles**



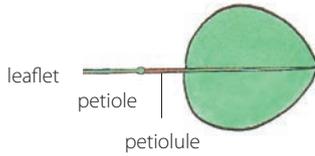
**conceptacle** A cavity having an outward opening pore in which sporangia develop, as in red and brown algae.  
*see* **sporocarp**

**concolorous** Having the same colour throughout. Of a leaf, having the upper and lower surfaces the same colour.  
*cf.* **discolorous, variegated**

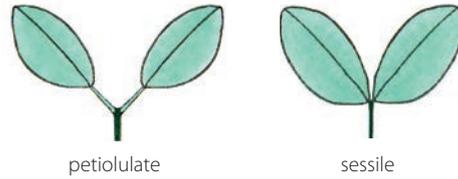
**compound leaf** A leaf divided into two or more leaflets on a common stalk.  
 A pinnate leaf has leaflets attached along the rachis, which is an extension of the petiole.  
 A palmate leaf has leaflets attached to the top of the petiole.  
 Leaflets may be sessile or on a petiolule.

**Compound leaf**

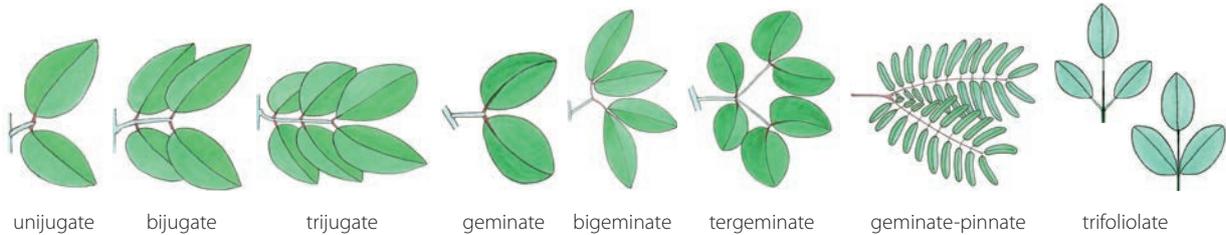
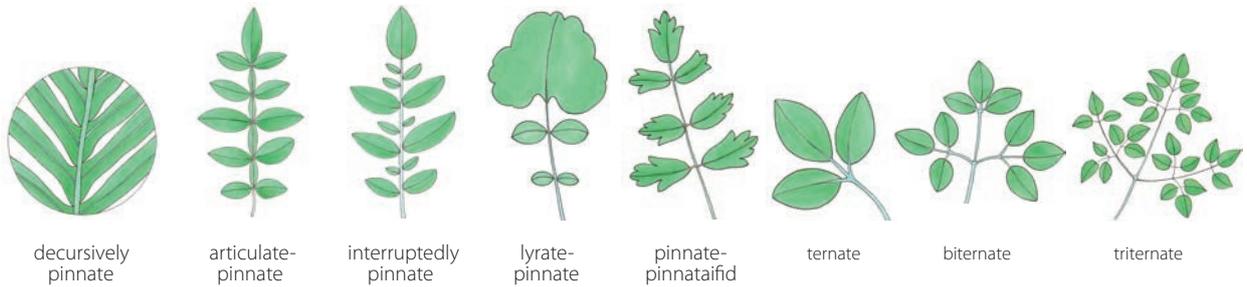
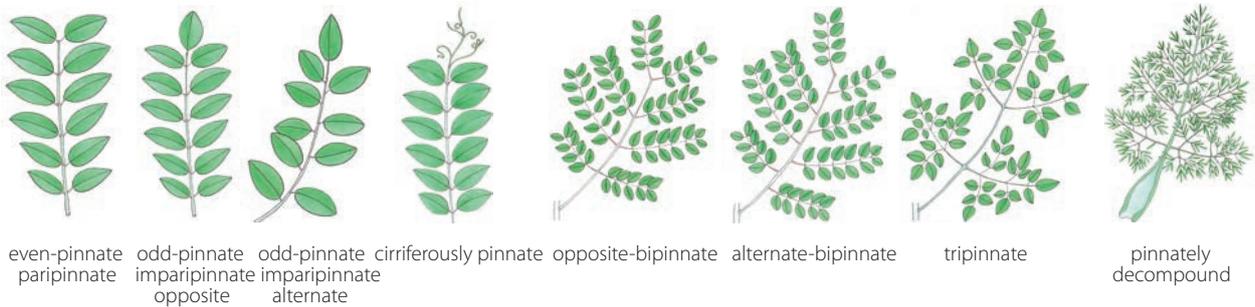
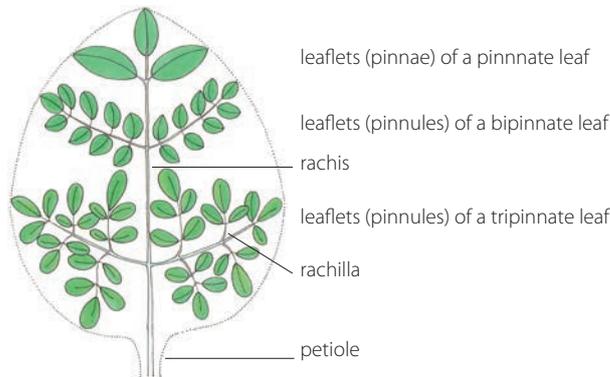
**Unifoliolate/Monofoliolate leaves**



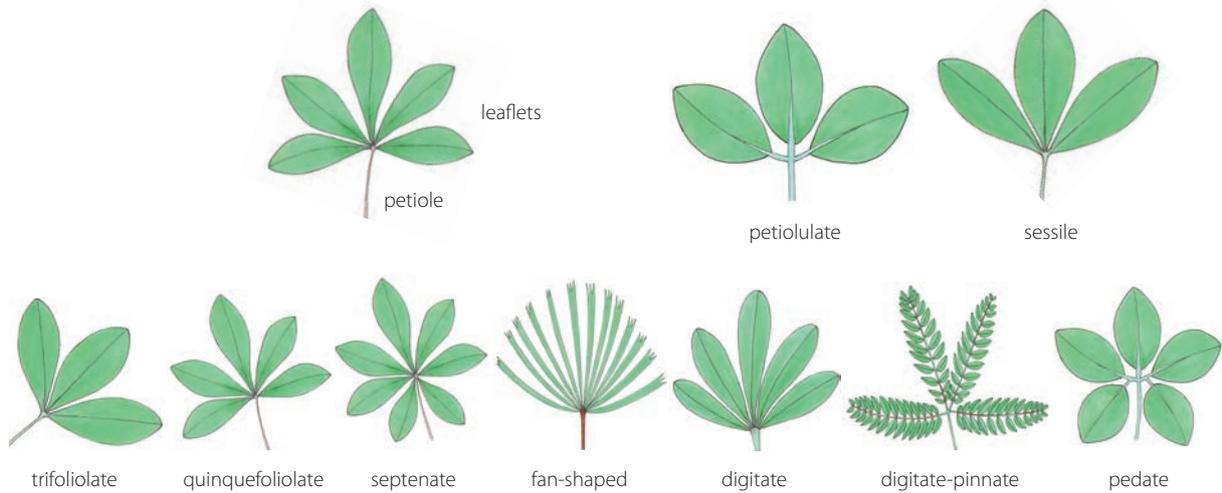
**Bifoliolate leaves**



**Pinnate leaves**



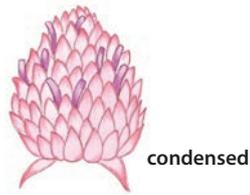
**Palmate leaves**



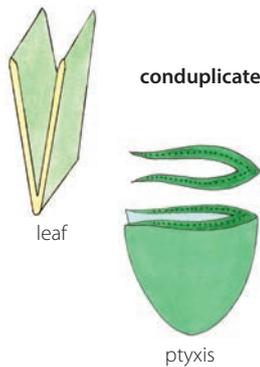
**concreescent** Of the fusion of like or unlike parts.  
see **adnate, connate**

**condensation** The change of a substance from a gaseous state to a liquid state.  
cf. **vaporisation**

**condensed** Dense or compact, as opposed to lax or open, as the inflorescence of a pineapple (*Ananas comosus*).



**conduplicate** Folded together lengthwise with the sides of the upper surface touching or almost touching, as the leaves of some grasses and palms.

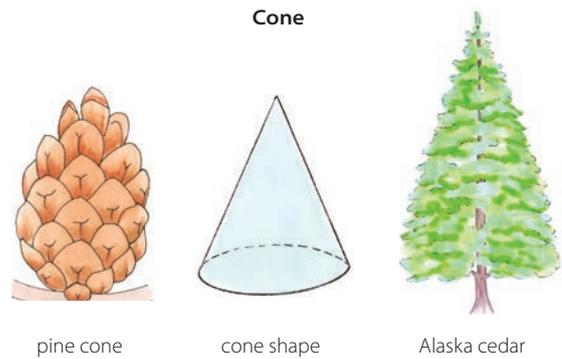


**conduplicate ptyxis** Of a single leaf in bud that is folded inwards lengthwise.

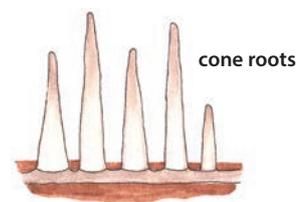
**cone** A specific term for the unisexual reproductive structures of conifers that have a central axis with spirally arranged scales that bear ovules and pollen sacs.  
A general term for a strobilus.  
A three-dimensional shape or solid object with the base commonly a circle or ellipse and the sides tapering to a point.

**conical, conoid, conoidal** Of or relating to a cone. Cone-shaped, as the canopy of the cypress, Alaska cedar (*Chamaecyparis nootkatensis*).

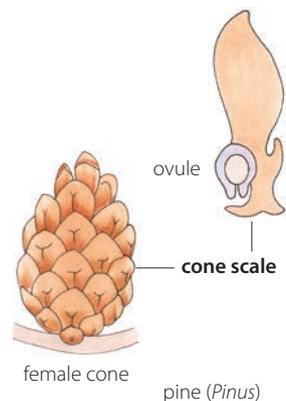
**Cone**



**cone roots** A cone-shaped pneumatophore found in mangroves.  
see also **knee roots, peg roots**

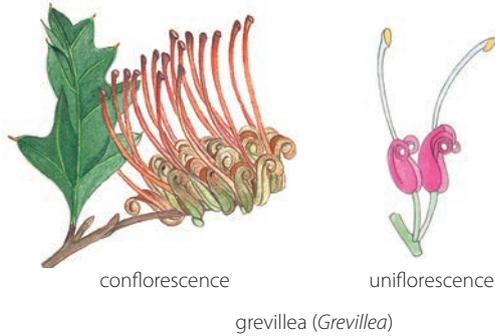


**cone scale** Of gymnosperms, one of the often woody scales that bears pollen sacs on the male cone and naked ovules or seeds on the female cone.  
= **sporophyll**  
see **megasporophyll, microsporophyll, ovuliferous scale**

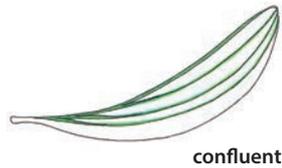


**conflorescence** A compound inflorescence composed of uniflorescences. The uniflorescences differ substantially in structure from the overall structure of the conflorescence, as grevillea (*Grevillea*).

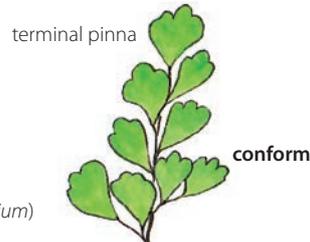
**Conflorescence**



**confluent** Running together. Merging into one another, as the veins of some leaves.



**conform** Similar in shape, as the terminal pinna of some ferns is similar in shape to the lateral pinnae.



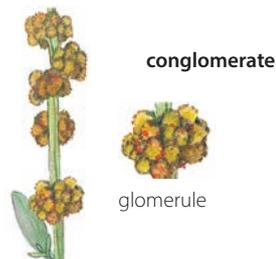
**congeneric** Belonging to the same genus.

**conglutinated** Joined together as if by glue.

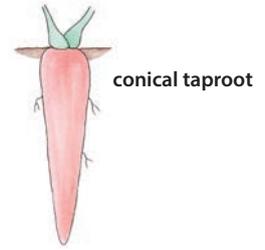
**congested** Extremely crowded together, as flowers in the spike of salt lawrenca (*Lawrenca spicata*).  
cf. **lax**



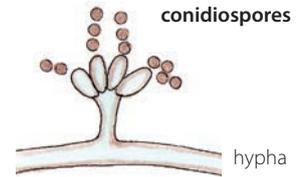
**conglomerate** Densely clustered, crowded together as flowers in a glomerule of coast saltbush (*Atriplex cinerea*).



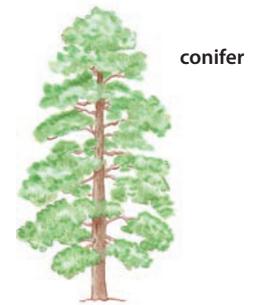
**conical taproot** A main, descending root that is broad at the top and tapers towards the base, as a carrot.  
see **fusiform taproot**, **napiform taproot**



**conidiospore** An asexually produced fungal spore that forms in a chain and breaks off when mature.

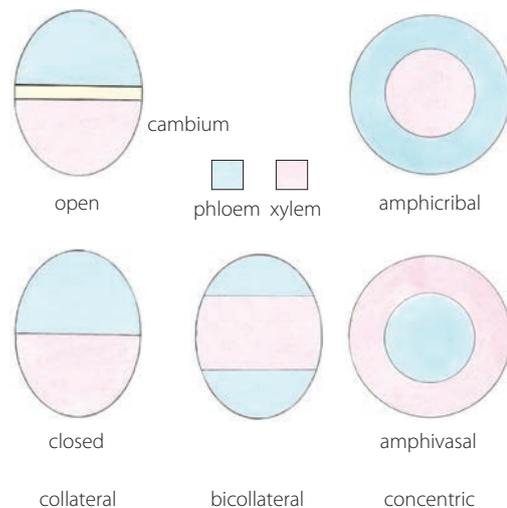


**conifer** Cone-bearing, usually evergreen trees or shrubs, such as pines and cypresses, with male and female cones usually on the same plant. A member of Pinophyta, one of the four divisions of gymnosperms.  
**coniferous** Producing or bearing cones.

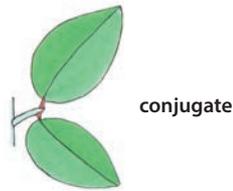


**conjoint vascular bundles** With phloem and xylem arranged together in the same radius. Found in stems and leaves. There are three types: collateral vascular bundles, bicollateral vascular bundles and concentric vascular bundles.

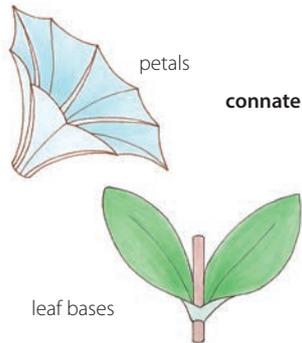
**Conjoint vascular bundles**



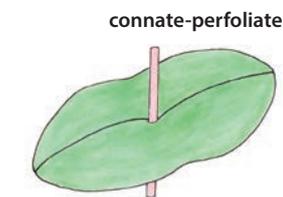
**conjugate** Joined together in pairs. Of a pinnate leaf having only one pair of leaflets. see **jugate**



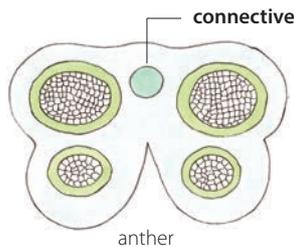
**connate** Of like parts fused to one another, as the petals of the bindweed family (Convolvulaceae) and the bases of some leaves. cf. **adnate**



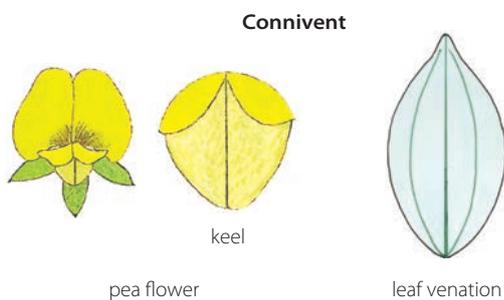
**connate-perfoliate** With the broad bases of two opposite leaves joined together so that the stem appears to pass through a whole leaf.



**connective** Of an anther, tissue that joins the pollen sacs together and connects the anther to the filament. It includes the vascular bundle.



**connivent** Touching but not fused, as the petals of the keel of a pea flower. Arched inward towards the tip, as the veins of some leaves. = **convergent**

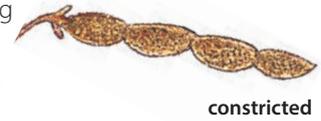


**conservation status** An indication of how likely a species is to survive now and into the future. see **critically endangered, endangered, extinct, International Union for Conservation of Nature, relict, threatened, vulnerable**

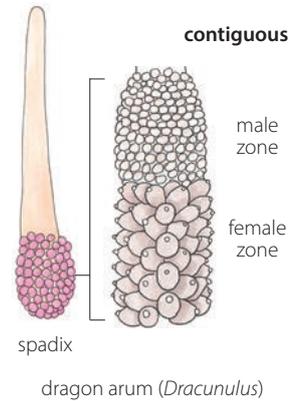
**conserved name** A name to be kept even though it may formerly have been invalid. = **nom. cons., nomen conservandum**

**conspecific** Belonging to the same species.

**constricted** Narrowed, especially by contracting at one place, as the jointed fruit of southern tick-trefoil (*Desmodium gunnii*).

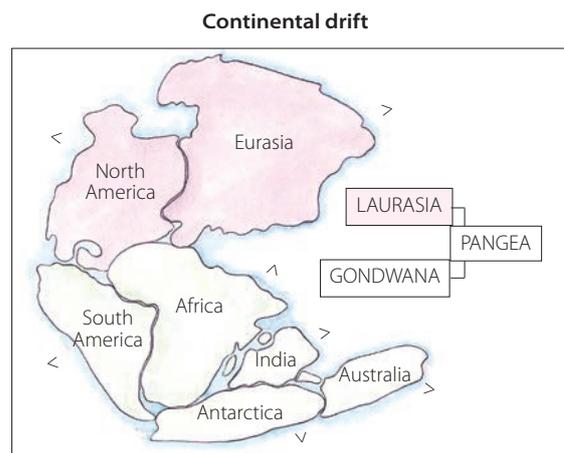


**contiguous** With parts touching and appearing fused but actually only in close contact, as the male zone of the spadix is contiguous with the female zone in the dragon arum (*Dracunculus*).

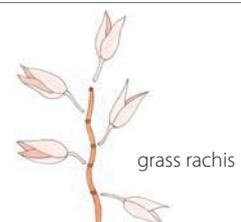


cf. **coalescent** Of plant communities that are directly adjacent to one another.

**continental drift** The fragmentation of Pangea into Laurasia and Gondwana, and the gradual movement of the continents across the earth's surface through geological time that is explained by plate tectonics.



**continuous** In grasses (Poaceae), of the jointed rachis from which the spikelets fall



leaving the stem entire.  
Uninterrupted, as a stem  
that lacks joints.

cf. **articulate, jointed**



**contorted** Twisted or bent. Convolute.

**contorted aestivation** Of young petals, tepals or sepals in the unopened bud, with one edge inside and the other edge outside the adjacent one, as the corolla of a hibiscus (*Hibiscus*).

= **convolute aestivation**

**contorted vernation** Of young leaves in the unopened leaf bud with margins overlapping on one side. A form of imbricate vernation.

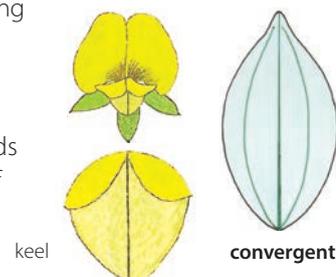
= **convolute vernation**

**convergent** Touching but not fused, as the petals of the keel of a pea flower.

Arched inward towards the tip, as the veins of some leaves.

= **connivent**

cf. **divergent**



**convergent evolution** The independent evolution of similar traits in two or more unrelated or distantly related organisms.

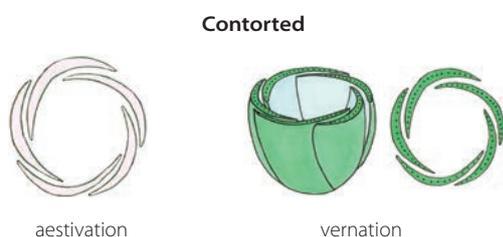
= **parallel evolution, homoplasy**

cf. **divergent evolution**

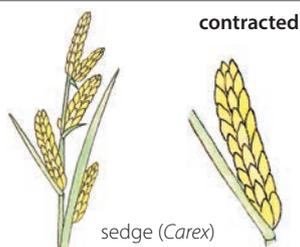
**converted clade name** Of phylogeny, a clade name converted from a pre-existing name.

= **nomen cladi conversum**

**convex** Of an outline or surface that curves outward, as the surface of a circle or a sphere.



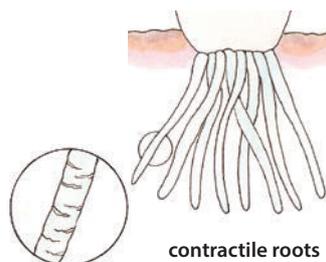
**contracted** Shortened or narrowed and dense as opposed to open, as the spikelets of some species of sedge (*Carex*).  
cf. **lax**



**contractile roots**

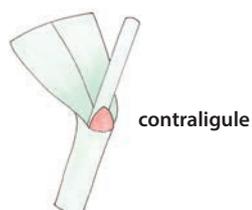
Specialised fleshy wrinkled roots that contract and pull the plant deeper into the soil.

Found in many plants, as bulbs, corms and some taproots.



**contraligule**

A membranous flap on the rim of the leaf sheath opposite the blade, as some nutrushes (*Scleria*).  
see **ligule**



**convolute** Rolled longitudinally upon itself.

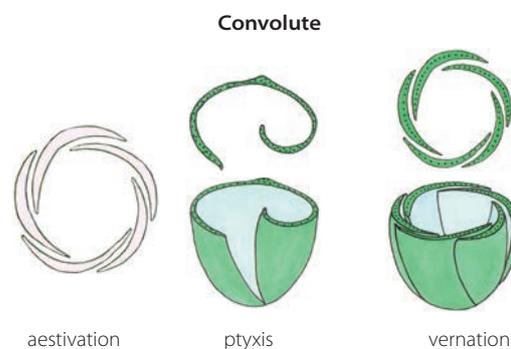
**convolute aestivation** Of young petals, tepals or sepals in the unopened bud, with one edge inside and the other edge outside the adjacent one, as the corolla of a hibiscus (*Hibiscus*).

= **contorted aestivation**

**convolute ptyxis** Of a leaf rolled from one margin to the other as banana (*Musa*) and aroids (*Araceae*).

**convolute vernation** Of young leaves in the unopened leaf bud, with margins overlapping on one side. A form of imbricate vernation.

= **contorted vernation**



**copal** An aromatic, amber-like resin exuded from various tropical trees.

cf. **amber**

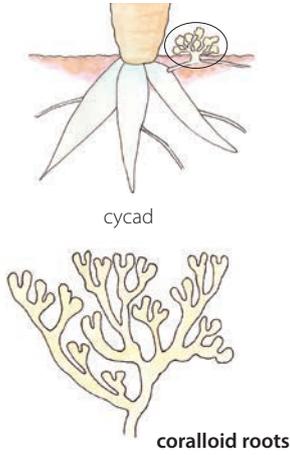
**coppice, copse** A thicket of small trees or shrubs.

To form a coppice by periodic cutting back to ground level to stimulate new growth.

**coralloid, coralliform** Like coral.

**coralloid roots**

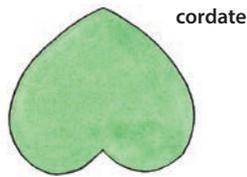
Of cycads, a much-branched root mass that looks like coral and grows on the surface of the soil. The relationship between the plant and these roots is symbiotic. The roots host cyanobacteria that fix nitrogen used by the plant and the plant supplies products from photosynthesis that support the bacteria.



**cordate** Heart-shaped in outline with the notch at the base.

cf. **obcordate**

**cordiform** Shaped like a heart.



**coriaceous** Leathery. Tough but somewhat flexible, as the phyllodes of some wattles (*Acacia*).



**cork** Non-living cells with waxy walls that are impervious to water and gases.

= **phellem**

see also **suberin**

**corky** Of, like or consisting of cork.

Having a light, compressible and resilient texture.

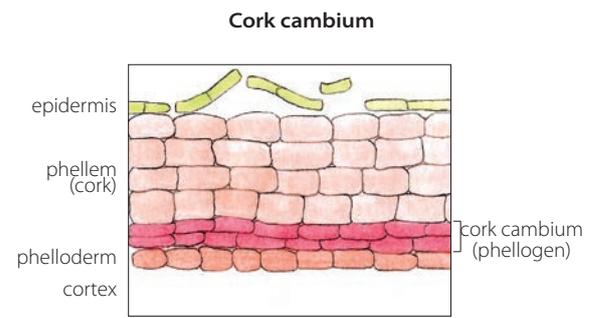
**cork cambium** A layer of meristem that is responsible for secondary growth. It is part of the periderm in woody plants and some herbaceous plants.

Cork cells (phellem) are produced on the side towards the surface of the plant and parenchymatous tissue (phelloderm) on the inner side.

= **phellogen**

see **cambium, lateral meristem**

see also **fusiform initials, ray initials**



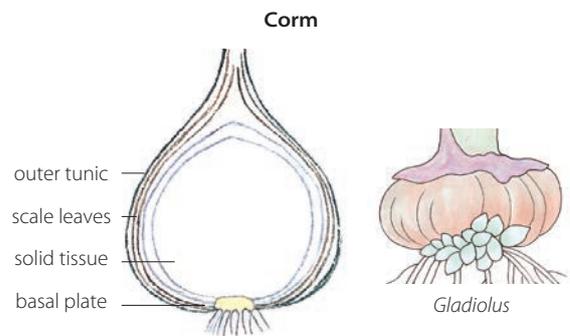
**corm** A solid, rounded underground stem that stores food.

It is covered with scale leaves and an outer tunic, as crocuses (*Crocus*) and gladioli (*Gladiolus*).

It bears buds on the basal plate that can produce new plants.

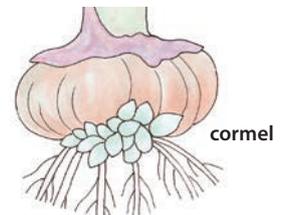
see **cormel**

**cormous** Bearing corms.



**cormel, cormlet**

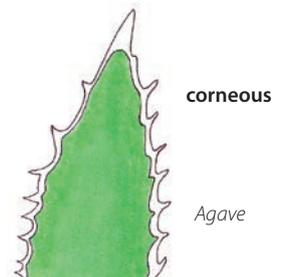
A small corm, that can produce a new plant, growing at the base of a corm, as gladioli (*Gladiolus*).



**corneous** With a hard, smooth texture, as the leaf margin of some agaves.

Having an incurved, tapering appendage like the horns of cattle.

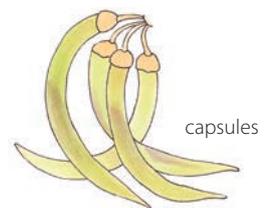
= **horny**



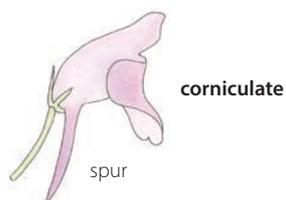
**corniculate, cornute**

With a small horn.

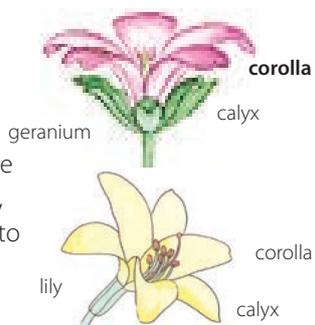
Horn-shaped, as the capsule of goat's horn mangrove (*Aegiceras corniculatum*).



Bearing a horn-like spur or appendage, as the toadflax flower (*Linaria*).



**corolla** The petals of a flower that may be free or united. It surrounds the reproductive organs (the ovary and the stamens), and is usually coloured to attract pollinators.  
cf. **calyx**



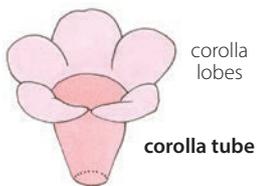
**corolla lobe**

The upper free parts of a petal when the lower parts of the petals are united into a tube.  
see **corolla tube**



**corolla tube**

The part of a corolla below the lobes, with the petals united.  
see **corolla lobe**, **gamopetalous**



**corona** A crown.

A ring of tissue arising from the perianth of a flower, as the solid trumpet-shaped outgrowth at the centre of a daffodil (*Narcissus*), or the ring of horned lobes at the centre of the flower of milkweed (*Asclepias*).  
The fringed membrane on the seed of Chilean needlegrass (*Nassella neesiana*).

**coronate** Having a crown.

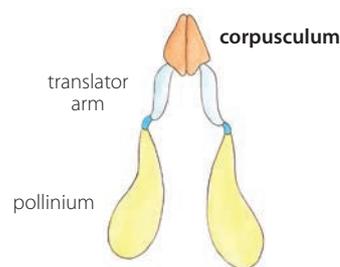
**coroniform** Having the form of a crown.

**Corona**



**corpusculum**

A sticky gland linked to the pollinia by translator arms in the milkweed family (Apocynaceae).

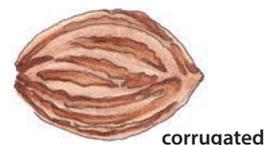


**corr., correctus** Correct name.

**correct name** In nomenclature, a name allowed under the rules of the International Code of Nomenclature.  
= **correctus**, *abbr.* **corr.**

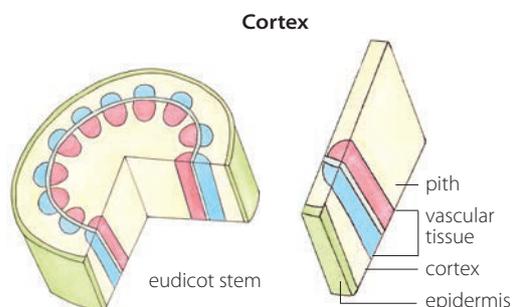
**correctus**, *abbr.* **corr.** Correct name.

**corrugated** Wrinkled into parallel ridges and troughs, as the stone of a peach (*Prunus persica*).



**cortex** Of the vascular cylinder, a region of unspecialised cells (ground tissue) lying between the epidermis and the vascular bundles in stems and roots.

**cortical** Of or relating to the cortex.



**corticate** Having a cortex, bark or rind.

**corticolous** Growing on bark, as a corticolous lichen.

**corymb** A flat-topped or rounded racemose inflorescence with the stalks (pedicels) starting at different points on the peduncle. Pedicels of the lower flowers are longer than those of the flowers above, bringing all flowers to about the same level.

A corymb can be simple or compound. It is an indeterminate or indefinite inflorescence.

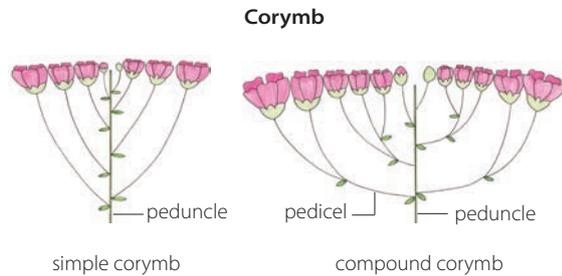
**corymb** page 70 (cont.)  
cf. **umbel**

**corymbiform** Having the form, but not necessarily the structure, of a corymb.

**corymbose** Relating to or having the characteristics of a corymb.

see **acropetal, centripetal**

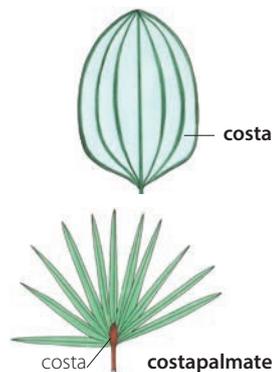
see also **cymose inflorescence**



**cosmopolitan** Having a worldwide distribution, as a species growing all over the world in habitats that are suited to it.

**costa** *pl. costae* A rib or vein of a leaf, leaflet or frond. The midrib.

**costate** Ribbed. Having one or more longitudinal veins or ribs.



**costapalmate** Of a palmate leaf with a short midrib (costa).

**costule** The midrib of a pinna or of a pinnule.



**cottony** Soft, white and fibrous like the fluffy fibre of a cotton boll (*Gossypium*).



**cotyledon** One of the leaves that originates directly from the tissue of the embryo of seed-bearing plants. Eudicots, as legumes, mostly have two cotyledons, and monocotyledons, as grasses and lilies, have one cotyledon.

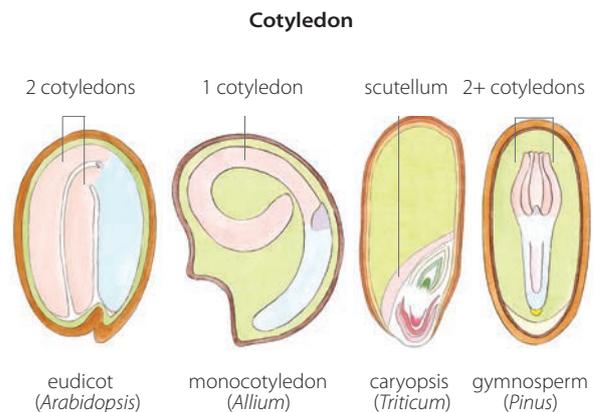
The scutellum of a caryopsis, the seed of the monocotyledonous grass family (Poaceae), is considered to be a modified cotyledon.

Gymnosperms have a variable number of cotyledons.

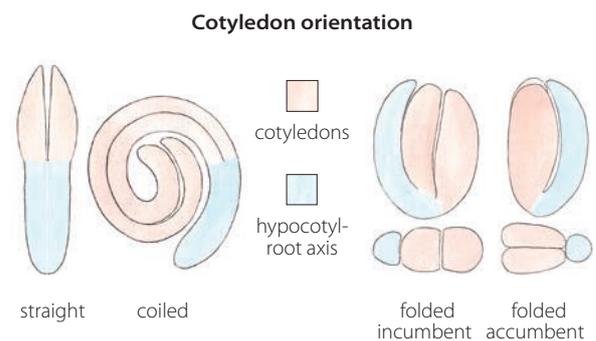
Commonly called a seed leaf.

**cotyledonous** Having cotyledons.

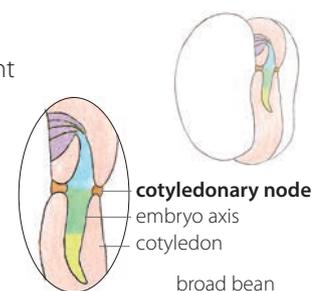
*cf.* **acotyledonous**



**cotyledon orientation** Various, including: straight, violet (*Viola hederacea*), coiled, hop (*Humulus lupulus*), folded and incumbent, mustard (*Erysimum cheiranthoides*) or folded and accumbent, bitter cress (*Barbarea sisymbrium*).



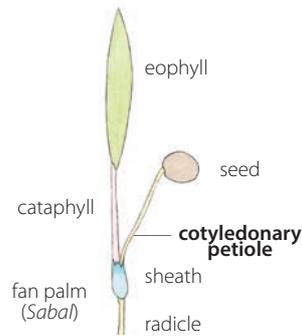
**cotyledonary node** The point of attachment of the embryo axis to the cotyledon(s), as the eudicot broad bean (*Vicia faba*).



**cotyledonary petiole** Of palms with remote germination and some other monocotyledons, the first structure to emerge from the seed.

It grows down into the soil, forming a swelling from which the first seedling root (radicle) and the plumular leaves emerge.

= **hyperphyll**

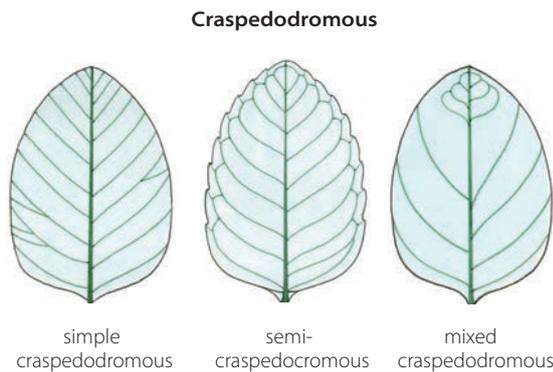


**coumarin** A poisonous chemical compound found in many plants that has the sweet scent of new-mown hay. Present in tonka beans (*Dipteryx odorata*) and sweet woodruff (*Galium odoratum*).

**cpDNA, chloroplast DNA** The small amount of DNA unique to chloroplasts. Unlike nuclear DNA, cpDNA is arranged in rings.

**craspedodromous**

Of leaves with veins starting from a point on the midrib and ending at the margin.



**crassi-** A prefix meaning thick.

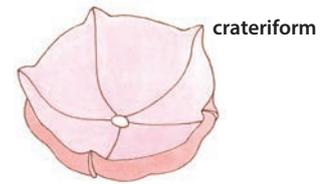
**crassinucellate** Of an ovule with several or numerous layers of cells in the nucellus. Having a thick nucellus. *cf.* **tenuinucellate**

**crassulacean acid metabolism, CAM**

A carbon fixation pathway that occurs when the stomata open at night to admit carbon dioxide while minimising water loss. Found in many xeric plants like cacti. Named after the stonecrop family (Crassulaceae) in which this pathway was first studied. *cf.* **photosynthesis**

**crateriform**

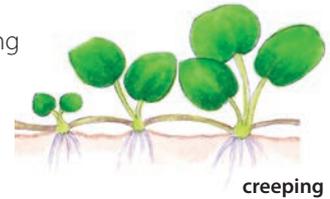
Having the form of a shallow bowl, as the corolla of some species of *Jaltomata*.



**creeper** A plant that grows horizontally and sends out roots from the nodes on the stem, as creeping thyme (*Thymus serpyllum*).

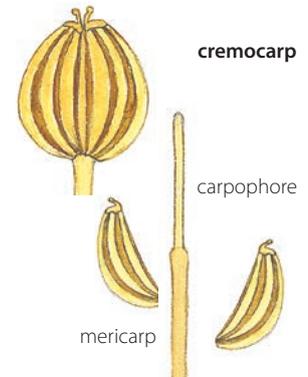
**creeping**

Prostrate and producing roots at the nodes, as creeping Charlie (*Glechoma hederacea*). = **repent, reptant**



**cremocarp**

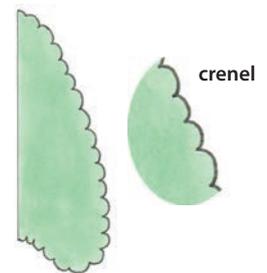
A dry two-seeded schizocarpic fruit that separates from the central axis (carpophore) into two one-seeded mericarps. Derived from a two-carpelled inferior ovary. Characteristic of the carrot family (Apiaceae).



**crenel**

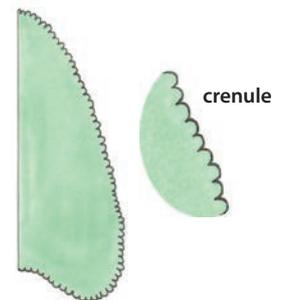
A round or convex flat tooth.

**crenate** Scalloped. of a toothed margin with regular, blunt or rounded teeth, as the margins of some leaves. *cf.* **bicrenate, crenulate**



**crenule**

A small, rounded notch. **crenulate** Minutely scalloped. Of a toothed margin with minute regular blunt or rounded teeth, as the margins of some leaves. *cf.* **bicrenate, crenate**



**crepuscular**

Relating to, occurring or active at dusk, as flowers that open or emit fragrance at this time. *cf.* **diurnal, matutinal, nocturnal, vespertine**

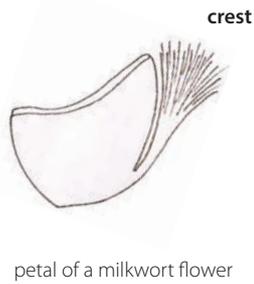
**crest** An elevated line or ridge on the surface or at the summit of an organ.

An appendage terminating an organ, as the tuft on the keel-shaped petal of some milkworts (*Polygala*). Of orchids (Orchidaceae), complicated callus, as that of the butterfly orchid (*Oncidium*).

= **crista**

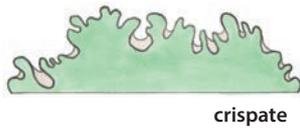
**crested** Having a crest.

= **cristate**



**crispate, crisped**

Curled or ruffled, as the margins of some leaves.



**crista** Another term for crest.

**cristate** Having a crest.

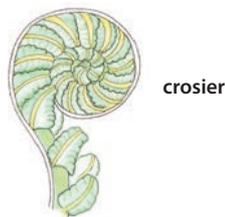
= **crested**

**critically endangered** According to the IUCN, a conservation status covering species that are considered to be facing an extremely high risk of extinction in the wild.

**crozier, crozier**

The coiled tip of a young fern frond.

= **fiddlehead**



**cross** A hybrid.

The offspring of parents from two different genera species or subspecies.

**cross-compatible** Of plants capable of cross-fertilisation.

see **compatible**

**cross-fertilisation** Fertilisation by pollen from a different plant, usually but not always, of the same species.

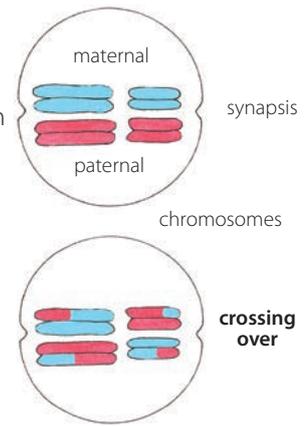
see **cross-pollination**

**cross-pollination** Pollination between flowers on different plants, usually but not always, of the same species.

cf. **cross-fertilisation**

**crossing over**

In meiosis, the exchange of genetic material, during synapsis, between the maternal and paternal chromosomes so that the haploid chromosomes in the sperm and the egg will differ from the diploid parent chromosomes. = **recombination**



**crown**

Of a tree, the branches and foliage above the bole.

Of a palms (Arecaceae), the cluster of fronds borne at the tip of the stem.

**Crown of a tree and of a palm**

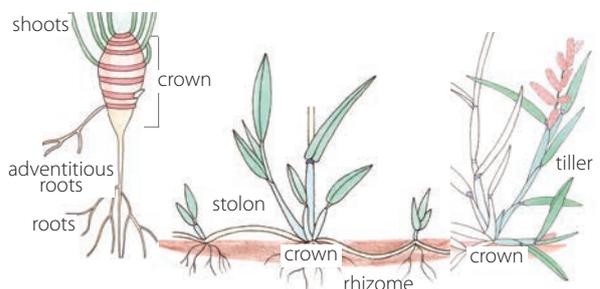


Of grasses, the connecting tissue between the roots and the shoots.

Leaves, flowering stems, tillers, rhizomes, stolons and the adventitious or secondary roots arise from the crown.

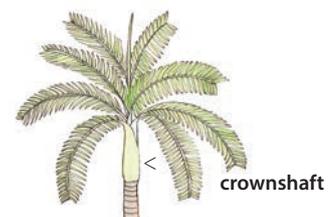
see **seminal root system**

**Crown of grasses**



**crownshaft**

A cylinder of clasping leaf sheaths at the top of the stem of some pinnate-leaved palms (Arecaceae).

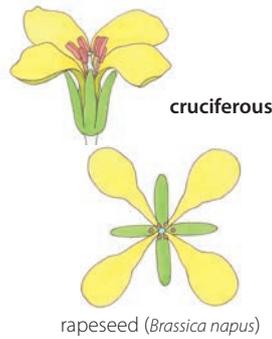


**crucifer** A cross.

**cruciferous** Shaped like a cross, as the flowers of rapeseed (*Brassica napus*). Of or relating to plants of the mustard family (Brassicaceae, formerly Cruciferae).

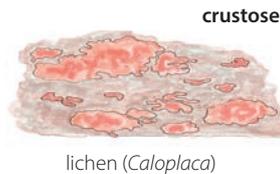
**cruciate, cruciform**

In the form of a cross.



**crustaceous** Hard, crust-like, thin and brittle.

**crustose** Of lichens, forming a thin crust that adheres closely to the surface on which it grows.



**crypto-** A prefix meaning hidden.

**cryptocotly** Of seed germination, having the cotyledons remain within the seed coat at germination.

cf. **phanerocotly**

**cryptogams** Organisms that reproduce by means of spores and have no true flowers or seeds. Includes ferns, bryophytes, algae, fungi and lichens.

cf. **phanerogam, spermatophyte**

**cryptophyte** Plants with perennating buds underground and food reserves stored in other subterranean perennating organs like tubers. Cryptophytes are subdivided into geophytes, helophytes and hydrophytes.

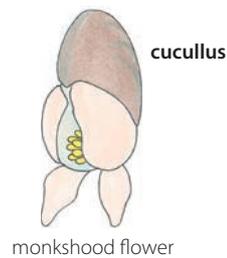
see also **chamaephyte, hemicytrophite, phanerophyte, therophyte**

**cucullus** In the form of a hood or cowl, as the upper sepal of monkshood (*Aconitum*).

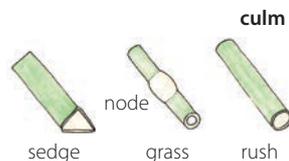
cf. **galea**

**cucullate** Hooded, hood-shaped.

cf. **galeate**

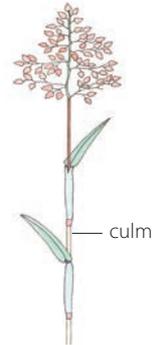


**culm** Of sedges (Cyperaceae), commonly a 3-sided, solid or pithy stem that lacks nodes.

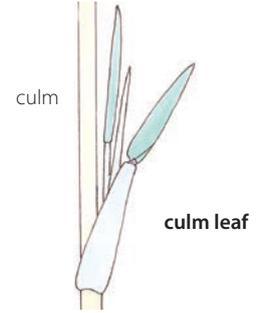


An aerial stem of some monocotyledons that bears the inflorescence.

Of grasses (Poaceae), a jointed, usually hollow stem, with solid nodes. Of rushes (Juncaceae), commonly a pithy terete stem with inconspicuous nodes.



**culm leaf** Of bamboos, one of the protective leaves that wraps around new shoots and the young culm as it grows. It provides protection and gives the culm strength during the initial growing period.



**cultigen** A plant known only in cultivation and whose origins are unknown or lost. Includes many cultivars and hybrids.

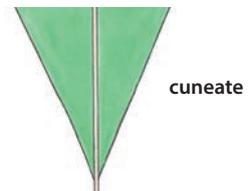
**cultivar** An independent category for plants that are a result of selective breeding of natural species, as those in agriculture, forestry and horticulture.

**cultivar epithet**

The final element of a full cultivar name, enclosed in single quotation marks to distinguish it from the scientific name that precedes it. As genus – *Geranium* + species epithet – *robertianum* + cultivar epithet – 'Celtic White' gives the cultivar name *Geranium robertianum* 'Celtic White'.

**cuneate**

Narrowly triangular, broad above and tapering by straight lines towards the base.

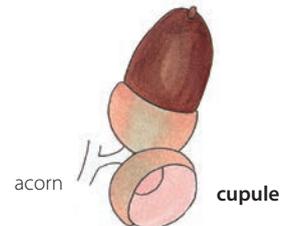


**cuneiform**

Wedge-shaped.



**cupule** A cup-shaped structure, as the cup-shaped involucre of an acorn and the indusium of some tree ferns in the genus *Cyathea*.



**cupule** page 74 (cont.)

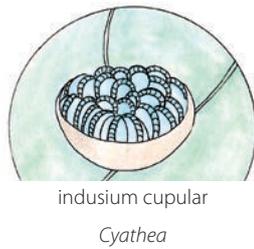
see also **calybiium**

**cupular** Relating to or shaped like a cupule.

**cupulate** Bearing a cupule.

**cupuliform** Shaped like a cupule.

= **cyatheoid, cyathiform**



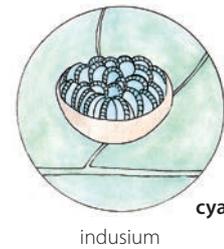
**cyatheoid** Of the tree fern genus *Cyathea*.

Cup-like, as the a cup-shaped indusium of some *Cyathea*.

**cyathoid, cyathiform**

Shaped like a cup.

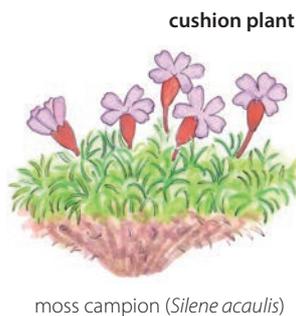
= **cupuliform**



**curvinervate, curvinerved** Having the veins of leaves curved.

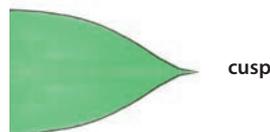
**cushion plant** A very compact, low-growing, mat-forming plant with a long taproot and numerous small leaves and flowers over a layer of insulating dead and living material.

A plant of alpine, subalpine, arctic and subarctic regions.



**cuspidate** Tipped with a cusp.

**cuspidate** Tipped with a cusp.



**cuticle** The waxy layer of cutin on the epidermis of the aerial parts of plants that reduces water loss.

It is typically thicker on plants like cacti and succulents that live in dry climates.

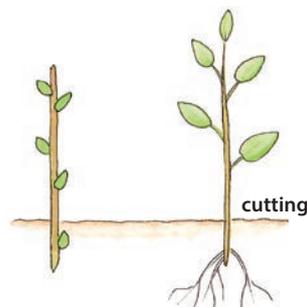
**cutin** The wax-like, water-repellent material present in the walls of some plant cells.

see **cuticle**

**cutting** Part of a stem, leaf or root that is cut off and grows roots and shoots to produce a new plant.

= **slip**

see also **grafting**

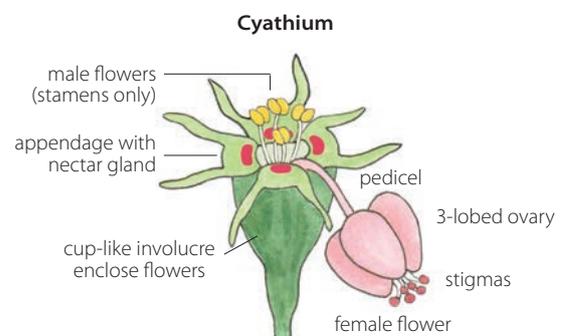


**cyanobacteria** Bacteria that contain chlorophyll and generate oxygen through photosynthesis.

They can live on land, as those that partner with fungi to form lichens, but most are aquatic.

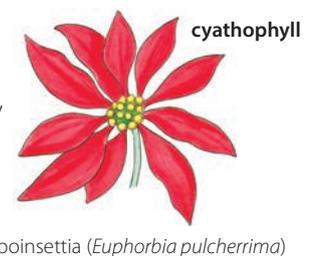
**cyathium, pl. cyathia** The characteristic inflorescence of the spurge family (Euphorbiaceae) that looks like a single flower. It consists of a cup-shaped involucre of fused bracts that encloses several male flowers, each reduced to one stamen, and one female flower reduced to a single pistil with a pedicellate ovary.

see also **pseudanthium**

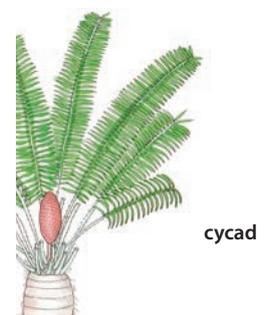


**cyathophyll**

Of the spurge genus (*Euphorbia*), bract-like structures below the tiny flowers that are leaf-like, reduced to tiny scales or may be showy and brightly coloured.



**cycad** Palm-like plants bearing large male or female cones on separate plants. Members of Cycadophyta, one of the four divisions of gymnosperms.



**cyclic** Having identical parts arranged in whorls, as leaves on a stem.

cf. **seriate**



**cylinder** A solid or hollow body with parallel sides and a circular or oval cross-section.

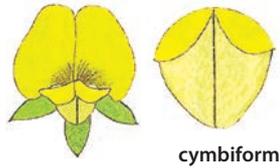
**cylindric, cylindrical**

Like a cylinder.



**cymbiform** Shaped like the bow of a boat, as the united lower petals (keel) of pea flowers (Fabaceae).

= **navicular**



**cyme** see page 76

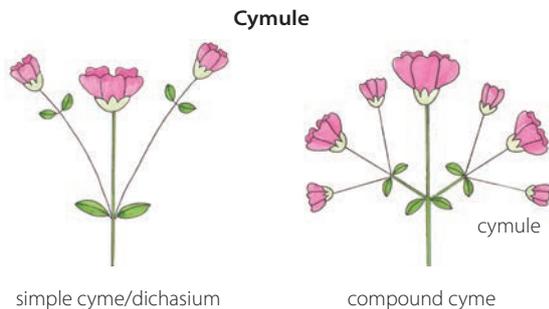
**cymose** Arranged in a cyme, bearing cymes.

cf. **racemose**

**cymule** A three-flowered part of a compound cyme, with the oldest flower in the middle and the lateral ones younger.

A simple cyme, as a dichasium.

The ultimate division of a compound cyme.



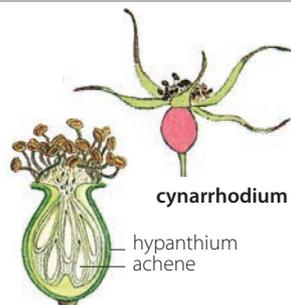
**cynarrhodium**

The fruit of the rose genus (*Rosa*).

The hollow hypanthium contains the achenes that are the true fruit.

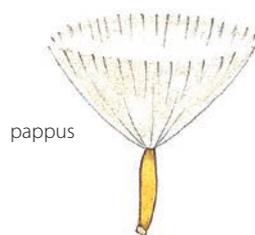
Commonly called a hip.

see **accessory fruit**



**cypsela, pl. cypselae,**

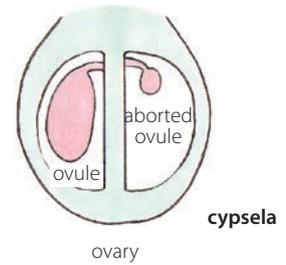
**cypselas** A dry indehiscent fruit, with or without a pappus, having one seed attached to the fruit wall (pericarp) at one point only.



Derived from a two-carpelled inferior ovary in which only one ovule develops into a fruit and the other is aborted.

Characteristic of the daisy family (Asteraceae).

cf. **achene, caryopsis, diclesium**



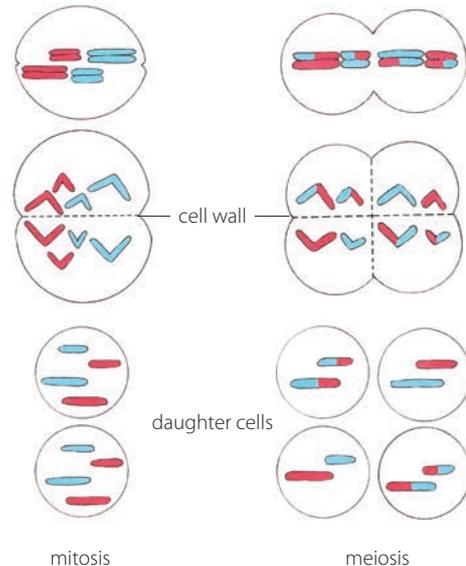
**cystolith** A stone-like mass of calcium carbonate that forms in specialised epidermal cells of some plants.

The deposit is typically attached to the cell wall by a cellulose stalk or peg.

see **lithocyst**

**cytokinesis** In meiosis and mitosis, the process of forming a cell wall that divides the cytoplasm of a parent cell into two or four daughter cells, each with its own nucleus.

**Cytokinesis**



**cytokinins** Plant hormones that stimulate seed germination, seed development, leaf expansion, induction of flowering and help delay senescence.

They work with auxins to regulate cell division in roots and shoots.

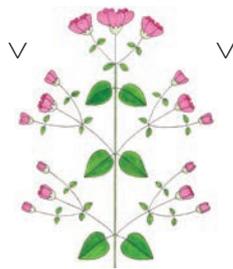
see **phytohormone**

**cytology** The study of the cell and its contents.

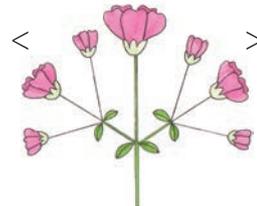
**cytological** Of or relating to cytology.

**cyme, cymose inflorescence** An inflorescence in which the main axis and lateral branches end in a flower. Each cyme unit has a pedicel that bears a single terminal flower. A lateral branch with a terminal flower then develops in the bracteole at the base of the pedicel. Subsequent branching follows the same pattern. Branching may be on one or both sides of the axis. The simplest cyme is a solitary flower. The first formed flower is at the tip of the peduncle so that flowering begins at the top in descending or basipetal succession. The arrangement of flowers is centrifugal, with the oldest flower in the centre and the youngest flowers towards the outside. The number of flowers is definite. A determinate or definite inflorescence. *see inflorescence*  
*cf. raceme, racemose inflorescence*

### Cymose inflorescence



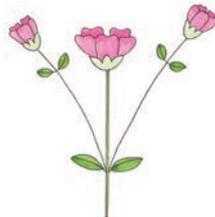
Flowering descending/basipetal



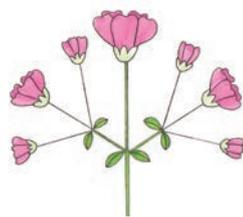
Flowering centrifugal



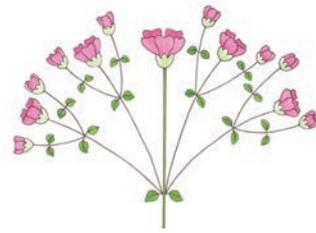
solitary flower



cyme/dichasium



compound cyme/dichasium



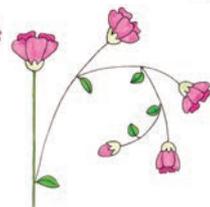
pleiochasial cyme/pleiochasium



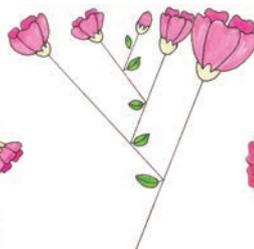
scorpioid cyme  
cincinnus



helicoid cyme  
bostryx



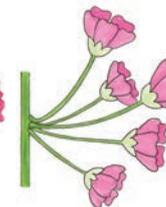
drepanium



rhipidium



verticillaster



fascicle

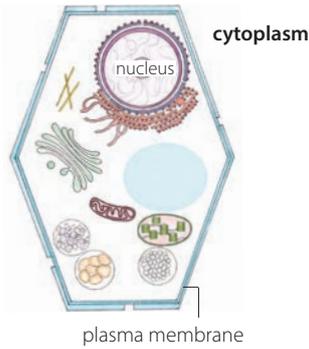


glomerule

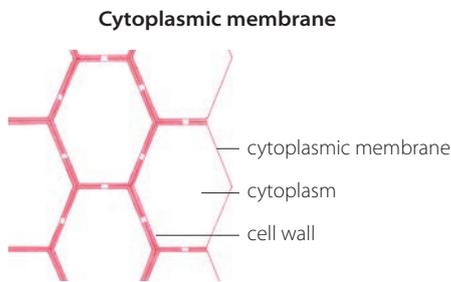
**cytoplasm** Of a plant cell, the substance (cytosol) surrounded by the plasma membrane and all organelles suspended in it other than the nucleus.

see **cell**

**cytoplasmic** Of or relating to cytoplasm.

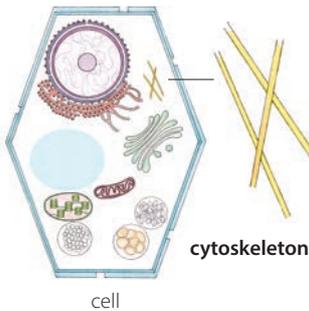


**cytoplasmic membrane** A thin semipermeable layer of tissue enclosing the cytoplasm of a cell and, in plants, surrounded by the cell wall. It allows movement of some substances into and out of the cytoplasm.  
= **cell membrane, plasma membrane**



**cytoplasmic streaming** The continuous movement of cytoplasm around the cell.

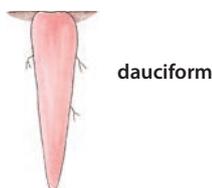
**cytoskeleton** A system of microfilaments and microtubules in the cytoplasm that gives a cell its shape. It is involved in the motility of organelles and other components from one part of the cell to another.



**cytosol** A clear substance that makes up most of the volume of the cytoplasm.  
= **ground substance, hyaloplasm**

**damping off** Of plant seed and seedlings, a fungal or other pathogenic disease that causes the seed to rot or the seedling to collapse.

**dauciform** Broad at the top and tapering towards the base. Carrot-shaped, as some roots.



**dealbate** Whitened.

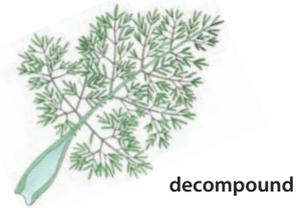
**deca-** A prefix meaning ten.

**deciduous** Falling seasonally as a plant that sheds its leaves annually. Falling off or shed at a particular stage of development as the petals of a flower.  
see also **caducous, fugaceous**  
cf. **evergreen, persistent**

**declinate** Bending downwards in a curve, as the stamens of cassia (*Cassia*).



**decompound** Many times compound, as the leaf of fennel (*Foeniculum vulgare*).  
see **pinnately decompound**

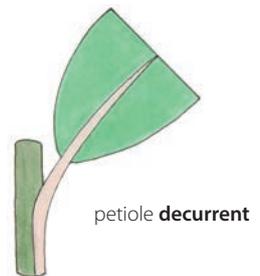


**decorticate** To peel, to remove the outer layer of, as bark or a husk.

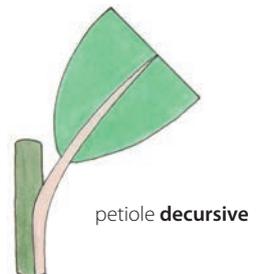
**decumbent** Of stems lying or growing along the ground with the tips curving upwards, as matted St John's wort (*Hypericum japonicum*).  
cf. **procumbent, prostrate**



**decurent** Having the base prolonged down the axis and adnate to it, as a leaf or leaflet with the base or the petiole extending down along the stem and attached to it.  
= **decursive**

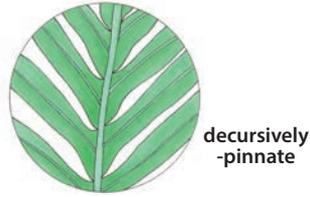


**decursive** Having the base prolonged down the axis and adnate to it, as a leaf or leaflet with the base or the petiole extending down along the stem and attached to it.  
= **decurent**



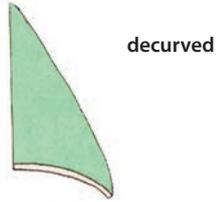
**decursively-pinnate**

Of a pinnate leaf with the base of the leaflets extending down along the rachis.



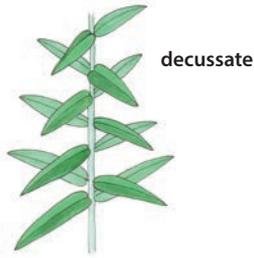
**decurved** Curved gradually downward, as some leaves on a stem or the the surface of some leaves.

cf. **recurved**



**decussate** Of opposite leaves with each pair arranged at right angles to the pair above and below.

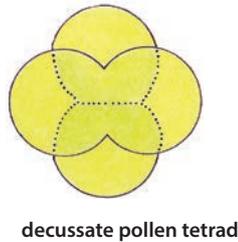
cf. **brachiate**



**decussate tetrad**

A multiplanar tetrad with the four cohering members arranged in two pairs lying one across the other, more or less at right angles to each other.

see also **pollen tetrad**  
see **multiplanar, viscin thread**



**definite** Lacking a persistent terminal growing point and having growth occur in successive lateral branches, as elms (*Ulmus*).

The pattern of growth in which the apex of the main stem ceases to grow due to the abortion of the apical bud or the development of a flower or another structure, as a tendril.

Growth continues below the apex from a succession of axillary branches with a similar

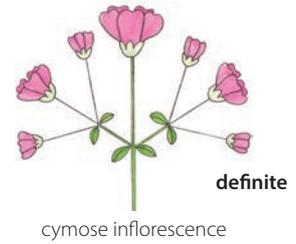


elm (*Ulmus*)



tendril

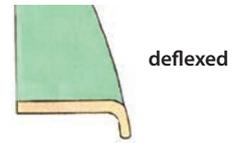
growth pattern. Of sympodial or determinate growth, as a cymose inflorescence. cf. **indefinite**



cymose inflorescence

**deflected, deflexed**

Bent abruptly downwards, as margins of some fern fronds.



deflexed

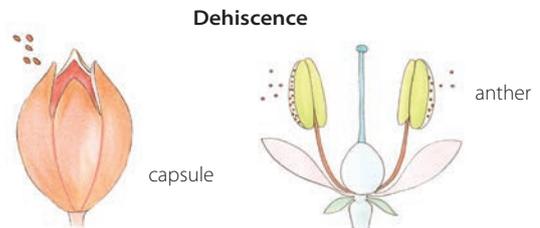
**defoliation** Shedding of leaves. Loss of leaves by use of chemicals.

**deforestation** The removal of trees by humans, as forests that are cleared for growing crops or logged to make wood products.

**dehiscence** The splitting open of a plant part in order to release its contents, as a capsule releasing seeds or an anther releasing pollen.

**dehiscence** To open spontaneously at maturity to release contents.

**dehiscent** Opening when ripe, as a capsule. cf. **indehiscent**



Dehiscence

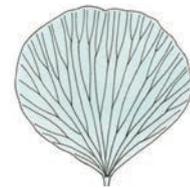
capsule

anther

**delimitation** Prescribing limits or boundaries, as those that define a genus or species.

**deliquescence** The condition of repeated divisions ending in fine divisions, as the venation of some leaves.

**deliquescent** Having a branching axis with the trunk soon lost or 'dissolved' into the successively divided branches, as most deciduous trees. cf. **excurrent**



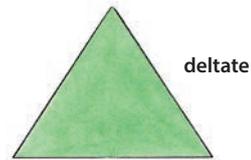
leaf venation



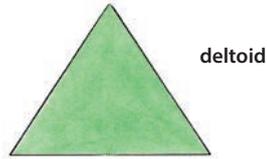
deliquescence

branching

**deltate** Of a triangle with sides of about equal length and broad at the base.  
= **deltoid**



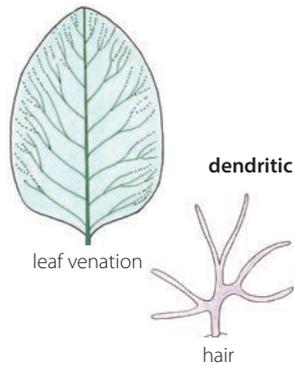
**deltoid** Of a triangle with sides of about equal length and broad at the base.  
= **deltate**  
cf. **obdeltoid**



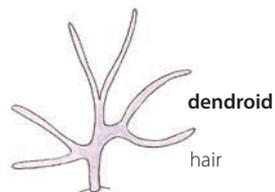
**demi-** A prefix meaning half.

**dendriform** Tree-like in form, arborescent.

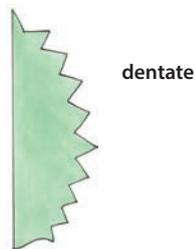
**dendritic** Tree-like. Branched like a tree, as the veins in some leaves or a hair that branches at the apex like a tree.  
= **dendroid**  
see also **cladodromous, open venation**  
cf. **anastomosis, closed venation**



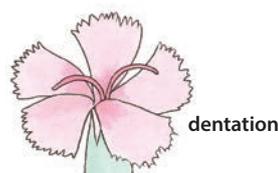
**dendroid** Tree-like. Branched like a tree, as a hair that branches at the apex like a tree.  
= **dendritic**



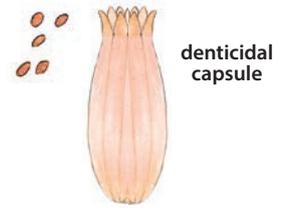
**dentate** Having teeth. With shallow tooth-like projections, like an equilateral triangle, at right angles to the margin, as some leaves.  
= **toothed**  
cf. **crenate, edentate, serrate**



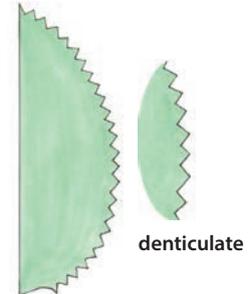
**dentation** Referring to teeth on a margin, as a leaf or the petals of some flowers, as carnations (*Dianthus*).



**denticidal capsule** A capsule that splits open at the apex and forms a ring of teeth, as chickweed (*Cerastium*).



**denticle** A very small tooth.  
**denticulate** Minutely toothed, minutely dentate. Having margins with minute tooth-shaped projections like an equilateral triangle, as the margins of some leaves.



**dentiform** Tooth-shaped.

**deoxyribose nucleic acid, DNA** A double-stranded, helically arranged acid in the nucleus of a cell that is the main constituent of chromosomes.  
see also **ribose nucleic acid (RNA)**

**depauperate** Of a plant that is stunted and arrested in growth and development due to poor growing conditions.  
Of an ecosystem, lacking in species variety.

**dependent** Hanging down.

**dephosphorylation** Removal of a phosphate group from an organic compound through hydrolysis. Adenosine triphosphate loses one or two phosphate groups when releasing energy for processes in the cell, thus becoming adenosine diphosphate or adenosine monophosphate. The process can be reversed by phosphorylation.

**depressed** Sunken or flattened as if pressed from above.

**derived character** In phylogenetics, a character that has evolved from, but become modified and distinct from, the one present in an ancestor.  
= **apomorphy**  
cf. **ancestral**

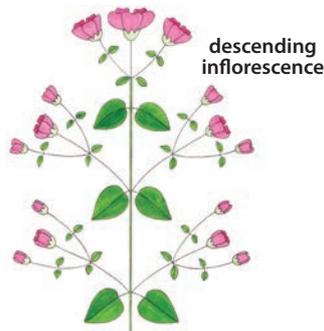
**dermal** Of the outer covering of a plant that includes the epidermis and the periderm.

**dermal tissue** The epidermis (a primary tissue that is derived from the protoderm) and the periderm (a secondary tissue that is derived from cork cambium).

**descending** Proceeding from a higher to a lower part. Gradually going downwards.

**descending axis** The axis of a plant below ground, the root.  
*cf.* **ascending axis**

**descending inflorescence**  
Having the upper flowers on the axis and branches opening first.  
= **basipetal**  
*cf.* **ascending inflorescence**



**descent** The transfer of genetic material from parents to offspring over time.

**description** The assignment of features or attributes to a taxon.  
A published account of the features of a taxon.  
*see* **circumscription, diagnosis**

**desert** An extremely dry landscape, with sparse vegetation that may be hot, as the Sahara Desert, or cold, as the Gobi Desert.  
*see* **biome**

**desertification** Land degradation in arid, semi-arid and dry subhumid areas resulting from human activities, like deforestation and grazing, and climatic variations.  
*see* **ecoagriculture**

**det.** *abbr.*, **determinavit** From the latin *determinavit*, meaning he/she determined. Used on the label of a herbarium specimen and followed by the name of the person who identified the specimen.

**determinate** Lacking a persistent terminal growing point and having growth occur in successive lateral branches, as elms (*Ulmus*).

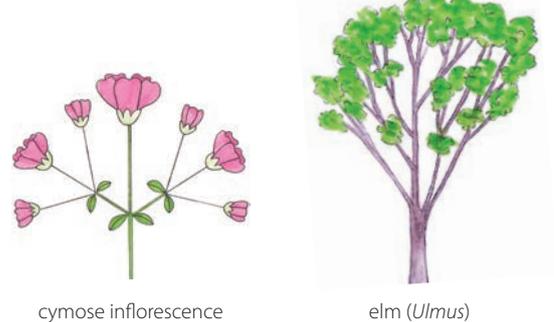
The pattern of growth in which the apex of the main stem ceases to grow due to the abortion of the apical bud or the development of a flower or another structure, as a tendril.

Growth continues below the apex from a succession of axillary branches with a similar growth pattern.

Of sympodial or definite growth, as a cymose inflorescence.

*cf.* **indeterminate**

#### Determinate

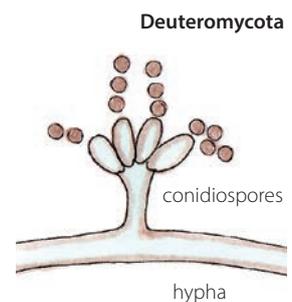


**determination** Description and naming of an unknown species by comparing its characteristics with a known species, or recognising that it is new and warrants formal description and naming. Specimens can be reidentified by adding a new determination and retaining a history of previous determinations that are termed 'unaccepted', though not necessarily wrong.  
*see* **identification**

**determinavit**, *abbr.* **det.** From the latin *determinavit*, meaning he/she determined. Used on the label of a herbarium specimen and followed by the name of the person who identified the specimen.

#### Deuteromycota

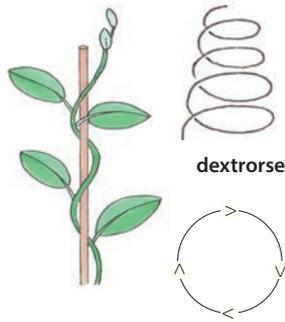
An informal group of fungi known as imperfect fungi that are thought to reproduce only asexually by conidiospores. They form ectendomycorrhizas with pines (*Pinus*), spruce (*Picea*) and larch (*Larix*).  
*see* **fungus, mycorrhiza**



**dextrorse** Twining from the base in a spiral from left to right, as seen from the side.

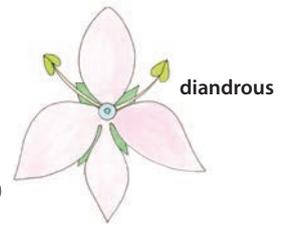
Twining in a clockwise direction, as seen from above.

cf. **sinistrorse**



cf. **monandrous, pentandrous, polyandrous, tetrandrous, triandrous**

*derwentia* (*Derwentia derwentiana*)



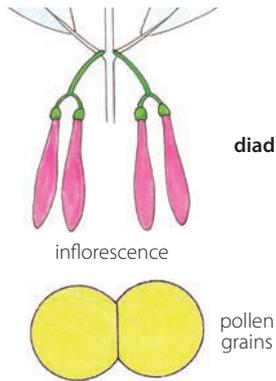
**di-** A prefix meaning two.

**diad, dyad** A group of two.

A pair of flowers in an inflorescence, as those of some mistletoes (*Amyema*).

Two united pollen grains.

cf. **monad, polyad, tetrad, triad**



**diaspore** The dispersal unit of a plant.

It may be a seed, as flowering plants, gymnosperms and pteridosperms, a spore as ferns and lycopods, a plant fragment as bryophytes, a whole plant as tumbleweed (*Salsola*), a seedling as mangrove (*Rhizophora*) or a fruit as beet (*Beta vulgaris*).

= **disseminule**

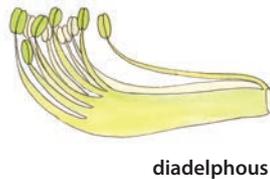
see also **propagule**

**diastase** Any one of a group of enzymes that causes the transformation of starch into maltose.

**diadelphous**

Of stamens united by their filaments into two bundles, as some pea flowers that have nine stamens united and one free.

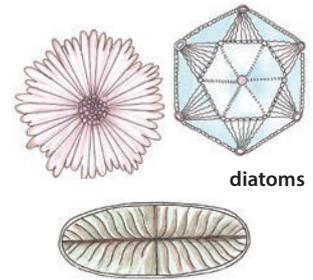
see **adelphous**



**diatom**

A minute single-celled photosynthetic alga with a cell wall composed of silica.

Found in vast quantities in fresh and marine waters.



**diagnosis** A description of what distinguishes one taxon from another, based on selected characters.

see **circumscription, description**

**dialypetalous**

With a corolla of separate petals.

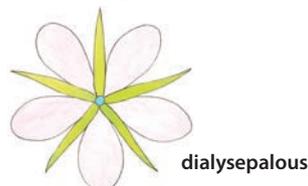
= **polypetalous**



**dialysepalous**

With a calyx of separate sepals.

= **polysepalous**



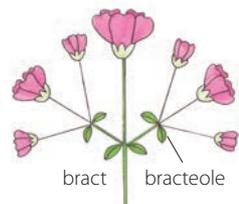
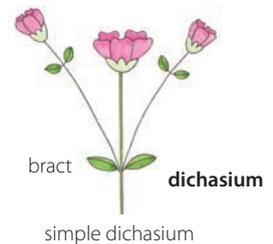
**diandrous** Having two stamens, as the flowers of *derwentia* (*Derwentia derwentiana*).

**dichasium, pl. dichasia, dichasial cyme**

A cymose inflorescence with the main axis bearing a terminal flower. A lateral axis may develop in each of the subtending bracts or bracteoles and bears a terminal flower.

see also **biparous, dichotomous**  
cf. **monochasium, pleiochasium, polychasium**

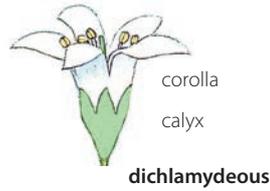
**dichasial** Of a dichasium.



**dichlamydeous**

Having a perianth of two whorls, that is, with both a calyx and a corolla.

cf. **chlamydeous**



**dichogamy** Of a flower, a way of preventing self-fertilisation by having stamens and stigmas maturing at different times.

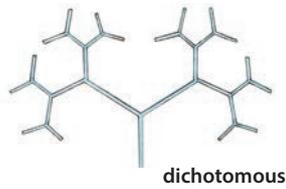
see **protandry, protogyny**

cf. **herkogamy**

**dichogamous** With stamens and stigmas maturing at different times.

**dichotomous** Forking once or several times, each time into two equal branches.

cf. **trichotomous**



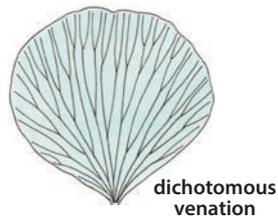
**dichotomous cyme** Another name for dichasium.

**dichotomous key** A key that offers two contrasting characters or couplets at each step so that by selecting one option each time an unknown plant can be identified.  
= **binary key**

**dichotomous venation**

Forking and dividing always into two more or less equal branches, as veins of some leaves.

see also **bifurcate**

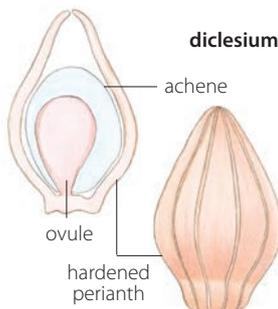


**diclesium** A small dry indehiscent fruit.

An achene, surrounded by a free but persistent hardened perianth, as marvel of Peru (*Mirabilis jalapa*).

cf. **achene, caryopsis, cypsel**

see **accessory fruit**



**diclinous** Having stamens and pistils in separate flowers.

see **androgynous, dioecious, monoecious, trioecious**

**dicotyledon** Angiosperms were formerly divided into monocotyledons, with one seed leaf (cotyledon) in the embryo, and dicotyledons, mostly with two seed leaves in the embryo.

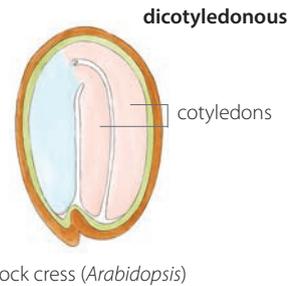
Dicotyledons are no longer regarded as a natural grouping and angiosperms are now divided into several groups, the larger groups being eudicots (with pollen grains having three pores or furrows) and monocotyledons (with pollen grains having one pore or furrow).

**dicotyledonous**

Of a plant embryo having two cotyledons, as most eudicots.

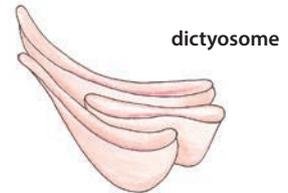
Of a plant producing such embryos.

cf. **monocotyledonous, polycotyledonous**



**dictyosome**

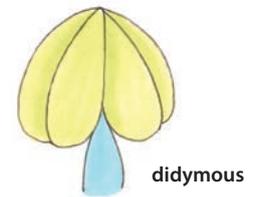
A stack of flattened membrane-bound cisternae that make up the Golgi complex.



**didymous** Of anthers where the connective is almost absent, as those of the genus *Clinosperma*.

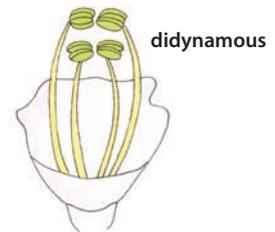
cf. **distractile**

see **anther attachment**



**didynamous** Having four stamens, two long and two short, as flowers of some members of the mint family (Lamiaceae).

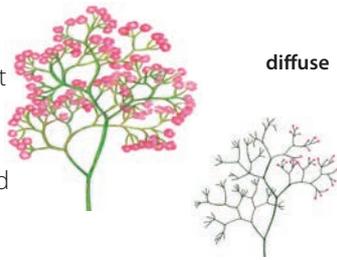
cf. **tetradynamous, tridynamous**



**differentiated** With visible distinctive characteristics, as a stamen divided into an anther and a filament or the petals and sepals of most flowers.

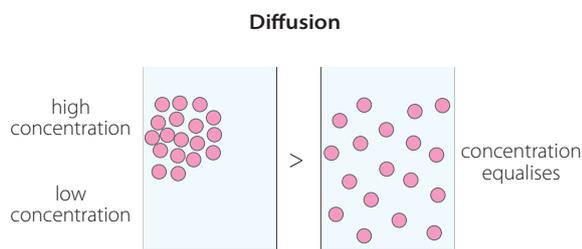
**differentiation** The process by which cells become specialised to form a particular function, as amorphous meristem cells that undergo various changes to form the different tissues of the plant body.

**diffuse** Of open spreading growth that is loosely branched, as the inflorescence of spreading hogweed (*Boerhavia diffusa*).



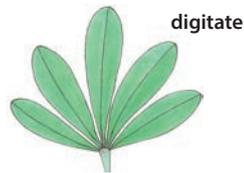
diffuse

**diffusion** Passive movement of molecules from a region of higher concentration to a region of lower concentration in order to equalise the concentration. Movement is random and occurs in the absence of a semipermeable membrane. It takes place in both liquids and gases.  
cf. **osmosis**



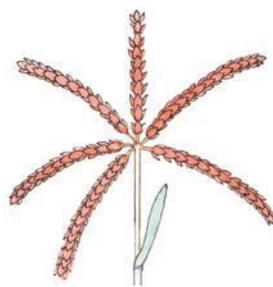
**digiform** Shaped like a finger.  
cf. **digitate**

**digitate** With the segments spreading from a common point like the fingers of a hand, as some palmate leaves.



digitate

**digitate inflorescence** An arrangement of spikes or racemes, (rather than flowers), radiating like fingers from a common point at the top of the peduncle. Found in some grasses (Poaceae) and sedges (Cyperaceae).  
cf. **anthela, panicle, raceme, spike**



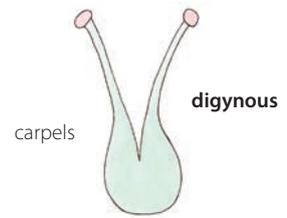
digitate inflorescence

**digitate-pinnate** Of a leaf with the segments spreading from a common point like the fingers of a hand and each segment divided pinnately.



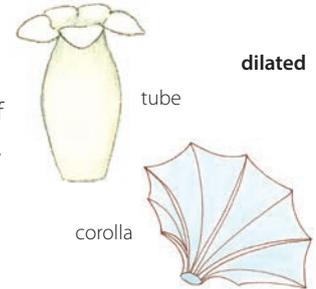
digitate-pinnate

**digynous** Of a flower having two carpels, whether free or variously fused.



digynous

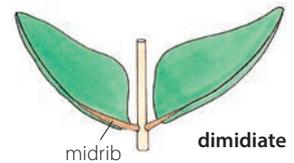
**dilated** Widened. Expanded, as the tube of some flowers or the funnel-shaped corolla of bindweed (*Convolvulus*).  
cf. **distended**



dilated

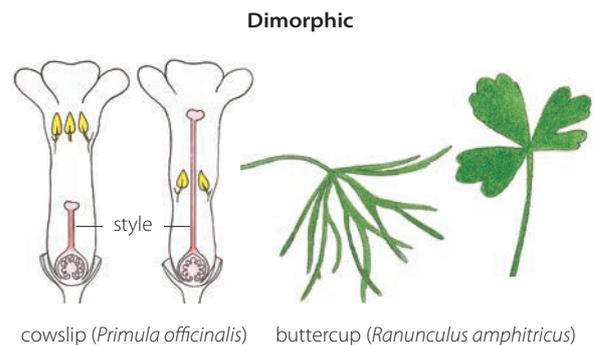
**dimerous** Having flower parts, such as petals, sepals and stamens, in whorls of two or multiples of two. 2-merous.  
see **-merous**

**dimidiate** Of a leaf or leaflet, with the leaf on one side of the midrib so reduced that it appears to be lacking.



dimidiate

**dimorphic** Having two distinct forms, as the styles of cowslip (*Primula officinalis*) and the leaves of small river buttercup (*Ranunculus amphitricus*).  
see **heterophylly, pin, thrum**  
cf. **monomorphic, polymorphic, trimorphic**



cowslip (*Primula officinalis*)

buttercup (*Ranunculus amphitricus*)

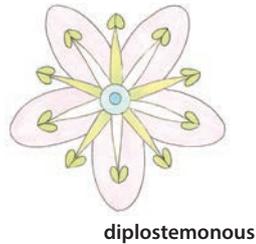
**dioecious** Of a species with unisexual flowers on different plants.  
see **androgynous, diclinous, monoecious, trioecious**

**diplo-** A prefix meaning double, in pairs or twofold.

**diploid, diploidy** Having two complete sets (2x) of chromosomes in each somatic cell.  
see **ploidy**

**diplospory** In flowering plants (angiosperms), the formation of an embryo from the diploid megaspore mother cell before it undergoes meiosis. A form of agamospermy.  
*cf.* **apospory**

**diplostemonous**  
With two whorls of stamens, the inner whorl opposite the petals and the outer whorl alternate with the petals.  
*cf.* **obdiplostemonous**



**dipterous** Of fruit or seed, having two wing-like expansions.

**disarticulate**  
To separate at the joints (nodes), as the rachilla of some grasses.  
*cf.* **articulate**



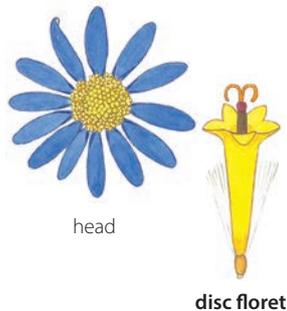
**disc, disk** A thin, flat and circular object. The central part of a daisy capitulum.



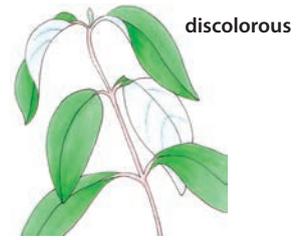
**disciform, discoid**  
Resembling a disc. Circular and flattened, as the inflorescence of most button weeds (*Cotula*).



**disc floret**  
Of the daisy family (Asteraceae), one of the tubular florets that form the central portion of a head, as distinct from the surrounding ray florets.  
= **tubular floret**  
*cf.* **ligulate floret, ray floret**



**discolorous** With two different colours. Of a leaf having the upper and lower surfaces unlike in colour.  
*cf.* **concolorous, variegated**



**discrete** Individually separate and distinct.  
*cf.* **coalescent**

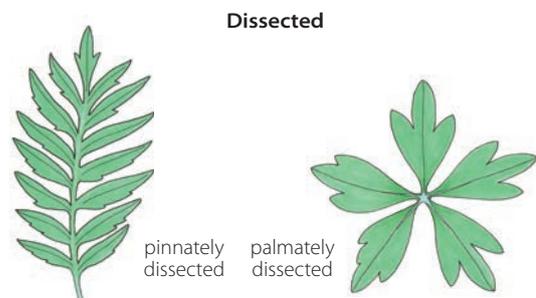
**disjunct distribution** Separated geographically, as populations of a species located in different areas due to habitat fragmentation.

**dispersal** Movement from the parent plant to a new location, usually for reproduction, as the scattering of fruit, seeds and pollen grains by wind, water, insects and so on.  
see **dispersal mechanism, dispersal unit**

**dispersal mechanism** The means by which a diaspore, or some other structure like pollen or a propagule, is removed from the vicinity of the parent plant. Includes dispersal by wind (anemochory), animals (zoochory), water (hydrochory) and ants (myrmecochory).

**dispersal unit** The entity that is shed from the parent plant for reproduction, as seeds, spores or pollen grains.  
see **disseminule**

**dissected** Deeply divided. Of a leaf having lobes with incisions that extend almost, but not quite, to the midrib or almost but not quite to the top of the petiole.



**dissemination** The spreading of disseminules.

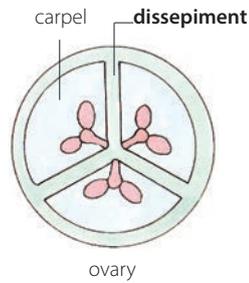
**disseminule** The dispersal unit of a plant. It may be a seed, as flowering plants, gymnosperms and pteridosperms, a spore as ferns and lycopods, a plant fragment as bryophytes, a whole plant as tumbleweed (*Salsola*), a seedling as mangrove (*Rhizophora*) or a fruit as beet (*Beta vulgaris*).

= **diaspore**  
see also **propagule**

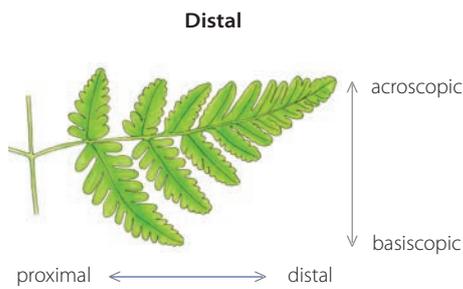
**dissepiment**

A partition or wall separating two cavities. In an ovary or fruit, usually formed by the fusion of adjacent carpel walls.

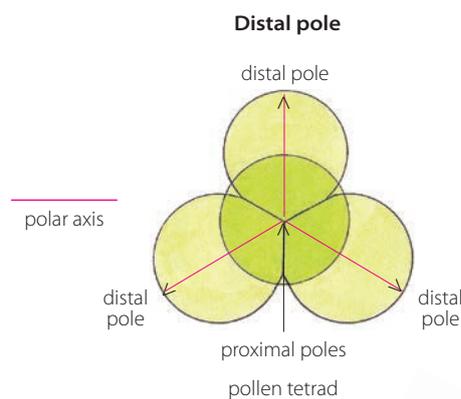
= **septum**



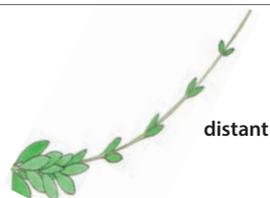
**distal** Near the free end as opposed to the attached (proximal) end.



**distal pole** Of a pollen grain in a tetrad, that part of the polar axis orientated towards the outside.  
cf. **proximal pole**

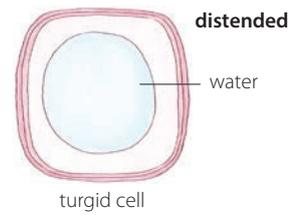


**distant** Separate or apart in space, far removed. Widely spaced, as leaves on a stem.  
= **remote**



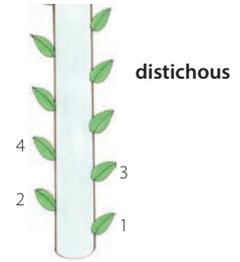
**distended** Expanded or swollen from internal pressure, as a turgid cell that is swollen from excess water.

cf. **dilated**



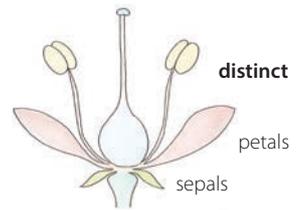
**distichous** Arranged in two vertical rows on opposite sides of a stem, as some leaves, with any third leaf above the one below it.

= **two-ranked**  
see **orthostichy**



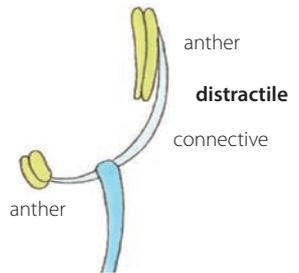
**distinct** With like parts separate and not fused, as the petals and sepals of a flower.

= **free**  
cf. **fused**



**distractile** Borne widely apart. Of anthers separated by a very long, narrow connective, as sage (*Salvia officinalis*).

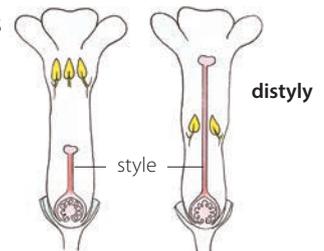
cf. **didymous**  
see **anther attachment**



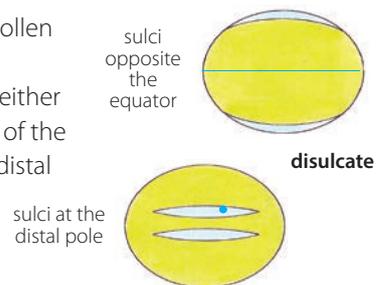
**distribution** The pattern of a species as it occurs over a particular geographical area.

**distyly** Having styles of two different lengths in flowers on the same plant, as the cowslip (*Primula vulgaris*).

cf. **heterostyly, tristyly**  
**distylous** Exhibiting distyly.

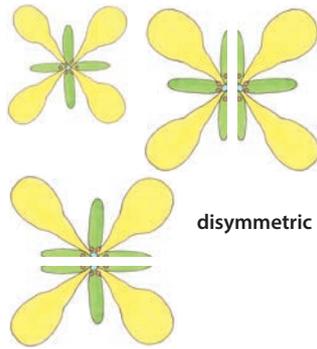


**disulcate** Of a pollen grain having sulci arranged in pairs, either on opposite sides of the equator or at the distal pole.



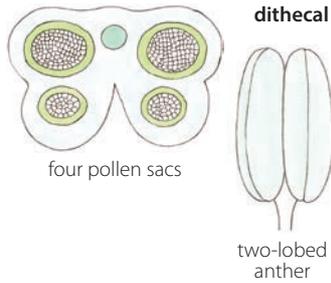
**disymmetric**

Divisible through the centre into exactly similar halves on two planes of symmetry, as the flowers of rapeseed (*Brassica napus*).  
cf. **bisymmetric**, **zygomorphic**



**dithecal, dithealous**

Of a stamen having two anther lobes and four pollen sacs (microsporangia), two in each lobe.  
= **tetrasporangiate**  
cf. **monothecal**

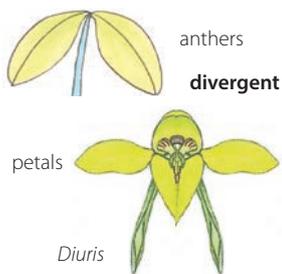


**diurnal** In the daytime. Of flowers, opening only during daylight.  
cf. **nocturnal**

**divaricate** Widely spreading, almost at right angles to the axis, as the pedicels of marsh speedwell (*Veronica scutellata*).



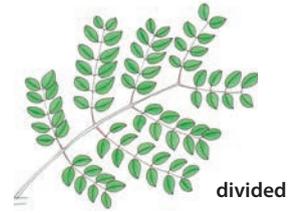
**divergent** Spreading broadly from the centre as the petals of many donkey orchids (*Diuris*).  
cf. **convergent**  
Of anthers, spreading from the centre.  
cf. **explanate**



**divergent evolution** The process whereby groups with a common ancestor accumulate differences over time in response to environmental pressures.  
Divergent evolution leads to speciation.  
cf. **convergent evolution**

**diversity** Variety, as the number of different species in a given community or the variety of communities within an ecosystem.

**divided** Separated into part.  
Of a leaf that is divided into leaflets.



**division** A taxonomic classification between kingdom and class.  
The name of a division in the plant kingdom ends in *-phyta*, as Magnoliophyta (flowering plants).  
= **phylum**  
see **taxonomic hierarchy**

**DNA** Deoxyribose nucleic acid.  
see also **RNA**

**DNA sequencing** Determination of the order of the four building blocks (adenine, guanine, cytosine or thymine) that make up a DNA molecule.  
= **gene sequencing**

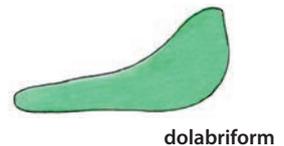
**Dodsonian mimicry**

Imitation by the flower of one species that has no nectar, by the flower of another species that has nectar, in order to attract a pollinator, as the flowers of some donkey orchids (*Diuris*) that mimic bush peas (*Pultenaea*) that have nectar.  
see **Bakerian mimicry**, **Pouyannian mimicry**, **Vavilovian mimicry**

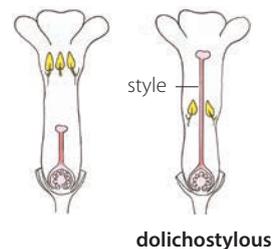
**Dodsonian mimicry**



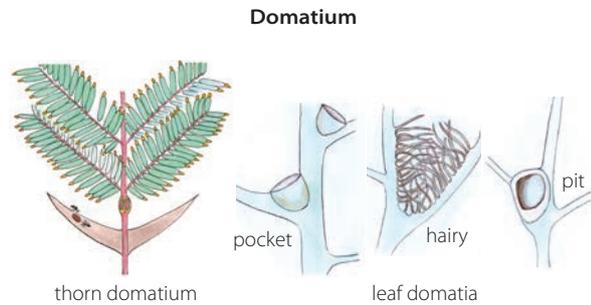
**dolabriform** Having the shape of the head of an axe or hatchet, as some leaves.



**dolichostylous** Of heterostylous flowers, those having long styles, as the cowslip (*Primula vulgaris*).  
cf. **brachystylous**, **isostylous**



**domatium, pl. domatia** Structures produced by a plant that provide shelter for tiny arthropods. They may feed on herbivorous pests harmful to the plant. Examples of domatia are tiny pits, pockets or tufts of hairs that house mites on the undersurface of some leaves, or hollow stems and thorns that house ants.



**domesticate** To breed, develop and stabilise a desirable characteristic in a wild plant so that it can be cultivated.

**dominant** Of a heterozygous individual, an allele of a gene that masks or conceals the expression of the other allele.

cf. **epistasis, recessive**

**dormancy**

A state in which a plant is synchronised with the external rhythms of the seasons and does not grow at certain times of the year, as herbs that die back to bulbs, or rhizomes and trees that are deciduous. A period of time when a plant, or its seeds, does not grow due to environmental conditions. Dormancy allows a plant to wait for favourable conditions before starting growth.

**dormant** Alive but temporarily inactive.

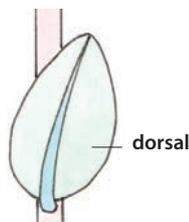
**dormant buds** Usually applied to buds that do not grow the following season.

Also sometimes applied to resting buds.

= **latent buds**

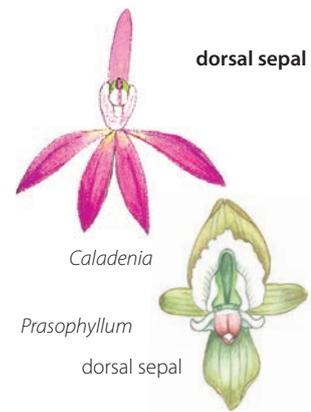
**dorsal** The back. The outer side facing away from the axis, as a leaf on a stem.

cf. **ventral**



**dorsal sepal**

The uppermost sepal of a resupinate orchid flower, as *Caladenia*, or the lowermost sepal of a non-resupinate orchid flower, as *Prasophyllum*.

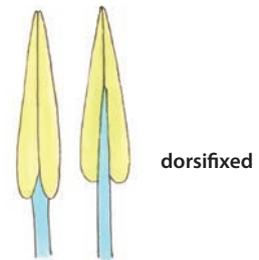


**dorsifixed** Attached on or by the back, as a stamen filament attached to the connective somewhere along the back of an anther.

cf. **medifixed,**

**ventrifixed**

see **anther attachment**

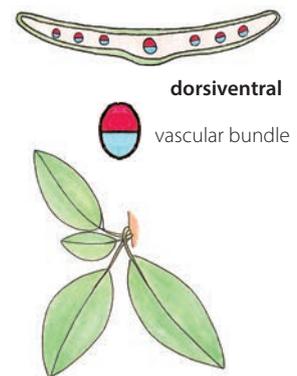


**dorsiventral** Having structurally different upper (adaxial) and lower (abaxial) surfaces, as the leaves of most dicotyledons.

Typical of leaves that orient themselves at an angle to the main axis.

= **bifacial**

cf. **isobilateral**



**double** Of a flower with more than the usual number of petals or with petal-like sepals, stamens or bracts, as paeony (*Paeonia*).

see **hose-in-hose**

**double fertilisation**

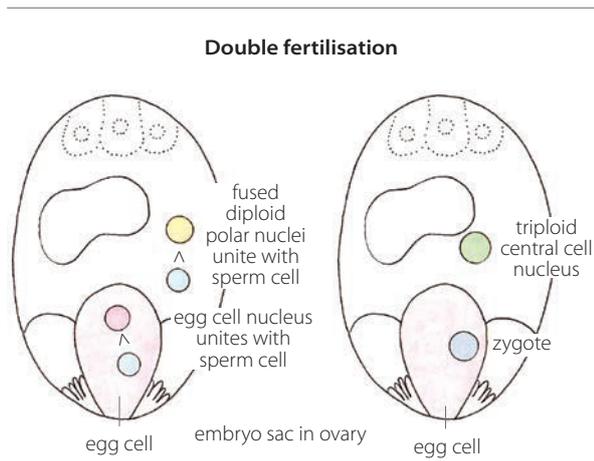
Of angiosperms, the two separate unions that occur in an ovule.

After the two male sperm cells enter the embryo sac, one sperm cell fertilises the egg cell nucleus, forming the diploid (2n) zygote.

The other sperm cell combines with the two fused polar nuclei to form a triploid (3n) nucleus in the centre of the large central cell. This cell will give rise to the endosperm of the seed.

**double fertilisation** page 88 (cont.)

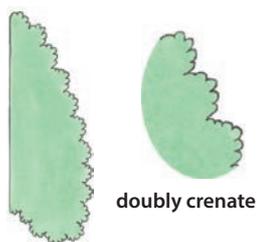
cf. **simple fertilisation**



**doubly crenate**

Of a margin with crenate teeth that are themselves crenate, as the margins of some leaves.

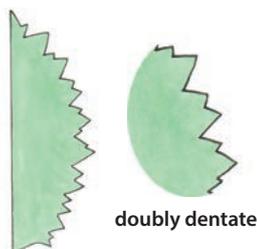
= **bicrenate**  
 cf. **crenate, crenulate**



**doubly dentate**

Having tooth-like projections that are themselves toothed. Doubly toothed, as the margins of some leaves.

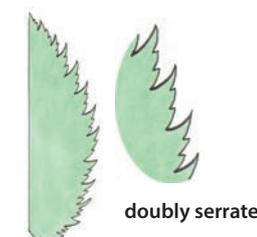
= **bidentate**  
 cf. **biserrate**



**doubly serrate**

Of a margin with saw-like teeth that are themselves toothed, as the margins of some leaves.

= **biserrate**  
 cf. **serrate, serrulate**



**down** A covering of short soft hairs, as on the buds, leaves and fruit of some plants.

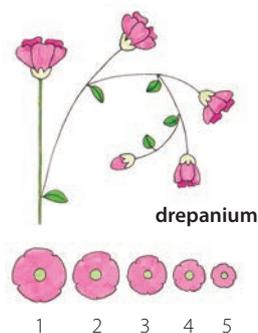
= **pubescence**  
**downy** Covered with down.



**drepanium,**

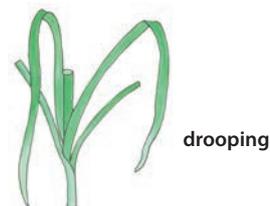
pl. **drepania**  
 A sickle-shaped cymose inflorescence that is flattened, with successive branches on one side only.

see also **monochasium**  
 cf. **rhipidium**



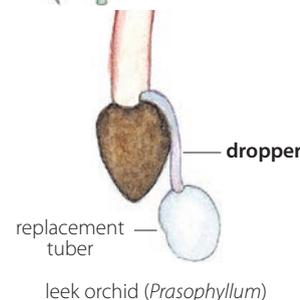
**-dromous** A suffix meaning moving or running.

**drooping** Hanging downwards limply, as leaves on a stem.



**dropper** A root that grows downward from a bulb or corm that bears a replacement bulb or corm.

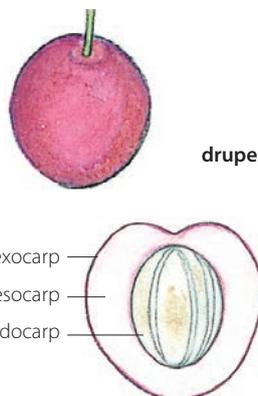
Of orchids, the short root that bears the replacement tuber.  
 = **sinker**



**drupe** A fleshy fruit with the ovary wall ripening into three layers, the skin (exocarp), the flesh (mesocarp) and the stone (endocarp) that encloses the seed.

Derived from a one-carpelled superior ovary, as the stone-fruit genus *Prunus*.

**drupaceous** Of or like a drupe.



**drupecetum**

An aggregate fruit composed of a cluster of drupes, as the raspberry (*Rubus*).



**drupelet** A small drupe.

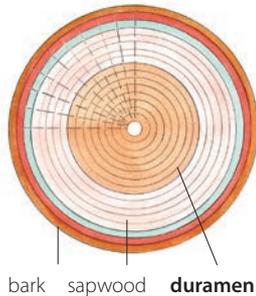
One segment of an aggregate fruit, as raspberries and blackberries (*Rubus*).



**duct** A tube formed by a row of cells that have lost their adjacent cell walls.

**duplicate specimen** Part of a single plant collection preserved as a separate specimen.

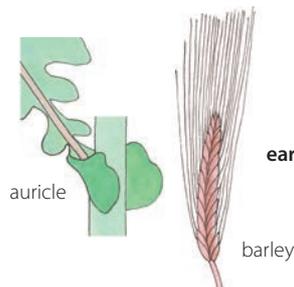
**duramen** The central usually darker inactive central wood of a trunk or branch. It is made up of non-functioning sapwood cells infiltrated with other substances like lignin.  
= **heartwood**



**dystrophic** Of a body of brownish acidic water, with a high concentration of dissolved humus. It is low in oxygen and supports little life.  
see **trophic**  
cf. **eutrophic, mesotrophic, oligotrophic**

**e-** A prefix meaning without.

**ear** An auricle. An ear-shaped appendage at the bottom of a leaf. The grain-bearing spike or head of a cereal plant, as wheat or barley.



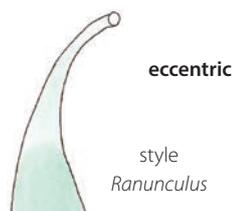
**early wood** Wood in a growth ring, with large thin-walled cells, that is produced in spring. It is less dense than late wood that is produced later in the growing season when growth is slower. Early wood and late wood usually appear as two distinct bands.

**ebracteate** Lacking bracts.

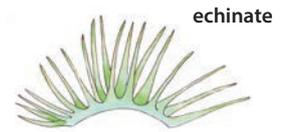
**ebracteolate** Lacking bracteoles.

**ealcarate** Without a spur.

**eccentric, excentric** Off-centre. Having the axis or other part not centrally placed, as the style of the buttercup genus (*Ranunculus*).



**echinate** Of a surface with stout spine-like projections.



**echinulate** Bearing small spines.

**ecoagriculture** A means of land and natural resource management that conserves native biodiversity, provides agricultural products on a sustainable basis and supports viable livelihoods for local people.

It recognises that there are unprecedented demands on the world's finite resources.

see **desertification**

**ecological succession** In ecology, the process of change in species structure as a community establishes over time.

Primary succession occurs on previously uncolonised areas like lava flows.

Secondary succession occurs on disrupted or disturbed areas.

= **succession**

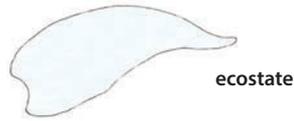
see also **climax community**

#### Ecological succession



**ecology** The study of the distribution and abundance of living organisms in relation to the environment and in relation to each other. In particular, the distribution and geographic range of a particular population.

**ecostate** Of a leaf without a midrib, as some mosses.



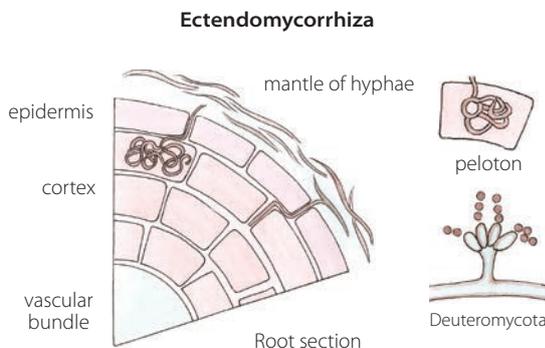
**ecosystem** All living organisms (biotic components) and their physical surroundings (abiotic components) in a given area. Biotic components include plants, animals, fungi, algae and microbes. Abiotic components include temperature, water availability and soil. An ecosystem may be small (a pond) or large (the tropical rainforest of the Amazon Basin), it may be aquatic, as a lake, river or coral reef, or terrestrial, as a grassland, forest or desert.  
*cf.* **biome, community, habitat, population**

**ecotone** A transitional area between two ecosystems, as that between a forest and a grassland.

**ecotype** A group of organisms within a species that has adapted genetically to its particular environmental conditions. It can still reproduce with other members of its species from other areas that have not undergone these changes.

**ectendomycorrhiza, pl. ectendomycorrhizae, ectendomycorrhizas**

A mutually beneficial symbiosis formed between Deuteromycota fungi and the roots of some conifers. Ectendomycorrhiza has characteristics of both ectomycorrhiza (that has a mantle of hyphae, around the outside surface of the root, ramifying through the intercellular spaces in the root cortex) and endomycorrhiza (that has hyphae penetrating the cells and forming pelotons).  
*see also* **mycorrhiza**



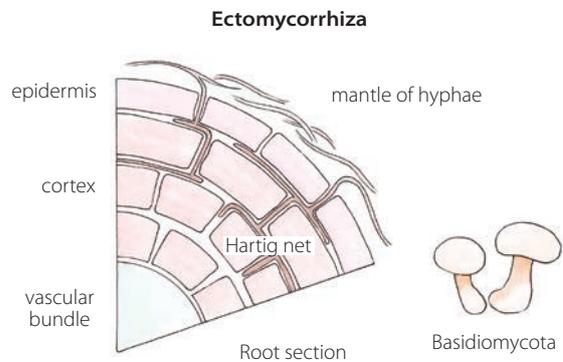
**ectexine, etkexine** The outer of two layers of the exine in the wall of a pollen grain, usually consisting of the tectum, infratectum and the foot layer.  
*see* **pollen wall**

**ecto-, ekto-** A prefix meaning outer.  
*cf.* **endo-**

**ectoaperture** An aperture present in one layer of the wall of a pollen grain. A simple aperture.

**ectocarp** Another term for epicarp and exocarp.

**ectomycorrhiza, pl. ectomycorrhizae, ectomycorrhizas** A mutually beneficial symbiosis formed between Basidiomycota fungi and the roots of the majority of forest trees. A network of hyphae forms a sheath (a mantle) around the outside surface of a root and penetrates the cells of the root cortex by ramifying through the intercellular spaces, forming a Hartig net, rather than extending into the cells themselves. The sheath of hyphae also extends into the surrounding soil.  
 = **ectotrophic mycorrhiza**  
*see* **Hartig net, mycorrhiza**  
*cf.* **ectendomycorrhiza, endomycorrhiza,**



**ectophyte** A parasitic plant that lives on the surface of its host.

**ectophytic** Relating to ectophytes.  
*cf.* **endophyte**

**ectotrophic** Obtaining nourishment from outside.  
*see* **trophic**  
*cf.* **endotrophic**

**ectotrophic mycorrhiza**  
 = **ectomycorrhiza**

**edaphic** Relating to the soil.

**edentate** Without teeth.  
cf. **dentate**

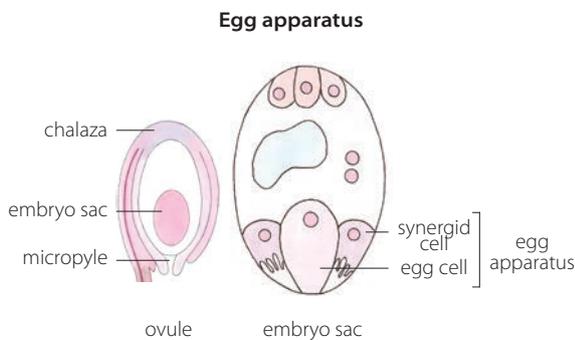
**effectively published** Published in accordance with the International Code of Nomenclature.  
= **validly published**

**efflorescence** The time or act of flowering.

**egg** The female reproductive cell of plants and animals.  
= **egg cell, megagamete, ovum**

**egg apparatus**

In angiosperms, the egg cell plus the two synergid cells at the micropylar end of the embryo sac.

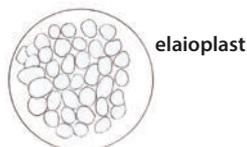


**egg cell** The female sex cell that unites, at fertilisation, with a male sperm cell to form a zygote.  
= **megagamete, ovum**  
see **megagamophyte**  
see also **egg, egg apparatus, embryo sac, oosphere**  
cf. **sperm cell**

**eglandular** Without glands.

**elaiophore** Floral glands that secrete oils as a reward for pollinators, as found in some monocot families like Orchidaceae, Iridaceae and some eudicot families like Curcubitaceae, Plantaginaceae and Primulaceae.

**elaioplast** A leucoplast that stores lipids as rounded oil droplets.



**elaiosome** A fleshy lipid and protein-rich

food body on some seeds that attracts ants. It is eaten by the ant and the seed is discarded and dispersed underground in the ant's nest.



**elaminate** Without a blade, as a sheath that lacks a blade in some sedges.  
see **aphyllopodic**  
cf. **laminated**



**elater** One of the spiral cells among the spores in the capsule of a liverwort. A slender appendage attached to the spores of horsetails. Both change shape in response to moisture and are involved in the ejection of spores from the capsule.

**eligulate** Without ligules.

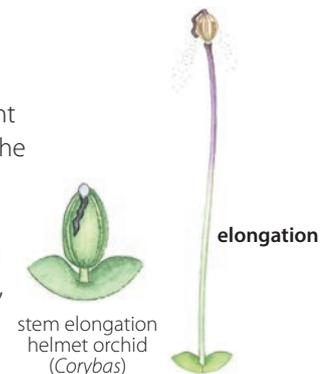
**ellipsoid** A three-dimensional shape, oval in outline and widest at the middle, with equally rounded ends, and elliptical in all sections through the long axis.  
cf. **elliptic**

**elliptic** A two-dimensional shape, oval in outline and widest at the middle, with equally rounded ends.  
= **oval**  
cf. **ellipsoid**

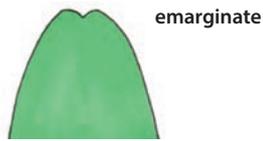


**elongate** Lengthened, as if stretched or extended. To lengthen. Of a plant part that is longer than wide, as grass leaves.

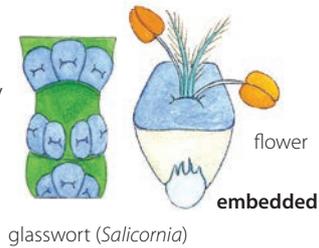
**elongation** The process whereby a plant part is lengthened, as the internodes in a grass stem or the elongation of a fruiting stem for seed dispersal, as *Corybas*.  
see also **gibberellins, jointing**



**emarginate** Having a distinct, broad, shallow notch at the apex, as with some leaves and petals.



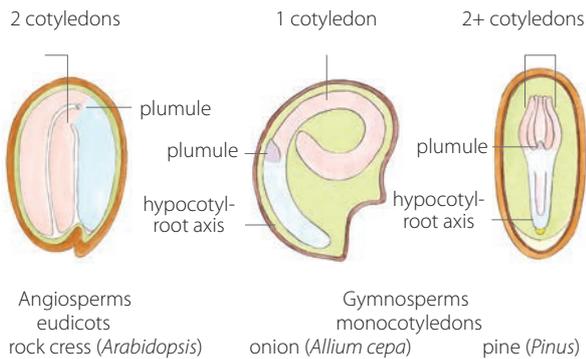
**embedded** Enclosed or fixed firmly in a surrounding mass, as the flowers of glassworts (*Salicornia*).



**embryo** The rudimentary plant within the seed before germination. It consists of a plumule, a hypocotyl-root axis and one, two or more cotyledons.

**embryonic** In an early stage of development. see **embryogenesis**

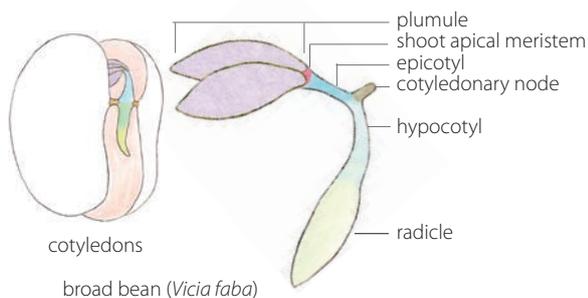
**Embryo**



**embryo axis, embryonic axis**

The plumule, epicotyl, hypocotyl and radicle together form the embryo axis. It is attached to the cotyledon at the cotyledonary node. It represents the axis of the future plant. = **tigellum**

**Embryo axis**



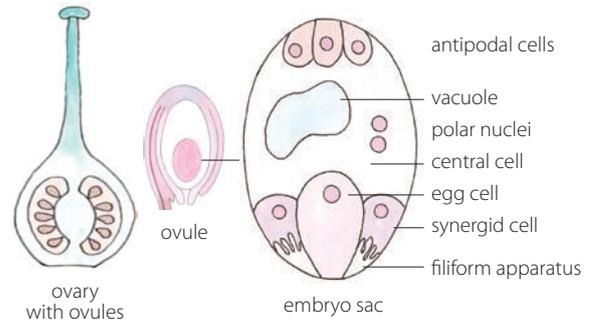
**embryo sac**

Of angiosperms, the female gametophyte that develops within each ovule of the ovaries. It commonly consists of seven cells, three antipodal cells, two synergid cells, one egg cell and one central cell with two polar nuclei.

= **megagametophyte**

see also **egg apparatus**

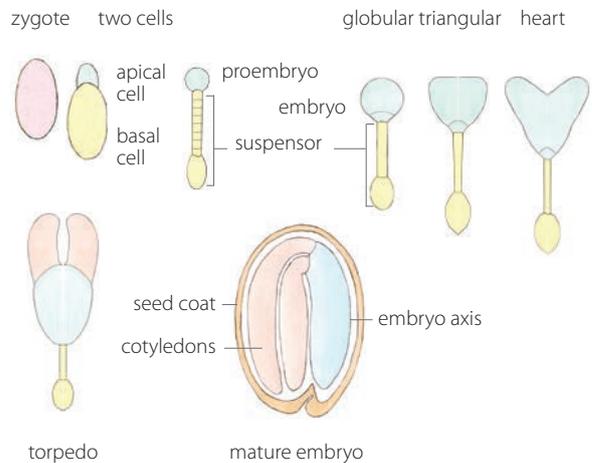
**Embryo sac**



**embryogenesis, embryogeny**

The process whereby the fertilised zygote undergoes a sequence of divisions to form an embryo.

**Embryogenesis**



**embryology** The study of embryo formation and development.

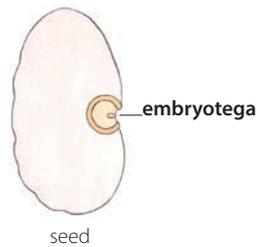
**embryony** Having or producing an embryo. see **monembryony, polyembryony**

**Embryophyta** A subkingdom of plants that develop embryos in specialised reproductive tissue and have a life cycle with alternating diploid and haploid generations.

Includes bryophytes, ferns, gymnosperms and angiosperms.

**embryophyte** Any member of the subkingdom Embryophyta.

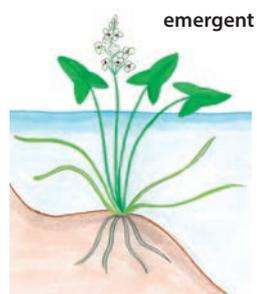
**embryotega** Of some seeds, a cap-like covering over the micropyle that, at germination, lifts like an operculum and allows the radicle to emerge, as the spiderwort family (Commelinaceae).



**emend., emendavit** In nomenclature, a correction or amendment to the description of a taxon followed by the name of the person who made the change.

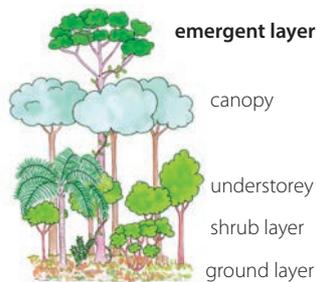
**emendavit, abbr. emend.** In nomenclature, a correction or amendment to the description of a taxon followed by the name of the person who made the change.

**emergent** Of an aquatic plant rooted in the soil below the water but with the stem and leaves rising out of the water, as arrowheads (*Sagittaria sagittifolia*).  
= **emersed**  
cf. **submerged**



**emergent layer**

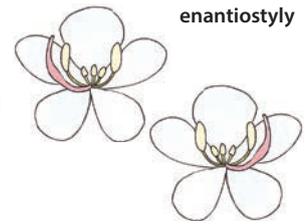
The storey in a rainforest that extends above the canopy and is composed of very tall trees and may include woody climbers and epiphytes.



**emersed** Of an aquatic plant rooted in the soil below the water but with the stem and leaves rising out of the water.  
= **emergent**

**enantiostyly**

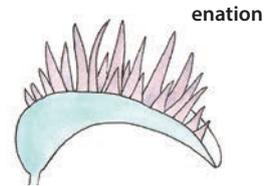
Deflection of the style to either the left side or to the right side of the floral axis, as the *Cassia* genus.



**enantiostylous**

Exhibiting enantiostyly.

**enation** An outgrowth from the surface of a plant part, as on the leaf of some members of the succulent genus *Eriospermum*.



**endangered** According to the IUCN, a conservation status covering species that are considered to be facing a high risk of extinction in the near future.

**endarch** Describes radial differentiation of xylem according to the relative position of protoxylem and metaxylem, in which protoxylem is positioned closest to the inside of the stem and metaxylem is positioned closest to the outside of the stem. Found in the more specialised stems and leaves of seed plants.

cf. **exarch, mesarch**

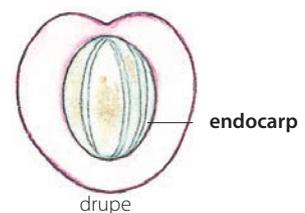
**endemic** Native to a particular geographical region and not found elsewhere.

**endexine** The inner of the two layers of the exine in the wall of pollen grain.  
see **pollen wall**

**endo-** A prefix meaning inner.  
cf. **ecto-, ekto-**

**endoaperture** An aperture formed in more than one layer of the pollen wall. A compound or composite aperture.

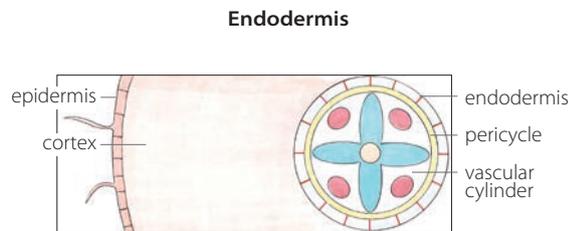
**endocarp** The innermost layer of the fruit wall that may be tough or hard. It surrounds the seed, as that of a stone fruit.  
see **pericarp**



**endodermis** In roots and some herbaceous stems, a single layer of living cells around the vascular cylinder that, together with the pericycle, separates it from the cortex.

Each cell has a waxy Casparian strip that regulates water flow from the cortex into and out of the vascular cylinder.

see also **exodermis**



**endogenous growth** Growing from or originating from within. Developing from inner tissue, as lateral roots that originate from the pericycle deep inside the root.

cf. **exogenous growth**

**endomitosis** Chromosomes that duplicate but fail to separate, resulting in the doubling of the chromosomes in the nucleus.

see also **polyploidy**

**endomycorrhiza, pl. endomycorrhizae, endomycorrhizas**

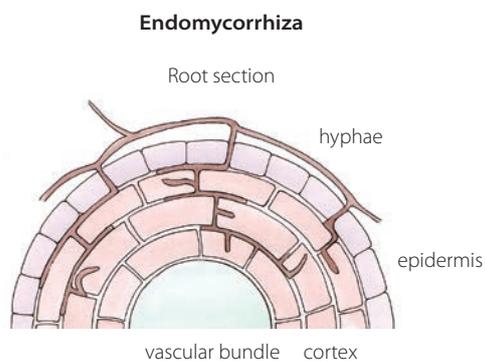
The most common mutually beneficial symbiosis formed between a fungus and the roots of plant. A network of hyphae with growth on the outside of the root limited and hyphae penetrating into the cells of the root cortex.

Examples include arbuscular mycorrhiza, ericoid mycorrhiza and orchidaceous mycorrhiza.

= **endotrophic mycorrhiza**

see **mycorrhiza**

cf. **ectendomycorrhiza, ectomycorrhiza**



**endophyte** An organism, often a fungus or bacterium, that lives inside a plant, usually without causing harm.

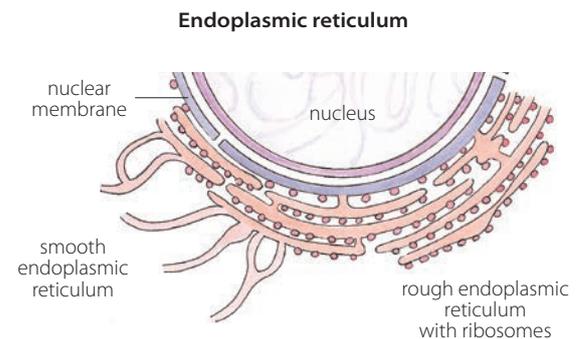
**endophytic** Relating to endophytes; infiltrating or invasive.

cf. **ectophyte**

**endoplasmic reticulum**

A cell organelle that is a network of flattened sacs and narrow tubes attached to the nuclear membrane.

It is composed of the smooth endoplasmic reticulum and the rough endoplasmic reticulum.



**endosperm**

Nutritive tissue in a seed that is not part of the embryo and is usually mostly starch with some lipids and proteins like albumin.

In angiosperms the tissue is derived from one male gamete and two female polar nuclei and is triploid.

In gymnosperms the tissue is derived from the female gametophyte and is haploid.

In gymnosperms and most monocots the endosperm persists and is the main source of food in the mature seed.

In most eudicots the endosperm is absorbed by the developing embryo and food is subsequently stored in the cotyledons that are produced by the embryo.

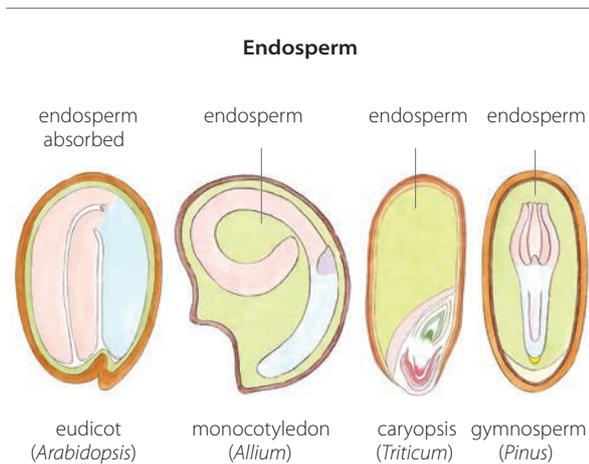
Orchids (Orchidaceae) lack a food supply in the seed and rely on a relationship with fungi to provide nourishment during germination.

Endosperm types include mealy, as wheat, oily, as poppies, bony, as some palms, and liquid, as coconuts.

see **albuminous seed, endospermic seed, exalbuminous seed, non-endospermic seed**

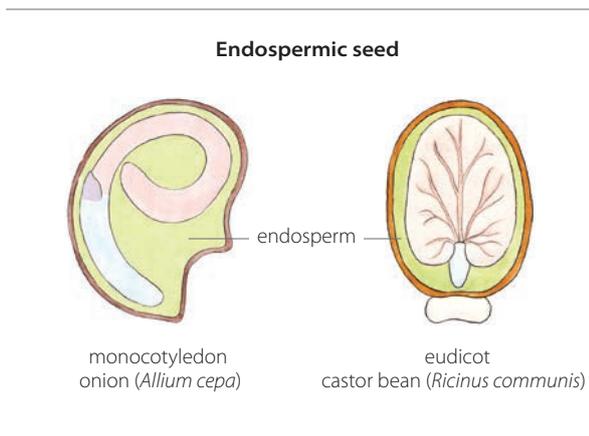
see also **cotyledon, perisperm**

**endospermic** Of or relating to the endosperm. having endosperm, as endospermic seed.



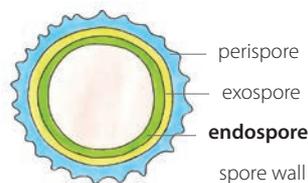
**endospermic seed**

One having endosperm persisting in the mature seed as the main source of nourishment for the embryo, as most monocotyledons. Some eudicots, as castor bean (*Ricinus communis*), have endosperm and are albuminous. All gymnosperm seeds are albuminous.  
= **albuminous seed**  
cf. **non-endospermic seed**



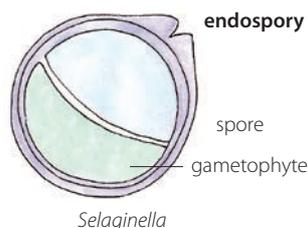
**endospore**

The innermost layer of a spore wall.  
see **sporoderm**  
cf. **intine**



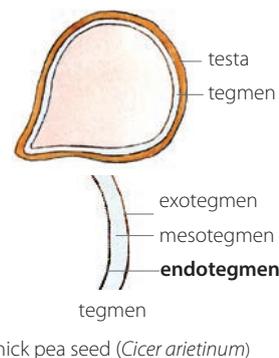
**endospory**

Development of a gametophyte (protonema) within a spore, as in some liverworts and the spike moss genus *Selaginella*.



**endotegmen**

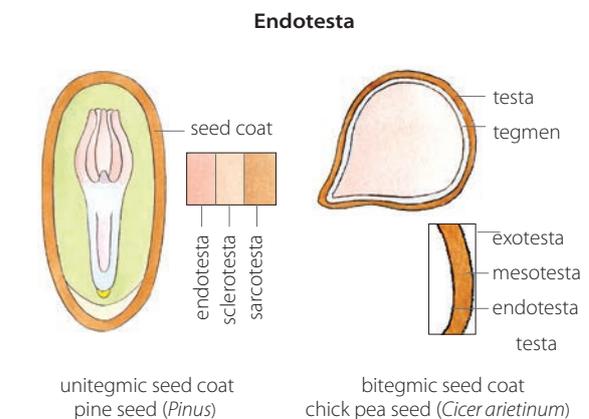
Of the bitegmic seed coat of angiosperms, the inner epidermis of the inner integument (tegmen).  
cf. **exotegmen, mesotegmen**  
see also **endotesta, exotesta, mesotesta**



**endotegmic seed** Of angiosperms, having the mechanical layer in the endotegmen.  
see **tegmic seed**

**endotesta, pl. endotestae**

Of the unitegmic seed coat of gymnosperms, the innermost parenchymatous layer, the other two layers being the outer sarcotesta and the middle sclerotesta, as pine (*Pinus*).  
Of the bitegmic seed coat of angiosperms, the inner epidermis of the outer integument (testa).  
cf. **exotesta, mesotesta**  
see also **endotegmen, exotegmen, mesotegmen**  
**endotestal** Of, relating to or having an endotesta.



**endotestal seed** Of angiosperms, having the mechanical layer in the endotesta.  
see **testal seed**

**endothecium** Of angiosperms, a fibrous layer of the wall of an immature pollen sac (microsporangium), situated next to the epidermis, with weak areas that are linked to anther dehiscence.  
see **microsporangial wall**

**endotrophic** Obtaining nourishment from within.  
*see* **trophic**  
*cf.* **ectotrophic**

**endotrophic mycorrhiza**  
 = **endomycorrhiza**

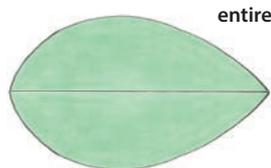
**endozoochory** Dispersal of seeds and fruit by passing unharmed through the digestive system of an animal.

**endozoochorous** Of or relating to endozoochory.

**ensiform** Shaped like the blade of a sword. Long and narrow with a sharp tip.  
 = **gladiate**



**entire** Having a smooth margin that is not toothed, lobed or divided, as the margins of some leaves and petals.



**entity** Something that exists as a discrete unit. It may be abstract, as a taxon in phylogenetic classification, or real, as a genome.

**entomochory** Dispersal of pollen, spores, seeds or fruit by insects.

**entomochorous** Of or relating to entomochory.

**entomogamy** Adapted to attract insect pollinators, pollination by insects.

**entomogamous** Of or relating to entomogamy.

**entomophile** A plant that is pollinated by insects.

**entomophily** Pollination by insects.

**entomophilous** Pollinated by insects.

**enzyme** A substance in living organisms that regulates the rate at which chemical reactions proceed, without itself being altered.

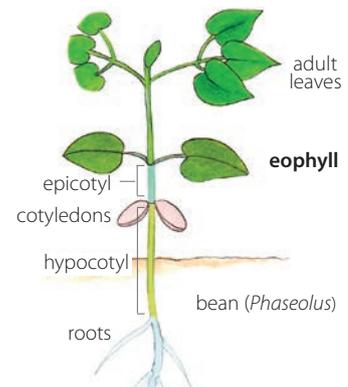
*see also* **catalyst**

*see* **amylase, diastase**

**eophyll** The first photosynthetic leaves of the seedling above the

the cotyledons. They are transitional leaves that are usually simpler in shape and smaller in size than adult leaves.

*see also* **plumular leaves**

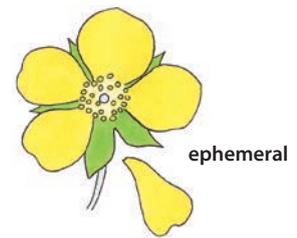


**epaleate** Lacking a palea or paleae.

**epedicellate** Lacking a pedicel.

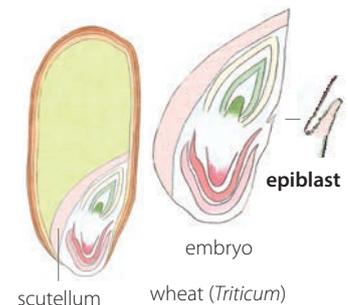
**ephemeral** Very short-lived. Lasting for a very short time, as the petals of guinea flowers (*Hibbertia*).

*cf.* **fugaceous, evanescent**



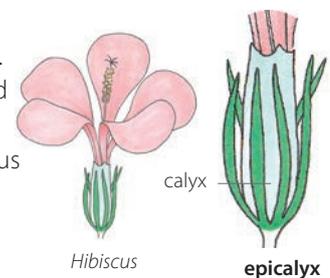
**epi-** A prefix meaning upon, over or outer.

**epiblast** Of a caryopsis, a scale-like appendage opposite the scutellum in the embryo of the seed, as wheat and rice. Some interpret it as a vestigial second cotyledon.



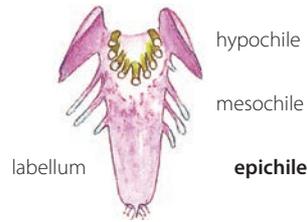
**epiblem, epiblema** The epidermis of the root. It is of different origin to the epidermis of shoots but is continuous with it.  
 = **rhizodermis**

**epicalyx** A small cup. A whorl of free or fused bracts that looks like a second calyx, as hibiscus (*Hibiscus*).  
 = **calicle, calycle, calyculus**



**epicarp** Another term for ectocarp and exocarp.  
*see* **exocarp**

**epichile** Of orchids, the apical portion of the labellum, as pink fairies (*Caladenia latifolia*).



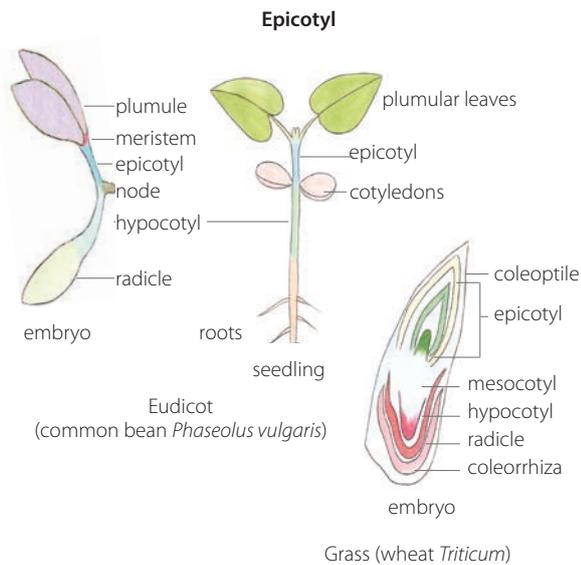
**epicormic** Of growth from a dormant bud on the trunk or limb of some trees. Usually triggered after injury, as fire or coppicing but also by stress or decline.



**epicortical** On top of the bark, as some mistletoes that produce epicortical runners that grow in a vine-like manner along the outside of the host branch.



**epicotyl** In grasses (Poaceae), that part of the embryo axis above the mesocotyl that is enclosed in the protective sheathing coleoptile. Of a seed, in eudicots and most monocotyledons, the part of the embryo axis that is above the cotyledonary node and below the plumule, with the apical meristem at its tip. Of a seedling, the part of the axis above the cotyledon(s) and below the plumular leaves.  
cf. **hypocotyl, hypocotyl-root axis, mesocotyl**



**epidermis** The outermost protective layer of cells on the surface of young shoots, roots and other organs of a plant.

It is a primary tissue derived from the protoderm in the apical meristem and is replaced by periderm in woody plants.

see **cuticle**  
see also **epiblem**

**epigeal, epigeous** On or out of the ground.  
see **hypogeal**

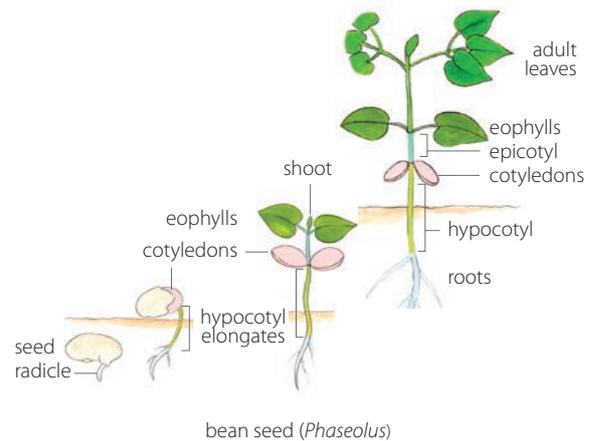
**epigeal germination, epigeous germination**

Of seed germination, the radicle elongates and penetrates the soil and the elongating hypocotyl pushes the cotyledons out of the ground.

Common in eudicots.

cf. **hypogeal germination, viviparous germination**

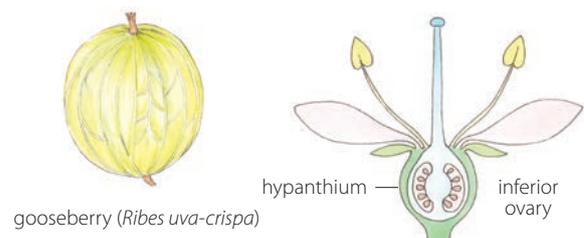
#### Epigeal germination



**epigenous** Growing on the surface of an organ, as fungus on a leaf.

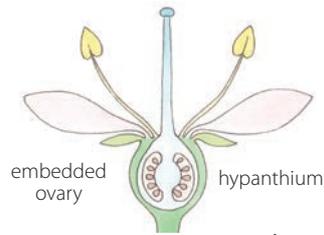
**epigynous berry** Sometimes used to distinguish a berry-like fruit derived from an inferior ovary and the hypanthium, as gooseberry (*Ribes uva-crispa*).

#### Epigynous berry



**epigyny** Having the ovary embedded in a hypanthium.

The whorls of stamens, petals and sepals are borne above the ovary on the rim of the hypanthium.



epigyny

**epigynous** Above the ovary.

cf. **hypogynous**, **perigynous**

**epilith** Growing on the surface of rocks

**epilithic** Of or relating to an epilith.

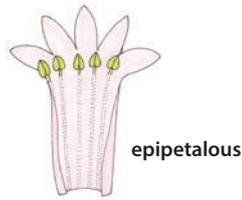
**epinasty** Increased growth along the upper surface of a plant part causing it to bend downward.

cf. **hyponasty**

**epinastic** Of or relating to epinasty.

**epipetalous** Inserted on the corolla, as the stamens of many species.

cf. **episepalous**, **epitepalous**



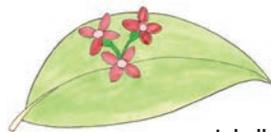
epipetalous

**epiphloedal** Growing on the bark of trees, as a lichen.

**epiphyllly** Having epiphytes on leaves.

**epiphyllous, epiphyllic**

Growing on a leaf, as the flowers of twisted stalk helwingia (*Helwingia*).



epiphyllly

**epiphyte** A plant that grows on another plant for support but not for nutrients, as a staghorn or an epiphytic orchid on a tree.

= **aerophyte, air plant**

cf. **hemiepiphyte, parasite, saprophyte**

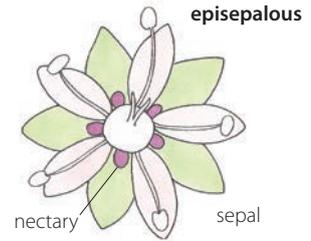
**epiphytic** Of or relating to an epiphyte.



epiphytic

**episepalous** Inserted on the sepals, as the nectaries of Burma lancewood (*Blackwellia tomentosa*).

cf. **epipetalous**, **epitepalous**



**epistase** In some plants, cells modified from the nucellar epidermis.

They have thick cutinised walls and are situated near the micropylar region of the ovule, as agave (*Agave*).

cf. **hypostase**

**epistasis** Having an allele of one gene masking or concealing the output of an allele of another gene.

cf. **dominant**

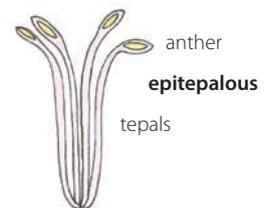
**epistomatous** Of leaves with stomata only on the upper surface.

= **hyperstomatous**

cf. **amphistomatous, hyperstomatous**

**epitepalous** Inserted on the tepals, as the anthers of banksia (*Banksia*).

cf. **epipetalous**, **episepalous**



**epithet** The word following the name of the genus and denoting a species, variety or other division, as *Geranium robertianum* and *Geranium sanguineum* var. *striata*.

**epitony** Development of lateral growth on the upper side of the main shoot.

cf. **amphitony, hypotony**



**epitropous** Of ovule orientation, with the micropyle proximal with reference to the funicle, as anatropous, campylotropous and amphitropous.

cf. **hypotropous, pleurotropous**

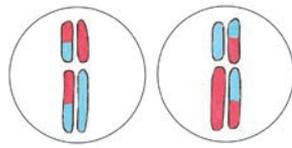
**epizoochory** Dispersal of seeds and fruit on the bodies of animals.

**epizoochorous** Of or relating to epizoochory.

**equational division**

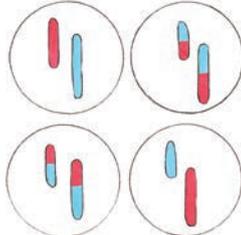
The second division in meiosis. The two haploid non-identical daughter cells divide again to produce four non-identical haploid cells. The chromosome number after division is equal to that in the two daughter cells.

see **meiosis**  
cf. **reduction division**



two haploid daughter cells

**equational division**

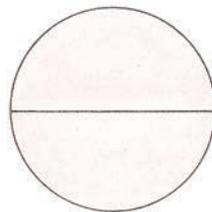


four haploid cells

**equator** A real or imaginary circle dividing a sphere or other surface into two usually equal parts.

cf. **axis**

**equatorial** On or relating to the equator.

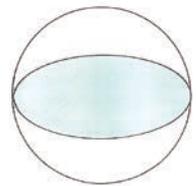


equator

**equatorial plane**

An imaginary flat surface dividing an object at the equator.

cf. **polar axis**

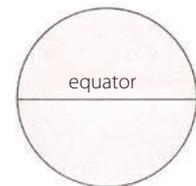


equatorial plane

**equatorial view**

An object as it appears when the equator is in the line of sight.

cf. **polar view**



equatorial view

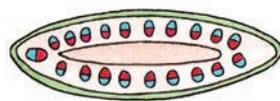
**equifacial**

With two similar sides having no evident distinction internally or externally between the upper and lower surfaces, as the leaves of an iris (*Iris*).

Typical of leaves that orient themselves parallel to the main axis, as most monocotyledons.

= **isobilateral**

cf. **bifacial, unifacial**

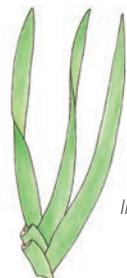


leaf cross-section



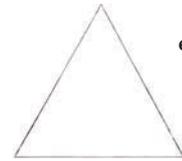
vascular bundle

**equifacial**



*Iris*

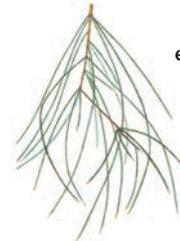
**equilateral** Having all sides equal, as an equilateral triangle.



equilateral triangle

**equinoctial** Of flowers that open and close regularly at specific times during the day, as some species of bindweed (*Convolvulus*).

**equisetoid** Drooping in habit like the horsetail genus (*Equisetum*), as members of the sheoak family (Casuarinaceae).



equisetoid

sheoak

**equitant** Of leaves, folded lengthwise and cohering except at the base. The outermost leaf encloses the next to form two ranks, as the iris genus (*Iris*).

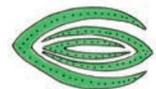
**equitant vernation**

Of young leaves in the unopened leaf bud with the margins folded to embrace both margins of another leaf.



leaves

equitant



vernation

**erect** Of a plant habit or plant part, upright, as the vertical trunk of a tree.



erect

**ergastic substances** Non-living substances in the protoplasm of a cell that are the product of various metabolic reactions.

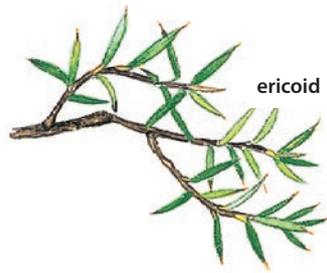
Reserve materials of food synthesised by the cell, as carbohydrates stored in amyloplasts, proteins stored in proteinoplasts and fats stored in elaioplasts. Secretory materials, as enzymes, nectar and chlorophyll, that are stored in cell protoplasm and are useful to the plant.

Excretory materials (waste products) stored in some cells of leaves fruit and bark, as latex and alkaloids.

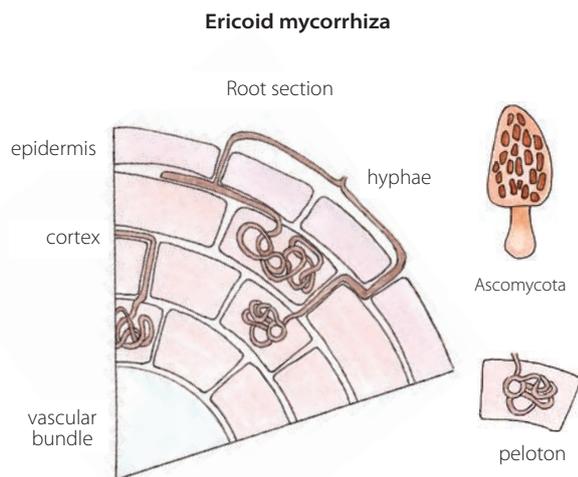
cf. **protoplasm**

**ericaceous** Belonging to or related to the heath family (Ericaceae).  
Also used to describe plants that like acid soil.  
*cf.* **ericoid**

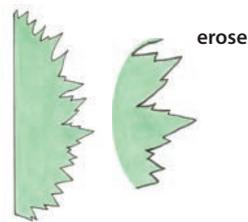
**ericoid**  
Of or resembling the genus *Erica*.  
Of leaves, small and tough like those of heather.  
*cf.* **ericaceous**



**ericoid mycorrhiza**  
A mutually beneficial symbiosis formed between Ascomycota fungi and the roots of plants mainly from the heath family (Ericaceae).  
One of the endomycorrhizas with hyphae that penetrate the cells of the root cortex and form pelotons.  
*see* **mycorrhiza**



**erose** Irregularly toothed. Of a margin that appears jagged or gnawed, as the margins of some leaves.  
= **irregularly dentate**

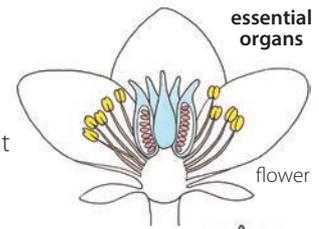


**erostrate** Lacking a beak.  
*cf.* **rostrate**

**escape, escapee** A garden or crop plant that has become naturalised and is often weedy and invasive.

**essential organs**

The pistil and stamens of a flower that are necessary for the production of seeds that reproduce the plant.



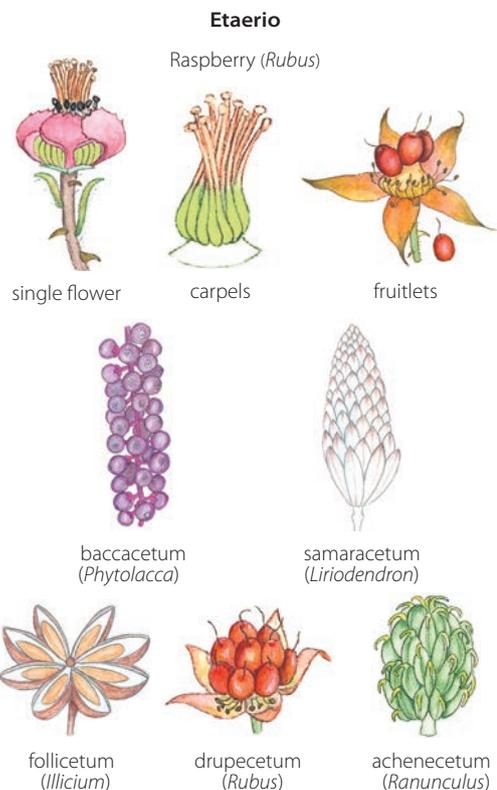
*cf.* **accessory organs**



**estipellate, exstipellate** Of leaflets that lack stipels at the base of the petiolules.  
*cf.* **exstipulate**

**estipulate, exstipulate** Of a leaf that lacks stipules at the base of the petiole.  
*cf.* **exstipellate**

**etaerio** Fruit formed from the unfused carpels of a single flower, with the carpels becoming fruitlets. A cluster of berries is a baccacium, of follicles a follicetum, of drupes a drupeacium, of achenes an achenecium and of samaras a samaracium.  
= **aggregate fruit**  
*see* **compound fruit**  
*see also* **apocarp**



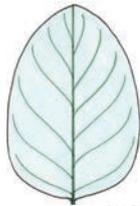
**ethylene** A plant hormone that influences other hormones in the transition from vegetative to reproductive stages and senescence. It plays a key role in fruit ripening.  
*see* **phytohormone**

**etiolated** Of a plant that is pale, weak and elongated due to a lack of light.  
*see also* **chlorosis**

**eu-** A prefix meaning true.

**eucamptodromous**

Of leaves with secondary veins upturned and becoming indistinct before reaching the margin.



**eucamptodromous**

**eudicot**

The largest divisions of flowering plants (75% of all angiosperms). Characterised by a seed with two cotyledons (seed leaves) in the embryo. Flower parts are often in multiples of four or five. Pollen has three furrows or pores. Leaves have reticulated veins. A stem in cross-section has vascular bundles in a ring. Typically the root is a taproot. There can be secondary, often woody, growth.  
*cf.* **dicotyledon, monocotyledon**

**euhydrophile** A plant requiring submergence in fresh water.

**euhydrophilous** Thriving submerged in fresh water.

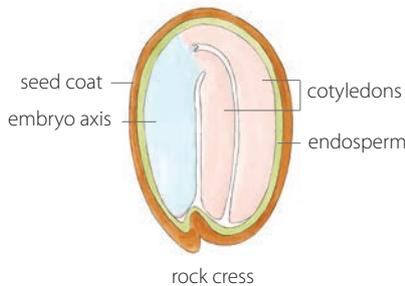
**euhydrophyte** A plant that is completely submerged (except for the inflorescence), or a plant that is anchored to the substratum with floating leaves or floating and submerged leaves, or is submerged and free-floating.

**eukaryote** An organism, other than cyanobacteria and bacteria, that has its DNA within a well-defined nucleus surrounded by a nuclear membrane as well as other organelles including mitochondria, Golgi apparatus and lysosomes.

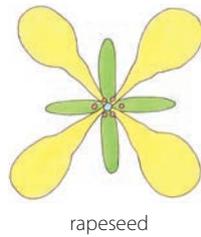
*cf.* **prokaryote**

**eukaryotic** Of a cell that has a clearly defined nucleus and organelles.

**Eudicots**



Seed with two seed leaves (cotyledons). Endosperm usually absorbed by developing seed.



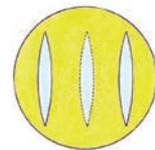
rapeseed



geranium

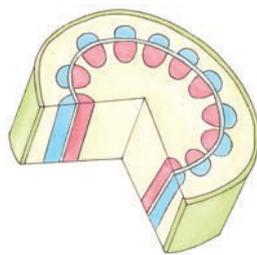


pea

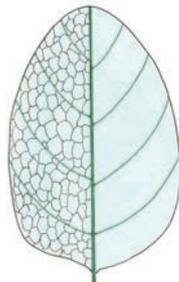


Pollen typically with three pores or furrows.

Flower parts usually in multiples of four or five. Sepals and petals usually distinct.



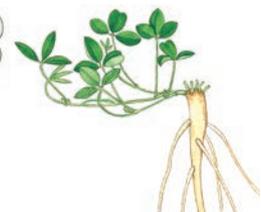
Herbaceous stem with vascular bundles in a ring.



Leaves with veins reticulated.



Herbaceous or woody plants.



Root system often a taproot.

**euphyllophytes** A group of plants within the vascular plants (tracheophytes) that includes seed-bearing plants (spermatophytes) and spore-bearing ferns (monilophytes). They possess true leaves (megaphylls), usually with many veins.

cf. **lycophytes**

**euryhaline** Of plants and animals able to tolerate a wide range of salinity.

**eurythermal** Tolerant of a wide range of temperatures.

**eusporangiate** Of spore-bearing vascular plants, that include some ferns, horsetails (*Equisetum*), whisk ferns (*Psilotum*), clubmosses (*Lycopodium*), spike mosses (*Selaginella*) and quillworts (*Isoetes*), that have sporangia arising from a group of epidermal cells.

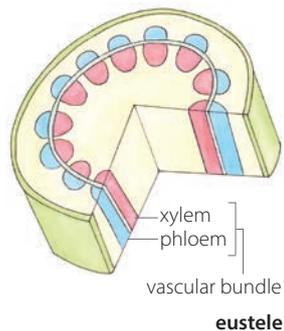
True ferns (leptosporangiate ferns) have sporangia that arise from a single epidermal cell.

see **fern**

**eustele** Stele with separated strands of vascular tissue. In cross-section they appear as a ring of discrete bundles with phloem to the outside and xylem to the inside.

Characteristic of eudicot stems.

cf. **atactostele**



**eutrophic** Of a body of water rich in nutrients, like nitrogen and phosphate, that support abundant plant life. As the plant life decays, it can deplete the oxygen supply that sustains other organisms.

see **algal bloom, trophic**

cf. **dystrophic, mesotrophic, oligotrophic**

**evanescent** Fleeting, remaining only a very short time.

cf. **fugaceous**

**evaporation** The transition from a liquid to a vapour (gas) at temperatures below boiling point. It occurs on the surface of the liquid, compared with boiling, in which vapour forms below the surface as bubbles.

see **vaporisation**

**even-pinnate**

Of a pinnate leaf with leaflets arranged in pairs and terminating with a pair of leaflets.

= **abruptly-pinnate, paripinnate**



**even-pinnate**

**evergreen** A plant that retains green leaves throughout the year.

cf. **deciduous**

**evolution** Changes in the genetic makeup of a population, species or lineage over time by which they are thought to have developed and diversified from earlier forms.

Natural selection, mutation, genetic drift and gene flow (gene migration) are the basic mechanisms of evolution.

see also **macroevolution, microevolution**

**ex-** A prefix meaning from, according to, without or former.

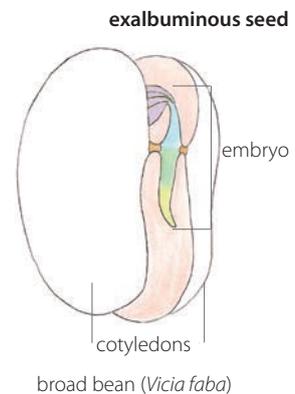
**exalbuminous seed**

One having endosperm absorbed by the growing embryo, with the embryo itself having cotyledons that store food for germination.

Found in most eudicots, as the bean family (Fabaceae).

= **non-endospermic seed**

cf. **albuminous seed**



**exarch** Describes radial differentiation of xylem in which protoxylem is positioned towards the outside of the stem and metaxylem towards the inside of the stem.

Found in some lower vascular land plants, as clubmosses (*Lycopodium*).

cf. **endarch, mesarch**

**exarillate** Of a seed that has no aril.

**excrescence** An outgrowth or protuberance that may be normal, as a nodule on the roots of legumes, or abnormal, as a gall.

**excretion**

The discharge of waste matter, such as carbon dioxide or salt, as some halophytic plants that excrete salt in droplets from their leaves.

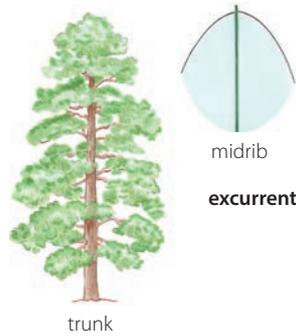
cf. **secretion**

**excretory** Relating to excretion.

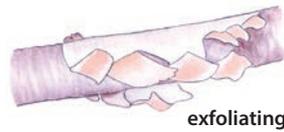


**excurrent** Having the axis prolonged to form an undivided main stem or trunk, as firs and spruces. Running through to the apex and beyond, as the midrib of certain leaves.

cf. **deliquescent**

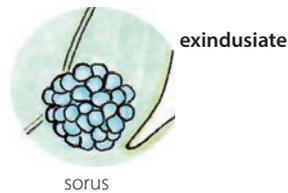


**exfoliating** Peeling off in layers or flakes, as the bark of paper birch (*Betula papyrifera*).



**exindusiate** Without an indusium, as the sorus of the polypody fern (*Polypodium*).

cf. **indusiate**



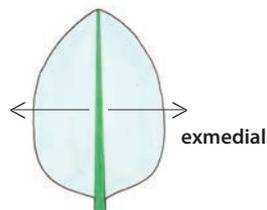
**exine** The outer layer of the pollen wall that is composed mainly of sporopollenin.

see **pollen wall**

**exmedial, exmedian**

Of venation, running away from the midline of the leaf lamina.

cf. **admedial**

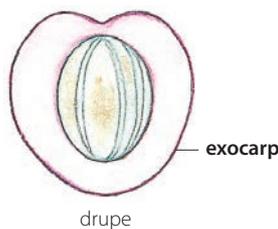


**exo-** A prefix meaning on the outside or external.

**exocarp** The outer layer of the fruit wall, as the soft skin of a stone fruit, or the leathery rind of an orange.

= **ectocarp, epicarp**

see **pericarp**



**exodermis** The outer layer of one or more cells with Casparian strips, that surrounds the cortex in some roots. It can supplement the function of the endodermis when plants are suffering a water deficit.

**exogenous growth** Growing from or originating from without.

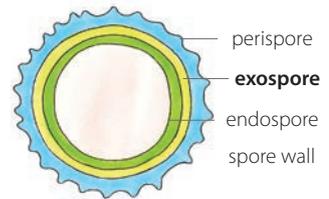
Developing from outer tissue, as root hairs that are outgrowths of epidermal cells.

cf. **endogenous growth**

**exospore** The layer between the outer perispore and the inner endospore of a spore wall.

see **sporoderm**

cf. **exine**



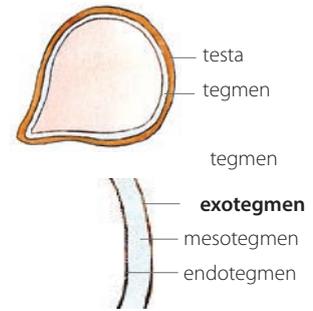
**exotegmen** Of the bitegmic seed coat of angiosperms, the outer epidermis of the inner integument (tegmen).

cf. **endotegmen,**

**mesotegmen**

see also **endotesta,**

**exotesta, mesotesta**



chick pea seed (*Cicer arietinum*)

**exotegmic seed** Of angiosperms, having the mechanical layer in the exotegmen.

see **tegmic seed**

**exotesta, pl. exotestae**

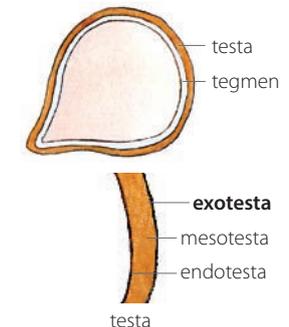
Of the bitegmic seed coat of angiosperms, the outer epidermis of the outer integument (testa).

cf. **endotesta, mesotesta**

see also **endotegmen,**

**exotegmen,**

**mesotegmen**



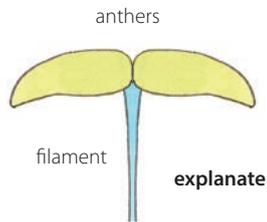
chick pea seed (*Cicer arietinum*)

**exotestal seed** Of angiosperms, having the mechanical layer in the exotesta.

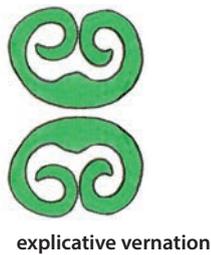
see **testal seed**

**exotic** Of plants in a region where they do not occur naturally.  
 Non-native species introduced from another place, often another country.  
 = **alien**

**explanate** Spread out and flattened. Of anthers spread at right angles to the filament, as some species of beardtongue (*Penstemon*).  
 cf. **transverse**  
 see **anther attachment**



**explicative vernation** Of pairs of leaves in bud that are flattened opposite each other but with the edges folded back or sometimes rolled, as some snowdrops (*Galanthus*).



**exserted** Projected beyond.  
 Protruding, as stamens extending beyond the corolla tube.  
 cf. **included**

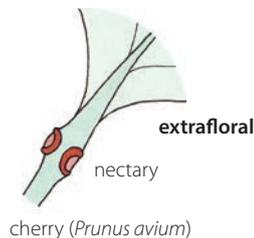


**extant** Still in existence.

**extinct** Of conservation status, said of a species that is extinct in the wild or no longer existing at all.

**extra-** A prefix meaning outside or beyond.

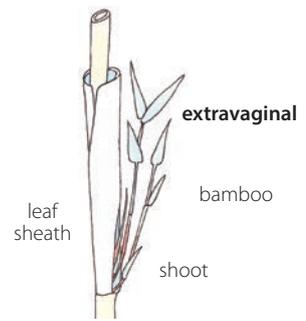
**extrafloral** Located other than in the flower, as the nectary of the cherry (*Prunus avium*) that is on the leaf petiole rather than in the flower.



**extrastaminal** Situated outside the whorl of stamens, as the glands on the male flower of spurge (*Phyllanthus*).

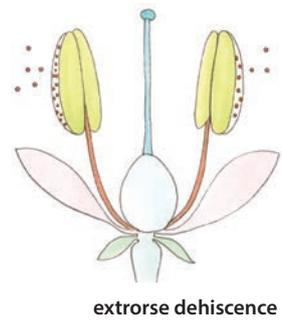


**extravaginal** Of branching, with the young shoot breaking through the base of the leaf sheath, as in some grasses (Poaceae).  
 cf. **infravaginal, intravaginal**



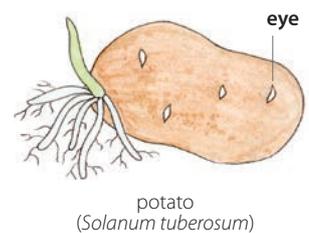
**extorse** Facing away from the axis.  
 = **posticous**  
 cf. **introrse, latorse**

**extorse dehiscence** Of anthers, facing outwards and opening longitudinally to release pollen away from the centre of the flower, as the dayflower family (Commelinaceae).  
 = **posticous dehiscence**  
 see also **anther dehiscence**



**exudate** A substance produced and discharged by a plant.  
 It may be through pores or through a wound, as resins, mucilage, gums and latex.  
 Roots exude chemicals into the rhizosphere.  
 Nectar is sometimes considered to be an exudate.

**eye** A small depression on a stem tuber.  
 Each represents a node bearing one or more buds, subtended by a scale leaf, from which a new plant can grow, as potatoes (*Solanum tuberosum*).  
 see **perennating bud, tuber**  
 cf. **slip**



**f.** An abbreviation for form or forma.

**F1 generation** The first filial generation. the hybrid offspring of a cross between two true breeding individuals.  
 see **F2 generation, P generation**

**F2 generation** The second filial generation. the result of a cross, either by self-pollination or cross-pollination, between two F1 hybrids.  
see **F1 generation, P generation**

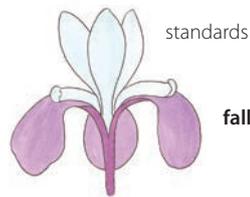
**facultative** Optional, as an orchid flower that can cross-pollinate or self-pollinate according to environmental conditions.  
cf. **obligate**

**facultative apomict** A plant that can reproduce either asexually (apomixis) or sexually.

**falcate, falciform**  
Curved like the blade of a sickle.

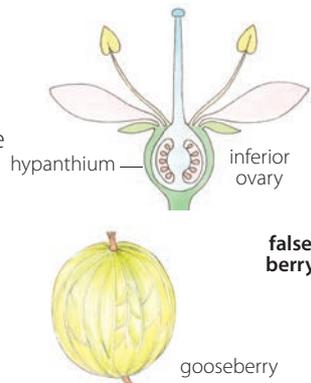


**fall** The spreading or drooping sepals of the flower of an iris (*Iris*) as distinct from the three more or less upright petals or standards.



**false aril** An arillode.

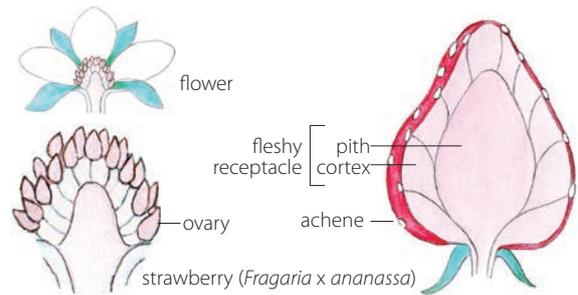
**false berry** A loosely applied term referring to a pulpy indehiscent accessory fruit with one to many seeds. Derived from an inferior ovary and the hypanthium, as gooseberry (*Ribes uva-crispa*).  
see **accessory fruit**



**false fruit**

A fruit derived from a simple ovary or compound ovary and some additional non-ovarian tissue like the receptacle.  
A strawberry has the true fruits (achenes derived from the ovaries) embedded in the fleshy receptacle.  
Other accessory fruits include hips, pomes and pineapples.  
= **accessory fruit, pseudocarp**  
cf. **true fruit**

**False fruit**



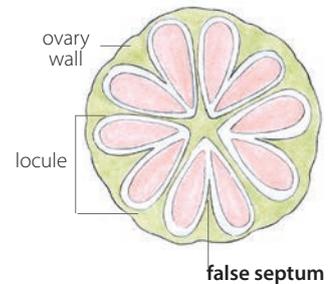
**false indusium**

A protective covering over the sporangia formed by the reflexed margin of a fern frond, as brake ferns (*Pteris*).

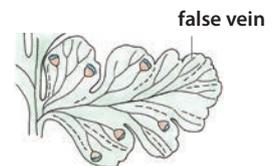


**false septum**

A projection from the ovary wall into the locules forming a partition, as flax (*Linum*) that has five locules that are further divided by five false septa.  
see also **replum**

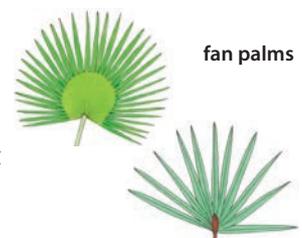


**false vein** Of fern fronds, a vein-like strand with no vascular bundle.  
= **pseudovein**



**family** In taxonomic classification, a rank below order and above genus. Names of orders end in *-acae*, as *Ochidaceae* (orchids).  
see **taxonomic hierarchy**

**fan palms** Palms with palmate or costapalmate leaves divided shallowly or deeply into a variable number of segments that often split at the tips.  
cf. **feather palms**



**farina** A powdery flour-like covering, as found on the stems and leaves of some plants.

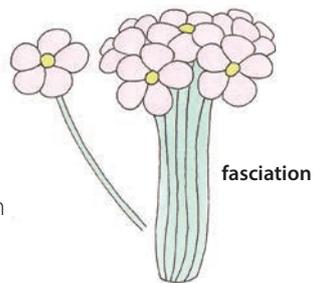
**farinaceous** Resembling flour.

Having a mealy texture or appearance.

Containing starch, as some seeds.

**farinose** Covered with a mealy powder-like flour, as the lower leaf surface of some goosefoots (*Chenopodium*).

**fasciation** The abnormally broad and flattened growth of a stem or stems so that it resembles several stems fused together side by side, as occurs in dandelion (*Taraxacum*).

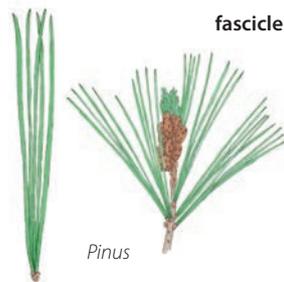


**fasciated** Showing abnormally flattened fusion of parts or organs.

**fascicle** A tight bundle. The elements are almost always independent, but appear to arise from the same point.

**fascicled, fasciculate**

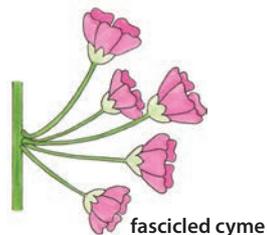
Arranged in bundles, as needles of the pine genus (*Pinus*).



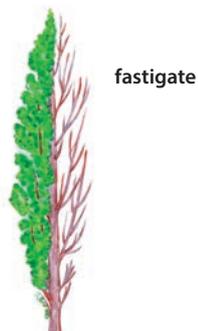
**fascicled cyme**

A cymose inflorescence composed of a small bundle of pedicellate flowers arising from more or less the same point, as toro (*Myrsine salicina*).

cf. **glomerule, verticillaster**



**fastigate** Of a tree or shrub having a very narrow canopy, with the branches about the same length and more or less parallel to the main stem, as Lombardy poplar (*Populus nigra* var. *italica*).

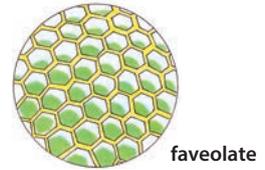


**faucal** Relating to the throat.

**fauna** All of the animal life occurring in a particular area or geological period.

cf. **flora**

**faveolate, favose** With cavities like honeycomb, honeycombed. Pitted, alveolate.



**feather palms**

Palms with pinnate or, rarely, bipinnate leaves, consisting of a series of individual leaflets along an extension of the petiole called the rachis.

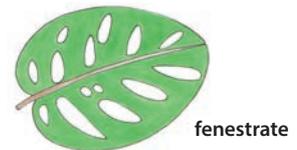
cf. **fan palms**



**felted** Intertwined, matted and compressed together, as some hairs.

**female flower** A flower with functional carpels but no functional stamens.

**fenestrate** Having openings or translucent areas like windows, as a fenestrate leaf.



**fern** see page 107

**fern allies** see page 108

**ferruginous, ferruginous** Rust-coloured, reddish-brown.

Of, relating to or containing iron, as some soils.

**fertile** Able to reproduce sexually.

Of flowers with viable pollen and ovules.

Producing viable seeds and fruit.

Of shoots, branches, bracts etc. that bear flowers.

cf. **infertile, sterile**

**fertile bract** A bract that bears a flower.

cf. **sterile bract**



**fertilisation** The union of gametes, a male sperm cell and a female egg cell, to form a zygote.

see **angiosperms, ferns, gymnosperms, hornworts, liverworts, mosses**

see also **double ~, simple ~**

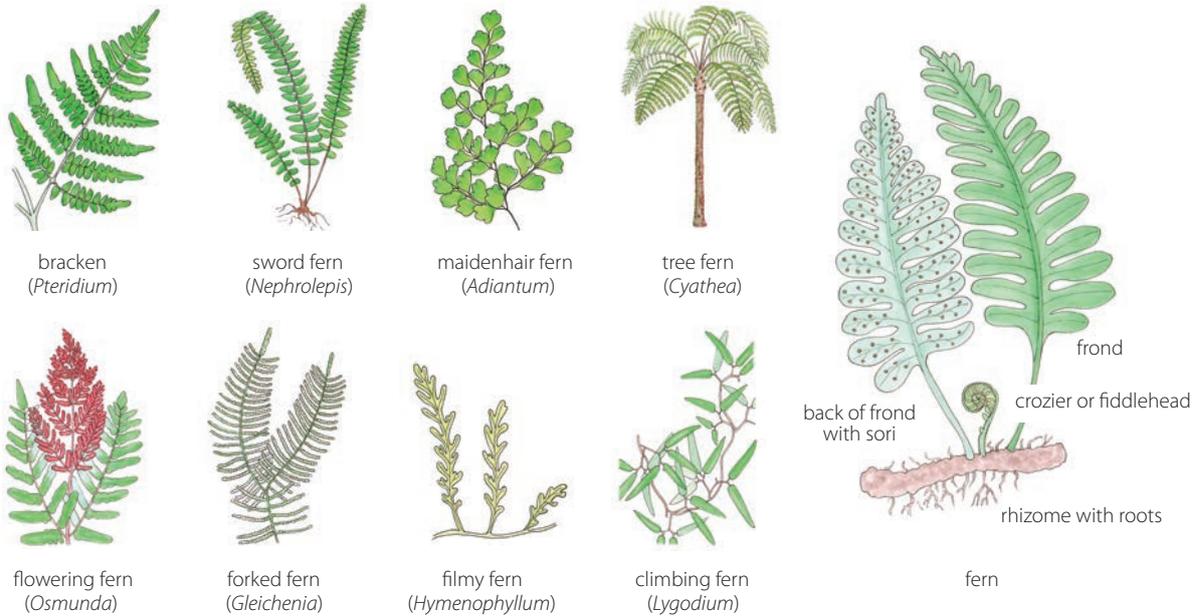
**fern** A vascular plant that reproduces by spores and has true leaves (fronds) usually arising from an underground rhizome, sometimes a stolon, or borne on an erect trunk (tree ferns).

Examples of true ferns from some of the main groups include: bracken (*Pteridium*), sword fern (*Nephrolepis*), maidenhair fern (*Adiantum*), tree fern (*Cyathea*), flowering fern (*Osmundia*), forked fern (*Gleichenia*), filmy fern (*Hymenophyllum*) and climbing fern (*Lygodium*).

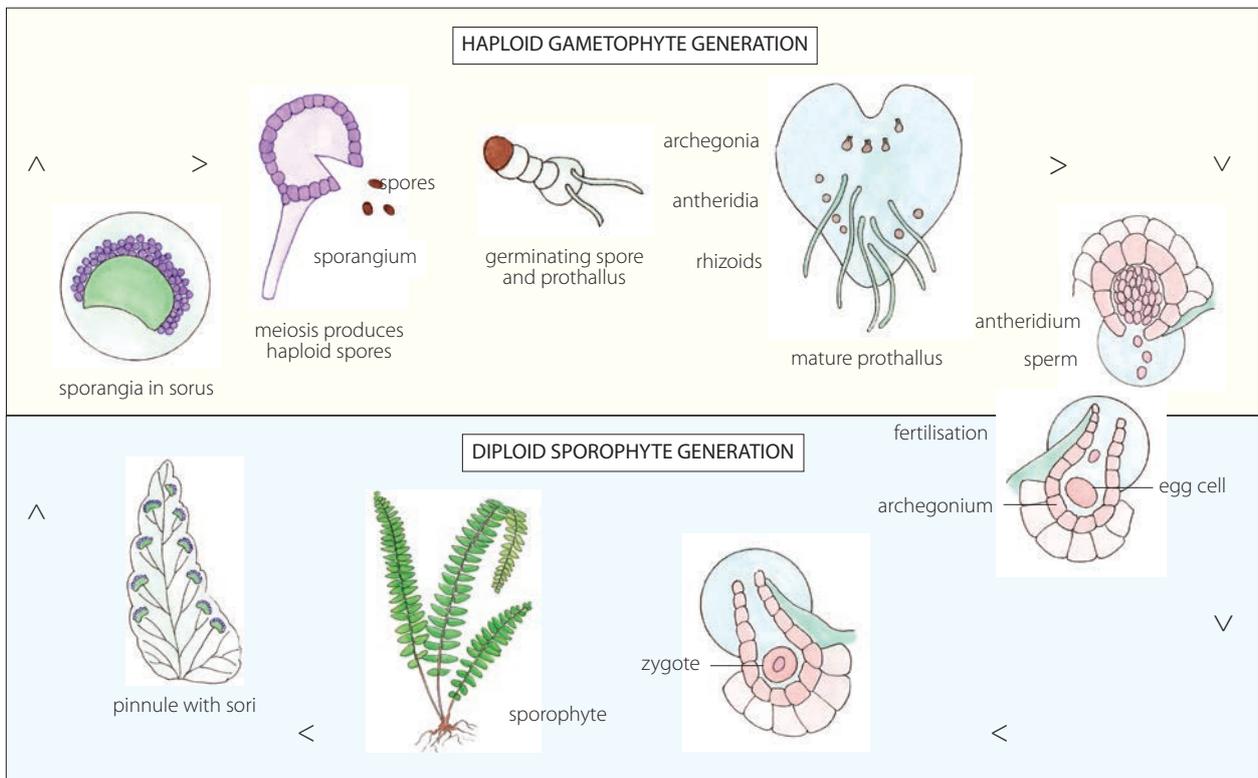
see also **leptosporangiate**

cf. **fern allies**

**Fern**

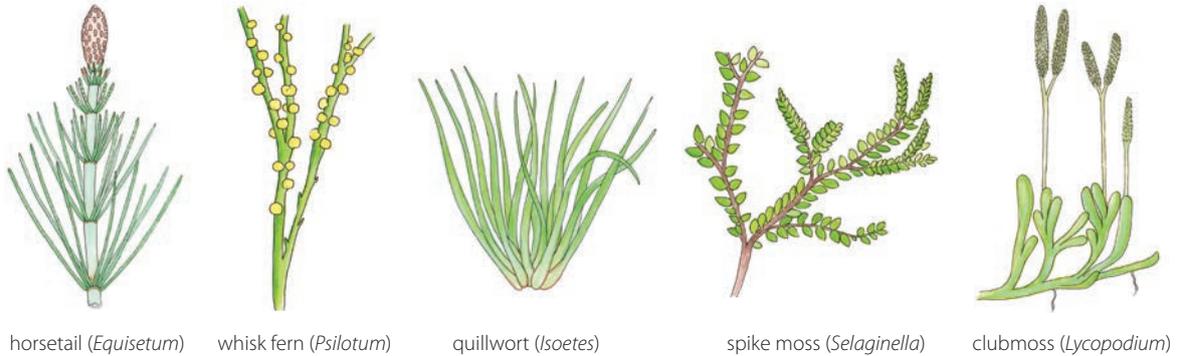


**ALTERNATION OF GENERATIONS**



**fern allies** Not a natural grouping but generally refers to vascular spore-bearing plants thought to be closely related to ferns. Includes horsetails (*Equisetum*), whisk ferns (*Psilotum*), quillworts (*Isoetes*), spike mosses (*Selaginella*) and clubmosses (*Lycopodium*).

**Fern allies**

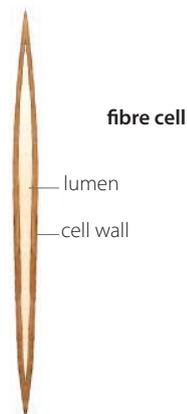


**festucoid** Resembling the perennial tufted grass fescu (*Festuca*).

**fetid, foetid** With an offensive stinking odour, as of decay.

**fibre** A long strand of thread-like material, as one of the fibres on a cotton seed. It may be hard or soft.  
**fibrose, fibrous** Thread-like. Having, consisting of or resembling fibres.

**fibre cell** An elongated cell with tapered ends and thick lignified cell walls enclosing a lumen. Fibre cells are dead at maturity and function as support tissue. Together with sclereids, they form sclerenchyma that is associated with phloem and more commonly with xylem.

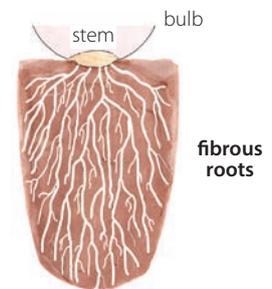


**fibril** A small fibre, a delicate thread-like filament or hair, as the hairs on the rootlets of some plants.  
**fibrillar, fibrillate, fibrillose** Bearing fine fibres or slender strands that are parallel to each other and not matted. Finely striated.

**fibrillous** Composed of small fibres.

**fibrous roots**

Of monocotyledons and some eudicots, a mass of adventitious roots of similar size that sprout from nodes on an underground stem, as at the base of some bulbs. Typical of most grasses.  
 cf. **taproot**

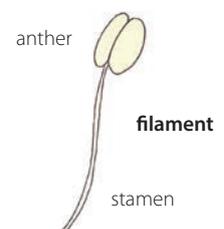


**-fid** A suffix meaning split or divided into parts.

**fiddlehead** The coiled tip of a young fern frond.  
 = **crossier**

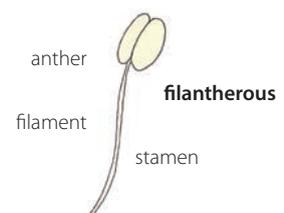


**filament** A slender, thread-like structure. Of a stamen, the stalk, not necessarily slender or thread-like, bearing the anther.

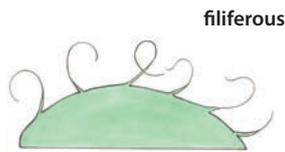


**filamentous** Bearing or resembling a filament.

**filantherous** Of a typical stamen with a distinct anther and a filament.  
 cf. **laminar**



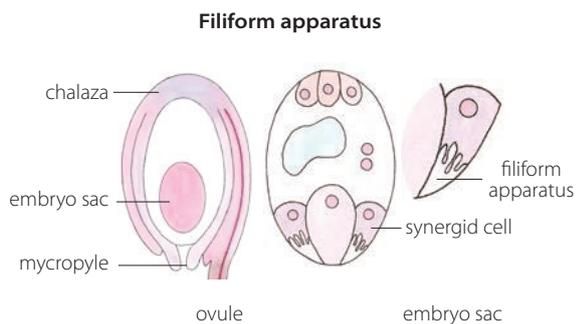
**filiferous** Bearing thread-like attachments, as the margins of some leaves.  
cf. **filiform**



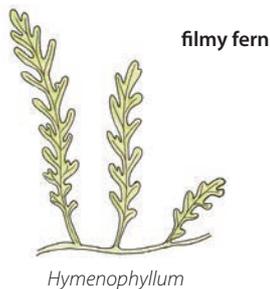
**filiform** Slender and thread-like.  
cf. **capillary**



**filiform apparatus** Numerous finger-like projections in the cytoplasm of a synergid cell.

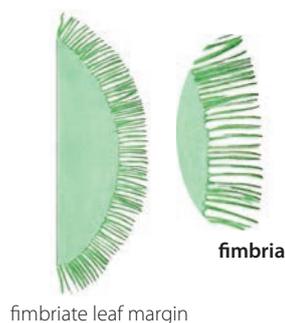


**filmy fern** Delicate small commonly epiphytic ferns in the family Hymenophyllaceae, with the fronds typically one cell thick (*Hymenophyllum*).  
see **fern**



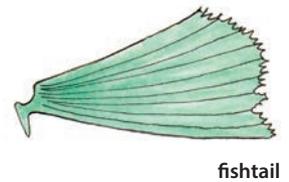
**fimbria, pl. fimbriae** A fine outgrowth, usually derived from the same material as the organ itself, as the hair-like fringe on the margins of some leaves.

**fimbriate** Having fimbria, fringed.  
cf. **ciliate, fimbriate, lacerate, laciniate**

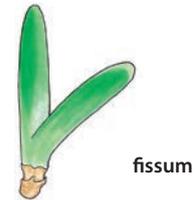


**fimbrilla, pl. fimbriillae** A single division or tooth of a minute, fine fringe.  
**fimbriate** Minutely fringed.  
cf. **fimbriate**

**fishtail** Of palms, leaflets shaped like a fish tail, with the tip appearing chewed, as the leaflet of the toddy palm (*Caryota urens*).  
see also **praemorse**



**fissum** Cleft or split, as the leaves of a stoneflower (*Argyrodema fissum*).

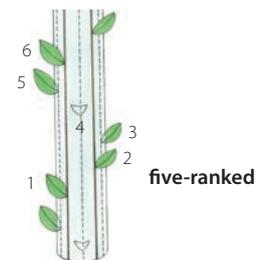


**fistular, fistulose, fistulous** Hollow and cylindrical, as the leaf of an onion.

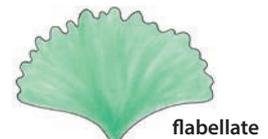


**fitness** Of natural selection, the degree of increased or decreased survival or reproduction of individuals in a population.

**five-ranked** Of leaves arranged in five vertical rows, with any sixth leaf above the one below it.  
= **pentastichous**  
see also **orthostichy**



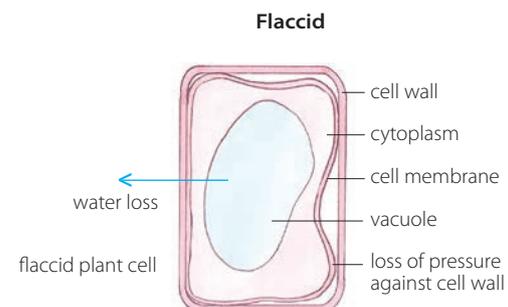
**flabellate, flabelliform** Fan-shaped.



**flaccid** Drooping or lacking stiffness through lack of water; caused by water loss in cells and the shrinking of the cell contents away from the cell wall.

cf. **tumid, turgid**

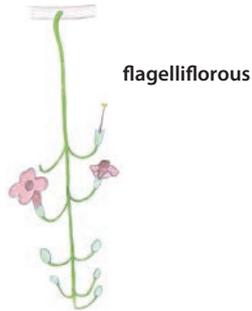
**flaccidity** The state of being flaccid, loss of turgour.



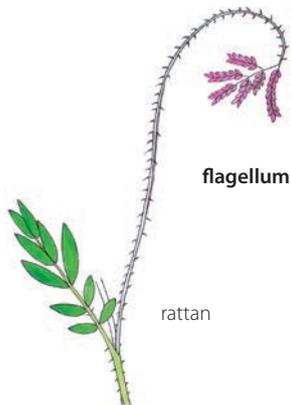
**flag leaf** Of grasses (Poaceae), uppermost leaf of the culm.  
see **boot stage**



**flagelliflorous** Having an inflorescence that projects down beyond the crown of the tree on a long hanging pedicel, as the sausage tree (*Kigelia africana*) and some some species of fig (*Ficus*).



**flagellum, pl. flagellae**  
A lash-like appendage, as a slender, flexible shoot or runner.  
Of palms (Arecaceae), a barbed whip-like extension of the inflorescence found in climbing palms (rattans).  
*cf.* **cirrus**  
**flagellate** With a whip-like extension, bearing flagella.  
**flagelliform** Elongate and slender like a whip.

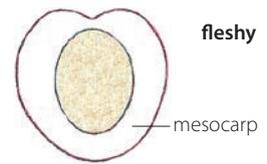


**flavescent** Yellowish, turning yellow.

**flavins** A group of orange-yellow pigments in plants that can only be seen when they are purified. Functions include control of phototropism.

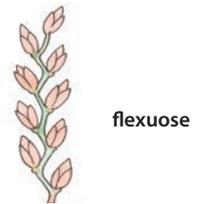
**flavonoids** A group of mostly yellow pigments found in plants that are usually only visible under ultraviolet light. Functions include ultraviolet nectar guides on flowers that are visible to pollinators and ultraviolet-absorbing flavones in some leaves that protect against harmful radiation. Includes anthocyanins that are brightly coloured red, purple and blue pigments.

**fleshy** Composed of a firm juicy pulp, as the mesocarp of a drupe, such as a prune. Succulent.

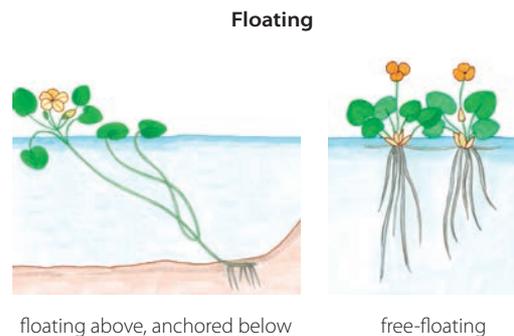


**flexible** Pliable, easily bent without breaking.

**flexuose, flexuous**  
Bending or curving alternately in different directions, as the axis of a grass spike.



**floating** Borne on the surface of water, as the leaves of an aquatic plant. The plant may be rooted in the mud below, as yellow floating heart (*Nymphoides peltata*) or free-floating, as frogbit (*Hydrocharis morsus-ranae*).  
see also **natant**



**floccule** A small clump of material that resembles a tuft of wool.

**flocculent** Having or resembling tufts of wool.

**floccus, pl. flocci** A woolly tuft.

**floccose** With tufts of woolly soft hairs.

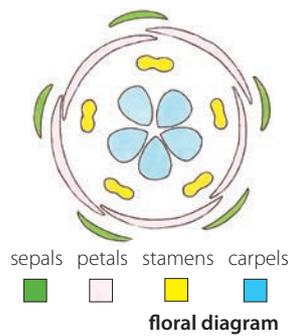
**flora** All of the plant species occurring in a particular area or geological period. Classifications include indigineous flora, agricultural flora, horticultural flora and weed flora. A taxonomic botanical publication documenting the flora of a particular area, usually with keys for plant identification.  
*cf.* **fauna, vegetation**

**floral** Belonging to or associated with a flower.

## floral diagram

A stylised drawing of the cross-section of a flower showing the number and relative position of the various parts.

see also **floral formula**

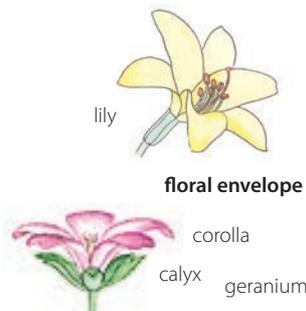


## floral envelope

A collective term for the calyx and corolla of a flower, especially when both are similar, as the day lily (*Hemerocallis*).

The sterile parts of a typical flower.

= **perianth, perigone**



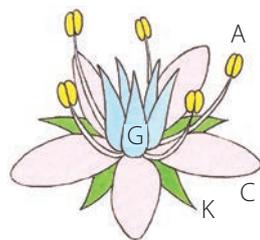
## floral formula

A system for representing the structure of a flower using numbers, letters and symbols to convey information about a flower in a compact form.

Typically K = calyx, C = corolla, A = androecium, G = gynoecium.

Each letter is followed by a numeral to indicate the number of parts, as C5 indicating 5 separate petals and C(5) indicating 5 united petals.

see also **floral diagram**



A5	androecium	5 stamens
G5	gynoecium	5 carpels
C5	corolla	5 petals
K5	calyx	5 sepals

**floral formula**

**floral symmetry** The planes of symmetry that give a mirror image in a flower.

With only one plane of symmetry (mirror image) the flower is monosymmetric (zygomorphic, bilaterally symmetrical), as the flowers in the pea family (Fabaceae).

With two planes of symmetry the flower is disymmetric, as the flowers of rapeseed (*Brassica napus*).

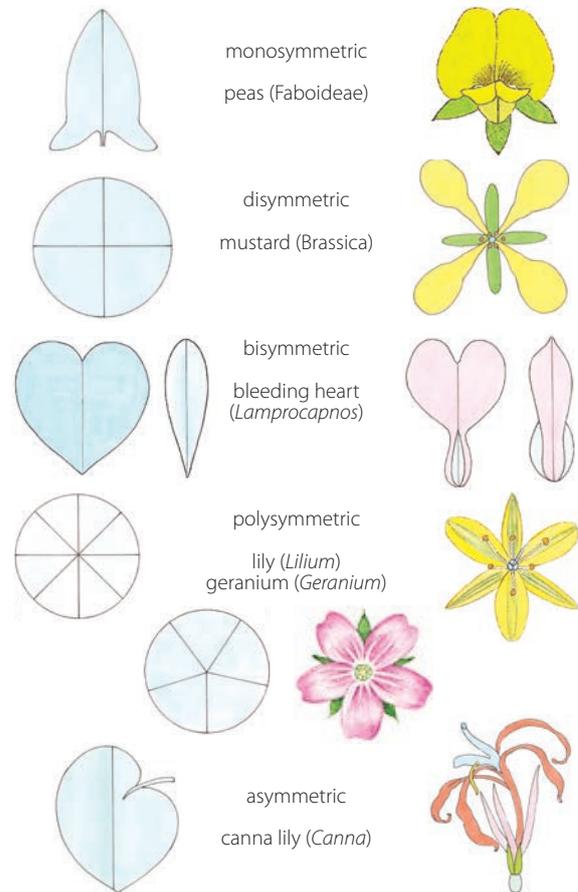
With two planes of symmetry at right angles to each other the flower is bisymmetric, as the flowers of bleeding heart (*Lamprocapnos*).

With three or more planes of symmetry the flower is polysymmetric (actinomorphic, radially symmetrical,

regular), as the flowers of geraniums (*Geranium*) and some lilies.

When there are no planes of symmetry the flower is asymmetric (amorphic), as the flowers of the canna lily (*Canna*).

## Floral symmetry



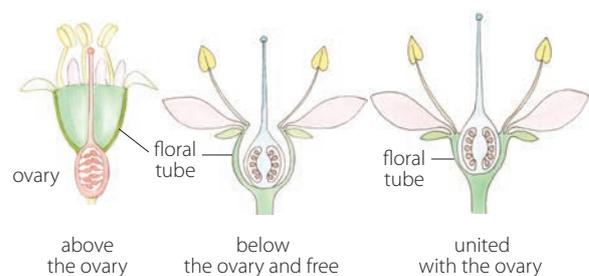
**floral tube** A tubular or cup-shaped enlargement of the receptacle and/or the bases of the floral parts. It bears the petals, sepals and stamens.

It is either above the ovary, below the ovary and free or variously united with it.

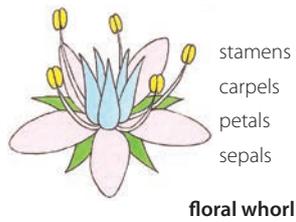
= **hypanthium**

cf. **receptacle**

## Floral tube



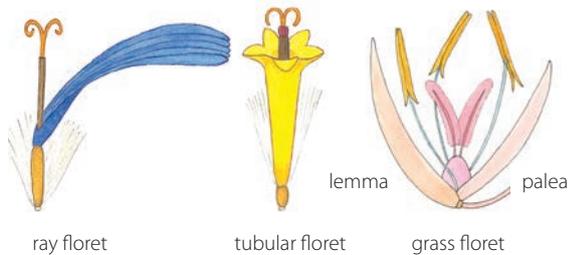
**floral whorl** Any one of the four flower parts, sepals, petals, stamens or carpels, borne at the same level on an axis.



**florescence** Flowering or blossoming. The flowering period. In grasses, a spikelet.

**floret** A small flower, especially when part of a larger inflorescence, as the ray florets and tubular florets of daisies (Asteraceae). Of grasses, each flower in a spikelet (locusta) together with the lemma and palea that enclose it. see **floscule**

**Floret**



**floricane** A second-year cane of a bramble that bears flowers and fruit. cf. **primocane**



**floriferous** Bearing numerous flowers.

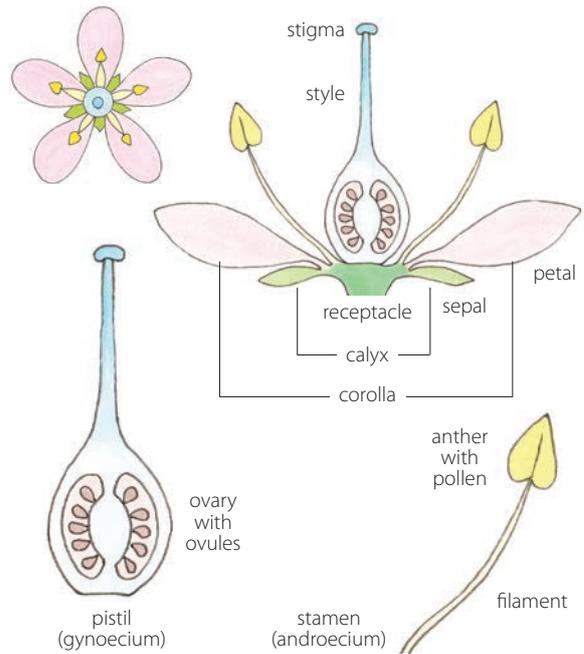
**floristics** Study of the distribution of plant species and the relationships between them in a geographic area.

**floscule** A little flower or floret.

**flosculose** Consisting of florets as the flower-like inflorescence of daisies (Asteraceae).

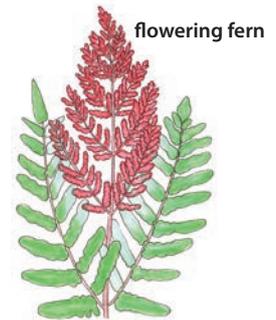
**flower** The structure for sexual reproduction in angiosperms. Typically arranged in whorls, with a non-fertile calyx and corolla and fertile stamens and pistil(s) that are all inserted on a receptacle at the tip of the flower stem (pedicel). see also **dioecious**, **monoecious**

**Flower**



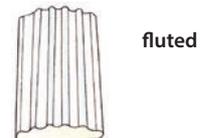
**flowering fern**

Common name of members of the genus *Osmunda*, so called because of the appearance of the fertile fronds that have spores located in rusty-coloured tassel-like clusters at the tips of the fertile fronds. see **fern**



flowering fern (*Osmunda regalis*)

**fluted** With longitudinal channels, grooves or furrows, as the stems of some cacti.



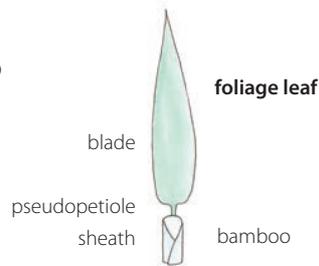
**foliaceous** Of or resembling a leaf. Bearing numerous leaves. = **foliose**

**foliage** The photosynthetic leaves of a plant collectively. see also **leaf**

**foliage leaf** The main photosynthetic organ of a plant, usually consisting of a blade and a petiole. see **leaf**



Of bamboos, leaves on branches and at the tip of mature culms, with large blades attached to the sheath by a pseudopetiole.  
**cf. culm leaf**



**foliar** Of or relating to leaves.  
 Leaf-like, as foliar stipules.



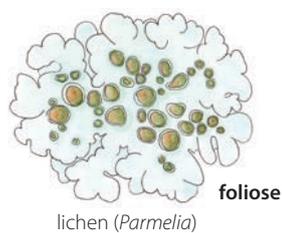
**foliate** Of or relating to leaves. Bearing leaves. Shaped like a leaf. Leaf-like.  
**see bifoliate, trifoliate, unifoliate**  
**cf. foliolate**

**-foliate** A suffix denoting the number of leaves.

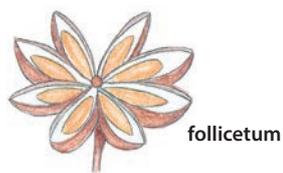
**-foliolate** A suffix denoting the number of leaflets.

**foliole** A leaflet in a compound leaf.  
**foliolate** Having leaflets.  
**see bifoliate, trifoliate, unifoliate**  
**cf. foliate**

**foliose** Resembling a leaf. Having many leaves.  
 = **foliaceus**  
 Of lichens, having a thallus with lobed, leaf-like extensions, as *Parmelia*.



**follicetum**  
 An aggregate fruit composed of a cluster of follicles, as star anise (*Illicium verum*).



**follicle** A dry dehiscent fruit with one or more seeds. It derives from a single carpel and splits open lengthwise along one suture only, as boronia (*Boronia*).

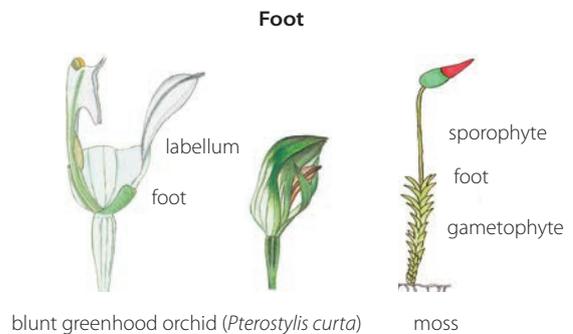


**follicular** Of or pertaining to a follicle.

**foot** Of an orchid, an extension of the base of the column.

**see column foot**

Of bryophytes, as mosses, the location at which the sporophyte is anchored to the gametophyte and through which nutrients are transferred from the gametophyte to the sporophyte.



**foot layer** The inner layer of the ectexine in the wall of a pollen grain.

**see pollen wall**

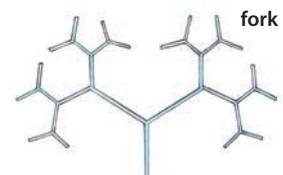
**foramen, pl. foramina** A minute opening, as the micropyle of the ovule through which the pollen tube usually enters; a very small hole.

**foraminate** Having small holes or perforations.

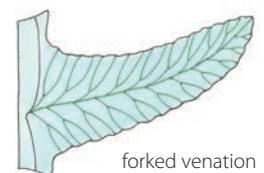
**forb** A broad-leaved herbaceous dicotyledonous plant, as distinct from grasses, sedges, shrubs and trees. Especially one growing in grasslands, prairies or meadows.

**forest** A vegetation type with the tallest layer composed of trees.

**fork** To separate from a common point into two branches or prongs. One of the branches or prongs into which anything is so divided. A Y-shaped or V-shaped branch.



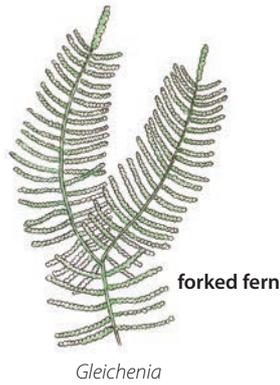
**forked** Branched to form a Y-shape or a V-shape, as the veins of some leaves and fronds.



= **furcate**  
**cf. cleft**

**forked fern**

The forked fern family (Gleicheniaceae) has long-creeping branched rhizomes and most species have fronds that fork at the tips indefinitely. They typically form large masses that cover the ground and other vegetation.



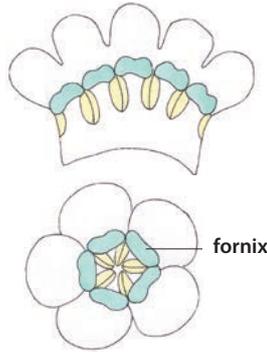
see **fern**

**form, forma, abbr. f.** A subdivision of species below variety, usually differentiated by a minor characteristic like colour variation.

The lowest rank in taxonomic classification, as *Geranium maculatum* forma *albiflorum*.

see **taxonomic hierarchy**

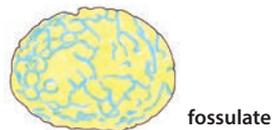
**fornix, pl. fornices** One of the little arched scales in the throat of a corolla, as hound's tongue (*Cynoglossum*) in the forget-me-not family (Boraginaceae).



**fornicate** Arched, bending over. Having fornices.

**fossulate**

With irregularly shaped narrow grooves.



**fovea, pl. foveae** A small pit or depression.

**foveate** Pitted.

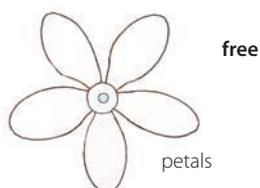
**foveola, pl. foveolae** A minute pit or depression.

**foveolate** Minutely pitted.

**fragmentation** Growth of a new plant from a piece of the parent plant, as occurs with some 'leafy' bryophytes like mosses.

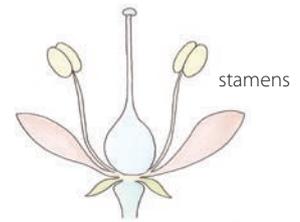
A form of vegetative reproduction.

**free** Separate, not joined to each other or to another organ. Usually referring to separateness of similar



parts, as petals, or of dissimilar parts or organs, as stamens.

= **distinct**  
cf. **fused**

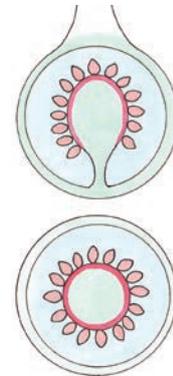


**free central placentation**

With carpels fused but the internal walls (septa) lacking, creating a unilocular ovary, as primrose (*Primula*).

The ovules are arranged along a central axis that does not reach the top of the ovary.

= **central placentation**  
see **placentation**

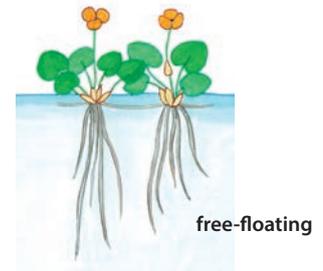


free central placentation

**free-floating**

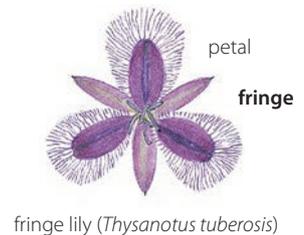
Unattached to the bottom substrate of a water body, as the aquatic plant frogbit (*Hydrocharis morsus-ranae*).

see also **natant**



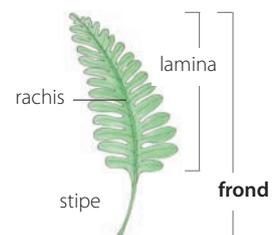
**fringe** A border. A line of appendages along a border.

**fringed** With a border of hairs, bristles, glands etc. along a margin.



**frond** The leaf of a fern, palm or cycad.

Fern fronds may be compound (pinnate or bipinnate) or simple and usually lobed (pinnatifid or bipinnatifid).



**fructan** A polymer of fructose located in the vacuoles that stores energy as soluble carbohydrate.

**fructiferous** Bearing fruit.

**fructification** The fruiting process of a plant.

**fruit** The seed-bearing structure of flowering plants (angiosperms).

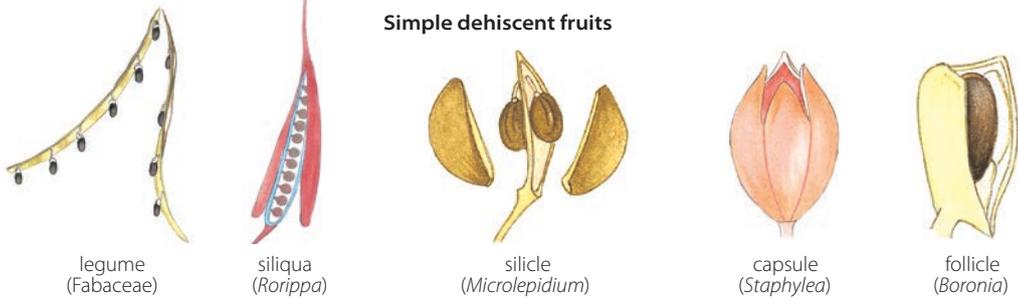
Formed after flowering from one or more ovaries and, sometimes, other floral parts.

A fruit may be dehiscent (a pod or capsule) or indehiscent (an achene or samara), dry (a capsule) or succulent (a drupe).

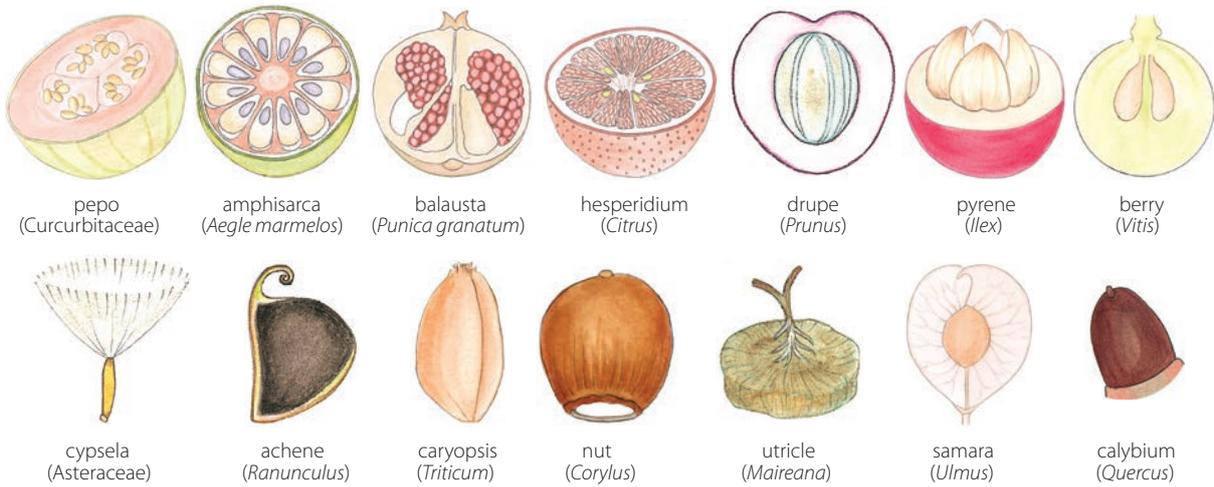
see **accessory ~, aggregate ~, multiple ~, schizocarp, simple ~**

## Fruit

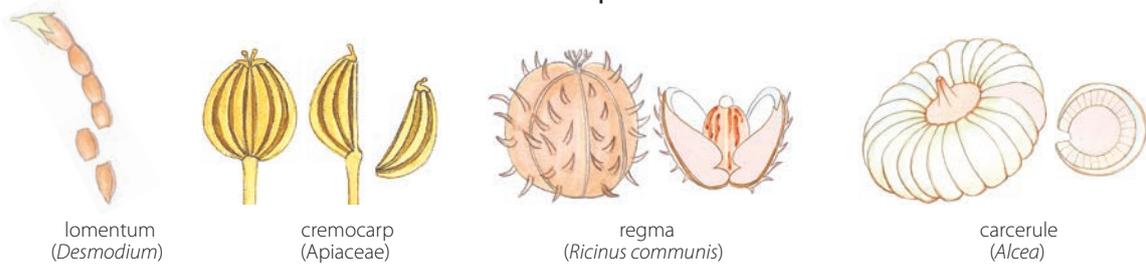
### Simple dehiscent fruits



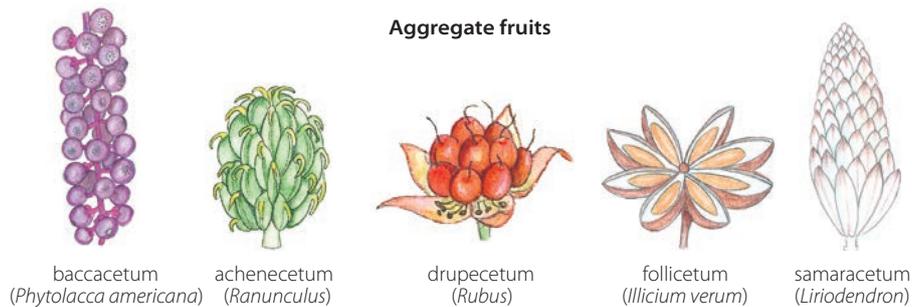
### Simple indehiscent fruits



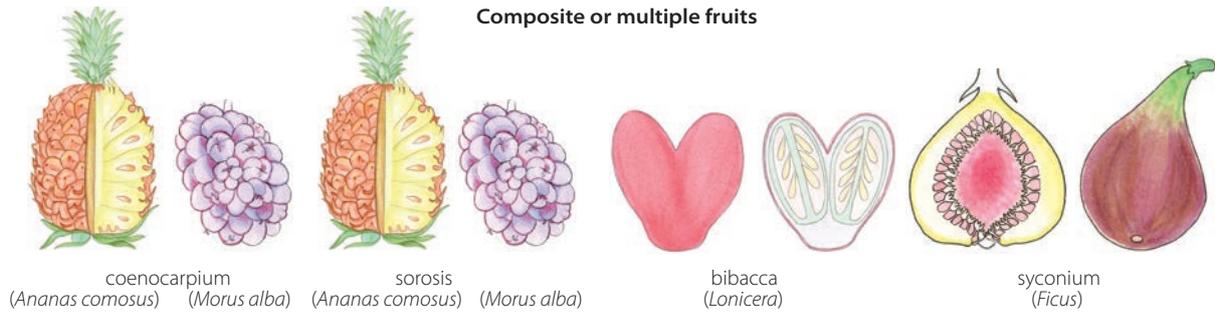
### Schizocarps



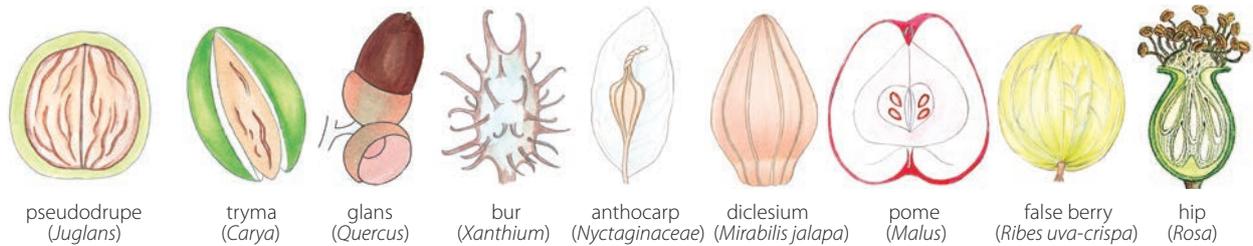
### Aggregate fruits



**Composite or multiple fruits**



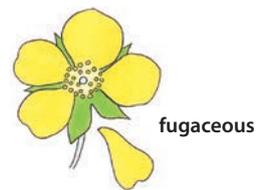
**Accessory fruits**



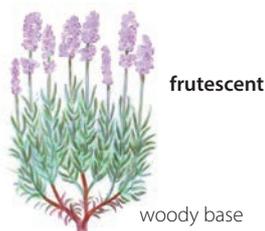
**fruitlet** A small fruit. One of the individual parts of an aggregate fruit, as a raspberry (*Rubus*).



**fugaceous, fugacious** Falling or fading early as the petals of guinea flowers (*Hibbertia*).  
cf. **ephemeral, evanescent, caducous**



**frutescent** Becoming shrubby, as rosemary (*Rosmarinus*) and lavender (*Lavandula*) that become woody at the base and remain herbaceous above.

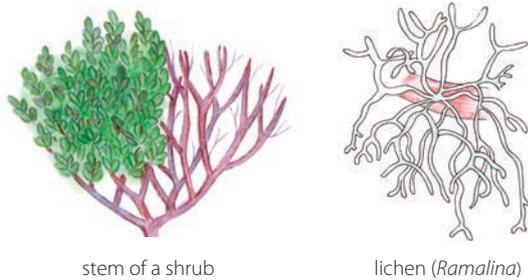


**fugitive species** A colonising species of disturbed sites that will usually be overgrown by a stronger competing species, as plants of deserts and ephemeral ponds that die when water evaporates.

**fruticose** With stems or branches but without a single main axis, shrub-like. Of lichens, having upright or pendulous branches.

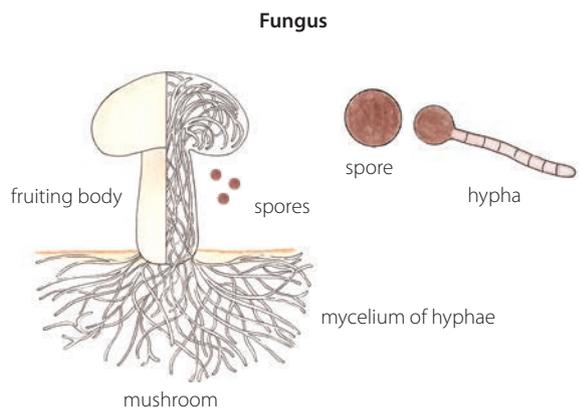
**fulvous** Reddish-brown.

**Fruticose**

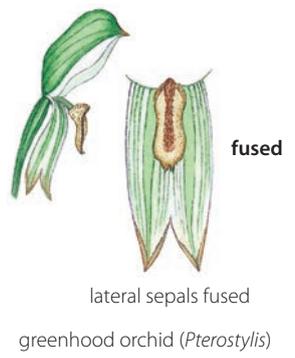


**fungus, pl. fungi** Unicellular organisms, or multicellular organisms made up of hyphae, some of which form fruiting bodies that are mushrooms or toadstools. Hyphae invade a food source, digest it externally, then absorb it. Cell walls contain chitin, a substance found in the exoskeleton of arthropods and insects. Reproduction is by spores. Fungi are divided into five phyla: Ascomycota, Basidiomycota, Chytridiomycota, Glomeromycota and Zygomycota. There is an additional informal group, Deuteromycota. see **mycelium, mycorrhiza, osmotrophy**  
**fungal** Relating to or like fungi.

**fruticulose** Somewhat shrubby, like a small shrub.

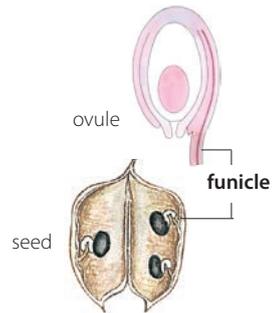


**fused** A general term meaning united, as the lateral sepals of greenhood orchids (*Pterostylis*) that are largely united.  
 see also **adherent, adnate, coalescent, coherent, connate**  
 cf. **contiguous, distinct, free**

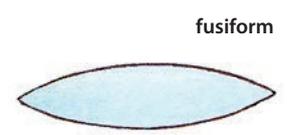


**funicle, funiculus**

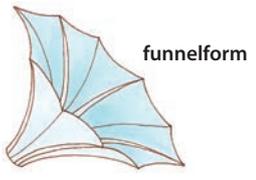
The stalk connecting an ovule to the placenta or attaching the seed to the wall of the pod, as some pea genera (Fabaceae).  
**funicular** Relating to a funicle.



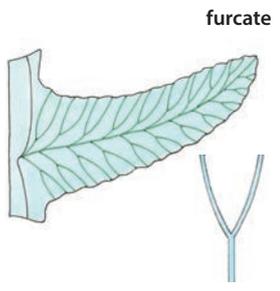
**fusiform** A three-dimensional shape that tapers at both ends and is widest in the middle. Spindle-shaped.



**funnelform** Funnel-shaped, as the corolla of bindweed (*Convolvulus*).  
 see **infundibular**

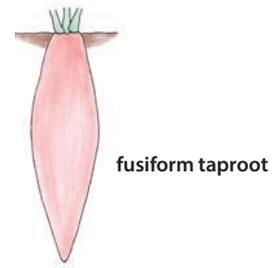


**furcate** Dividing into two prong-like branches. Branched to form a Y-shape or a V-shape, as the veins of some leaves and fronds.  
 = **forked**  
 see **bifurcate, trifurcate**



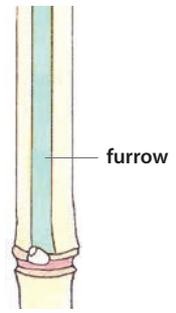
**fusiform initials** One of two types of initial cells (the other being ray initials) in cambium that are the meristematic tissue responsible for secondary growth in plants. Fusiform initials are elongated tapering cells that give rise to vertical growth and produce the conducting cells of both secondary xylem and secondary phloem in wood. They transport food and water vertically.

**fusiform taproot** A main, descending root that is broad in the middle and tapers towards the apex and the base, as some radishes.  
 see **conical taproot, napiform taproot**



**furfuraceous** Covered with soft easily displaced bran-like scales. Scurfy.

**furrow** A groove or channel, as the indentation along the side of the culm in the bamboo genus *Phyllostachys*.  
**furrowed** With a longitudinal groove.  
 = **sulcate**



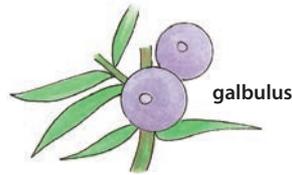
**fynbos** A shrubby vegetation in South Africa, with few trees or grasses, growing on poor soils and having cool wet winters and hot dry summers. It is a Mediterranean-type ecosystem together with the garrigue and maquis in the Mediterranean Basin, the chaparral in California, matorral in Chile and kwongan in southwestern Australia.

**Gaia hypothesis** A theory put forward by James Lovelock in the 1960s that proposed that the earth is a vast self-regulating organism that seeks an environment optimal for life.

**fuscous** A dusky brownish-grey colour.

**galbulus, pl. galbuli**

A modified cone that becomes fleshy and berry-like, typical of the juniper genus (*Juniperus*).



**galea** A helmet.

cf. **cucullus**

**galeate** Helmet-shaped, as the helmet-like structure formed by fusion of the petals and dorsal sepal of greenhood orchids (*Pterostylis*).

cf. **cucullate**



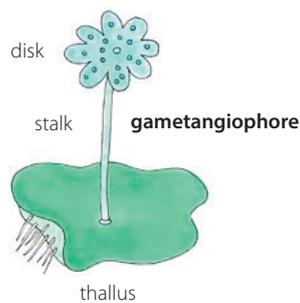
**gall** An abnormal growth form induced in a plant in response to the presence of fungi, bacteria, irritation or insects, as the larvae of the gall midge that cause flower-like galls on beaded glasswort (*Sarcocornia quinqueflora*).

cf. **domatium**



**gametangiophore**

The gamete-bearing structure, including a disk and a stalk, that grows out of the thallus, in thallose liverworts. It is either male (an antheridiophore) or female (an archegoniophore).



**gametangium, pl. gametangia** A reproductive cell or organ in which gametes are formed. The term is usually restricted to the sex organs of algae, fungi, bryophytes, ferns and fern allies. see **antheridium, archegonium**

**gamete** Of sexual reproduction, one of the haploid male or female sex cells that unite at fertilisation to form a zygote. The sperm cells are male gametes and the egg cells are female gametes.

**gametogenesis** The formation of the sex cells (male sperm and female eggs) in the reproductive organs of a plant.

In angiosperms, the male sperm cells form in a pollen grain and the female egg cell forms in the embryo sac.

In gymnosperms, the male sperm cells form in a pollen grain and the female egg cell forms in an archegonium.

In ferns, mosses, liverworts and hornworts, the male sperm cells form in an antheridium and the female egg cell forms in an archegonium.

see **megagametogenesis, microgametogenesis**

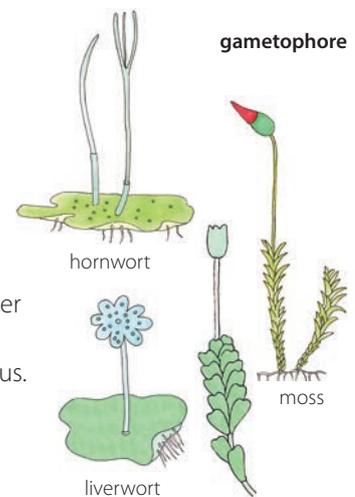
**gametophore**

In bryophytes, a structure bearing gametangia.

In mosses and hornworts it is a green perennial 'leafy' stem.

In liverworts it is either a green perennial 'leafy' stem or a thallus. It may be dioecious or monoecious.

cf. **gametophyte**



**gametophyte** see page 119

**gametophyte generation** The haploid phase of a plant's life cycle that produces the male and female gametes that unite to form a zygote. see **alternation of generations, gametophyte** cf. **sporophyte generation**

**gametophytic apomixis** In flowering plants (angiosperms), the production of an embryo directly from the megaspore mother cell or a cell next to the megaspore mother cell. A form of agamospermy. see also **apospory, diplospory** cf. **sporophytic apomixis**

**gammate** Shaped like the greek letter gamma ( $\Gamma$ ), as the calli on the labellum of the orchid *Caladenia capillata*.



**gamo-** A prefix meaning united or fused.

**gametophyte** All plants have a life cycle alternating between a haploid gametophyte generation and a diploid sporophyte generation. The sporophyte produces haploid spores by meiosis that germinate and grow into a haploid gametophyte.

A gametophyte produces male and female gametes (sperm and eggs) and may be bisexual or unisexual.

In nonvascular plants (bryophytes), the gametophyte is a thallus or a 'leafy' stem that is larger than the tiny sporophyte. The thallus bears antheridia that produce sperm and archegonia that produce eggs.

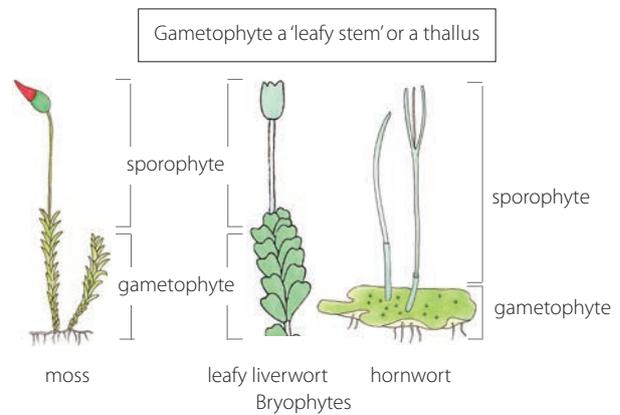
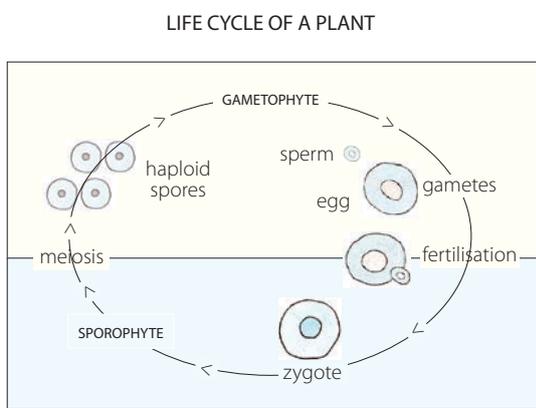
Vascular plants that produce spores (ferns and fern allies), have a prothallus that is much smaller than the larger sporophyte. The prothallus bears antheridia that produce sperm and archegonia that produce eggs.

Vascular plants that produce seeds, (gymnosperms and angiosperms) have microscopic dependent gametophytes (male pollen and female ovules) that live in or on the larger photosynthetic sporophyte. Gymnosperms have male and female gametophytes borne on cones and in angiosperms the male gametophyte (pollen grain) is borne in an anther and the female gametophyte (ovule) is enclosed in an ovary.

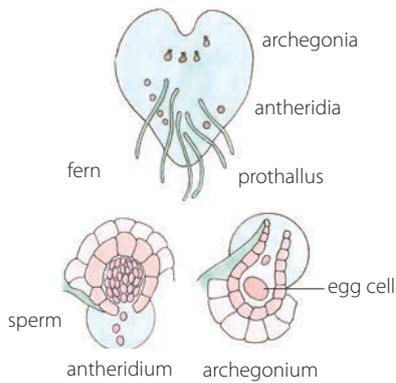
see **alternation of generations**

cf. **gametophore, sporophyte**

### Gametophyte

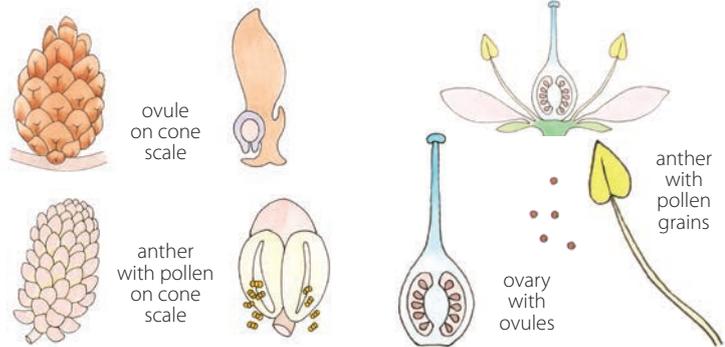


Gametophyte a prothallus



Ferns and fern allies

Male gametophyte a pollen grain, female gametophyte an ovule



Gymnosperms

Angiosperms

**gamopetalous** With petals fused, at least at the base.

= **sympetalous**

cf. **apopetalous,**

**choripetalous,**

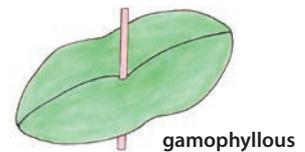
**polypetalous**



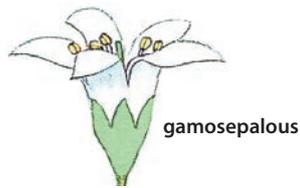
**gamophyllous** Having leaves united, usually by their margins.

having leaf-like parts

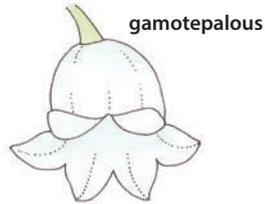
united, as a calyx.



**gamosepalous** With sepals fused, at least at the base.  
= **synsepalous**  
cf. **aposepalous**



**gamotepalous** With tepals fused, at least at the base, as flowers of lily of the valley (*Convallaria majalis*).  
= **syntepalous**  
cf. **apotepalous**

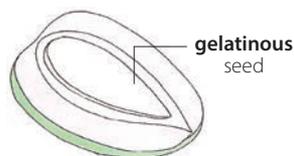


**garrigue** An open low shrubby vegetation less than a metre high, growing on limestone soils in low rainfall areas in the Mediterranean Basin. It is a Mediterranean-type ecosystem together with the maquis, also in the Mediterranean Basin, the chaparral in California, matorral in Chile, kwongan in southwestern Australia and fynbos in South Africa.

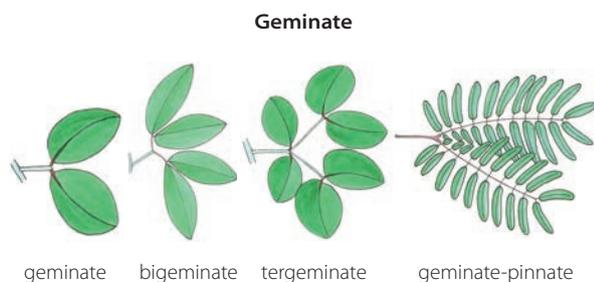
**geitonogamy** Pollination between flowers on the same plant.  
see **allogamy**, **xenogamy**  
cf. **autogamy**

**gel** A semi-solid jelly-like substance in which a liquid is dispersed in a solid.

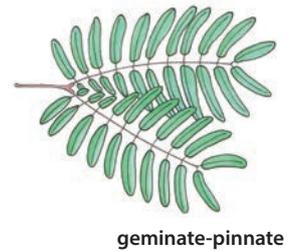
**gelatinous** A wet, sticky state between solid and liquid, as the seed of an unripe almond (*Prunus dulcis*).



**geminate** Growing in pairs.  
Of a petiole having only two leaflets.  
= **binate**



**geminate-pinnate** Of a compound leaf with a pair of leaflets and each leaflet being divided pinnately, as the red powder puff plant (*Calliandra haematocephala*).



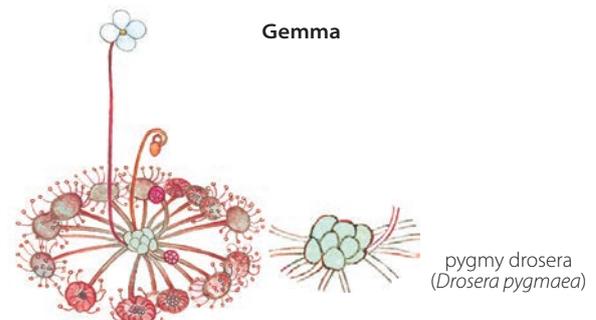
**gemma**, pl. **gemmae** A bud or bud-like structure that separates from the parent plant and serves as a means of vegetative propagation, as tiny sundew (*Drosera pygmaea*).

cf. **turion**

An asexually produced cell or group of cells developed on the leaves of some bryophytes from which new plants may develop. In some thallose liverworts they are borne in specialised 'gemma cups'.

**gemmate**, **gemmaiferous**

Having gemmae. Reproducing by gemmae.



**gene** A unit of heredity consisting of a sequence of DNA in a specific location on a chromosome. It determines a particular characteristic of an organism.  
see also **nucleotide**

**gene expression** The process by which a DNA sequence is converted into instructions for protein synthesis.  
cf. **genetic code**

**gene flow** The exchange of genes between individuals within a population, or between different populations of the same species, as a result of dispersal of pollen, spores or seeds. One of the basic mechanisms of evolution together with natural selection, mutation and genetic drift.  
= **gene migration**  
see **dispersal mechanism**

**gene migration** The exchange of genes between individuals within a population, or between different populations of the same species, as a result of dispersal of pollen, spores or seeds.

One of the basic mechanisms of evolution together with natural selection, mutation and genetic drift.

= **gene flow**

see **dispersal mechanism**

**gene pool** The sum of all genes and combinations of genes (alleles) in a population of a single species.

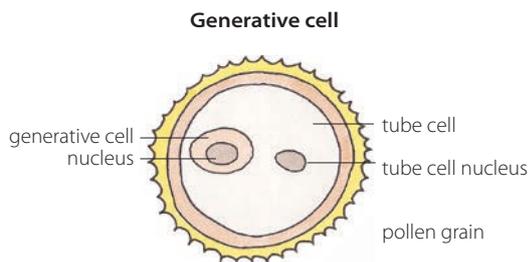
**gene sequencing** Determination of the order of the four building blocks (adenine, guanine, cytosine or thymine) that make up a DNA molecule.

= **DNA sequencing**

**generative cell** One of the two cells, lacking a cell wall, in a pollen grain.

It floats in the cytoplasm of the tube cell and divides, either before pollen is shed or in the pollen tube, to form two male gametes.

see also **tube cell**



**genet** A single genetic individual that is produced from the seed of a particular zygote.

A result of sexual reproduction.

cf. **ramet**

**genetic code** The set of rules by which information encoded in genetic material (DNA or RNA sequences) is translated into amino acid sequences (proteins) by living cells.

see also **codon**

**genetic drift** Change in allele frequencies in a population over generations due to chance.

One of the basic mechanisms of evolution together with natural selection, mutation and gene flow (gene migration).

**genetic engineering** The manipulation of DNA to alter one or more of an organism's characteristics by adding, removing or replacing genes.

see also **vector**

**genetic marker** A DNA sequence with a known physical location on a chromosome.

**geniculate** Bent abruptly like a knee joint, as some stems.



**genome** Generally, the complete genetic information of an organism.

In particular, the DNA found in the nucleus of a cell. Chloroplasts and mitochondria have their own DNA and have their own separate genomes.

**genotype** The genetic makeup of a cell or an organism inherited from its parents.

cf. **phenotype**

**genus, pl. genera** In taxonomic classification, a rank below family and above species.

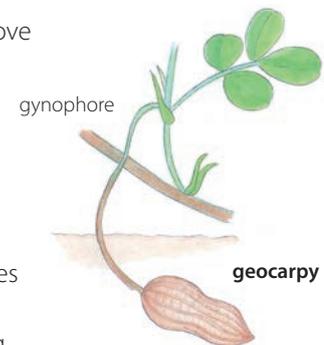
see **taxonomic hierarchy**

**generic** Of or relating to a genus.

**geocarp** The ripening of fruit below ground from flowers borne above ground, as the peanut (*Arachis hypogaea*).

The gynophore of the spent flower grows downward and pushes the fertilised ovule into the soil where it matures into the fruit.

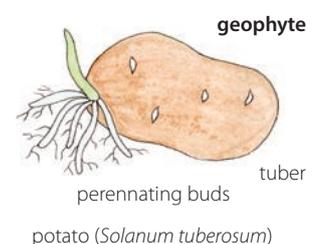
**geocarpic** Pertaining to geocarp.



**geophilous** Of a plant having adaptations for surviving by disappearing underground when protection is needed.

**geophyte** A plant with perennating buds underground in dry conditions, as those having rhizomes and tubers.

see also **cryptophyte**



**geotropism** The response of a plant to gravity, either tending to grow downwards (positive geotropism), as roots, or tending to grow upwards (negative geotropism), as shoots.

= **gravitropism**

see **tropism**

**geotropic** Of or relating to geotropism.

**germinal aperture** The variously shaped, thinner region of the pollen wall through which the pollen tube emerges or the spore wall through which the protonema emerges.

**germinate, germination** see page 123

**gibberellins** A group of plant hormones responsible for growth and development, including seed germination, stem elongation due to increased cell size, transition to flowering and development of flowers, fruits and seed.

see **phytohormone**

**gibbosity** A swelling or protuberance.

**gibbous** Swollen or enlarged on one side, as the flower tube of common valerian (*Valerian officinalis*).

With a pouch-like swelling.

see also **ventricose**



**ginkgo** The deciduous maidenhair tree (*Ginkgo biloba*), so called because of its fan-shaped leaves like those of some maidenhair ferns.

It bears male or female cones on separate plants. The sole surviving species of Ginkgophyta, one of the four divisions of gymnosperms.

**girth** Measurement around the circumference of something, as of a tree at a certain distance above ground level.

**glabrate, glabrescent** Becoming glabrous. Almost glabrous.

**glabrous** Lacking hairs, scales or other indumentum, smooth.

**gladiate** Shaped like the blade of a sword, as the leaves of gladiolus and iris.

= **ensiform**



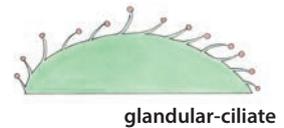
**gland** A cell or group of cells that secrete or excrete a substance, such as a hormone, enzyme, wax, nectar, salt or water. It may be on or near the plant surface and discharging the substance externally, as glandular hairs, nectaries and hydathodes, or internal and releasing the substance into a canal or cavity, as resin canals in pines and schizogenous cavities or ducts in Asteraceae.

**glandular, glanduliferous** Having or relating to glands.

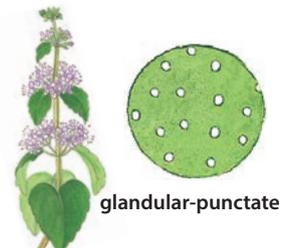
**glandular hair** Tipped with a gland, as those on the leaf of a sundew (*Drosera*) that produce a secretion that traps and digests insects.



**glandular-ciliate** With gland-tipped eyelash-like hairs, as the margins of some leaves.

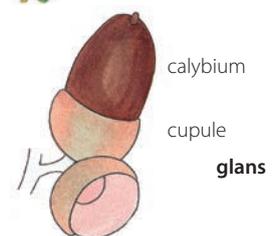


**glandular-punctate** With dot-like depressions, due to translucent or coloured glands, as the leaves of mints (*Mentha*).



**glans** A nut (calybiium) partly or completely enveloped at the base by a cupule, as the fruit of the oak (*Quercus*) or chestnut (*Castanea*).

see **accessory fruit**



**glaucous** Somewhat glaucous, becoming glaucous.

**glaucous** Covered with a greyish, bluish or whitish bloom of fine white powder or wax.

see also **ceraceous, pruinose**

**germination** Of seed plants, the resumption of growth of the embryo in the seed, resulting in the rupture of the seed coat, usually at the micropyle, and the emergence of the young root or radicle.

In epigeal germination, the radicle elongates and penetrates the soil and the elongating hypocotyl pushes the cotyledons out of the ground.

In hypogeal germination the epicotyl grows upward and the cotyledons remain underground.

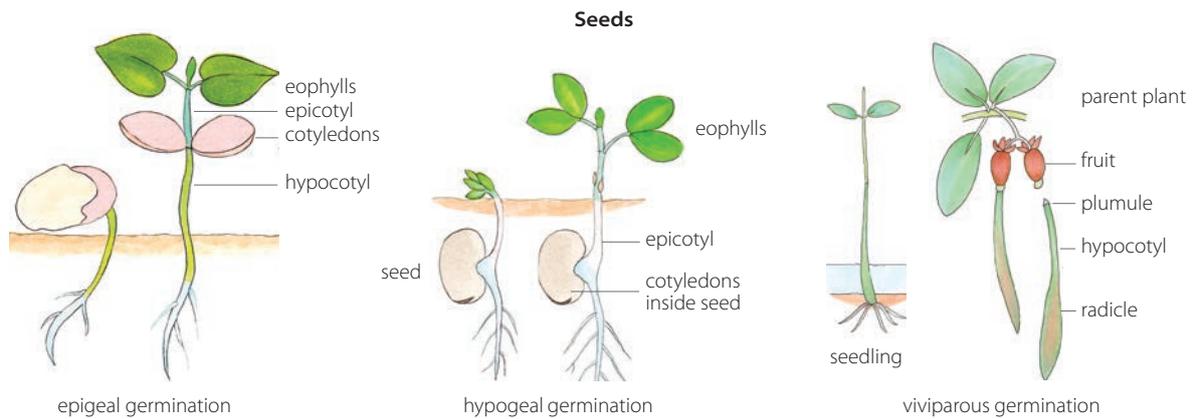
In viviparous germination the seed germinates before becoming detached from the parent plant.

Of seed plants, the rupture of the pollen grain on the stigma of a flower and growth of the pollen tube.

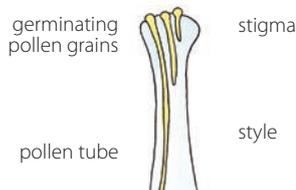
Of cryptogams, the rupture of the spore and emergence of a multicellular protonema that will give rise to a small gamete-producing plant (gametophyte).

**germinate** To sprout, shoot or produce buds.

### Germination



### Pollen grains

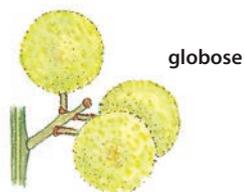


### Spore (moss)

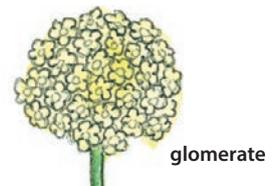


### globose, globular

Spherical or nearly so, as the flower heads of some wattles (*Acacia*.)



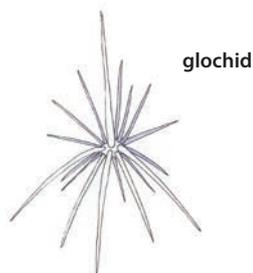
**glomerate** Collected into a dense, spherical mass, as the flowers of some pennyworts (*Hydrocotyle*).



### glochid, glochidium,

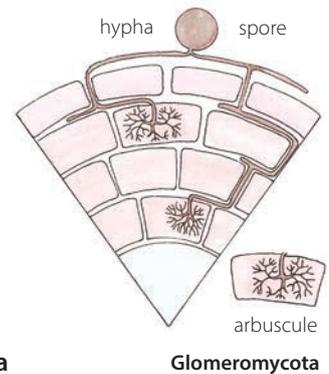
*pl. glochidia*  
A fine barbed detachable spine derived from the epidermis and occurring in the areoles of the prickly pear genus (*Opuntia*).

*cf. prickle, spine, thorn*  
**glochidiate** With fine barbed spines.



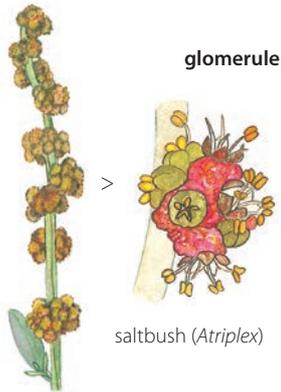
### Glomeromycota

A phylum of fungi dependent on a symbiotic relationship with plant roots. Its hyphae invade cells of the root cortex and form arbuscules. Thought to reproduce asexually by spores. *see fungus, mycorrhiza*

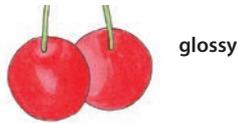


**glomerule, pl. glomeruli**

A dense cluster.  
A dense head-like cymose inflorescence of almost sessile and usually small flowers. Commonly part of a compound inflorescence. see **fascicled cyme, verticillaster**  
**glomerulate** Having glomeruli. Arranged in small compact clusters, as the male flowers of some saltbushes (*Atriplex*).

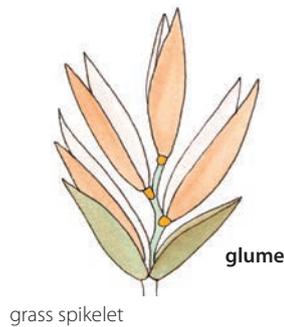


**glossy** Having a smooth shiny surface, as cherries (*Prunus avium*).

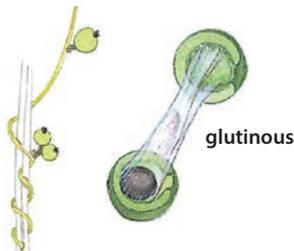


**glucose** A simple sugar (monosaccharide) that is the main source of energy for cellular metabolism. In plants, a product of photosynthesis. see also **glycolysis**

**glume** One of usually two bracts at the base of a spikelet in grasses (Poaceae). The single bract subtending the flower in sedges (Cyperaceae). **glumaceous** Resembling a glume. Bearing glumes.



**glutinous** Resembling glue in texture, sticky. Viscid, as the glutinous pericarp of the drupe of the dodder laurel (*Cassytha*).



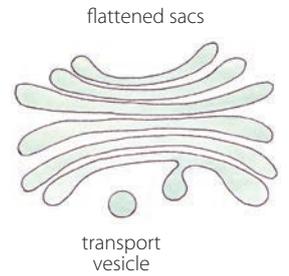
**glycolysis** A series of reactions in cellular respiration that breaks down glucose so that it can be stored as the readily available energy source adenosine triphosphate (ATP). see also **Krebs cycle**

**gnetales** A group of non-flowering seed plants restricted to three genera today (*Gnetum, Ephedra*

and *Welwitschia*). Members of Gnetophyta, one of the four divisions of gymnosperms.

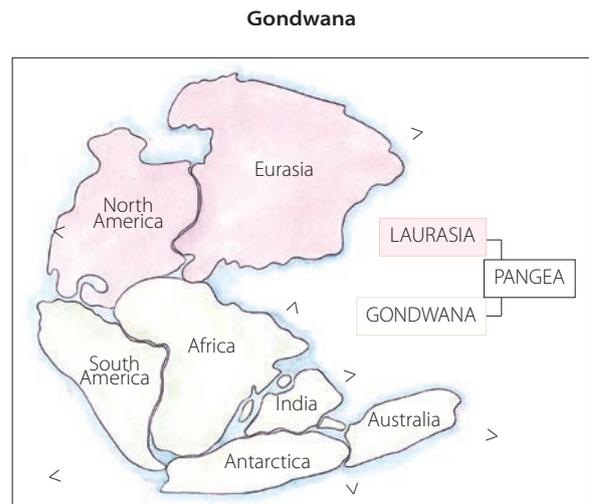
**Golgi apparatus, Golgi body, Golgi complex**

An organelle in the cytoplasm of a cell consisting of a system of flattened sacs and transport vesicles. It produces, modifies and packages proteins and other products for use within the cell or outside the cell.



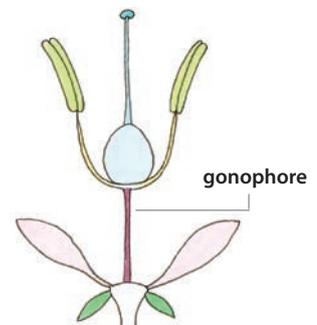
**Golgi apparatus**

**Gondwana, Gondwanaland** One of two vast continents believed to have existed in the southern hemisphere resulting from the break up of Pangea. see **continental drift, Laurasia**



**gonophore**

An elongated stalk (stipe), inserted on the receptacle, that bears the stamens and pistil of a flower above the corolla and calyx. = **androgynophore, gynandrophore**

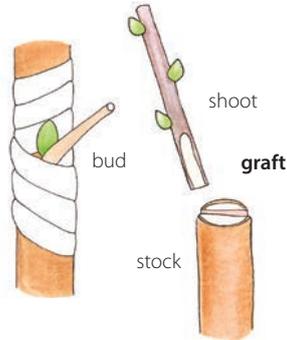


**gourd** Sometimes applied generally to the fruits of the pumpkin family (Curcubitaceae),

but more specifically to the two genera *Lagenaria* and *Curcubita* that have a hard, often irregular, rind. The plant that bears this fruit.



**graft** A shoot or bud (scion) to be implanted into a growing plant. The point of union of the scion with the stock. A plant produced from the union of a scion with a stock. see **grafting**



**graft chimaera** A bud at the junction of the scion and stock that has tissues with the characteristics of both plants. = **graft hybrid**

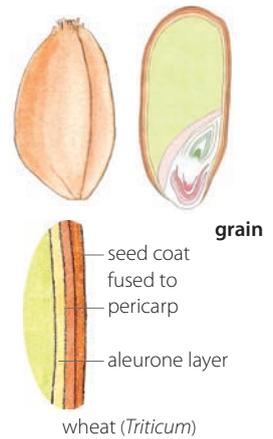
**graft hybrid** A bud at the junction of the scion and stock that has tissues with the characteristics of both plants. = **graft chimaera**

**graftage** A method of vegetative reproduction that consists of implanting a bud (budding), or a shoot (scion), usually with two or three buds (grafting), from one plant into the tissue of another plant (stock). It is used for plants that do not grow true from seed, as most fruit trees, or plants with cuttings that do not root easily.

**grafting** A method of vegetative reproduction that consists of implanting a shoot (scion), usually with two or three buds, from one plant into the tissue of another plant (stock). Used for plants that do not grow true from seed, as most fruit trees, or plants with cuttings that do not root easily. see **budding, graftage, stock**



**grain** A dry indehiscent fruit with one seed fused to the fruit wall (pericarp). Derived from a one-carpelled superior ovary. Characteristic of grasses (Poaceae), as wheat (*Triticum*). cf. **achene, cypsela, diclesium** = **caryopsis**



**graminaceous, gramineous** Pertaining to plants of the grass family (Poaceae).

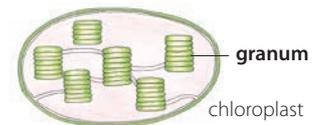
**graminoid** Resembling grasses. A grass (Poaceae) or grass-like plants, such as sedges (Cyperaceae) and rushes (Juncaceae).

**granulate** To form into small grains. To become granular in texture, to become rough and grainy in texture or appearance.

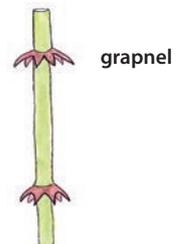
**granule** A small grain or particle, as the microscopic starch grains in the cytoplasm of a plant cell.

**granular** Consisting of or covered with small grains or particles. Having a roughened surface due to small rounded protuberances.

**granum, pl. grana** A stack of disc-shaped thylakoids in a chloroplast.



**grapnel** A hook with three or more recurved prongs. usually found in a ring on a stem. They are used for climbing and support. see **rattan**



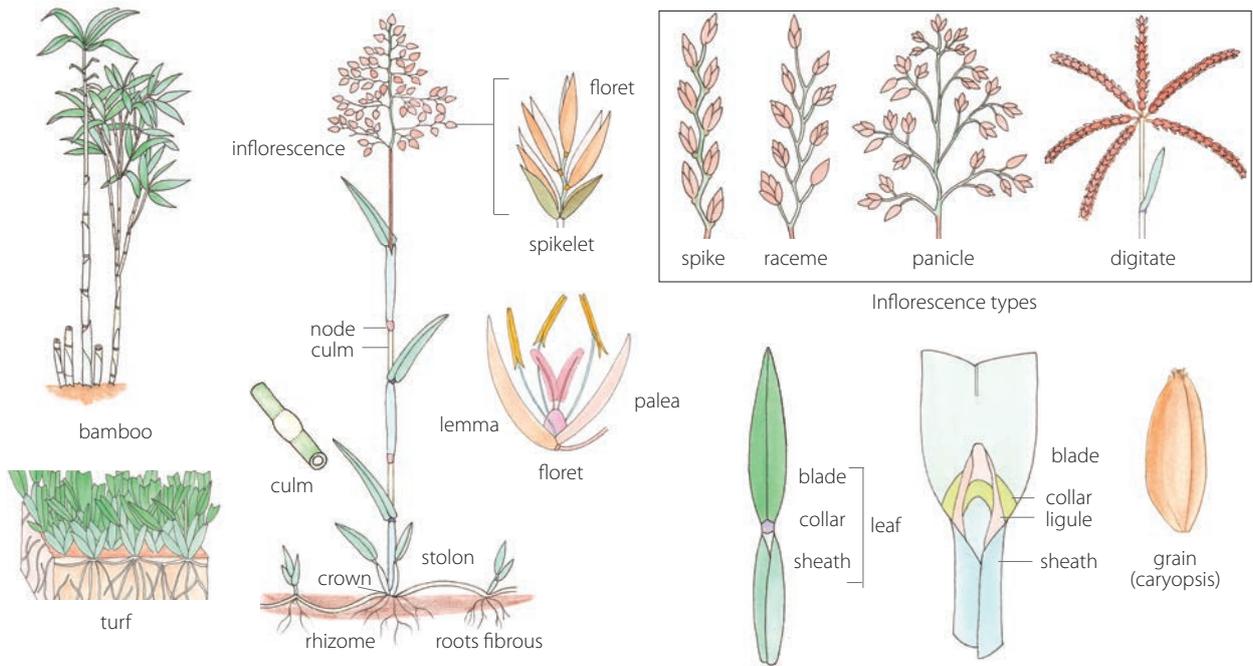
**grass** Any member of the family Poaceae that has some 9500 species that include cereal grasses, bamboos, natural and cultivated grasses (turf), and pastures.

A typical inflorescence of spikelets starting at the uppermost node. Florets are 2-ranked. Leaves are narrow, with parallel veins, and mostly arranged alternately in two opposite rows or at the base. A sheath attaches the blade to a node and at the junction of the blade and sheath there is usually a ligule. Stems (culms) are circular in cross-section and pithy or hollow with solid nodes. Roots are fibrous. The fruit is a grain (caryopsis).

see **grassland**

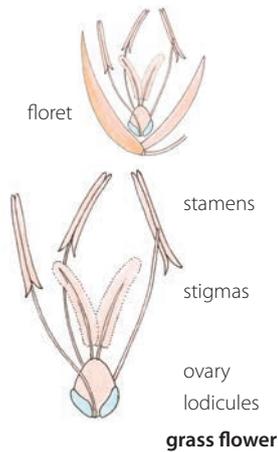
cf. **forb**

**Grass**

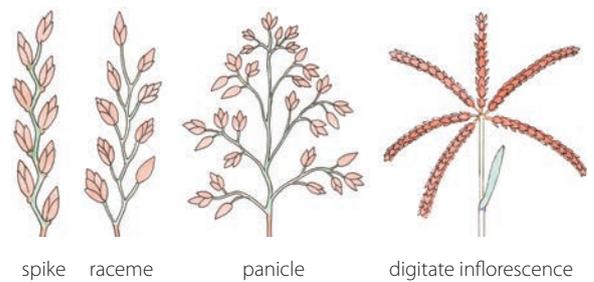


**grass flower**

Typically reduced to little more than reproductive organs and comprising two tiny lodicules, three stamens and a unilocular ovary bearing two stigmas. The flower, together with the two enclosing bracts, the lemma and palea, is a grass floret.



**Grass inflorescence**



**grass inflorescence** Typically an inflorescence of spikelets arranged in spikes, racemes or panicles.

**grassland** A grazing ecosystem with vegetation that is herbaceous and grasses being predominant. The rainfall is usually insufficient for trees. Temperate grasslands include the velds of South Africa, the puszta of Hungary, the pampas of Argentina and Uruguay, the steppes in Russia and the prairies of North America. Tropical grasslands, as the Serengeti in eastern Africa, and subtropical grasslands, have tall grasses and scattered trees.

see also **savanna**

**gravitropism** Growth of a plant in response to gravity, either downwards (positive gravitropism) or upwards (negative geotropism), as taproots that grow vertically downwards and shoots that grow vertically away from gravity.

= **geotropism**

see **tropism**

**gravitropic** Of or relating to gravitropism.

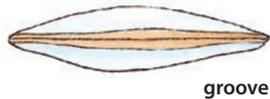
**gregarious flowering** Of plants within a species, and having the same seed origin, that flower at the same time, often after a long interval, although located at places distant from one another.

see also **masting**

cf. **plietesimal**

**grex, pl. greges** In orchid nomenclature, the hybrid progeny of an artificial cross between two parent plants.

**groove** A long narrow cut or depression, as that on the side of a plum stone.



**ground meristem** One of three regions of primary meristematic tissue that develops behind the apical meristem.

It differentiates into ground tissue (parenchyma, collenchyma and sclerenchyma).

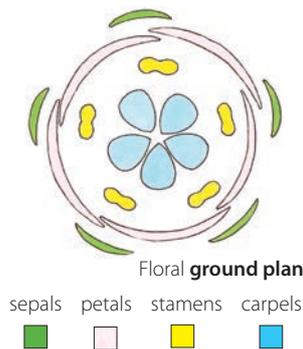
see **primary meristem**

see also **procambium, protoderm**

**ground plan**

A diagrammatic cross-section to show the organisation of the floral organs (floral ground plan) or the vascular system of a plant.

cf. **numerical plan**



**ground substance** A clear substance that makes up most of the volume of the cytoplasm.

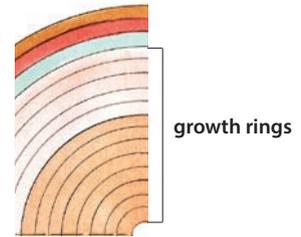
= **cytosol, hyaloplasm**

**ground tissue** Plant tissue other than that of the vascular system and the dermal system.

Comprises the majority of the plant body and is composed of three tissues, parenchyma, collenchyma and sclerenchyma, which are distinguished by their cell wall structures.

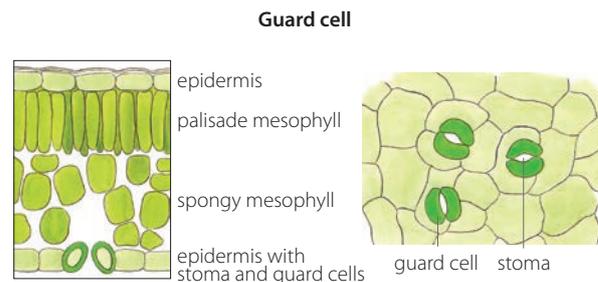
**growth ring** A distinct, usually single, annual band of secondary thickening that forms in the wood of some trees.

see also **early wood, late wood**



**guard cell** One of two cells located either side of a stoma in the epidermis of a leaf.

Changes in turgidity of the guard cells cause the stoma to open or close, regulating the flow of gases and water vapour into and out of the plant tissue.



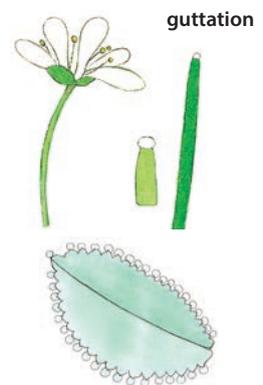
**gum** A viscid plant exudate that hardens. It is soluble or swells in water.

cf. **resin**

**guttation** Exudation of excess water in plants when transpiration is negligible and soil moisture is high.

It occurs on leaf margins, as strawberries and roses, and at the tips of leaves, as grasses and some members of the purslane family (Portulacaceae).

see **hydathode**



**gymnosperm** A seed-bearing plant that lacks flowers.

Gymnosperms have a life cycle alternating between a haploid sexual gametophyte generation and a diploid asexual sporophyte generation.

The sporophyte generation is the larger familiar green plant.

The gametophyte generation, (eggs and pollen), is microscopic and lives on the sporophyte.

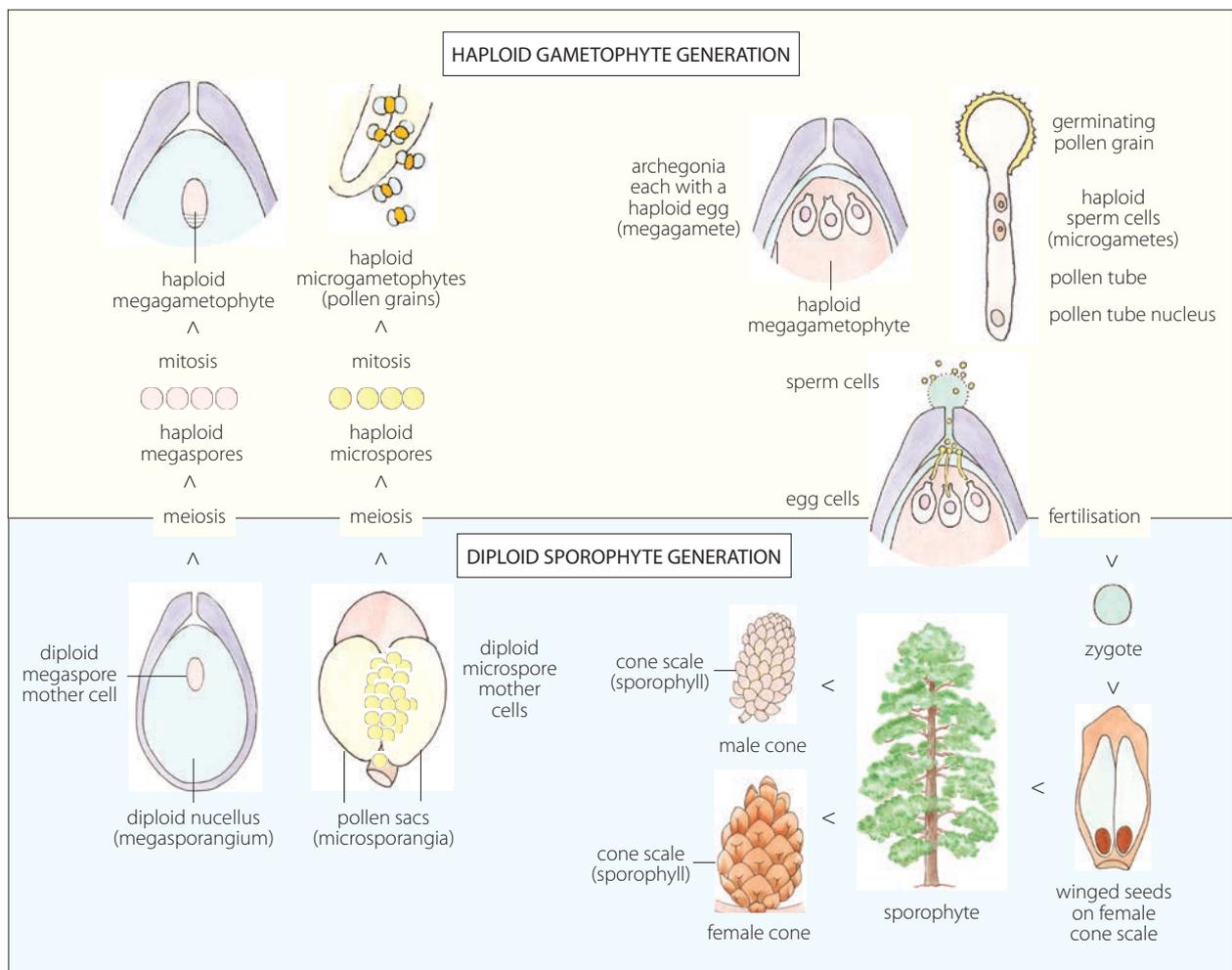
The reproductive structure is usually a unisexual cone. Female cones bear ovules and seeds exposed on scales rather than in an ovary that becomes a fruit, as angiosperms. Pollen is borne in sacs on scales of the male cones. Characteristics include simple fertilisation and haploid nutritional material (megagametophyte). Gymnosperm seeds have more than two cotyledons.

There are four divisions: conifers (Coniferophyta), cycads (Cycadophyta), ginkgo (Ginkgophyta) and gnetales (Gnetophyta).

see also **seed**

cf. **angiosperm**

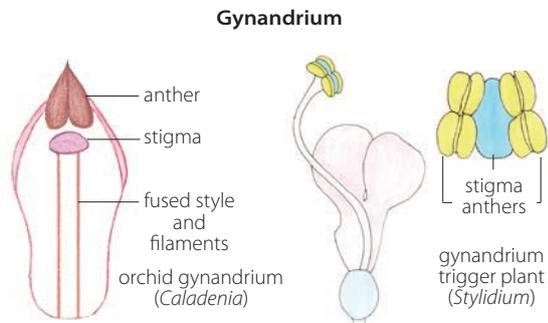
### Alternation of generations



**gynandrium**, *pl. gynandria* Of a flower, the central structure made up of the male stamen and the female stigma and style fused together, as in an orchid flower (Orchidaceae) and trigger plant flower (*Stylidium*).

= **column**, **gynostemium**

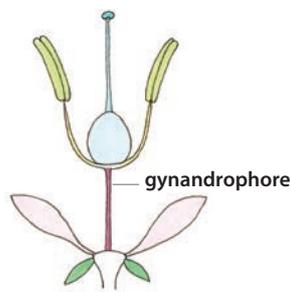
**gynandrous** With or relating to a gynandrium.



**gynandrophore**

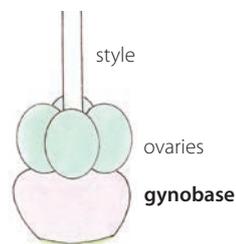
An elongated stalk (stipe), inserted on the receptacle, that bears the stamens and pistil of a flower above the corolla and calyx.

= **androgynophore**, **gonophore**



**gynobase**

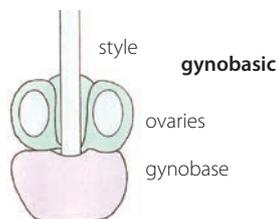
An elongation or enlargement of the receptacle bearing the gynoecium, as the swollen gynobase of the sage genus *Salvia* in the mint family (Lamiaceae).



**gynobasic**

Of a style arising from the gynobase and attached to the carpels.

A characteristic of the mint family (Lamiaceae).



**gynodioecious** Of a species with pistillate (female) flowers on one plant and bisexual flowers on a different plants within the same species.

see also **gynomonoecious**  
cf. **androdioecious**

**gynoecious** Of a plant having only female flowers.

see also **pistillate**  
cf. **androecious**

**gynoecium**, *pl. gynoecia*, **gynecium**, *pl. gynecia*

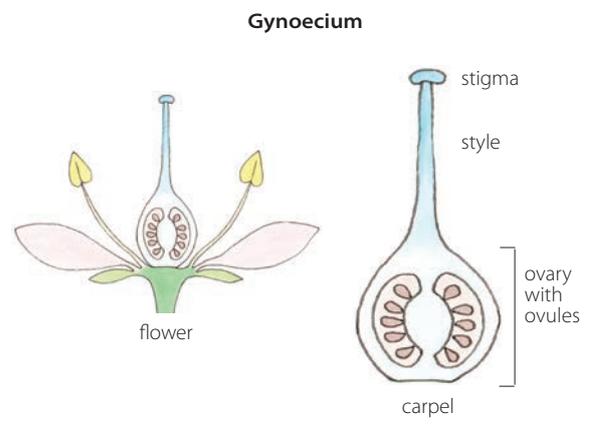
The female reproductive organ of a flower (pistil).

The basic unit is a carpel consisting of a stigma, style and an ovary enclosing one or more ovules each of which has an ovum (the female sex cell or gamete).

A gynoecium may have more than one carpel.

If there is only one carpel the terms carpel, pistil and gynoecium are synonymous.

see **apocarpous**, **syncarpous**



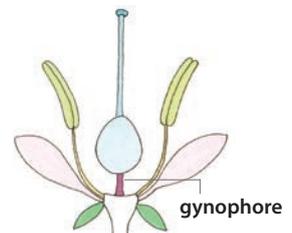
**gynomonoecious** Of a species with pistillate (female) and bisexual flowers on the same plant.

see also **andromonoecious**  
cf. **androdioecious**

**-gynous** A suffix referring to the gynoecium. Having carpels as specified.

**gynophore** A stalk-like prolongation (stipe) of the receptacle that raises the pistil above the other floral parts.

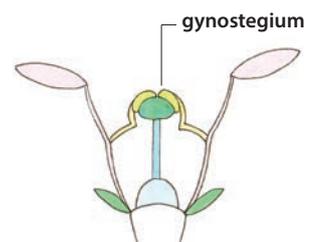
cf. **podogyne**



**gynostegium**

Formed by the fusion of the anthers to the stigma, as in the milkweed genus (*Asclepias*).

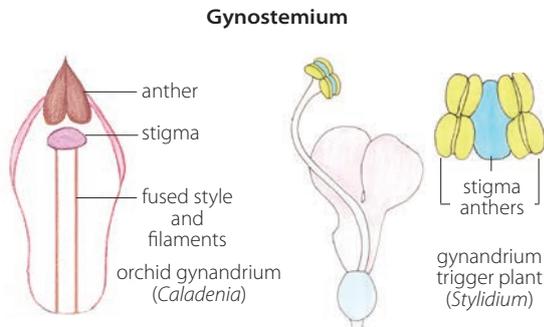
**gynostegial** Having or relating to a gynostegium.



**gynostemium**, *pl. gynostemia* Of a flower, the central structure made up of the male stamen and the female stigma and style fused together, as in an orchid flower (Orchidaceae) and trigger plant flower (*Stylidium*).

= **column**, **gynandrium**

**gynostemial** With or relating to a gynostemium.



**gypsophile** A plant preferring gypsum-rich soil.

**gypsophilous** Flourishing in soil containing or derived from gypsum.

**gypsophyte** A plant that tolerates or thrives in soil rich in gypsum.

**habit** The characteristic shape and growth form of a plant, as a herb, vine, liana, shrub or tree.

Terms like erect, creeping, scandent, woody and so on further describe the habit.

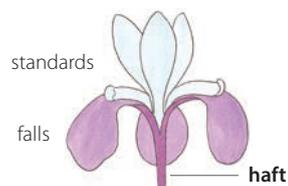
*cf.* **habitat**



**habitat** The environment in which plants and other organisms live.

*cf.* **biome**, **community**, **ecosystem**, **population**

**haft** The base of an organ when narrow or constricted, as the narrower part of the falls of an iris (*Iris*).

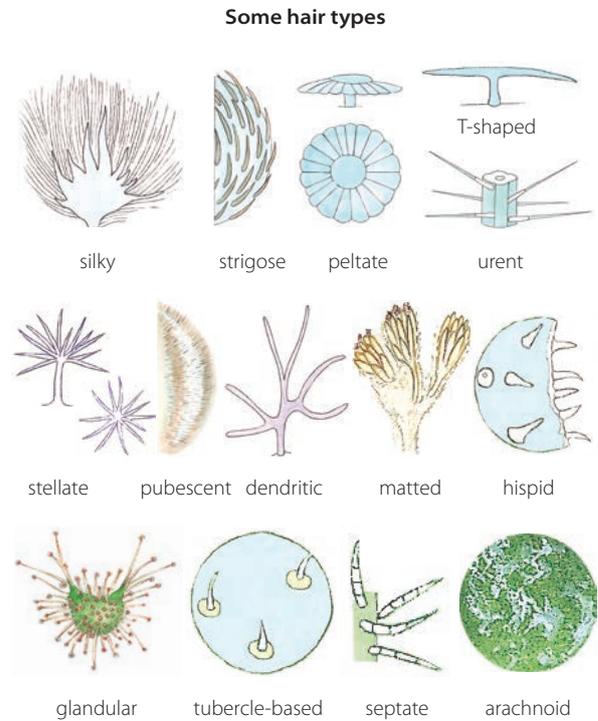


**hair** A unicellular or multicellular outgrowth of the epidermis that is branched or unbranched.

The texture varies, as a fine thread or a stiff bristle.

They are variously shaped, as T-shaped or stellate and may be glandular or non-glandular.

*see* **indumentum**



**half-equitant vernation**

Of young leaves in the unopened leaf bud with the margins folded to embrace one margin of another leaf.

= **obvolute vernation**



**half-equitant vernation**

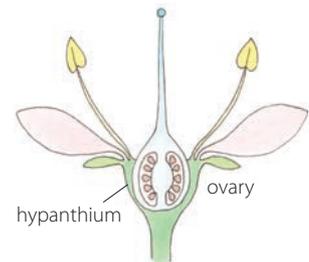
**half-inferior ovary**

An ovary having the lower half embedded in the hypanthium and the upper part free.

= **semi-inferior ovary**

*cf.* **inferior ovary**,

**superior ovary**



**half-inferior ovary**

**halophile** A plant living and thriving in a saline environment.

**halophilous** Growing in soils with high concentrations of salt.

**halophobe** A plant that does not tolerate a saline environment.

**halophobic** Not tolerant of soils with high concentrations of salt.

**halophyte** A salt-resistant or salt-tolerant plant that completes its life cycle in soils or waters containing high salt concentrations. Species like saltbushes (*Atriplex*) and glassworts (*Salicornia*) absorb and store salt or excrete it.

**halophytic** Of or relating to a halophyte.

**halosere** An ecological succession that starts in saline soil or water.

**hamulus, pl. hamuli** A small hook.

Of orchids, a stipe formed from the apex of the rostellum.

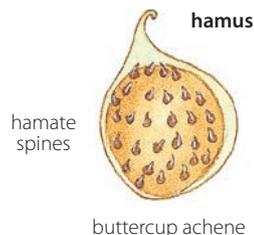
*cf.* **tegula**

**hamulate** With a small hook at the tip; with little hooks.

**hamus, pl. hami** A hook.

**hamate** Bent at the end like a hook.

Hooked at the apex, as the achene of some buttercups (*Ranunculus*).



**hapaxanthic** Of stems (rather than whole plants) that flower and bear fruit once in their lifetime then die, as palms that form stem clusters. Most commonly used to describe palms (Arecaceae) and bamboos.

*cf.* **iteroparous, monocarpic, pleoanthic, polycarpic, semelparous**

**haploid** The number ( $n$ ) of chromosome sets in a gamete that is half the number of chromosome sets ( $2n$ ) in a somatic cell.

One chromosome set occurs in gametes of diploids, two chromosome sets occur in gametes of tetraploids, and so on.

*see* **diploid, ploidy**

**haplomorphic** With floral whorls spirally arranged and appearing hemispheric to conoidal overall, as flowers of the genus *Illicium*.

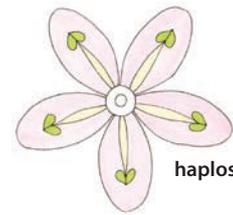


**haplostemonous**

With a single whorl of stamens.

With as many stamens as petals.

= **isostemonous**



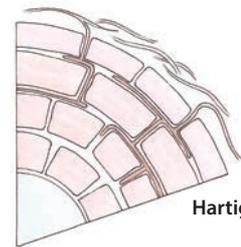
**hardwood** The wood of angiosperms, as eucalypts, beech and blackwood, though the wood is not always hard.

*cf.* **softwood**

**harmemogathy** A mechanism facilitating changes in shape and size by varying the degree of hydration, as occurs in pollen grains.

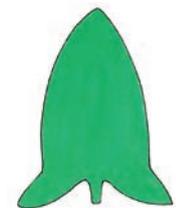
**Hartig net** The network of hyphae that ramify through the intercellular spaces of the roots of some plants.

*see* **ectomycorrhiza**



**hastate** Shaped like the head of a halberd, with two spreading, somewhat triangular lobes at the base, as some leaves.

*cf.* **saggitate**

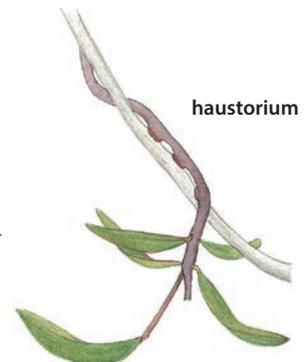


**hastula** Of palms (Arecaceae), a flap of tissue at the junction of the petiole and the lamina in most palmate and costapalmate leaves.



**haustorium, pl. haustoria**

A root-like projection from the stem of a parasitic plant that penetrates the cell walls of the host plant in order to absorb nutrients and water, as the haustoria on creeping mistletoe (*Muellerina eucalyptoides*).

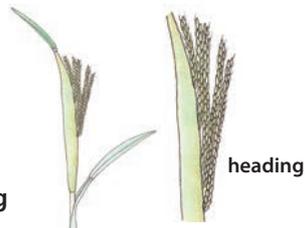


**head** A compact mass of leaves, flowers or fruit, as a head of lettuce, a head of grain or a dense cluster of flowers.

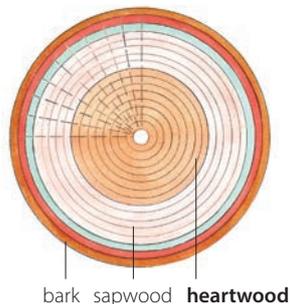
Of a racemose inflorescence, as a daisy capitulum (Asteraceae).

Of a cymose inflorescence, a glomerule, as saltbushes (*Atriplex*).

**heading** Of grasses (Poaceae), emergence of the inflorescence from the uppermost sheath on a culm.  
see **boot stage, booting**



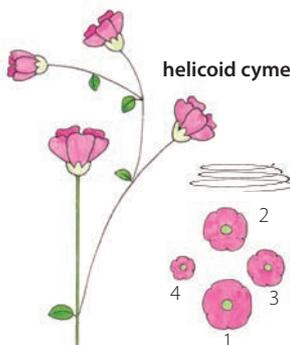
**heartwood**  
The central usually darker inactive central wood of a trunk or branch made up of non-functioning sapwood cells infiltrated with other substances like lignin.  
= **duramen**



**heathland** A plant community, typically with low-nutrient soils, dominated by small-leaved shrubs, often of the Ericaceae family.

**helicoid** Having the form of a flattened coil or spiral.

**helicoid cyme**  
A flattened, spirally coiled cymose inflorescence with a single new stem developing repeatedly on the same side of the axis.  
= **bostryx**  
see also **monochasium**  
cf. **scorpioid cyme**



**heliophile** A plant that thrives in sunlight.  
**heliophilic, heliophilous** Thriving in sunlight, as the sunflower (*Helianthus*).  
cf. **heliophobic**

**heliophobe** A shade-loving plant that has an aversion to sunlight.  
**heliophobic** Thriving in shade.  
cf. **heliophilic**

**heliophyte** A plant that tolerates or thrives in sunlight.

**heliophytic** Tolerating or thriving in sunlight.

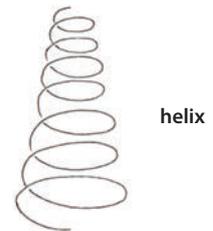
**heliotropism** Originally used when movement of some plants was thought to be a response to the sun and now used to describe a plant's response to light.

see **tropism**

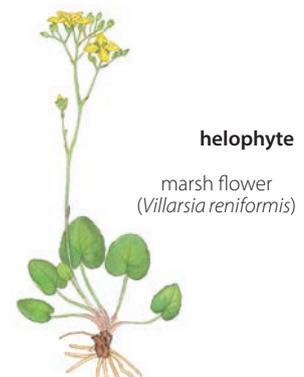
**heliotropic** Of or relating to heliotropism.

**helix** A spiral line that follows the path of a cylinder or cone at a constant angle.

**helical** Of or having the shape of a helix. Spiralled.  
cf. **helicoid**

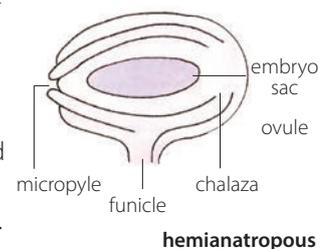


**helophyte** Plants with perennating buds on rhizomes in water-saturated soil like marshes and pond or lake edges, as running marsh flower (*Villarsia reniformis*).  
see also **cryptophyte**



**hemi-** A prefix meaning half.

**hemianatropous** Of ovule orientation, with the ovule turned at 90° so that it is at a right angle to the funicle and has the chalaza and micropyle on each side.  
see **ovule orientation**



**hemicyptophyte** Herbaceous plants having perennating buds on the surface of the soil and aerial shoots dying down with the onset of adverse conditions.  
see also **chamaephyte, cryptophyte, phanerophyte, therophyte**

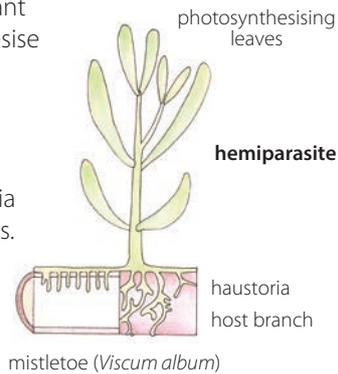
**hemiepiphyte** A plant with a life cycle that includes both terrestrial and epiphytic phases. Primary hemiepiphytes, like strangler figs (*Ficus*), have seeds germinating in a tree canopy and roots that grow downwards and become rooted in the ground where the plant continues to grow. Secondary hemiepiphytes, like the vanilla orchid (*Vanilla planifolia*), have seeds that germinate and grow in the soil but also roots that climb a host tree where the orchid eventually becomes epiphytic.

**hemiepiphytic** Of or relating to a hemiepiphyte.

**hemiparasite** A plant that can photosynthesise but also parasitises another plant, as mistletoe that gets nourishment from its host through haustoria inserted into branches.

= **semi-parasite**

**hemiparasitic** Of or relating to a hemiparasite.



**hepta-** A prefix meaning seven.

**herb** A plant that does not develop a woody stem. It may be annual, biennial or perennial. Includes both forbs and graminoids.

**herbaceous** Not woody. Usually green and soft in texture with soft stems.

**herbfield** A vegetation type dominated by forbs and lacking trees and dense shrubs.

= **herbland**

**herbivore** An animal that eats only plants.

**herbivorous** Feeding on plants, as many animals: includes leaf chewing, sap sucking, seed predation and gall induction by insects.

= **phytophagous**

cf. **carnivorous**

**herbland** A vegetation type dominated by forbs and lacking trees and dense shrubs.

= **herbfield**

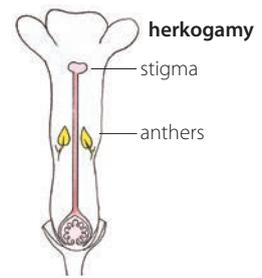
**heredity** The passing on of genes that determine traits from parents to offspring, by means of sexual or asexual reproduction.

= **inheritance**

**herkogamy** Positioning of the anthers and stigma in a flower so that pollen is unable to reach the stigma, as the cowslip (*Primula vulgaris*).

see **pin, thrum**

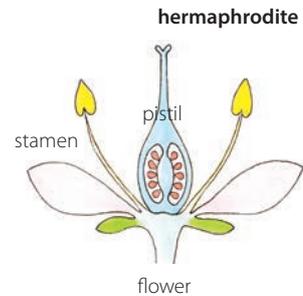
cf. **dichogamy**



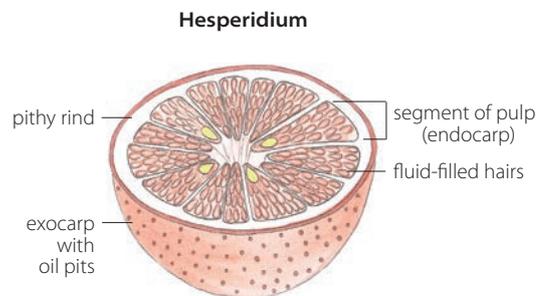
**hermaphrodite** Of a flower with stamens and a pistil or pistils that are fertile. A bisexual or perfect flower.

**hermaphroditic** Flowers with stamens and a pistil or pistils that are fertile. Bisexual.

cf. **unisexual**



**hesperidium** A fleshy fruit, with the pulp in segments, surrounded by a separable pithy rind: derived from a usually five-carpelled septate superior ovary. The exocarp (outer layer of the rind) contains volatile oils in pits and the endocarp (fleshy interior) is composed of fluid-filled specialised hair cells. Typical fruit of the citrus genus (*Citrus*), as orange, lemon and grapefruit.

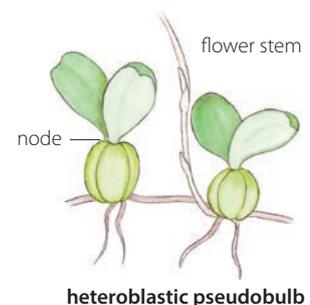


**hetero-** A prefix meaning different.

cf. **homo-**

**heteroblastic pseudobulb** Of orchids having a pseudobulb consisting of a single internode that bears the leaves, as nodding bulbophyllum, (*Bulbophyllum nutans*).

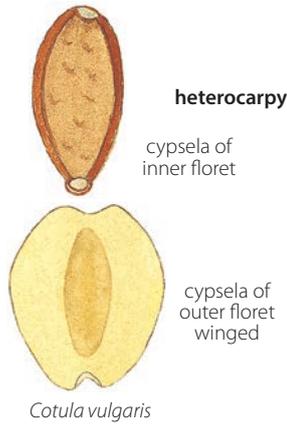
cf. **homoblastic pseudobulb**



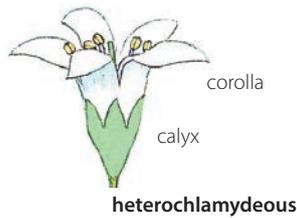
**heteroblasty** Having leaves that show a striking difference in appearance between the juvenile and the adult condition, as leaves of mountain clematis (*Clematis aristata*).  
**cf. homoblasty**  
**heteroblastic** Relating to heteroblasty.



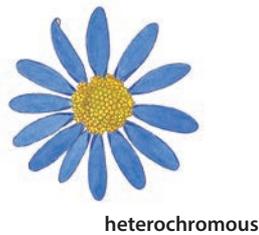
**heterocarp**  
Producing two kinds of fruits from the one inflorescence, as slender cotula (*Cotula vulgaris*) that has cypselas from the outer florets differing from those of the inner florets.  
**heterocarpous** Of or relating to heterocarp.  
**cf. amphicarpic**



**heterochlamydeous, heterochlamydous**  
Having a perianth clearly differentiated into a calyx and a corolla.  
**cf. chlamydeous**



**heterochromous**  
Having different colours, as a daisy capitulum with the disc florets one colour and the ray florets another.  
**cf. homochromous**



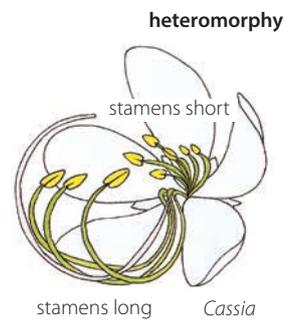
**heterogamy** Producing flowers of two or more kinds: bisexual, unisexual and/or neuter.  
**cf. homogamy**  
**heterogamous** Of an inflorescence with two or more kinds of flowers, as some in the daisy family (Asteraceae) that have bisexual disc florets and unisexual ray florets.  
**cf. homogamous**

**heterogeneous** Not uniform in composition. Of ecology, having a rich variety of species, habitats, soil types etc.  
**cf. homogeneous**

**heterogonous** Having flowers of a species with differing relative lengths of stamens and pistils.  
**cf. heterostyly, homogonous**

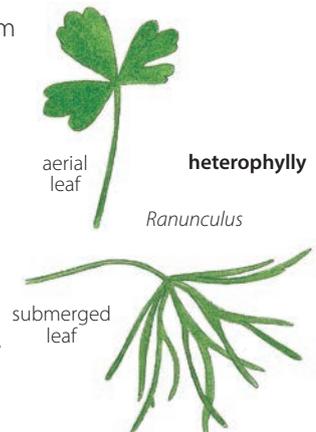
**heteromerous** Having whorls with a different number of parts, as a flower with sepals, differing in number from the petals, carpels and/or stamens.  
= **anisomerous**  
**cf. isomerous**

**heteromorphy**  
The condition of existing in different forms.  
**heteromorphic, heteromorphous**  
Having two or more distinct forms, as the stamens of cassia (*Cassia*).  
**cf. homomorphic**

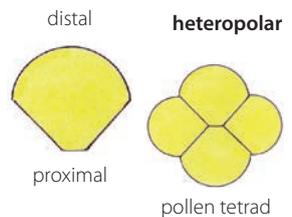


**heteromycotroph** A plant that obtains nutrients partly as a mycotroph. It is usually not green due to inadequate photosynthesis.  
**heteromycotrophic** Of or relating to a heteromycotroph.  
**see trophic**

**heterophylly** Leaf form alteration in response to environmental conditions, as aquatic plants with underwater leaves differing from aerial or floating leaves.  
**cf. heteroblasty**  
**heterophyllous**  
Relating to heterophylly.  
**cf. heteroblastic, homoblastic**



**heteropolar** Of pollen grains in a tetrad having different proximal (facing towards the centre) and distal halves (facing away from the centre).  
**cf. isopolar**



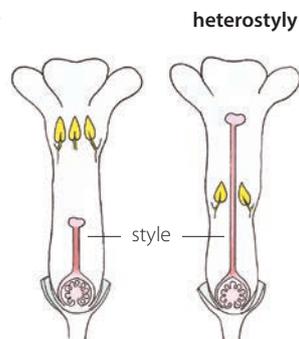
**heterosis** The tendency of cross-breeding to produce a plant with a greater hardiness than its parents.  
= **hybrid vigour**

**heterospory** Having male and female spores (microspores and megaspores) that develop in separate sporangia (microsporangia and megasporangia), as seed plants (gymnosperms and angiosperms) and some ferns and fern allies. Gametophytes from these spores are either male or female and produce either male or female gametes.  
*cf.* **homospory**

**heterosporous** Having different sporangia that produce morphologically different types of spores.  
*cf.* **homosporous**

**heterostyly** Having styles of different lengths in flowers on the same plant, as the cowslip (*Primula vulgaris*).  
*see* **distily, pin, tristyly, thrum**

*cf.* **herkogamy, homostily, heterostylous**  
Exhibiting heterostyly.  
*cf.* **homostylous**



**heterotroph** A living organism that gets its food from other plants or animals. Includes all animals, some fungi and most bacteria.

*cf.* **autotroph**  
**heterotrophic** Of or relating to a heterotroph.  
*see* **trophic**

**heterotypic synonym** In nomenclature, a name used with two or more names and two or more types for the same taxon.

**heterozygous** Having two different alleles at a locus on a chromosome.  
*cf.* **homozygous**

**hexa-** A prefix meaning six.

**hexamerous** Having flower parts, such as petals, sepals and stamens, in whorls of six or multiples of six. 6-merous.  
*see* **-merous**

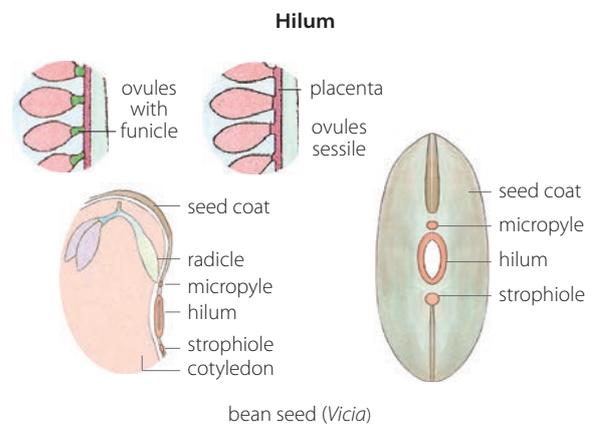
**hibernal** Of or appearing in winter.  
*cf.* **aestival, autumnal, vernal**

**hierarchy** The successive levels at which taxa are classified.  
*see* **rank, taxonomic hierarchy**

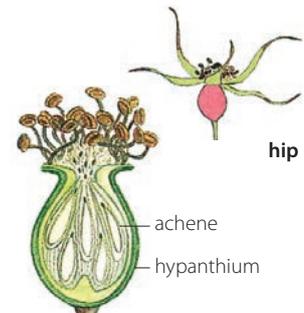
**hilum, pl. hila** The scar on a seed coat that marks its point of detachment from the fruit wall. It represents the point of attachment of the ovule to the placenta, either directly when it is sessile or by a stalk, the funicle, that is an extension of the ovule wall.

The central point in a starch grain around which starch is deposited.

**hilar** Relating to a hilum.

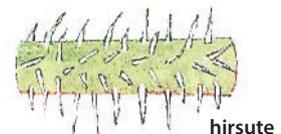


**hip** The common name for the fruit of the rose genus (*Rosa*). The hollow hypanthium contains the achenes that are the true fruit.  
= **cynarrhodium**  
*see* **accessory fruit**



**hippocrepiform** Shaped like a horse-shoe.

**hirsute** Rough due to a covering of coarse, longish hairs.  
*cf.* **hispid, villous**



**hirsutulous** Slightly hirsute.

**hirtellous** Minutely hirsute. With a covering of minute somewhat rigid hairs.

**hispid** Rough due to a covering of erect stiff hairs or bristles.  
*cf. hirsute*



hispid

**hispidulous** Minutely hispid.

**histology** Study of the cellular details of tissues.  
**histological** Of or relating to histology.

**hoary** Pale silvery-grey.  
 Covered with a greyish to whitish layer of very short, closely interwoven fine hairs.  
 = **canescent**

**holomycotroph** A plant that get its nutrients entirely from fungi and never carries out photosynthesis, as the underground orchid (*Rhizanthella*).

**holomycotrophic** Of or relating to a holomycotroph.  
*see trophic*

**holophyte** An organism that synthesises its own food through photosynthesis, as green plants and some bacteria.  
*see also autotroph*

**holophytic** Of or relating to a holophyte.

**holotype** The single specimen used to describe a new taxon.

**homo-** A prefix meaning the same.  
*cf. hetero-*

**homoblasty** Having leaves that show a small and gradual change in appearance from the juvenile to adult condition.

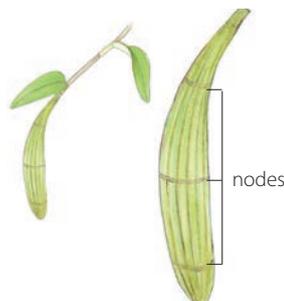
*cf. heteroblastic*

**homoblastic** Relating to homoblasty.

**homoblastic pseudobulb**

Of orchids having a pseudobulb with several internodes, as the pigeon orchid (*Dendrobium crumenatum*).

*cf. heteroblastic pseudobulb*



homoblastic pseudobulb

**homocarp** Having all flowers producing fruits that are of the one kind.

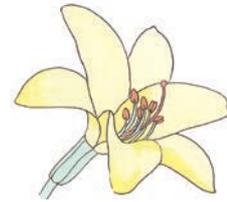
*cf. heterocarp*

**homocarpous** Of or relating to homocarp.

**homochlamydeous**

Having a perianth composed of similar segments (tepals) and not clearly divided into a calyx and a corolla.

*cf. chlamydeous*

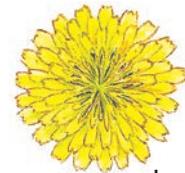


homochlamydeous

**homochromous**

Alike in colour, as a daisy capitulum having all florets the same colour.

*cf. heterochromous*



homochromous

**homogamy** Producing flowers of one kind.

Having the anthers and the stigma of a bisexual flower maturing at the same time.

Fertilisation of a flower by its own pollen or that of another flower on the same plant.

*cf. heterogamy*

**homogamous** Of a plant or inflorescence having flowers of one kind, either bisexual, male or female.

Of a flower, having stamens and pistils that mature simultaneously, thus ensuring self-pollination.

*cf. heterogamous*

**homogeneous** Of the same kind.

Of the ecology of an area, having a lack of variety in species, soil types and uniform habitats.

Applies mainly to man-made plant communities.

Few if any natural landscapes are composed of homogenous communities.

*cf. heterogeneous*

**homogonous** Having all flowers of a plant alike in respect of the stamens and pistils.

*cf. heterogonous, homostyly*

**homologous** Similar in form or function.

In genetics, of or relating to a homologue.

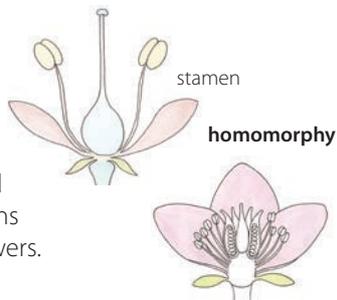
In phylogenetics, of similar characters in two different taxa that can be attributed to their presence in a common ancestor, as the pentadactyl limb in humans and whales.

*cf. analogous*

**homologue** One of the corresponding chromosomes from the sperm and the egg that are similar because they carry the same genes in the same locations but the versions of the genes differ. Homologous chromosomes in pairs are diploid (2n), in threes are triploid (3n), in fours are tetraploid (4n) and so on.

**homomorphy**  
Similarity of form.

**homomorphic, homomorphous**  
Having the same kind or form, as the stamens of many different flowers.  
*cf. heteromorphic*



**homonym** In nomenclature, two or more taxa that have been given the same scientific name. The accepted name is usually the first name published and an alternative name is given to the other taxon.

**homophylly** Having leaves all of the same kind.  
*cf. heterophylly, isophylly*  
**homophyllous** Relating to homophylly.

**homoplasy** In phylogenetics, similar characters that have evolved from different ancestral sources, as the evolution of eyes in very different groups like vertebrates and octopuses.

= **convergent evolution, parallel evolution**  
*cf. plesiomorphy*

**homoplastic** Of or related to homoplasy.

**homospory** Having morphologically similar, equal-sized spores within the same sporangium, as most bryophytes and pteridophytes. All spores germinate and develop into free-living gametophytes that are bisexual, as a thallus with male gametes (in antheridia) and female gametes (in archegonia).

*cf. heterospory*

**homosporous** Having a sporangium with morphologically similar spores that are not differentiated by sex.

*cf. heterosporous*

**homostyly** With styles of a constant length and shape in flowers of the same species.

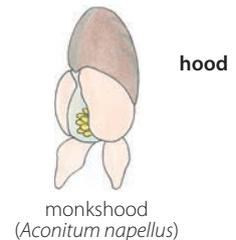
*cf. heterostyly*

**homostylous** Exhibiting homostyly.  
*cf. heterostylous*

**homotypic synonym** In nomenclature, a name used when there are two or more names but only one type for a taxon.

**homozygous** Having two identical alleles at a locus on a chromosome.  
*cf. heterozygous*

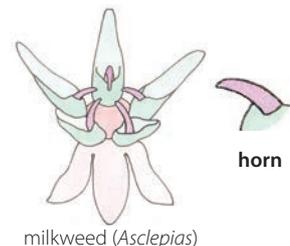
**hood** A hollow arched covering, as the upper sepal of monkshood (*Aconitum napellus*).  
= **cucullus**



**hormone** Of plants, a chemical substance, released in small quantities, that regulates growth and development.  
*see phytohormone*  
*cf. pheromone*

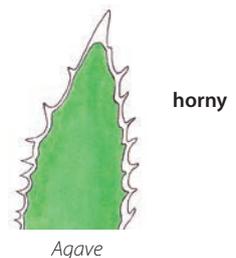
**horn** A curved, pointed appendage shaped like an animal's horn, as the appendages on the lobes of the corona of a milkweed (*Asclepias*).

**horned** Having a horn.  
*see corniculate*



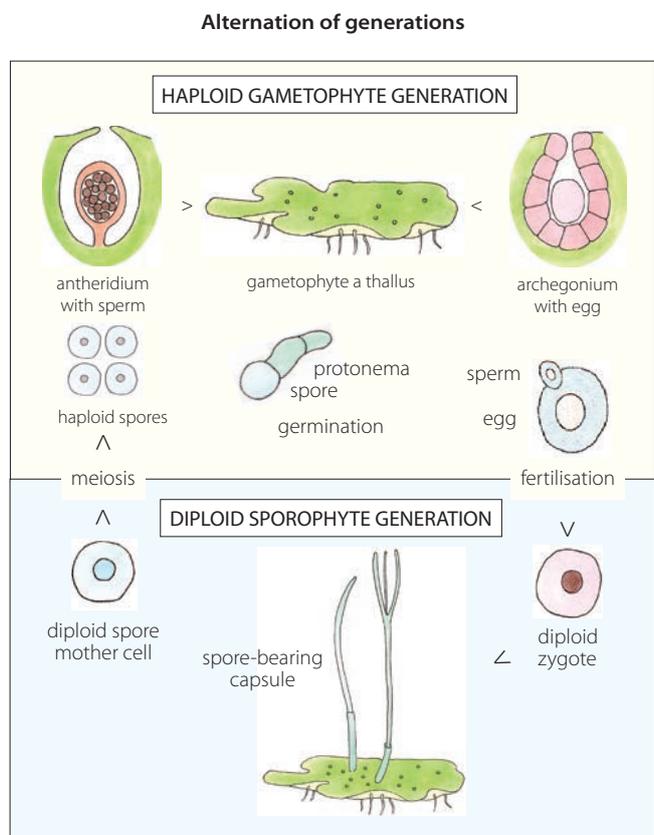
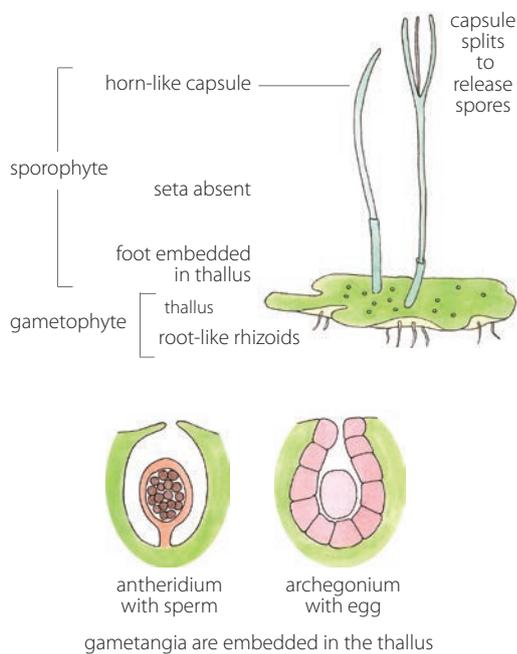
**hornworts** *see page 138*

**horny** With a hard, smooth texture, as the leaf margin of some agaves. Having an incurved, tapering appendage like the horns of cattle.  
= **corneous**



**hornworts** One of three major groups of nonvascular land plants (bryophytes) that are photosynthetic, reproduce by spores and lack flowers, true leaves and roots. A hornwort has two alternating generations, the larger haploid gamete-producing gametophyte generation and the smaller diploid spore-producing sporophyte generation that has a horn-like capsule that remains attached to the female gametangium (archegonium). The haploid gametophyte is a thallus, with gamete producing sex organs (the female archegonia and/or the male antheridia) that are partially or completely embedded in the upper surface. The diploid sporophyte lacks a seta and comprises a horn-like capsule and a foot embedded in the thallus. A male sperm from an antheridium fertilises a female egg in an archegonium, that then develops into a diploid spore-producing sporophyte. The diploid spores in the capsule undergo meiosis to form haploid spores that are dispersed and develop into gametophytes, thus beginning the life cycle anew. *see bryophyte*

### Hornworts



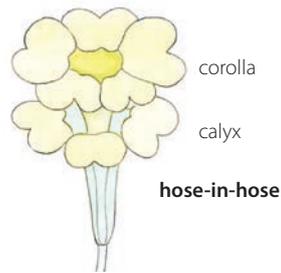
**horsetail** The horsetail family (Equisetaceae) comprises one genus (*Equisetum*) of vascular plants that reproduce by spores rather than seeds. Stems are erect, jointed and grooved with whorls of branches and leaves. Spores are homosporous and borne in cone-like strobili. *see fern allies*



**hort., horti** When placed after a taxon name, it indicates the use of that name in horticulture.

**horticulture** The cultivation of commercial or domestic garden crops, usually fruits, vegetables and ornamental plants.

**hose-in-hose** Of a flower with a petaloid calyx and the tube of the corolla inserted in the tube of the calyx so that the flower appears to be double, as primrose (*Primula*).  
see **double**



**host** A plant that sustains another plant or animal species. It can involve mutualism, commensalism or parasitism, as species of eucalypt (*Eucalyptus*) and wattle (*Acacia*) that host the parasitic harlequin mistletoe (*Lysiana exocarpi*).

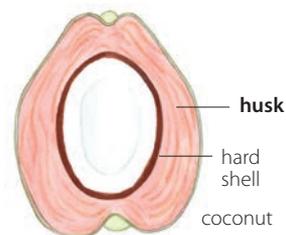


**hull** The outer covering of some fruits and seeds, as the pod of peas or the husk of a grain.  
The persistent calyx of a strawberry.

**hummock grass** Tussock-forming grass with spiny leaves in the genus *Triodia* that are native to dry inland habitats in Australia.

**humus** That part of the soil formed by the decomposition of animal or vegetable matter.

**husk** The dry outer covering of some fruits and seeds, as the foliaceous leaves on a corn cob or the fibrous covering of a coconut.



**hyalescent** Somewhat hyaline.

**hyaline** Thin, colourless and translucent, almost like clear glass, as the margins of some bracts and leaves.

**hyaloplasm** A clear substance that makes up most of the volume of the cytoplasm.  
= **cytosol, ground substance**

**hybrid** The offspring from a cross between parent plants of different varieties, subspecies, species or genera.  
= **cross**  
cf. **purebred**

**hybrid formula** The names of the parents of a hybrid linked by a multiplication sign, as *Geranium macrorrhizum* x *G. dalmaticum*.

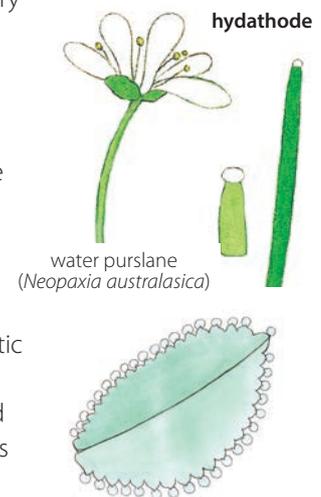
**hybrid vigour** The tendency of cross-breeding to produce a better plant than its parents.  
= **heterosis**

**hybridisation** The crossing of parent plants from different varieties, subspecies, species or genera to produce offspring called a hybrid.

**hydathode** A secretory structure, as glands or pores, that removes excess water in plants when transpiration is negligible and moisture in the roots is high. Hydathodes occur in some herbaceous land plants like grasses and are widespread in aquatic plants.

They are usually located on the margins, surfaces and tips of leaves.

see **guttation**



**hydric** Of, relating to or adapted to an environment that receives abundant amounts of water, as a wetland.  
cf. **mesic, xeric**

**hydro-** A prefix meaning water or containing hydrogen.

**hydrochasy** Movement caused by the absorption of water in plant parts that are mostly dead. Results in the opening of capsules after rain in most of the succulent plant family Aizoaceae.

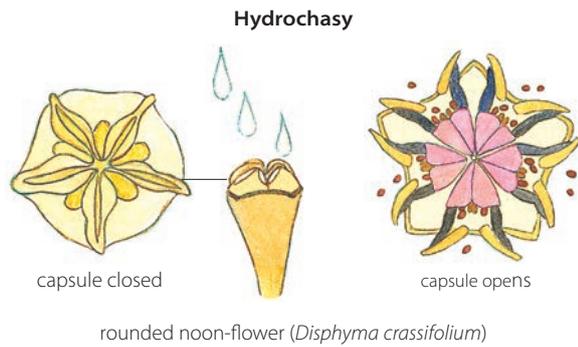
**hydrochasy** page 140 (cont.)

= **hygrochasy**

cf. **xerochasy**

**hydrochastic** Of or related to plant movement caused by the absorption of water.

= **hygrochastic**



**hydrochore** A plant that depends on water for the dispersal of its pollen, spores, seeds or fruit.

**hydrochory** Dispersal of pollen, spores, seeds or fruit by water.

*cf.* **hydrogamy, hydrophily**

**hydrochorous** Of or relating to hydrochory.

**hydrogamy** Dispersal of pollen and pollination by water.

= **hydrophily**

*cf.* **hydrochory**

**hydrogamous** Of or relating to hydrogamy.

**hydrolysis** A chemical reaction requiring water in which an enzyme breaks a larger molecule into smaller subunits, as starch, a polysaccharide, is broken down into maltose, a disaccharide.

**hydrophile** A plant species that is pollinated by water.

**hydrophily** Dispersal of pollen and pollination by water.

= **hydrogamy**

**hydrophilous** Pollinated by water-borne pollen.

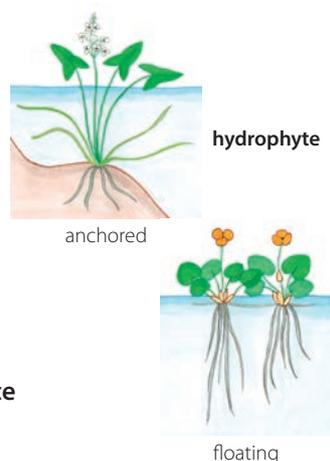
**hydrophyte**

An aquatic plant that grows in water or waterlogged soil. It may be anchored or floating and has perennating buds below water level.

*see also* **cryptophyte**

*cf.* **hygrophyte,**

**mesophyte, xerophyte**



**hydosere** An ecological succession that starts in an aquatic habitat.

**hydrotropism** Growth or movement of a plant towards or away from water.

*see* **tropism**

**hydrotropic** Of or relating to hydrotropism.

**hygrochasy** Movement caused by the absorption of water in plant parts that are mostly dead.

= **hydrochasy**

*cf.* **xerochasy**

**hygrochastic** Of or related to plant movement caused by the absorption of water.

= **hydrochastic**

**hygrophile** A plant living and thriving in moist places.

**hygrophilous** Thriving in moist places.

**hygrophyte** A plant adapted to waterlogged soil and a damp atmosphere, as marsh plants.

*cf.* **hydrophyte**

**hygrophytic** Needing wet or waterlogged soil to grow in.

**hygroscopic** Gaining or losing moisture depending on the surrounding humidity. Expanding when water is present and contracting in its absence causing changes in movement, as the opening and closing of some grass leaves or the teeth at the top of a moss capsule that open to release spores.

*see* **bulliform cell**

**hypanthium**

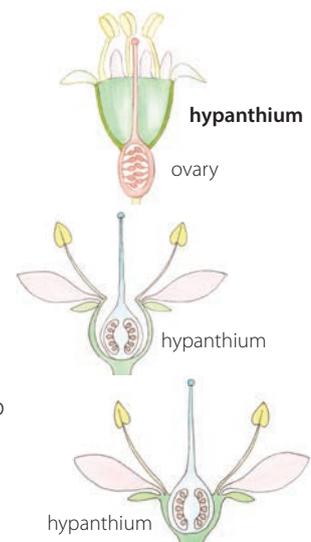
A tubular or cup-shaped enlargement of the receptacle and/or the bases of the floral parts.

It bears the petals, sepals and stamens. It is either above the ovary, below the ovary and free, or variously united with it.

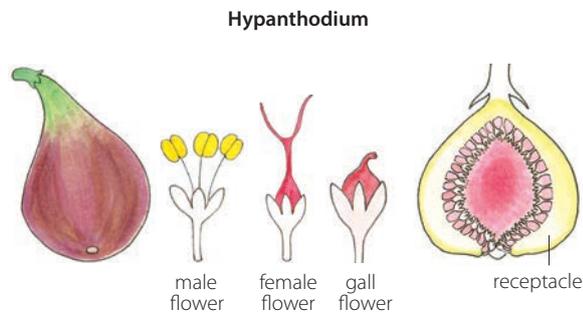
**hypanthial** Relating to the hypanthium.

= **floral tube**

*cf.* **receptacle**



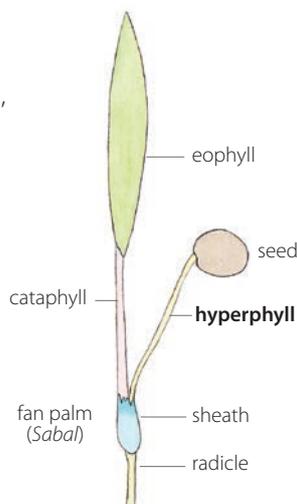
**hypanthodium** Characteristic inflorescence of the fig genus (*Ficus*).  
 The fleshy, hollow receptacle is lined with numerous sessile flowers, the flowers being male, female, or female and sterile (gall flowers).  
 The female flowers develop into numerous fruitlets.  
 see **syconium**



**hyper-resupinate** In some orchids, of flowers twisted at more than 180°.

**hypereutrophic** Of a nutrient rich body of water, with problems arising from lack of oxygen due to excessive plant and algal growth.  
 see **trophic**  
 cf. **eutrophic**

**hyperphyll** Of palms with remote germination, and some other monocotyledons, the first structure to emerge from the seed.  
 It grows down into the soil, forming a swelling from which the first seedling root (radicle) and the plumular leaves emerge.  
 = **cotyledonary petiole**

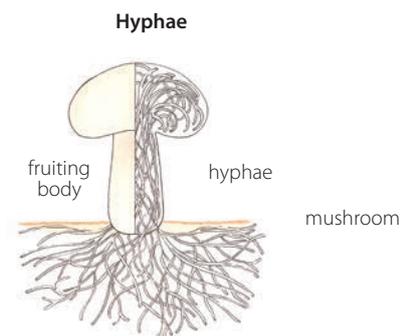


**hyperstomatous** Of leaves with stomata only on the upper surface.  
 = **epistomatous**  
 cf. **amphistomatous, hyperstomatous**

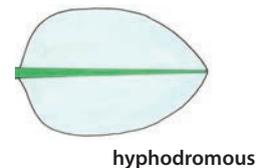
**hypertonic** Having the higher osmotic pressure of two fluids.  
 cf. **hypotonic, isotonic**

**hypha, pl. hyphae** Long branched thread-like filaments that make up a fungus.  
 Some give rise to erect stalks with fruiting bodies like mushrooms or toadstools.  
 The network of hyphae (a mycelium) may be above ground, as bread moulds, or underground.  
 It extends long distances underground and can carry nutrients to roots that would otherwise be inaccessible.

see also **mycorrhiza, osmotrophy**  
**hyphal** Relating to or like hyphae.

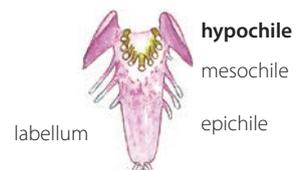


**hypodromous** Of leaves with a distinct midrib but other veins absent or concealed within the fleshy leaf.



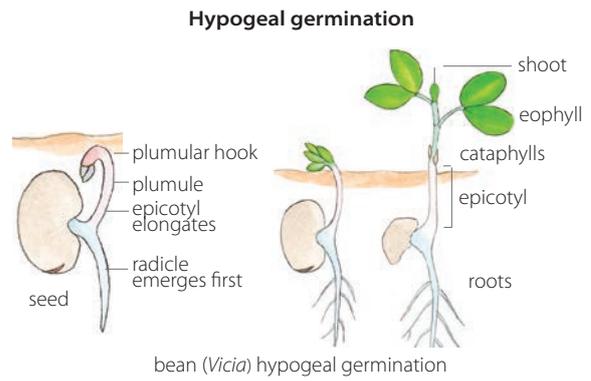
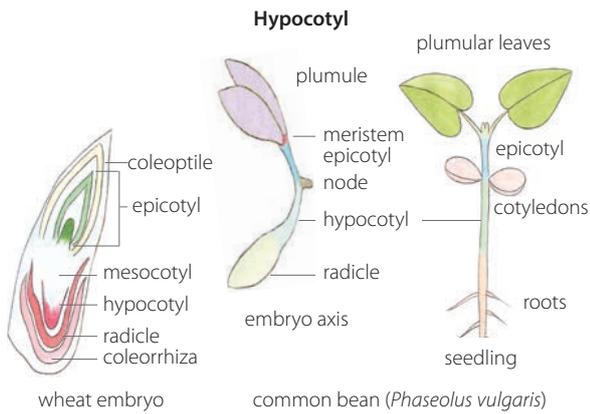
**hypo-** A prefix meaning beneath or under.

**hypochile** Of orchids, the basal portion of the labellum, as pink fairies (*Caladenia latifolia*).



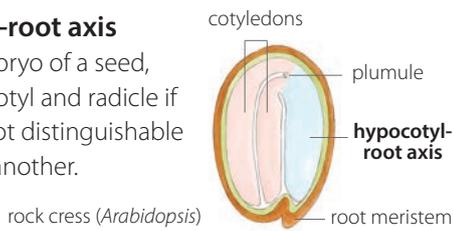
**hypocotyl** Of a seed, in eudicots and most monocotyledons, the part of the embryo axis below the cotyledonary node and above the radicle.  
 In grasses, (Poaceae) that part of the embryo axis below the mesocotyl that is the embryonic root (radicle) enclosed in the protective sheathing coleorrhiza.

Of a seedling, the part of the axis below the cotyledon(s) and above the roots.  
**hypocotyl** page 142 (cont.)  
 cf. **epicotyl, hypocotyl-root axis, mesocotyl**



**hypocotyl-root axis**

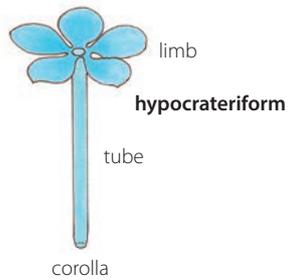
Of the embryo of a seed, the hypocotyl and radicle if they are not distinguishable from one another.



**hypocrateriform**

Of a corolla with a long slim tube and an abruptly expanded limb spreading at 90° to the tube, as some primroses (*Primula*).

= **salverform**



**hypodermis**

One or more layers of cells lying immediately below the epidermis in plants. Unlike the epidermis, it is derived from a ground tissue (collenchyma) and is sometimes modified to give structural support.

**hypogaeal, hypogeous** Below the ground.  
see **epigeal**

**hypogaeal germination, hypogeous germination** Of seed germination, the cotyledons in the seed remain underground while the epicotyl together with the plumule grows upward out of the ground. During this process the plumule is protected by a plumular hook. Common in monocotyledons and found in some eudicots. Characteristic of grasses (*Poaceae*).  
cf. **epigeal germination, viviparous germination**

**hyogenous**

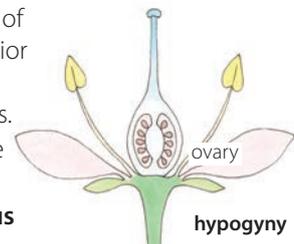
Produced or growing on the undersurface, as fern spores growing on the undersurface of a leaf.

**hypogyny**

The position of the ovary when it is superior relative to the whorls of stamens, petals and sepals.

**hypogynous** Below the ovary.

cf. **epigynous, perigynous**



**hyponasty**

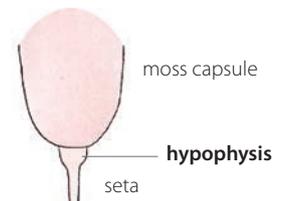
Increased growth along the lower surface of a plant part causing it to bend upward.

cf. **epinasty**

**hyponastic** Of or relating to hyponasty.

**hypophysis,**

pl. **hypophyses** The enlarged neck between the base of a moss capsule and the top of the seta.  
= **apophysis**



**hypotonic**

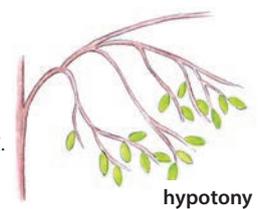
Having the lower osmotic pressure of two fluids.

cf. **hypertonic, isotonic**

**hypotony**

Development of lateral growth on the upper side of the main shoot.

cf. **amphitony, epitony**



**hypotropous**

Of ovule orientation, with the micropyle distal with reference to the funicle, as orthotropous (atropous) and circinotropous.

cf. **epitropous, pleurotropous**

**hysteranthous**

Of leaves appearing after flowers.

cf. **precocious, proteranthous, synanthous**

**ICN** The International Code of Nomenclature for algae, fungi and plants formerly, the International Code of Botanical Nomenclature (ICBN), is the set of rules for naming plants.

**ICNP** The International Code of Nomenclature for Cultivated Plants is the set of rules for naming cultivated plants.

**identification** Description and naming of an unknown species by comparing its characteristics with a known one, or recognising that it is new and warrants formal description and naming. Identifying a species, usually by using a taxonomic key.

see **determination, dichotomous key**

**idioblast** An isolated plant cell that differs greatly from the surrounding cells or tissue, as a sclereid in pears or raphides in a cell.

**illegitimate name** A published name that does not accord with the rules of the International Code of Nomenclature.

= **nomen illegitimum**

**imbricate** Overlapping like tiles or shingles on a roof, as leaves along a stem. Having edges overlapping, as in an unopened leaf or flower bud.

**imbricate aestivation**

The arrangement of petals, tepals or sepals in a bud with the margins overlapping but not involute.

**imbricate vernation**

The arrangement of young leaves in an unopened leaf bud with the margins overlapping but not involute.



imbricate



imbricate aestivation



imbricate vernation

**imbricate bulb**

A true bulb that consists of a compressed stem with nodes (basal plate), bearing fleshy overlapping leaves that lack a tunic, as the lily genus (*Lilium*).

= **naked bulb, scaly bulb**

see also **tunicate bulb**



fleshy leaves

imbricate bulb

**immature** Not yet fully developed, not ripe.

cf. **mature, senescent**

**immersed** Partially or wholly sunken into the surrounding parts, as seeds of pittosporum (*Pittosporum*) in a sticky pulp.

Growing under water, entirely submerged, as the aquatic plant dwarf eelgrass (*Zostera noltii*).

cf. **submerged**



seeds immersed in pulp

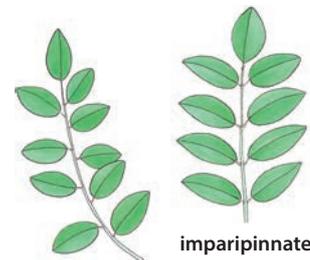


immersed in water

**imparipinnate**

Of a pinnate leaf with leaflets opposite or alternate, and terminating with a single leaflet.

= **odd-pinnate**



imparipinnate

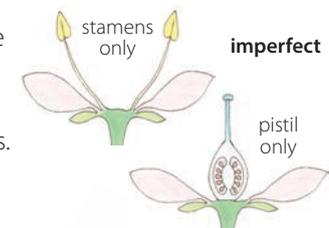
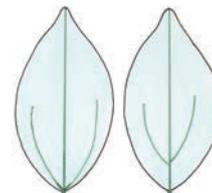
**imperfect** Of leaf venation when lateral veins extend for less than two-thirds of the leaf surface.

Of a flower with either stamens or pistils fertile but not both.

Of a flower lacking either stamens or pistils.

= **unisexual**

cf. **perfect**

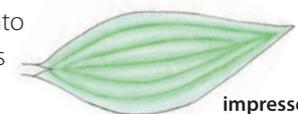


stamens only

imperfect

pistil only

**impressed** Sunken into the surface, as the veins of some leaves.



impressed

**in-** A prefix meaning absent.

**inaperturate** Of a pollen grain or a spore without apertures.

cf. **alete**

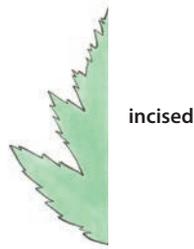
**inbreeding** The production of seeds between plants that are closely related genetically.

see also **autogamy**

cf. **outbreeding, outcrossing**

**incertae sedis** A taxon or group of taxa whose relationship with others is unknown or uncertain.

**incised** Cut deeply, sharply and unevenly. Of a margin, intermediate between toothed and lobed, as the margins of some leaves.

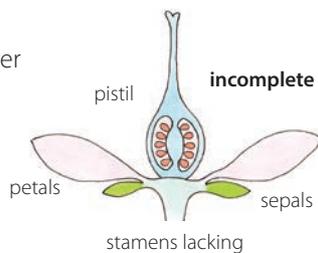


**included** Enclosed. Not protruding, as stamens within the corolla.  
cf. **exserted**



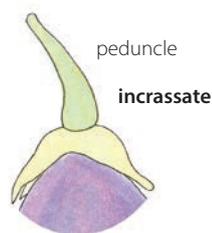
**incompatible** Incapable of self-fertilisation or cross-fertilisation. Incapable of forming a successful graft.  
cf. **compatible**

**incomplete** Of a flower with one or more of the four whorls (sepals, petals, stamens and/or pistils) lacking.  
cf. **complete**

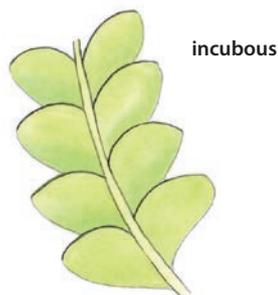


**incomplete dominance** The partial expression of a dominant allele that allows some expression of the recessive allele and results in an alternative phenotype with traits of both alleles.

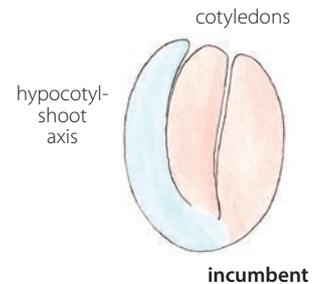
**incrassate** Thickened or swollen. Becoming thicker by degrees, as the peduncle of the egg plant (*Solanum melongena*).



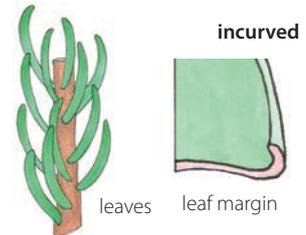
**incubous** Of leafy liverworts, having leaves attached to the stem obliquely so that the upper margin of each leaf overlaps the base of the leaf above it. The new leaf begins under the older one.  
cf. **succubous**



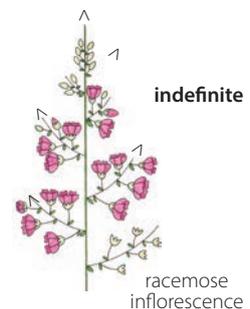
**incumbent** Of cotyledons that are folded with the back of one lying against the hypocotyl-shoot axis, as mustard (*Erysimum cheiranthoides*).



**incurved** Curved or bent upward or inward. Of leaf margins curved towards the adaxial side.  
cf. **involute, recurved, revolute**



**indefinite** Having a persistent terminal growing point and with growth similar on lateral branches. The pattern of growth in which the apex of the main stem and branches continues to grow indefinitely. Of monopodial or indefinite growth, as a racemose inflorescence or the branching of some trees as firs (*Abies*), that results in a pyramidal shape.  
= **indeterminate**  
cf. **definite**



**indehiscence** Of a plant part not opening at maturity to release its contents, as an indehiscent fruit, like a berry or stone fruit.

**indehiscent** Not opening when ripe.  
cf. **dehiscent**

**indeterminate** Having a persistent terminal growing point and with growth similar on lateral branches. The pattern of growth in which the apex of the main stem and branches continues to grow indefinitely. Of monopodial or indefinite growth, as a racemose inflorescence or the branching of some trees as firs (*Abies*), that results in a pyramidal shape.  
= **indefinite**  
cf. **determinate**

**Indeterminate growth** ^



fir (*Abies*)

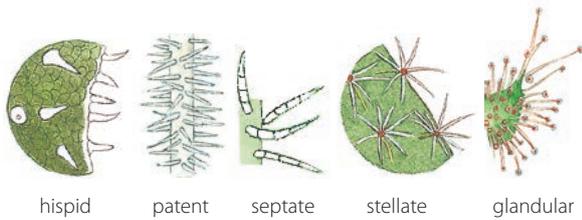


racemose inflorescence

**indigenous** Growing naturally in a particular place, not introduced.  
= **native**

**indument, indumentum** Specifically, the nature of the hairs on the surface of a plant or plant part. Generally, any type of hairiness, scaliness or other covering on the surface of a plant.  
*see also* **vestiture**

**Some indumentum hairs**



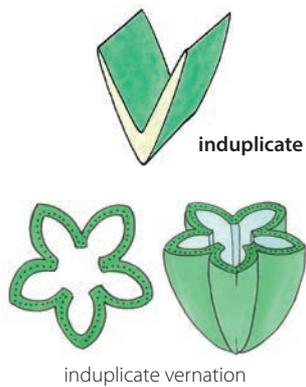
hispid    patent    septate    stellate    glandular

**induplicate** Of palm leaflets with margins bent inwards, V-shaped in cross-section.

*cf.* **reduplicate**

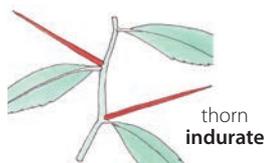
**induplicate vernation**

Of young leaves in the unopened leaf bud folded inward and arranged in a circle with the margins touching but not overlapping.



induplicate vernation

**indurate** Hardened, as a thorn or the lemma and palea of some grass flowers.



thorn  
indurate

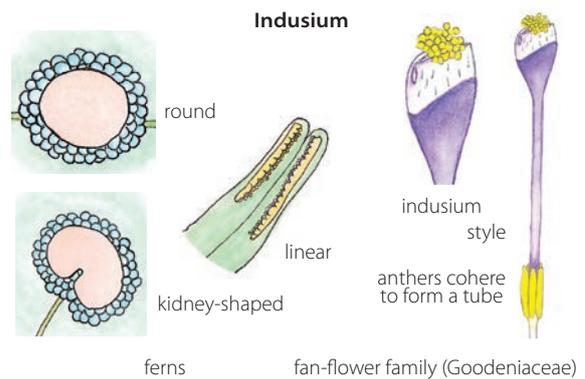
**indusium, pl. indusia** Of flowers, a cup-like structure at the tip of the style that collects pollen as it passes through the anther tube. A characteristic of the fan-flower family (Goodeniaceae).

Of ferns, a membranous or scale-like shield covering the sorus on some fronds. It is variously shaped, as round (*Rumohra adiantiformis*), kidney-shaped (*Dryopsis apiciflora*) or linear (some *Blechnum* species).

*cf.* **false indusium**

**indusiate** Having an indusium.

*cf.* **exindusiate**



round    kidney-shaped    linear    indusium style    anthers cohere to form a tube    ferns    fan-flower family (Goodeniaceae)

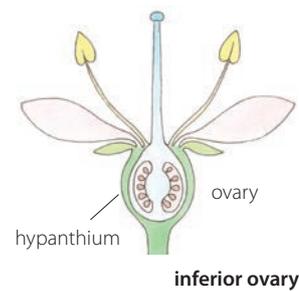
**ined., ineditus** Unpublished.

**ineditus, abbr. ined.** Unpublished.

**inermous** Lacking thorns spines or prickles.  
= **unarmed**  
*see* **armature**

**inferior ovary** An ovary that is embedded in the hypanthium. An ovary that is below the level of insertion of the floral parts on the hypanthium.

*cf.* **semi-inferior ovary, superior ovary**



hypanthium    ovary    inferior ovary

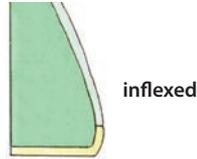
**infertile** Unable to reproduce, sterile. Of land that is unproductive.  
*cf.* **fertile**

**inflated** Filled or expanded by, or as if by, gas or air, as the enlarged calyx of Chinese lantern (*Physalis alkekengi*).  
cf. **saccate**



inflated

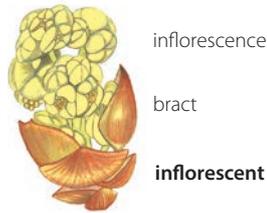
**inflexed** Bent abruptly inwards, as margins of some fern fronds.



inflexed

**inflorescence** see pages 147–148

**inflorescent** Of or relating to blooming or flowering, as inflorescent shoots or the inflorescent bracts of sweet wattle (*Acacia suaveolens*).  
cf. **inflorescence**



inflorescence

bract

inflorescent

**infra-** A prefix meaning below or beneath.  
cf. **supra-**

**infracoliar** Of an inflorescence produced below the crown of leaves, as some palms (Arecaceae).  
cf. **interfoliar**, **supracoliar**



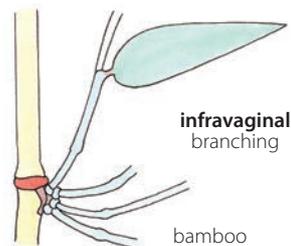
infracoliar inflorescence

**infrageneric** Of a division within a genus, such as subgenus, section or series.

**infraspecific** Of a division within a species, such as subspecies, variety, form or cultivar.

**infratectum** A layer between the tectum and the foot layer (or endexine if the foot layer is missing).  
see **pollen wall**

**infravaginal** Of branching that occurs below the point of attachment of the leaf sheath, as in some bamboos (Poaceae).  
cf. **extravaginal**, **intravaginal**

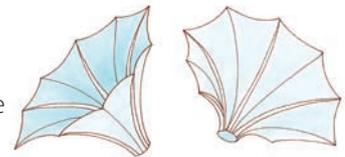


infravaginal branching

bamboo

**infructescence** The mass of fruits derived from an entire inflorescence, as a pineapple (*Ananas comosus*).  
see **compound fruit**

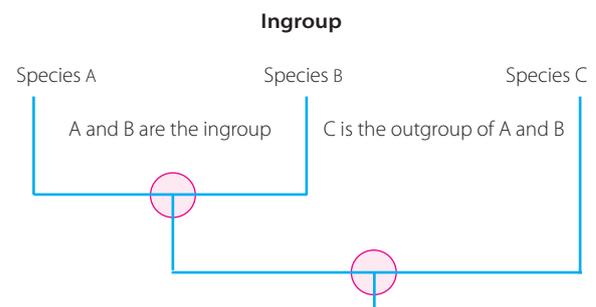
**infundibular, infundibuliform** Funnel-shaped, as the corolla of bindweed (*Convolvulus*).



infundibular

**ingroup** In phylogenetics, the group of taxa being studied.

cf. **outgroup**



**inheritance** The passing on of genes that determine traits, from parents to offspring, by means of sexual or asexual reproduction.  
= **heredity**

**inherited character** A feature that is passed on from the chromosomes of parents to the chromosomes of their offspring.  
cf. **acquired character**

**inhibitor** A chemical substance that prevents a growth process, as the hormone ethylene that causes lateral buds to remain dormant while the apex of the stem is growing.  
cf. **activator**

**initial cell** An actively dividing plant cell in a meristem. At each division one daughter cell remains in the meristem as an initial cell and the other will continue to divide and differentiate to become one of the three primary tissues: epidermis, ground tissue or vascular tissue.  
see also **ground meristem**, **procambium**, **protoderm**

**inflorescence** The arrangement of flowers on a plant.

The flowering part of a plant including stems, stalks, bracts and flowers.

The process of flowering.

There are two main types of inflorescence. In a racemose or indeterminate inflorescence the main axis and lateral branches continue to grow indefinitely, with flowers arising along the axis and branches. In a cymose or determinate inflorescence the main axis and lateral branches end in a flower.

An inflorescence may be simple or compound, terminal, axillary or intercalary.

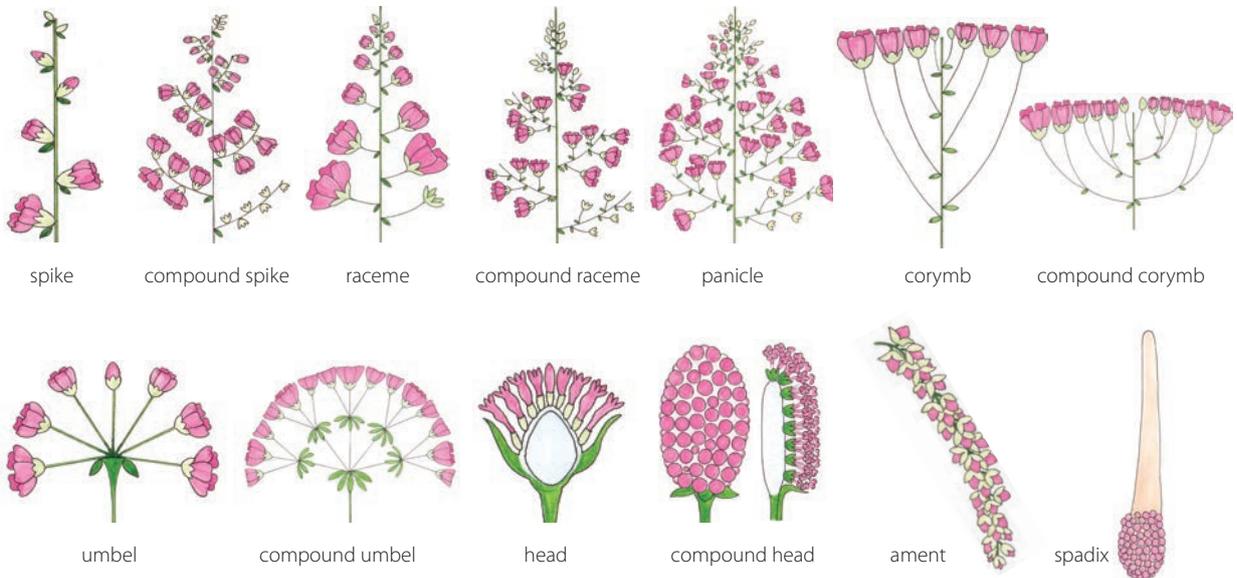
see **anthotaxy**

see also **cauliflory, ramiflory**

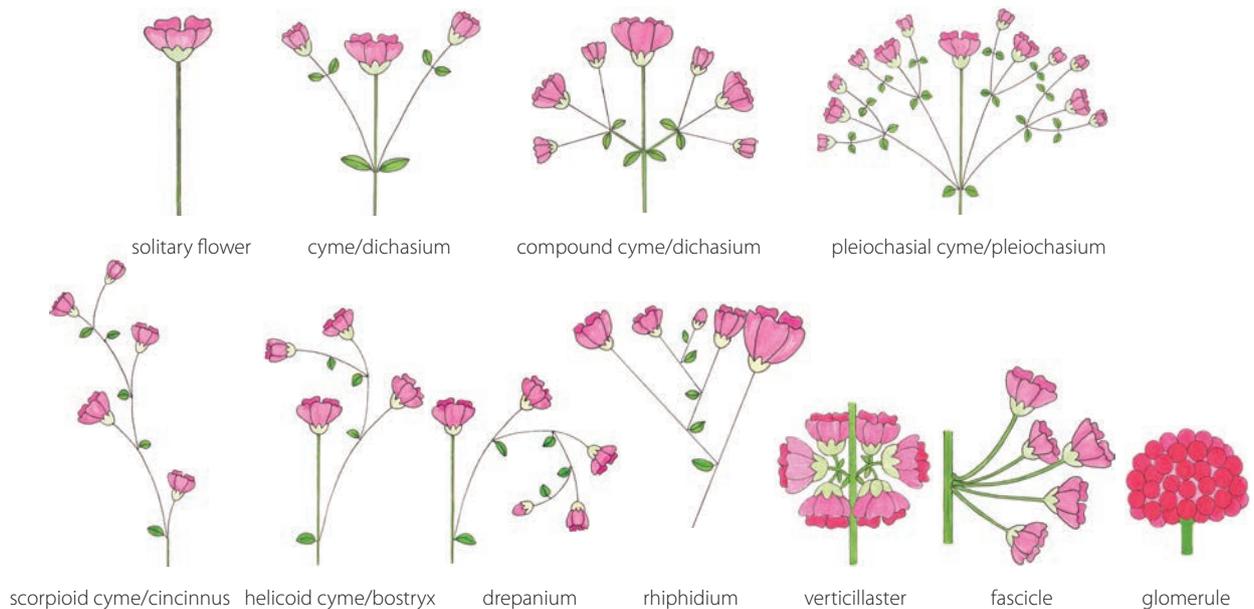
cf. **inflorescent**

## Inflorescence

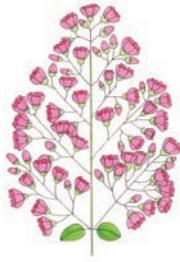
### Racemose Indefinite/Indeterminate



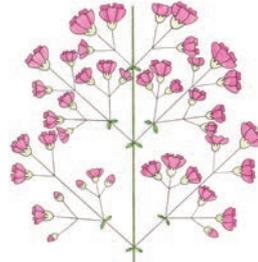
### Cymose Definite/Determinate



**Mixed inflorescence**



mixed panicle



thyrse

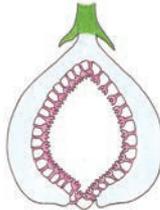
**Special types of inflorescence**



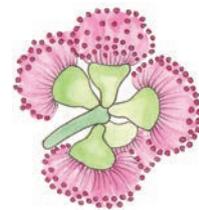
coenanthium



syconium



cyathium



umbellaster

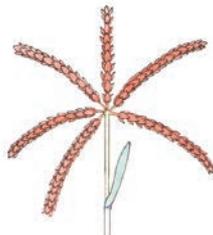
**Inflorescence of grasses, rushes and sedges**



spikelet/locusta



spike



compound digitate spike



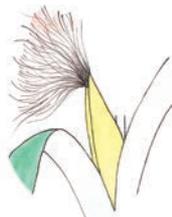
raceme



panicle



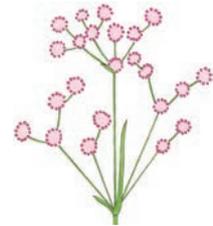
tassel



ear



anthelodium



anthela

**innate** Attached at or by the base, as a stamen filament attached to the base of the anther.  
= **basifixed**  
see **anther attachment**



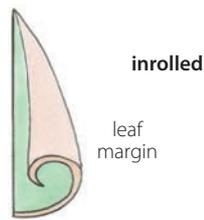
innate

**innovation** A new shoot, especially in plants with intermittent growth.  
Of mosses, a new shoot that becomes independent by dying off where it joins the parent plant.

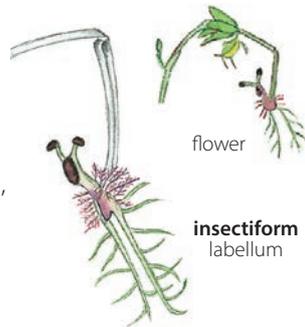
**inorganic** Of chemical compounds that do not contain carbon.  
Not composed of living or once living matter.  
*cf.* **organic**

**innocuous** Of a plant structure or substance, harmless. Lacking the capacity to injure, as a stem without spines, thorns, prickles and the like.  
*cf.* **inermous**

**inrolled** Of a margin with the edges rolled inwards towards the upper surface.  
= **involute**

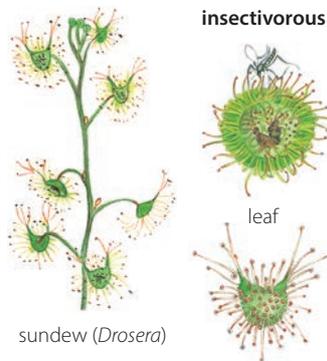


**insectiform** Having the appearance of an insect, as the labellum, a modified petal, of the elbow orchid (*Thynniorchis huntianus*), that mimics the female of the pollinating wasp species (*Arthrothynnus huntianus*).



**insectivorous**

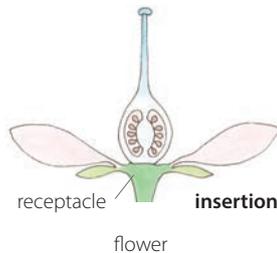
Of plants, with adaptations to capture and digest insects, as the leaves of sundews (*Drosera*). The sticky stalked glands capture insects and drown them in digestive secretions.



see also **carnivorous**

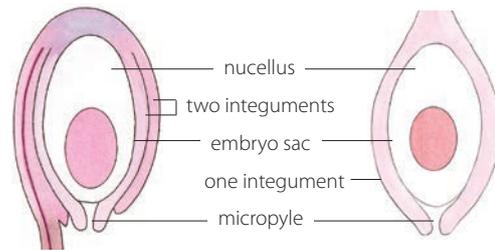
**insertion** The point of attachment of one part to another.

**inserted** Attached to or arising from, as flower parts inserted on a receptacle.



**integument** Of an ovule, one or two protective layers surrounding the nucellus and having an opening at the micropyle. Monocotyledons and most eudicots are bitegmic and have two integuments, and gymnosperms are unitegmic and have one integument. The integuments usually give rise to the seed coat.  
see **tegmen, testa**

**Integument**



bitegmic angiosperm ovule

unitegmic gymnosperm ovule

**inter-** A prefix meaning between or among.  
cf. **intra-**

**intercalary** Inserted between two parts, as the intercalary meristem between the leaf blade and the sheath in grasses.

see **intercalary inflorescence**

cf. **axillary, terminal**

**intercalary inflorescence**

Of an inflorescence appearing to be in the middle of a leafy stem due to the axis continuing to grow vegetatively after producing flowers, as the bottlebrush genus (*Melaleuca*). Inflorescences may also be terminal or axillary.

see **auxotelic**



**intercalary meristem**

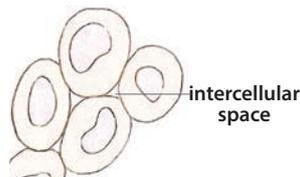
A band of meristem interposed between two mature tissues enabling new tissue to be inserted in a longitudinal direction, as between the blade and the sheath of a grass leaf.

In grasses, it has two zones, the upper that is responsible for growth of the blade and the lower for growth of the sheath, with the upper zone eventually differentiating into the leaf collar. It is present in many stems and at the base of a leaf, where it functions for leaf development, and in the abscission layer of deciduous leaves.

see also **apical meristem, collar, lateral meristem**

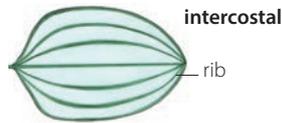
### intercellular spaces

Air spaces between adjacent cells, as in parenchyma.  
see also **lacuna**



### intercostal

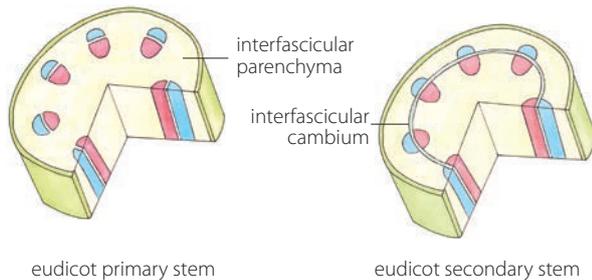
Between the ribs.  
The surface between the ribs of a leaf.



**interfascicular** Between the vascular bundles.

**interfascicular cambium** Vascular cambium that forms in secondary growth between the vascular bundles.  
It forms from the interfascicular parenchyma in primary growth.  
Vascular cambium and interfascicular cambium eventually join to form a continuous ring.

#### Interfascicular cambium



**interfoliar** Of an inflorescence produced within the crown of leaves, as some palms (Arecaceae).  
cf. **infrafoliar**,  
**suprafoliar**



**intergeneric** Existing or occurring between different genera.

**intergeneric hybrid** A hybrid between two different genera.  
The orchid genus  $\times$  *Brassocattleya* is a hybrid between the genera *Brassavola* and *Cattleya*, with *Brassocattleya Mendelosa* being a hybrid between *Brassavola nodosa* and *Cattleya mendelii*.  
= **bigeneric hybrid**

### International Code of Nomenclature

The International Code of Nomenclature for algae, fungi and plants (ICN), formerly the International Code of Botanical Nomenclature (ICBN), is the set of rules for naming plants.

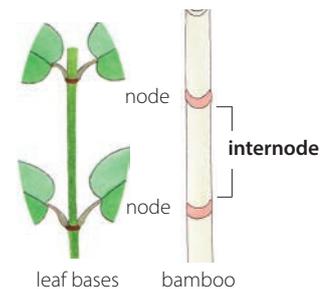
There is an additional set of rules for naming cultivated plants, the International Code of Nomenclature for Cultivated Plants.

**International Code of Nomenclature for Cultivated Plants** The set of rules for naming cultivated plants.

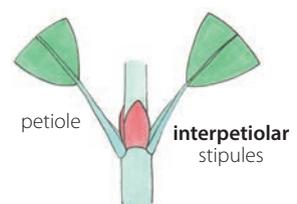
**International Code of Phylogenetic Nomenclature** A developing draft for a formal set of rules governing phylogenetic nomenclature.  
see **PhyloCode**

**International Union for Conservation of Nature, IUCN** The chief organisation for standardising threat status of plants and animals throughout the world.

**internode** The part of the stem between two nodes (joints), as that on the stem of a bamboo or between one leaf base and the next.  
see also **node**



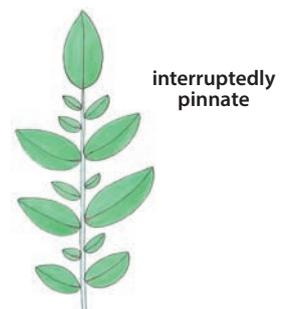
**interpetiolar** Between the petioles of opposite leaves.  
Of stipules of opposite leaves fused to form one stipule on each side of the stem.



**interrupted** Not continuous in arrangement, unevenly distributed.  
cf. **continuous**

### interruptedly pinnate

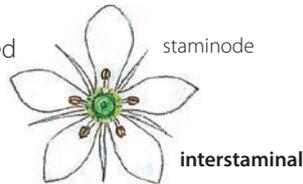
Of a pinnate leaf with spaces along the rachis between the leaflets and the leaflets unevenly distributed, with smaller leaflets among larger leaflets.



**interspecific** Existing or occurring between different species.

**interspecific hybrid** A hybrid between two different species belonging to the same genus. *Geranium x cantabrigiense* is a hybrid between *G. macrorrhizom* and *G. dalmaticum*.  
= **bispecific hybrid**

**interstaminal** Situated between the stamens, as the staminodes of some flowers.



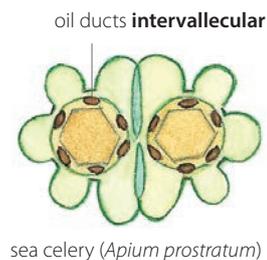
**interstice** A small space between parts.  
**interstitial** Relating to or located in one or more interstices.

**intertidal** The zone of a seashore that is submerged during high tide and exposed during low tide.

**intervallecular**

Situated in a furrow, as the oil glands in furrows between the ribs of some fruit of the carrot family (Apiaceae).

see **vallecula**  
cf. **intrajugal**



**intine** The innermost layer of the wall of a pollen grain that is next to the cytoplasm.  
see **pollen wall**

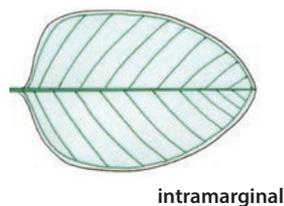
**intra-** A prefix meaning within.  
cf. **inter-**

**intrajugal** Within the ribs.  
cf. **intervallecular**

**intramarginal**

Situated inside, but close to, the margin, as an intramarginal vein on a leaf.

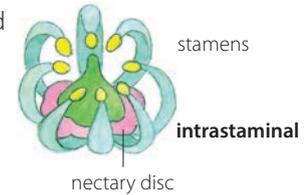
cf. **marginal venation**



**intrapetiolar** Between the petiole and the stem. Of a pair of stipules that fuse to form one stipule that is between the petiole and the stem.



**intrastaminal** Situated inside the whorl of stamens, as the nectary disc of some boronia (*Boronia*).



**intravaginal**

Of branching, with the young shoot growing up inside the leaf sheath, as some grasses (Poaceae).

cf. **extravaginal**,  
**infravaginal**



**intricate** Tangled, as some roots and hairs.

**introduced** A non-native plant that has usually been purposefully introduced, as European blackberry (*Rubus fruticosus*) that is native to much of Europe but is now a noxious weed in Australia, New Zealand and the USA.

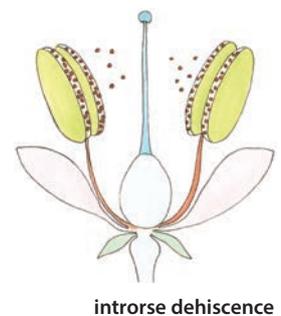
**introgression** The incorporation of alleles from one entity (population, species etc.) into the gene pool of a second entity by hybridisation and repeated backcrossing.

**introrse** Facing towards the axis.  
= **anticous**  
cf. **extrorse**, **latrorse**

**introrse dehiscence**

Of anthers, facing inwards and opening longitudinally to release pollen towards the centre of the flower, as the daisy family (Asteraceae).

= **anticous dehiscence**  
see also **anther dehiscence**



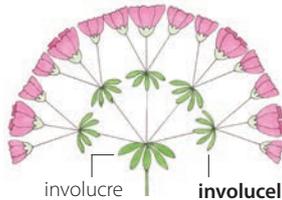
**invalid name** Publication of a new species that does not accord with the provisions of the International Code of Nomenclature for valid publication.

= **nomen invalidum**

**invasive** A plant that has the ability to thrive and spread aggressively outside its natural range.

**involucre** Of the carrot family (Apiaceae), a secondary involucre at the base of an umbellule within a compound umbel.

cf. **involucre**



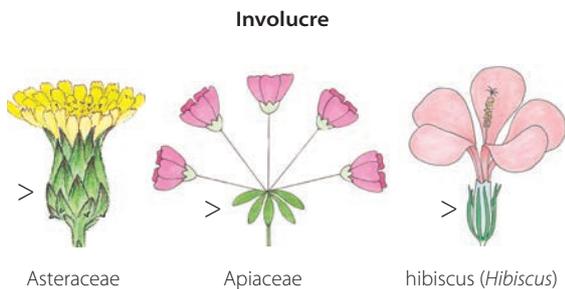
**involucre** A whorl of bracts around a head (Asteraceae), at the base of an umbel (Apiaceae), or around a single flower, as hibiscus (*Hibiscus*).

see also **epicalyx**

cf. **involucrel**

**involucral** Relating to the involucre.

**involucrate** Having an involucre.



**involute**

With margins rolled inward towards the upper surface, as the margins of some leaves.

= **inrolled**

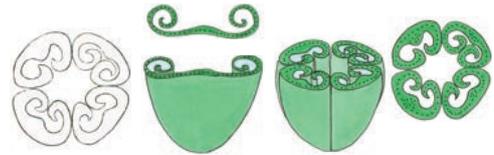
cf. **revolute**

**involute aestivation** Of young petals, tepals or sepals in the unopened bud with margins rolled inwards towards the upper surface.

**involute ptyxis** Of a single leaf in bud with margins rolled inwards towards the upper surface.

**involute vernation** Of young leaves in the unopened leaf bud with margins rolled inwards and arranged in a circle.

**Involute**



leaf margin

aestivation

ptyxis

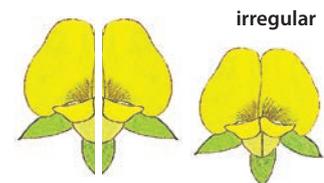
vernation

**iridescent** With shifting rainbow colours like those on a soap bubble.

**irregular** Of a flower that is divisible into halves along one plane only.

= **zygomorphic**

cf. **asymmetric, regular**



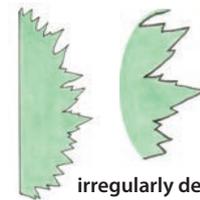
pea flower

**irregularly dentate**

Irregularly toothed.

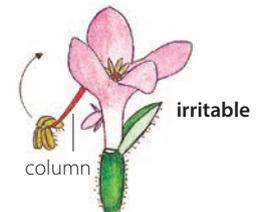
Of a margin that appears jagged or gnawed, as the margins of some leaves.

= **erose**



irregularly dentate

**irritable** Responding actively to stimuli, as the column of a trigger plant (*Stylidium*) when it is touched.



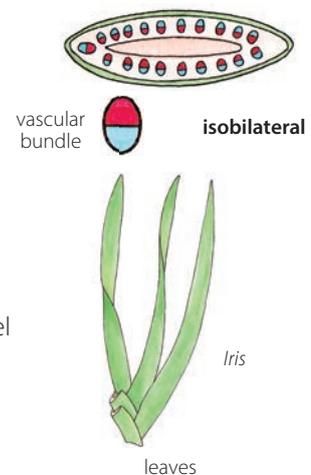
**iso-** A prefix meaning identical.

**isobilateral** Having two similar sides, where there is no evident distinction internally or externally between the upper and lower surfaces, as the leaves of an iris (*Iris*).

Typical of leaves that orient themselves parallel to the main axis, as most monocotyledons.

= **equifacial, isolateral**

cf. **dorsiventral**



vascular bundle

isobilateral

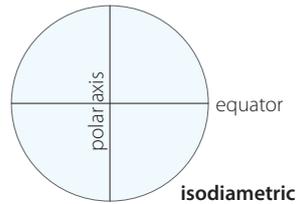
Iris

leaves

**isocotly** Having two equally sized cotyledons.

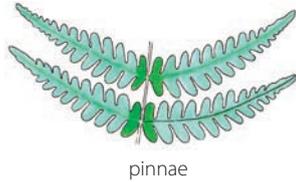
cf. **anisocotly**

**isodiametric** Of an object with the polar axis and the equatorial diameter more or less equal.



= **spheroidal**

**isodromous, isodromic** Of ferns, with the basal pinnae or pinnules opposite and having the first set of veins in a segment opposite.



cf. **anadromous, catadromous**

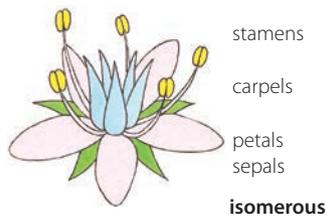


**isolateral** Having similar upper and lower surfaces.

= **isobilateral**

**isolectotype** A duplicate of a lectotype.

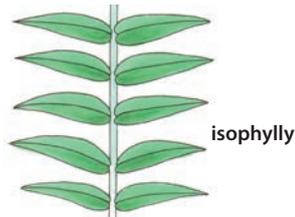
**isomerous** Having whorls with the same number of parts, as a flower with equal numbers of sepals, petals, carpels and/or stamens.



**isophylly** Having leaves equal in size and shape at any point on the stem.

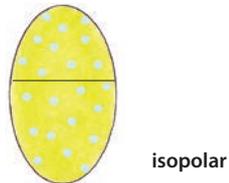
cf. **anisophyllous**

**isophyllous** Relating to isophylly.



**isopolar** Of a pollen grain having identical proximal and distal halves.

cf. **heteropolar**



**isostemonous** With a single whorl of stamens. With as many stamens as petals.

= **haplostemonous**



**isostylous** Of flowers having styles all of the same length.

= **homostylous**

cf. **brachystylous, dolichostylous**

**isosyntype** A duplicate of a syntype.

**isotonic** Of two fluids having the same osmotic pressure.

cf. **hypertonic, hypotonic**

**isotype** Any duplicate that is part of the original collection of the holotype.

**isthmus** A connecting part or organ, especially when narrow and joining two larger parts.

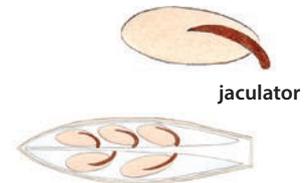
**iteroparous** Of a plant that flowers and bears fruit more than once in its lifetime, as perennial plants like roses.

= **pleoanthetic, polycarpic**

cf. **hapaxanthic, monocarpic, semelparous**

**IUCN** The International Code for Conservation of Nature is the chief organisation for standardising threat status of plants and animals.

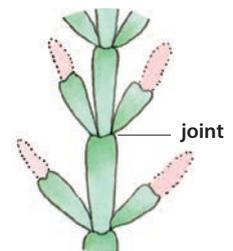
**jaculator** A small hooked stalk that ejects seeds from a capsule, as *Ruellia* in the acanthus family (Acanthaceae).



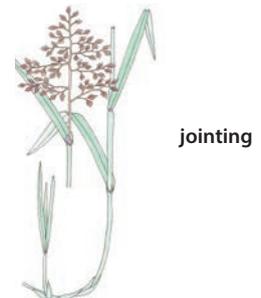
**joint** A place of union or separation of two parts, a node or articulation on a stem, as the stems of glassworts (*Salicornia*).

**jointed** With joints.

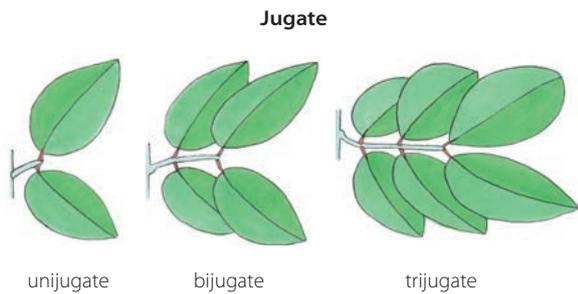
cf. **continuous**



**jointing** Of grasses (Poaceae), the stage during which stem internodes lengthen and the culm grows taller ready for flowering and the reproductive phase. see **vegetative phase**



**jugate** Forming a pair.  
Of leaflets arranged in pairs.  
see also **conjugate, multijugate, quinquejugate**



**juvenile** The early, non-adult phases of a plant's life or a plant organ.  
Of leaves that show a striking difference in appearance between the young and the adult condition, as leaves of mountain clematis (*Clematis aristata*).  
cf. **homoblastic**



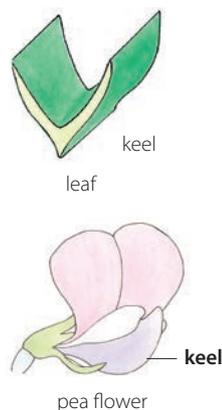
**karyokinesis** The process of mitosis.

**karyotype** An image of a stained and treated set of chromosomes as they appear under the microscope.  
Usually arranged in a particular order according to length, centromere location and so on.

**keel** A ridge along the centre of the lower surface like that on the bottom of a boat.  
The two lower petals of a pea flower united along their lower margin to form a keel enclosing the stamens and pistil.

= **carina**

**keeled** Having a keel.  
= **carinate**



**keiki** A plantlet or offshoot that grows from the base of the plant or from one of the nodes on the stem of some orchids, as *Dendrobium*.  
It is a clone of the mother plant and can be detached and propagated once the rootlets have developed.

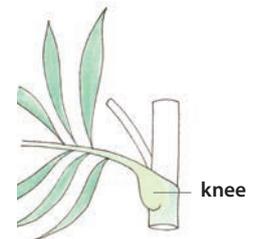


**kernel** The softer usually edible part of a nut, seed or fruit stone that is contained within a hard shell.  
The grain of a cereal enclosed in the hard husk.

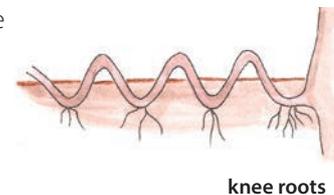
**key** Of taxonomy, an aid for rapid identification of unknown plants, as a dichotomous key.

**kingdom** One of the divisions into which natural organisms are classified.  
Various numbers of kingdoms have been proposed, most recently seven: Bacteria, Archaea, Protozoa, Chromista, Plantae, Fungi and Animalia.  
see **taxonomic hierarchy**

**knee** In most climbing palms (rattans), a swelling on the leaf sheath at the base of the petiole.



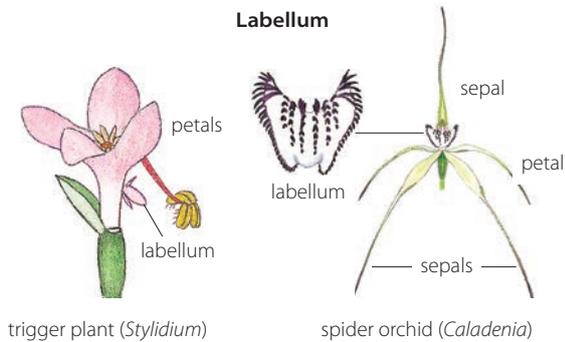
**knee roots** Horizontal lateral roots with emergent loops that allow for gas exchange with the atmosphere in oxygen-poor waterlogged soil.  
Swamp cypress (*Taxodium distichum*) and some mangroves as (*Bruguiera*) have conspicuous knee roots.  
see also **lenticel**



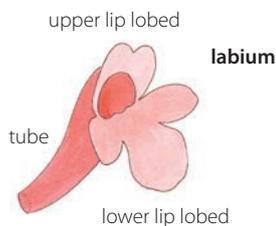
**Krebs cycle** The stage of cellular respiration in which food molecules are broken down in the presence of oxygen to release energy. It occurs in the mitochondria. Also called the citric acid cycle and the tricarboxylic acid cycle (TCA).  
*see also glycolysis*

**kwongan** An Aboriginal term for plains that are sandy and open with scrubby vegetation and mild wet winters and warm dry summers in south-western Australia. It covers an area the size of England, with some 3000 of the 5710 plant species being endemic. It is a Mediterranean-type ecosystem, together with the maquis and garrigue in the Mediterranean Basin, chaparral in California, matorral in Chile and fynbos in South Africa.

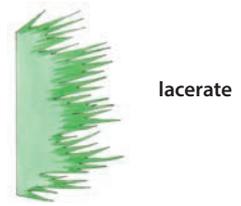
**labellum** A lip. Of trigger plant flowers (Stylidiaceae), one of five petals that is usually distinctly different from the other petals. Of orchid flowers (Orchidaceae), one of three petals that is usually distinctly different from the other petals.



**labium** A lip. One of the lip-like divisions of a bilabiate corolla. **labiate** Of flowers with a tubular corolla and the limb divided into two lip-like parts that may or may not be lobed. Of or belonging to the mint family (Lamiaceae, formerly Labiatae).



**lacerate** Of a margin with irregular narrow segments that appear to have been torn, as the margins of some leaves.  
*cf. fimbriate, laciniate*

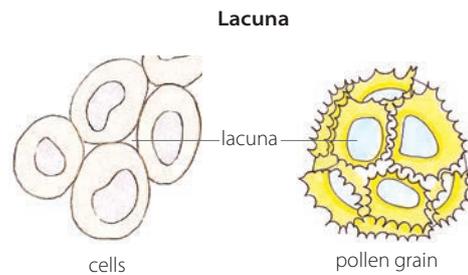


**laciniate** Irregularly and finely cut into long thin strips as if slashed, as the margins of some leaves.  
*cf. fimbriate, lacerate*



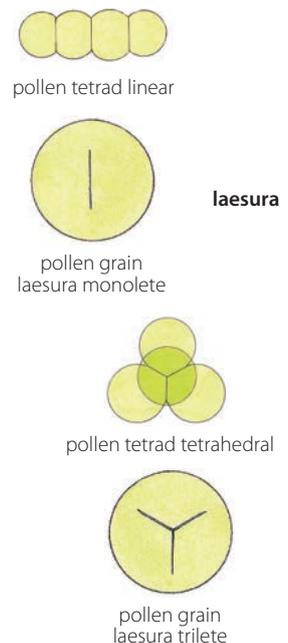
**lacuna, pl. lacunae** A space, gap, cavity or depression. An air space between adjacent cells, as in parenchyma. Of pollen grains, a depressed area on the outer surface that is surrounded by ridges.

**lacunose** Of, like or having a lacuna or lacunae.



**lacunar collenchyma** Collenchyma with intercellular spaces. The cell wall thickenings are adjacent to these intercellular spaces.

**laesura, pl. laesurae** A single groove (monolete) or three-rayed, Y-shaped groove (trilete) on the face of a spore. Also sometimes, one branch of a trilete laesura. It marks the way in which the four spores of a tetrad were in contact with each other after meiosis. It is the area of weakness in the wall through which a spore germinates.  
 = **tetrad mark**



**laevigate** Smooth as if polished, as the surface of some leaves and the seeds of some wattles (*Acacia*).



**lageniform** Much dilated and subglobose at the base with a slender neck, as a bottle gourd (*Lagenaria*).



**lamella, pl. lamellae** A septum in an ovary. A thin, plate-like or scale-like structure.

**lamellar, lamellate, lamellose** Composed of a lamella or lamellae.

**lamelliform** With the shape of a thin plate or scale.

**lamellar collenchyma** Collenchyma having the two sides of the cell wall that are parallel with the organ surface (the tangential cell walls) thicker than the other two (the radial cell walls).

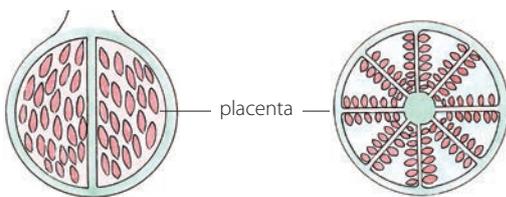
**lamellar placentation**

Having carpels fused but the internal walls (septa) lacking, creating a unilocular ovary, with ovules attached to septa-like placentas that project from the wall of the ovary, as water lilies (*Nymphaea*).

= **superficial placentation**

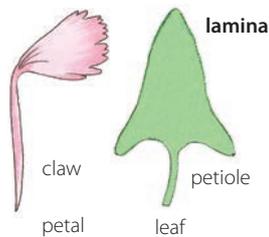
see **placentation**

Lamellar placentation

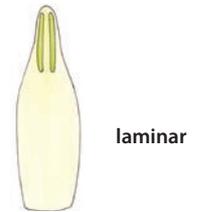


**lamina, pl. laminae** A thin flat organ or part. The flat expanded part of a leaf or petal. A blade.

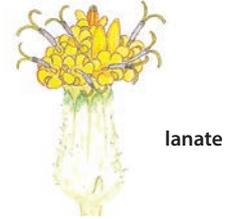
**lamine** Having the form of a lamina.



**laminar** Blade-like, as the stamens of masiratu (*Degeneria*).

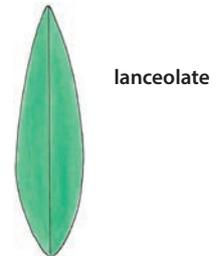


**lanate, lanose** Woolly. Densely covered with long tangled fine soft curly or wavy hair, as the white-woolly bracts of blanket leaf (*Bedfordia arborescens*).



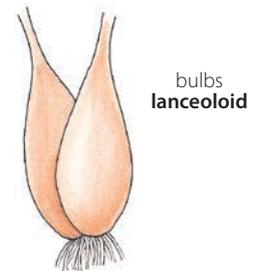
**lanceolate** Shaped like the head of a lance. Distinctly longer than wide, tapering each end and widest below the middle.

cf. **oblanceolate**



**lanceoloid** A three-dimensional shape that is much longer than wide, tapering at each end and widest below the middle, as the bulbs of chives (*Allium schoenoprasum*).

cf. **lanceolate**



**landing platform**

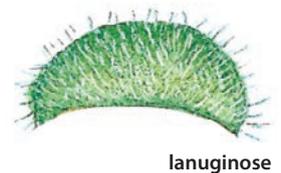
The lower petal of the corolla of some flowers, as that of bugle flowers (*Ajuga*), adapted to form a perch for visiting insects.



**lanuginose, lanuginous**

Covered with short fine soft cottony or woolly hairs. Downy.

cf. **lanate**



**lanulose** Minutely woolly.

**late wood** Wood in a growth ring with small thick-walled cells produced later in the growing season. It is more dense than early wood that is produced in spring when growth is faster. Early wood and late wood usually appear as two distinct bands.

**latent** Having the potential to develop, as a dormant bud.

cf. **dormant, quiescent**

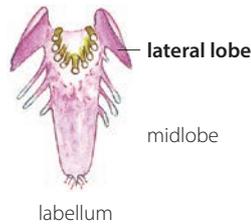
**latent buds** Usually applied to buds that do not grow the following year.

Also sometimes applied to resting buds.

= **dormant buds**

**lateral** At, of or on the side.

**lateral lobe** Of an orchid with a three-lobed labellum, one of two lobes at the base of the labellum, as pink fairies, (*Caladenia latifolia*).



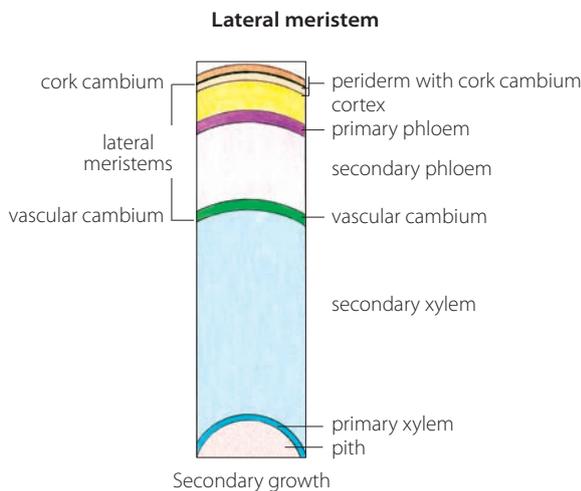
**lateral meristem** There are two lateral meristem tissues, vascular cambium and cork cambium. Both are found in woody plants and both give rise to secondary growth.

Vascular cambium produces secondary xylem (wood) and secondary phloem (bark) that increase the girth of the plant.

Cork cambium (phellogen) produces periderm (outer bark) that replaces the epidermis.

= **secondary meristem**

see also **intercalary meristem, primary meristem**



**latex** A milky liquid in certain plants that coagulates on exposure to air, as the dune thistle stem (*Actites megalocarpus*).

see **laticifer**



**lati-** A prefix meaning broad or wide.

**laticifer** An elongated cell, or series of cells joined together, that synthesises and stores latex.

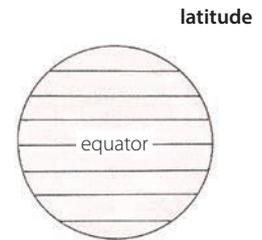
**laticiferous** Containing, bearing or secreting latex.

**latitude** A line on the surface of a sphere measuring the distance north or south of the equator.

cf. **longitude**

**latitudinal** Across rather than lengthwise. Of or relating to latitude.

cf. **longitude**

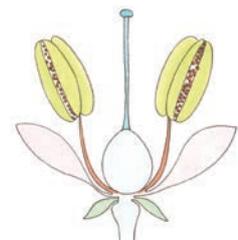


**latrorse** Facing towards the side.

**latrorse dehiscence**

Of anthers, opening laterally rather than facing towards or away from the centre of the flower. The anther splits longitudinally to release pollen.

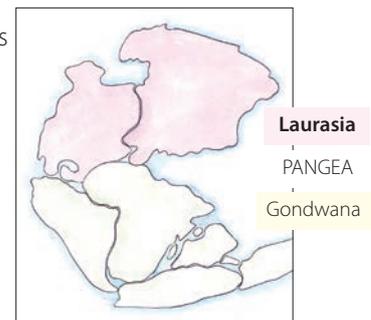
see also **anther dehiscence**



**latrorse dehiscence**

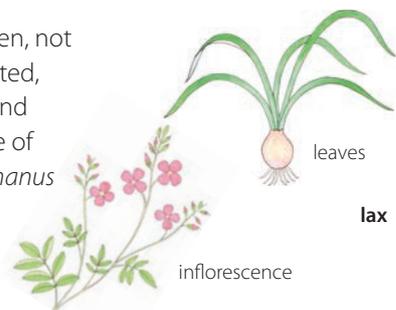
**Laurasia** One of two vast continents believed to have existed mostly in the northern hemisphere and to have resulted from the break up of Pangea.

see **continental drift, Gondwana**



**lax** Loose or open, not dense or congested, as some leaves and the inflorescence of wild radish (*Raphanus raphanistrum*).

cf. **congested**



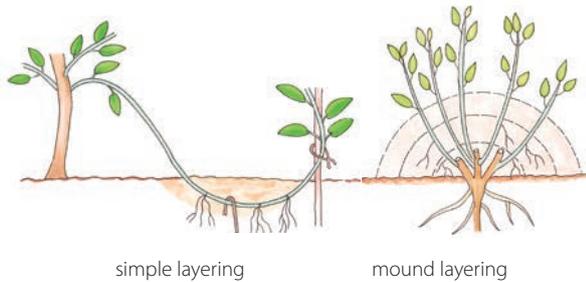
**layering** A form of propagation that encourages root development on a stem while it is still attached to the parent plant.

This results in a new plant that can exist separately from the parent plant.

Examples of layering are simple layering, either underground or aerial, and mound layering (stool layering).

see also **stool**

### Layering

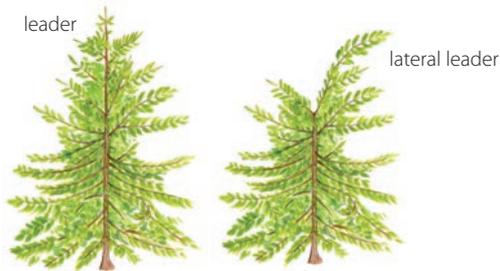


**leader** The dominant shoot of a tree or shrub usually at the tip of the whole plant.

If the central axis dies or is damaged a lateral leader may form at the tip of a branch.

Some plants have no dominant leader.

### Leader



**leaf** see pages 159–165

**leaf anatomy** A leaf blade is organised to collect sunlight and carry out photosynthesis.

A typical eudicot leaf blade has many layers.

The waxy non-cellular layer of cuticle on the top of the leaf prevents water escaping.

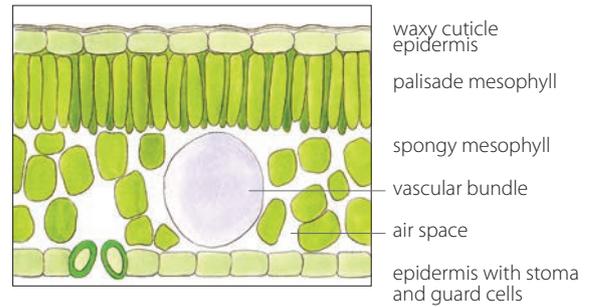
The epidermis covers and protects the leaf.

Palisade mesophyll is responsible for most of the photosynthesis in the leaf.

Spongy mesophyll has air spaces that work with the stomata to allow gas exchange.

Vascular tissue transports products of photosynthesis and nutrients to and from the leaf.

### Leaf anatomy



**leaf arrangement** see pages 159–160

**leaf base** see page 160

**leaf lobing** see pages 160–161

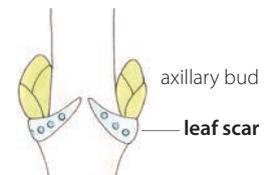
**leaf margins** see pages 161–162

**leaf mosaic** The arrangement of foliage in a pattern that exposes the maximum number of leaves to the direct rays of the sun.

**leaf scar** The corky healing layer that forms on a stem after a leaf falls.

see also **abscission**

cf. **bundle scar**

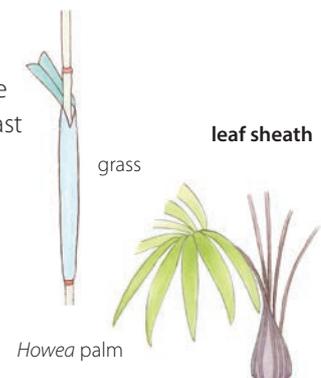


**leaf shape** see pages 162–163

**leaf sheath** A tubular or rolled structure at the base of a leaf that, at least partly, surrounds the stem, as grasses.

The expanded embracing base of the petiole, as the young *Howea* palm.

see **crownsheath**



**leaf tip** see pages 163–164

**leaf venation** see pages 164–165

**leaf vernation** see **vernation**

**leaf** In vascular plants, a vegetative organ that is responsible for most of the plant's photosynthesis and transpiration.

A foliage leaf is a mostly flat, green outgrowth from a stem, usually consisting of a blade (lamina) and a petiole. It may be simple and undivided or compound with a number of individual leaflets on a common stalk (rachis). Many eudicots produce compound leaves but in monocots they are found only in palms.

A grass leaf usually consists of a blade, collar and sheath.

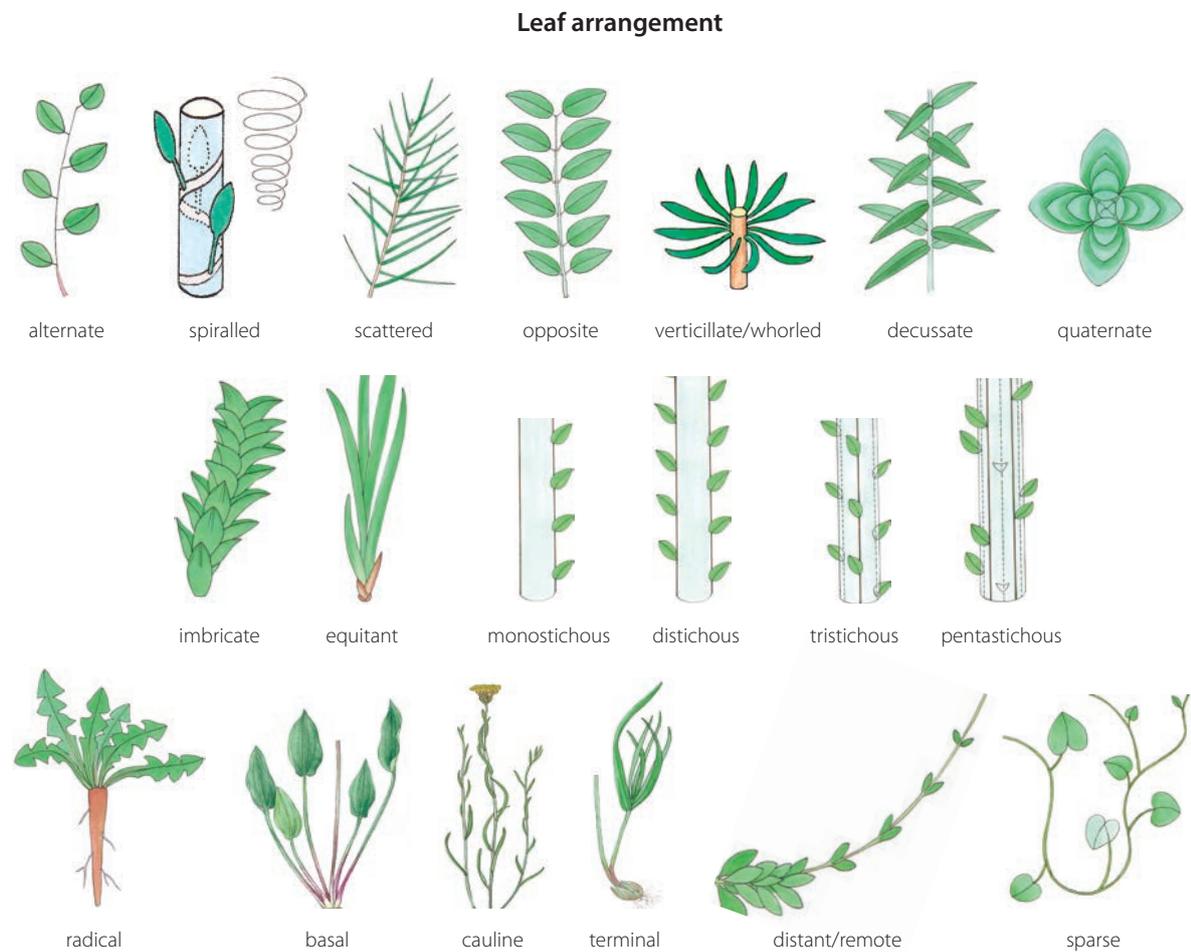
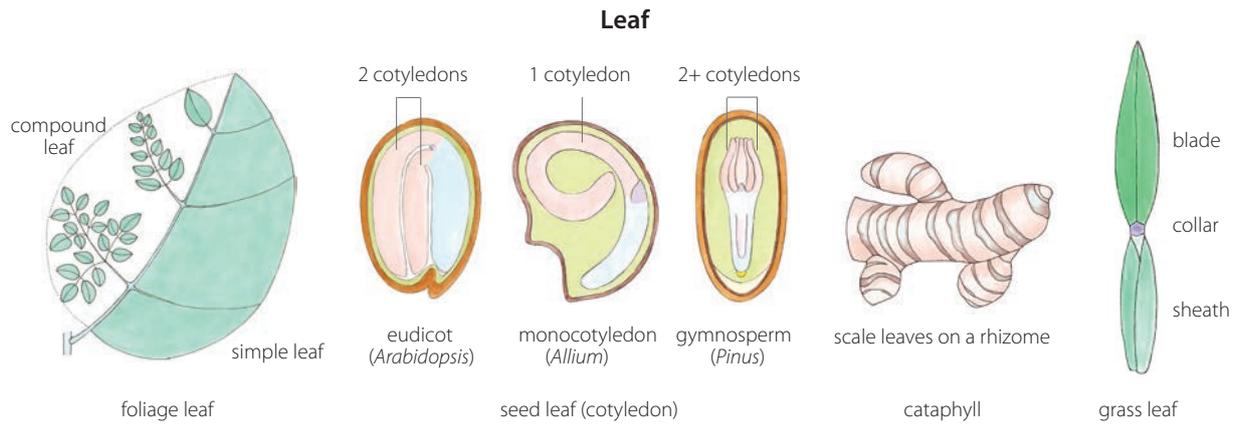
A seed leaf is a cotyledon that originates directly from the tissue of the embryo of seed-bearing plants.

A cataphyll is a leaf that is not photosynthetic and functions as protection or storage, as bulb scales.

Modified leaves include bracts, tendrils and spines.

Stamens, carpels, petals and sepals are considered to be modified leaves.

see also **foliage, leaf anatomy, prophyll**





rosetlate/rosetted



caespitose/tufted



fasciculate/fascicled

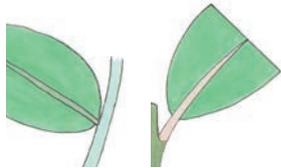


clustered

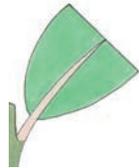


marcescent

### Leaf base



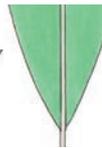
sessile



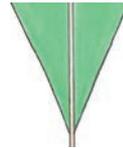
petiolate



obtuse



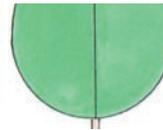
acute



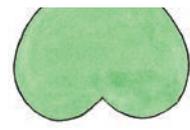
cuneate



attenuate



rounded



cordate



truncate



hastate



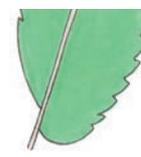
saggitate



auriculate



oblique



unequal



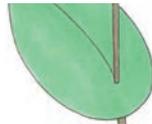
with a deep sinus



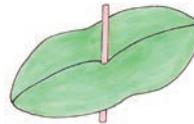
amplexicaul



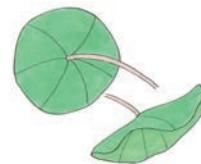
connate



perfoliate



connate-perfoliate

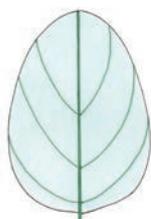


peltate



sheathing/vaginate

### Leaf lobing



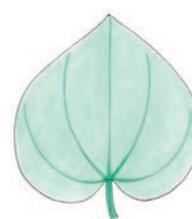
simple leaf with pinnate venation



pinnate venation and lobing



leaf outline obovate margin lobed



simple leaf with palmate venation



palmate venation and lobing



pinnately lobed



pinnatifid



pinnatipartite



pinnatisect



twice pinnatisect



thrice pinnatisect



lyrate-pinnatifid



pandurate



runcinate



pectinate



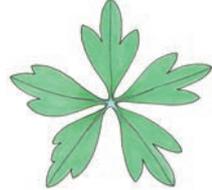
palmately lobed



palmatifid



palmatipartite



palmatisect



pedately lobed



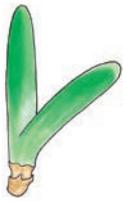
pedatifid



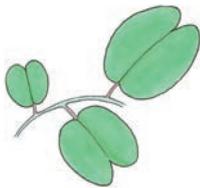
pedatipartite



pedatisect



fissum



bilobate



trilobate



bifid



trifid



bipartite



tripartite

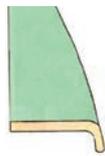
### Leaf margins



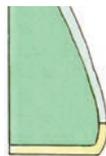
entire



marginate



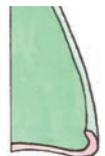
reflexed



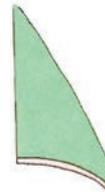
inflexed



recurved



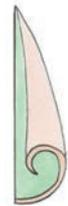
incurved



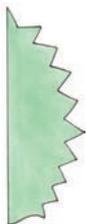
decurved



revolute



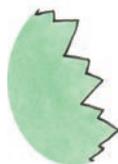
involute



dentate



denticulate



bidentate



serrate



serrulate



biserrate



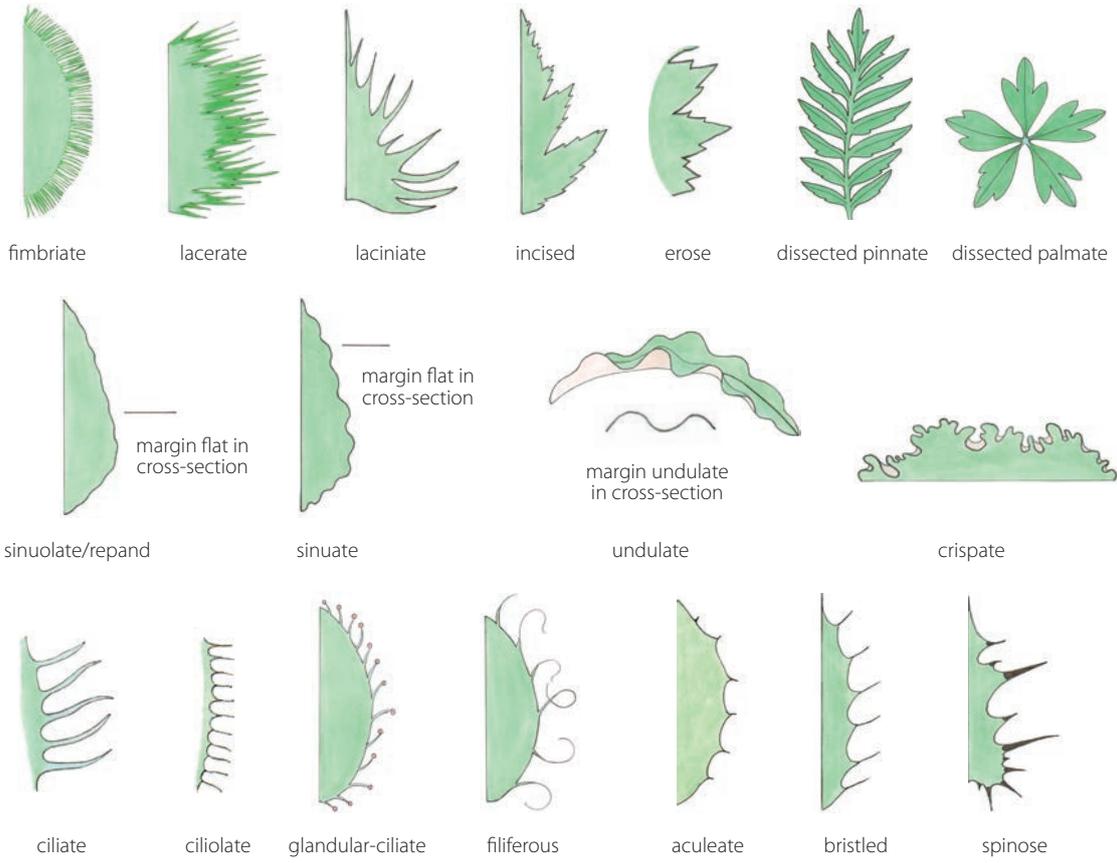
crenate



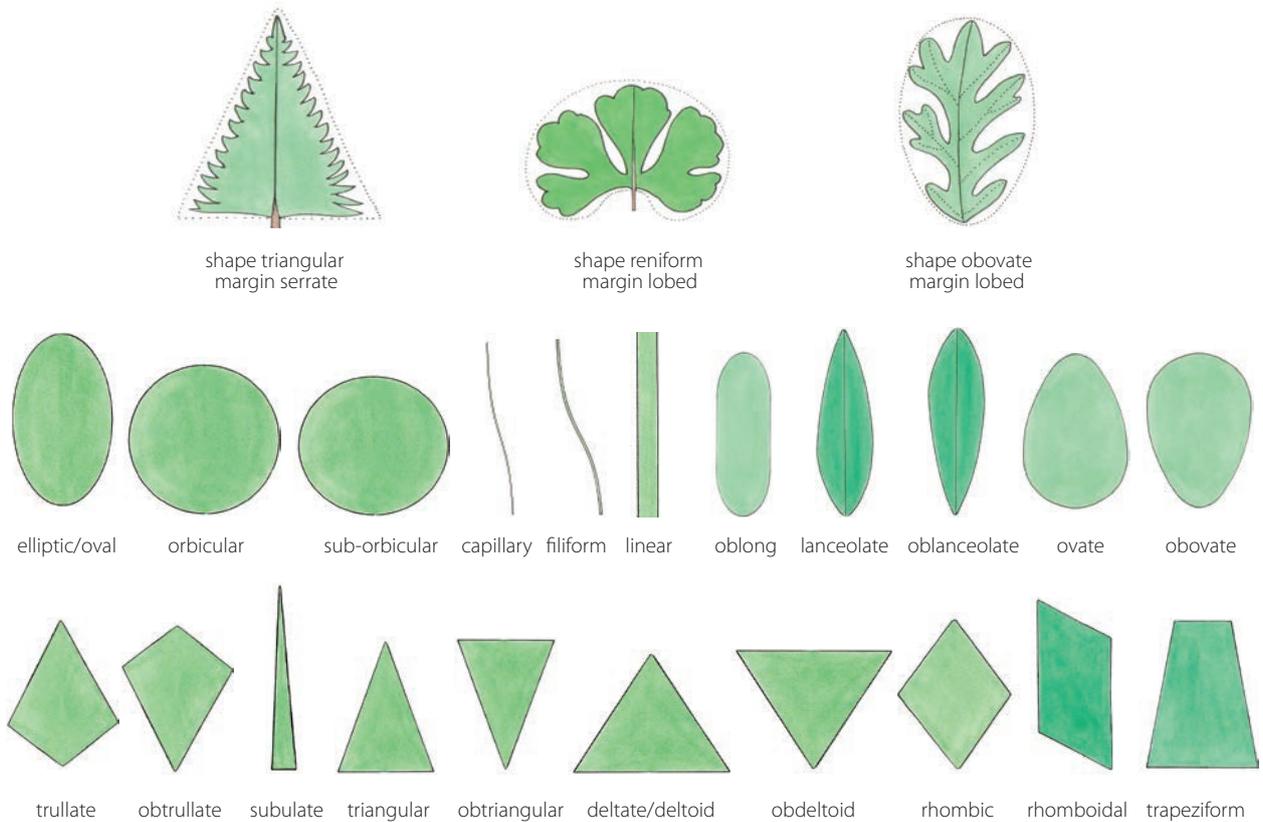
crenulate

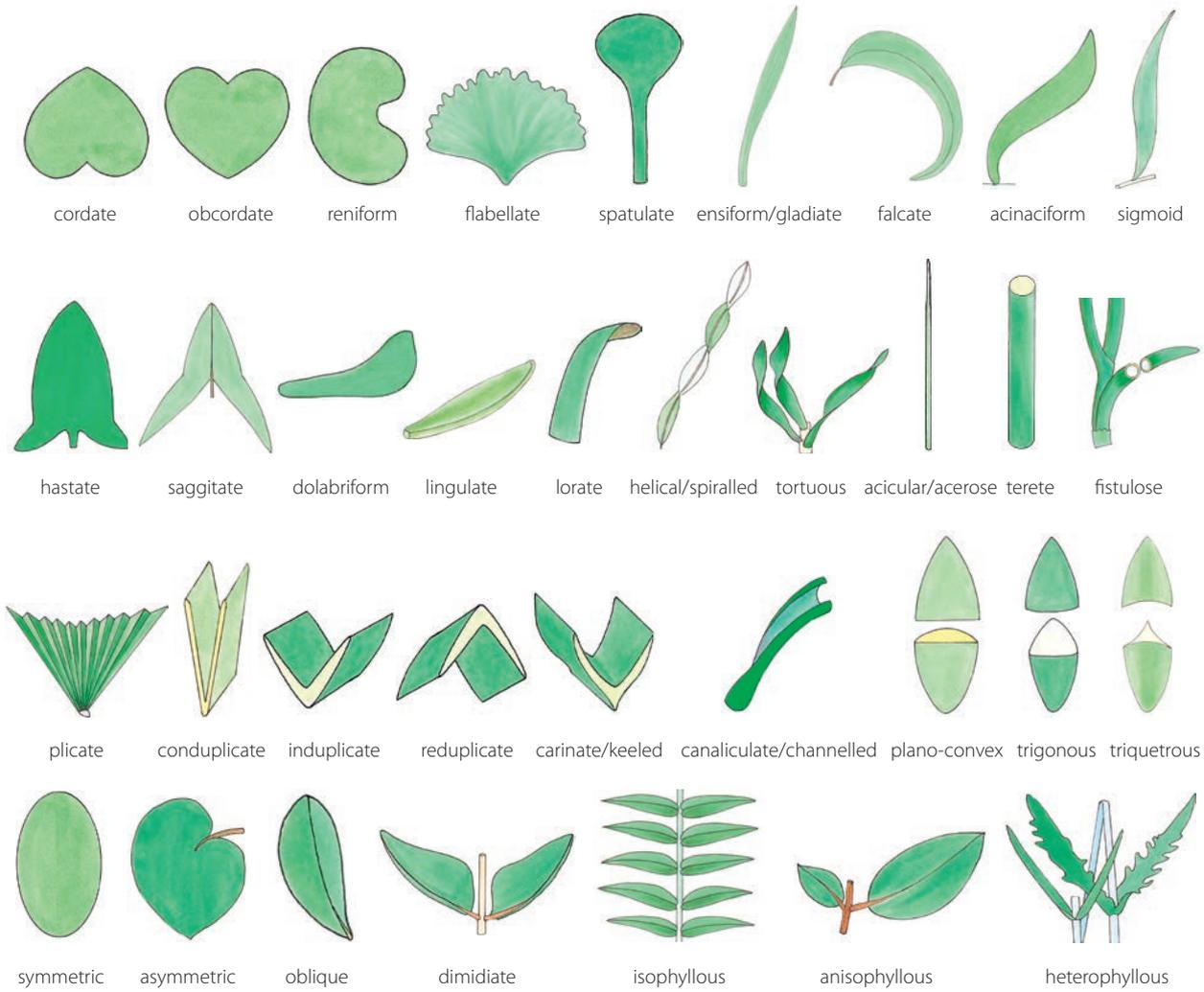


bicrenate

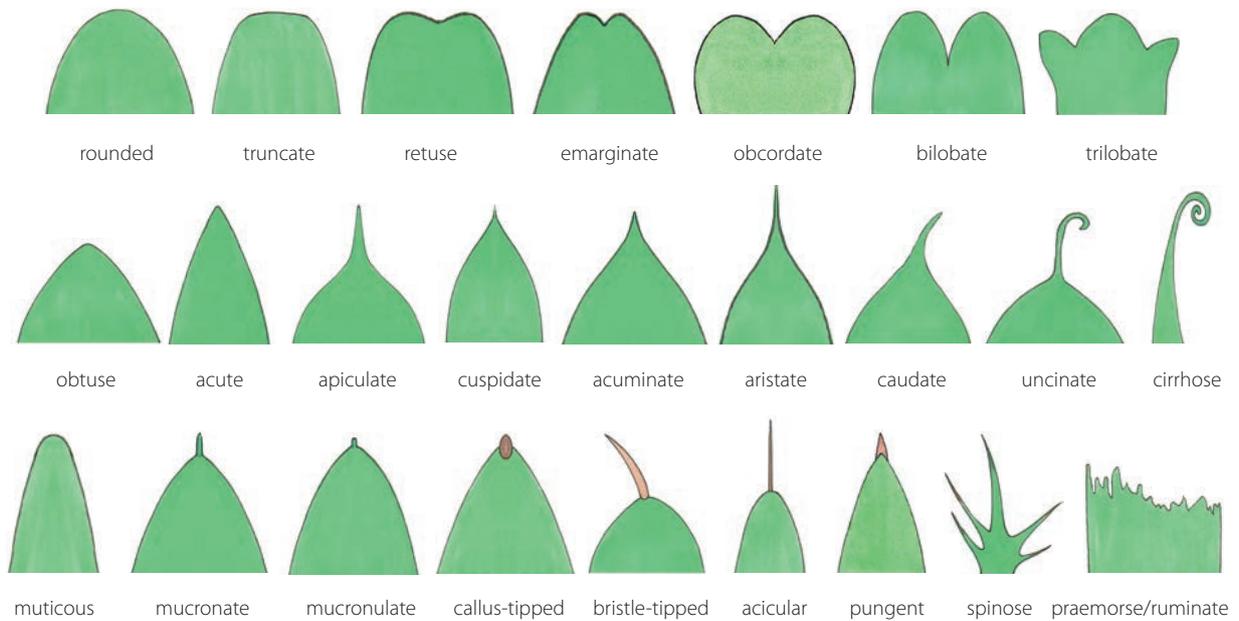


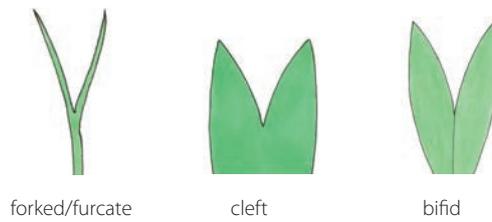
### Leaf shape



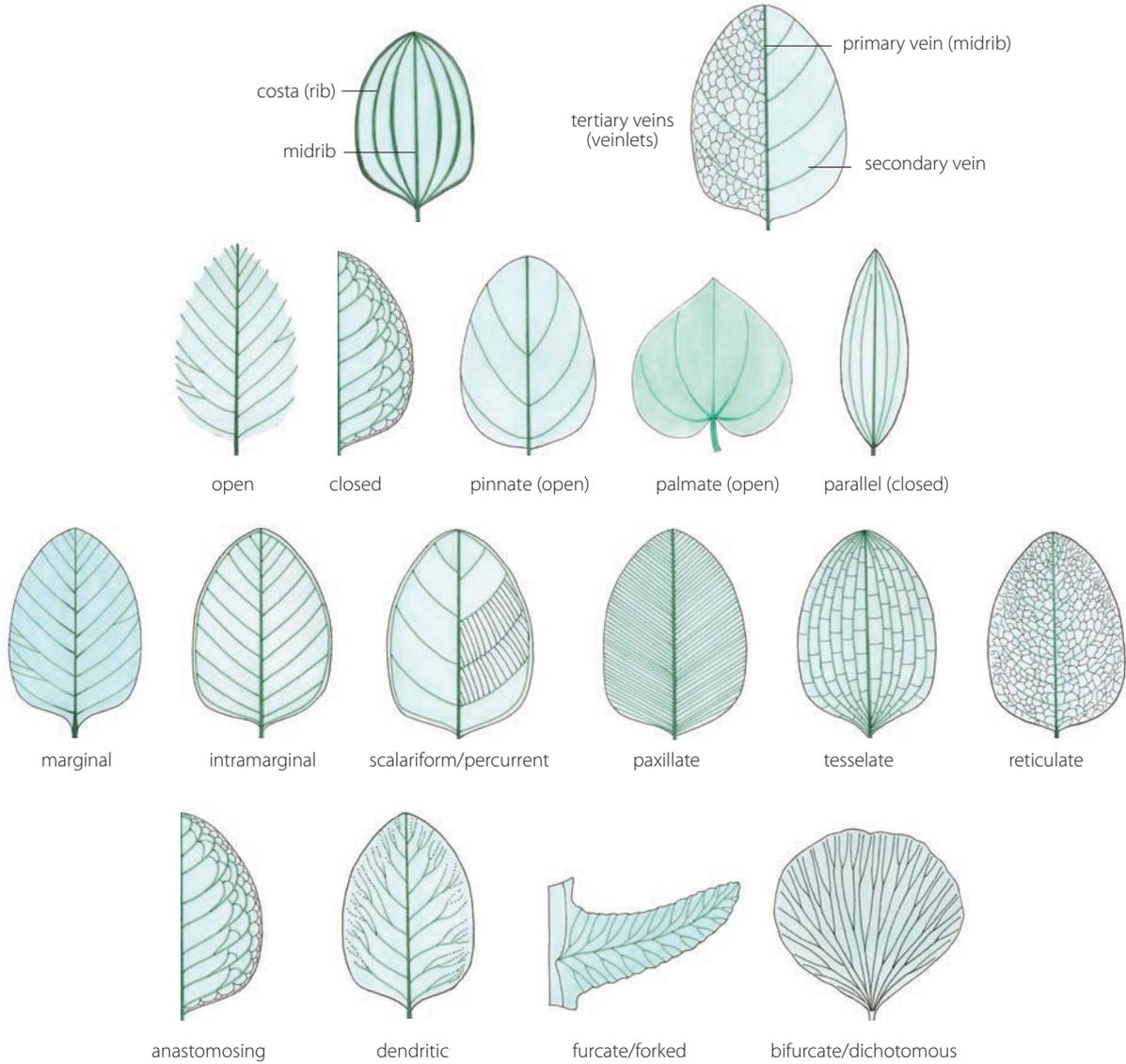


### Leaf tip





**Leaf venation**



**Leaf venation of eudicots**

(Hickey LJ (1973) Classification of the architecture of dicotyledonous leaves. *American Journal of Botany* **60**, 17–33)

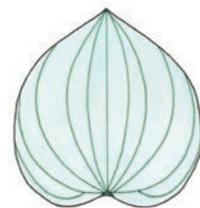
**Parallelodromous**

With two or more primary veins originating at the base and converging towards the apex.



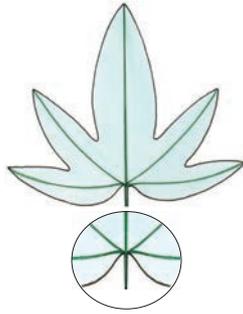
**Campylodromous**

With primary veins or branches running in recurved arches from the base and converging at the top.



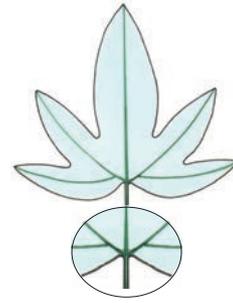
**Actinodromous**

With three or more primary veins diverging radially from a single point at the base.



**Palinactinodromous**

With three or more primary veins diverging radially from a single point at the base and these veins branching dichotomously.

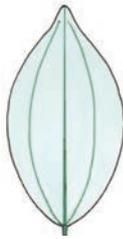


**Acrodromous**

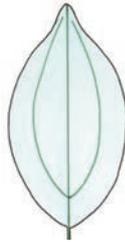
With two or more primary or strong secondary veins running in converging arches towards the apex.

**Perfect**

With lateral veins covering at least two-thirds of the surface.



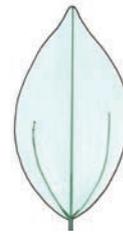
basal-perfect



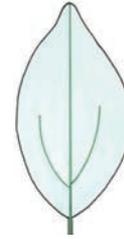
suprabasal-perfect

**Imperfect**

With lateral veins covering less than two-thirds of the surface.



basal-imperfect



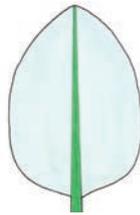
suprabasal-imperfect

**Pinnate**

With a single primary vein (midrib) serving as the origin for the higher order veins.

**Hyphodromous**

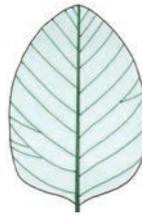
All but primary veins absent or not visible.



hyphodromous

**Craspedodromous**

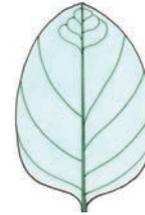
Secondary veins terminating at the margins.



simple craspedodromous



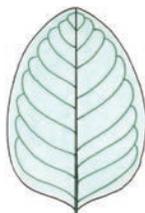
semicraspedodromous



mixed craspedodromous

**Camptodromous**

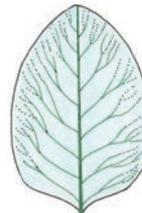
Secondary veins not terminating at the margins.



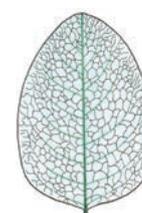
brochidodromous



eucamptodromous



cladodromous



reticulodromous

**leaflet** The small leaf-like parts of a compound leaf.  
 see also **compound leaf, pinna, pinnule**



leaflet

**leathery** Tough but somewhat flexible, as the phyllodes of some wattles (*Acacia*).  
 = **coriaceous**



leathery

**lectotype** A specimen chosen, from the specimens available to the original author, when a holotype was never designated.

**legit, abbr. leg.** From the latin *legit*, meaning he/she collected.  
 Used on the label of a herbarium specimen and followed by the name of the collector.

**legit., legitimate** Legal. Conforming to the rules.

**legitimate, abbr. legit.** Legal. Conforming to the rules.

**legitimate name** In nomenclature, a name conforming to the rules of the International Code of Nomenclature.

**legume** A dry dehiscent fruit, with one or more seeds, that splits into halves lengthwise along two sutures.  
 Derived from a one-carpelled superior ovary. Characteristic fruit of wattles and peas (Fabaceae).

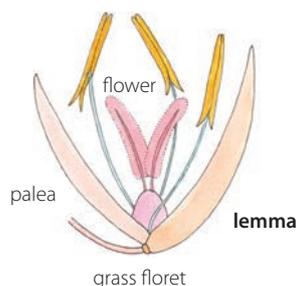


legume

wattle (*Acacia*)

**leio-** A prefix meaning smooth.

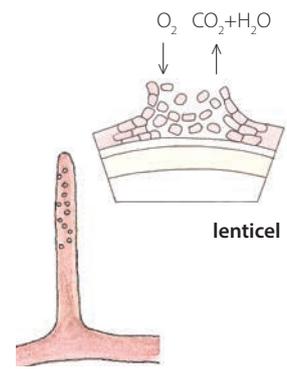
**lemma pl. lemmata, lemmas** Of grasses (Poaceae), the lower and usually larger outer bract that together with the palea encloses the flower of a grass floret.  
 see **locusta, spikelet**



grass floret

**lens** A strophiole.

**lenticel** A small raised pore, usually elliptical in shape, for gas exchange between a plant and the atmosphere.  
 Found on the surface of woody stems, some roots, as the aerial roots of mangroves and on the skin of apples and pears.  
 cf. **stoma**



lenticel

aerial root with lenticels

**lenticellate** Having or producing lenticels.

**lenticular** More or less disc-shaped but convex on both sides, as the seeds of lentils (*Lens culinaris*).



lenticular

**lentiginose, lentiginous**

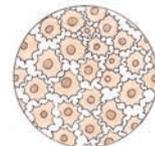
Covered with minute dots like dust scurf or freckles, as the pod of freckled milk vetch (*Astragalus lentiginosus*).



lentiginose

**lepidote, leprous**

Covered with scurfy scales, as the leaves of some species of *Croton*.



lepidote

**lept-, lepto-** A prefix meaning slender, thin or narrow.

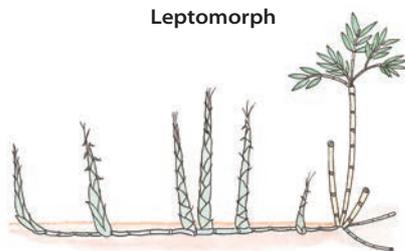
**leptocaul** A growth form of plants that are deemed to be advanced.  
 Characterised by being much-branched with small leaves, as most angiosperms.  
 cf. **pachycaul**

**leptoma** A thinning of the pollen wall, as found in conifers and on the spore wall of some mosses, that is presumed to function as a germination site.

**leptomorph** Of woody bamboos, a long thin running and branching rhizome that spreads horizontally over a considerable distance and can develop a new plant at each node. Such bamboos are indeterminate and invasive.

see **amphipodium, monopodium**

cf. **pachymorph, sympodium**



Leptomorph

**leptophyllous** With slender leaves.

**leptosporangiate** Of true ferns (leptosporangiate ferns) that arise from a single epidermal cell.

see **fern**

cf. **eusporangiate**

**-lete** A suffix denoting the presence or absence of laesurae on a spore.

see **alete, monolete, trilete**

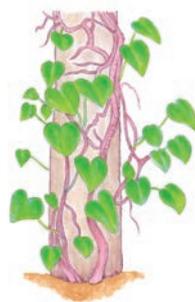
**leuc-, leuco-** A prefix meaning white.

**leucoplast** A colourless non-pigmented plastid in the cytoplasm of a cell, as amyloplasts that store starch, elaioplasts that store fat, or proteinoplasts that store proteins.



leucoplast

**liana, liane** A thick-stemmed woody climber of tropical rainforest that grows to the top of the tree canopy in order to reach sunlight, as philodendron (*Philodendron eximium*). It begins life as a seedling on the forest floor and is rooted in the ground.

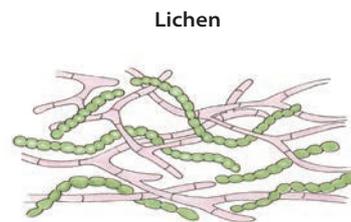


liana

**lianoid** Having a liana-like habit.

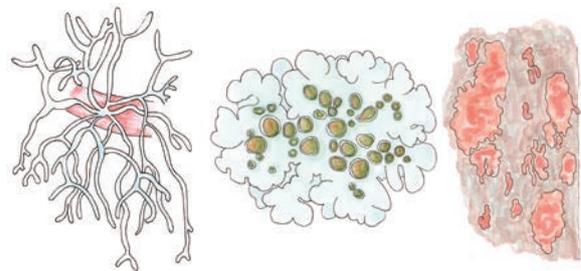
**lichen** A plant consisting of a symbiotic relationship between fungi and photosynthetic algae and/or cyanobacteria. The fungi take nutrients from the soil and the algae absorb carbon dioxide from the air and carry out photosynthesis.

There are three main growth forms: fruticose with upright or pendulous branches, crustose that is usually flat with unlobed edges and foliose that is lobed and often more or less circular.



Lichen

algae chains with fungal hyphae



fruticose (*Ramalina*)

foliose (*Parmelia*)

crustose (*Caloplaca*)

**life cycle** The successive stages in the life of a plant, broadly divided into a sexual phase (gametophyte generation) and a vegetative phase (sporophyte generation).

see **alternation of generations**

**lignification** The deposition of lignin in the cell walls of woody plants, thereby increasing their strength and hardness.

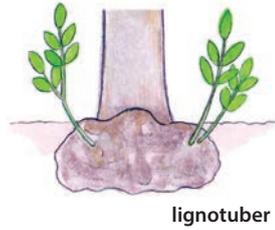
**ligneous** Woody or resembling wood.

**lignified** Woody due to lignification.

**lignin** A complex organic substance that adds strength and rigidity to cell walls and, together with cellulose, forms the main component of wood.

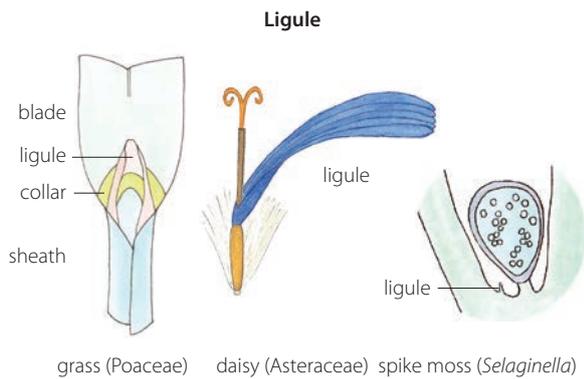
see **lignification**

**lignotuber** A large rounded woody outgrowth at the base of a tree or shrub that can resist fire and drought. It consists of food reserves and a mass of vegetative buds that grow after the plant has been cut or damaged by fire.



**ligule** A strap-shaped structure. Of many grasses (Poaceae), the membranous outgrowth at the junction of the blade and the sheath that grows upward from the inner surface of the collar region. Of the daisy family (Asteraceae), the strap-shaped fused petals of the corolla of a ray floret. Of spike mosses (*Selaginella*) and quillworts (*Isoetes*), the minute appendage near the base of a leaf.

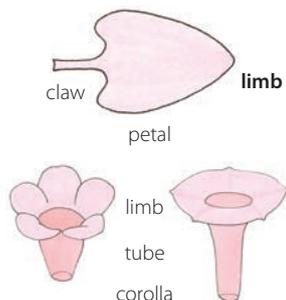
**ligulate** Having a ligule. Strap-shaped.



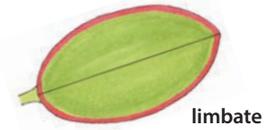
**liliaceous** Of, relating to or resembling lilies (Liliaceae). Having a regular perianth of six tepals, similar to that of the lily genus (*Lilium*).



**limb** The broad upper part of a petal as distinct from the claw. The spreading, often lobed, rim of the united petals of a corolla, as distinct from the tube. The broad upper part of a petal as distinct from the claw.



**limbate** Bordered, with one colour surrounded by an edging of another, as some leaves.



**limicolous** Growing in mud.

**limnophile** Of a plant growing in marshes or quiet shallow water.

**limnophilous** Growing in quiet shallow water.

**limnophyte** Of a plant growing in marshes or quiet shallow water.

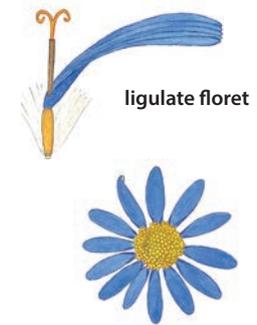
It may be rooted or not, submerged or floating.  
*cf.* **rheophyte**

**lineage** A line of descent through time connecting an ancestor to its descendants.  
*see* **clade**

**linear** Long and narrow with parallel margins.



**ligulate floret** Of the inflorescence of a daisy (Asteraceae), a small tubular flower with the lobes united on one side into a strap-like blade.  
= **ray floret**  
*see also* **capitulum**  
*cf.* **disc floret, tubular floret**

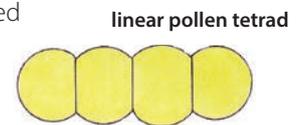


**lineolate** Marked with minute parallel lines, finely lineate.

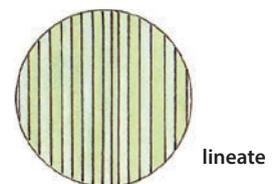
**linear tetrad**

A uniplanar tetrad arranged with all four members cohering in a row.

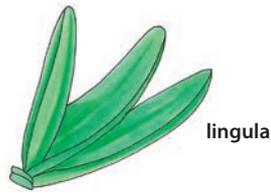
*see also* **pollen tetrad**  
*see* **uniplanar, viscin thread**



**lineate** Striped with longitudinal lines, grooves or ridges, as the leaves of *Aloe lineata*.



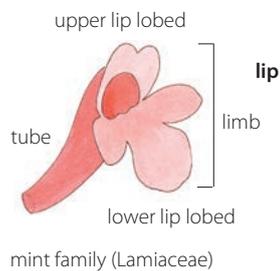
**lingula, pl. lingulae** A tongue-shaped structure.  
**linguiform, lingulate** Tongue-shaped, as some leaves.



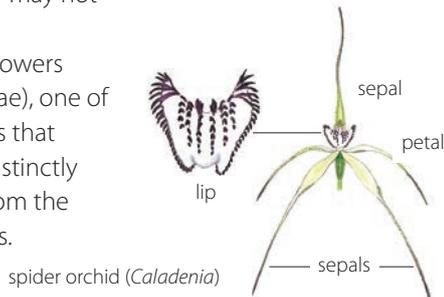
**linkage** The tendency for a group of genes located nearby on the same chromosome to be inherited together.

**Linnaean System** A system of plant classification developed in the 18th century by the Swedish botanist Carl Linnaeus. It introduced the concepts of a taxonomic hierarchy and binomial nomenclature.

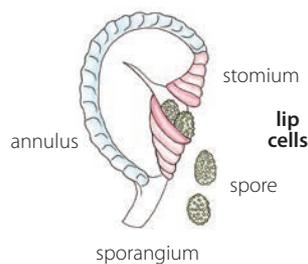
**lip** A labellum. One of the lip-like divisions of a bilabiate corolla, as flowers that have a tubular corolla and the limb divided into two lip-like parts that may or may not be lobed.



Of orchid flowers (Orchidaceae), one of three petals that is usually distinctly different from the other petals.



**lip cells** Cells on the sporangium of some ferns that are distinct from the annulus and part of the stomium. They are the first to separate at dehiscence.



**lipid** A fatty or waxy organic compound that is insoluble in water. It stores energy and is a structural component of the cell membrane.

**lithocyst** A specialised epidermal cell in which cystoliths form, as in the leaves of species of fig (*Ficus*).

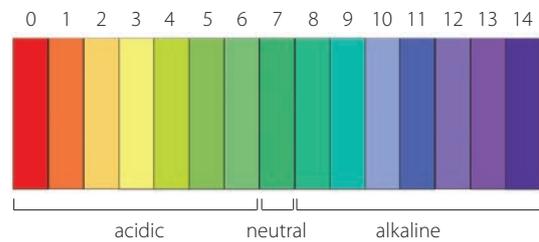
**lithophyte** A plant that grows on the surface of rocks.

**lithophytic** Of or relating to a lithophyte.  
*cf.* **chasmophyte, chomophyte**

**lithosere** An ecological succession that starts on a bare rock surface.

**litmus test** A test for acidity or alkalinity (pH) using litmus paper. It has a colour scale running for 0 to 14, with 0 at the red end representing the most acidic, 14, at its opposite end, a dark blue representing the most alkaline, and in the middle the pH becomes neutral.

Litmus test for pH



**litoral, littoral** A region lying along a shoreline that is periodically immersed, as a lakeside, but mostly referring to the area of the seashore between high and low tides.

**liverworts** see page 170

**loam** Soil composed of a mixture of sand, clay and organic matter.

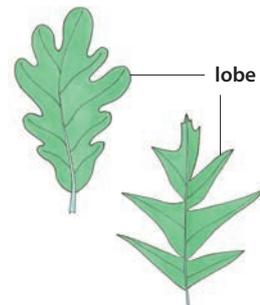
**lobe** A usually rounded, or angular, part of a margin, as the margin of a leaf or a corolla tube.



*cf.* **sinus**

**lobed** With a lobe or lobes, as some pinnatifid or palmatifid leaves.

**lobate** Having lobes or resembling a lobe.



**liverworts** One of three major groups of nonvascular land plants that are photosynthetic, reproduce by spores and lack flowers, true leaves and roots.

A liverwort has two alternating generations, the larger haploid gamete-producing gametophyte generation and the smaller diploid spore-producing sporophyte generation that remains attached to the female gametangium (archegonium).

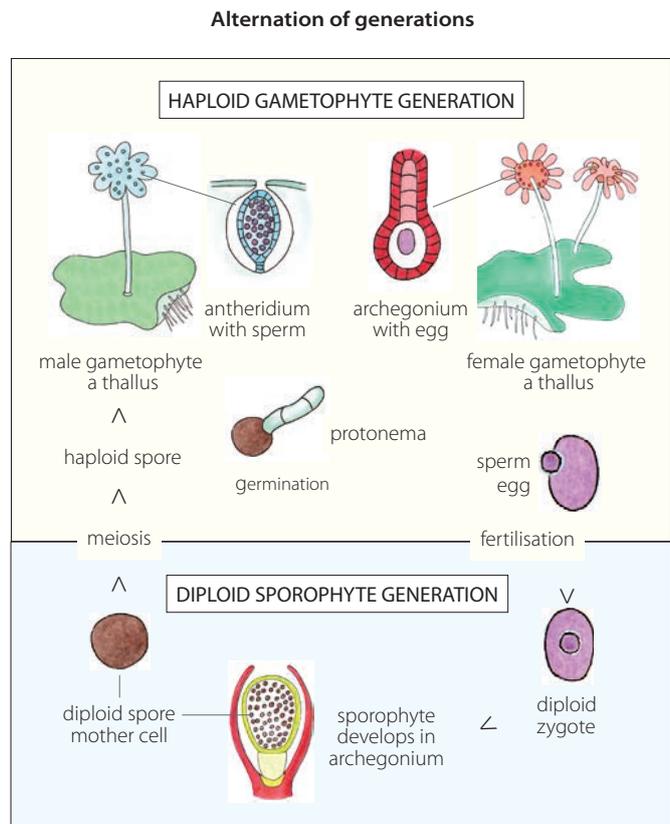
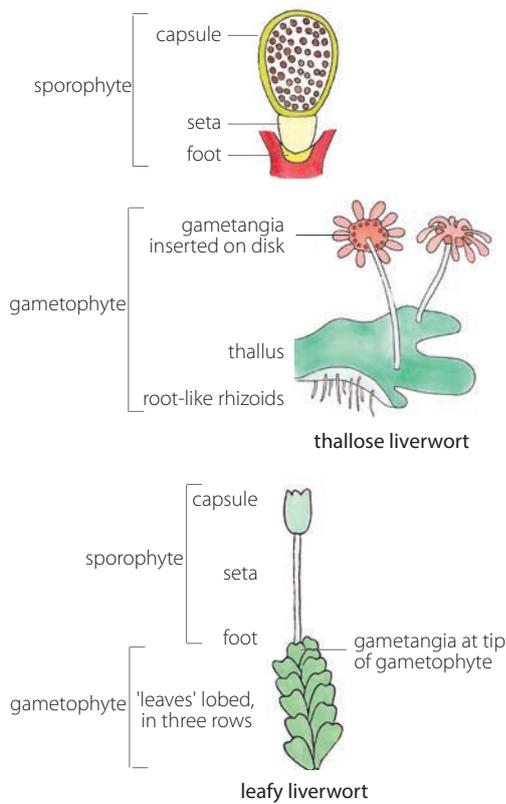
The haploid gametophyte, that is either a thallus or a 'leafy stem', bears the gamete producing sex organs (the female archegonia and/or the male antheridia).

A male sperm from an antheridium fertilises a female egg in an archegonium, that then develops into a diploid spore-producing sporophyte, comprising a stalk (seta), capsule and a foot.

The diploid spores in the capsule undergo meiosis to form haploid spores that are dispersed and develop into gametophytes, thus beginning the life cycle anew.

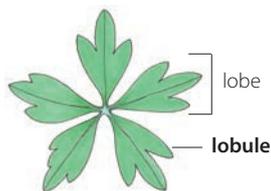
see **bryophyte**

### Liverworts



**lobule** A small lobe, a subdivision of a lobe.

**lobulate** Having small lobes or resembling a lobule.



**locellus, pl. locelli** A subdivision of a loculus when it is divided into even smaller cavities.

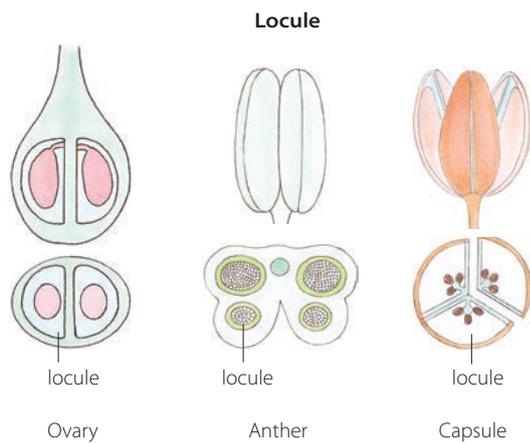
**locellate** Having small secondary cavities.

**locule, loculus, pl. loculi** A small, more or less closed cavity or compartment within an organ that acts as a container.

In an ovary a locule contains the ovules, in an anther the locule (pollen sac) contains pollen and in a capsule a locule contains the seeds.

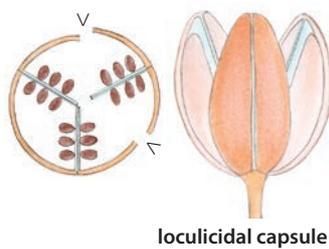
Unilocular, bilocular, trilocular and multilocular refer to the number of locules present.

**locular, loculate** Having locules, divided into separate cavities or compartments.



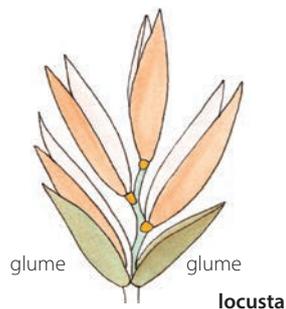
**loculicidal capsule**

A capsule that splits lengthwise into the cavity of the locules, as a violet (*Viola*).

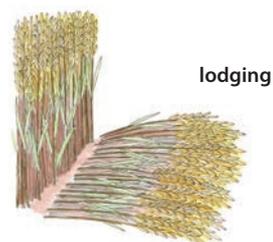


**locus, pl. loci** The position of a particular gene on a chromosome.

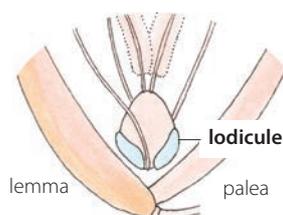
**locusta** In grasses (Poaceae), the basic unit of an inflorescence. Typically composed of two bracts (glumes) at the base of an axis (rachilla), with one or more florets arranged alternately in two ranks. = **spikelet**



**lodging** Bending or collapse of the stem of a plant. The collapse of a cereal stem when it can no longer support its own weight.



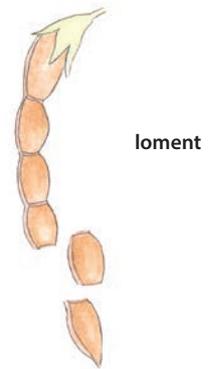
**lodicule** One of usually two minute scales at the base of the pistil in a grass floret. It swells to push the bracts (lemma and palea) apart during flowering. = **squamula**



**loment, lomentum, pl. lomenta**

A legume-like pod that is contracted between the seeds and separates at maturity into one-seeded segments that don't split open. Derived from a one-carpelled superior ovary, as tick-trefoil (*Desmodium*).

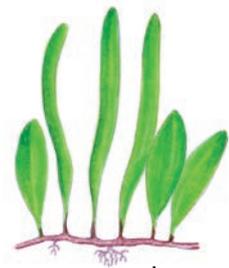
**lomentaceous** Having the appearance of or bearing of a loment.



**long-creeping**

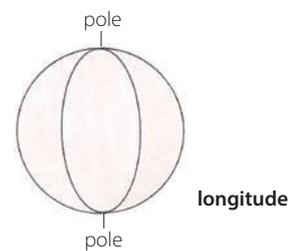
Of ferns, having a rhizome that elongates quickly so that the fronds are some distance apart, as lance-leaf tongue fern (*Pyrrosia lanceolata*).

cf. **short-creeping**



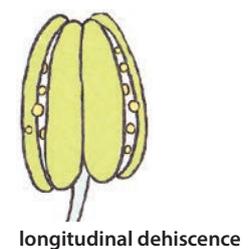
**longi-** A prefix meaning long.

**longitude** A line on the surface of a sphere connecting the poles. cf. **latitude**



**longitudinal dehiscence**

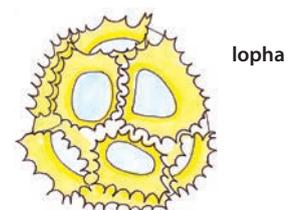
Of anthers, opening lengthwise to release pollen, as those of devil's trumpet (*Datura*). see also **anther dehiscence**



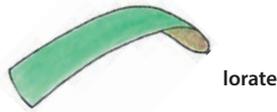
**lopha, pl. lophae**

A network-like pattern of ridges surrounding spaces or depressions.

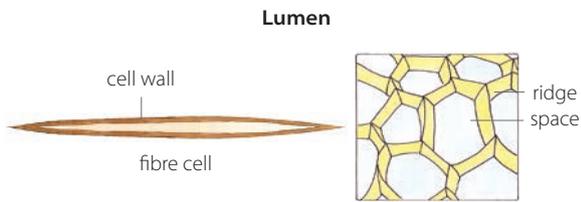
**lophate** Having lophae. cf. **lacuna**



**lorate** Strap-shaped, as some leaves.



**lumen, pl. lumina** A cavity enclosed by a cell wall, as that in the centre of a fibre cell. A space enclosed by ridges. *cf. murus*

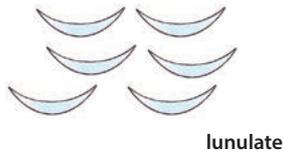


**lumper** A taxonomist who concentrates on similarities rather than subtle differences to subdivide species, resulting in a smaller number of taxa.

**lunate** Shaped like a crescent.



**lunulate** Shaped like a small crescent. Having crescent-shaped markings.

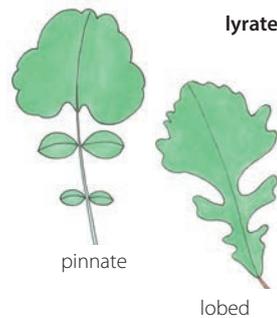


**lustrous** Having a smooth shining surface, glowing.

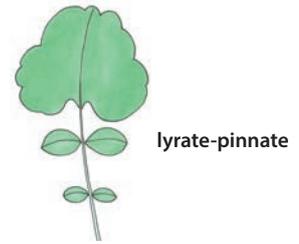
**Lycophyta, lycophytes** One of two groups of vascular plants that bear spores rather than seeds, the other group being Monilophyta (ferns). They possess small leaves with one vein (microphylls). Lycophyta comprises quillworts (*Isoetes*), clubmosses (*Lycopodium*) and spike mosses (*Selaginella*).

*see also fern allies*  
*cf. euphyllophytes*

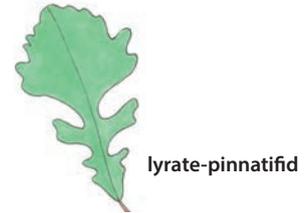
**lyrate** Lyre-shaped. Of a leaf, lobed to resemble a lyre, with the terminal lobe or leaflet largest and the lower lobes or leaflets smaller. The leaf may be pinnate or lobed  
*see lyrate-pinnate, lyrate-pinnatifid*



**lyrate-pinnate** Of a pinnate leaf where the terminal leaflet is largest and the others successively smaller towards the base.  
*cf. lyrate-pinnatifid*



**lyrate-pinnatifid** Of a pinnately lobed leaf with the terminal lobe largest and the lower lobes smaller.  
*cf. lyrate-pinnate*

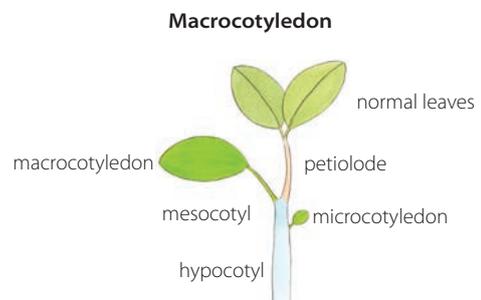


**lysigenous** Of intercellular spaces formed due to the breakdown of entire cells by their own enzymes.  
*cf. schizogenous*

**lysosome** In the cytoplasm of an animal cell, one of the sacs with enzymes that break down cellular waste and debris. Sacs in plants with similar functions are considered by some to be lysosomes.

**macro-** A prefix meaning large or long.  
*cf. micro-*

**macrocotyledon** The larger of two unequally developed cotyledons that grows to resemble a foliage leaf, as nodding violet (*Streptocarpus caulescens*). A petiolode with normal leaves arises from the mesocotyl situated between the microcotyledon and the macrocotyledon.  
*see anisocotily*  
*cf. microcotyledon*

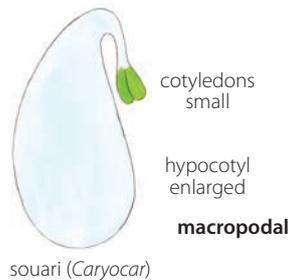


**macroevolution** Evolution of large groups (above species level) over the history of life, as mammals and flowering plants.  
*cf. microevolution*

**macronutrient** Nutrients needed by a plant in higher amounts than other nutrients, as nitrogen, potassium and phosphorus.  
*cf.* **micronutrient, trace element**

**macrophyll** A leaf with a complex system of veins. Typical of seed plants and ferns.  
 = **megaphyll**  
*cf.* **microphyll**  
**macrophyllous** With large leaves.  
 = **megaphyllous**

**macropodal, macropodous**  
 Of an embryo having an enlarged hypocotyl and lacking well-developed cotyledons, as souari trees (*Caryocar*).



**macrospore** Another term for megaspore.

**macula, pl. maculae** A spot or blotch.  
**maculate** Spotted or blotched.

**maidenhair fern**  
 Maidenhair ferns (*Adiantum*) belong to one of about 50 genera of mostly terrestrial ferns in the family (Pteridaceae), that have variously divided fronds and erect or creeping scaly or woolly rhizomes.  
*see* **fern**

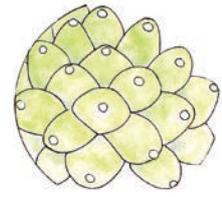


**male flower** A flower with functional stamens but no functional carpels.

**malodorous, malodourous** Smelling unpleasant or offensive.

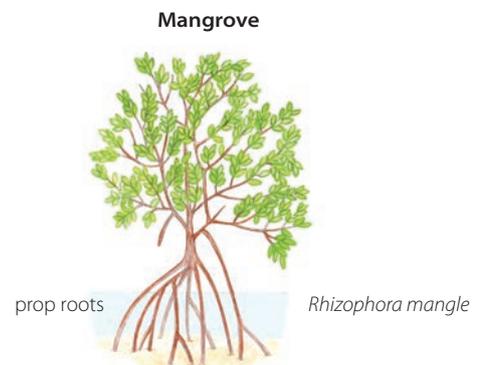
**maltose** A sugar formed by the action of diastase on starch.

**mammilla, pl. mammillae**  
 A nipple-shaped protuberance.  
**mammiform** Shaped like a breast or teat.  
**mammillate** With nipple-like projections, as the cactus genus *Mammillaria*.

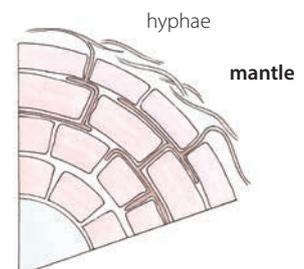


**mangal** One of the mangrove forests along much of the coastline in tropical areas of the world.

**mangrove** A shrub or small tree variously adapted to growing in brackish water and the muddy, oxygen-poor soils of tidally inundated areas along the coast and in river estuaries. Adaptations include prop roots for support and breathing roots that project above the mud and have small openings (lenticels) for gas exchange with the atmosphere. Found in many families, including Rhizophoraceae, Acanthaceae, Combretaceae and Arecaceae. The name given to the habitat in which these plants grow.  
*see also* **mangal, vivipary**

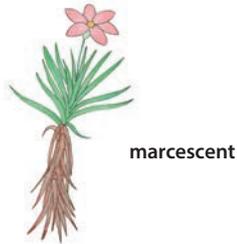


**mantle** An outer covering. Of fungi, a network of hyphae that form a sheath, as that around the outside surface of some roots.  
*see* **ectomycorrhiza**



**maquis** A dense shrubby vegetation more than three metres high, growing on siliceous soils in low rainfall areas in the Mediterranean Basin. It is a Mediterranean-type ecosystem together with the garrigue, also in the Mediterranean Basin, the chaparral in California, matorral in Chile, kwongan in southwestern Australia and fynbos in South Africa.

**marcescent** Withered but remaining attached, as the leaves of some plants and the fronds of some ferns or palms.

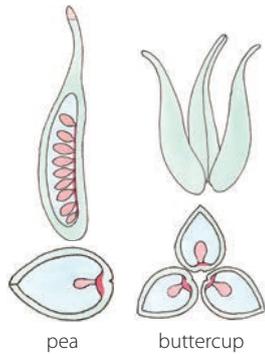


**margin** An edge or border.

**marginal** On the edge or border, relating to the margin.

**marginal placentation**

With ovules arranged along the fused margins of a single free carpel (simple ovary), as peas (*Pisum*) that have one free carpel, and buttercups (*Ranunculus*) that have several free carpels.

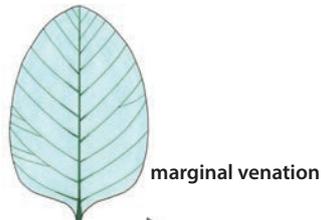


see **placentation**

**marginal placentation**

**marginal venation**

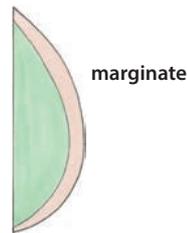
Of leaf venation with the veins reaching the margin of the leaf.  
cf. **intramarginal**



**marginal venation**

**marginate**

With a distinct margin or border, as the margins of some leaves.  
cf. **emarginate**



**marginate**

**margo** An ornamented margin surrounding a colpus on the wall of a pollen grain.  
cf. **annulus**



**margo**

**marine** Of or relating to the sea, as marine habitat rather than a freshwater habitat.

**marsh** A freshwater or saltwater wetland that is dominated by herbaceous plants, as grasses, sedges, rushes, low shrubs and forbs rather than trees.

see also **halophyte**

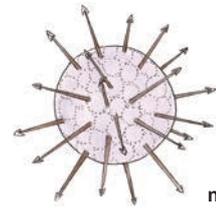
cf. **bog, swamp**

**massula, pl. massulae**

Of aquatic ferns in the Salviniaceae family, a group of microspores enclosed in a hardened mucilage, often with hooked bristles.

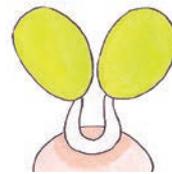
Of orchids, a cohering mass of pollen grains produced from a single pollen mother cell.

Many of these make up a pollinium.



**massula**

*Azolla*



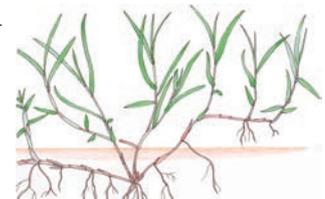
orchid pollinia

**mast** The fallen fruit of trees and shrubs that are eaten by wildlife, as acorns (*Quercus*) and chestnuts (*Castanea*).

**masting** Within a species, mass synchronised flowering and fruiting, at intervals, across a large area.

see also **gregarious flowering, plietesial, semelparous**

**mat grass** Any of various stoloniferous or rhizomatous grasses, with tillers on long, often branched lateral stems that spread across the ground.



**mat grass**

cf. **bunch grass**

**mat-forming** Prostrate and dense, as some foxtails (*Ptilotus*), or a plant spreading by sending out roots from the nodes on the horizontal stems, as creeping thyme (*Thymus serpyllum*).

**matorral** A vegetation type in Chile, with drought-deciduous and evergreen sclerophyllous shrubs, trees and diverse herbaceous plants having winter rain and summer droughts.

It is a Mediterranean-type ecosystem together with the garrigue and maquis in the Mediterranean Basin, the chaparral in California, kwongan in southwestern Australia and fynbos in South Africa.

**matrix** The material or tissue in which more specialised structures are embedded.

**matt, matte** Having a dull lustreless surface that reflects little if any light.  
*cf.* **glossy**

**matted** With hairs tangled and adhering closely together. Tomentose, as the soft cottony or woolly hairs of cudweed (*Gnaphalium*).



**mature** Fully developed, ripe.  
*cf.* **immature, senescent**

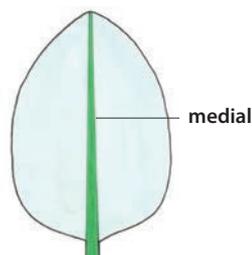
**matutinal** Occurring or active early in the morning, as the flowers of morning glory (*Ipomoea purpurea*) that open at dawn.  
*cf.* **crepuscular, diurnal, nocturnal, vespertine**

**mealy** Covered with a crumbly, scurfy flour-like powder, as young saltbushes (*Atriplex*).

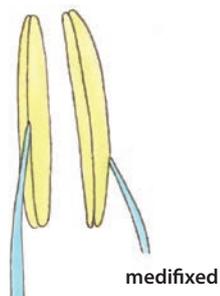


**mechanical layer** Of a seed coat, thick-walled cells with lignin, suberin or cutin in one or more layers of the integuments. It provides support and protection.

**medial, median** Of or situated at or towards the middle, as the midvein of a leaf. Midway between the base and the apex.  
*cf.* **admedial, distal, exmedial, proximal**



**medifixed** Attached at or by the middle, as a stamen filament attached to the middle of the connective at the back of an anther.  
*cf.* **dorsifixed, ventrifixed**  
*see* **anther attachment**



## Mediterranean-type ecosystems

Characterised by mild wet winters and warm dry summers and dominated by evergreen sclerophyllous shrublands.

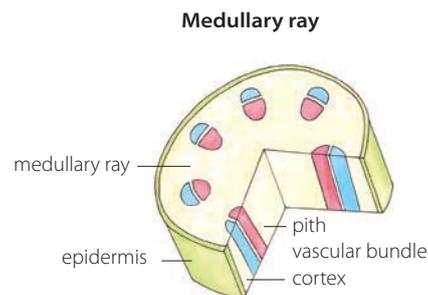
Termed maquis and garrigue in the Mediterranean Basin, chaparral in California, matorral in Chile, fynbos in South Africa and kwongan in southwestern Australia.

**medulla** Pith.

**medullary ray** Of primary growth, one of the bands of mostly parenchyma tissue in young eudicot stems and gymnosperms extending radially from the pith (medulla) between the vascular bundles to the cortex. Medullary rays store nutrients and transport them radially compared with the vascular bundles that transport nutrients vertically.

*see* **vascular ray**

*see also* **ray initials**



**mega-** A prefix meaning large in size or amount: one million units of the base word.

**megagamete** The larger female gamete formed by plants that have unequal-sized male and female gametes.

= **egg cell, ovum**

*see* **megagamophyte**

*cf.* **microgamete**

## megagametogenesis

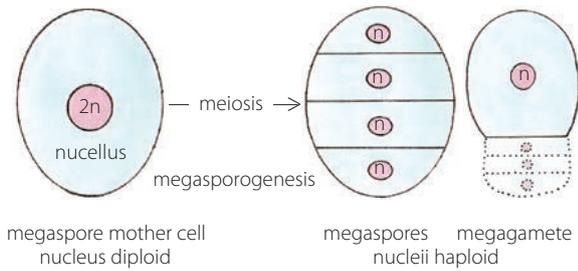
Formation of a megagamete from a megaspore mother cell.

After meiosis three of the microspores degenerate and the one remaining microspore is the megagamete (egg cell).

**megagametogenesis** page 176 (cont.)

*cf.* **microsporogenesis**

### Megagametogenesis



### megagametophyte

Of seed plants, the female gametophyte that develops within each ovule.

In angiosperms it commonly consists of seven cells: three antipodal cells, two synergid cells, one egg cell and one central cell with two polar nuclei.

Found in the ovule that is enclosed in the ovary.

= **embryo sac**

In gymnosperms, the haploid nutritional tissue, formed from the megaspore, in which the archegonia develop.

Found in the exposed ovule on the upper surface of a cone scale on the female cone.

cf. **microgametophyte**

**megalo-** A prefix meaning exceptionally large.

**megaphyll** A leaf with a complex system of veins; typical of seed plants and ferns.

= **macrophyll**

cf. **microphyll**

**megaphyllous** With large leaves.

= **macrophyllous**

### megasporangium, pl. megasporangia

The structure in which megaspores are formed in a heterosporous plant.

In seed plants (gymnosperms and angiosperms), the tissue in the immature ovule in which megaspores are formed.

= **nucellus**

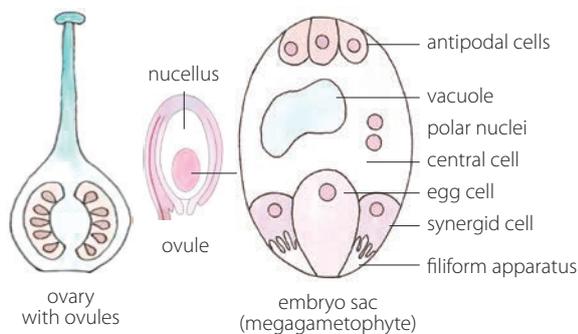
Some fern allies, like the spike moss (*Selaginella*) are heterosporous. Spike moss has megasporangia in the axils of the leaves (sporophylls) and each consists of a short stalk and a wall enclosing the sporogenous tissue from which the megaspores are formed.

see **megasporogenesis**

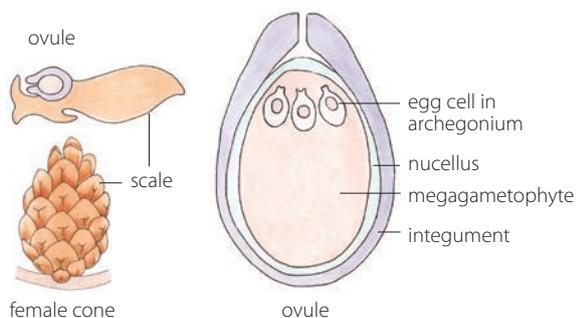
cf. **microsporangium**

### Megagametophyte

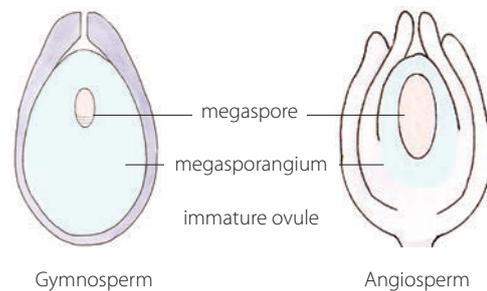
#### Angiosperms



#### Gymnosperms



### Megasporangium



**megaspore** One of two kinds of spores, produced by meiosis in a heterosporous plant. It gives rise to the female gametophyte (megagametophyte).

All seed-bearing plants, as well as some ferns and other seedless plants, are heterosporous.

In angiosperms and gymnosperms, it is one of usually four haploid cells produced by the diploid megaspore mother cell. Three of these cells degenerate and the remaining megaspore develops into the the embryo sac (megagametophyte).

The fern ally, spike moss (*Selaginella*) is a seedless heterosporous plant that produces megaspores in megasporangia located in the leaf axils on the upper part of the stem.

The fern ally, spike moss (*Selaginella*) is a seedless heterosporous plant that produces megaspores in megasporangia located in the leaf axils on the upper part of the stem.

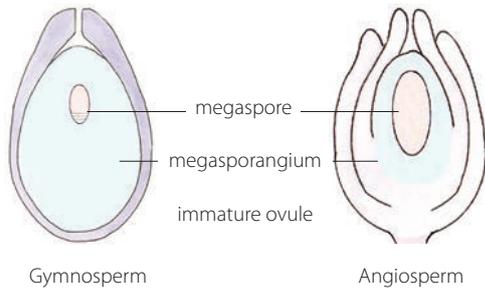
The fern ally, spike moss (*Selaginella*) is a seedless heterosporous plant that produces megaspores in megasporangia located in the leaf axils on the upper part of the stem.

= **macrospore**

see **macrosporangium, macrosporogenesis**

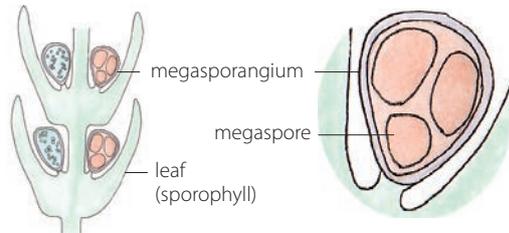
cf. **microspore**

### Megaspore



Gymnosperm

Angiosperm



Spike moss (*Selaginella*)

### megaspore mother cell

In seed plants, a diploid cell in the immature ovule that gives rise, by meiosis, to four female haploid spores (megaspores).

There are usually four megaspores and three of these disintegrate.

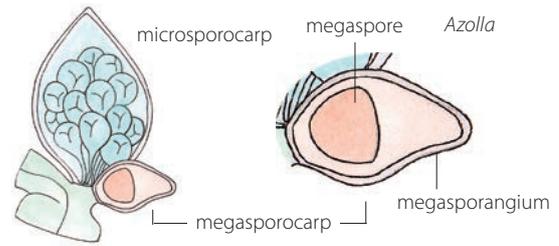
The one remaining megaspore develops into the megagametophyte.

= **megaspore mother cell**

see **megasporogenesis, megasporangium, mother cell**

cf. **microspore mother cell**

### Megasporocarp



### megasporecyte

In seed plants, a diploid cell in the immature ovule that gives rise, by meiosis, to four female haploid spores (megaspores).

There are usually four megaspores and three of these disintegrate, with the one remaining megaspore developing into the megagametophyte.

= **megaspore mother cell**

see **mother cell**

cf. **microsporocyte**

### megasporogenesis

In heterosporous plants, the process of forming, by meiosis, haploid megaspores from the diploid megaspore mother cell.

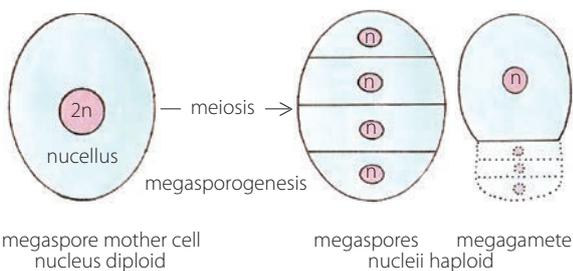
Macrosporogenesis takes place in the megasporangium.

There are usually four megaspores and three of these disintegrate.

The one remaining megaspore develops into the megagametophyte.

cf. **megagametogenesis, microsporogenesis**

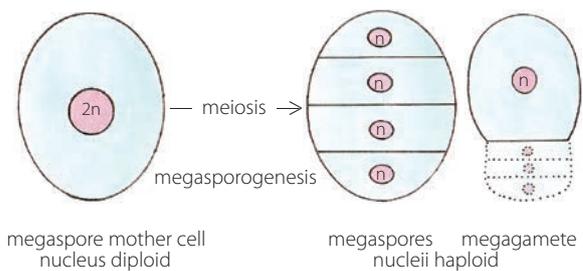
### Megaspore mother cell



megaspore mother cell  
nucleus diploid

megaspores  
nucleii haploid

### Megasporogenesis



megaspore mother cell  
nucleus diploid

megaspores  
nucleii haploid

### megasporocarp

The reproductive structure in some heterosporous fern families consisting of a single megasporangium with a single megaspore.

see **sporocarp**

cf. **microsporocarp**

### megasporophyll

A modified leaf that bears the megasporangia in a heterosporous plant.

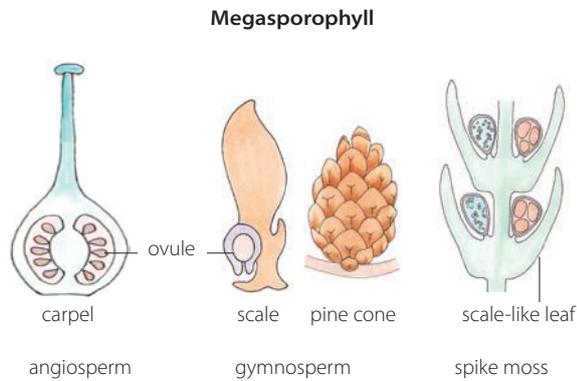
In angiosperms, it is the ovule-bearing carpel.

In gymnosperms, it is the ovule-bearing scale, as on a female pine cone.

**megasporophyll** page 178 (cont.)

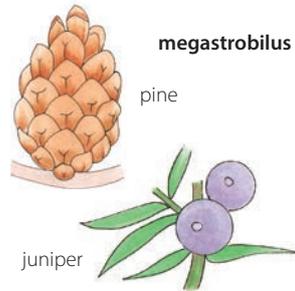
In some heterosporous fern allies, like spike moss (*Selaginella*), it is a scale-like leaf on the cone at the top of the stem.

see **megasporangium**  
cf. **microsporophyll**



**megastrobilus,**  
pl. **megastrobili**

The ovule-producing cone of gymnosperms, as the female pine cone. Rarely, it can be fleshy, as the cones of juniper (*Juniperus communis*).  
cf. **microstrobilus**



**meiosis** see page 179

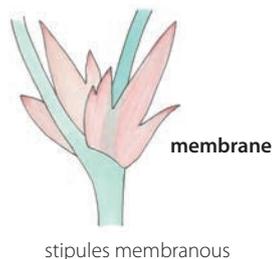
**melittophile** One of thousands of plant species pollinated by bees.

**melittophily** Dispersal of pollen and pollination of bees.

**melittophilous** Pollinated by bees.

**membrane** A thin, rather soft, pliable and semi-transparent tissue.

**membranaceous,**  
**membranous,**  
**membraneous** Like a membrane, as the stipules of some leaves.

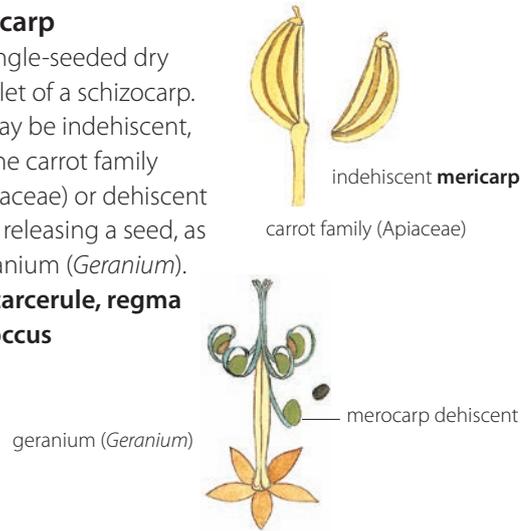


**Mendelian inheritance** The key ideas of this model of inheritance are that traits are determined by genes, that genes come in pairs and in different versions called alleles, that gametes receive one of each gene from each parent, and that traits are inherited independently of each other.

**mentum** In some orchids, a chin-like projection formed by the bases of the column and the lateral sepals, as the genus *Dendrobium*.

**mericarp**

A single-seeded dry fruitlet of a schizocarp. It may be indehiscent, as the carrot family (Apiaceae) or dehiscent and releasing a seed, as geranium (*Geranium*).  
see **carcerule, regma**  
= **coccus**



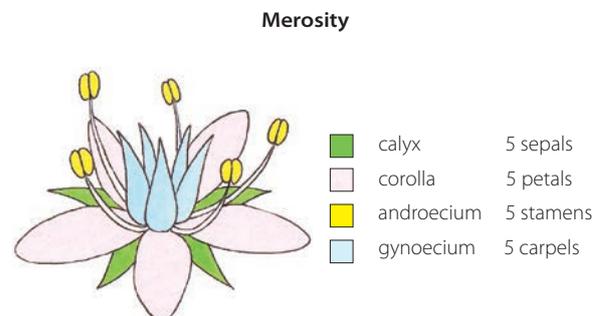
**meristem** A region of primary undifferentiated cells (initial cells) that divide and grow continuously. It is classified according to its location.

Apical meristem occurs at the tips of shoots and roots, lateral meristem occurs in vascular tissue (vascular cambium and cork cambium) and intercalary meristem between two mature tissues. Meristematic cells differentiate to form plant tissues.

**meristematic** Of or relating to a meristem.

**merosity** The number of parts in each whorl of a plant structure, as the number of sepals in a calyx, the number of petals in a corolla, the number of stamens in an androecium and the number of carpels in a gynoecium.

see **numerical plan**



**-merous, -merus** Suffix indicating number of parts.

see **dimerous, monomerous, pentamerous, polymerous, tetramerous, trimerous**

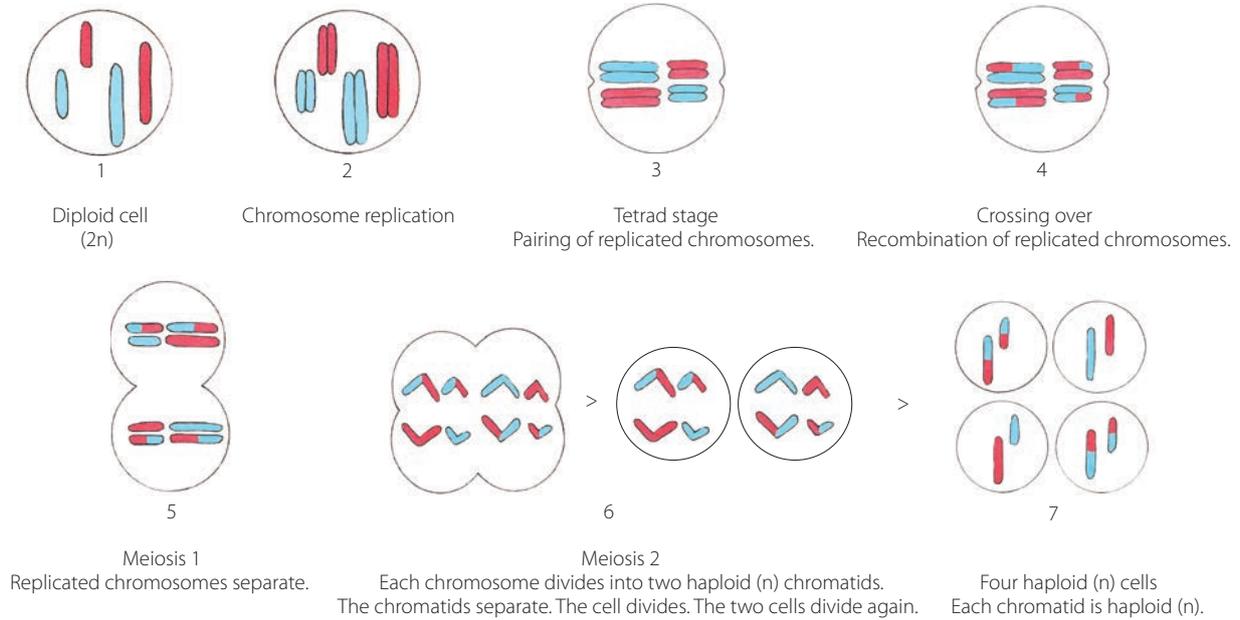
**meiosis** The process of division of a diploid reproductive cell.

The cell divides twice to produce four haploid daughter cells that are genetically unique due to crossing over. At the end of meiosis the cell is haploid.

cf. **mitosis**

**meiotic** Of or pertaining to meiosis.

**Meiosis**



**mesarch** Describes radial differentiation of xylem according to the relative position of protoxylem and metaxylem in which protoxylem is positioned in the centre of the stem and is surrounded by metaxylem. Found in many species of ferns.

cf. **endarch, exarch**

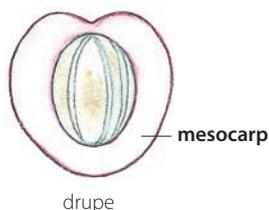
**mesic** Of, related to or adapted to an environment that receives a moderate or well-balanced supply of moisture, as a temperate hardwood forest or prairies that have good drainage and high moisture available during the growing season.

cf. **hydric, xeric**

**meso-** A prefix meaning middle.

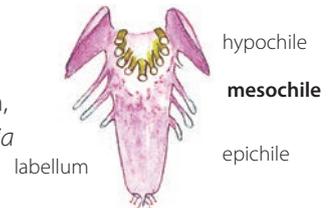
**mesocarp** The middle layer of the fruit wall that is usually fleshy, as the succulent layer of a stone fruit.

see **pericarp**



**mesochile**

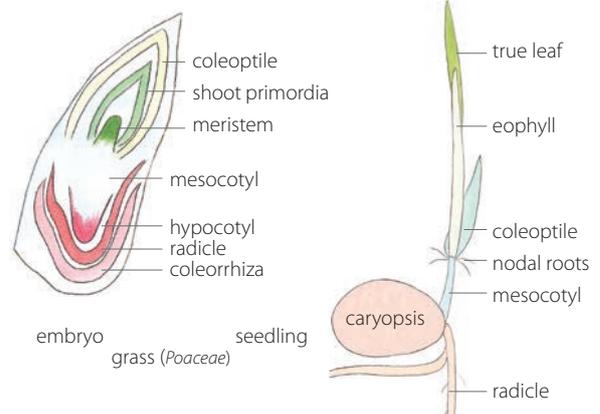
Of orchids, the middle portion of the labellum, as pink fairies (*Caladenia latifolia*).



**mesocotyl** Of grasses (Poaceae), part of the embryo axis, or of a seedling, below the coleoptile. Elongation of the mesocotyl during germination pushes the coleoptile above the soil surface.

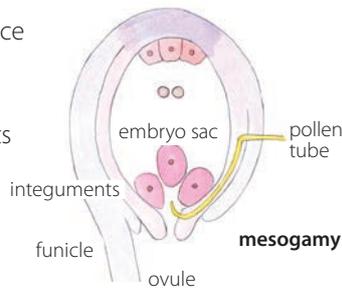
cf. **epicotyl, hypocotyl**

**Mesocotyl**



**mesogamy** Entrance of the pollen tube through the middle part, the integuments or funicle, of the ovule.

cf. **chalazogamy, porogamy**



**mesophyll**

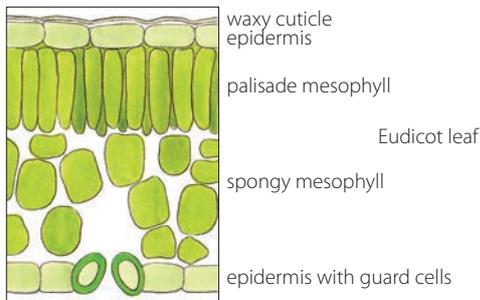
Photosynthetic cells that make up the bulk of the internal tissue of a leaf.

Eudicots have two types of mesophyll: palisade mesophyll and spongy mesophyll.

Mesophyll cells in monocotyledonous leaves are not differentiated into two types.

see **chlorenchyma**

**Mesophyll**



**mesophyte**

A plant that requires adequate water during its growing season but does not tolerate environmental extremes like drought. Most angiosperms, grasses, herbs and woody plants are mesophytes.

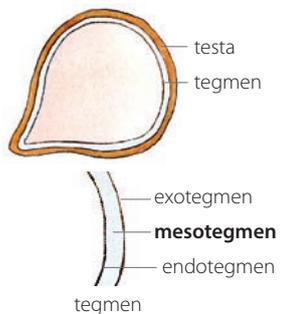
They may be evergreen or deciduous.

cf. **trophophyte, xerophyte**

**mesotegmen**

Of the bitegmic seed coat of angiosperms, the middle layer of the inner integument (tegmen).

cf. **endotegmen, exotegmen**  
see also **endotesta, exotesta, mesotesta**



chick pea seed (*Cicer arietinum*)

**mesotegmic seed** Of angiosperms, having the mechanical layer in the mesotegmen.

see **tegmic seed**

**mesotesta,**

pl. **mesotestae**

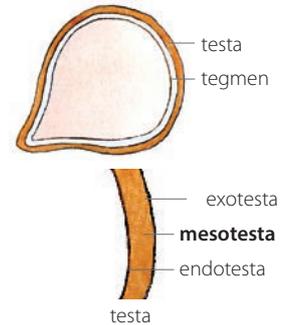
Of the bitegmic seed coat of angiosperms, the middle layer of the outer integument (testa).

cf. **endotesta, exotesta**

see also **endotegmen,**

**exotegmen,**

**mesotegmen**



chick pea seed (*Cicer arietinum*)

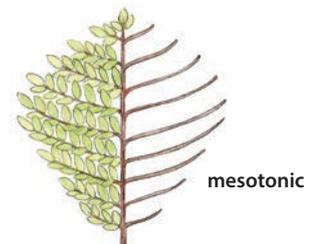
**mesotestal seed** Of angiosperms, having the mechanical layer in the mesotesta.

see **testal seed**

**mesotonic**

Having growth strongest in the median part of the plant.

cf. **acrotonic, basitonic**



**mesotrophic**

Of a body of water having a moderate amount of dissolved nutrients, as a lake with clear water and submerged aquatic plants.

see **trophic**

cf. **dystrophic, eutrophic, oligotrophic**

**messenger RNA, mRNA**

A molecule in a cell that carries information encoded in DNA to a ribosome, a specialised organelle in the cytoplasm, for protein synthesis.

**meta-**

A prefix meaning changed or substituted for.

**metabolism**

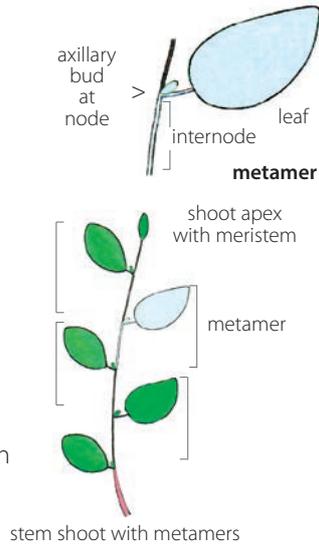
The complex physical and chemical processes that together allow a plant to live and survive (as photosynthesis and respiration).

It promotes growth and development.

see **anabolism, catabolism**

**metamer**

The basic structural unit of a plant that is repeated. It derives from the meristem of a root or shoot apex. Of stem shoots, it comprises a node with its leaf or leaves, its axillary bud(s) and the subtending internode. Metamers also occur on lateral growth. = **phytomer**



**metaphloem**

Phloem tissue that differentiates from procambium in the apical meristem of root and shoot tips during primary growth of a vascular plant. It replaces protophloem. It is conducting tissue that occurs in regions that are no longer actively elongating and functions indefinitely. see **primary phloem**

**metaxylem**

Found in primary growth, the primary xylem in a vascular bundle that develops from the procambium after protoxylem. It is distinguished from protoxylem by having more tracheids and cells that are not capable of elongating. see **primary xylem**

**micro-**

A prefix meaning small. cf. **macro-**

**microbe**

A mostly unicellular living organism that is too small to be seen with the naked eye. Includes bacteria and some fungi. = **microorganism**

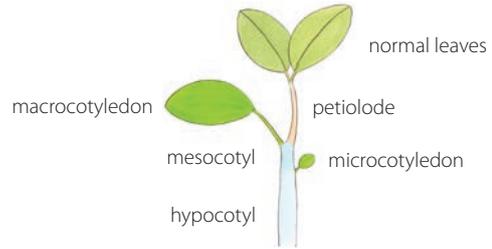
**microclimate**

A smaller area within a climate zone that has its own unique climate.

**microcotyledon**

The smaller of two unequally developed cotyledons that grows to resemble a tiny foliage leaf, as nodding violet (*Streptocarpus caulescens*). A petiolode with normal leaves arises from the mesocotyl situated between the microcotyledon and the macrocotyledon. see **anisocotily** cf. **macrocotyledon**

**Microcotyledon**



**microevolution**

Change in allele frequency within the population of a species. Observable over a short period of time.

cf. **macroevolution**

**microgamete**

One of two male sperm cells in the pollen grain that are derived from the generative cell.

see **microgametogenesis, pollen tube**

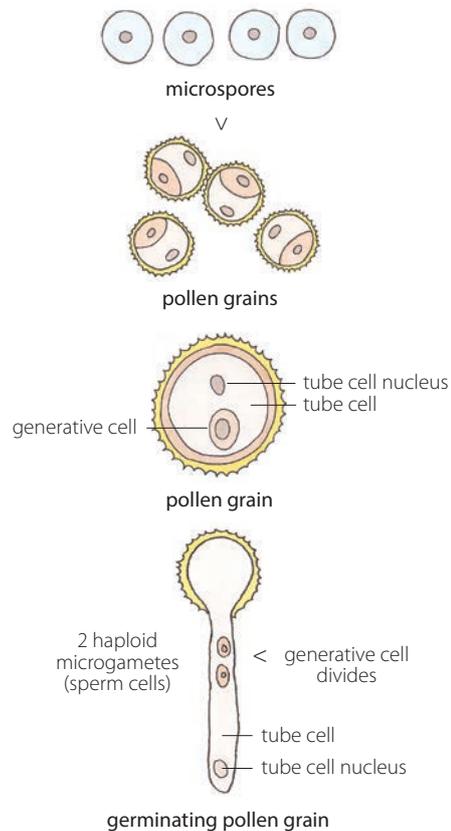
cf. **megagamete**

**microgametogenesis**

Formation of pollen grains from microspores and development of microgametes in the pollen grain.

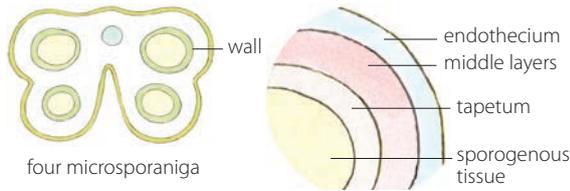
cf. **megagametogenesis, microsporogenesis**

**Microgametogenesis**





**Microsporangial wall**



immature angiosperm anther

microsporangial wall

**microsporangium, pl. microsporangia**

The structure in which microspores are formed in a heterosporous plant.

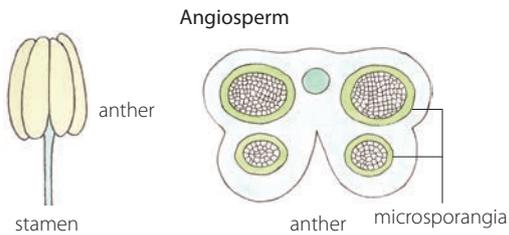
In angiosperms the microsporangium is the pollen sac in the anther and in gymnosperms it is the pollen sac borne on the lower surface of scales (microsporophylls) on a male cone.

Some fern allies, like the spike moss (*Selaginella*) are heterosporous. Spike moss has microsporangia in the axils of the upper leaves (sporophylls).

cf. **megasporangium**

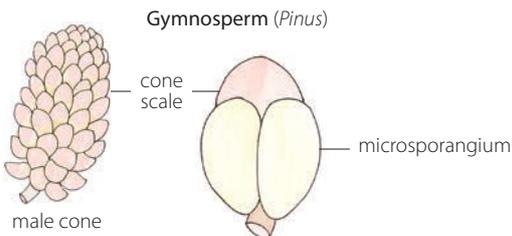
**microsporangial** Of or relating to microsporangia.

**Microsporangium**



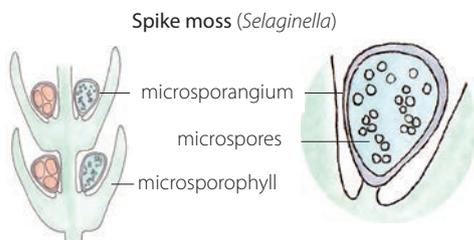
stamen

anther microsporangia



male cone

microsporangium



Spike moss (*Selaginella*)

microsporangium

microspores

microsporophyll

**microspore** One of two kinds of spores, produced by meiosis in a heterosporous plant, that gives rise to the male gametophyte (microgametophyte).

All seed-bearing plants, as well as some ferns and other seedless plants, are heterosporous.

In angiosperms and gymnosperms, one of four haploid cells produced by a diploid microspore mother cell that develops into a pollen grain (microgametophyte).

The fern ally, spike moss (*Selaginella*) is a seedless heterosporous plant that produces microspores in microsporangia located in the leaf axils on the upper part of the stem.

see **microsporogenesis, microsporangium**

cf. **megaspore**

**microspore mother cell** A diploid cell in the immature pollen sac that gives rise, by meiosis, to four haploid male spores.

In seed plants (angiosperms and gymnosperms) the mother cells are in the pollens sacs.

The four microspores are usually viable and will develop into pollen grains.

see **microsporogenesis, microsporangium, mother cell**

cf. **megaspore mother cell**

**microsporocarp**

The male reproductive structure in some heterosporous ferns, as *Azolla*.

It encloses many microsporangia. The microsporangia contain the microspores.

see **sporocarp**

cf. **megasporocarp**



*Azolla*

**microsporocyte** In seed plants, a diploid cell in the immature pollen sac that that gives rise, by meiosis, to male haploid spores (microspores).

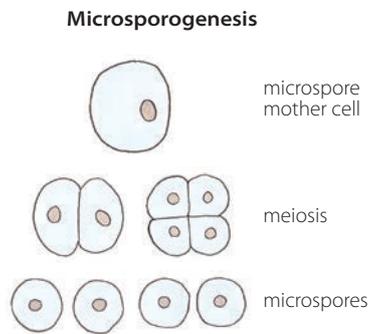
These will develop into the microgametophytes.

= **microspore mother cell**

see **mother cell**

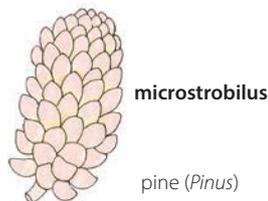
cf. **megasporocyte**

**microsporogenesis** In heterosporous plants, the division, by meiosis, of a diploid microspore mother cell to form four haploid microspores. These will develop into microgametophytes. Microsporogenesis takes place in the microsporangium.  
*cf. megasporogenesis, microgametogenesis*

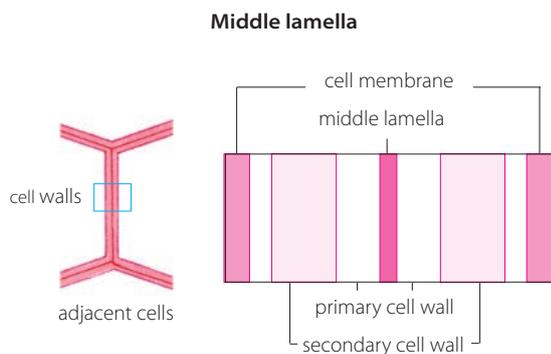


**microsporophyll** A modified leaf that bears the microsporangia in a heterosporous plant. In angiosperms, it is the anther that bears the pollen sac. In gymnosperms, it is the pollen sac-bearing scale, as on a male pine cone. In some heterosporous fern allies, like spike moss (*Selaginella*), it is a leaf-like scale on the cone at the top of the stem.  
*see microsporangium*  
*cf. megasporophyll*

**microstrobilus**,  
*pl. microstrobili* The male, pollen-producing cone of gymnosperms.  
*cf. megastrobilus*

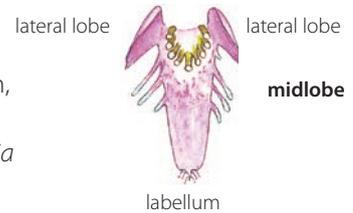


**middle lamella** The adhesive layer between two fully grown adjacent cell walls that binds them to one another and is mainly composed of pectin.  
*see primary cell wall, secondary cell wall*

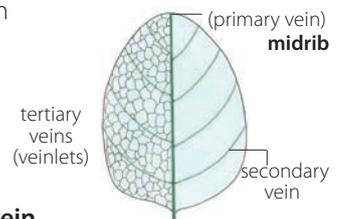


**middle layer** Of angiosperms, one to three layers of the wall of an immature pollen sac (microsporangium) that is made up of parenchyma cells. Gymnosperms have a single middle layer in the wall of the immature pollen sac (microsporangium).  
*see microsporangial wall*

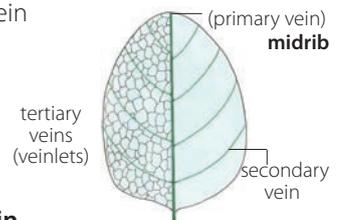
**midlobe** Of an orchid with a three-lobed labellum, the middle lobe, as pink fairies, (*Caladenia latifolia*).



**midrib** The main vein of a leaf or leaflet, usually running up the centre as a continuation of the petiole or petiolule.  
**= midvein, primary vein**



**midvein** The main vein of a leaf or leaflet, usually running up the centre as a continuation of the petiole or petiolule.  
**= midrib, primary vein**



**migration** The exchange of genes between individuals within a population or between different populations of the same species.

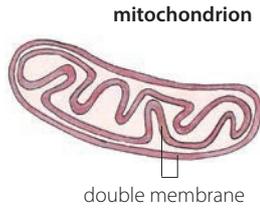
**mimic** To copy or imitate closely, as orchid flowers that mimic a female wasp to attract a male wasp pollinator.  
*see pseudocopulation*

**mimicry** A form of deception whereby one organism adopts the colour, smell or structure of another organism.  
*see Bakerian mimicry, Dodsonian mimicry, Pouyannian mimicry, Vavilovian mimicry*

**mitochondrial DNA, mtDNA** The small amount of DNA unique to mitochondria. Unlike nuclear DNA, mtDNA is arranged in rings.

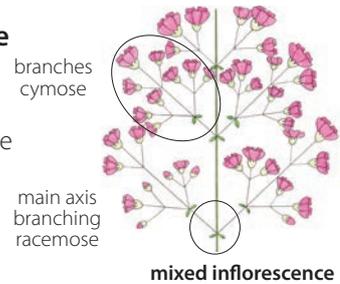
**mitochondrion,**

*pl. mitochondria* An organelle in the cytoplasm of a cell enclosed by a double membrane. It produces energy in the form of adenosine triphosphate (ATP).  
 see also **aerobic respiration, glycolysis, Krebs cycle**



**mixed inflorescence**

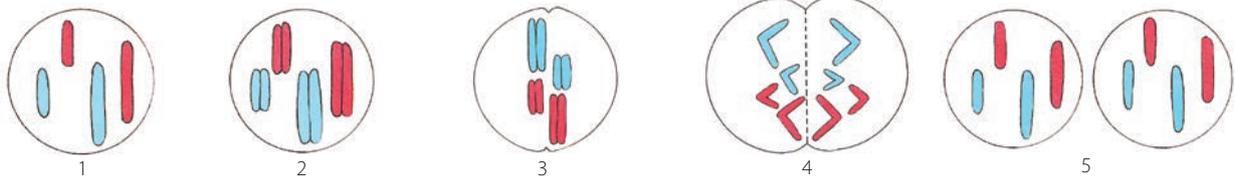
An inflorescence in which some of the branching is racemose and some is cymose, as a thyrsse.



**mitosis**

The process of division in a diploid somatic cell in which the chromosomes replicate exactly. The cell divides once into two identical daughter cells, each with a complete copy of the parent chromosomes. At the end of mitosis the cell is diploid.  
*cf. meiosis*  
**mitotic** Of or pertaining to mitosis.

**Mitosis**



One diploid (2n) cell. Chromosome replication. Replicated chromosomes line up at equator. Replicated chromosomes separate. The cell divides. There are now two diploid (2n) cells.

**mitra**

Of orchids, the hood on a column formed by the fusion of the staminodia and the filament of the fertile stamen, as the midlobe in some sun orchids (*Thelymitra*) that forms a hood over the anther.



**modification**

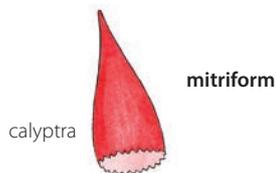
Of evolution, a change in the genetic material that is transferred from parents to offspring. A result of mutation or recombination.

**modified**

Changed, altered. The petals, sepals, pistils and stamens of a flower are modified leaves.

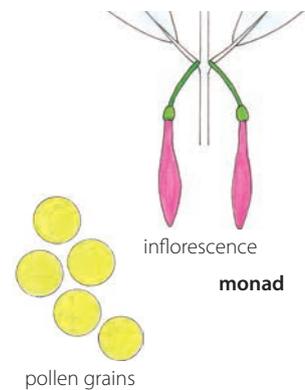
**mitriform**

Shaped like a peaked cap, as the calyptra of a moss.



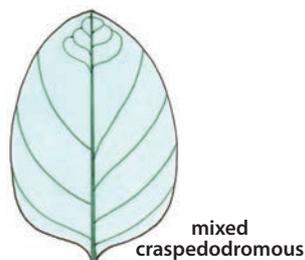
**monad**

A single individual. A solitary, sessile or pedicellate flower in an inflorescence, as some mistletoes (*Amyema*). A pollen grain or spore that is not united with others.  
*cf. diad, polyad, tetrad, triad*



**mixed**

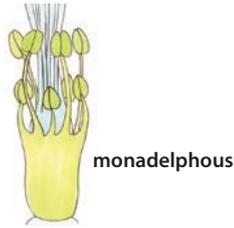
**craspedodromous** Of leaves with about half of the secondary veins terminating at the margin and the remainder not.  
 see **craspedodromous**



**monadelphous**

Of stamens united by their filaments into one bundle, as wood sorrel (*Oxalis*).

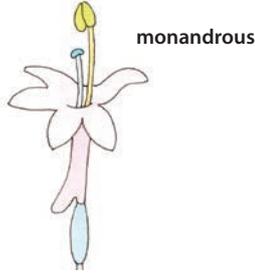
see **adelphous**



**monandrous**

Having one stamen, as the flowers of red valerian (*Centranthus ruber*).

cf. **diandrous, pentandrous, polyandrous, tetrandrous, triandrous**



**monembryony**

The condition of having or producing one embryo.

cf. **polyembryony**

**moniliform**

Like a string of beads, as the pods of river cooba (*Acacia stenophylla*).



**Monilophyta, monilophytes**

One of two groups of vascular plants that bear spores rather than seeds, the other group being Lycopphyta. They have large leaves (megaphylls) usually with more than one vein. It comprises ferns, horsetails (*Equisetum*) and whisk ferns (*Psilotum*).

see **euphyllphytes**

**mono-**

A prefix meaning one.

**monocarp**

An annual or other plant that flowers and fruits only once then dies.

see **monocarpic**

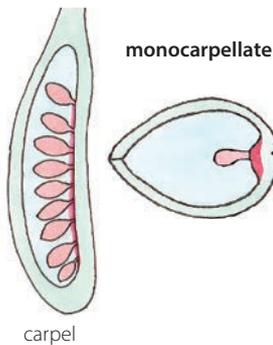
cf. **hapaxanthic, iteroparous, pleoanthic, polycarpic**

**monocarpellary, monocarpellate, monocarpous**

Of a flower having a carpel with one locule, as peas.

= **stylodious, unicarpellate**

cf. **apocarpous, syncarpous**



**monocarpic**

Of a plant that reproduces once in its lifetime then dies. An annual is monocarpic, as rice (*Oryza sativa*). Some monocarpic plants are long-lived, as century plant (*Agave americana*), the talipot palm (*Corypha*) and some species of bamboo.

= **semelparous**

see **monocarp, monocarpy**

cf. **hapaxanthic, iteroparous, pleoanthic, polycarpic**

**monocarpy**

The condition of being monocarpic. The process of bearing fruit once then dying.

**monocephalous**

Having a solitary flower head, as some plants in the daisy family (Asteraceae).



**monochasium, pl. monochasia, monochasial cyme**

A cymose inflorescence with the main axis bearing a terminal flower and a lateral branch that bears a terminal flower developing in one of the subtending bracts or bracteoles.

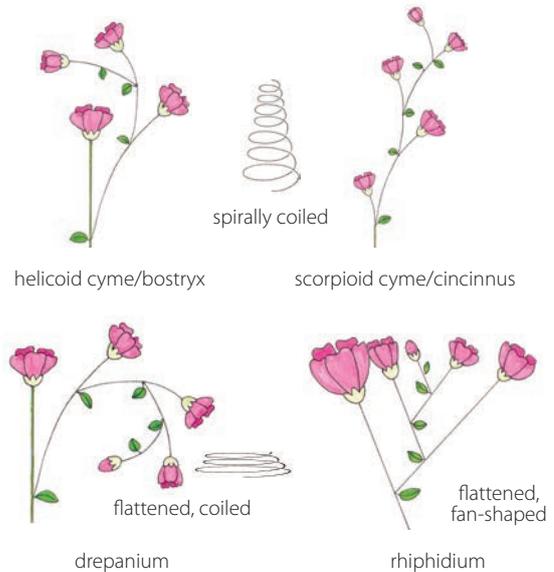
There are four kinds of monochasium: the helicoid cyme (bostryx) and the scorpioid cyme (cincinnus), that are spirally coiled, and the drepanium and the rhipidium, that are coiled and flattened.

see also **uniparous**

cf. **dichasium, pleiochasium, polychasium**

**monochasial** Of a monochasium.

**Monochasial cymes**



**monochlamydeous** Having a perianth of a single whorl, that is, with either a calyx or a corolla.  
*cf. chlamydeous*

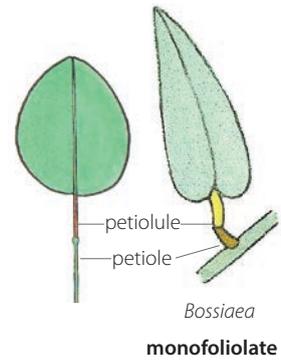
**monoclinous** Of a flower having both stamens and pistils.  
 = **hermaphrodite**  
*see perfect*

**monocolpate** Of a pollen grain, having a single colpus.

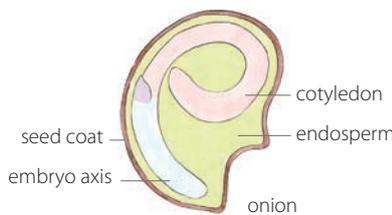
**monocotyledon** One of the largest divisions of flowering plants (22% of all angiosperms). Characterised by a seed with one cotyledon (seed leaf) in the embryo, endosperm that persists, flower parts that are usually in multiples of three, pollen with a single furrow or pore, leaves with main veins parallel, a stem in cross-section with vascular bundles scattered and roots that are usually fibrous.  
*cf. dicotyledon, eudicot*

**monofoliolate**

Of a compound leaf having a single leaflet, with the leaflet on a petiolule attached to the top of the petiole, as some bossiaea (*Bossiaea*) and lemon (*Citrus*).  
*cf. unifoliolate*  
 = **unifoliolate**



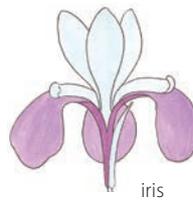
**Monocotyledons**



Seed with one seed leaf (cotyledon).  
 Endosperm persists.



water plantain



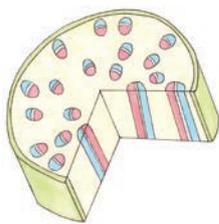
iris



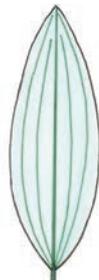
lily



Pollen with a single pore or furrow.



Vascular bundles in stem scattered.



Leaves with main veins parallel.



garlic



roots



grass



bamboo



lily

Usually herbaceous plants that lack side shoots.  
 Root system usually fibrous, never a taproot.

**monocotyledonous**

Of a plant embryo having one cotyledon, as most monocotyledons.  
 Of a plant producing such embryos.  
*cf. dicotyledonous, polycotyledonous*



onion (*Allium cepa*)

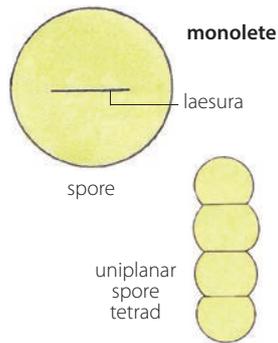
**monocotyledonous**

**monogeneric**

Of a family having only one genus.

**monoecious** Of a species with unisexual flowers on the same plant.  
*see diclinous, dioecious, trioecious*

**monoete** Of a spore with a single laesura that is a result of the way the four spores of the uniplanar tetrad are in contact with each other after meiosis. It is the area of weakness in the wall through which the spore germinates.



cf. **alete, trilete**

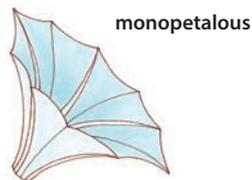
**monomerous** Having flower parts, such as petals, sepals and stamens, each solitary. 1-merous.

see **-merous**

**monomorphic** Having only one form that is invariable across a taxon, as the stamens and pistils of most species.

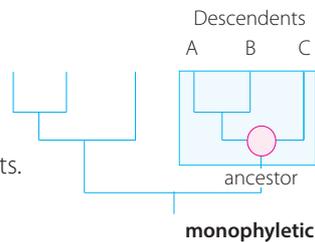
cf. **dimorphic, polymorphic, trimorphic**

**monopetalous** Having only one petal, or the petals united by their edges into one piece, as bindweed (*Convolvulus*).



**monophyletic** Of a group of organisms that includes a common ancestor and all of its descendants.

cf. **paraphyletic, polyphyletic**



**monoploid, monoploidy** Having one chromosome set (x) in each somatic cell.

see **ploidy**

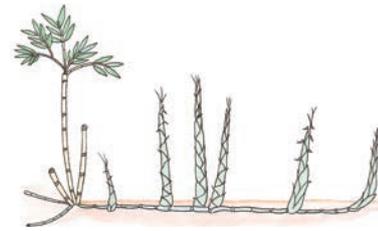
**monopodium** A pattern of growth in which the apex of the main stem continues to grow indefinitely and lateral stems grow similarly. A rhizome with a persistent growing point producing buds at nodes along its length. The growth pattern of an invasive running bamboo. see **pachymorph**

cf. **amphipodium, leptomorph**

**monopodial** Having a persistent terminal growing point.

Of indeterminate or indefinite growth, as a racemose inflorescence or the branching of some trees, as firs (*Abies*), that results in a pyramidal shape.

### Monopodium



rhizome of a running bamboo



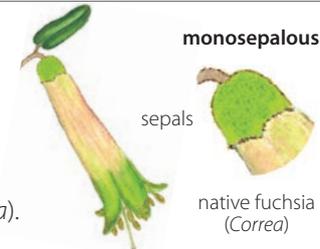
racemose inflorescence



fir (*Abies*)

### monosepalous

Having only one sepal, or the sepals united by their edges into one piece, as some species of native fuchsia (*Correa*).



monosepalous

sepals

native fuchsia (*Correa*)

**monoseriate** Arranged in one row or whorl.

= **uniseriate**

see also **seriate**

**monospecific** Of a genus having only one species.

**monosporangiate** Of an anther with only one pollen sac, as the dwarf mistletoes (*Arceuthobium*).

= **unisporangiate**

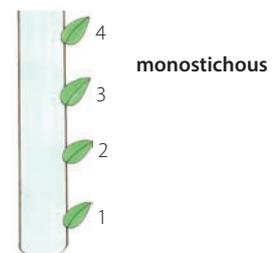
cf. **bisporangiate, tetrasporangiate**

Of conifers, having cones that are either male or female but not both.

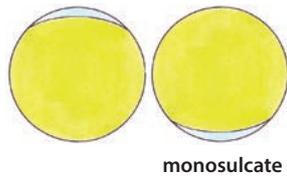
### monostichous

Arranged in a single row on one side of a stem, as some leaves, with any leaf above the one below it.

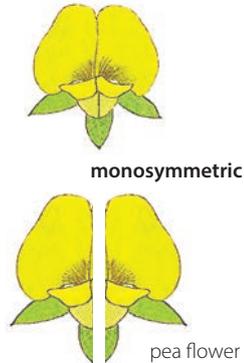
see **orthostichy**



**monosulcate** Of a pollen grain having a single elongated aperture (sulcus) situated at one of the poles.  
see also **monocotyledon**

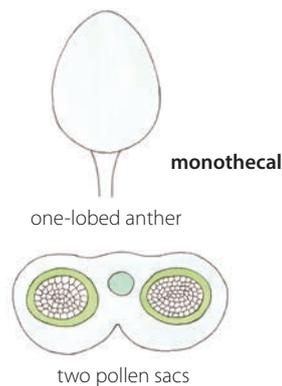


**monosymmetric**  
Divisible through the centre, on one plane only, into exactly similar halves, as flowers in the pea family (Fabaceae). Bilaterally symmetrical.  
= **zygomorphic**  
cf. **bisymmetric**, **polysymmetric**



**monotelic** Of an inflorescence axis that ends with a flower and thus stops growing, the oldest flower being at the tip, as a determinate or definite inflorescence.  
see **cymose inflorescence**  
cf. **polytelic**

**monotheal**, **monothealous**  
Of a stamen having a single anther lobe (theca) with two pollen sacs (microsporangia).  
= **bisporangiate**  
cf. **ditheal**



**monotypic** A taxon with only a single representative, as a genus with only one species or a family with only one genus.

**montane** Of mountainous areas, but usually excluding the true alpine zone.

**morphology** The external form or structure of a plant or plant part. The study of plant structure that compares features and observes patterns of development, as in the reproductive system or the root system.  
= **phytomorphology**  
cf. **anatomy**  
**morphological** Of or relating to morphology.

**morphotaxon**, pl. **morphotaxa** A taxon classified according to its morphology alone.

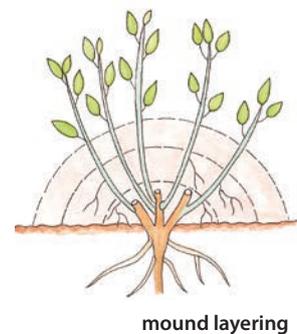
**mosaic** An organism having a mixture of genetically different tissues that originate from one zygote. A plant disease caused by various strains of viruses, as tobacco mosaic disease that stunts the growth of tobacco plants.  
see **graft chimaera**

**mosses** see page 190

**mother cell** In mitosis, a cell that divides to produce two new daughter cells that are genetically identical to itself. In meiosis, a cell that divides to produce four new haploid daughter cells that are genetically different from itself. A cell that divides to form another type of cell, as a diploid microspore mother cell that gives rise to haploid microspores.

**motile** Capable of independent movement. Self-propelled, as the sperm of mosses and ferns that swim through water to the non-motile egg.

**mound layering**  
A form of propagation whereby a plant is cut back to near ground level and covered with layers of soil as new shoots develop. Rooted shoots are later separated and grown as new plants.  
= **stool layering**



**mRNA, messenger, RNA** A molecule in a cell that carries information encoded in DNA to a ribosome, a specialised organelle in the cytoplasm, for protein synthesis.

**mtDNA, mitochondrial DNA** The small amount of DNA unique to mitochondria. Unlike nuclear DNA, mtDNA is arranged in rings.

**mosses** One of three major groups of nonvascular land plants that are photosynthetic, reproduce by spores and lack flowers, true leaves and roots.

A moss has two alternating generations, the larger perennial haploid gamete-producing gametophyte generation and the smaller short-lived diploid spore-producing sporophyte generation.

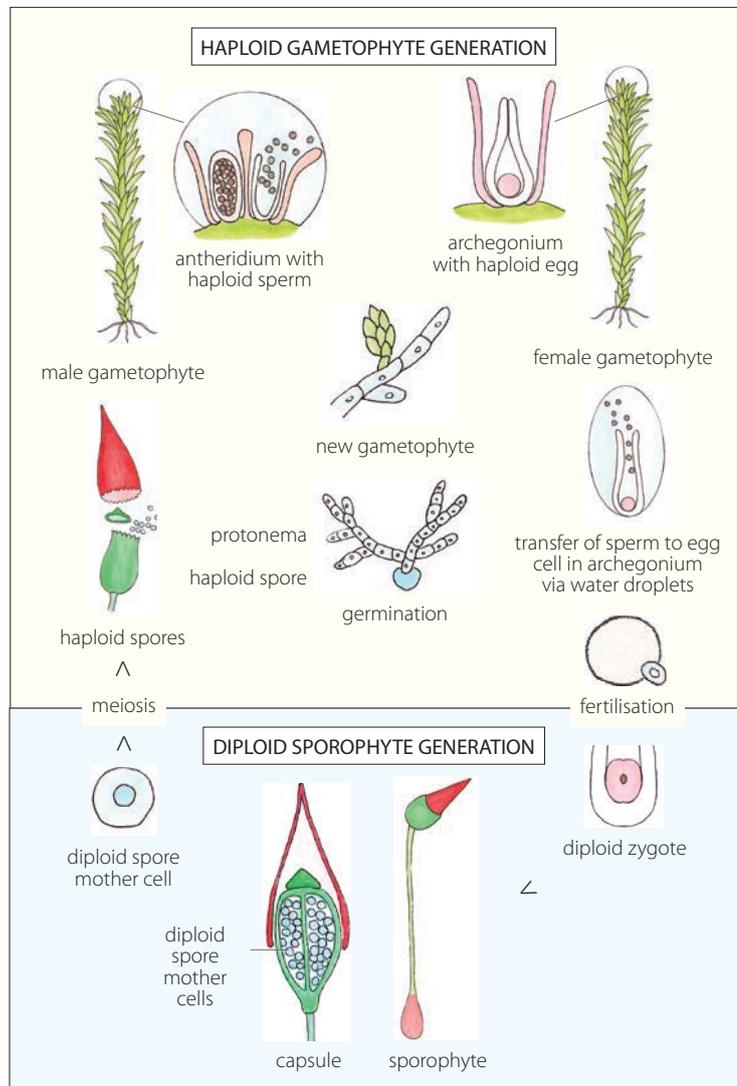
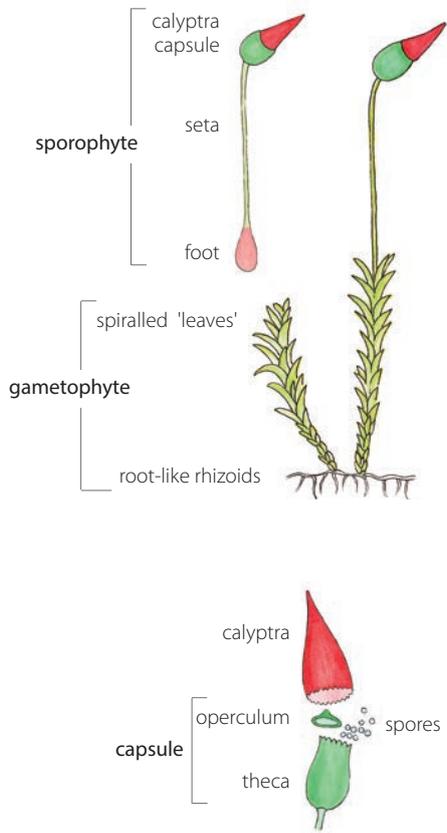
The haploid gametophyte is a leafy stem that bears the gamete-producing sex organs, the female archegonia and/or the male antheridia at the tip, and the diploid sporophyte comprises a capsule, a seta and a foot.

A male sperm from an antheridium fertilises a female egg in an archegonium, that then develops into a diploid spore-producing sporophyte, comprising a long stalk (seta) and a capsule capped by a calyptra and an operculum. The diploid spores developing in the capsule undergo meiosis to form haploid spores that are dispersed and develop into gametophytes, thus beginning the life cycle anew.

see **bryophyte**

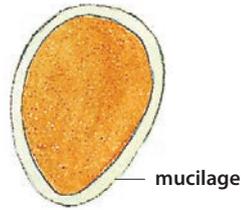
### Mosses

#### Alternation of generations



**mucilage** A slippery or jelly-like substance, secreted by specialised plant cells when they are exposed to water, as that surrounding the seeds of plantain (*Plantago*).

**mucilaginous** Moist, soft and sticky.

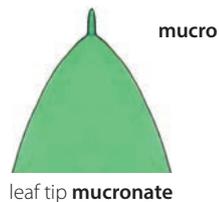


**mucous** Slimy. Of a thick and slippery texture.

**mucro** A short, sharp, hard point, as at the tips of some leaves.

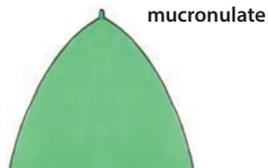
**mucronate** With a mucro.

cf. **mucronulate**



**mucronulate** Ending with a very short, sharp, hard point, such as a mucronulate leaf tip.

cf. **mucronate**



**multi-** A prefix meaning many.

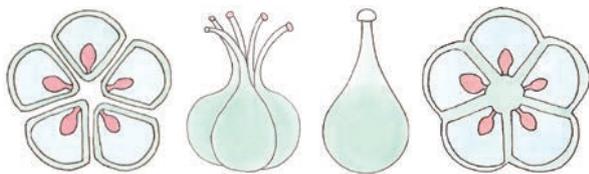
**multicarpellary, multicarpellate**

Of a flower having a gynoecium with more than one carpel, the carpels being either free or variously fused.

= **polycarpellate, polygynous**

see also **apocarpous, syncarpous**

**Multicarpellate**



gynoecium with free carpels

gynoecium with fused carpels

**multicipital** Of a rhizome or root, producing many crowns.

**multijugate** Of a pinnate leaf having more than one pair of leaflets. Having many pairs of leaflets.

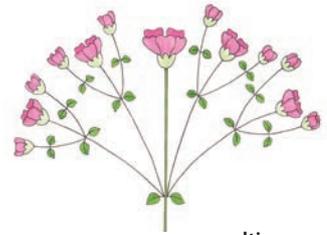
see **jugate**

**multiparous** Of a cymose inflorescence forming more than two stems at each branching point as a multiparous cyme.

see also **polychasium,**

**pleiochasium**

cf. **uniparous, biparous**



**multiparous**

**multiplanar** Having or situated on more than one plane, as pollen grains in a decussate tetrad or a tetrahedral tetrad.

see **pollen tetrad**

cf. **uniplanar**

**multiple fruit** A fruit derived from an entire inflorescence with more than one flower.

It may incorporate parts of the flower other than the carpels, as a sorosis (mulberry and pineapple), a bibacca (honeysuckle) or a syconium (fig).

= **composite fruit**

cf. **accessory fruit, aggregate fruit**

**Multiple fruit**



sorosis  
pineapple  
(*Ananas comosus*)

white mulberry  
(*Morus alba*)

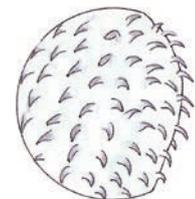
bibacca  
honeysuckle  
(*Lonicera*)

syconium  
fig  
(*Ficus*)

**multiseriate** Arranged in two or more rows or whorls.

see also **seriate**

**muricate** Covered with minute short hard-pointed protuberances, as the surface of the fruit of soursop (*Annona muricata*).



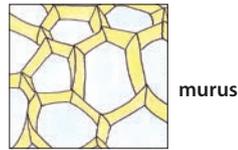
**muricate**

**muriculate** Slightly muricate.

**murus, pl. muri**

A ridge that forms part of a mesh-like reticulum.

cf. **lumen**



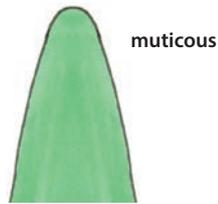
**mutant** A new entity or individual that has arisen as a result of a mutation.

**mutation** A permanent change in DNA resulting from a new allele on a chromosome. It may occur spontaneously or it may be induced artificially.

**muticous** Blunt.

Of an apex lacking a projection, as a mucro or an awn.

cf. **aristate, cuspidage, mucronate, mucronulate**



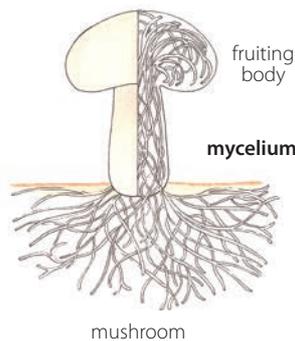
**mutualism** A relationship between two organisms where both benefit, as the association between the nitrogen-fixing bacteria *Rhizobium* that live in the nodules on the roots of legumes like clover. The bacteria fixes nitrogen from the atmosphere for the plant to use and the plant supplies shelter and organic acids that can be used as a food source for the bacteria.  
see **symbiosis**

**mycelium, pl. mycelia**

A network of fungal hyphae that reproduce by spores. It may be above ground, as bread mould, or underground where it can spread for kilometres.

During favourable conditions a fruiting body that produces spores will grow. These include mushrooms, toadstools, bracket fungi and truffles.

see **fungus**



**mycology** The study of fungi.

**mycologist** A biologist specialising in the study of fungi.

**mycorrhiza, pl. mycorrhizae, mycorrhizas**

**mycorrhizal** see page 193

**mycotroph** A plant that obtains part or all of its nutrients through a symbiotic association with fungi. A three-way system that includes the mycotroph, a mycorrhizal fungus and a photosynthesising (green) plant.

The mycotroph parasitises the fungus which in turn gets its nutrients from the roots of the green plant, as some heath species that indirectly parasitise the roots of a conifer via a fungus.

**mycotrophic** Of plants that obtain nutrients through an intermediary mycorrhizal fungi.

see also **mycorrhiza, trophic**  
cf. **saprophyte**

**myophile** Flies, as bee flies and hoverflies, that feed on nectar and pollen.

cf. **sapromyophile**

**myophily** Dispersal of pollen and pollination by flies.

**myophilous** Pollinated by flies.

**myrmecochory** Dispersal of seeds by ants.

**myrmecorous** Having seeds that are dispersed by ants.

see **elaiosome**

**myrmecophile** A plant or other organism in a symbiotic association with ants.

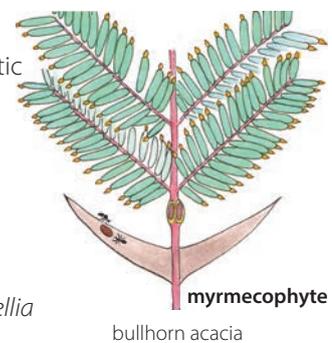
**myrmecophily** Ant love. A symbiotic relationship between an organism and ants.

**myrmecophilous** Of or relating to myrmecophily or a myrmecophile.

see **myrmecophyte**

**myrmecophyte**

A plant adapted to maintaining a symbiotic relationship with ants. Adaptations include swollen stems with cavities for ants, and domatia, as those in the thorns of the bullhorn acacia (*Vachellia cornigera*).



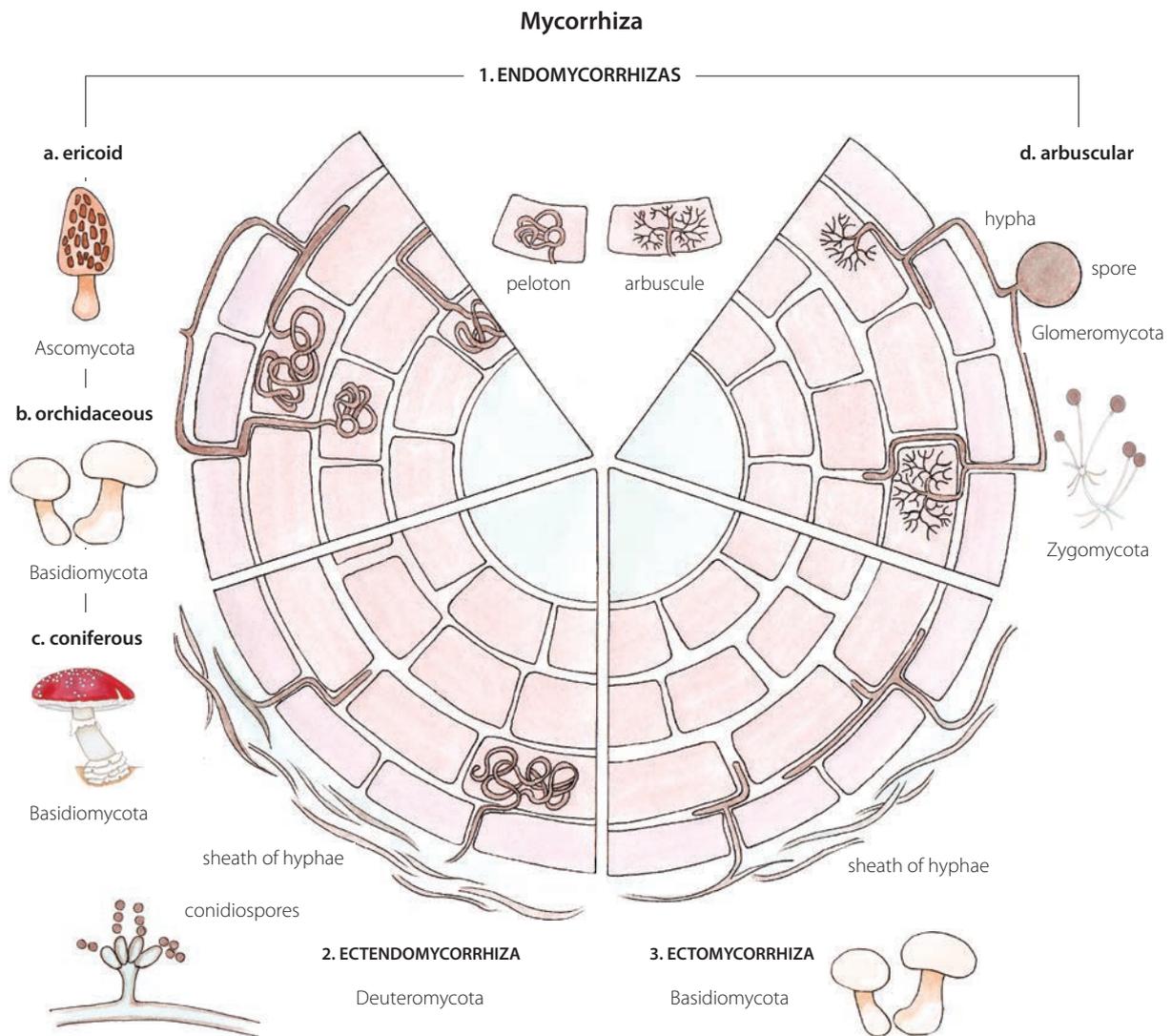
**myxogenic** Producing mucus or slime, as some hairs and cells.

**mycorrhiza**, *pl. mycorrhizae, mycorrhizas* A mutually beneficial association between a fungus (or several different kinds of fungi) and the roots of a particular plant.

The fungus supplies mineral nutrients like phosphorus and in turn receives nutrients from the plant like carbon, that results from photosynthesis.

Mycorrhiza differ in how they enter the root structure. Fungal hyphae either enter the spaces between the cells (ectomycorrhizas) or penetrate the cells (arbuscular mycorrhizas, endomycorrhizas, ericoid mycorrhizas and orchidaceous mycorrhizas) or both (ectendomycorrhizas). Hyphae reproduce asexually but from time to time reproduce by sending up fruiting bodies, like sac fungi (Ascomycota), that produce spores.

**mycorrhizal** Of or relating to a mycorrhiza.



**n** The haploid number of chromosomes that occurs in a reproductive cell. It represents half the number (2n) of chromosomes in a somatic cell.

**nacreous** Having the lustrous rainbow-like colours of mother-of-pearl.

**naked** Lacking a covering.  
Of a bud that lacks protective scales.

see **bud scale**

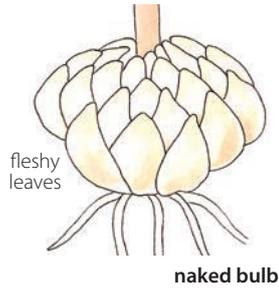
Of a flower, without a perianth, as the female flower of willows (*Salix*).

see **achlamydeous**

Of gymnosperms, having ovules and seeds that are exposed on the surface of a cone scale.

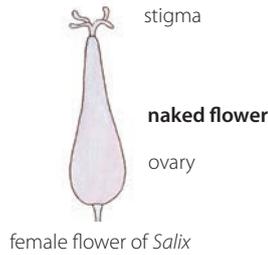
**naked bud** A bud lacking protective bud scales.

**naked bulb** A true bulb that consists of a compressed stem with nodes (basal plate), bearing fleshy overlapping leaves that lack a tunic, as the lily genus (*Lilium*).  
= **imbricate bulb, scaly bulb**



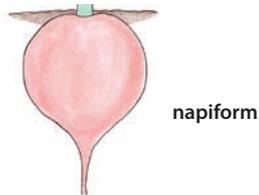
see also **tunicate bulb**

**naked flower** Of a flower having no tepals. Without a perianth, as the female flower of willows (*Salix*).  
= **achlamydeous, atepalous**

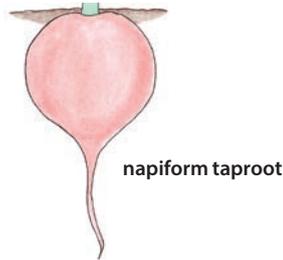


**nan-, nann-, nano-, nanno-** A prefix meaning dwarf.

**napiform** Turnip-shaped, large and round in the upper part and slender below.



**napiform taproot**  
A main, descending root large and round in the upper part and slender below, as a turnip.  
see **conical taproot, fusiform taproot**

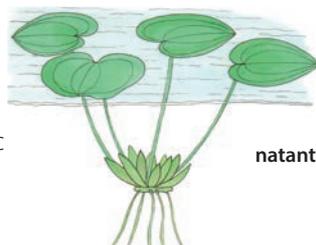


**nastism** Plant movement, not related to the direction of growth, caused by an external stimulus, as the opening and closing of flowers in response to alteration in temperature or light.

cf. **tropism**

**nastic** Of or relating to nastism.

**natant** Floating on water, as the leaves of water lily (*Nymphaea*) and some other aquatic plants.  
see also **floating**



**native** Growing naturally in a particular place, not introduced.

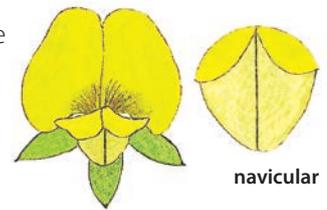
= **indigenous**

**natural selection** A natural process that favours the survival of organisms best adapted to an environment at the expense of those that are not. One of the basic mechanisms of evolution together with genetic drift, mutation and gene flow (gene migration).

cf. **artificial selection**

**naturalised** Of a non-native plant that has become adapted to its new environment.

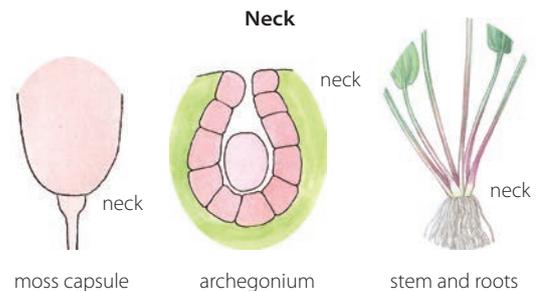
**navicular** Shaped like the bow of a boat, as the united lower petals (keel) of pea flowers (Fabaceae).  
= **cymbiform**



**neck** A narrow supporting part in a plant. The swelling between the base of the capsule and the top of the seta in mosses.

= **apophysis**

The slender tube-like extension of an archegonium through which the sperm swim to reach the egg. The junction between the base of the stem and the roots.

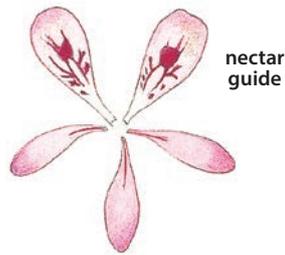


**necrosis** Localised death of cells occurring in living tissue.

**necrotic** Of necrosis.

**nectar** A sugar substance secreted by glands (nectaries) that attract pollinators.

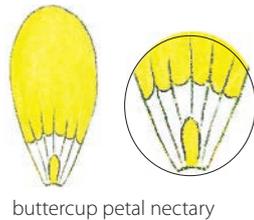
**nectar guide** Patterns on petals of some flowers, as those on pelargoniums (*Pelargonium*), that guide pollinators to a nectar reward.



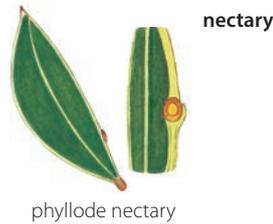
**nectariferous** Producing nectar. Bearing nectar producing glands.

**nectary**

A gland that secretes nectar. Floral nectaries are located on flower parts, as those at the base of the petals of buttercups (*Ranunculus*), and extrafloral nectaries are located on plant parts other than the flower, as on the phyllodes of wattles (*Acacia*).



buttercup petal nectary



nectary

phyllode nectary

**needle** A long narrow leaf, characteristic of many conifers.



needle

**neo-** A prefix meaning new or recent.

**neoteny** Reaching sexual maturity while retaining juvenile characteristics.

**neotropics** The New World tropical regions that extend south of the Mexican desert and includes Central America and all of South America to the sub-Antarctic zone.

Vegetation ranges from tropical rainforest to savanna.

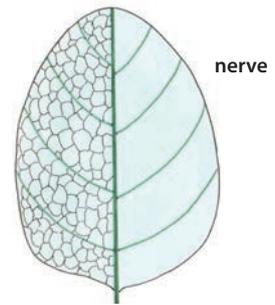
cf. **palaeotropics**

**neotropical** Of or relating to the neotropics.

**neotype** A specimen used instead of the holotype if the specimens available to the original author have been lost or destroyed.

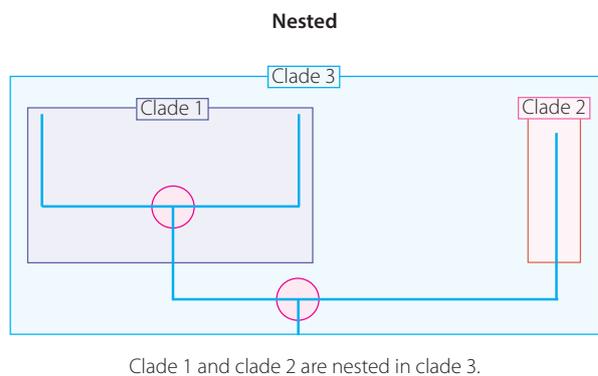
**nervation** The arrangement of veins in a leaf.

**nerve** A vascular bundle in a leaf or other plant part that circulates water, minerals and other substances. It typically divides or branches and provides support and strength.  
= **vein**

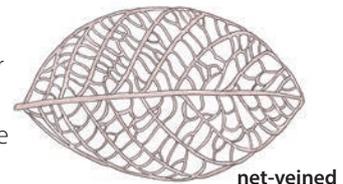


**nerved, nervose** With ribs or veins.

**nested** Embedded, as a taxon or clade within another clade in a phylogenetic tree.



**net-veined** Leaf venation with smaller veins joined in a net-like or mesh-like pattern.



**neuter** Of a flower lacking stamens and pistils, or stamens and pistils present but not functional.  
cf. **bisexual, unisexual**

**new clade name** Of phylogeny, a new clade name.  
= **nomen cladi novum**

**new combination** A new name for a taxon that has the specific or infraspecific epithet used with a new genus or species name respectively.  
= **combinatio nova**

**new name** A replacement name.  
= **avowed substitute, nomen novum**

**nexine** The inner non-sculptured layer of the exine that lies below the sexine in the pollen grain wall.  
see **pollen wall**

**niche** The position a species or population has within an ecosystem. It is related to how it finds food and shelter, reproduces and survives. Different plants may coexist in the same niche, or compete, as native and introduced species.

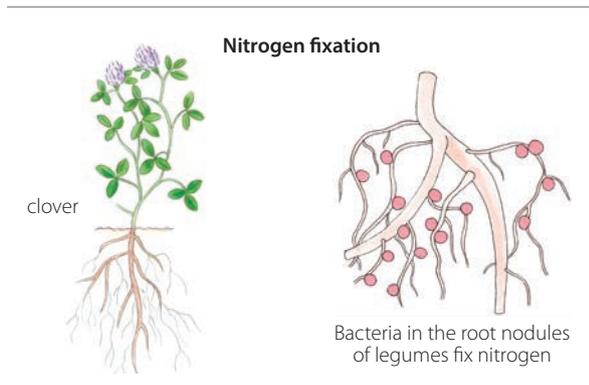
**nidulent** Of seeds that are immersed in pulp, as those of a berry.

**nigrescent** Blackish, turning black.

**nitid** Having a smooth, shiny, polished surface.

**nitrogen, (N), (N<sub>2</sub>)** A common, non-metallic element that is normally a colourless, odourless and tasteless gas. It makes up 78 per cent of the earth's atmosphere and is a constituent of all living tissues. Plants do not absorb nitrogen directly from the air but through their roots, from nitrate (NO<sub>3</sub><sup>-</sup>) and ammonium (NH<sub>4</sub><sup>+</sup>) ions in the soil. It is a major component of chlorophyll and amino acids, the building blocks of proteins. It is also a component of adenosine triphosphate that is involved in energy conservation and release in cells  
see **nitrogen fixation**

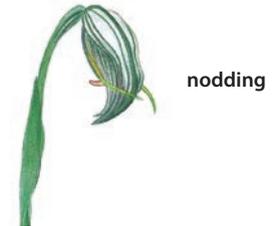
**nitrogen fixation** Nitrogen diffuses into the soil from the atmosphere and needs to be changed or 'fixed' before plants can use it. Microorganisms, like rhizobia in the root nodules of many plants, but primarily legumes such as clover, bind nitrogen and water to form ammonium that can be used by plants. Lightning converts atmospheric nitrogen into ammonia and nitrates that enter the soil with rainfall.



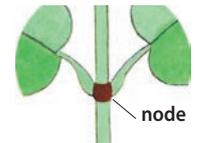
**niveous** Snow white.

**nocturnal** Of or appearing at night, as the flowers of the cactus queen of the night (*Epiphyllum oxypetalum*) that open only during the night.  
cf. **diurnal**

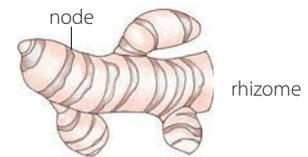
**nodding** Having the tip hanging downwards, as the flower of the nodding greenhood (*Pterostylis nutans*).  
= **nutant**



**node** A joint. That part of a stem, sometimes swollen or knob-like, from which leaves, branches or flowers arise.



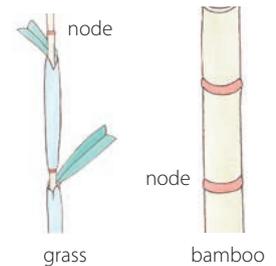
Horizontal stems, (rhizomes and stolons) have nodes that give rise to scale leaves, roots and shoots.



see also **internode**

**nodal** Of or like a node.

**nodose** With closely packed nodes. Knotty.

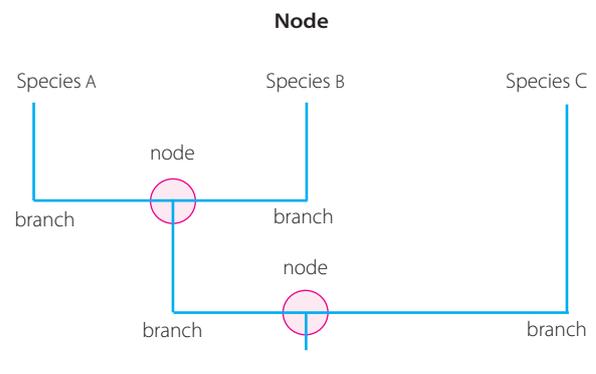


**node**

Of phylogenetics, the point at which two new branches occur that represents a speciation event in a phylogenetic tree.

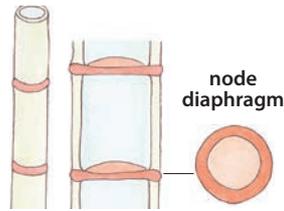
A hypothetical ancestor.

see also **sister group, sister taxa**



**node diaphragm**

Of bamboos, a rigid membrane inside a node that forms a partition between adjacent internodes.



**nodule** A small rounded protuberance.

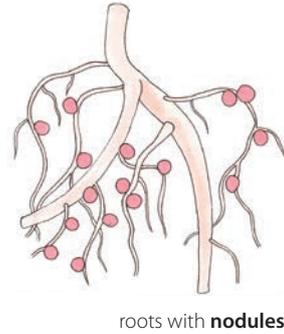
A small swelling on the roots of legumes, as clover, and some other plants, resulting from infection by nitrogen-fixing bacteria.

see also **nitrogen**

**fixation, rhizobium**

**nodular** Relating to or characterised by having nodules.

**nodulose** Bearing nodules.



**nom., nomen** Name.

**nomen**, *abbr.* **nom.** Name.

**nomen cladi conversum** Of phylogeny, a clade name converted from a pre-existing name.  
= **converted clade name**

**nomen cladi novum** Of phylogeny, a new clade name.  
= **new clade name**

**nom. cons., nomen conservandum**  
Conserved name. A name that is kept even though it may formerly have been invalid.

**nomen conservandum**, *abbr.* **nom. cons.**  
Conserved name. A name that is kept even though it may formerly have been invalid.

**nom. illeg., nom. illegit., nomen illegitimum**  
Illegitimate name.  
A published name that does not accord with the rules of the International Code of Nomenclature.

**nomen illegitimum**, *abbr.* **nom. illeg., nom. illegit.** Illegitimate name.  
A published name that does not accord with the rules of the International Code of Nomenclature.

**nom. inval., nomen invalidum** Publication of a new species that does not accord with the provisions of the International Code of Nomenclature for valid publication.  
*cf.* **nomen nudum**

**nomen invalidum**, *abbr.* **nom. inval.**  
Publication of a new species that does not accord with the provisions of the International Code of Nomenclature for valid publication.  
*cf.* **nomen nudum**

**nom. leg., nom. legit., nomen legitimum**  
A validly published name that is in accordance with the rules of the International Code of Nomenclature.

**nomen legitimum**, *abbr.* **nom. leg., nom. legit.**  
A validly published name that is in accordance with the rules of the International Code of Nomenclature.

**nom. nov., nomen novum** New name.  
A replacement name.  
= **avowed substitute**

**nomen novum**, *abbr.* **nom. nov.** New name.  
A replacement name.  
= **avowed substitute**

**nom. nud., nomen nudum** A name published without a description or diagnosis and is therefore invalid.  
*cf.* **nomen invalidum**

**nomen nudum**, *abbr.* **nom. nud.** A name published without a description or diagnosis and is therefore invalid.  
*cf.* **nomen invalidum**

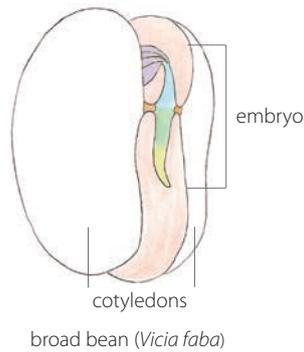
**nom. rejic., nomen rejiciendum** A name rejected in favour of a conserved name.

**nomen rejiciendum**, *abbr.* **nom. rejic.** A name rejected in favour of a conserved name.

**nomenclatural type** The specimen or illustration with which the name of a taxon is permanently associated, not necessarily the most typical or representative of the taxon.

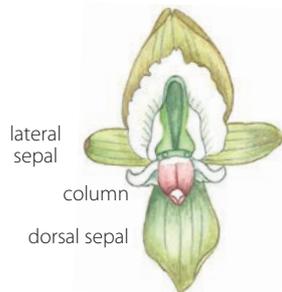
**nomenclature** The procedure of naming plants according to the International Code of Nomenclature and the PhyloCode.

**non-endospermic seed** One having endosperm absorbed by the growing embryo, with the embryo itself having cotyledons that store food for germination. Found in most eudicots, as the bean family (Fabaceae).  
= **exalbuminous seed**  
cf. **endospermic seed**



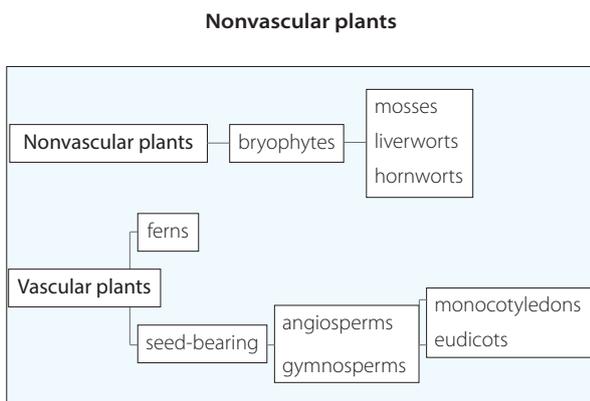
**non-endospermic seed**

**non-resupinate** Not twisting through 180°. Of orchids, flowers that have the dorsal sepal below the lateral sepals, as leek orchids (*Prasophyllum*).  
cf. **hyper-resupinate, resupinate**



**non-resupinate**

**nonvascular plants** Mosses, liverworts, hornworts and some algae that lack specialised tissues (xylem and phloem) for conducting water and nutrients.  
see also **cryptogams**  
cf. **vascular plants**



**notch** A V-shaped cut or indentation. A nick.  
**notched** With a notch.

**nothogenus** A hybrid genus produced by crossing plants from different genera and indicated

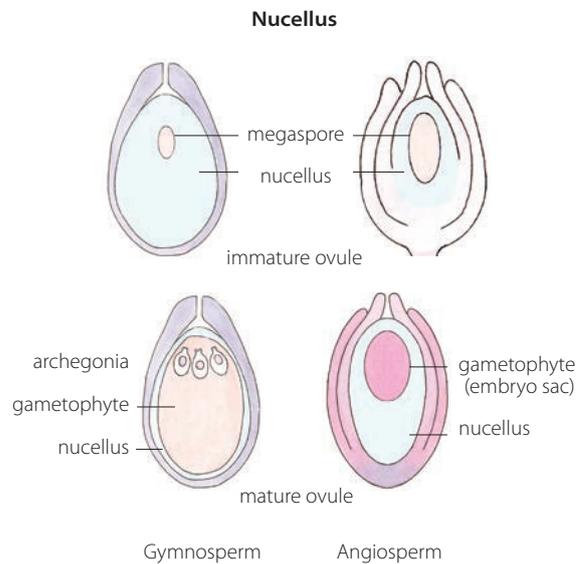
by x before the genus name, as the orchid *xBrassocattleya* that is a hybrid between *Brassavola* and *Cattleya*.

**nothomorph** A now obsolete term denoting any hybrid variant derived from the same parent species and denoting a subordinate taxon within a nothospecies. Names published at the rank of nothomorph are now treated as varieties.

**nothospecies** A hybrid from a cross between two species belonging to the same genus, as *Geranium xcantabrigiense* that is a hybrid between *Geranium macrorrhizum* and *G. dalmaticum*.

**nothotaxon** A hybrid taxon.  
see **nothogenus, nothospecies**

**nucellus, pl. nucelli** In seed plants, the tissue in the immature ovule in which megaspores are formed. The megaspore grows to become the gametophyte which is nourished by the nucellus in the mature ovule.  
see **megasporangium**

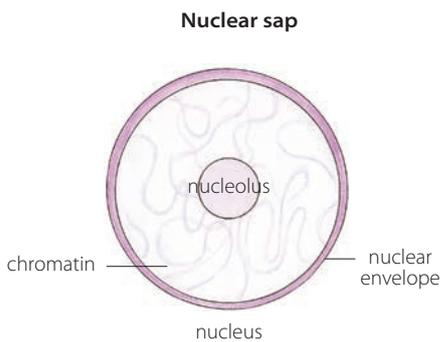


**nuciferous** Bearing nuts, nut-like.

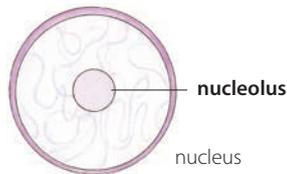
**nuclear envelope** A membrane barrier that separates the nucleus from the cytoplasm in eukaryotic cells. It is composed of an inner and outer membrane, with the perinuclear space in between.

**nuclear pores** Numerous small holes in the nuclear envelope through which material passes into and out of the nucleus.

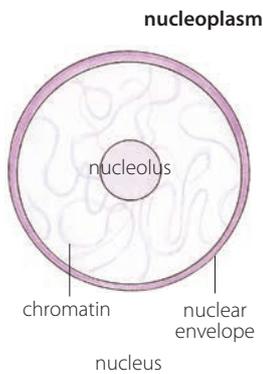
**nuclear sap** The gelatinous substance inside the nucleus, enclosed by the nuclear envelope. The nucleolus and chromatin are suspended in the nucleoplasm. Processes that occur in the nucleoplasm include transcription and replication.  
= **nucleoplasm**



**nucleolus, pl. nucleoli**  
A body within the cell nucleus that consists of RNA and protein. It assembles ribosomes.

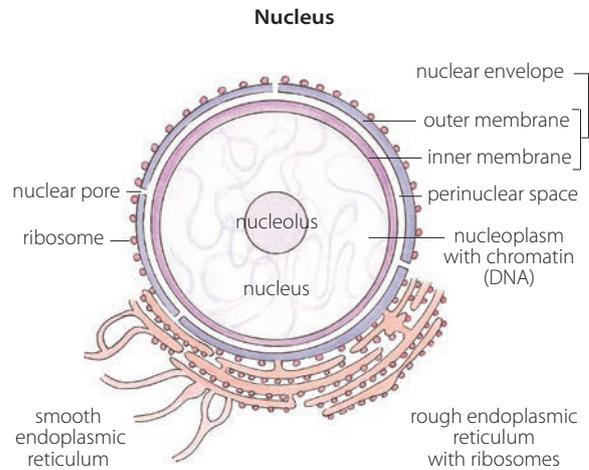


**nucleoplasm** The gelatinous substance inside the nucleus, enclosed by the nuclear envelope. The nucleolus and chromatin are suspended in the nucleoplasm. Processes that occur in the nucleoplasm include transcription and replication.  
= **nuclear sap**



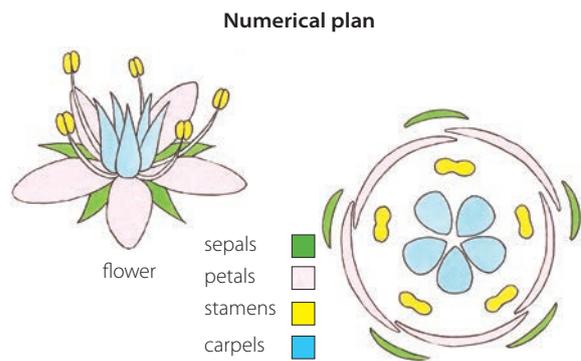
**nucleotide** A basic building block of DNA and RNA. In DNA it is composed of a nitrogen base (adenine, guanine, cytosine or thymine), a five-carbons sugar base (deoxyribose) and a phosphate group. In RNA, thymine is replaced by uracil.  
*see also* **DNA sequencing**

**nucleus, pl. nuclei** A membrane-bound organelle that contains the genetic material of a cell, as DNA (deoxyribose nucleic acid).  
*cf.* **nucleolus**  
**nuclear** Of or relating to the nucleus of a cell.



**nucule** A nutlet.

**numerical plan** The numerical order discernible in the petals, sepals, gynoecium and androecium of a flower. Commonly arranged in multiples of three, four or five and then termed 3-merous, 4-merous and 5-merous. Monocots are typically 3-merous and eudicots usually 4- or 5-merous.  
*see also* **ground plan, merosity**



**numerous** Many, often indefinite in number. More than ten.

**nut** A dry indehiscent fruit with a hard pericarp (shell) that encloses one seed, as hazelnut (*Corylus*).

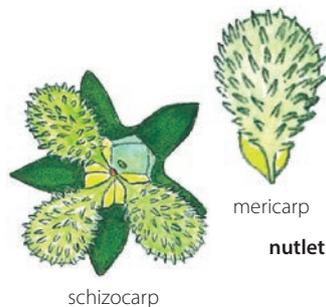
Also used loosely to describe any hard dry indehiscent fruit with a single seed, as an achene or mericarp.



**nutant** Having the tip hanging downwards, as the flower of the nodding greenhood (*Pterostylis nutans*).  
= **nodding**



**nutlet** A small indehiscent nut. A unit of a compound fruit that splits at maturity, as a mericarp of a schizocarp in the borage family (Boraginaceae) and mint family (Lamiaceae).



**nutrient** One of the substances that provides nourishment essential for plant growth and development.  
*cf.* **macronutrient, micronutrient, trace element**

**nyctanthous** Flowering at night.

**nyctinasty** Plant movement in response to nightly changes in temperature and light intensity.

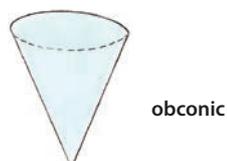
*see also* **phytochrome, pulvinus**

**nyctinastic** Of or relating to nyctinasty.

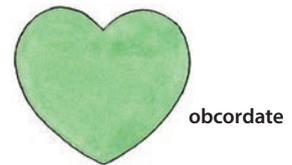
**nyctitropism** The tendency of some plant parts to assume a different position at night, as the folding of the leaflets of some leguminous plants.

**ob-** A prefix indicating an inversion or rotation of 180°.

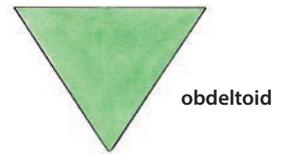
**obconic, obconical** Cone-shaped with the narrow end at the base.  
*cf.* **conical**



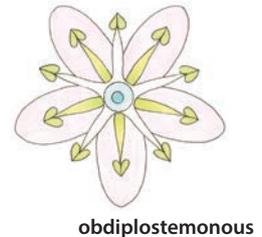
**obcordate** Heart-shaped in outline with the notch at the top.  
*cf.* **cordate**



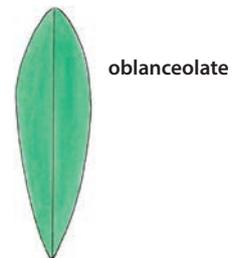
**obdeltoid** A triangle with sides of about equal length and broad at the top.  
*cf.* **deltoid**



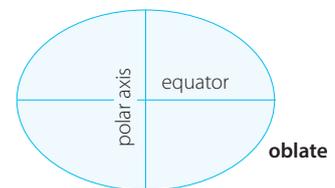
**obdiplostemonous** With two whorls of stamens, the inner whorl alternate with the petals and the outer whorl opposite the petals.



**oblanceolate** Shaped like the inverted head of a lance. Distinctly longer than wide, tapering each end and widest above the middle.  
*cf.* **lanceolate**



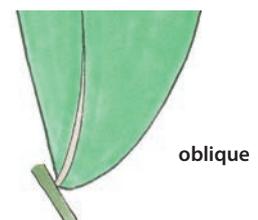
**oblate** Of an object with the polar axis shorter than the equatorial diameter.  
*cf.* **prolate**



**obligate** Essential, restricted to a particular function, as some orchids that must cross-pollinate in order to produce viable seeds.  
*cf.* **facultative**

**obligate outcrosser** Pollen from a different plant is required for successful seed set.  
*cf.* **autogamy, self-pollination, selfing**

**oblique** Slanting. Of a leaf or leaflet larger on one side of the midrib than on the other. Of a midrib that is nearer one margin than the other. Asymmetrical.  
*see also* **unequal**



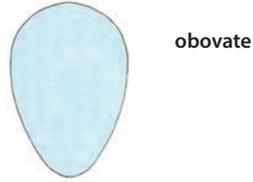
**obloid** A three-dimensional oblong shape.

**oblong** About two or three times longer than broad, with parallel sides and rounded ends.



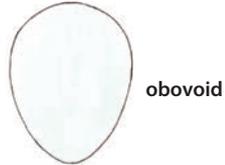
oblong

**obovate** Egg-shaped in outline, with the broad end at the top.  
*cf.* **obovoid**



obovate

**obovoid** Obovate but three-dimensional with the broad end above the middle.

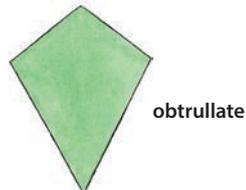


obovoid

**obsolescent** Having dwindled to a rudimentary state or disappeared altogether.  
*cf.* **obsolete**

**obsolete** No longer in use.  
*cf.* **obsolescent**  
*see also* **rudimentary, vestigial**

**obtrullate** Shaped like a bricklayer's trowel but broadest at the top.  
*cf.* **trullate**



obtrullate

**obturator** An outgrowth, usually of the funicle, producing a secretion that promotes the passage of the pollen tube into the ovule.

**obtuse** Terminating gradually into a blunt or rounded tip or base, with the margins meeting at an angle of more than 90°.  
*cf.* **acute**



leaf tip obtuse

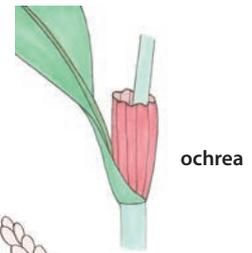
**obvolute vernation**  
Of young leaves in the unopened leaf bud with the margins folded to embrace one margin of another leaf.  
= **half-equitant vernation**



obvolute vernation

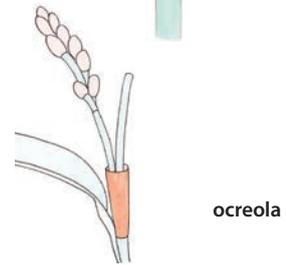
**ochrea, ocrea** A sheath formed by stipules of alternate leaves that fuse around a stem.

**ochreate, ocreate**  
With an ochrea.



ochrea

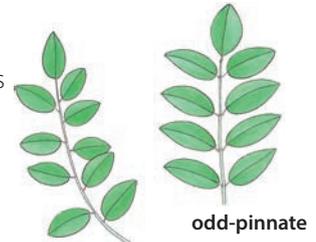
**ocreola** A small ochrea subtending the flowers in the inflorescence of the knotweed family (Polygonaceae).



ocreola

**oct-, octa-, octo-** A prefix meaning eight.

**odd-pinnate** Of a pinnate leaf with leaflets alternate, or arranged in pairs, and terminating with a single leaflet.  
= **imparipinnate**

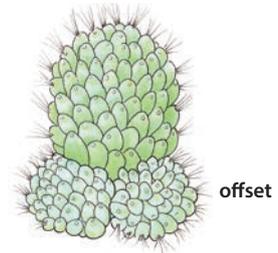


odd-pinnate

**odor, odour** Having a smell, whether pleasant or unpleasant.

**odiferous, odoriferous, odorous** Having a characteristic smell, as fragrant or malodorous.

**offset** A young plantlet developed at the base of the parent plant, as many of the globular cacti. It is often rooted and can be detached and propagated as a new plant.



offset

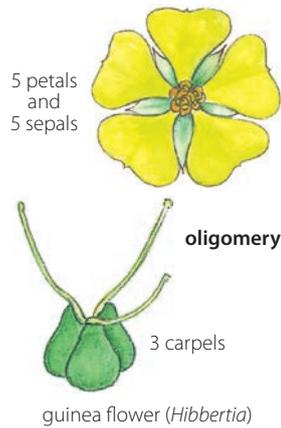
**oleaginous** Resembling or having the properties of oil, oily.  
Containing or producing oil, as the fruit of the olive tree (*Olea europaea*).

**oleiferous** Producing oil, as seeds of the sunflower (*Helianthus annuus*).

**oleoresin** A mix of volatile oil and resinous substances, as turpentine.

**oligo-** A prefix meaning few.

**oligomery** A whorl of a flower that has a lesser number of members than the other whorls, as the whorl of two or three carpels in guinea flower (*Hibbertia*) that has five petals, five sepals and many stamens.



cf. **pleiomery**

**oligomeric** Of or relating to oligomery.

**oligospermous** Having few seeds.

**oligotrophic** Of a body of clear water low in nutrients, like nitrogen and phosphate, that supports few plants and is rich in dissolved oxygen.

see **trophic**

cf. **dystrophic, eutrophic, mesotrophic**

**olive** Dark yellow-green.

**olivaceous** Relating to the olive.

Dark yellow-green in colour.

**omni-** A prefix meaning all.

**ontogenesis, ontogeny** The sequence of stages through which an organism passes during its lifetime.

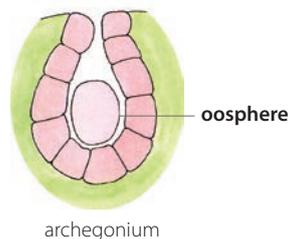
The stages of development of an anatomical or behavioural feature.

cf. **phylogeny**

**ontogenic** Of or related to ontogenesis or ontogeny.

**oosphere** The non-motile female gamete (egg cell) of bryophytes and ferns that is retained in the archegonium.

cf. **spermatozoid**



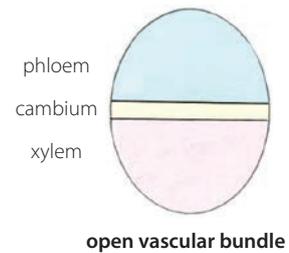
**opaque** Having a surface that does not reflect light and is neither transparent or translucent.

**open vascular bundle**

With a cambium layer, that promotes secondary growth, between the phloem and xylem.

Typical of most eudicots.

cf. **closed vascular bundle**



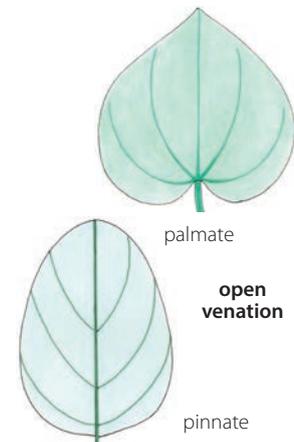
**open venation**

Venation that is branched with free-ending veins: leaves may be toothed, lobed or compound.

The two forms of open venation are pinnate and palmate.

see **cladodromous, dendritic**

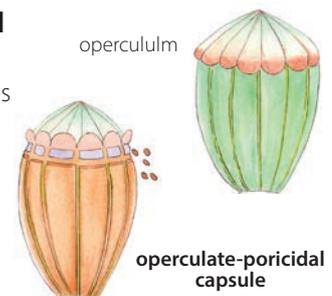
cf. **anastomosis, closed venation**



**operculate-poricidal capsule**

A capsule that dehisces through pores in a lid called an operculum, as the opium poppy (*Papaver somniferum*).

cf. **poricidal capsule**



**operculum, pl. operculi**

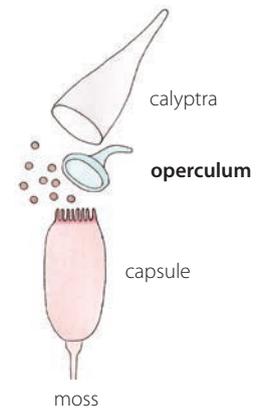
A hood or lid.

Of mosses, a small cap covering the mouth of the capsule that is shed at spore dispersal.

cf. **calyptra**

**operculate, opercular**

Relating to, bearing or resembling an operculum.



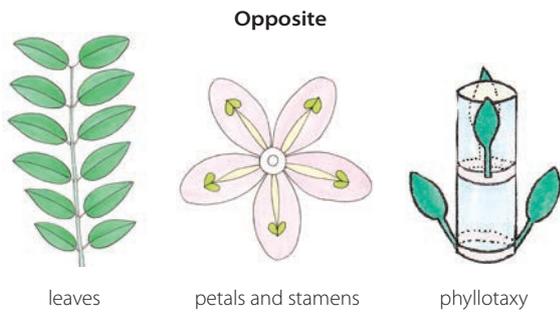
**opportunistic** Of plants adapted to exploit newly available habitats, as on a clear-cut forest floor that is colonised rapidly by opportunistic plants with windborne seeds.

These plants typically have a short life cycle and establish themselves quickly.

**opposite**

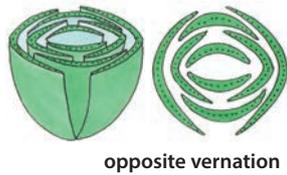
Of plant parts, as leaves and flowers, arranged in pairs on each side of a stem.  
Of plants parts, as stamens above petals, arranged with one on top of the other.  
Of phyllotaxy, having two leaves or shoots occurring at a node on opposite sides of a stem. The simplest form of a whorled arrangement.

cf. **distichous, whorled**



**opposite vernation**

Of young leaves in the unopened leaf bud arranged in alternating pairs.



**opposite-bipinnate**

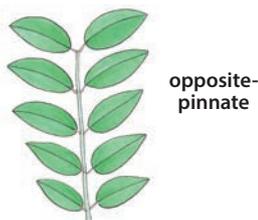
Of a bipinnate leaf with the primary divisions arranged in pairs on opposite sides of the rachis.

see also **pinnate**



**opposite-pinnate**

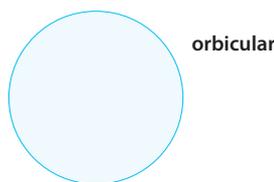
Of a pinnate leaf with leaflets in pairs on opposite sides of the rachis.



**orbicular**

A two-dimensional shape, with a circular or almost circular outline.

cf. **globose**



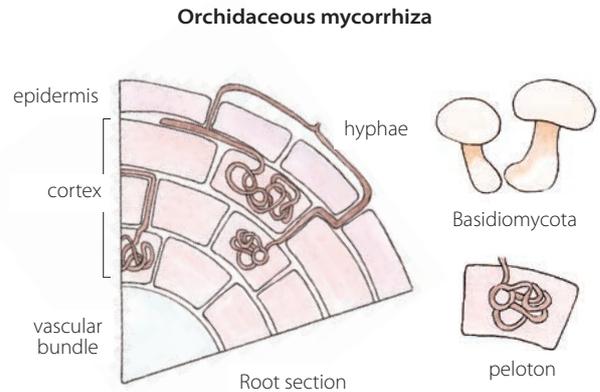
**orchidaceous** Of, relating to or resembling the orchid family (Orchidaceae).

**orchidaceous mycorrhiza**

Mutually beneficial symbiosis formed between a Basidiomycota fungi and the roots of orchids (Orchidaceae).

One of the endomycorrhizas with hyphae that penetrate the cells of the root cortex and form pelotons.

see **mycorrhiza**



**orchids** see page 204

**organ**

A structure that performs a particular function and is composed of all three types of plant tissue (dermal, ground and vascular).

Organs include: stems that support and mediate growth, leaves that produce food through photosynthesis, flowers and fruits that reproduce the plant, and roots that absorb water and nutrients. Cells are organised into tissues, tissues are organised into organs and organs function together in systems.

**order**

In taxonomic classification, a rank below class and above family. Names of orders end in *-ales*. see **taxonomic hierarchy**

**organelle**

A structure in a eukaryotic cell (cell with a nucleus) that has a specific function, as the nucleus that holds the cell's genetic information, chloroplasts that provide energy for cell metabolism, mitochondria and the Golgi apparatus.

**organelle** page 204 (cont.)

**orchids, Orchidaceae** The largest flowering plant family in the world.

Flowers have three sepals and three petals, with the column in the middle, and one petal (labellum) usually different from the others and often modified to attract pollinators.

Stamens and pistils are united into a single structure, the column, with one fertile anther.

Pollen is bound together into two pollinia that sit in the anther and are easily carried away by pollinating insects.

The stigmatic disc sits below the anther.

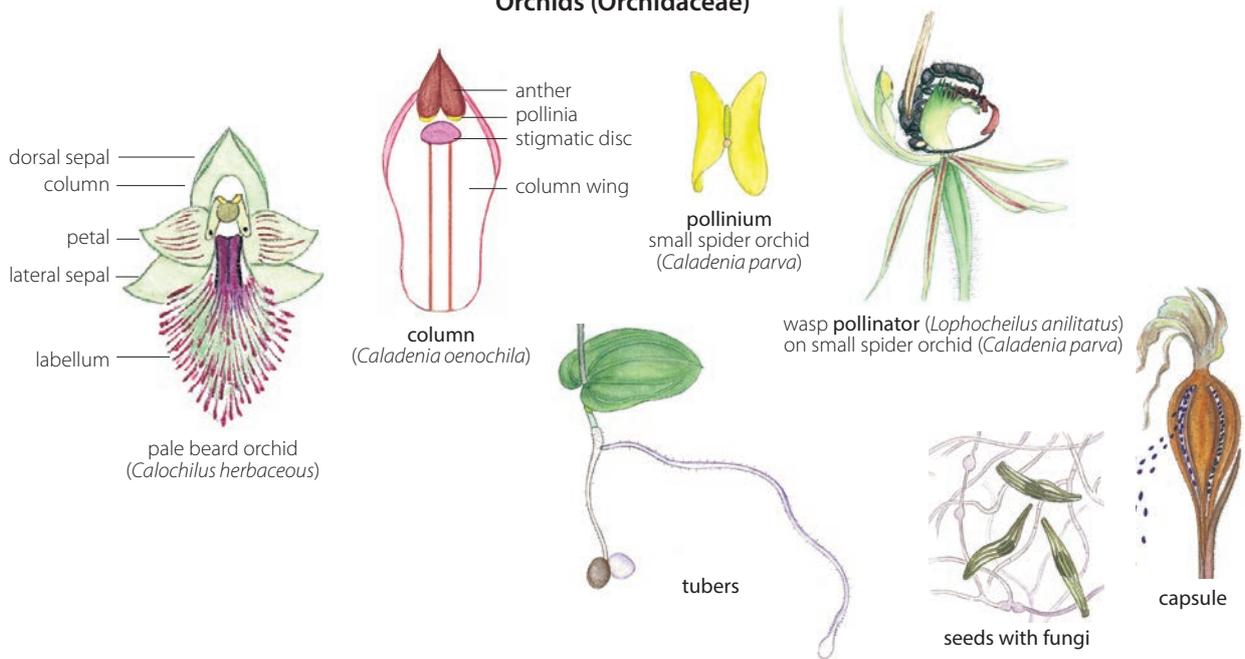
Most orchids are pollinated by insects.

Fruit is a capsule.

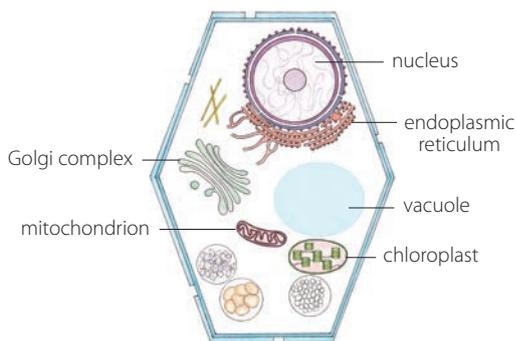
Seeds lack endosperm and after germination rely on a relationship with mycorrhizal fungi for nutrition.

Orchids also reproduce vegetatively by tubers.

**Orchids (Orchidaceae)**



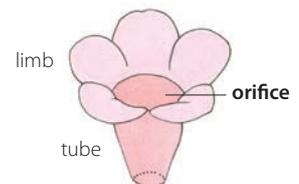
**Organelle**



**organism** An individual life form, as an animal, plant, fungus or alga.

**orifice** An opening or mouth, as the tubular part of a corolla where it joins the limb.

*cf.* **palate**



**ornamentation** Surface features, as those on a pollen grain.

*see* **sculpturing**

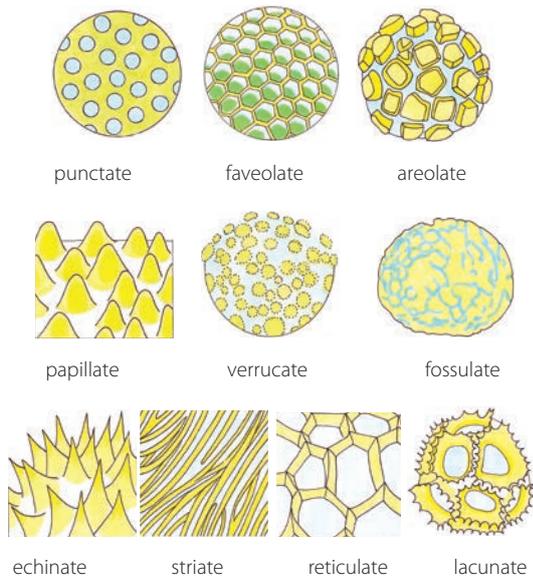
**ornamental** Of plants grown for decorative purposes.

**organic** Describes a molecule that consists mainly of carbon and hydrogen atoms.

Of, relating to, derived from or characteristic of living plants and animals.

*cf.* **inorganic**

**Ornamentation of pollen grains**



**ornithochore** A plant whose seeds, spores or fruits are dispersed by birds.

**ornithochory** Dispersal of seeds and fruit by birds.

cf. **ornithophilous**

**ornithochorous** Of or relating to ornithochory.

**ornithogamy** Having flowers adapted to attract bird pollinators. Pollination by birds.

**ornithogamous** Of or relating to ornithogamy.

**ornithophile** A plant that is pollinated by birds.

**ornithophily** Pollination of flowers by birds.

cf. **ornithochory**

**ornithophilous** Pollinated by birds.

**orophile** Thriving in subalpine or mountainous regions.

**orophilous** Thriving in subalpine habitats.

**orophyte** A plant growing in subalpine habitats.

**orophytic** Thriving in subalpine habitats.

**orthostichy** see page 206

**orthotropism** Tendency of a plant to grow in a vertical direction, either upwards as some stems or downwards as taproots.

see **tropism**

**orthotropic** Of or relating to orthotropism.

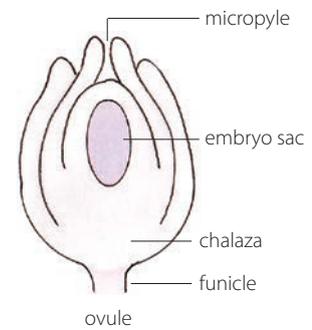
**orthotropous**

Of ovule orientation, with the chalaza at the base the micropyle at the top and facing upwards and the ovule between, with all aligned with the funicle on a straight axis.

The most primitive ovule orientation.

= **atropous**

see **ovule orientation**



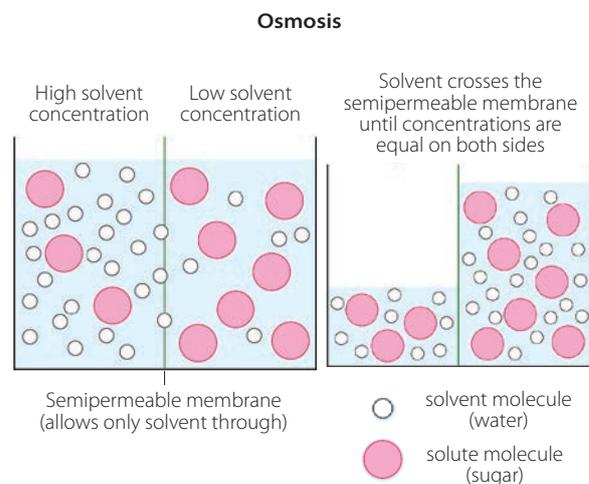
**orthotropous**

**osmophore**

Scent-producing glands, as those on the sepals of some spider orchids (*Caladenia*).



**osmosis** Movement of solvent molecules from a region of higher concentration to a region of lower concentration across a semipermeable membrane. A solvent (like water) can pass through the membrane but dissolved solids (like sugar) cannot. Movement continues across the membrane until the concentrations of solvent and solute are equal on both sides.



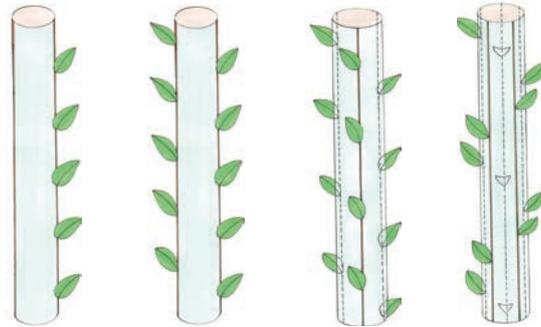
**orthostichy** A vertical row or rank of leaves, flowers or scales along a stem.

A stem with one row is monostichous, two rows is distichous, three rows tristichous and five rows pentastichous.

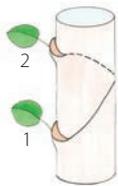
see also **phyllotaxy**

cf. **parastichy**

### Orthostichy



monostichous      distichous      tristichous      pentastichous



**monostichous**

One vertical row of leaves on the stem

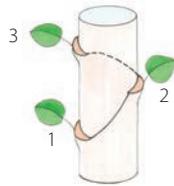
One turn around the stem

The second leaf is above the first and begins a new series

One turn in the series  
Two leaves in the series

1/1

Turns around stem once, vertical rows one



**distichous**

Two vertical rows of leaves on the stem

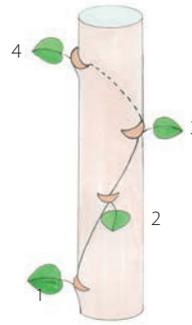
One turn around the stem

The third leaf is above the first and begins a new series

One turn in the series  
Two leaves in the series

1/2

Turns around stem once, vertical rows two



**tristichous**

Three vertical rows of leaves on the stem

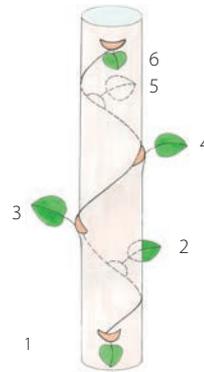
One turn around the stem

The fourth leaf is above the first and begins a new series

One turn in the series  
Three leaves in the series

1/3

Turns around stem once, vertical rows three



**pentastichous**

Five vertical rows of leaves on the stem

Two turns around the stem

The sixth leaf is above the first and begins a new series

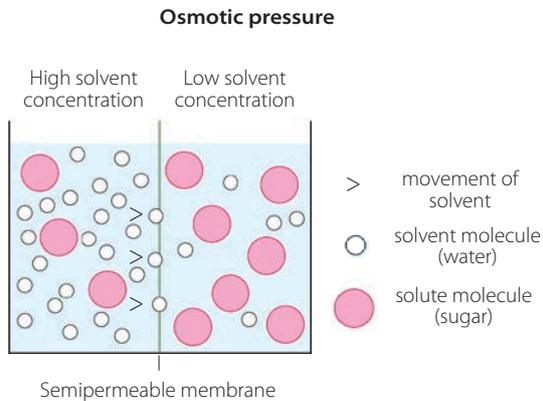
Two turns in the series  
Five leaves in the series

2/5

Turns around stem twice, vertical rows five

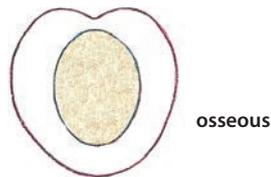
**osmotic pressure** Pressure of a solvent against a semipermeable membrane when moving in the direction of a low solvent concentration. It persists until concentrations of solvent and solute are equal on both sides of the membrane.

see also **osmosis**

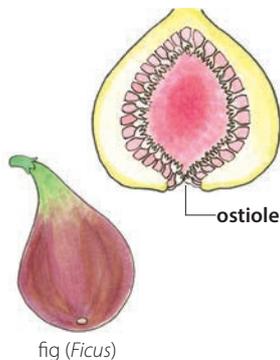


**osmotrophy** Digestion outside the cells before absorbing nutrients into the cells by osmosis, as in fungi.

**osseous** Of a bone-like hardness and texture, as the stone in the fruit of olives (*Olea europaea*).



**ostiole** A small opening or pore. The opening at the apex of the fig inflorescence through which fig wasps enter and pollinate the tiny flowers.



**ostiolar** Pertaining to an ostiole.

**outbreeding** The production of seeds between plants that are from different populations, subspecies or species.

see also **autogamy**

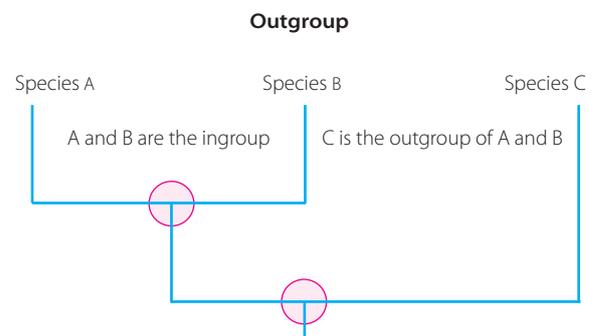
cf. **outbreeding, outcrossing**

**outcrossing** Pollination or fertilisation by pollen from a different plant of the same species.

cf. **self-pollination**

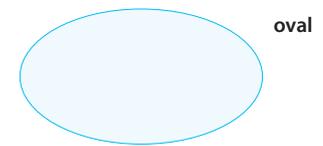
**outgroup** In phylogenetics, taxa of interest to a study that are closely related to but not included in the ingroup.

cf. **ingroup**



**oval** Widest at the middle, with equally rounded ends.

= **elliptic**



**ovary**

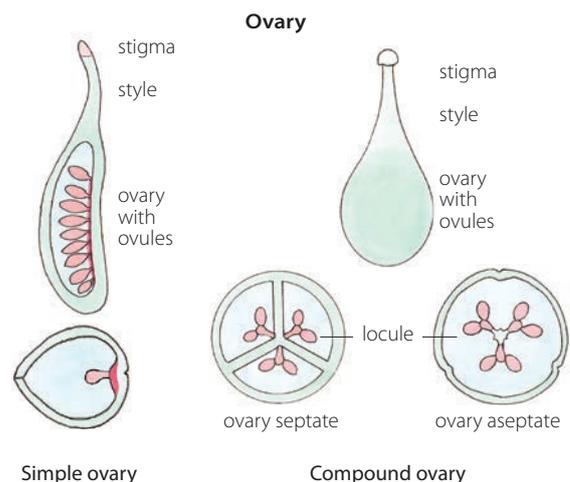
The part of the carpel below the stigma and style that encloses one or more ovules, with each ovule containing an ovum (female sex cell or gamete).

A simple ovary is a single carpel containing one ovary, as a pea (*Pisum*).

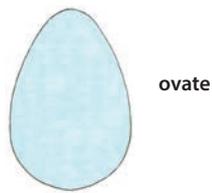
A compound ovary results from two or more fused carpels. If the carpels of a compound ovary are aseptate it has one locule.

The ovary matures into the seed-bearing fruit.

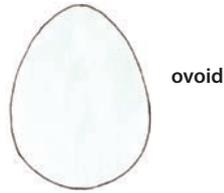
see also **paracarpous, syncarpous**



**ovate** Egg-shaped in outline, with the broad end at the base.  
*cf.* **ovoid**



**ovoid, oviform** Ovate, but three-dimensional with the broad end below the middle. Egg-shaped.

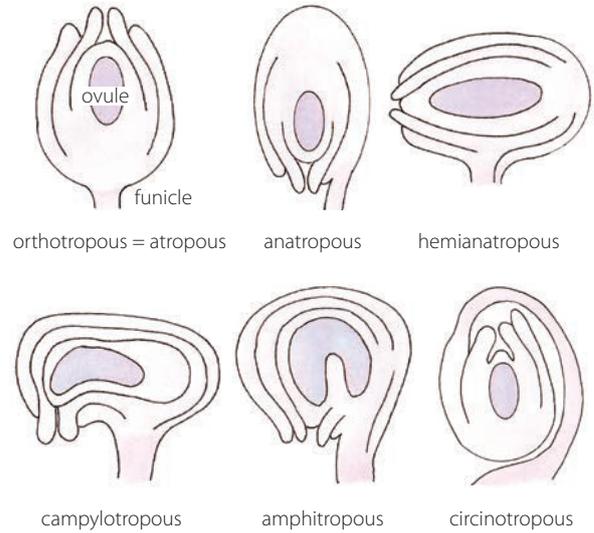


**ovulate cone** The female, ovule-producing cone of gymnosperms.  
 = **megastrobilus**  
*cf.* **staminate cone**

**ovule** In seed plants, a haploid egg (the female gamete) that develops into a seed after fertilisation. In angiosperms, it is the embryo sac (female gametophyte, megagametophyte), enclosed in the ovary, in which one egg (female gamete) develops. In gymnosperms, the ovule is exposed on the upper surface of a scale on the female cone. Typically, at maturity, it consists of an integument, a thin layer of nucellus and an ovoid female gametophyte (megagametophyte) that is undifferentiated except for several archegonia, each with an egg (female gamete).

**ovule orientation** The positioning of the ovule in the ovary in seed plants (angiosperms and gymnosperms). Generally, it takes into account the relative positions of the ovule and funiculus.

**Examples of ovule orientation in angiosperms**



**ovuliferous** Bearing ovules.

**ovuliferous scale** Of gymnosperms, typically one of the scales on a female cone, usually bearing two ovules on its upper surface.  
*see megasporophyll*

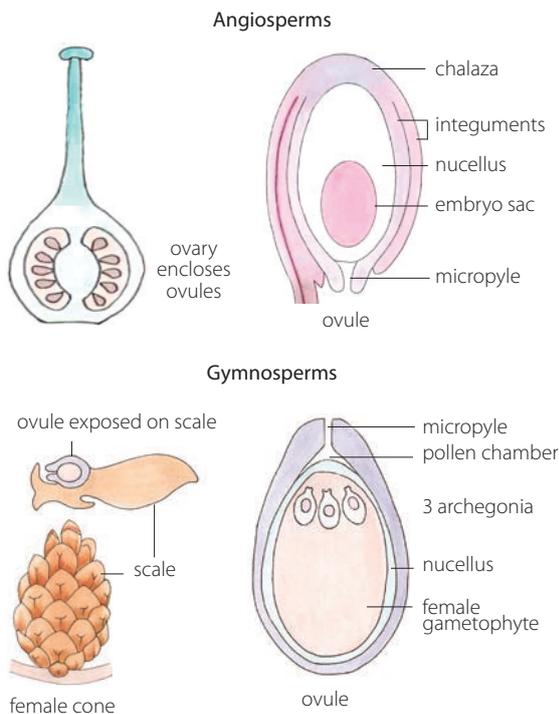
**ovulode** A sterile reduced ovule. Common in the myrtle family (Myrtaceae).  
*cf.* **staminode**

**ovum, pl. ova** The female reproductive cell of plants and animals.  
 = **egg, egg cell, megagamete**

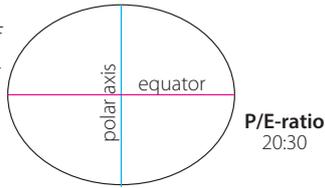
**oxygen, (O), (O<sub>2</sub>)** Plants acquire oxygen by the breakdown of carbon dioxide (CO<sub>2</sub>) during photosynthesis. A small amount is used in cellular respiration and the rest is released back into the atmosphere as molecular oxygen.

**P generation** The parental generation. The two true breeding varieties that are crossed to produce a hybrid (F1 generation).

**Ovule**

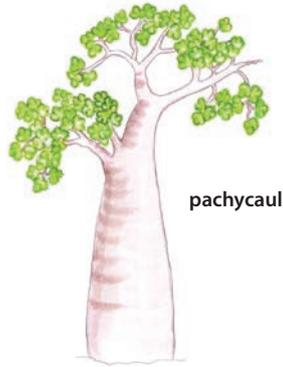


**P/E-ratio** The ratio of the length of the polar axis to the equatorial diameter.

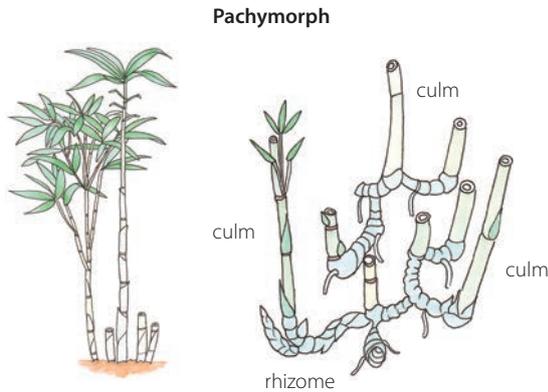


**pachy-** A prefix meaning thick.

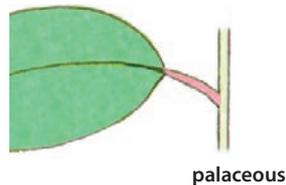
**pachycaul** A growth form of plants that is deemed to be a trait of primitive angiosperms. Characterised by thick unbranched trunks and few large leaves, as cucumber tree (*Dendrosicyos socotranus*).  
*cf. leptocaul*



**pachymorph** Of woody bamboos, a short thick clumping rhizome that usually curves upwards, with a culm produced at the tip of each rhizome. Such bamboos are determinate and non-invasive.  
*see amphipodium, sympodium*  
*cf. leptomorph, monopodium*



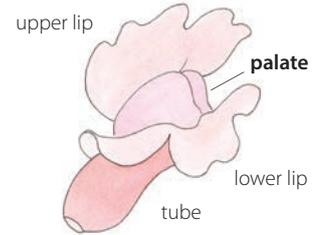
**palaceous** With the stalk attached to the margin, as the petiole of a leaf.



**palae-, paleo-** A prefix meaning ancient or from a time in the geological past.

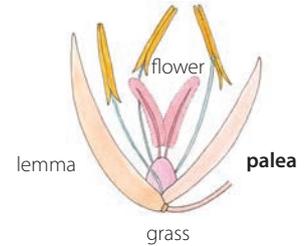
**palaeotropics** The Old World tropical continental regions of Africa and southwest Asia (excluding Australia) and islands of the Indian and Pacific oceans.  
*cf. neotropics*

**palate** A projection of the lower lip of a bilabiate corolla that partially or completely closes the throat, as that on the snapdragon flower (*Antirrhinum*).  
*cf. throat*

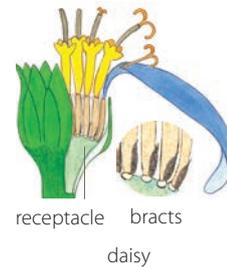


**palea, pl. paleae, paleas**

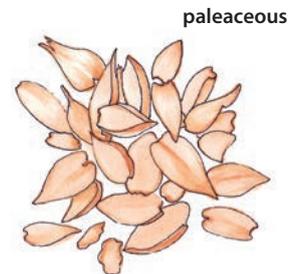
Of grasses (Poaceae), the inner bract that, together with the lemma, encloses the typical flower. One of the chaffy bracts or scales subtending a floret on the receptacle of the head of many Asteraceae.



= **receptacular bract**  
**paleate** Chaffy. Bearing paleae.



**paleaceous** Consisting of chaff, as the winnowed glumes lemmas and paleas of grains and other grasses. Bearing chaff or chaffy scales. Chaff-like. Of grasses, bearing a palea.



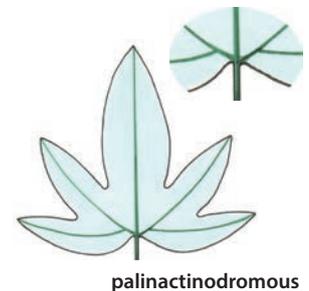
**paleola** A diminutive or secondary palea.

**paleolate** With a paleola.

**palinactinodromous**

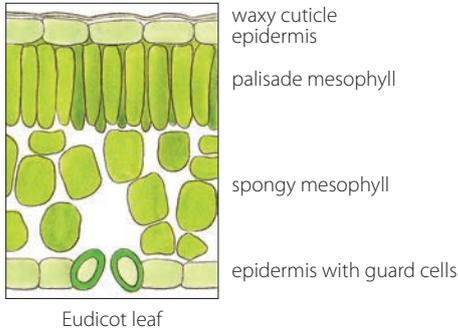
Of leaves with primary veins diverging radially from a single point and with these main veins themselves branching dichotomously.

*cf. actinodromous*

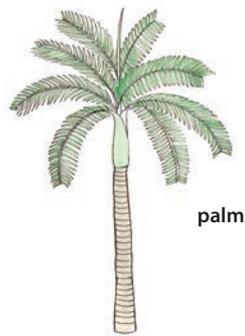


**palisade mesophyll** A layer of elongated cells located beneath the upper epidermis of a eudicot leaf. It contains most of a leaf's chlorophyll.

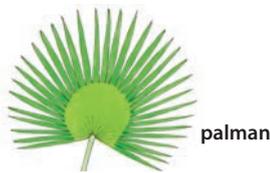
**Palisade mesophyll**



**palm** Common name for a member of the *Arecaceae* family. A subtropical tree, shrub or climbing vine (rattan). Except for rattans, mostly characterised by a crown of pinnate or palmate fronds on a tall unbranched stem.

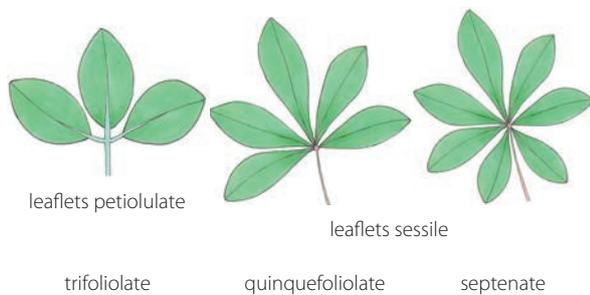


**palman** The undivided central part of a palmate leaf.

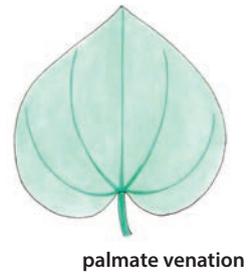


**palmate** Having the shape of a hand. Of a compound leaf with sessile or petiolulate leaflets attached to the apex of the petiole. *cf.* **pinnate**

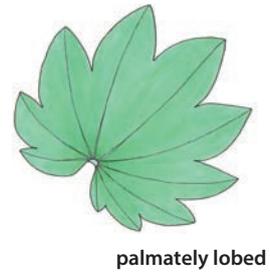
**Palmate**



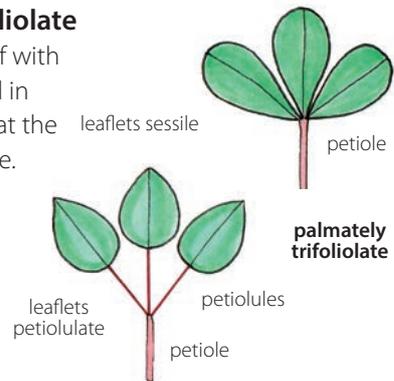
**palmate venation, palmately veined** Leaf venation with the main veins radiating from one point at the base, usually near the tip of the petiole. *cf.* **parallel venation, pinnate venation**



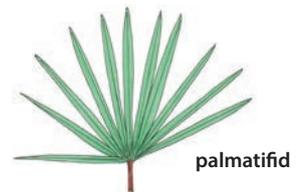
**palmately lobed** Having lobes that are rounded and with the divisions not more than half way to the top of the petiole, as some palmate leaves. = **palmatilobate, palmatilobed**



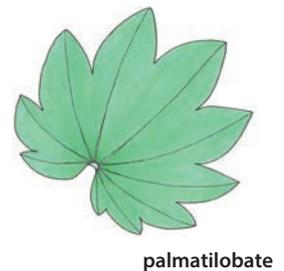
**palmately trifoliolate** Of a palmate leaf with leaflets arranged in groups of three at the top of the petiole. Leaflets can be sessile or petiolulate. *see also ternate cf. pinnately trifoliolate*



**palmatifid** Of a palmate leaf that is split into pointed rather than rounded lobes.



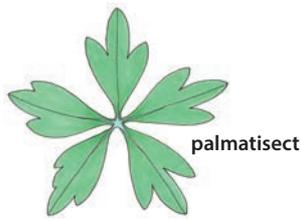
**palmatilobate, palmatilobed** Having lobes that are rounded and with the divisions not more than half way to the top of the petiole, as some palmate leaves. = **palmately lobed**



**palmatipartite** Of a palmate leaf having lobes with incisions extending from about half to three-quarters of the way towards the top of the petiole.



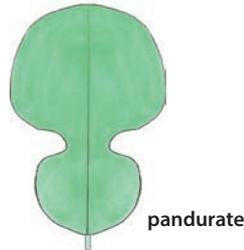
**palmatisect** Of a palmate leaf having lobes with incisions that extend almost, but not quite, to the top of the petiole.



**pan-** A prefix meaning all, whole or all-inclusive.

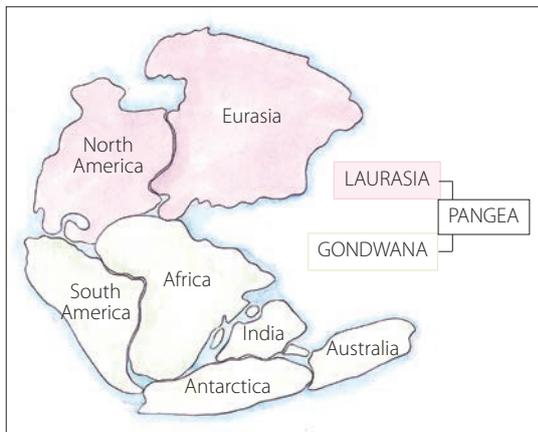
**pandurate, panduriform**

Fiddle-shaped. Of a pinnately lobed leaf that is obovate in outline with an indentation on each side, like a violin, as the leaf of fiddle dock (*Rumex pulcher*).



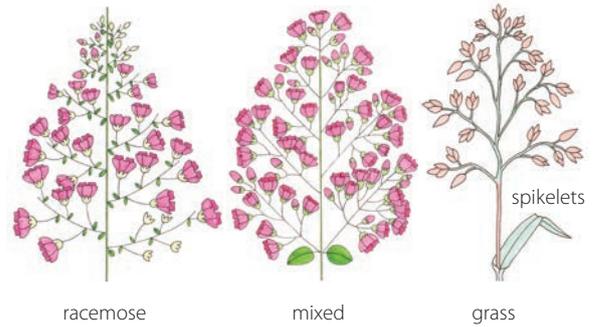
**Pangaea, Pangea** A vast continent, including all the exposed landmass of the earth, believed to have existed prior to the Triassic period when it split into Laurasia and Gondwana. *see continental drift*

Pangaea



**panicle** Loosely, a much-branched inflorescence. Specifically, a compound racemose inflorescence in which a raceme branches into racemes, or a raceme branches in diverse ways and becomes irregularly compound. In grasses (Poaceae), the arrangement of pedicellate spikelets, (rather than flowers), along the spreading or contracted branches of the inflorescence. *cf. digitate inflorescence, raceme, spikelet, thyse*  
**paniculate** Growing or arranged in racemes.  
**paniculiform** With the appearance, but not necessarily the structure, of a panicle.

Panicle



**pannose** Covered with felted woolly hairs.

**panto-** A prefix meaning global.

**pantoaperturate** Of a pollen grain with apertures distributed more or less evenly over its surface.

**pantoporate** Of a pollen grain with pori distributed more or less evenly over its surface.

**pantropical** Distributed throughout all of the tropical regions of the world.

**papery** Thin and dry like paper, as the outer bracts of blunt everlasting (*Argentipallium obtusifolium*). = **chartaceous**



**papilionaceous**

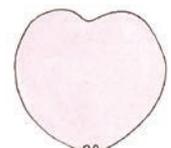
Butterfly-like, as the corolla of peas (family Fabaceae, subfamily Faboideae). It has five petals comprising a large upright standard, two clawed lateral wings and two lower petals united along their lower margin to form a keel enclosing the stamens and pistil.



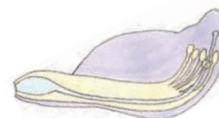
pea flower



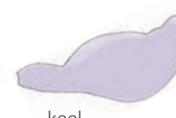
wing



standard



pistil and stamens



keel

**papilionaceous aestivation** Another term for vexillary aestivation.

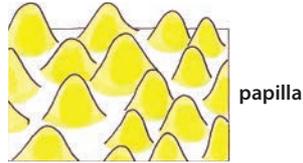
**papilionate** Butterfly-like, as the flowers of peas (family Fabaceae, subfamily Faboideae).

**papilla, pl. papillae**

A small rounded protuberance.

**papillate, papillose**

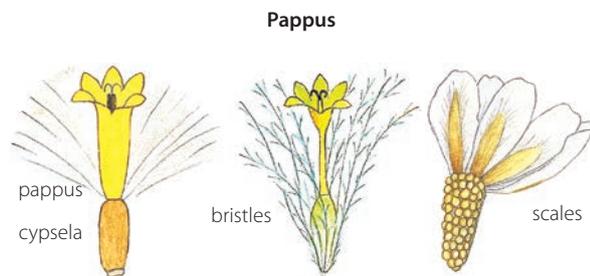
Bearing papillae.



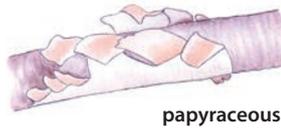
**pappus, pl. pappuses, pappi**

A modified calyx, composed of a ring of hairs, bristles or scales, borne at the base of the floret of many daisies (Asteraceae).

It persists and assists dispersal of the fruit, a cypsela, by wind.



**papyraceous** Thin and dry like paper, as the bark of the paper birch (*Betula papyrifera*) that peels off in papery strips.

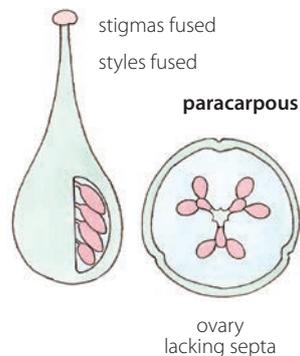


**para-** A prefix meaning by the side of, near, compared with or similar to.

**paracarpous**

Of a flower having a compound gynoecium of two or more carpels with the ovaries, styles and stigmas fused together to form one unit and the ovary lacking septa inside.

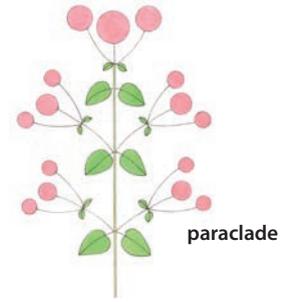
*cf. syncarpous*



**paraclade, paracladium, pl. paracladia**

A lateral inflorescence in a synflorescence that repeats the pattern of the terminal inflorescence.

*cf. coflorescence*



**parallel evolution** The independent evolution of similar traits in two or more unrelated or distantly related organisms.

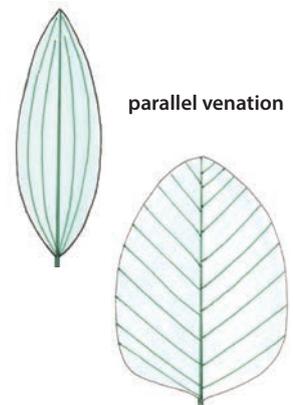
= **convergent evolution, homoplasy**

*cf. divergent evolution*

**parallel venation**

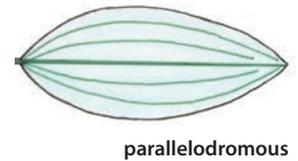
Leaf venation with two or more parallel main veins originating at the base and converging towards the apex and more or less parallel with the midrib or with veins at acute or right angles to the midrib.

*cf. palmate venation, pinnate venation*



**paralleldromous**

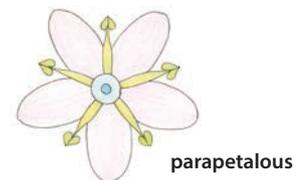
Of leaves with two or more parallel main veins originating at the base and converging towards the apex.



**parapatric** Of distribution, occurring in the same geographic area but having adjacent but non-overlapping ranges.

*cf. allopatric, sympatric*

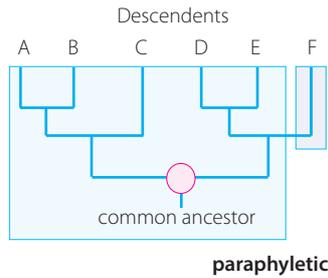
**parapetalous** Beside or between petals, as stamens that are beside or between the petals.



**paraphyletic**

Of a group of organisms that includes the most recent common ancestor but not all of its descendants.

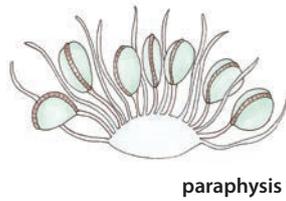
cf. **monophyletic**, **polyphyletic**



**paraphyllidium** pl. **paraphyllidia** A reduced leaflet at the base of the pinna in mimosa (*Mimosa*).

**paraphysis**, pl. **paraphyses**

A sterile filament among the sporangia of some ferns, as tree ferns (*Cyathea*), and some cryptogams.

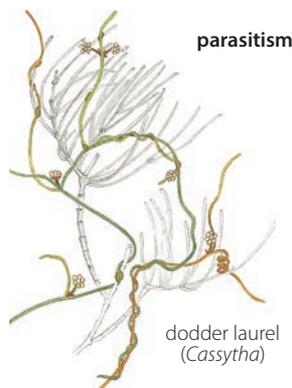


**parasite** An organism (the parasite) that lives on or in another organism (its host) from which it derives some or all of its nourishment, to the detriment of its host.

see **parasitism**, **symbiosis**  
cf. **epiphyte**, **saprophyte**

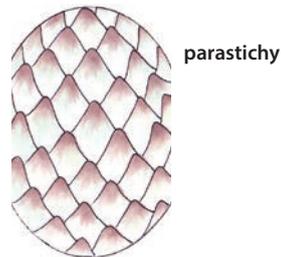
**parasitic** Of or relating to a parasite.

**parasitism** A close and prolonged interaction between organisms of different species in which one benefits (the parasite) and the other (the host) is harmed, as dodder laurel (*Cassytha*) that parasitises and harms other plants.



**parastichy** An imaginary spiral around a stem connecting the bases of a series of crowded leaves, scales or bracts.

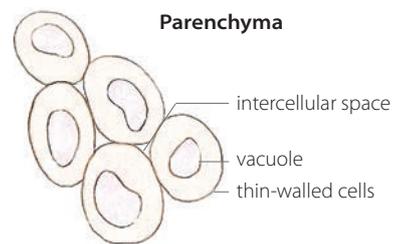
see also **phyllotaxy**  
cf. **orthostichy**



**paratype** Any specimen used, together with the holotype, in the original description of a taxon (protologue).

**parenchyma** Composed of thin-walled isodiametric cells that are flexible, still capable of dividing and typically with a large central vacuole. Functions include photosynthesis in the parenchyma of leaves, storage (mainly starch) and secretion of hormones and enzymes. Found, for example, in the cortex and pith of stems, the pulp of fruits and the endosperm of seeds.

**parenchymatous** Like or consisting of parenchyma.



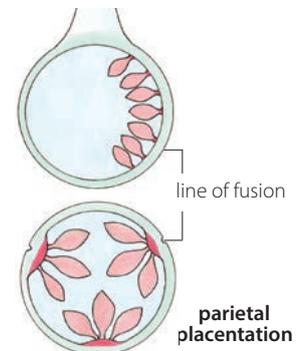
**parietal** Attached to the wall of a structure, as ovules attached to placentas on the wall of the ovary.

cf. **axile**

**parietal placentation**

With carpels fused but the internal walls (septa) lacking, creating a unilocular ovary, with ovules arranged along each line of fusion, as violets (*Viola*).

see **placentation**



**paripinnate**

Of a pinnate leaf with leaflets arranged in pairs and terminating with a pair of leaflets. = **abruptly-pinnate**, **even-pinnate**



**parsimony** In phylogenetics, the principle that when more than one evolutionary tree (cladogram) can be made from available data the simplest tree is chosen as the hypothesis to study.

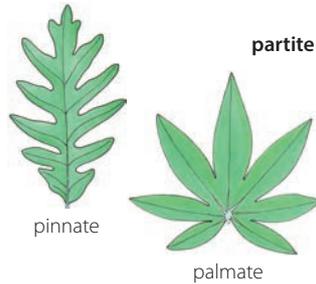
= **phylogenetic hypothesis**

**parthenocarpy** Formation of fruit without fertilisation of ovules, resulting in seedless sterile fruits. It may occur naturally or be artificially induced, as cultivars of bananas, pineapples and navel oranges. cf. **parthenogenesis, stenospermocarpy**

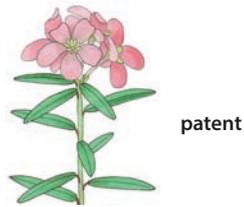
**parthenogenesis** The development of an embryo from an unfertilised egg cell. A form of agamospermy. cf. **parthenocarpy**

**-partite** A suffix meaning divided into parts.

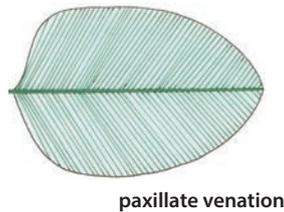
**partite** Divided into segments extending about three-quarters of the way towards the midrib of a pinnately lobed leaf or to the base of a palmately lobed leaf.



**patent** Horizontal, spreading more or less at right angles, as leaves on a stem.

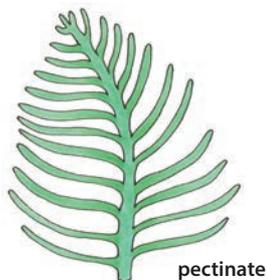


**paxillate venation** Leaf venation with very closely parallel veins running from the midrib to the margin at a slight angle.

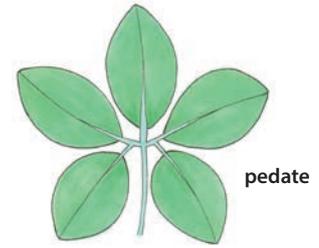


**pectin** Any of various water-soluble polysaccharides that bind adjacent cell walls in plant tissues. see **middle lamella**

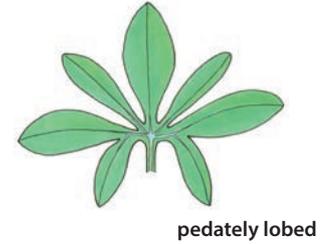
**pectinate** Of a pinnately lobed leaf with the lobes numerous, close and narrow, like the teeth of a comb. Of leaf arrangement, arranged like the teeth of a comb, as the narrow leaves of some firs (*Abies*).



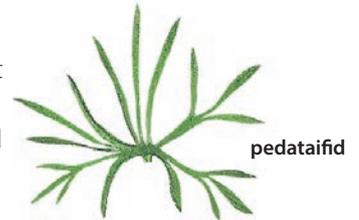
**pedate** Palmately divided but with the lowest leaflet on each side attached to the petiole of the leaflet above. see also **palmate, pedately lobed**



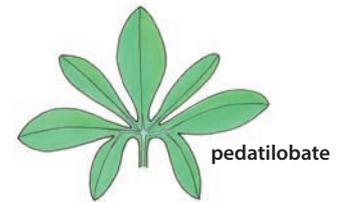
**pedately lobed** Palmately lobed but with the lowest lobe on each side itself lobed. = **pedatilobate, pedatilobed**



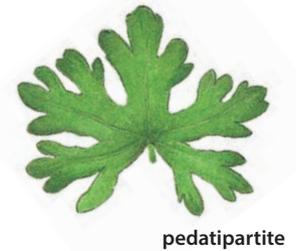
**pedatifid** Of a pedate leaf that is split into pointed rather than rounded lobes.



**pedatilobate, pedatilobed** Palmately lobed but with the lowest lobe on each side itself lobed. = **pedately lobed**



**pedatipartite** Of a pedate leaf having the main lobes with incisions extending from about half to three-quarters of the way to the top of the petiole.



**pedatisect** Of a pedate leaf having the main lobes with incisions that extend almost, but not quite, to the top of the petiole.

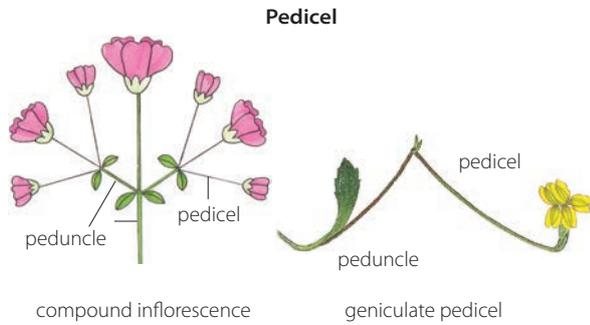


**pedicel** The stalk of a single flower in a compound inflorescence.

Of a geniculate pedicel, the stalk beyond the bend in the stem between the peduncle and the calyx, as bent goodenia (*Goodenia geniculata*).

cf. **peduncle**

**pedicellate** Borne on or having a pedicel.

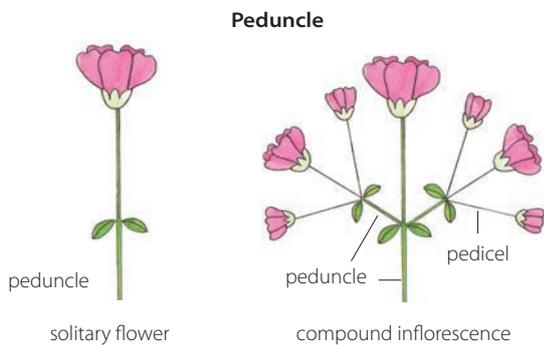


**peduncle** The stem that supports a group of pedicels in a compound inflorescence. The stem of a solitary flower.

cf. **pedicel, petiole, scape**

**pedunculate** Borne on or having a peduncle.

**peduncular** Of or relating to a peduncle.

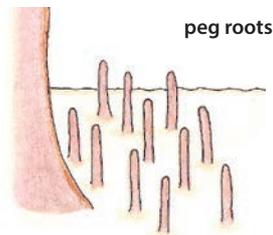


**peg roots**

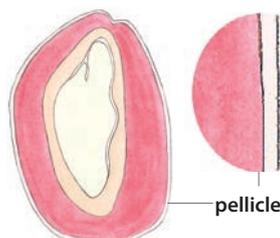
A slender cylindrical pneumatophore found in mangroves.

= **pencil roots**

see also **cone roots, knee roots**



**pellicle** A thin skin-like or membranous covering, as that on the outer surface of the seed of a pomegranate (*Punica granatum*).

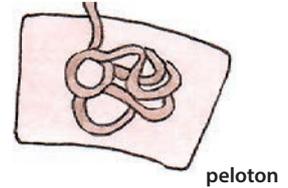


**pellucid** Letting light through, transparent or translucent.

**peloria** Abnormal development, due to a mutation, of a typically zygomorphic flower so that it becomes actinomorphic.

**peloric** Of or relating to peloria.

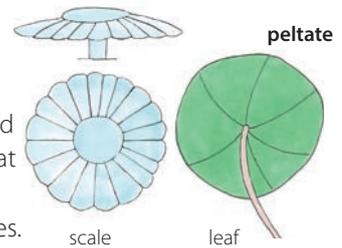
**peloton** Of ericoid and orchidaceous mycorrhizas and ectendomycorrhizas, coils of hyphae found in the cortical cells of roots.



**peltate**

Shield-like.

More or less circular, with the stalk attached on the lower surface at or near the centre, as some leaves and scales.

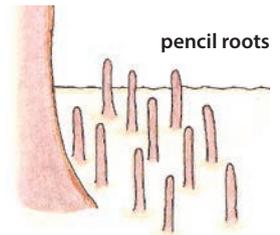


**pencil roots**

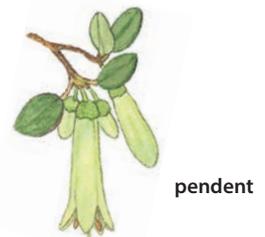
A slender cylindrical pneumatophore found in mangroves.

= **peg roots**

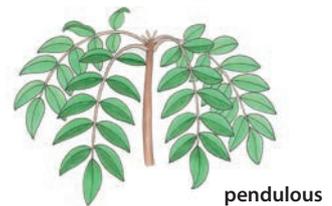
see also **cone roots, knee roots**



**pendent** Hanging with the apex pointing vertically downward, as a flower or a fruit.

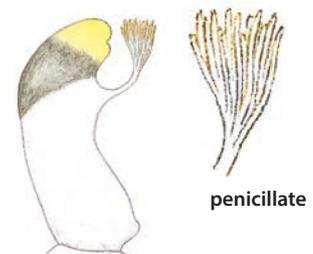


**pendulous** Hanging loosely.



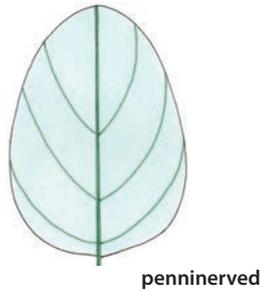
**penicillate**

Resembling a tuft or brush of fine hairs, as those on the column lobes of the trim sun orchid (*Thelymitra peniculata*).



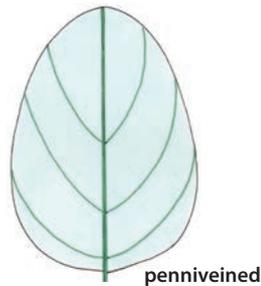
**penninerved** Of leaves with the secondary veins starting from a point on the midrib and running more or less parallel to each other towards the margin.

= **penniveined**  
see **pinnate venation**



**penniveined** Of leaves with the secondary veins starting from a point on the midrib and running more or less parallel to each other towards the margin.

= **penninerved**  
see **pinnate venation**

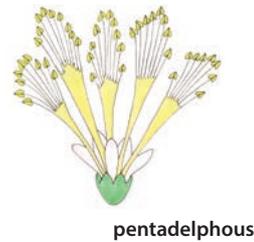


**penta-** A prefix meaning five.

**pentadelphous**

Of stamens united by their filaments into five bundles, as some species of *Hypericum*.

see **adelphous**



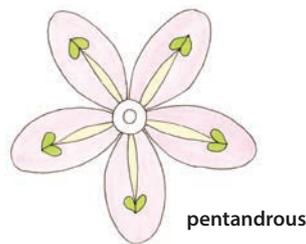
**pentamerous** Having flower parts, such as petals, sepals and stamens, in whorls of five or multiples of five. 5-merous.

see **-merous**

**pentandrous**

Having five stamens, as flowers of the carrot family (Apiaceae).

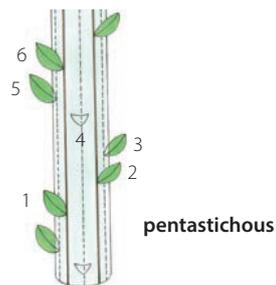
cf. **diandrous**,  
**monandrous**,  
**polyandrous**,  
**tetrandrous**, **triandrous**



**pentastichous**

Arranged on a stem in five vertical rows, as some leaves, with any sixth leaf above the one below it.

= **five-ranked**  
see **orthostichy**



**pepo** A many-seeded, fleshy fruit with a firm hard rind.

Derived from a three-carpelled non-septate inferior ovary.

Typical fruit of the gourd family (Curcubitaceae), as melon and squash.

cf. **amphisarca**



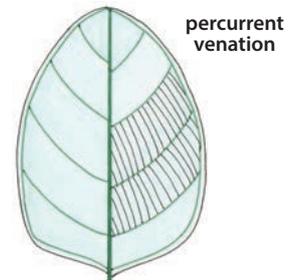
**per-** A prefix meaning through.

**percurrent** Running through the entire length from the base to the tip, as the midrib of a leaf.

**percurrent venation**

Leaf venation with veins of the same order that run parallel to each other like a ladder along the entire area between veins of a higher order.

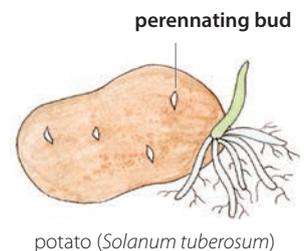
see **scalariform**



**perennating bud**

The vegetative buds on aerial stems and underground stems (bulbs, rhizomes, tubers, corms etc.) that survive during dormancy and produce new growth for the next season.

A potato is a tuber with perennating buds.



**perennation** Survival from one season to the next, often in unfavourable conditions like drought or cold when the plant becomes dormant or dies back.

Buds, tubers, bulbs and rhizomes are examples of organs that allow a plant to perennate.

**perennate, perennating** To last from one season to the next often with a period of dormancy or reduced growth between seasons.

**perennial** A plant living and usually flowering for more than two years.

It may die back annually or persist above ground.

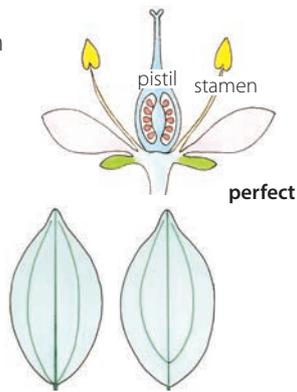
see also **herbaceous**  
cf. **annual**, **biennial**

**perfect** Of a flower with both stamens and pistils fertile.

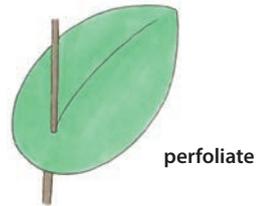
= **bisexual, hermaphrodite**

Of leaf venation, having lateral veins extend for at least two-thirds of the leaf surface.

cf. **imperfect**

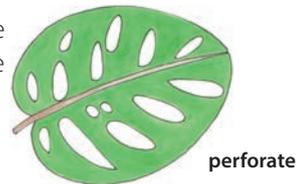


**perfoliate** With the two basal lobes of an alternate leaf or bract united so that the stem appears to pass through the blade.



**perforate** The presence of holes, as in a fenestrate leaf.

cf. **pit, punctate**



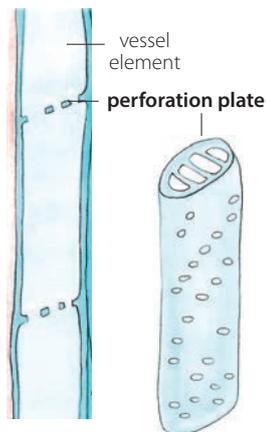
**perforation plate**

The remains of the end walls between two vessel elements in a xylem vessel.

Dying vessel element cells digest large holes in their end walls that allow free flow of water vertically in the xylem.

see **vessel**

cf. **sieve plate**

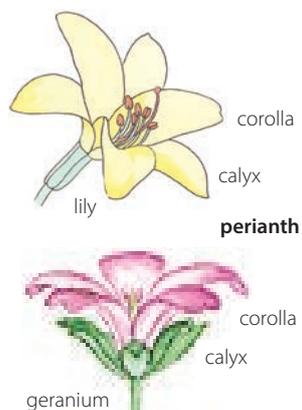


**peri-** A prefix meaning around or enclosing.

**perianth** A collective term for the calyx and corolla of a flower, especially when both are similar, as the day lily (*Hemerocallis*).

The sterile parts of a typical flower.

= **floral envelope, perigone**



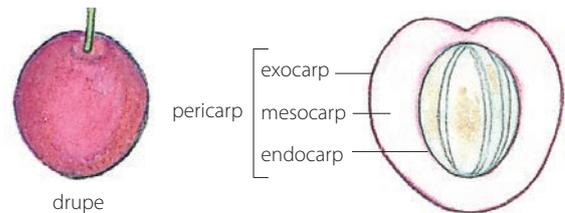
**pericarp** The dry or fleshy fruit wall that develops from the ovary wall or the ovary wall plus accessory parts and encloses the seed(s).

It consists of one or more of three layers: the outer layer (exocarp), the middle layer (mesocarp) and the inner layer (endocarp).

In fleshy fruits, as drupes, three layers are present.

see also **achene, caryopsis**

**Pericarp**

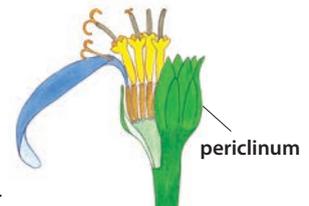


**perichaetium** A cluster of modified leaves around the reproductive organs of some bryophytes.

**periclinal** Of the cell division plane, or any lines generally, parallel to the surface of the plant body.

cf. **anticlinal**

**periclinium** The involucre surrounding flowers on the common receptacle of a flower head (capitulum) in the daisy family (Asteraceae).

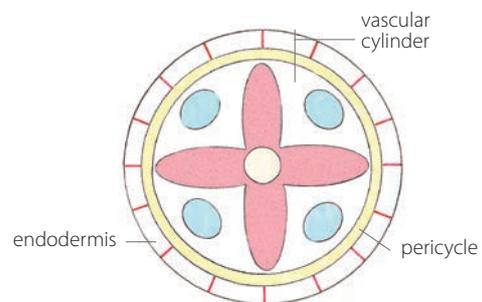


**pericycle**

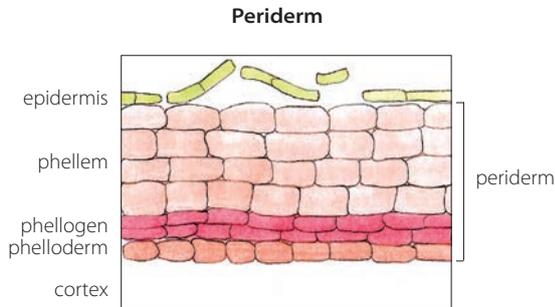
A layer of parenchyma cells that surrounds the vascular cylinder in roots and is in turn surrounded by the endodermis.

In eudicots it gives rise to lateral roots.

**Pericycle**

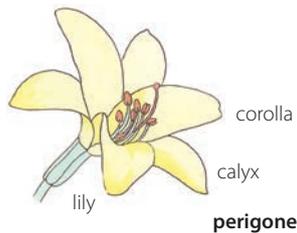


**periderm** A protective layer that replaces the epidermis in gymnosperms and woody eudicots and in the oldest parts of some herbaceous eudicots.  
Consists of cork cells (phellem), cork cambium (phellogen) and parenchyma-like cells (phelloderm).

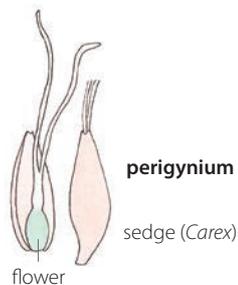


**perigone, perigonium, pl. perigonia**

A collective term for the calyx and corolla of a flower, especially when both are similar, as the day lily (*Hemerocallis*). The sterile parts of a typical flower that enclose the reproductive stamens and/or pistil.  
= **floral envelope, perianth**  
see also **perichaetium**

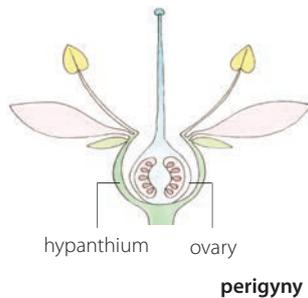


**perigynium** The papery sac-like structure that encloses the female flower in the sedge genus *Carex*.  
= **utricle**



**perigyny** The position of the ovary when it is surrounded by a hypanthium that bears the calyx, corolla and stamens.

**periginous** Around the ovary.  
Of the calyx, corolla and stamens inserted on the rim of a hypanthium and the ovary free within it.  
cf. **epigynous, hypogynous**

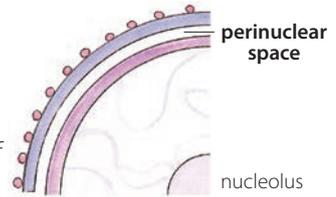


**perine** The often highly ornamented layer of sporopollenin on the exine of a pollen grain wall.  
see also **pollen wall**  
cf. **perispore**

**perinuclear** Situated around or surrounding the nucleus of a cell.

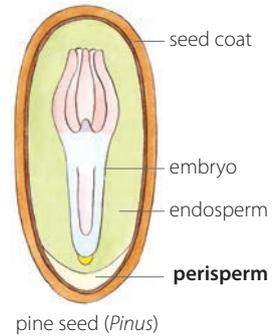
**perinuclear space**

Of the nucleus, the empty space between the inner and outer nuclear membranes of the nuclear envelope.



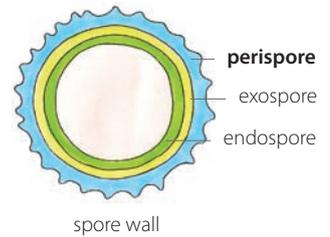
**perisperm**

Storage tissue in some seeds that is derived from the diploid nucellus. It is present in some gymnosperms, as pine (*Pinus*). Occurs in a few eudicot families, as the goosefoot family (Amaranthaceae).  
see also **cotyledon, endosperm**

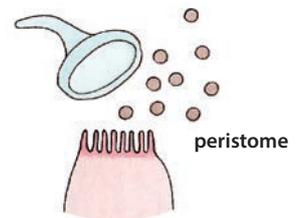


**perispore**

The often highly ornamented sporopollenin layer that surrounds the exospore of a spore wall.  
see **sporoderm**  
cf. **perine**

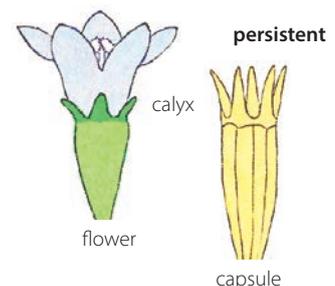


**peristome** A single or double fringe of teeth around the mouth of a moss capsule. It usually regulates spore dispersal.



**persistent**

Remaining attached to the plant beyond the usual time of falling, as the calyx that remains on the capsule of bluebells (*Wahlenbergia*).



**pers. comm., personal communication**

Personal communications from which data is not recoverable, as emails, conversations and speeches.

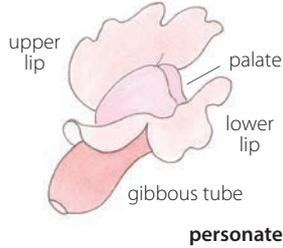
**personal communication, abbr. pers. comm.**

Personal communications from which data is not recoverable, as emails, conversations and speeches.

**personate** Mask-like.

Of a corolla, in the form of a face, with two lips, a prominent palate closing or almost closing the throat and a gibbous tube, as snapdragons (*Antirrhinum*).

cf. **ringent**

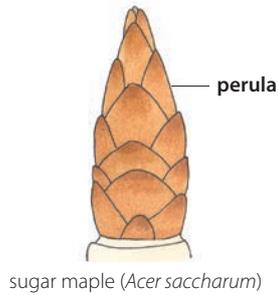


**perula, perule,**

pl. **perulae, perules**

A modified leaf that acts as a protective covering and tightly encloses the developing flower or leaf bud of some plants, as the leaf bud of sugar maple (*Acer saccharum*).

= **bud scale**

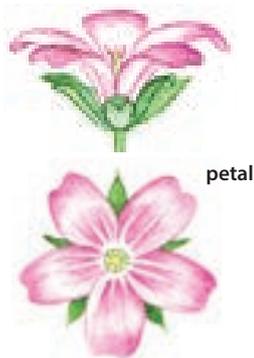


**petal** A segment of the corolla of a flower that is typically coloured and soft in texture. Pollinators are attracted by their colour and shape.

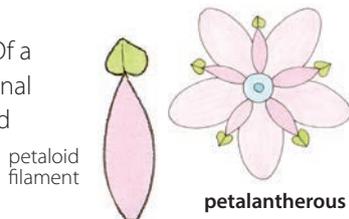
cf. **sepal, tepal**

**petaliferous** Bearing petals.

**petaline** Relating to, attached to or resembling a petal.

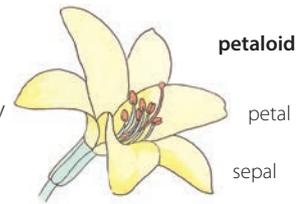


**petalantherous** Of a stamen, with a terminal anther and a petaloid filament.



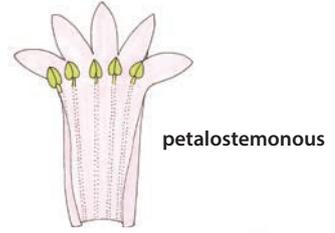
**petalody** The abnormal development of floral parts into petals or petaloid organs.

**petaloid** Having the form or appearance of a petal, as the sepals of day lilies (*Hemerocallis*).



**petalostemonous**

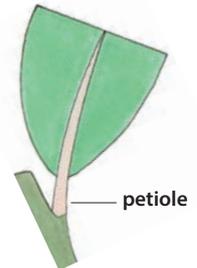
With filaments of stamens fused to the petals or corolla tube and anthers free.



**petiole** The stalk of a leaf that attaches the blade to a stem or branch.

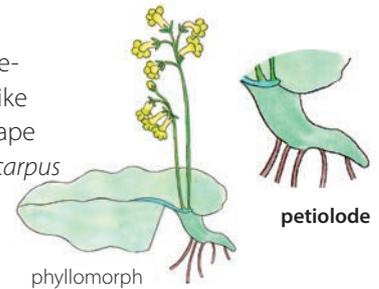
**petiolar** Borne on or relating to a petiole.

**petiolate** With a petiole.



**petiolode**

The rooting petiole-like stalk of a leaf-like phyllomorph, as cape primrose (*Streptocarpus haygarthii*).

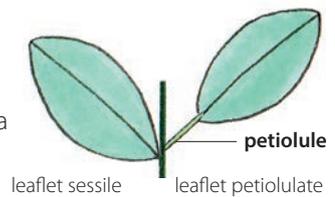


**petiolule** A small petiole.

The stalk of a leaflet.

**petiolulate** Having a petiolule.

cf. **sessile**



**pH** The pH scale measures how acidic or alkaline a solution is.

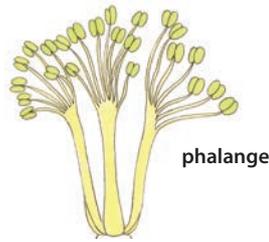
The scale ranges from 0 to 14, with 7 being neutral, less than 7 having a high concentration of hydrogen ions and being acidic, and greater than 7 having a low concentration of hydrogen ions and being alkaline.

see **litmus test**

**phalaenophily** Dispersal of pollen and pollination by moths.

**phalaenophilous** Pollinated by moths.

**phalange** A bundle of stamens united by their filaments, as some members of the gourd family (Curcubitaceae).  
see **adelphous**

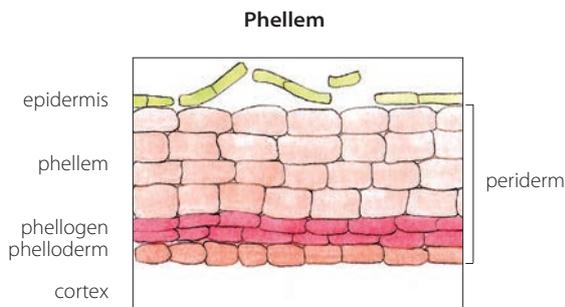


**phanerocotlyly** Of seed germination, having the cotyledons emerge from the seed coat at germination.  
cf. **cryptocotlyly**

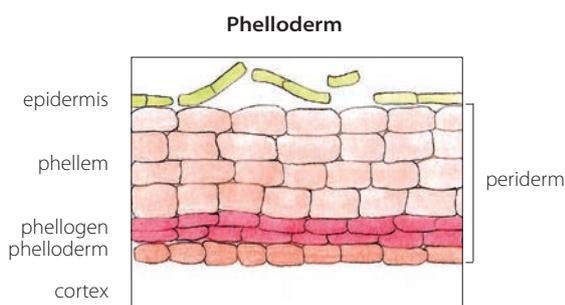
**phanerogams** Seed plants that comprise the flowering plants (angiosperms) and a group of non-flowering plants (gymnosperms) that includes conifers and cycads.  
= **spermatophyte**  
cf. **cryptogam**

**phanerophyte** Plants with perennating buds exposed on branches and twigs as most woody trees and shrubs, woody lianas and some epiphytes. They may be deciduous or evergreen.  
see also **chamaephyte, cryptophyte, hemicryptophyte, therophyte**

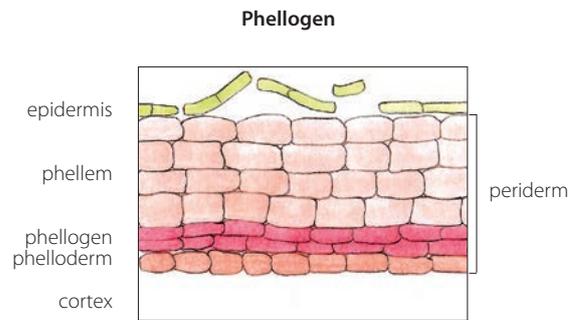
**phellem** Cork tissue that is one of three layers of the periderm.  
It is produced by the cork cambium (phellogen).



**phelloderm** Parenchyma tissue that is one of three layers of the periderm.  
It is produced by the cork cambium (phellogen).



**phellogen** A layer of meristem that is responsible for secondary growth and is part of the periderm in woody plants and some herbaceous plants. It produces cork cells (phellem) on the side towards the surface of the plant and parenchymatous tissue (phelloderm) on the inner side.  
= **cork cambium**  
see **cambium, lateral meristem**  
see also **fusiform initials, ray initials**



**phenetics** A system of classifying plants according to their shared morphological characteristics only.  
cf. **phylogenetics, taxonomy**

**phenology** The study of the timing of biological events in plants, such as flowering and reproduction, in relation to changes in season and climate.

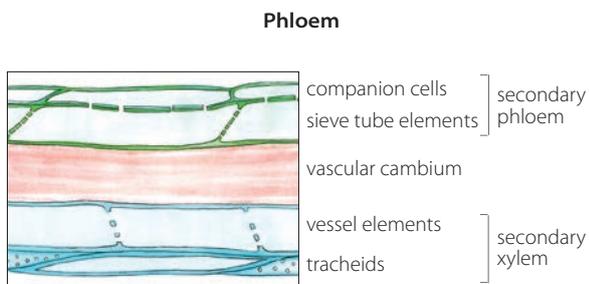
**phenotype** The observable characteristics of a cell or an organism, such as its size, shape and metabolism, that is a result of its genetic makeup and its interaction with the environment.  
cf. **genotype**

**pheromone** A volatile chemical compound released by plants into the environment that affects the behaviour of another species.  
Notable in orchids that produce pheromones to attract a pollinating insect.  
cf. **hormone**

**phloem** Tissue in a vascular bundle composed of living cells that transport sap containing nutrients from the shoots to all parts of the plant. There are two types of phloem. In primary growth, primary phloem is formed from procambium in the apical meristem of shoots and roots, and in secondary growth, secondary phloem is formed from vascular cambium and is the inner layer of the bark.

Typical phloem components are sieve elements (sieve tube elements in angiosperms and sieve cells in gymnosperms and lower vascular plants), companion cells (in angiosperms) and albuminous cells (in gymnosperms).  
 Fibre and/or sclereid cells and parenchyma cells can also be found in the phloem.

see **bast, metaploem, protophloem, vascular bundle**



**phorophyte** Any plant, most often a tree, on which an epiphyte grows.

**phosphorylation** A biochemical process that adds a phosphate group to an organic compound, as the addition of a phosphate group to adenosine diphosphate (ADP) forms adenosine triphosphate (ATP).

see **dephosphorylation**

**photoautotroph, phototroph** An organism that uses sunlight, through photosynthesis, to synthesise its own food from inorganic substances like carbon dioxide and water. Almost all plants are autotrophs.

see **autotroph**

**photoautotrophic, phototrophic** Of or relating to a photoautotroph or phototroph.

see **trophic**

**photophile** Describing a phase in which light affects flowering.

**photophilic, photophilous** Of a plant that seeks or thrives in light.

**photophobe** Describing a phase in which darkness affects flowering.

**photophobic** Of a plant that seeks or thrives in shade or indirect sunlight.

**photosynthesis** The process that converts light energy from the sun into chemical energy. This energy is used to make sugars from carbon dioxide that is absorbed by plants from the atmosphere.

**phototropism** Growth of a plant towards or away from light that is controlled by the flow of auxin to or away from a plant part.

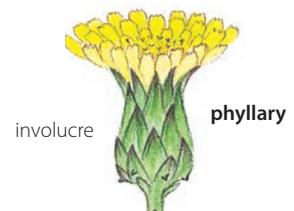
see **tropism**

cf. **heliotropism**

**phototropic** Of or relating to phototropism.

cf. **phototrophic**

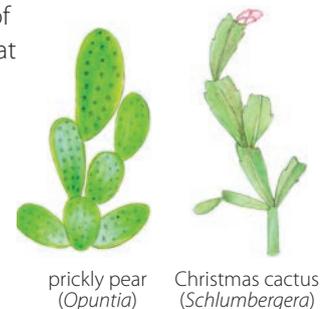
**phyllary** One of the bracts in the involucre that surrounds the capitulum in the daisy family (Asteraceae).



**phylloclade** A type of cladode or phyllode that resembles and/or functions like a leaf, as those in the cactus family. A term with variable definitions

see **cladode**

= **cladophyll**



**phyllode, phyllodium,**

pl. **phyllodia**

A modified petiole that functions as a leaf, as many wattles (*Acacia*).

cf. **cladode**

**phyllodineous**

Relating to or having phyllodes.

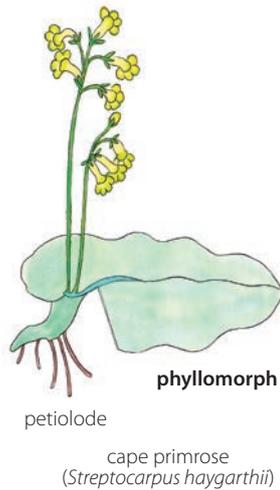


**phyllody** The abnormal development of floral parts into leafy organs.

**phyllome** A plant part that is a leaf or derived from a leaf.

cf. **caulome**

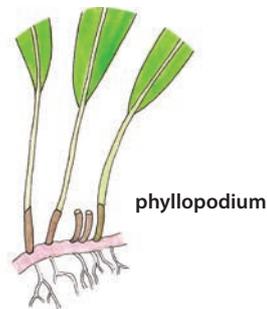
**phyllomorph** A term coined to distinguish the peculiar leaf-like structures of cape primrose (*Streptocarpus*) from true leaves and a cotyledon. It consists of a foliose lamina that is the single enlarged cotyledon with a rooting petiole-like stalk called the petiolode. Species are unifoliate, as cape primrose (*Streptocarpus haygarthii*), or in a rosette of several unifoliate units, as African violet (*Saintpaulia*).



**phyllopodic** Of some sedges in the genus *Carex*, having the base of a flowering stem bearing dead leaves from the previous year's vegetative growth.

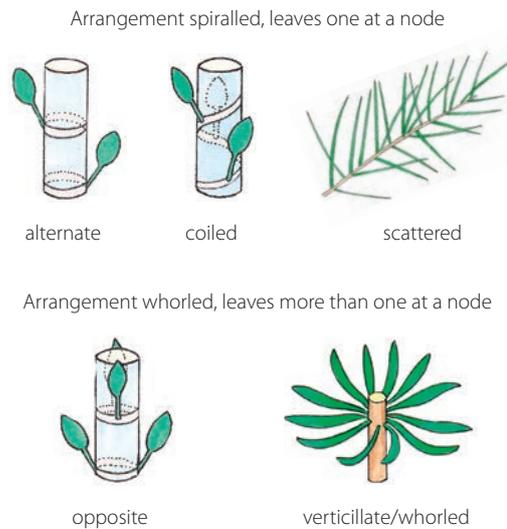


**phyllopodium**,  
*pl. phyllopodia*  
The articulation at the base of the stipe of some ferns, as *Oleandra*. It remains on the rhizome once the frond has fallen off.



**phyllotaxy**  
The order in which leaves, scales or bracts with flowers are arranged on the stem. There are three basic types: spiralled, with one leaf at each node on alternate sides, including alternate, coiled and scattered; opposite, with two leaves arising from each node on opposite sides of the stem; and whorled (verticillate), with at least three leaves at each node.  
*see also* **orthostichy**, **parastichy**

### Phyllotaxy



**PhyloCode** A code for classifying organisms according to ancestry and descent (phylogeny), using clades within clades, rather than a hierarchy of taxonomic ranks (species, genus, family etc.) as set out in the International Code of Nomenclature.

**phylogenesis** The evolutionary history of a species or other taxonomic entity. It is commonly represented as a cladogram (phylogenetic tree).  
= **phylogeny**  
*cf.* **ontogeny**

**phylogenetic, phylogenic** Of or relating to the evolutionary development of organisms.

**phylogenetic hypothesis** In phylogenetics, the principle that when more than one evolutionary tree (cladogram) can be made from available data the simplest tree is chosen as the hypothesis to study.  
= **parsimony**

**phylogenetic nomenclature** A rank-free system of nomenclature consisting of species and clades.

**phylogenetic systematics** The study of organisms and their classification into groups based on their evolutionary descent.

**phylogenetic taxon** The members of a named entity with a common evolutionary history of descent.

The node subtending a clade that may be real or, more often, hypothesised.

A phylogenetic taxon gains or loses characteristics over time.

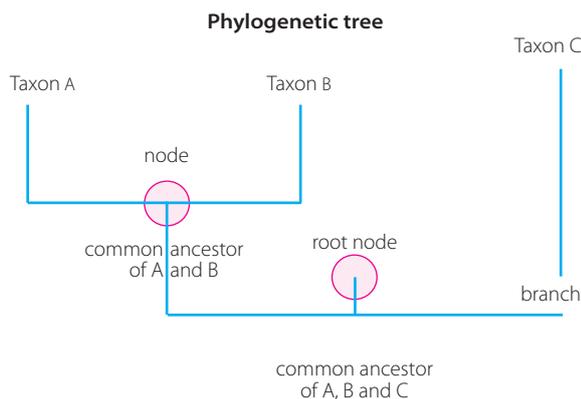
**phylogenetic taxonomy** A system of classification that shows how species may be related by descent from a common hypothetical ancestor.

It groups these species, together with their common ancestor, in a clade.

**phylogenetic tree** A branching diagram or indented list depicting the lines of descent of different species, organisms or genes from a common hypothetical ancestor.

A phylogeny.

see **branch, node, root node**



**phylogenetics** A type of classification that expresses theoretical relationships between plants in terms of their evolutionary history.

DNA sequencing methods are used to study these relationships between organisms.

see **phylogeny, systematics, taxonomy**

**phylogeny** The evolutionary history of a species or other taxonomic entity.

It is commonly represented as a cladogram (phylogenetic tree).

= **phylogenesis**

cf. **ontogeny**

**phylum** A taxonomic classification between kingdom and class.

Formerly applied correctly only to the animal kingdom.

The name of a division or class in the plant kingdom ends in *-phyta*.

= **division**

see **taxonomic hierarchy**

**physiology** The study of the vital processes that take place in a plant, as metabolism, growth and development, reproduction and responses to the environment.

**physiological** Of or relating to physiology.

**-phyte** A suffix meaning relating to plants.

**phyte-** A prefix meaning relating to plants.

**phytochrome** A blue-green pigment in plants that can only be seen when it is purified.

It regulates plant development, including seed germination, stem growth, leaf expansion and pigment synthesis.

**phytohormone** A compound produced in small quantities that is a plant growth and development regulator. Includes: abscisic acid, auxins, cytokinins, ethylene and gibberellins.

**phytomelan, phytomelanin** A black, inert organic material that forms a crust-like covering on some seeds, as hippeastrum (*Hippeastrum*) and the cypselas of some daisies (*Asteraceae*), as sunflowers (*Helianthus*).

**phytomer, phytomere**

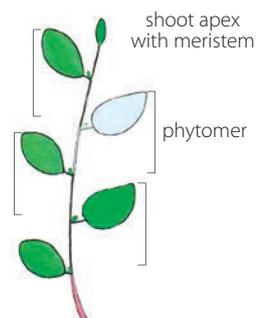
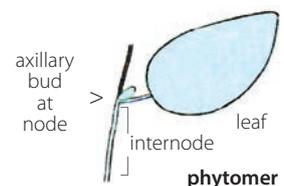
The basic structural unit of a plant that is repeated.

It derives from the meristem of a root or shoot apex.

Of stem shoots, it comprises a node with its leaf or leaves, its axillary bud(s) and the subtending internode.

Phytomers also occur on lateral growth.

= **metamer**



stem shoot with phytomers

**phytomorphology** The study of the external form or structure of a plant or plant part that compares features and observes patterns of development.

**phytomorphological** Of or relating to phytomorphology.

**phytophage** An animal that eats only plants.

**phytophagous** Feeding on plants as many animals; includes leaf chewing, sap sucking, seed predation and gall induction by insects.

= **herbivorous**

**phytotomy** The study of the anatomy of plant tissues and organs.

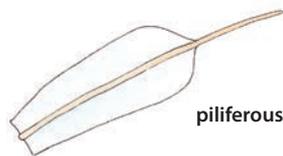
**phytotoxic** Of or relating to phytotomy.

**pigment** A substance produced by plants that absorbs specific wavelengths of sunlight and reflects it back as colour.

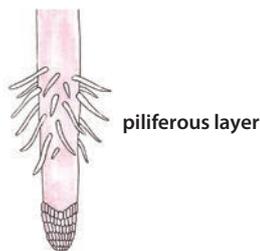
Main plant pigment groups are chlorophylls, carotenoids, flavonoids and betalains.

**pileus, pl. pilei** The apex of the angular drupe of pandanus (*Pandanus*).  
The cap of a mushroom or toadstool.

**piliferous** Tipped with a single slender bristle or hair, as the leaves of some mosses.  
Bearing hairs.

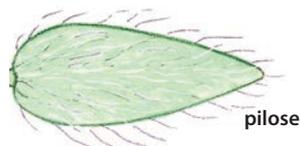


**piliferous layer** The region near the root tip that is covered with the root hairs responsible for water uptake, particularly in young plants.



**piliform** Resembling a hair, hair-like.

**pilose** Hairy. Covered with soft slender hairs, as some leaves  
*cf. villous*



**pilosulose** Finely pilose.

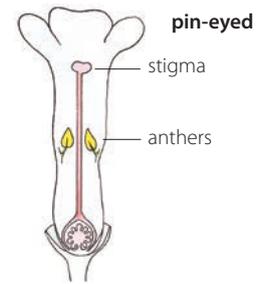
**pilosulous** Slightly pilose.

**pin, pin-eyed**

Presentation of the stigma above the level of the anthers so that floral visitors contact the stigma first, as the cowslip (*Primula vulgaris*).

*see herkogamy*

*cf. thrum*



**pinna pl. pinnae** A leaflet of a pinnate leaf.  
*cf. pinnule*

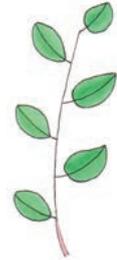
**Pinna**



opposite



sessile or petiolulate



alternate

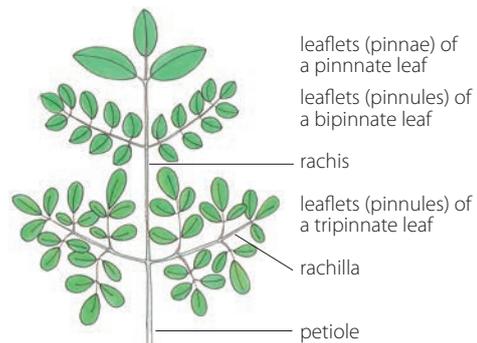
**pinnate** Resembling a feather.

One of two ways in which a leaf is divided into leaflets (a compound leaf), the other being palmate. The leaflets (pinnae) arranged on either side of a common rachis.

Leaflets may be opposite or alternate, sessile or with a petiolule.

*see also pinnately unifoliolate*

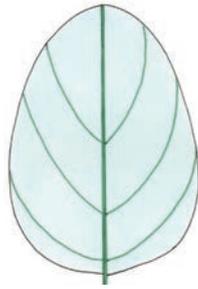
**Pinnate**



**pinnate venation, pinnately veined**

Leaf venation with the secondary veins starting from a point on the midrib and running more or less parallel to each other towards the margin.

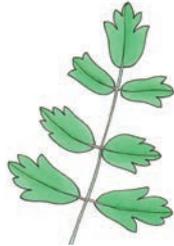
= **penniveined**  
cf. **basinerved, palmate venation, parallel venation**



pinnate venation

**pinnate-pinnatifid**

Of a pinnate leaf with leaflets pinnately lobed.



pinnate-pinnatifid

**pinnately decompose**

Of a pinnate leaf divided more than three times or irregularly divided many times, as fennel (*Foeniculum vulgare*).  
see **decompound**



pinnately decompose

**pinnately lobed**

Having lobes that are rounded and with the divisions not more than half way to the midrib, as some pinnate leaves.

= **pinnatilobate, pinnatilobed**

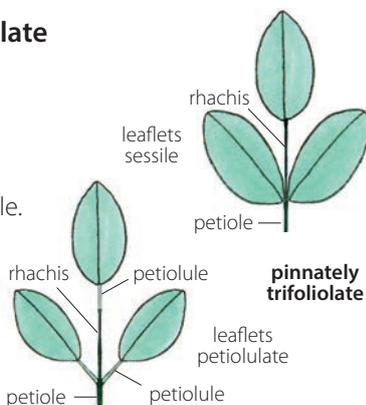


pinnately lobed

**pinnately trifoliolate**

Of a pinnately compound leaf with three leaflets. Leaflets can be petiolulate or sessile.

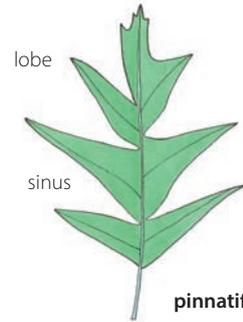
see also **ternate**  
cf. **palmately trifoliolate**



pinnately trifoliolate

**pinnatifid** Of a pinnately lobed leaf, split almost to the midrib, by sharp sinuses, into pointed rather than rounded lobes.

see also **pinnatipartite, pinnatisect**  
cf. **bipinnatisect, tripinnatisect**



pinnatifid

**pinnatilobate, pinnatilobed**

Having lobes that are rounded and with the divisions not more than half way to the midrib, as some pinnate leaves.

= **pinnately lobed**



pinnatilobate

**pinnatipartite**

Of a pinnately lobed leaf with the incisions extending about three-quarters of the way towards the midrib.

see also **pinnatifid, pinnatisect**



pinnatipartite

**pinnatisect**

Of a pinnately lobed leaf with the incisions extending almost, but not quite, to the midrib.

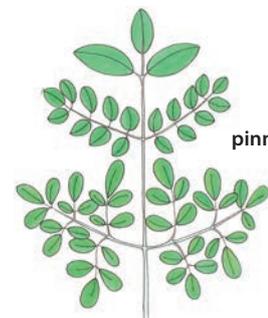
see also **pinnatifid, pinnatipartite**  
cf. **bipinnatisect, tripinnatisect**



pinnatisect

**pinnule** A leaflet that is one of the divisions of a bipinnate or tripinnate compound leaf.

see also **bipinnate, pinnately decompose, tripinnate**  
cf. **pinna**

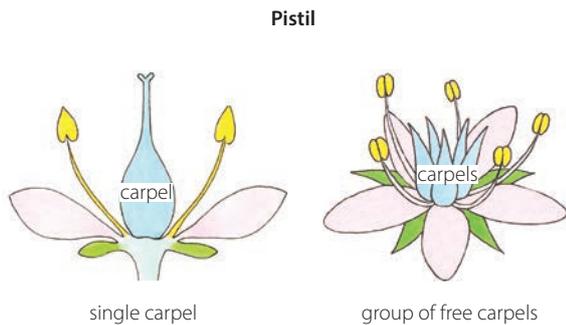


pinnule

**pioneer species** Hardy species that are the first to colonise degraded ecosystems and disturbed areas, such as construction sites or bush that has been burnt.

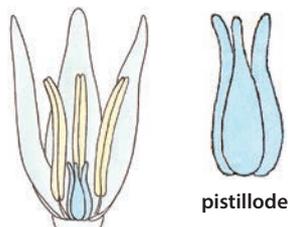
see also **colonisation, coloniser**

**pistil** The female reproductive organ of a flower (gynoecium).  
A single carpel or group of free or fused carpels.  
see also **compound gynoecium, simple gynoecium**



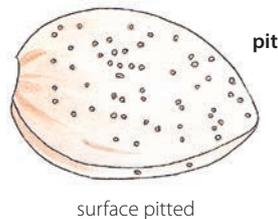
**pistillate** Of a unisexual female flower having a carpel or carpels and no functional stamens.  
cf. **staminate**

**pistillode** A sterile or rudimentary pistil, often present in male flowers, as coconut (*Cocos nucifera*).  
cf. **staminode**

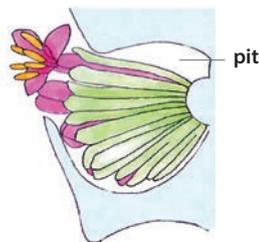


**pit** A small depression. A hollow or an indentation on a surface.

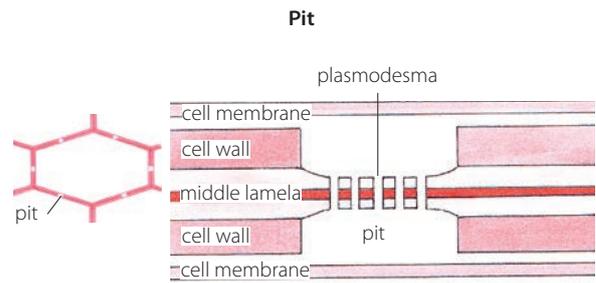
**pitted** With small pits on the surface, as the nut of an almond (*Prunus dulcis*).



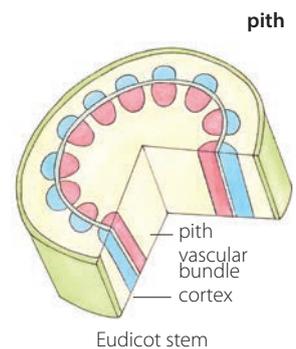
**pit** Of palms (Arecaceae), a cavity in the receptacle that bears flowers.



**pit** A cavity in a cell wall with channels (plasmodesmata) that connect adjacent cells.

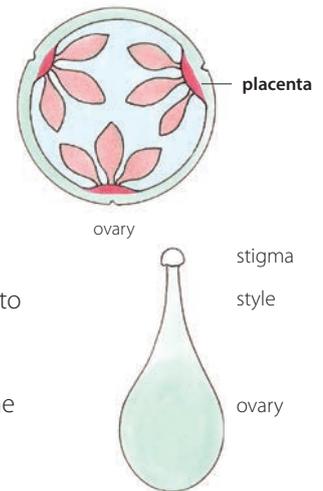


**pith** A core of spongy ground tissue in the centre of the stems of most flowering plants, gymnosperms and ferns. It functions primarily as storage. Also the tissue inside the rind of some fruits, as oranges and lemons.  
= **medulla**

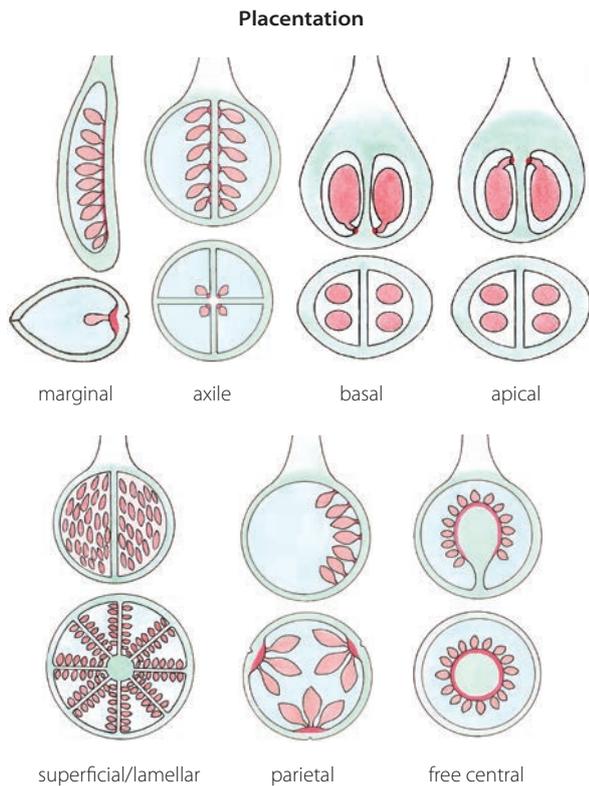


**placenta, placentae**

Mostly undifferentiated tissue, in the ovary of a flower, on which the ovules are borne. A vascular bundle that provides nutrition extends through the placenta and connects to the ovules. The ovules may be sessile or attached to the placenta by a stalk-like funicle.



**placentation** The arrangement of the ovules on the placenta in the ovary of a flower. There are several types of placentation, including axile, apical, basal, free central, lamellar, marginal and superficial.



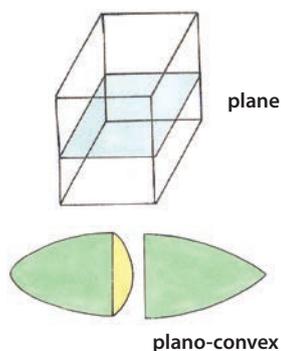
**plagiogeotropism** The tendency of a plant part to grow at an oblique angle to the direction of the orienting growth stimulus, as lateral branches that grow at an oblique angle to the stimulus of gravity. *see diatropism, plagiotropism, tropism*

**plagiogeotropic** Of or relating to plagiogeotropism.

**plagiotropism** The tendency of a plant part to grow at an oblique angle or perpendicular to the direction of the orienting growth stimulus, as lateral branches and roots that grow at an oblique angle or perpendicular to the stimulus of gravity. *see diatropism, plagiogeotropism, tropism*

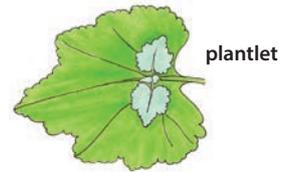
**plagiotropic** Of or relating to plagiotropism.

**plane** A real or imaginary flat surface. *see also equatorial plane*  
*cf. axis*

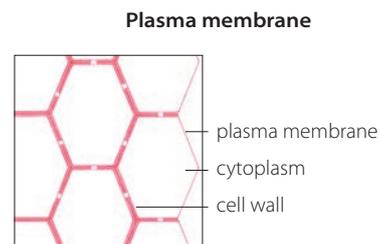


**plano-convex** Flat on one side and convex on the other.

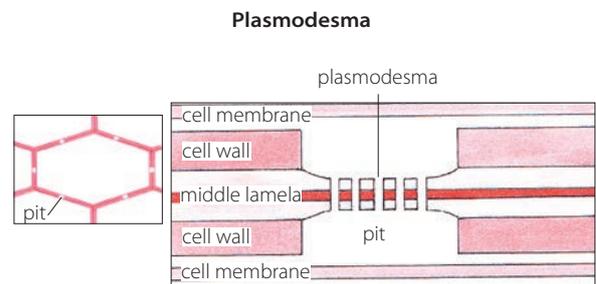
**plantlet** A small plant, as that growing on a leaf of the piggyback plant (*Tolmiea menziesii*) and on the fronds of some ferns.



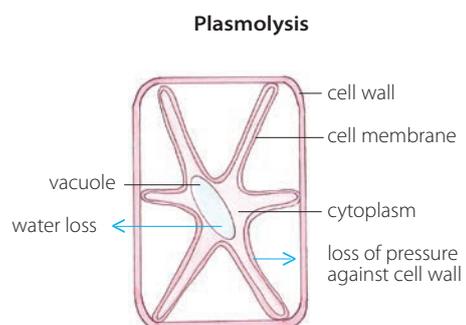
**plasma membrane** A thin semipermeable layer of tissue enclosing the cytoplasm of a cell and, in plants, surrounded by the cell wall. It allows movement of some substances into and out of the cytoplasm.  
= **cell membrane, cytoplasmic membrane**



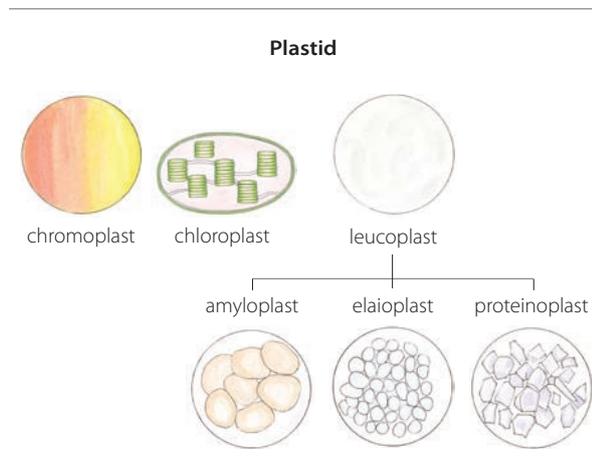
**plasmodesma, pl. plasmodesmata** A minute connecting channel in the pits of adjacent cell walls. exchange of molecules between cells takes place here.



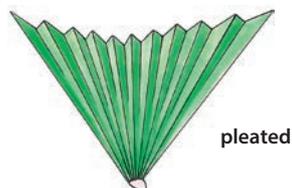
**plasmolysis** Shrinkage of the cytoplasm away from the cell wall due to loss of water through osmosis.  
*cf. flaccidity, turgor*



**plastid** An organelle found in the cytoplasm of a plant cell.  
The different types of plastid have specific functions in the cell.



**pleated** Folded back and forth longitudinally, as some leaves.  
= **plicate**



**pleiochasium**

A compound cymose inflorescence, in which the main axis has more than two lateral branches.

= **polychasium**

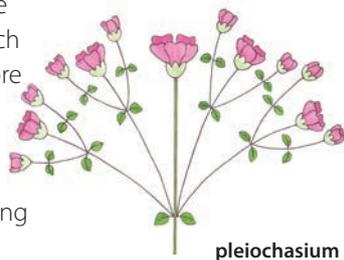
**pleiochasial** Relating to a pleiochasium.

see also **multiparous**

**cyme**

cf. **monochasium**,

**dichasium**



**pleiometry** A whorl of a flower that has a greater number of members than the other whorls, as the whorl of many stamens in guinea flower (*Hibbertia*) that has five petals, five sepals and two or three carpels.

cf. **oligometry**

**pleiomerous** Of or relating to pleiometry.



**pleiometry**



**pleiomorphic, pleomorphic** Able to change shape or form.

cf. **amorphic**

**pleiotropy** The phenomenon of a single gene affecting multiple traits.

see also **genotype**, **phenotype**

**pleonanthic** Of a plant or stem that flowers and bears fruit more than once in its lifetime.

Most commonly used to describe palms, as bamboos.

Of palms that have unlimited vegetative growth with flowering shoots produced on axillary branches year after year.

= **iteroparous**, **polycarpic**

cf. **hapaxanthic**, **monocarpic**, **semelparous**

**plesiomorph, plesiomorphy** In cladistics, an ancestral or primitive character.

cf. **apomorph**, **apomorphy**

**plesiomorphic** In cladistics, ancestral or primitive.

**pleurotropic** Of ovule orientation, with the micropyle lateral, as hemianatropous.

cf. **epitropous**, **hypotropous**

**plicate**

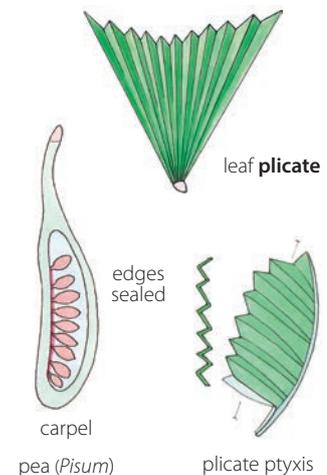
Folded back and forth longitudinally, as some leaves.

= **pleated**

Of carpels, folded with edges sealed together, as peas (*Pisum*).

**plicate ptyxis**

Of a single leaf in bud, folded like a fan.



**plietesial** Of plants within a species that flower at the same time, often after an interval of years and over a wide area, then set seed and die.

see **semelparous**

see also **masting**

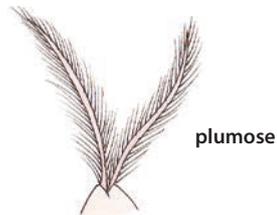
cf. **gregarious flowering**

**ploidy** The number of sets of chromosomes in a cell. Each set is designated by *n*.

The chromosomes in a set may be haploid (*n*) (occurring singly) as in gametes, or in somatic cells diploid (*2n*) (occurring in pairs), triploid (*3n*) (occurring in threes), tetraploid (*4n*) (occurring in fours) and so on.

see **chromosome set**

**plumose** Like a feather, with fine hairs branching from a central axis, as the stigmas of many grasses (Poaceae).

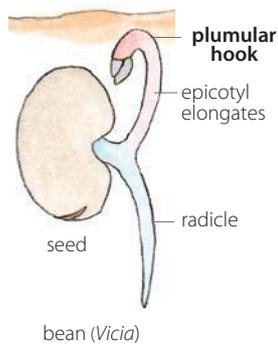


**plumular hook**

The hook-like curve of the epicotyl found in seedlings that germinate buried in the soil. It protects the shoot from damage as the seedling is pushing upwards towards light.

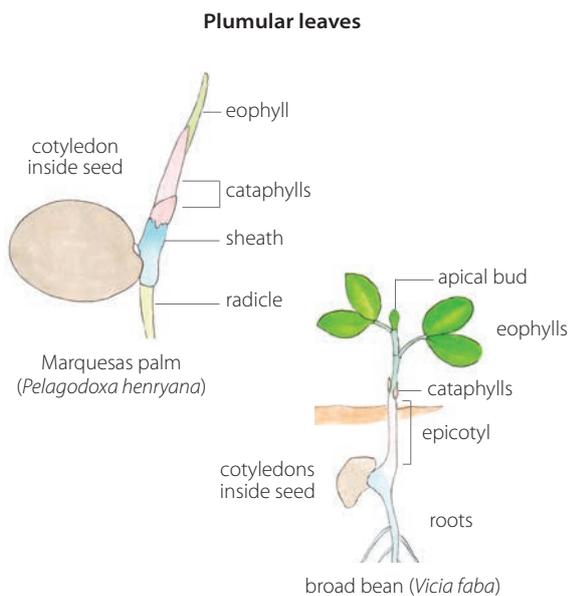
= **apical hook**

see **hypogeal germination**



**plumular leaves** The first seedling leaves, as cataphylls and eophylls.

They are transitional leaves produced in succession to the cotyledons and are usually simpler in shape and smaller in size than the true adult leaves.



**plumule** Of a seed embryo, the primordial shoot system initiated by the shoot apical meristem at the tip of the epicotyl.

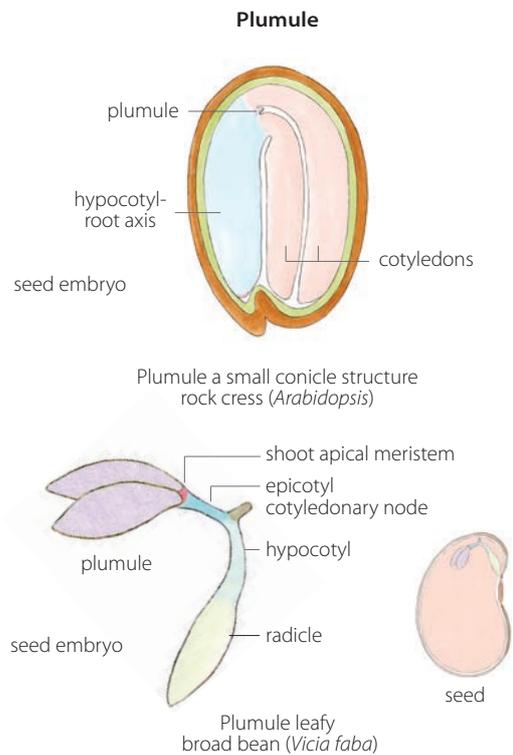
Usually a small conical structure but sometimes leafy, as broad bean (*Vicia faba*).

cf. **radicle**

see **embryo axis**

see also **hypogeal germination**

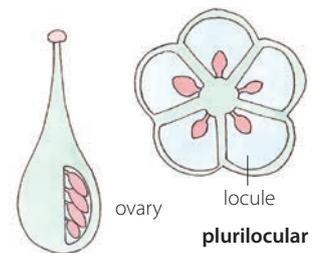
**plumular** Relating to a plumule.



**pluri-** A prefix meaning several.

**plurilocular**

Of an ovary, anther or fruit, having several or many locules or cavities for ovules, pollen or seeds.



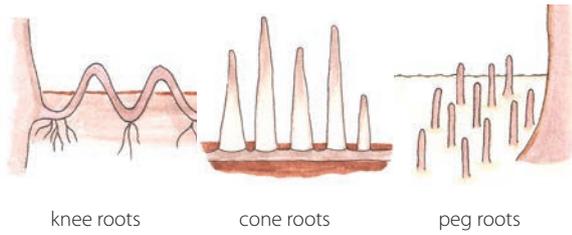
**pneumatophore** A usually vertical aerial root, specialised for gas exchange with the atmosphere, found in plants that grow in oxygen-poor soil in waterlogged conditions.

Examples of pneumatophores in mangroves are knee roots, cone roots and peg roots.

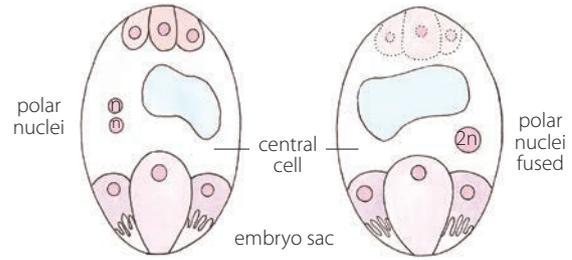
**pneumatophore** page 230 (cont.)

see **lenticel**

### Pneumatophore

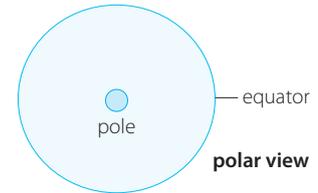


### Polar nucleus

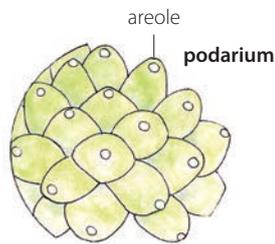


**pod** A general term for a legume or dry legume-like fruit, as that of the vanilla orchid. It has one or more seeds and dehisces when mature. Derived from a one-carpelled ovary.

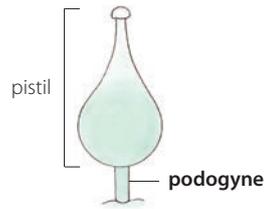
**polar view** An object as it appears when the pole is in the line of sight. *cf.* **equatorial view**



**podarium** Of some succulents, the modified photosynthetic leaf base that is a nipple-like projection with an areole at the tip, as the cactus genus *Mammillaria*.

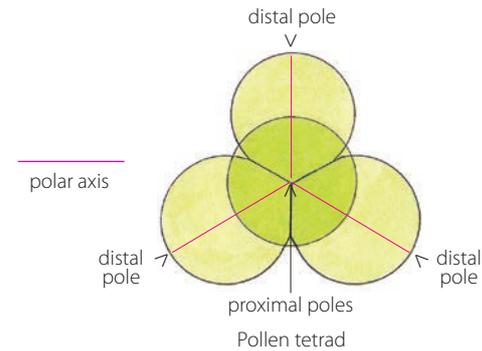


**podogyne** A small stalk (stipe) that is a prolongation of the base of the pistil, as the aquatic genus *Ruppia*. *cf.* **gynophore**



**polarity** Having two distinct poles. The orientation of a pollen grain in a tetrad. *see also* **distal pole, polar axis, proximal pole** *cf.* **apolar, heteropolar, isopolar**

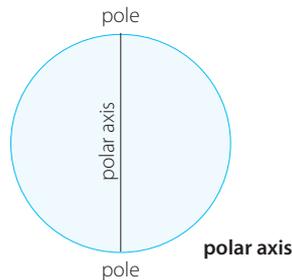
### Polarity



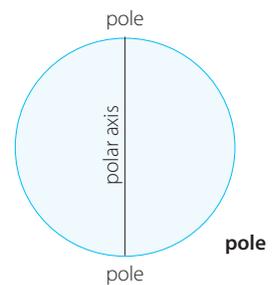
**polar** A biome, usually covered by ice most of the year, that includes the Arctic and Antarctic regions around the North and South poles. *see* **biome**

**pole** Either extremity of an axis through a sphere. *cf.* **equator**

**polar axis** An imaginary line connecting two poles, as the line that connects the proximal and distal poles of a pollen grain. *cf.* **equatorial plane**



**polar** Relating to a pole. Of pollen grains with a distinctly recognisable polarity. *cf.* **apolar**

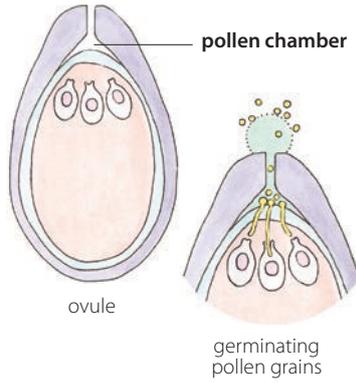


**polar nucleus** Either of two female haploid nuclei in the central cell of the embryo sac. These fuse before fertilisation, then, at fertilisation, combine with one of the two male sperm cell. The central cell then has a triploid nucleus and will divide to form the endosperm of the seed. *see* **double fertilisation**

**pollen** Of seed plants, minute grains, commonly yellow in colour, produced in a pollen sac and shed from the anther of a flower or from the exposed pollen sacs of gymnosperms. Pollen is the result of two stages: microsporogenesis followed by microgametogenesis. *see* **pollen dispersal, pollen grain**

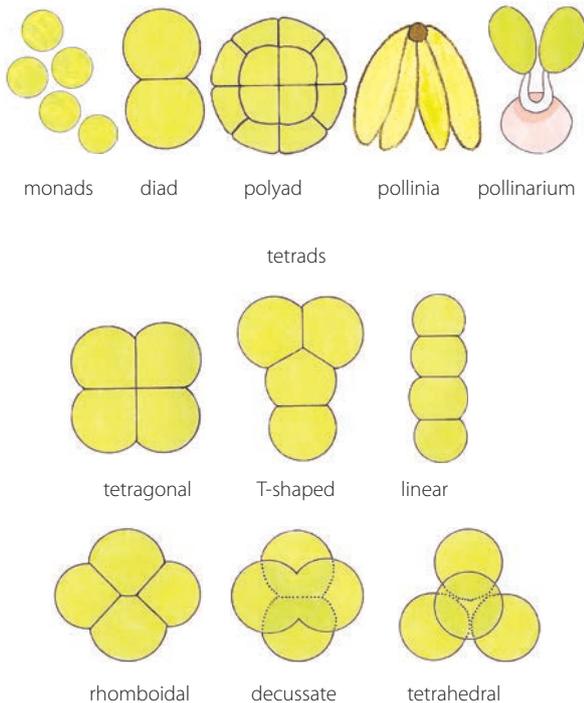
**pollen chamber**

Of gymnosperms, a small space in the ovule, near the micropyle, for collecting pollen. Pollen grains germinate here.  
*see also* **pollen tube, pollination drop, siphonogamy**



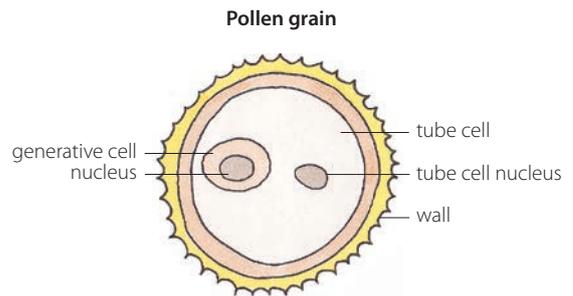
**pollen dispersal** In gymnosperms pollen is dispersed by wind (anemophily) and in angiosperms pollen it is commonly dispersed by wind (anemophily), insects (entomophily), water (hydrophily) or animals (zoophily). Dispersal units can be solitary pollen grains (monads), grains aggregated into diads, tetrads or polyads, or a massula, pollinium or pollinarium.  
*see* **multiplanar, uniplanar**

**Pollen dispersal units**

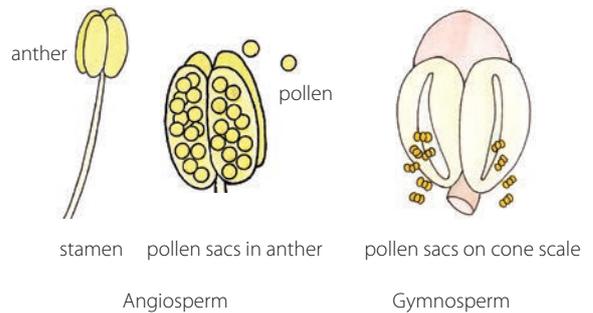


**pollen grain** In seed plants, a male gametophyte, the male gamete-bearing entity produced from a microspore. In angiosperms pollen grains develop in the pollen sacs in the anthers. Each grain has two cells, a reproductive generative cell from which the two male gametes (sperm cells) develop and a vegetative cell, the tube cell.

In gymnosperms, the pollen grains develop in the pollen sacs, typically exposed on the lower surface of scales on the male cone. The generative cell produces two gametes (sperm cells) but only one survives. Grains may be solitary or cohere in units of two (diads), four (tetrads), eight or sixteen and so on, for dispersal.  
 = **microgametophyte**  
*see also* **massula, ornamentation, pollen dispersal, pollen wall, pollinium, polyad**  
*cf.* **megagametophyte**



**Angiosperm pollen grain**

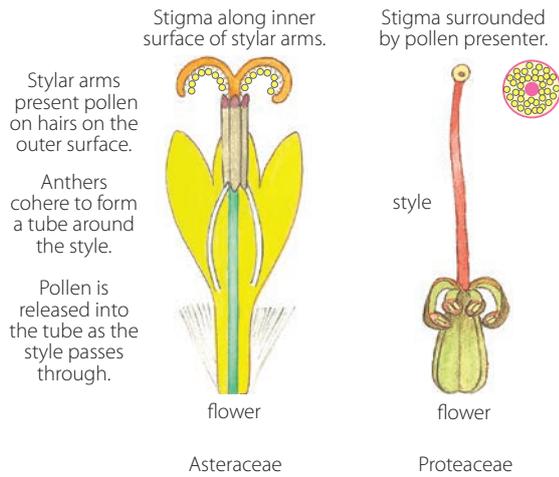


**pollen kit, pollenkitt** A sticky material commonly found coating a pollen grain.  
*see* **tryphine**

**pollen presenter** A floral structure other than an anther that presents pollen for cross-fertilisation. It is a strategy to prevent self-pollination. Anthers release their pollen before the stigma is receptive. The style emerges and pollen is presented on hairs on the style and stilar arms in Asteraceae. Pollen is presented on the expanded area around the small stigma in Proteaceae. In flowering plants, an indusium is a pollen presenter.

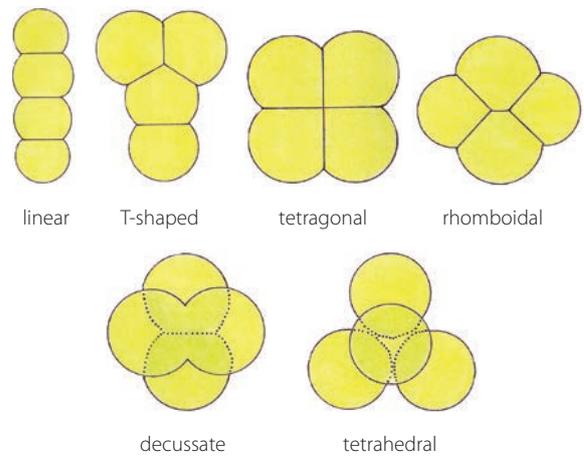
**pollen presenter** page 232 (cont.)

**Pollen presenter**



**pollen tetrad** Four cohering pollen grains.  
see **pollen dispersal**

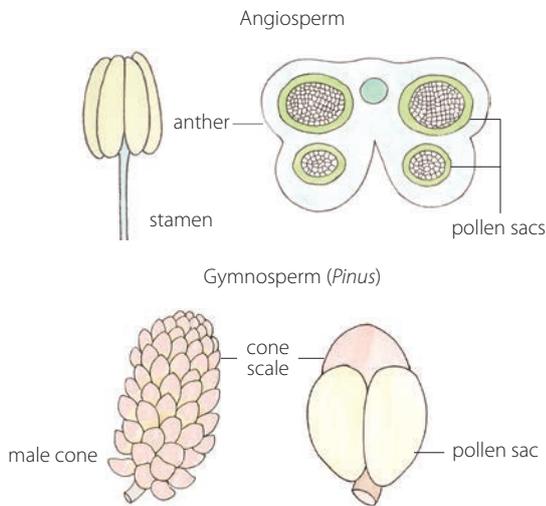
**Pollen tetrad**



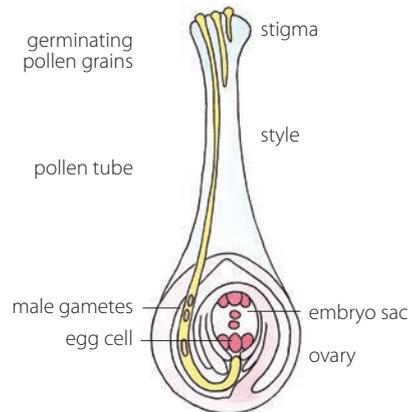
**pollen sac** The chamber (locule) in an anther of a flowering plant (angiosperm) in which pollen is produced. In gymnosperms, the structure on the lower surface of a scale on the male cone in which pollen is produced.  
= **microsporangium**  
see **anther sac**

**pollen tube** In the course of germination of a pollen grain, the structure that will transport the non-motile male gametes through the style to the egg cell in the embryo sac of flowering plants. It develops from the wall of the pollen grain.  
see also **double fertilisation, siphonogamy**

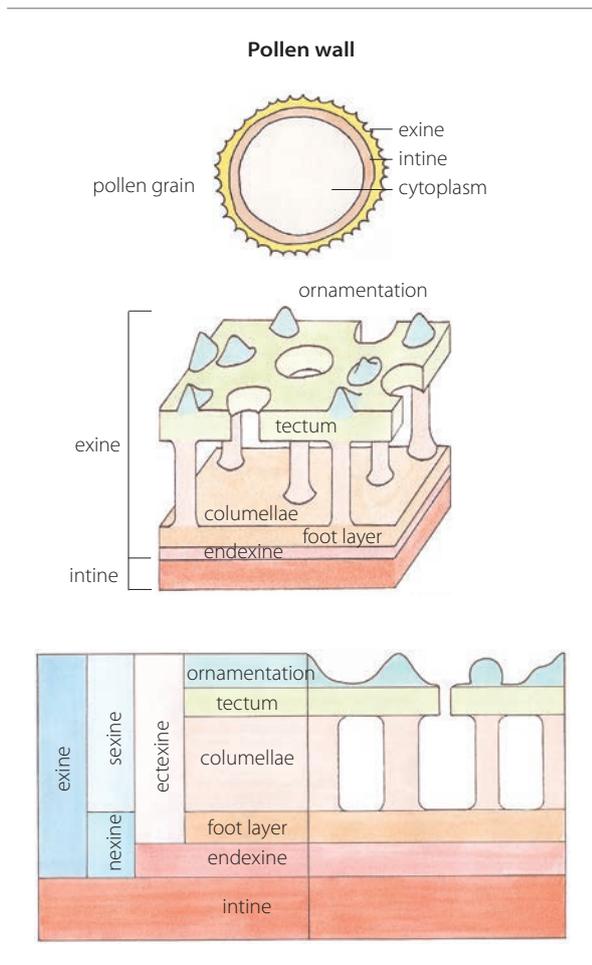
**Pollen sac**



**Pollen tube**

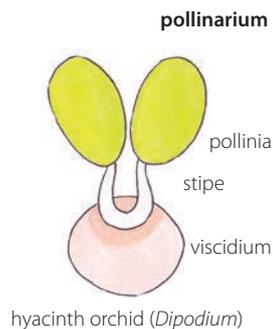


**pollen wall** The layers enclosing the cytoplasm of a pollen grain.  
It is almost always composed of two major layers: the outer exine and the inner intine.  
see also **sporoderm**



**polleniser** A plant that provides fertile pollen.  
*cf.* **pollinator**  
**pollenise** To provide pollen for pollination.  
*cf.* **pollinate**

**pollinarium**,  
*pl.* **pollinaria**  
 The pollen dispersal unit of orchids (Orchidaceae) and milkweeds (Asclepiadaceae) that includes the pollinia, and its accessories like the stipe, caudicle and viscidium.  
*cf.* **pollinium**

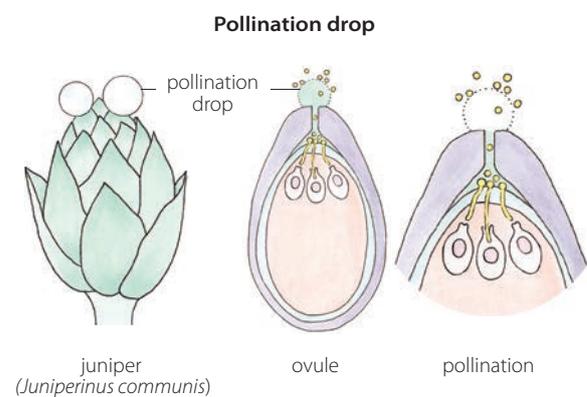


**pollination** Of angiosperms, the transfer of pollen from the anther of a flower to the stigma of the same flower, or to the stigma of another flower, usually of the same species, commonly by animals, insects and wind.  
*see* **abiotic, biotic, pollinator**

Of gymnosperms, the transfer of pollen from a male cone to the ovules on a female cone belonging to the same species, commonly by wind. Pollen grains are often winged to assist wind dispersal.

*see* **pollination drop, sporophyll**  
*cf.* **fertilisation**  
**pollinate** To bring about pollination.  
*cf.* **pollenise**

**pollination drop** Of many gymnosperms, a drop of sugary fluid, exuded at the tip of each ovule, that traps pollen then retracts, transporting the pollen to the pollen chamber near the egg.  
*see* **siphonogamy**



**pollination syndrome** A system of pollen transfer.  
 It may be abiotic (as wind and water) or biotic (as birds, mammals and insects).  
*cf.* **pollinator syndrome**

**pollinator** The agent that moves pollen from the anther of a flower to the stigma of the same flower, or to the stigma of another flower, or from the male cone to the ovules on a female cone, so that fertilisation and seed production can occur.  
 Bees, wasps, wind and water are examples of pollinators.  
*cf.* **polleniser**

**pollinator syndrome** Flower characteristics related to a certain type of pollinator, as form, colour, odour and nectar attract pollinators like birds, bees and flies.  
 Plants that use wind or water as pollinators produce large amounts of pollen.  
*cf.* **pollination syndrome**

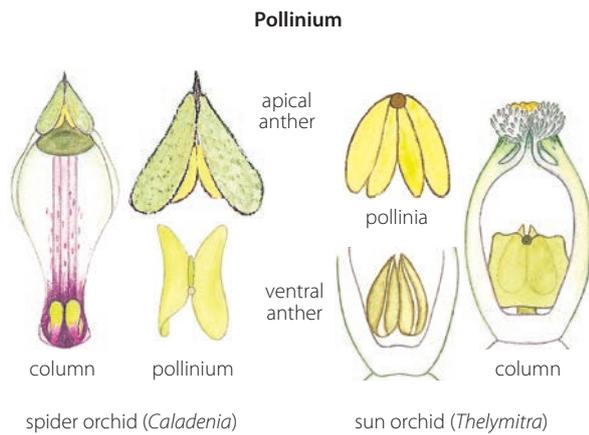
**polliniferous** Producing or bearing pollen.

**pollinium, pl. pollinia** Of plants with one anther, as orchids (Orchidaceae) and milkweeds (Asclepiadaceae), a cohering mass of pollen grains produced in the anther and transferred as a unit during pollination.

The pollen mass may be soft, hard or mealy.

see also **massula, sectile**

cf. **pollinarium**



**polycarp** A plant that flowers and fruits an indefinite number of times. A perennial.

cf. **monocarp, monocarpy**

**polycarpic** Of or relating to a polycarp.

= **iteroparous, pleoanthic**

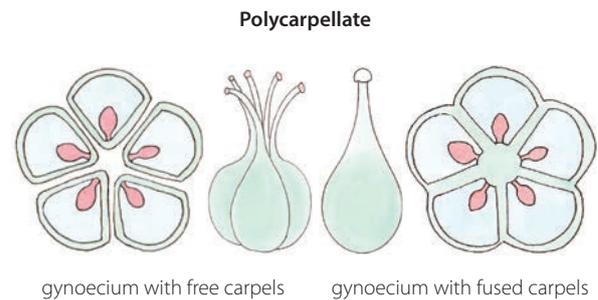
cf. **hapaxanthic, monocarpic, semelparous**

**polycarpellary, polycarpellate, polycarpous**

Of a flower having a gynoecium with more than one carpel, the carpels being either free or variously fused.

= **multicarpellate, polygynous**

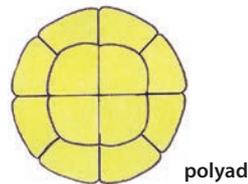
see also **apocarpous, compound pistil, syncarpous**



**poly-** A prefix meaning many.

**polyad** A group consisting of an undefined number. A unit of many cohering pollen grains.

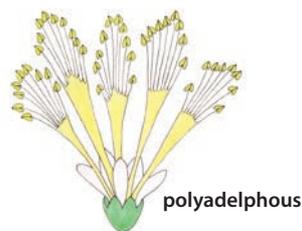
cf. **monad, diad, tetrad, triad**



**polyadelphous**

Of stamens united by their filaments into several bundles, as paperbark (*Melaleuca*).

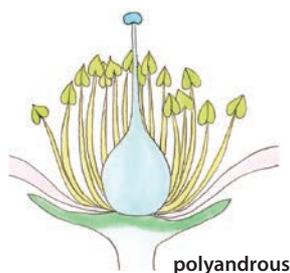
see **adelphous**



**polyandrous** Having many stamens, as the flowers of buttercups (*Ranunculus*).

= **polystemonous**

cf. **diandrous, monandrous, pentandrous, tetrandrous, triandrous**



**polycarpic** Of a plant that reproduces more than once in its lifetime, as perennial plants.

= **iteroparous**

see **pleoanthic**

cf. **hapaxanthic, monocarpic, semelparous**

**polychasium**

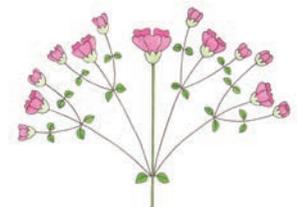
A compound cymose inflorescence. The main axis has more than two lateral branches.

= **pleiochasium**

**polychasial** Relating to a polychasium.

see also **multiparous**

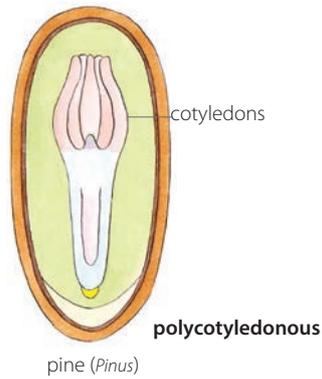
cf. **dichasium, monochasium**



polychasium

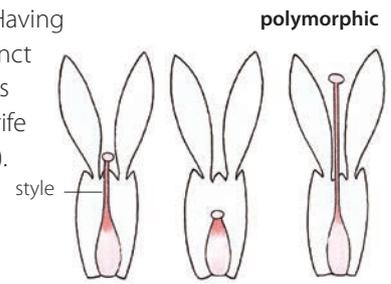
**polycotyledonous**

Of a plant embryo, having more than two cotyledons, as many conifers that belong to the non-flowering seed plants (Gymnosperms).  
Of a plant producing such embryos.  
cf. **dicotyledonous, monocotyledonous**



**polymorphic**

Having two or more distinct forms as the styles of purple loosestrife (*Lythrum salicaria*).  
cf. **dimorphic, monomorphic, trimorphic**



**polyembryony**

The formation of two or more embryos from a single fertilised ovum.  
The presence of two or more embryos in a seed resulting in more than one seedling emerging from a seed.

**polyembryonic** Having more than one embryo.

**polygamodioecious**

Having bisexual and male flowers on some plants and bisexual and female flowers on others.  
see **polygamomonoecious, polygamous**

**polygamomonoecious**

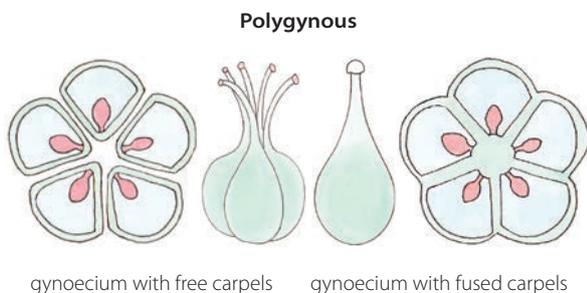
Of a plant with male flowers, female flowers and bisexual flowers.  
see **polygamodioecious, polygamous**

**polygamous**

Of a species with bisexual and unisexual flowers on the same plant.  
see **polygamodioecious, polygamomonoecious**

**polygynous**

Of a flower having a gynoecium with more than one carpel, the carpels being either free or variously fused.  
= **multicarpellate, polycarpellate**  
see also **apocarpous, syncarpous**



**polymorphism**

Multiple forms (alleles) of a single gene existing in an individual or population that give rise to different traits, as species that have genes for distinctly different flower colour or style lengths (heterostyly).

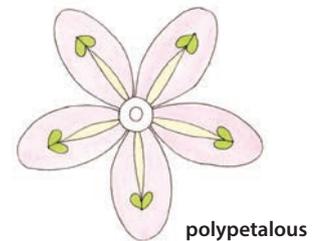
Many polymorphisms are not visible and require genetic techniques to identify them.

**polymorphic** Of or relating to polymorphism.

**polypetalous**

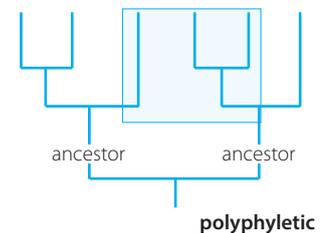
With petals free from each other.

= **apopetalous, choripetalous, dialypetalous**  
cf. **gamopetalous, sympetalous**



**polyphyletic**

Of a group of organisms that does not include a single common ancestor.  
cf. **monophyletic, paraphyletic**



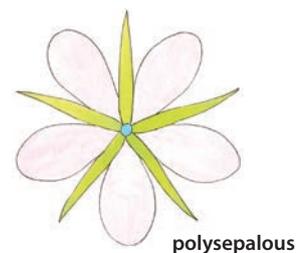
**polyploid, polyploidy**

Having three or more complete sets of chromosomes in each somatic cell.  
The two types of polyploidy are autopolyploidy and allopolyploidy.  
see **ploidy**

**polysepalous**

With sepals free from each other.

= **aposepalous, chorisepalous, dialysepalous**  
cf. **gamosepalous, synsepalous**

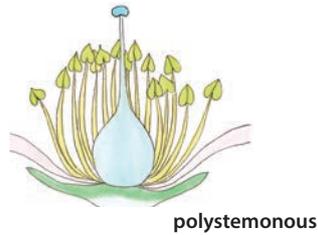


**polymerous**

Having petals, sepals and stamens, in whorls, each with many parts.  
see **-merous**

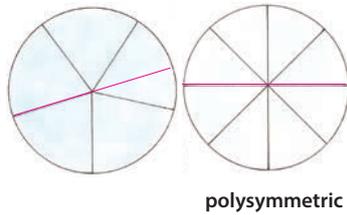
**polystemonous**

Having many stamens, as the flowers of buttercups (*Ranunculus*).  
= **polyandrous**



**polysymmetric, polysymmetrical**

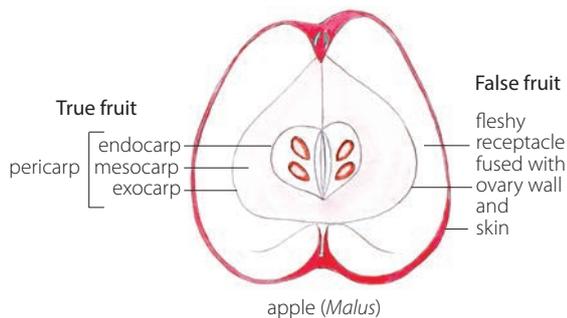
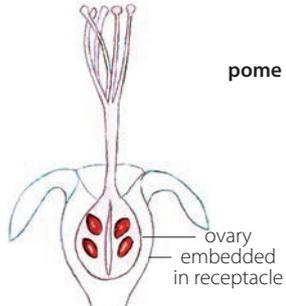
Divisible into like halves on more than one plane.  
cf. **radial symmetry**



**polytelic** Of an inflorescence axis that grows indefinitely, the oldest flower being at the base, as an indeterminate or indefinite inflorescence.  
see **racemose inflorescence**  
cf. **monotelic**

**polytepalous** With tepals free from each other. Of flowers having more petals and/or sepals than usual, as some daylilies with more than six tepals.  
see **apotepalous, choritepalous**  
cf. **gamotepalous**

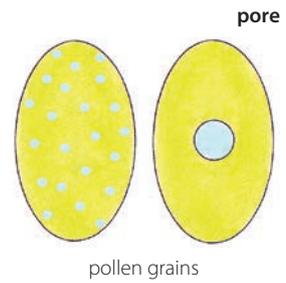
**pome** The fleshy false fruit in which the receptacle enlarges, encloses and adheres to the true fruit. Characteristic of the apple genus (*Malus*) and the pear genus (*Pyrus*).  
see **accessory fruit**



**population** A group of organisms of a particular species living in a given area.  
cf. **biome, community, ecosystem, habitat**

**pore, porus pl. pori**

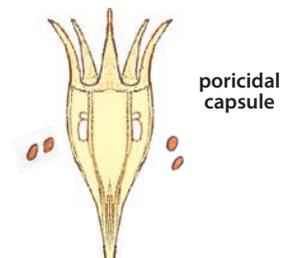
A small, usually rounded opening.  
A small, more or less circular aperture on a pollen grain located at the equator or evenly distributed over its surface.  
see **pantoaperturate**  
cf. **colporus, colpus, sulcus**  
**porate, porose** Having a pore or pores.



**poricidal** Opening by pores, as some capsules.  
see **poricidal capsule**

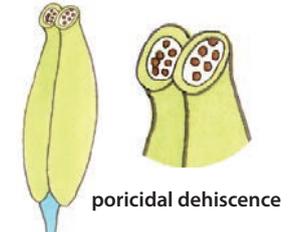
**poricidal capsule**

A capsule that dehisces through pores, as the those on the sides of the capsule of Venus' looking glass (*Triodanis perfoliata*).  
cf. **operculate-poricidal capsule**



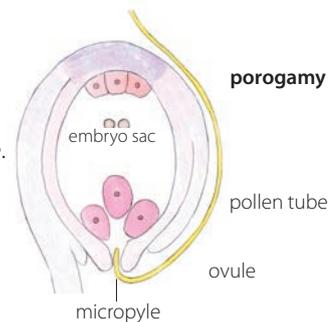
**poricidal dehiscence**

Of anthers, opening by pores to release pollen, as the potato and tomato genus (*Solanum*).  
see also **anther dehiscence**



**porogamy**

Entrance of the pollen tube through the micropyle of the ovule.  
cf. **chalazogamy, mesogamy**

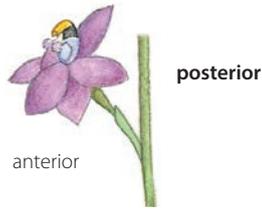


**porrect** Extending forward. Stretched out as the column arms of some sun orchids (*Thelymitra*).



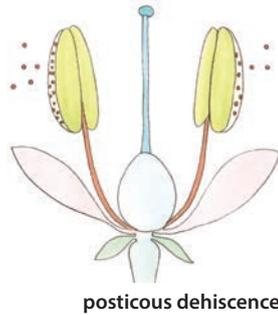
**post-** A prefix meaning after.

**posterior** Nearest the axis. The side of a flower nearest the stem.  
 cf. **anterior**



**posticus** Facing away from the axis.  
 = **extrorse**  
 cf. **introrse, latrorse**

**posticus dehiscence**  
 Of anthers, facing outwards and opening longitudinally to release pollen away from the centre of the flower, as the dayflower family (Commelinaceae).  
 = **extrorse dehiscence**  
 see also **anther dehiscence**

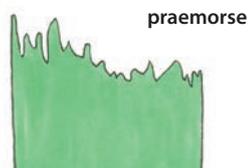


**pouch** A little sac, a bulge.  
**pouched** With small sac-like structures, as on the fronds of pouched coral fern (*Gleichenia dicarpa*).  
 = **saccate**

**Pouyannian mimicry** Evolution of plants to appear like other organisms in order to attract a pollinator, as the labellum of the elbow orchid (*Thynniorchis huntianus*) that mimics the female of the wasp of its pollinator *Arthrothynnus huntianus*.  
 see **pseudocopulation**  
 cf. **Bakerian mimicry, Dodsonian mimicry, Vavilovian mimicry**

**prae-, pre-** A prefix meaning before.

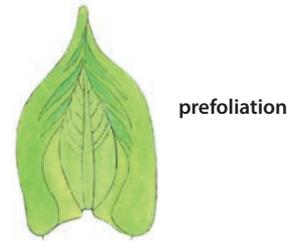
**praemorse, premorse**  
 Appearing as if bitten off at the apex. Ruminant. The same as truncate but with the apex ragged and irregular.



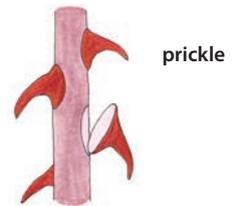
**prairie** Vast stretches of flat temperate grasslands and herbfields in the middle of North America. Equivalent to the steppe of Europe and Siberia.  
 see **biome**

**precocious** Appearing or developing early. Of flowers, appearing before leaves, as on the deciduous peach tree (*Prunus persica*).  
 cf. **coetaneous, serotinous**

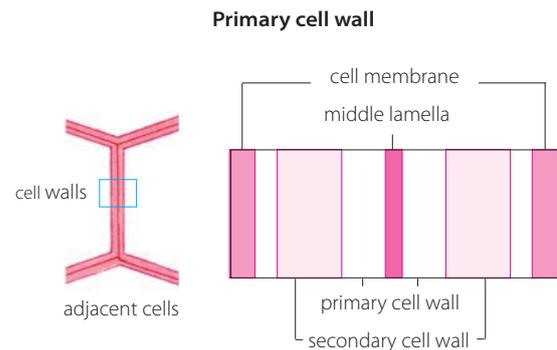
**prefoliation, praefoliation**  
 The arrangement of young leaves in the unopened leaf bud.  
 = **vernation**



**prickle**  
 A sharp outgrowth on a plant derived that is from the epidermis, as on a rose (*Rosa*).  
 cf. **spine, thorn**



**primary cell wall** The first layer of wall laid down next to the cell membrane. Mainly composed of cellulose.  
 see **middle lamella, secondary cell wall**

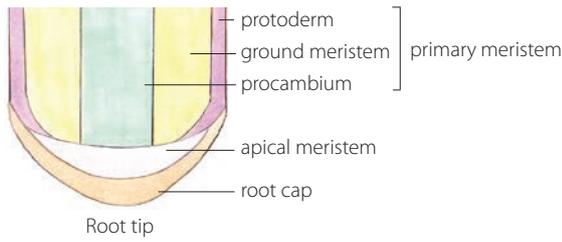


**primary growth** Occurs in the apical meristems located at the tips of roots and above-ground shoots and in buds on stems. It increases the length of the plant. Plants with only primary growth are herbaceous.  
 cf. **secondary growth**

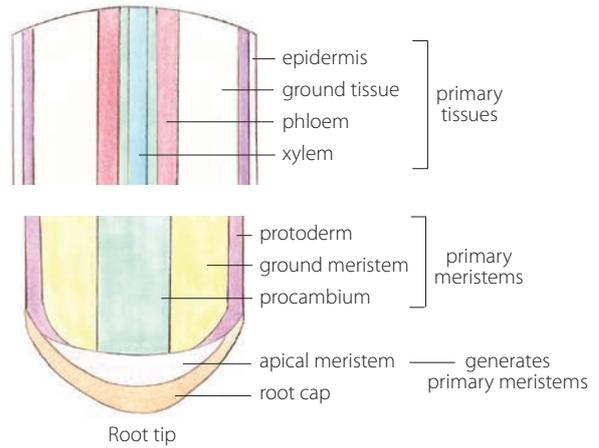
**primary meristem** Any one of three apical meristem tissues: protoderm gives rise to the epidermis; ground meristem gives rise to parenchyma, collenchyma and sclerenchyma; and procambium gives rise to primary xylem and primary phloem and produces two secondary meristems, the cork cambium and the vascular cambium.

**primary meristem** page 238 (cont.)  
 see **primary tissue**  
 cf. **secondary meristem**

**Primary meristem**

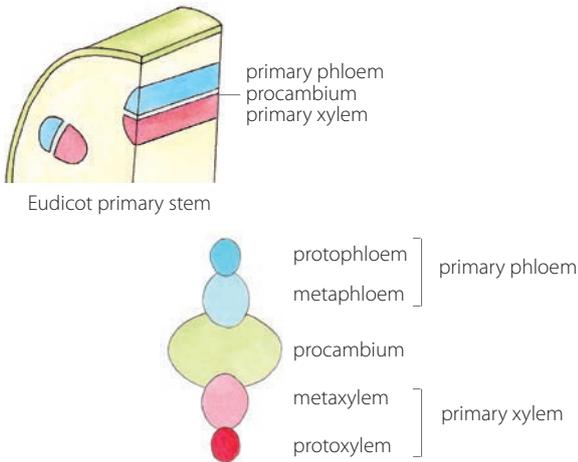


**Primary root tissue**



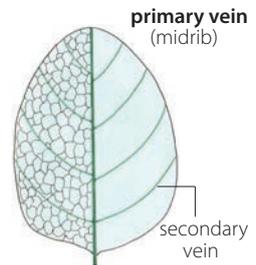
**primary phloem** Phloem tissue that differentiates from procambium in the apical meristem of root and shoot tips during primary growth of a vascular plant. There are two types of primary phloem: protophloem and the later forming metaphloem. Together with primary xylem, it is a major component of vascular bundles that run the length of the plant.  
see **secondary phloem**

**Primary phloem**



**primary vein**

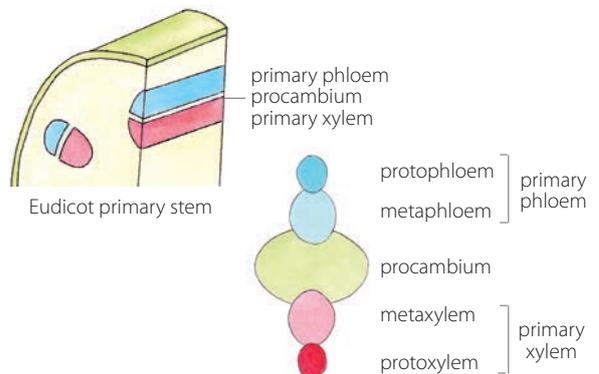
The main vein of a leaf or leaflet, usually running up the centre as a continuation of the petiole or petiolule. = **midrib, midvein**



**primary xylem**

Xylem tissue that differentiates from procambium in the apical meristem of root and shoot tips during primary growth of a vascular plant. Together with primary phloem, it is a major component of vascular bundles that run the length of the plant. There are two types of primary xylem: protoxylem and the later forming metaxylem.  
see **secondary xylem**

**Primary xylem**



**primary tissue** Tissues derived from one of three primary meristems (protoderm, ground meristem or procambium) that generate the three primary plant tissues. Protoderm generates the epidermis. Ground meristem generates the ground tissue. Procambium generates the two primary vascular tissues, phloem and xylem.  
see **apical meristem**  
cf. **secondary tissue**

**primitive character**

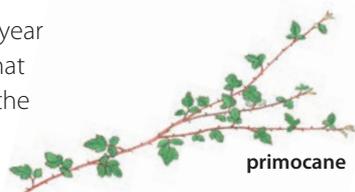
In phylogenetics, of a character belonging to or inherited from an ancestor.

Ancestral or plesiomorphic are preferred terms as primitive may falsely infer inferiority.

cf. **derived character**

**primocane** A first year cane of a bramble that will flower and fruit the next year.

cf. **floricane**



**primordium, pl. primordia** Plant tissue, in its earliest stage of development, at the very beginning of differentiation into a particular cell type.

**priority** In taxonomy, when there is more than one name available for a taxon, the principle of the right of the first name validly published to take precedence, with other names becoming synonyms.

**p.p., pro parte** In nomenclature, denotes that a taxon includes more than one currently recognised entity, and that only one of those entities is being considered.

**pro parte, abbr. p.p.** In nomenclature, denotes that a taxon includes more than one currently recognised entity, and that only one of those entities is being considered.

**procambium** One of three regions of primary meristematic tissue that develops behind the apical meristem of stems and roots. It differentiates into the first vascular tissue (primary xylem and primary phloem).

see **primary meristem**

see also **ground meristem, protoderm**

**procumbent** Trailing loosely along the ground without taking root, as the stems of some goodenias (*Goodenia*).

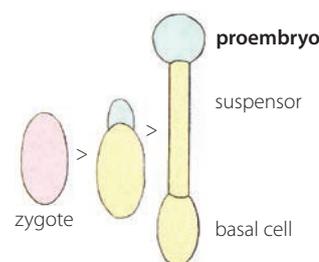
cf. **decumbent,**

**prostrate**



**proembryo** In eudicots, the earliest multicellular stage of the embryo before cells specialise into the tissues of the embryo.

see **embryogenesis**



**progenitor** A direct ancestor of a plant.

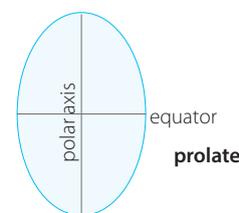
**prokaryote** A unicellular organism that does not have DNA in a well-defined nucleus that is surrounded by a membrane. It lacks organelles due to the absence of internal membranes, as bacteria.

cf. **eukaryote**

**prokaryotic** Of a cell that does not have a clearly defined nucleus and lacks organelles.

**prolate** Of an object with the polar axis longer than the equatorial diameter.

cf. **oblate**



**proliferation** Rapid growth or reproduction of new parts, as roots. Producing buds or offshoots, especially from unusual organs, as bulblets from leaves.

cf. **proliferation**

**proliferate** To increase by proliferation.

**proliferous** Of plants or parts that increase by proliferation.

**proliferation** The production of offspring.

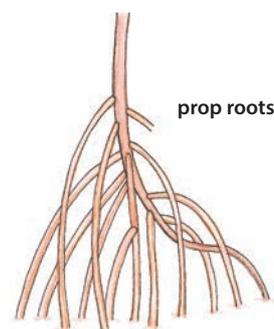
A mutation or disorder of flowers having one or more buds form in an already open bloom, as can occur in roses (*Rosa*).

cf. **proliferation**

**prop roots** Adventitious roots that grow out from the lower trunk of a tree and into the soil to provide support. Found in some mangroves (*Rhizophora*) and the banyan (*Ficus benghalensis*).

= **stilt roots**

cf. **buttress root**



**propagation** The reproduction of plants by any number of natural means, as seeds, offsets and bulbs, or by artificial means, as cuttings, layering and grafting.

see also **micropropagation**

**propagule** A structure capable of producing a new plant.

Seeds, bulbs, suckers and runners are propagules. In non-flowering plants like fungi, ferns and bryophytes, a spore is a propagule.

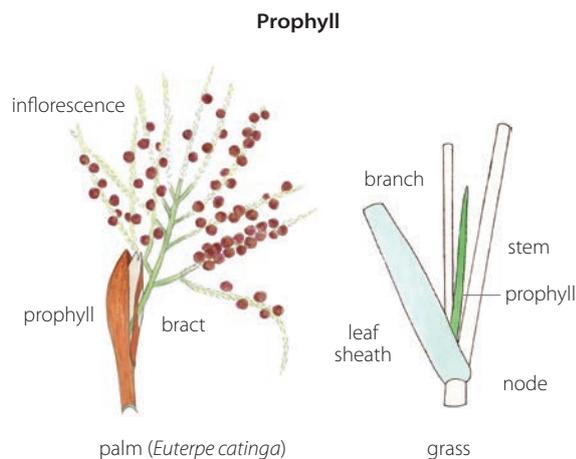
see also **micropropagation**

**prophyll, prophyllum** A modified leaf-like structure.

The modified first leaf (monocotyledons) or two leaves (eudicots), as a bracteole, produced at the first node of a lateral shoot.

Of palms, the usually two-keeled bract that encloses the inflorescence.

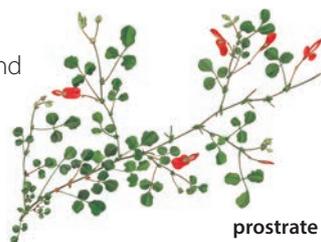
Of grasses, a two-keeled modified leaf, without a blade, attached to the node within the leaf sheath on the adaxial side of a branch.



**proplastid** An undifferentiated plastid that can differentiate into a specific kind of plastid with a particular function in the cell, as chloroplasts that are the site of photosynthesis.

**prostrate** Growing closely along the ground without taking root, as running postman (*Kennedia prostrata*).

cf. **decumbent**,  
**procumbent**



**protandry** The condition of a flower having anthers mature and shed pollen before the stigma becomes receptive.

**protandrous** Of or relating to protandry.

see **dichogamous**, **protogynous**

**protein** Any of a group of complex organic molecules that contain carbon, hydrogen, oxygen and nitrogen.

An essential component of living cells and substances like enzymes and hormones.

**proteinoplast**

A leucoplast that stores proteins in crystalline or amorphous bodies.



**proteinoplast**

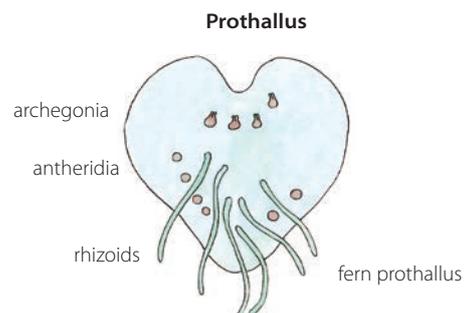
**proteranthous** Having flowers appearing before the leaves.

cf. **hysteranthous**, **synanthous**

**prothallus** The gametophyte phase of ferns, most fern allies and some algae.

In ferns and most fern allies a germinating spore gives rise to a thread-like protonema that develops into a multicellular prothallus. It is usually cordate, photosynthetic and has no vascular system or differentiation into root, stem or leaf-like structures. The lower surface bears archegonia, antheridia and rhizoids.

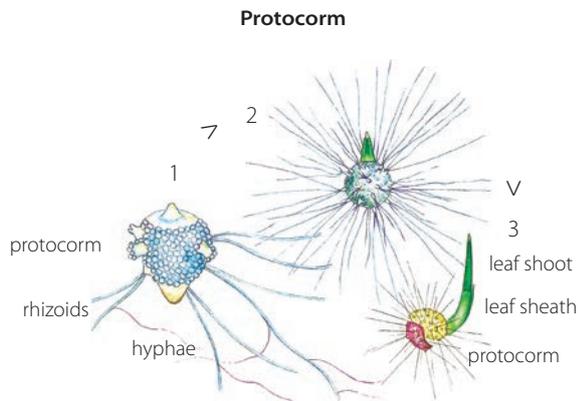
In gymnosperms, as pines (*Pinus*), the megaspore germinates and gives rise to the female gametophyte or prothallus.



**Protista** The taxonomic kingdom that contains organisms that do not fit into any other category. They are a very diverse group that are not plants, animals, bacteria or fungi.

**proto-** A prefix meaning first, earliest form or original.

**protocorm** Of orchids, following fertilisation, the tuber-like body with rhizoids that gives rise to the first leaf and root shoots.



**protoderm** One of three regions of primary meristematic tissue that develops behind the apical meristem.

It differentiates into epidermis.

see **primary meristem**

see also **ground meristem, procambium**

**protogyny** The condition of a flower having the stigma become receptive before pollen is shed from the anthers.

**protogynous** Of or relating to protogyny.

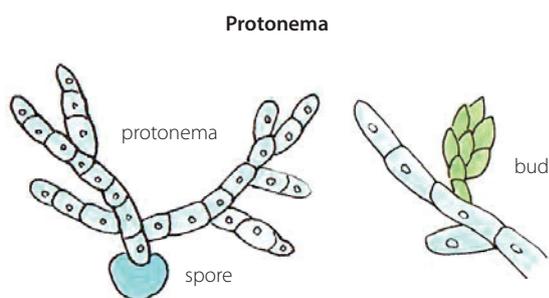
see **dichogamous, protandry**

**protologue** The original description of a taxon including any other elements like illustrations, references, specimens, synonyms etc.

**protonema, pl. protonemata** The thread-like chain of cells produced by a germinating bryophyte, fern or fern ally spore.

Buds on a bryophyte protonema develop into the thalloid or leafy gametophyte.

Gametophyte buds on the protonema of a fern and most fern allies develop into the prothallus.



**protophloem** The first formed phloem tissue that differentiates from procambium in the apical meristem of root and shoot tips during primary growth of a vascular plant.

It is conducting tissue that occurs in regions that are actively elongating and is transient, being replaced by metaphloem that functions indefinitely.

see **primary phloem, protoxylem**

**protoplasm** Everything inside the plasma membrane of a cell, including the nucleus in eukaryotes.

It contains organelles, that carry out metabolic functions, and ergastic substances that are the product of the cell's metabolism.

cf. **protoplast**

**protoplast** A plant cell from which the cell wall has been removed.

see also **cell membrane**

cf. **protoplasm**

**protostele** Stele having a solid core of primary xylem surrounded by a cylinder of phloem. A primitive type of stele.

**protoxylem** Found in primary growth, the conducting tissue formed at the beginning of vascular differentiation.

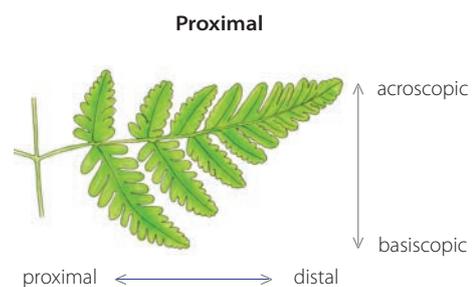
It has mostly thin-walled cells that elongate rapidly and a few tracheids with thickened rings or spirals of lignin.

It differentiates from the procambium and is followed by the formation of metaxylem.

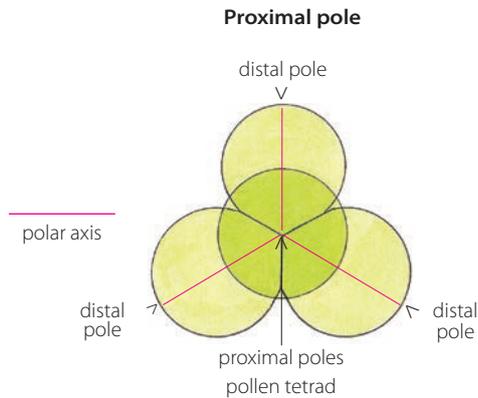
see **primary xylem**

**provisional name** A name proposed in anticipation of the future publication and acceptance of a taxon.

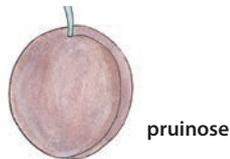
**proximal** Near the attached end as opposed to the free (distal) end.



**proximal pole** Of a pollen grain, that part of the polar axis orientated towards the inside.  
*cf.* **distal pole**



**pruinose** Covered with a usually white powdery or waxy bloom, as that on a prune.

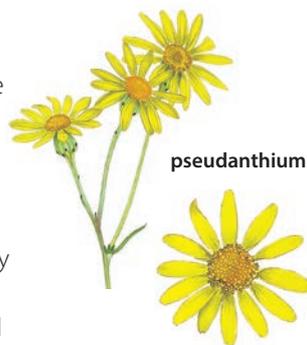


**psammosere** An ecological succession that starts on new sand dunes.

**psamophyte** A plant thriving in shifting sands, primarily of deserts and dunes.

**pseudanthium**

A false flower.  
 A compact inflorescence of many small flowers that collectively look like a single flower.  
 Characteristic inflorescence of the daisy family (Asteraceae).  
*see also* **capitulum, head**

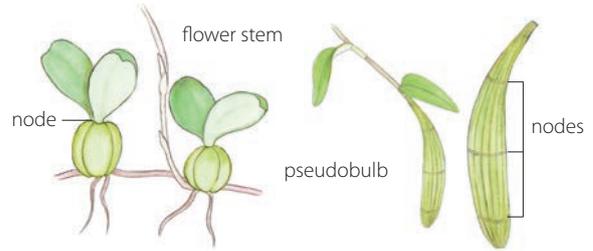


**pseudo-** A prefix meaning false.

**pseudobulb** Of most epiphytic orchids, an enlarged portion of the stem, that serves as a water and storage organ, from which all leaves and inflorescences arise.  
 Regardless of shape a pseudobulb is either heteroblastic (with a single internode) and bearing leaves at the apex or homoblastic (with many internodes) and bearing leaves along its length or at the apex.

**pseudobulbous** Bearing pseudobulbs.

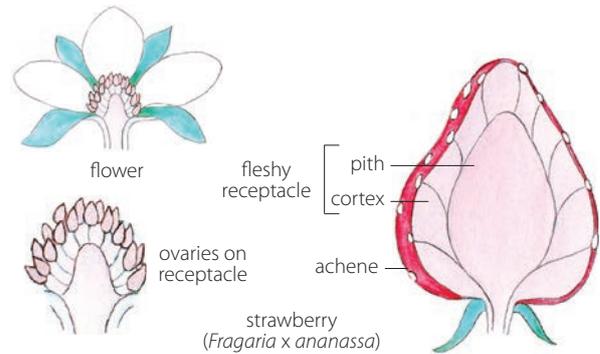
**Pseudobulb**



**pseudocarp** A fruit derived from a simple ovary or compound ovary and some additional non-ovarian tissue like the receptacle. A strawberry has the true fruits (achenes derived from the ovaries) embedded in the fleshy receptacle.

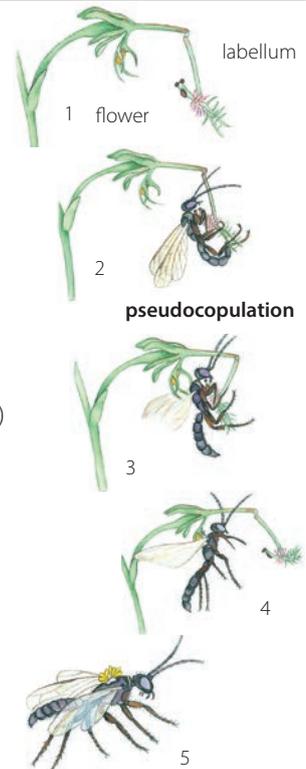
Other accessory fruits include hips, pomes and pineapples.  
 = **accessory fruit, false fruit**

**Pseudocarp**



**pseudocopulation**

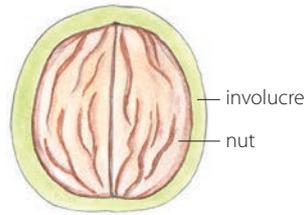
An attempt by a male insect to mate with a flower that resembles its female and in doing so takes pollen from the flower and carries it to another flower of the same species, thus pollinating the flower.  
 The wasp pollinator (*Arthrothynnus huntianus*) pollinates the elbow orchid (*Thynniorchis huntianus*) when it attempts to mate with the labellum that mimics the female of its species.



**pseudodrupe**

A nut surrounded by a fleshy fused indehiscent involucre, as the walnut (*Juglans*).

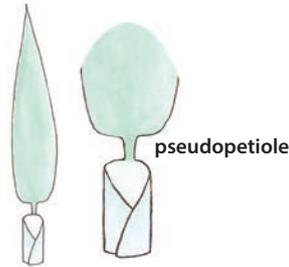
see **accessory fruit**  
cf. **tryma**



pseudodrupe

**pseudopetiole**

A narrow petiole-like extension of the leaf in some monocotyledons, as grasses and bamboos.



**pseudopollen**

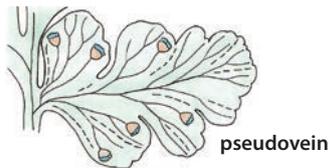
Of some orchids, a mealy material resembling pollen that is collected by pollinators, as that on the labellum of the potato orchid (*Gastrodia sesamoides*).

It may or may not be a true food reward.

**pseudovein**

Of fern fronds, a vein-like strand with no vascular bundle.

= **false vein**



**psilate**

With a more or less smooth surface.

**psychophily**

Pollination of flowers by butterflies.

**psychophilous**

Pollinated by butterflies.

**pteridophyte**

A term informally used for ferns and fern allies that are vascular spore-bearing plants.

**pteridosperm**

A member of an extinct group of plants that is believed to be intermediate between ferns and seed-bearing plants.

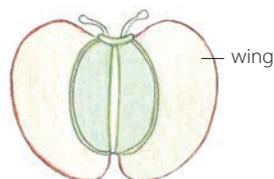
Now included in gymnosperms.

**ptero-**

A prefix meaning wing or feather.

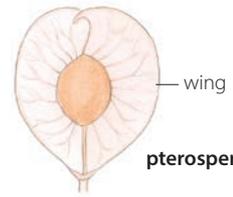
**pterocarpous**

Having winged fruit, as the wing pennywort (*Hydrocotyle pterocarpa*).



**pterospermous**

Having winged seeds, as elms (*Ulmus*).



**ptyxis**

see page 244

**puberulent, puberulous**

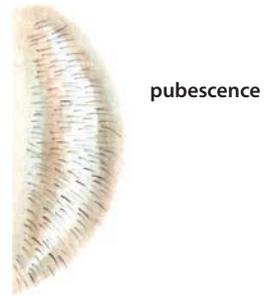
Minutely pubescent.

**pubescence**

A covering of short soft hairs, as on the buds, leaves and fruit of some plants. More generally, hairiness.

= **down**

**pubescent** Covered with short soft hairs or down.



**pulp**

Soft or fleshy and moist plant tissue, as the sticky pulp in which the seeds of pittosporum (*Pittosporum*) are immersed.



**pulverulent**

Appearing dusty or powdery.

**pulvinus**

A swelling at the base of a leaf, leaflet or phyllode that functions as a leaf-moving organ.

see also **nyctinasty,**

**phytochrome,**

**thigmotropism**

**pulvinate** Having a pulvinus.



**puncticulate, punctulate**

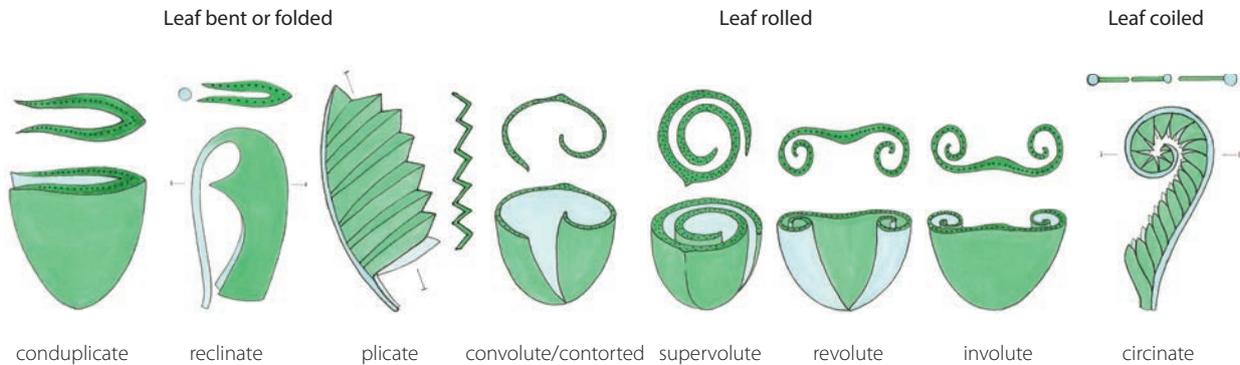
Minutely punctate.

**ptyxis** The configuration of a single leaf within the leaf bud before it opens.

The leaf is typically folded, rolled or coiled.

see also **vernation**

### Ptyxis

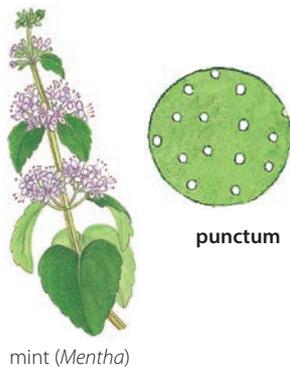


### punctum, *pl.* punctae

A small dot.

**punctate** With dot-like markings or depressions, often due to translucent or coloured glands, as the leaves of mints (*Mentha*).

**punctiform** In the form of a dot or point.



mint (*Mentha*)

**pungent** Tipped with a sharp rigid piercing point.

Having a strong acrid smell or taste.



leaf tip **pungent**

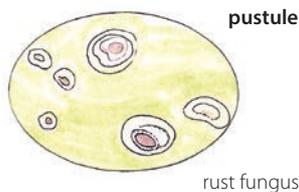
**purebred** Offspring having the same traits as their genetically similar parents.

These traits have been maintained and passed on unchanged through many generations.

*cf.* **hybrid**

**pusticulate** Minutely pustulate.

**pustule** A small raised swelling like a pimple or a blister, as the rust fungus (*Uromyces viciae-fabae*) infecting the leaves of faba beans (*Vicia faba*).



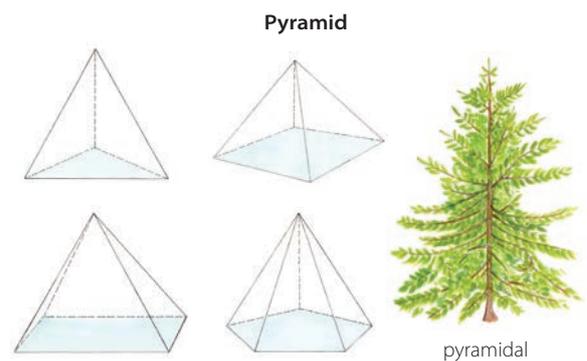
**pustular, pustulate, pustulose** Of a surface covered with pustules.

**putamen** The endocarp of some fruits, that encloses and protects the seed, as the hard stone of a plum, cherry or peach, or the shell of a walnut.  
see also **pericarp**

**putative** Supposed. Commonly accepted as true without being proven, as applied to some hybrids.

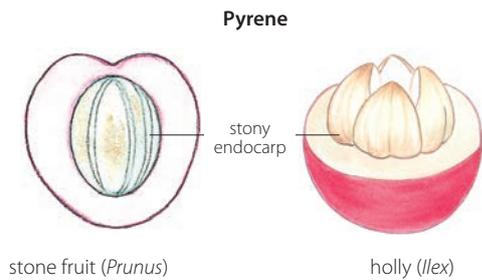
**pyramid** A solid body with sloping triangular sides that meet at a point at the top. The base may be triangular, square, rectangular or polygonal.

**pyramidal** Resembling a pyramid in shape, as the canopy of liquidamber (*Liquidamber styractiflua*).



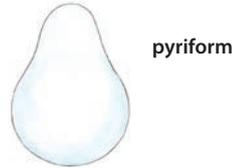
**pyrene** A seed covered by a hard endocarp, as the stone in the stone fruit genus *Prunus*.

A drupe-like fleshy fruit, derived from a multicarpellate superior ovary, with two or more seeds, each surrounded by a stony endocarp, as holly (*Ilex*).



**pyriform**

Three-dimensional and pear-shaped.



**pyrophile** A plant that is adapted to tolerate fire or is stimulated by fire to germinate or regrow.

**pyrophilous** Fire tolerant.

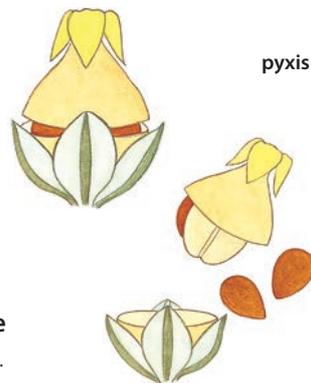
**pyrophyte** A plant that is adapted to tolerate fire or is stimulated by fire to germinate or regrow.

**pyxis, pyxide, pyxidium, pl. pyxides, pyxidia**

A capsule that dehisces around the circumference so that the upper part separates like a lid, as plantain (*Plantago*).

= **circumcissile capsule**

**pyxidate** Having a lid.



**quadri-** A prefix meaning four.

**quadrijugate** Of a pinnate leaf having four pairs of leaflets.

see **jugate**

**quaternate**

In sets of four. Of leaves when four are located at each node.



**quiescence** A period of inactivity, as the state of delayed seed germination when environmental conditions are not suitable.

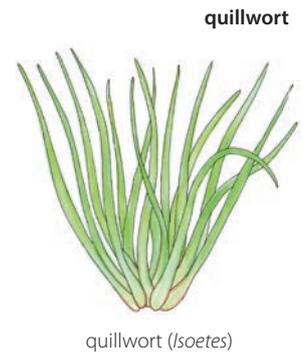
**quiescent** Inactive.

cf. **dormant, latent**

**quillwort**

The quillwort family (Isoetaceae) comprises one genus (*Isoetes*) of mostly aquatic or semi-aquatic vascular plants that reproduce by spores rather than seeds. Plants have tufts of spirally arranged single-veined quill-like leaves. Spores are of two kinds (heterosporous).

see **fern allies**



**quincunx**

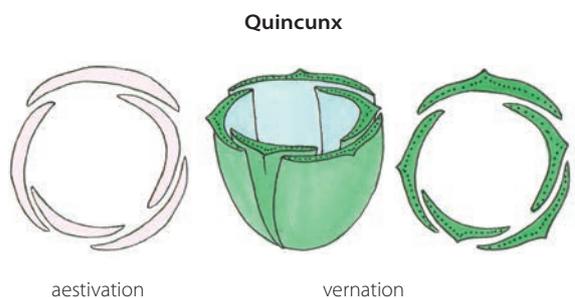
Arrangement of an object with five parts, two are outer, two are inner and the fifth has one margin exterior and one margin interior.

A form of imbricate vernation.

**quincunx aestivation** The arrangement of petals, tepals or sepals in a bud.

**quincunx vernation** The arrangement of young leaves in an unopened leaf bud.

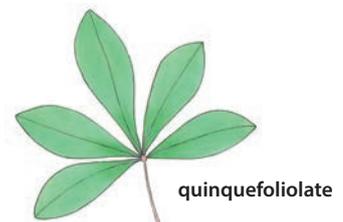
**quincuncial** Arranged in a quincunx.



**quinque-** A prefix meaning five.

**quinquefoliate**

Having five leaflets, as a palmate leaf with five leaflets attached to the tip of the petiole.



**quinquejugate** Of a pinnate leaf having five pairs of leaflets.

see **jugate**

**raceme** A racemose inflorescence in which the floral axis bears single flowers on stalks (pedicels) of about equal length.

The axis continues to grow indefinitely, with the youngest flower on the stem near the growing point at the apex and the oldest at the base.

A raceme can be simple, as lily of the valley (*Convallaria majalis*) or compound (then a panicle), as white hellebore (*Veratrum album*).

Of grasses (Poaceae), the arrangement of pedicellate spikelets, (rather than flowers), on the axis of the inflorescence.

An indeterminate or indefinite inflorescence.

see **acropetal, centripetal**

see also **racemose inflorescence**

**racemiform** With the appearance, but not necessarily the structure, of a raceme.

**racemose** Growing or arranged in a raceme. Bearing racemes.

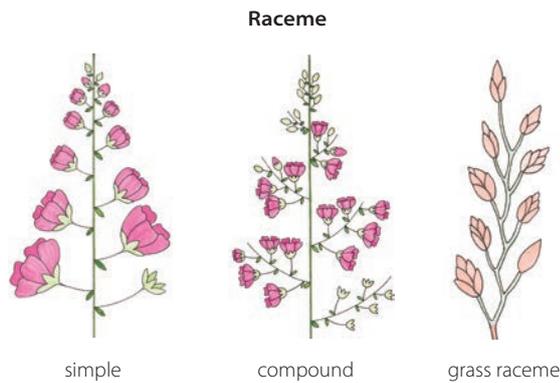
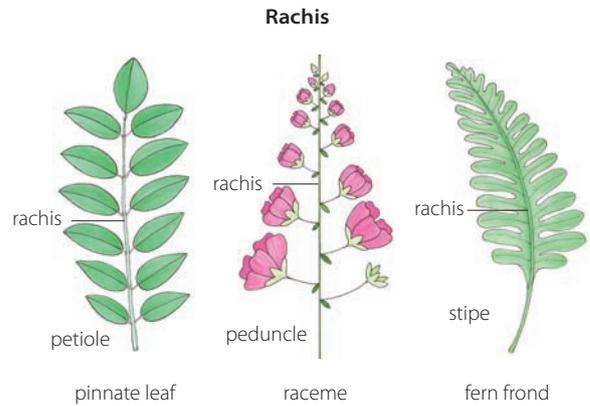
cf. **cymose**

**rachis, rhachis, pl. rachides, rhachides**

Of a pinnate leaf, the continuation of the petiole on which the leaflets (pinnae) are arranged.

Of an inflorescence, the continuation of the peduncle along which the flowers are arranged, as in a spike or a raceme.

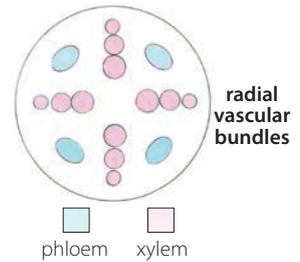
Of ferns, the continuation of the stipe into the lamina of the frond to form the midrib.



**radial vascular bundles**

With xylem and phloem arranged separately on different radii.

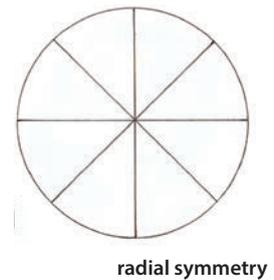
Typical of roots of eudicots and monocotyledons.



**radial symmetry**

The quality of having a flattened circular surface that, looked at from above, has parts that divide equally anywhere by a line that passes through the centre.

cf. **bilateral symmetry, polysymmetric**



**racemose inflorescence** see page 247

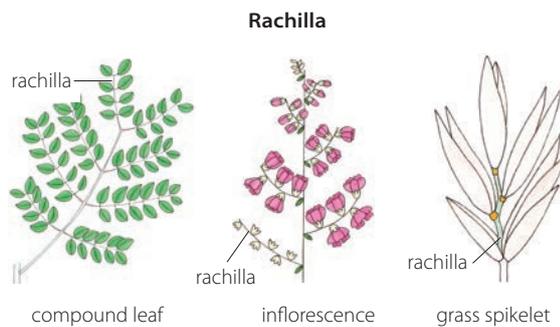
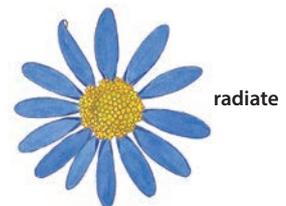
**rachilla, rhachilla, pl. rachillae, rhachillae**

The secondary stem of a compound leaf, fern or inflorescence.

The stem of a grass or sedge spikelet above the glumes.

see **rachis**

**radiate** Spreading from the centre like the spokes of wheel as the flower head of some daisies (Asteraceae).



**racemose inflorescence** An inflorescence in which the main axis and lateral branches continue to grow indefinitely, with flowers arising along the axis and branches.

The first formed flower is at the base of the peduncle so that flowering begins at the base in ascending or acropetal succession.

The arrangement of flowers is centripetal, with the youngest flowers in the centre and the oldest flowers towards the outside.

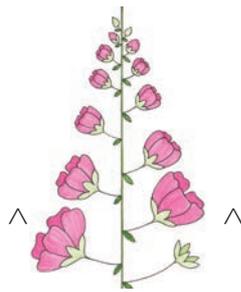
The number of flowers is indefinite.

An indeterminate or indefinite inflorescence.

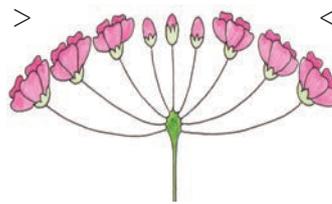
see **inflorescence, raceme**

cf. **cymose inflorescence**

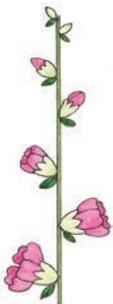
### Racemose inflorescence



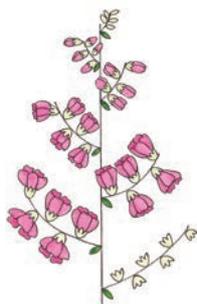
Flowering ascending/acropetal



Flowering centripetal



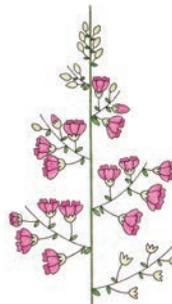
spike



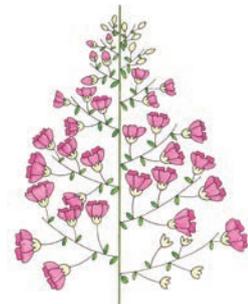
compound spike



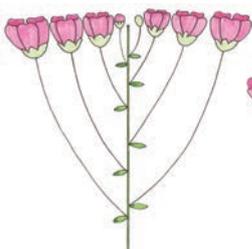
raceme



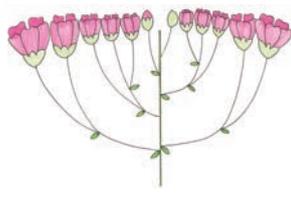
compound raceme



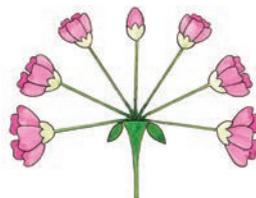
panicle



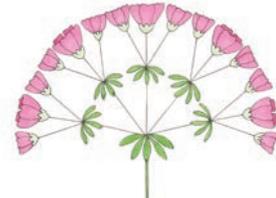
corymb



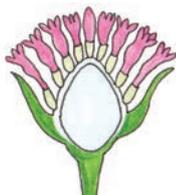
compound corymb



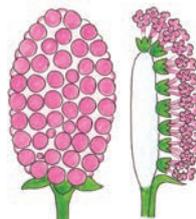
umbel



compound umbel



head



compound head

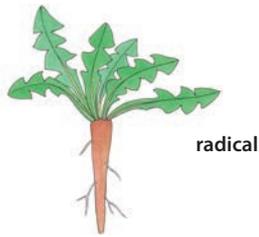


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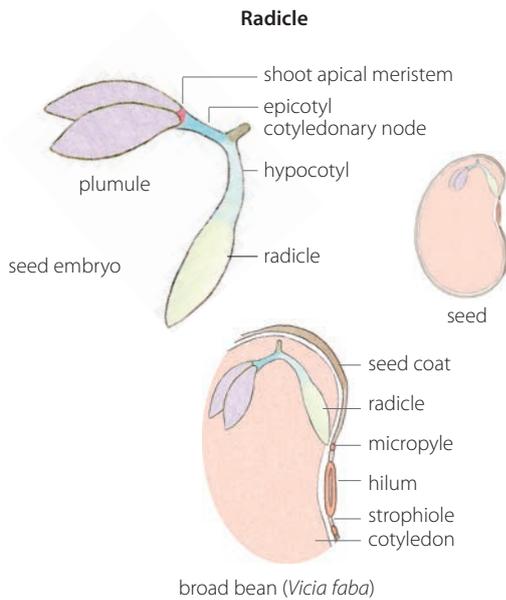


spadix

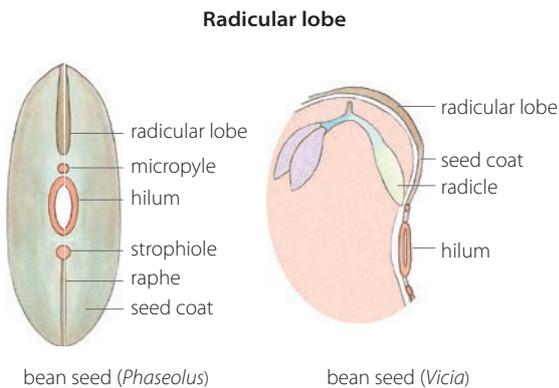
**radical** Of or relating to the root.  
Of leaves arising directly from the rootstock.



**radicle** The embryonic root in a seed embryo.  
Normally the first structure to emerge from the seed through the micropyle at germination.  
In gymnosperms and eudicots it becomes a taproot, and in monocots it is replaced by adventitious roots.  
*cf.* **plumule**



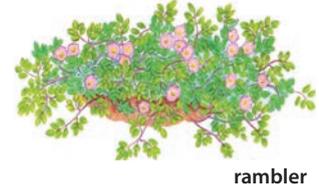
**radicular lobe** The lobe sometimes visible on the seed coat under which the radicle is located.



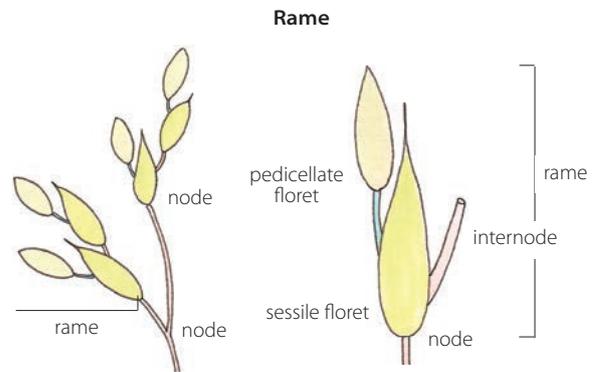
**rainforest** Luxuriant forest characterised by high annual rainfall, extensive growth and poor soils.  
It includes tropical rainforest found near the equator that has no distinct seasons and four layers of

growth, (the emergent layer, the canopy layer, the understorey layer and the forest floor), monsoon rainforest that has a wet and a dry season, and cool temperate rainforests with a long wet winter and a shorter drier summer.  
*see also* **storey**

**rambler** A plant with lax flexible stems that straggles over other vegetation, as rambling roses.

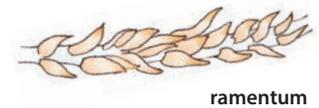


**rame** An inflorescence in grasses (Poaceae) consisting of paired sessile and pedicellate florets at each node, with each pair disarticulating at maturity, together with the internode above.  
**ramose** Of a rame or series of rames.



**ramentum, ramenta**

A thin chaffy scale.  
**ramentaceous** With thin chaffy scales, as the stipes of many ferns.



**ramet** A plant that is reproduced from a clone that is genetically identical to it.  
A result of vegetative propagation.  
A strawberry plant is a genet and the runners that can root and survive as separate plants are clones and individual member of a clone is a ramet.  
*cf.* **genet**

**ramification** Of stems and roots, the process of branching and its general arrangement.

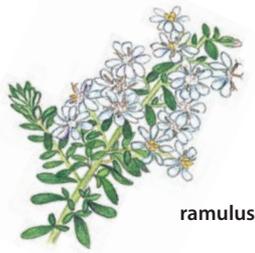
**ramiflory** The production of flowers on branches, as in the redbud (*Cercis canadensis*).  
**ramiflorous** Exhibiting ramiflory.

**ramulus, pl. ramuli**

A small branch or twig.

**ramulose, ramulous**

With numerous small branches, as the twiggy daisy bush (*Olearia ramulosa*).



ramulus

**ramus, pl. rami** A branch or branching part.

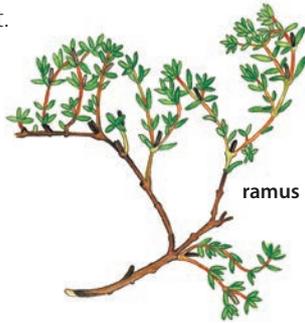
**ramal, rameal** Of or belonging to a branch.

Growing or originating on a branch, as some leaves.

**ramiferous** Having many branches.

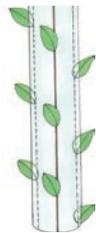
**ramose** Bearing branches.

Full of branches.



ramus

**rank** A vertical row, as a row of leaves on a stem.



rank

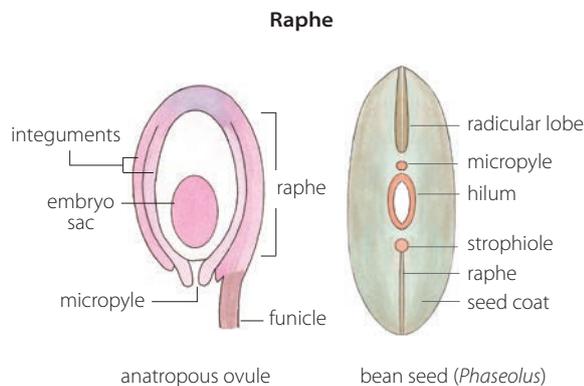
**rank** A level in a taxonomic hierarchy.

In taxonomy, the successive levels from highest to lowest are: kingdom, division or phylum, class, order, family, genus and species.

The ranks of hybrid taxa (nothotaxa) are nothogenus and nothospecies.

Phylogenetic classification does not rank organisms but assigns a name to the position of a taxon within a tree diagram (cladogram).

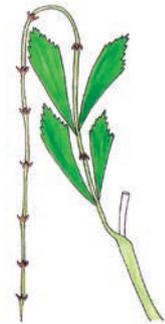
**raphe** Of some ovules and seed, the part of the funicle that is adnate to the surface of the ovule and is visible as a line or ridge on the seed coat.



**raphide** One of the needle-shaped crystals of calcium oxalate found in an idioblast.

**ratoon** Regrowth from underground root buds after harvesting that produces a new crop, as sugar cane (*Saccharum officinarum*).

**rattan** A palm with very long stems and leaves not clustered in a crown. Leaves are pinnate and have long whip-like barbed tips by which the plant climbs to the top of the tree canopy in tropical rainforests.

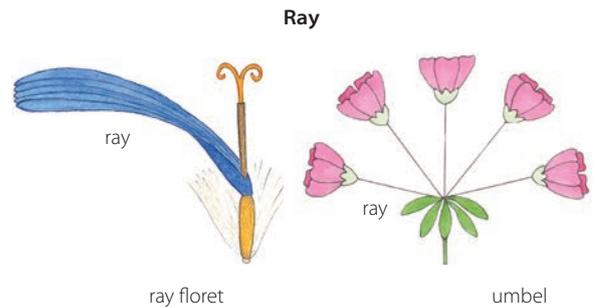


rattan

**ray** The strap-shaped ligulate corolla of a ray floret in a daisy head (Asteraceae).

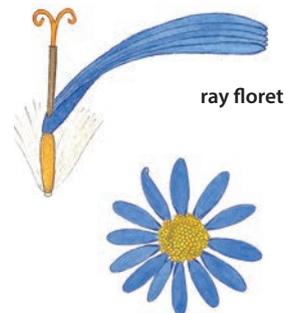
A branch of an umbel.

see **medullary ray, vascular ray**



**ray floret** In the inflorescence of a daisy (Asteraceae), a small tubular flower with the lobes united on one side into a strap-like blade.

= **ligulate floret**  
see also **capitulum**  
cf. **disc floret, tubular floret**

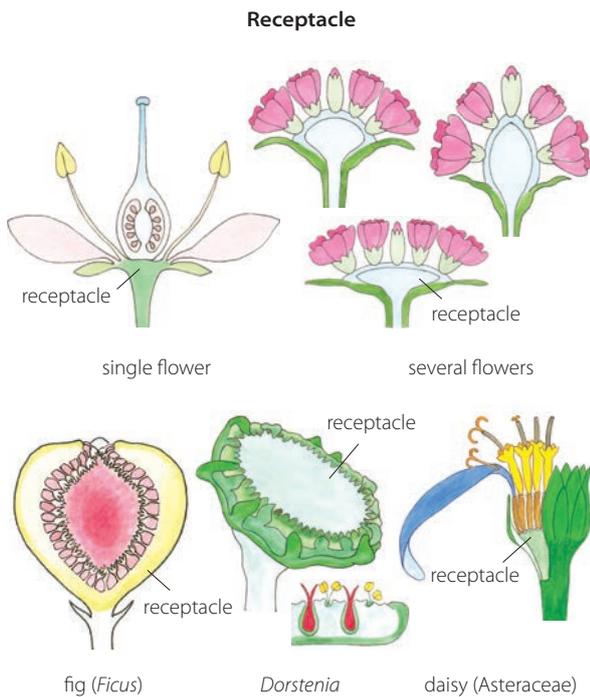


**ray initials** One of two types of initial cells (the other being fusiform initials) in cambium, the meristematic tissue responsible for secondary growth in plants. Ray initial cells are cuboidal in shape and give rise to horizontal growth in rays of wood that transport food and water horizontally through the secondary xylem and secondary phloem.

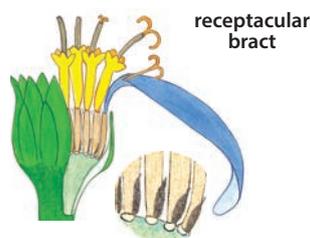
**re-** A prefix meaning again.

**reaction wood** Structurally abnormal wood formed in response to mechanical stress, as wind, on leaning stems and branches, that functions to bring the main stem or branch back to its normal position.  
Called compression wood in softwoods like pine and tension wood in hardwoods like elm.

**receptacle** An expanded area at the top of a stem on which the sepals, petals, stamens and carpels of a single flower are inserted.  
The expanded area at the top of a stem on which several flowers are inserted, as the genera *Dorstenia* and *Ficus* that are both in the mulberry family (Moraceae), or on which florets are inserted, as daisies (Asteraceae)  
= **thalamus, torus**  
*cf.* **hypanthium**  
**receptacular** Borne on or relating to the receptacle.



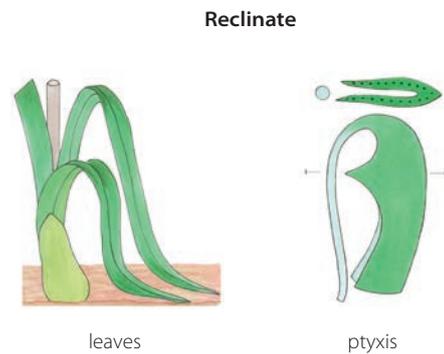
**receptacular bract** One of the chaffy bracts or scales subtending a floret on the receptacle of a head in many daisies (Asteraceae).



**receptive** Ready to receive, as a stigma that becomes receptive to pollen grains.

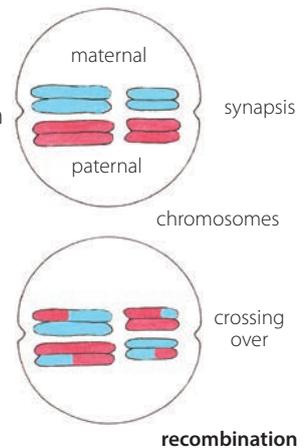
**recessive** Of a heterozygous individual, an allele of a gene that may be concealed by the expression of the other allele.  
*cf.* **dominant**

**reclinate** Bent or turned downward towards so that the tip is lower than the base, as some leaves.  
**reclinate ptyxis** Of a single leaf in bud that is folded inwards and lengthwise and has the apex bent downwards towards the base.



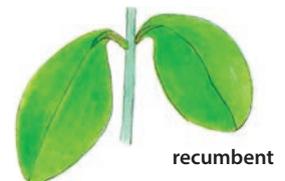
**recombination**

In meiosis, the exchange of genetic material, during synapsis, between the maternal and paternal chromosomes so that the haploid chromosomes in the sperm and the egg will differ from the diploid parent chromosomes.  
= **crossing over**

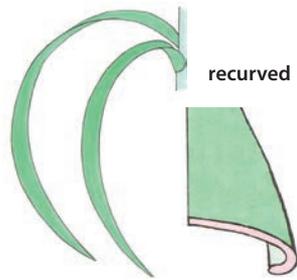


**recti-** A prefix meaning straight or upright.

**recumbent** Bent back until the apex is below the base, as leaves of common speedwell (*Veronica officinalis*).

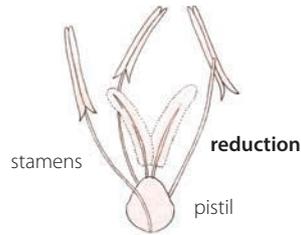


**recurved** Curved or curled downward or backward, as some leaves on a stem. Of leaf margins curved towards the abaxial side.  
*cf.* **decurved, incurved, involute, revolute**



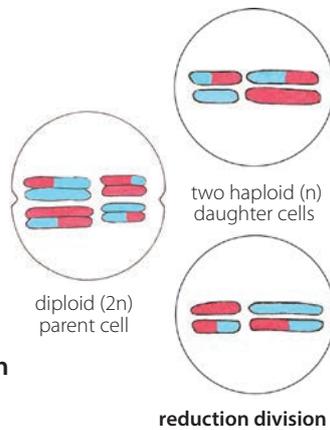
**reduced** Decreased in size or number.

**reduction** An atypical form, as the grass flower that lacks a calyx and corolla and is reduced to the stamens and pistil only.

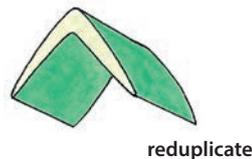


**reduction division**

The first division in meiosis. The chromosome number in a diploid (2n) parent cell is halved to produce two haploid (n) daughter cells.  
*see* **meiosis**  
*cf.* **equational division**



**reduplicate** Of palm leaflets with margins bent backwards. Upside-down V-shape in cross-section.  
*cf.* **induplicate**



**reed** A tall grass-like plant with slender jointed hollow stems that grows in water or on marshy ground.  
*see also* **arundinaceous**

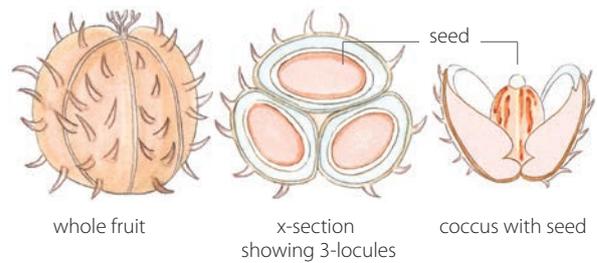
**reflexed** Of leaves, bent sharply backwards or downwards towards the stem.



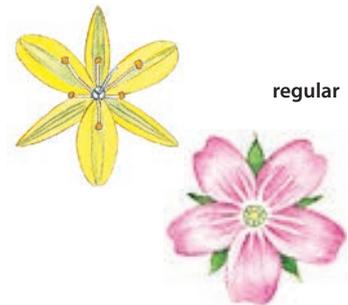
**regeneration** Renewal of growth in a disturbed area.

**regma, pl. regmata** A dry schizocarpic fruit that splits into three one-seeded cocci. The cocci in turn dry out, split open and eject the seed.  
 Derived from a three-carpelled, three-loculed syncarpous superior ovary, as the castor oil plant (*Ricinus communis*).

**Regma**



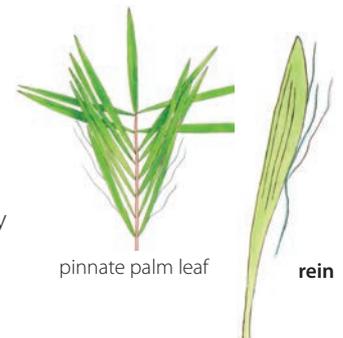
**regular** Of flowers with radial symmetry that divide through the centre into two or more like halves.  
 = **actinomorphic**  
*see* **polysymmetric**  
*cf.* **zygomorphic**



**regulator gene** A gene that controls the expression of another gene.

**rein**

Of palms (Arecaceae), a narrow strip along the margins of some pinnate leaves that peels away as the leaflets unfold. Usually shed or sometimes persists long after the leaf has opened.



**rejected name** A name rejected in favour of a conserved name.  
 = **nomen rejiciendum**

**relict, relictual** The remains of a plant population that was once more widely spread at an earlier time. Of conservation status, a small population of plants that has stabilised after declining or has been isolated from the core population.

**remote** Separate or apart in space, at a distance.

cf. **adjacent**

Widely spaced, as leaves on a stem.

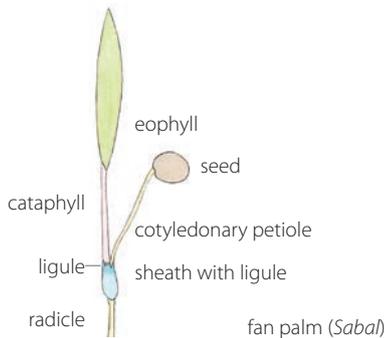
= **distant**



**remote germination** Of palms, having the seedling develop at some distance from the seed. see **remote-ligular germination**, **remote-tubular germination**

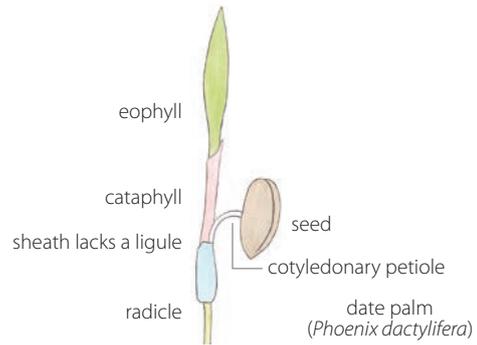
**remote-ligular germination** Of palms, one of three types of germination, as fan palms (*Sabal*). The cotyledon produces a petiole that grows downward into the soil at a distance from the seed. The plumular leaves emerge through the mouth of the sheath surrounding the cotyledonary petiole and the radicle emerges from its base. The cotyledonary sheath has a ligule. cf. **adjacent-ligular germination**, **remote-tubular germination**

**Remote-ligular germination**



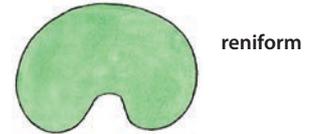
**remote-tubular germination** Of palms, one of three types of germination, as occurs in the date palm (*Phoenix dactylifera*). The cotyledon produces a petiole that grows downward into the soil at a distance from the seed. Plumular leaves emerge through a slit in the sheath surrounding the cotyledonary petiole and the radicle emerges from its base. The cotyledonary sheath lacks a ligule. cf. **adjacent-ligular germination**, **remote-ligular germination**

**Remote-tubular germination**



**reniform**

Kidney-shaped.

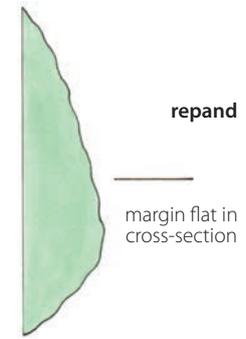


**repand** With margins more or less flat in cross-section and curving slightly inward and outward like the movement of a snake, as the margins of some leaves.

Slightly sinuate.

= **sinuate**

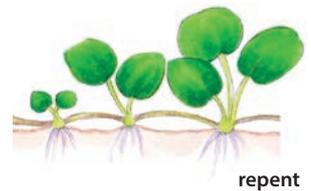
see also **sinuate**



**repent, reptant**

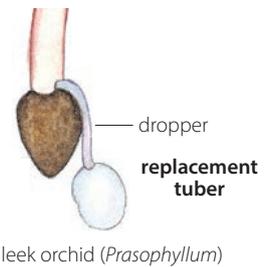
Prostrate and producing roots at the nodes, as creeping Charlie (*Glechoma hederacea*).

= **creeping**



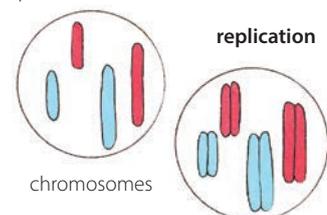
**replacement tuber**

Of orchids, the new tuber that will lie dormant until the following season at the end of a short root, a dropper, that grows down from the previous season's spent tuber.

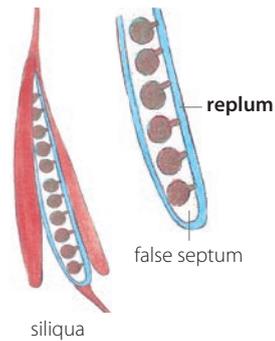


**replication** In genetics, the process whereby chromosomes in a cell make an exact copy of themselves before cell division.

see **mitosis**



**replum** The persistent frame-like placenta bearing seeds that remains after the valves fall away in some species of the mustard family (Brassicaceae). It usually has a membranous false septum.



**reproduction** The production of new individuals by sexual or asexual means.

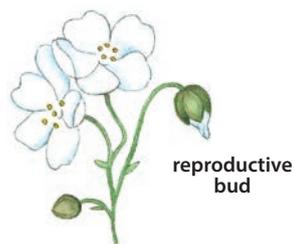
see **asexual reproduction, sexual reproduction**

**reproductive bud**

A flower bud that contains an embryonic flower. It is usually enclosed in the calyx.

see also **aestivation**

cf. **vegetative bud**



**reproductive cell** An egg cell or sperm cell (gamete) of a plant that, as a result of meiosis, has half the number chromosome sets found in the non-reproductive (somatic) cells.

A set of these haploid (n) chromosomes is contributed to an organism by the the male parent and a set by the female parent.

cf. **somatic cell**

**reproductive phase** The phase in which plants transition from vegetative to reproductive growth. This involves transforming the meristem that produces vegetative structures, such as leaves, into meristem that produces reproductive structures, such as a flower or an inflorescence.

see **senescence, vegetative phase**

see also **alternation of generations**

**resin** A plant exudate, particularly from coniferous trees, that is insoluble in water but soluble in certain organic solvents.

cf. **gum**

**resiniferous, resinous** Containing or bearing resin. Resembling resin.

**respiration** The breakdown of glucose in the presence of oxygen to release energy.

Carbon dioxide and water are the by products.

see also **aerobic respiration, anaerobic respiration**

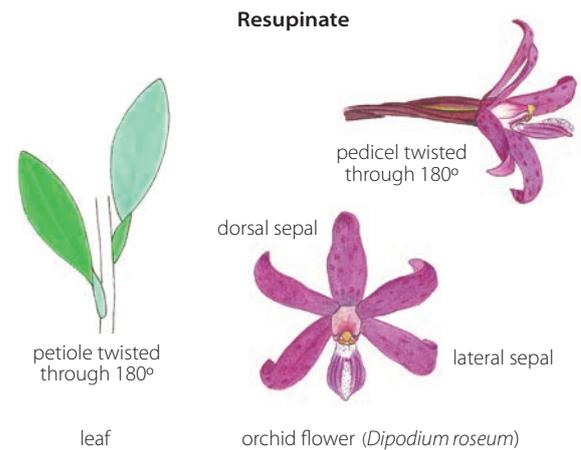
cf. **cellular respiration**

**resting buds** Buds that lie dormant until the onset of the next growing season, as those on the twigs of birch trees (*Betula*) in winter.

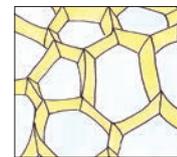
cf. **dormant buds**

**resupinate** Twisting through 180°, as the petiole of a leaf, resulting in the blade turning upside-down. Of the pedicel of a flower, resulting in the flower turning up-side down, as most orchids that have the dorsal sepal above the lateral sepals.

cf. **hyper-resupinate, non-resupinate**



**reticulate** Forming a network of intersecting lines like those of a net. Of a pollen grain with a surface network of spaces (lumina) enclosed by ridges.

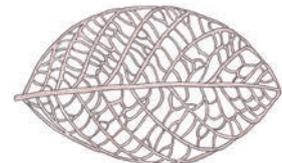


pollen

Of venation, forming a network of fine veins, as on a leaf or petal.

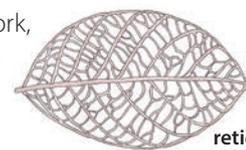
see also **reticulodromous**

cf. **areolate**



leaf

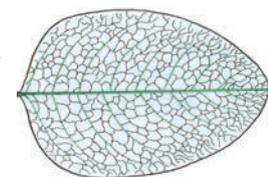
**reticulation** A network, as the net-like veins on a leaf.



reticulation

**reticulodromous**

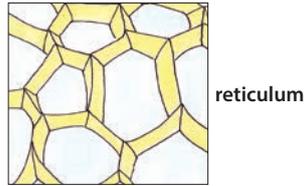
Of leaves with secondary veins forming a network that becomes finer towards the margin.



reticulodromous

**reticulum, pl. reticula**

A network-like pattern. Of pollen grains, a surface network of spaces (lumina) enclosed by ridges.



**retinaculum,**

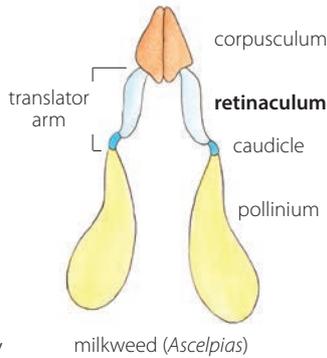
*pl. retinacula*

In Asclepiadaceae, part of the translator arm that together with the caudicle connects a pollinium to the corpusculum.

= **translator**

Of orchids, another term for viscidium.

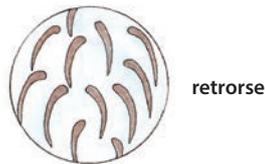
Of the acanthus family (Acanthaceae), the hooked stalk on the seeds.



**retorse**

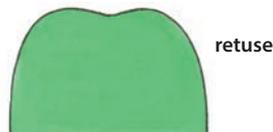
Curved or bent downward towards the base, as hairs or spines.

*cf. antrorse*



**retuse**

Having a rounded or obtuse apex with a central shallow notch.



**revolute**

Of a margin with the edges rolled under towards the lower surface, as the margins of some leaves.

*cf. involute*

**revolute aestivation**

Of young petals, tepals or sepals in the unopened bud with margins rolled outwards towards the lower surface.

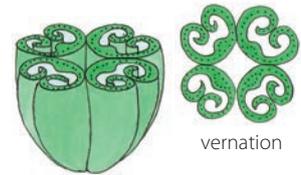
**revolute ptyxis**

Of a single leaf in bud with margins rolled downward towards the lower outer surface.



**revolute vernation**

Of young leaves in the unopened leaf bud with margins downward towards the lower outer surface and arranged in a circle.



**rheophyte**

Aquatic plants of flowing waters with narrow leaves that survive the currents or land plants along the edges of streams and rivers, like some palms, that are adapted to occasional fast-flowing currents, as flash floods.

*cf. limnophyte*

**rhipidium,**

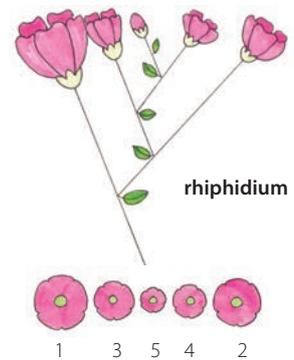
*pl. rhipidia,*

**rhipidium, pl. rhipidia**

A cymose inflorescence that is flattened and fan-shaped, with successive branches alternating from one side to the other so that the axis is zigzagged.

*see also monochasium*

*cf. drepanium*



**rhizanthogene**

An underground cleistogeme. Spikelets are highly modified and are borne on highly specialised underground rhizomes.

**rhizobium, pl. rhizobia**

A bacteria, in roots and in nodules on the roots, of some plants that converts nitrogen into a form that is usable by plants.

*see nitrogen fixation*

**rhizodermis**

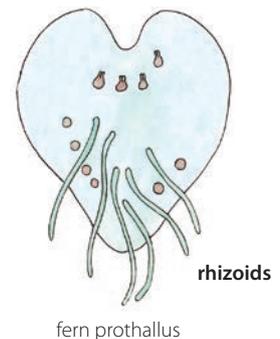
The epidermis of the root. It is of different origin to the epidermis of shoots but is continuous with it.

= **epiblem**

**rhizoid**

A thread-like outgrowth from a prothallus in some nonvascular plants, as ferns.

It acts like a root and has similar functions of attachment to a substrate and absorption.



**rhizome** A specialised underground stem with nodes from which new plants are produced. Rhizomes can be horizontal or vertical.

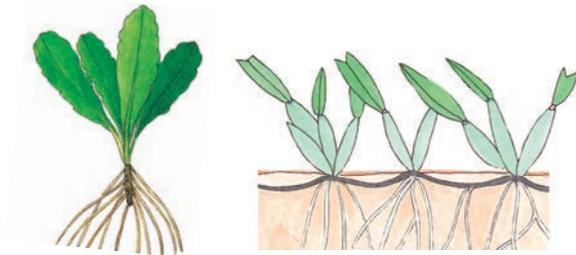
see **caudex**

= **rootstock**

cf. **long-creeping, short-creeping, stolon**

**rhizomatous** Bearing or producing rhizomes.

**Rhizome**



Vertical rhizome  
(*Lagenophora huegelii*)

Horizontal grass rhizome

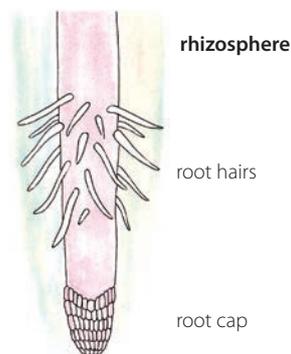
**rhizoplane** The root epidermis to which soil particles, microorganisms and fungal hyphae adhere.

cf. **rhizosphere**

**rhizosphere** The zone of soil, immediately surrounding a plant root, where complex interactions occur. It is rich in microorganisms, root secretions and sloughed-off cells. Bacterial interactions are initiated here and mycorrhizal fungi and root nodules occur here.

see **nitrogen fixation**

cf. **rhizoplane**



**rhizosphere**

root hairs

root cap

**rhomboïd** A four-sided figure with opposite sides parallel but adjacent sides of unequal length.

**rhomboïdal** Shaped like a rhomboïd.



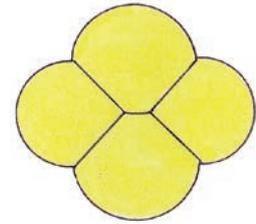
**rhomboïd**

**rhomboïdal tetrad**

A uniplanar tetrad arranged with the faces of two members in contact and the remaining two separated so that they cohere in a more or less diamond-shaped outline.

see **uniplanar, viscin thread**

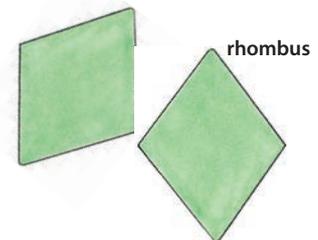
see also **pollen tetrad**



**rhomboïdal pollen tetrad**

**rhombus** A four-sided figure with all sides equal.

**rhombic** Diamond-shaped.



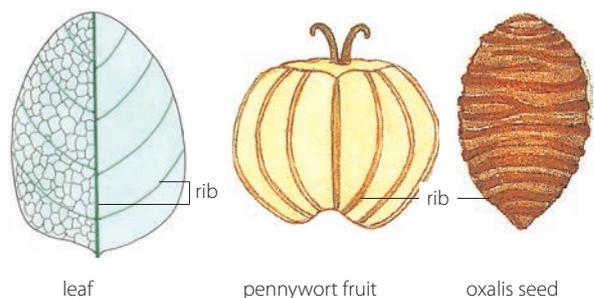
**rhombus**

**rhytidome** Layers of dead phloem and periderm tissue that make up the exterior bark of a tree.

**rib** The main vein, or other prominent vein, of a leaf.

**ribbed** Of a leaf with prominent raised veins. Of a surface with marked, raised, roughly parallel bands, as the fruit of pennywort (*Hydrocotyl*) and the seeds of some oxalis (*Oxalis*).

**Rib**



leaf

pennywort fruit

oxalis seed

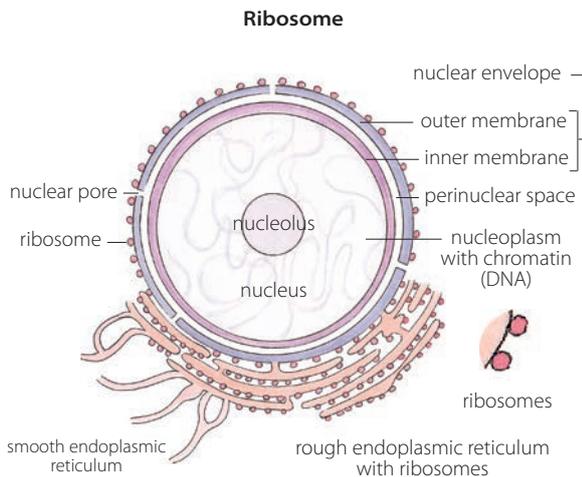
**ribose nucleic acid, RNA** The nucleic acid present in all living cells that plays an essential role in the synthesis of proteins.

see also **deoxyribose nucleic acid (DNA), ribosome, transcription, translation**

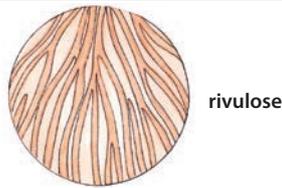
**ribosome** An organelle that is the site of protein synthesis and is composed of protein and RNA (ribose nucleic acid).

It is either free in the cytoplasm or attached to the endoplasmic reticulum or outer nuclear membrane. Synthesised proteins may be stored in the endoplasmic reticulum or sent to the Golgi complex for modification.

see also **transcription, translation**

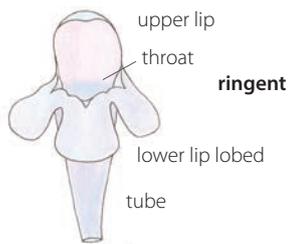


**rivulose** Marked with fine channels like rivulets.  
cf. **striate, sulcate**



**rigid** Unable to bend or be forced out of shape, not flexible, not breaking.

**ringent** Gaping.  
Having a bilabiate corolla with lips separated and the throat open as the flower of thyme (*Thymus serpyllum*).  
Lips may be lobed or not.  
cf. **personate**



**riparian** Of or relating to the bank of a river or stream.

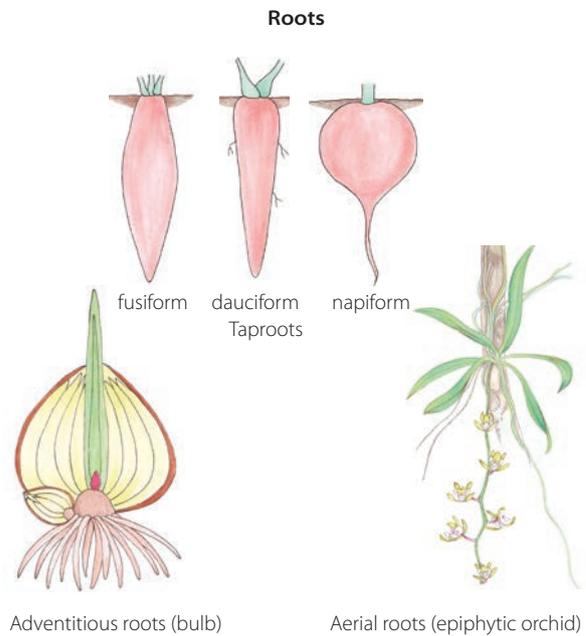
**ripe** Fully developed, ready to harvest.

**RNA** Ribose nucleic acid.  
see also **DNA**

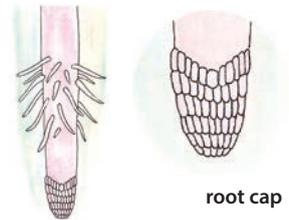
**robbery** The removal of nectar by floral visitors without providing pollination, as bees that extract nectar from a hole pierced or bitten in the corolla.  
cf. **thievery**

**robust** Hardy and vigorous.

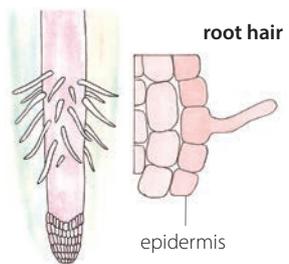
**root** The usually underground part of a plant that absorbs water and nutrients and lacks nodes. There are three types. A taproot is derived from the radicle in the seed and has different shapes as those of a turnip (napiform) or carrot (dauciform). Adventitious roots are roots growing on a short underground stem, as those on a bulb. Aerial roots grow in the air, as those of epiphytic orchids.



**root cap** The thimble-shaped mass of loose cells that covers and protects a root tip.

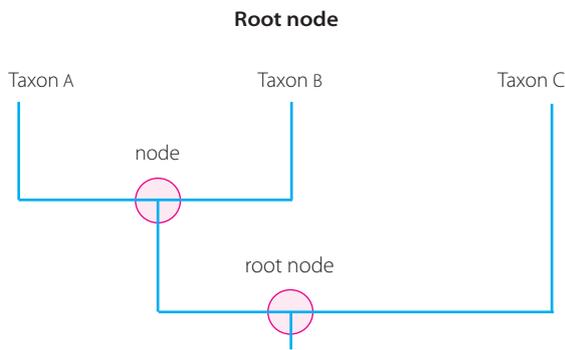


**root hair** A hair-like outgrowth from an epidermal cell on a root that increases the total surface area available for the absorption of water and nutrients.  
cf. **rootlet**

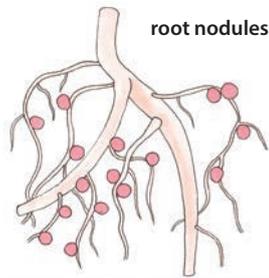


**root node** In a phylogenetic tree, the most recent common ancestor of all of taxa represented on the tree.

see **node**



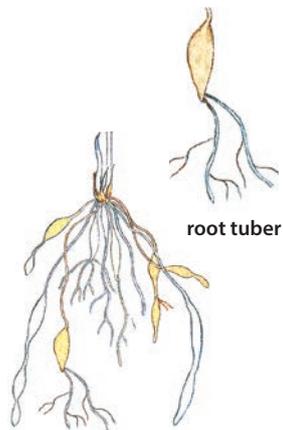
**root nodule** A small swelling on roots of legumes, such as clover, and some other plants as a result of infection by nitrogen-fixing bacteria. see also **nitrogen fixation, rhizobium**



**root system** One of two plant organ systems, the other being the shoot system, that consists of all roots and underground structures like tubers.

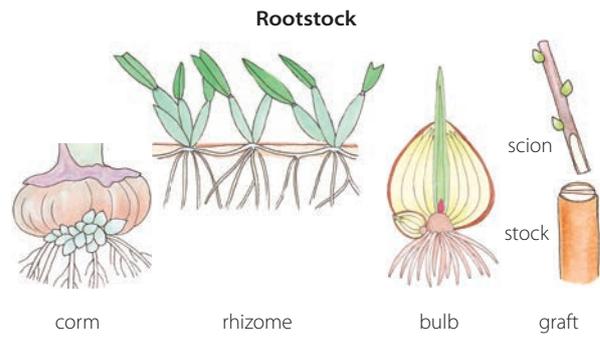
**root tuber** A swollen part of a root that functions as a storage organ and allows the plant to survive during dormancy. Unlike stem tubers, they do not have growing points called eyes. Root tubers propagate vegetatively by producing roots and shoots.

cf. **stem tuber, tuberoid**



**rootlet** A small root. cf. **root hairs**

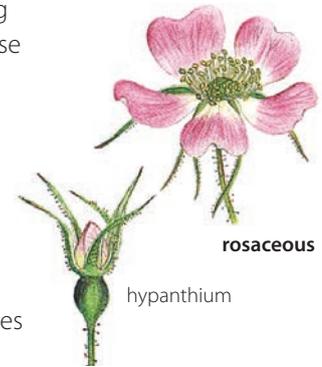
**rootstock** The underground part of a perennial plant from which roots arise, as a rhizome, corm or bulb. In grafting, the rooted plant onto which a shoot or bud (scion) is grafted; that part below the graft gives rise to the lower main stem and root system of the graft. Also called the stock.



**roridous** Dewy, appearing as if covered with fine dew drops.

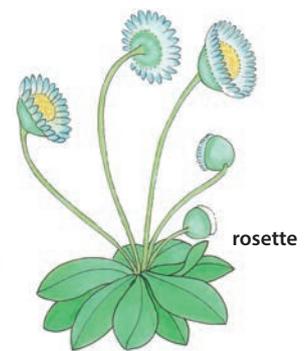
**roridulate, roridulous** Finely roridous.

**rosaceous** Of, relating to or resembling the rose family (Rosaceae). Typically with a hypanthium bearing a four- or five-petalled radially symmetrical flower, many stamens and simple pistils, as roses, plums, blackberries and apples.



**rosette** Leaves borne on a contracted stem so that the internodes are close together and the leaves form a radiating cluster on or near the ground.

**rosetted** Arranged in a rosette. = **rosulate**

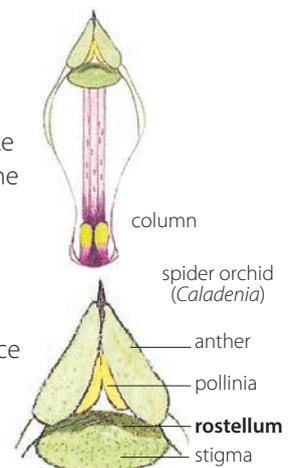


**rostellum, pl. rostella** **rostellums** A small rostrum.

Of some orchids, a shelf-like or beak-like extension of the upper edge of the stigma that separates the pollinia from the fertile stigma. It forms the viscidium that secretes a viscous substance used in pollination.

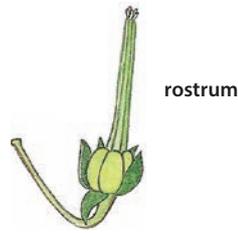
see also **viscidium**

**rostellate** Having a rostellum.

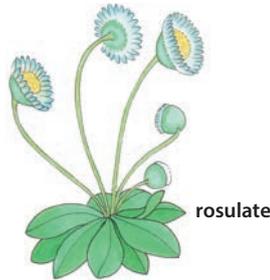


**rostrum** A beak-like projection, as the the carpophore of a crane's-bill (*Geranium*).

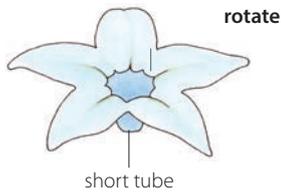
**rostrate** Beak-like.



**rosulate** Of leaves borne on a contracted stem so that the internodes are close together and the leaves form a radiating cluster on or near the ground.  
= **rosetted**



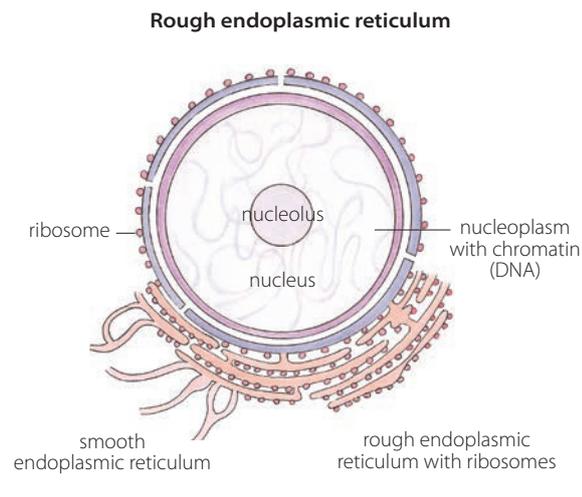
**rotate** Wheel-shaped. Of a corolla with a short tube and a flattened, spreading circular limb, as some flowers of the nightshade genus (*Solanum*).



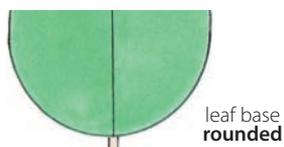
**rough endoplasmic reticulum** Endoplasmic reticulum with ribosomes attached that give it a rough appearance.

The ribosomes synthesise proteins that may be stored in the rough endoplasmic reticulum or sent to the Golgi complex for modification.

cf. **smooth endoplasmic reticulum**



**rounded** In a smooth curve, as the base of some leaves.



**rubescens, rubicund** Inclined to redness, turning rosy-red.

**rubiginose, rubiginous** Rust-coloured, reddish-brown.

**ruderal** Of plants growing on waste or disturbed lands. Commonly weedy or introduced plants, as nettles and rosebay willowherb (*Chamaenerion angustifolium*).

**rudimentary** Imperfectly or incompletely developed, embryonic. Being in the earliest stages of development, as the rudimentary plant in a seed comprised of a plumule, one or two cotyledons and a radicle.

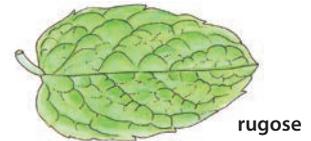
cf. **abortive, vestigial**

**rufescent** Tinged with red.

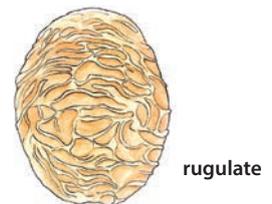
**rufous** Dark red.

**ruga, pl. rugae** A fold, crease or wrinkle.  
**rugate** Having rugae.

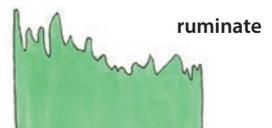
**rugose** Deeply wrinkled, typical of leaves in the mint family (Lamiaceae).



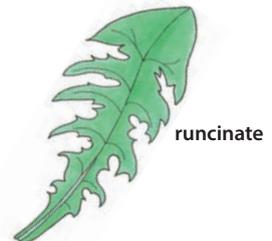
**rugula, pl. rugulae** A fine wrinkle or fold.  
**rugulate, rugulose** Finely wrinkled, as the pollen of elms (*Ulmus*).



**ruminant** Appearing as if chewed. Praemorse.



**runcinate** Of a pinnately lobed leaf, usually oblanceolate in outline, with lobes pointing towards the base, as the leaves of dandelion (*Taraxacum*).



**runner** A slender prostrate stem with long internodes that forms new plants by putting down roots at the nodes or at the tips, as strawberry (*Fragaria*).  
= **stolon**



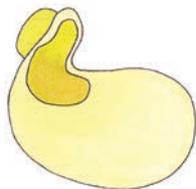
runner

**rupestral, rupestrine, rupicolous** Growing on or among rocks, as many lichens and some ferns.  
= **saxicolous**

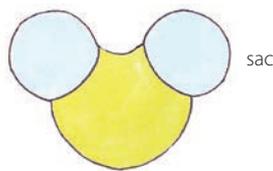
**rush** Common name for a plant in the Juncaceae family.  
Tufted or rhizomatous, annual or perennial grass-like herbs, with solid or hollow, terete or laterally flattened stems that lack joints.  
Flowers are inconspicuous, regular with six tepals and are wind-pollinated.  
Fruit is a capsule.

**sac, saccus** *pl. saccii* A little bladder, a pouch or cavity.  
**saccate** Pouched, inflated to form a sac.  
Of the inflated corolla of slipper flowers (*Calceolaria*).  
Of the pollen grains of some gymnosperms.

Sac



slipper flower (*Calceolaria*)



pollen grain

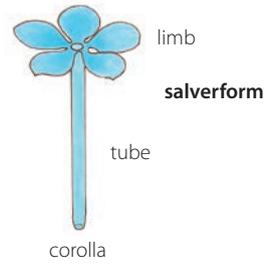
**sagittate** Shaped like an arrowhead, with two acute spreading lobes at the base, as some leaves.  
*cf. hastate*



sagittate

**saltmarsh** A low-growing plant community, typically dominated by halophytic vegetation and occupying the intertidal zone of coasts or fringing inland salt lakes.

**salverform** Of a corolla with a long slim tube and an abruptly expanded limb spreading at 90° to the tube, as some primroses (*Primula*).  
= **hypocrateriform**



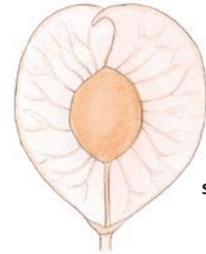
corolla

salverform

limb

tube

**samara** A dry indehiscent fruit with one winged seed, as the fruit of elms (*Ulmus*). The wing is an extension of the fruit wall (pericarp).  
Derived from a two- or three-carpelled syncarpous superior ovary in which only one seed develops.



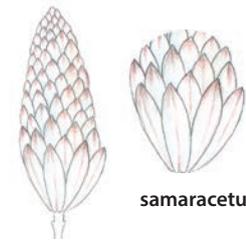
seed with wing

samara

**samaroid** Of or like a samara.

**samaracetum**

An aggregate fruit composed of a cluster of samaras, as the tulip tree (*Liriodendron*).



samaracetum

**samphire** Hardy salt-tolerant grasses, succulents and low shrubs that form a boundary between the coastal shoreline and land vegetation.  
Dominated by the saltbush family (*Chenopodiaceae*).

**sand** Small fragments or particles of rock ranging in size from 0.05 to 2 mm in diameter.

**sanguine** A blood-red colour.

**sap** The fluid that circulates through the vascular system of a plant carrying dissolved mineral salts, sugars and other nutrients to various tissues.

**sapling** A young tree with a slender trunk. The stage between a seedling and a mature tree, usually defined as having a diameter between 5 and 10 cm and a height of 140 cm above ground level.



sapling

**sapromyophile** A fly that visits dung, rotting flesh or plants that mimic their odours.  
*cf.* **myophile**

**sapromyophily** Dispersal of pollen and pollination by sapromyophile.

**sapromyophilous** Pollinated by sapromyophiles.

**saprophyte** A plant, fungus or microorganism that has no chlorophyll and lives on decaying organic matter, as the potato orchid (*Gastrodia sesamoides*).

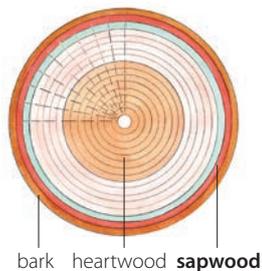
*cf.* **epiphyte, parasite**

**saprophytic** Of or relating to a saprophyte.



**sapwood** The younger layers of wood between the heartwood and the bark. It contains the functioning vascular tissue in which the sap flows.

= **alburnum**

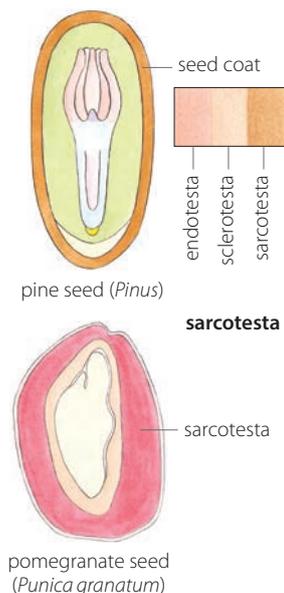


**sarcocarp** The fleshy mesocarp of a stone fruit, as a peach or a plum.  
*see* **pericarp**

**sarcotesta,**  
*pl.* **sarcotestae** Of the unitegmic seed coat of gymnosperms, the outer fleshy parenchymatous layer, the other two layers being the middle sclerotesta and the innermost endotesta, as pine (*Pinus*).

Of the bitegmic seed coat of angiosperms, if all or part of the outer integument is fleshy it is then called a sarcotesta, as pomegranate (*Punica granatum*).

**sarcotestal** Relating to or having a sarcotesta.



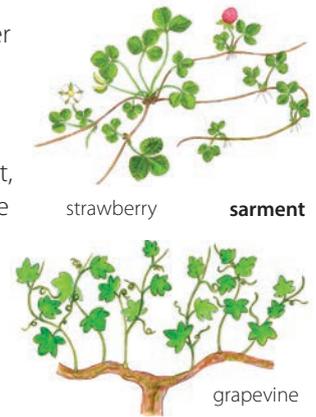
**sarment** A long slender stolon or runner, as those of the strawberry (*Fragaria*).

A flexible new vine shoot, as those of the grapevine (*Vitis vinifera*).

**sarmentiferous**

Bearing sarments.

**sarmentose** Bearing or resembling sarments.



**savanna, savannah** A plant community characterised by open grassland and very few trees due to a lack of water. Savannas are located between latitudes 30° north and 30° south of the equator. Temperatures are warm all year round. There is a characteristic long dry season in winter and a wet season in summer.

*see* **biome**

**saxicolous** Growing on cliffs, rocks and scree.  
 = **rupestral, rupestrine, rupicolous**

**scaberulent, scaberulose, scaberulous**

Slightly scabrous, slightly rough to the touch.

**scabrelate, scabrellous, scabridulous**

Minutely scabrous, usually because of minute stiff bristles.

**scabrid** Somewhat scabrous, slightly rough to the touch.

**scabrosity** Roughness. An outgrowth that gives a surface a rough texture.  
 = **asperity**

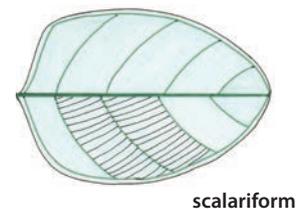
**scabrate, scabrous**

Rough or harsh to the touch due to minute projections like tiny bristles or scales.



**scalariform** Ladder-like, as a leaf with veins running parallel and appearing ladder-like.

*see* **percurrent venation**



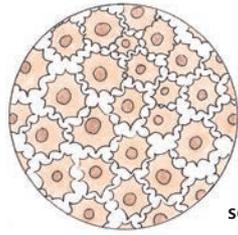
**scale** A small, thin, usually flattened dry structure.

= **squama**

see also **perule, scurf**

A plant disease or infestation caused by scale insects.

**scaly** With a covering of scales, shedding scales or flakes, resembling scales.



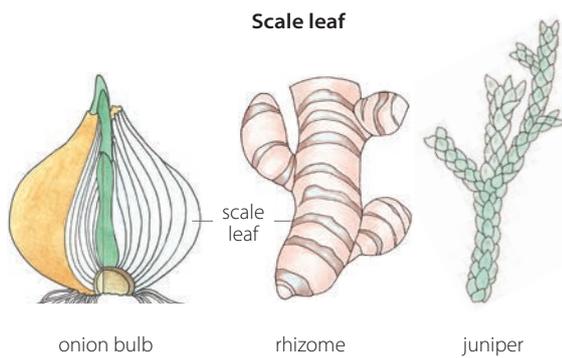
lepidote scales

**scale insect** A parasitic sap-sucking insect that adheres to plants and robs them of essential nutrients.

**scale leaf** A small often membranous modified leaf, as on a rhizome or protecting a dormant bud. The fleshy modified leaf of a bulb.

The leaves of some conifers, as juniper (*Juniperus*).

see also **tunic**



onion bulb

rhizome

juniper

**scalloped** Of a margin with rounded teeth.

= **crenate**

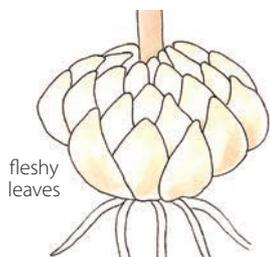


scalloped

**scaly bulb** A true bulb that consists of a compressed stem (basal plate), bearing roots and fleshy overlapping leaves that lack a tunic, as the lily genus (*Lilium*).

= **imbricate bulb, naked bulb**

see also **tunicate bulb**



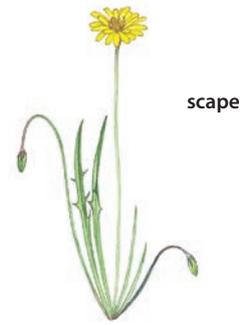
scaly bulb

**scandent** Of a plant that climbs as it grows, having a climbing habit.

**scape** A leafless stem bearing a solitary flower or an inflorescence that grows directly from the root or from a rosette of basal leaves.

**scapigerous, scapose**

Having a scape.



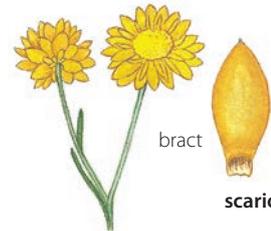
**scapiflorous** Having flowers borne on a scape.

Of a flower or inflorescence stalk arising from ground level, with or without basal leaves.

cf. **cauliflorous**

**scarious**

Thin, dry, membranous and somewhat stiff, as the bracts of golden everlasting (*Xerochrysum bracteatum*).



scarious

**scattered** Having no regular order, as leaves around a stem.



scattered

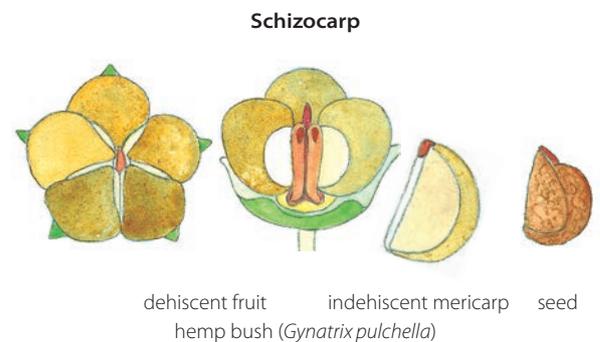
**schizocarp** A fruit type intermediate between dehiscent and indehiscent fruits.

The fruit splits into a number of indehiscent fruitlets that each contain a single seed, as a schizocarp of mericarps.

Derived from a superior or inferior two- or more loculed ovary.

see also **carcerulus, cremocarp, lomentum, regma**

**schizocarpic** Of or bearing schizocarps.



dehiscent fruit

indehiscent mericarp

seed

hemp bush (*Gynatrix pulchella*)

**schizogenous** Of intercellular spaces formed by the breakdown of the common wall between adjacent glandular initial cells, resulting in a space lined by secretory epithelial cells.

cf. **lysigenous**

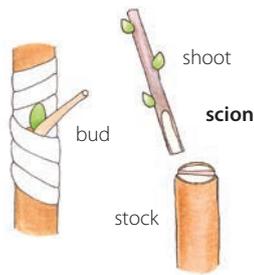
**scientific name** The published and correct scientific name of a plant as opposed to the common name, as *Malus domestica* (scientific name) and apple (common name).

see **binomial nomenclature**

**scion** A shoot, usually with two or three buds, or a single bud, that is implanted by grafting into the stock of another plant.

The aerial part of a graft.

see **budding**



**sciophile** A plant that tolerates or thrives in shade.

**sciophilous** Shade-loving.

Of plants suited to diffuse light or low light intensity.

**sciophyte** A plant that tolerates or thrives in shade, as forest understorey plants.

**sciophytic** Tolerating or thriving in shade.

**sclereid** One of variously shaped cells with thick often lignified walls.

Together with fibre cells they form sclerenchyma.

Also occur singly as an idioblast or in groups, as in the flesh of a pear where they give a gritty texture.

**sclerenchyma** Tissue, with hard tough cell walls that are impregnated with lignin, that functions as support and protects softer plant parts. It is distributed throughout the plant body, both in primary and secondary growth, and is composed of sclereids and fibre cells.

Typically sclerenchyma is dead at maturity.

**sclerenchymatous** With hard, tough cell walls that are impregnated with lignin.

**sclerification** Thickening of cell walls, that may also involve lignification, to provide rigidity.

**sclerified** Hardened.

**scleroid** Having a hard or hardened texture, as the shell of a walnut.

**sclerophyll** A type of vegetation characterised by hard leathery evergreen leaves that are adapted to reduce water loss and to survive hot dry summers and minimise the effects of fire, as the Proteaceae family.

Typical of Mediterranean-type ecosystems that include the garrigue, maquis, chaparral, matorral, fynbos and most Australian forests, heathlands and savannas.

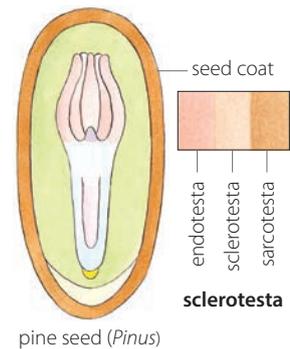
**sclerophyllous** Having tough leathery usually evergreen leaves adapted to reduce water loss.

**sclerotesta,**

pl. **sclerotestae**

Of the unitegmic seed coat of gymnosperms, the middle stony layer, the other two layers being the outer sarcotesta and the innermost endotesta, as pine (*Pinus*).

**sclerotestal** Of, relating to or having a sclerotesta.



**scobicular** In fine grains like sawdust, as most orchid seeds.

**scobiform** Resembling sawdust.



**scorpioid** Curved or coiled to one side like a scorpion's tail.

**scorpioid cyme**

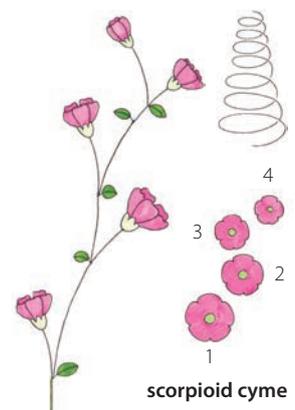
A spirally coiled cymose inflorescence with a single new stem developing from one axil only.

Branching continues to alternate from one axil to the other so that the axis is zigzagged.

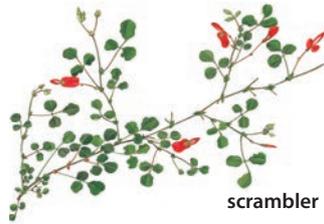
= **cincinnus**

see **monochasium**

cf. **helicoïd cyme**

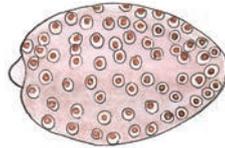


**scrambler** A plant with long stems and a sprawling, climbing or creeping habit, as running postman (*Kennedia prostrata*).



scrambler

**scrobiculate** Minutely pitted. Of a surface with shallow depressions, grooves or pits, as the seeds of passion fruit (*Passiflora edulis*).



scrobiculate

**sculpturing** Three-dimensional ornamentation on a surface, as on a pollen grain, seed or fruit. see **ornamentation**



sculpturing

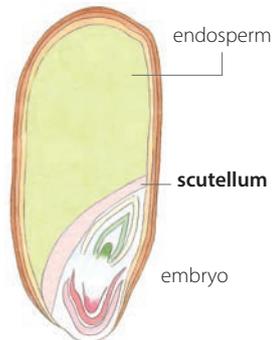
*Hakea* follicle

**scurf** Small bran-like scales.

**scurfy** Covered with minute loose flake-like scales.

**scutellum, pl. scutella**

Of a caryopsis, the more or less shield-shaped intermediate absorbing structure between the embryo and nutritive endosperm in the seed, as wheat and corn. It is thought to be a modified cotyledon.



endosperm

scutellum

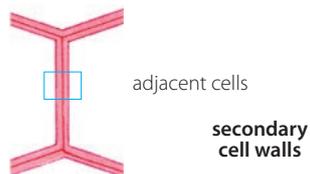
embryo

**secondary cell wall**

A rigid layer in some cells laid down between the primary cell wall and the cell membrane.

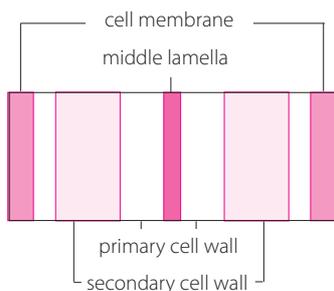
It is mainly composed of lignin.

see **middle lamella, primary cell wall**



adjacent cells

secondary cell walls



cell membrane  
middle lamella

primary cell wall  
secondary cell wall

**secondary growth** Occurs in the second and subsequent years in woody eudicots and gymnosperms (it is absent in monocots). It begins with the formation of lateral meristems (vascular cambium and cork cambium). Vascular cambium of the stems and roots produces secondary xylem (wood) on the inside and secondary phloem (bark) on the outside to increase the thickness or girth of a plant. Cork cambium produces periderm that replaces the epidermis in stems and roots.

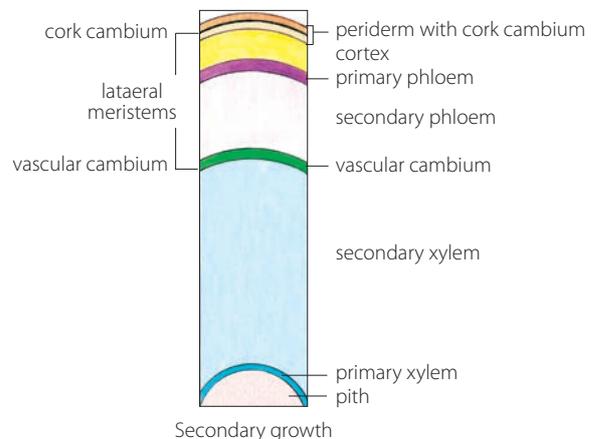
cf. **primary growth**

**secondary meristem** Two lateral meristem tissues, vascular cambium and cork cambium, found in woody plants that give rise to secondary growth. Vascular cambium produces secondary xylem (wood) and secondary phloem (bark) that increase the girth of the plant. Cork cambium (phellogen) produces periderm (outer bark) that replaces the epidermis.

= **lateral meristem**

see also **intercalary meristem, primary meristem**

Secondary meristem



Secondary growth

**secondary phloem** A secondary tissue (the inner layer of bark) derived from vascular cambium.

It occurs in vascular tissue along the roots and stems of woody angiosperms (where it consists of sieve tube members and companion cells), and of gymnosperms (where it consists of sieve cells and albuminous cells).

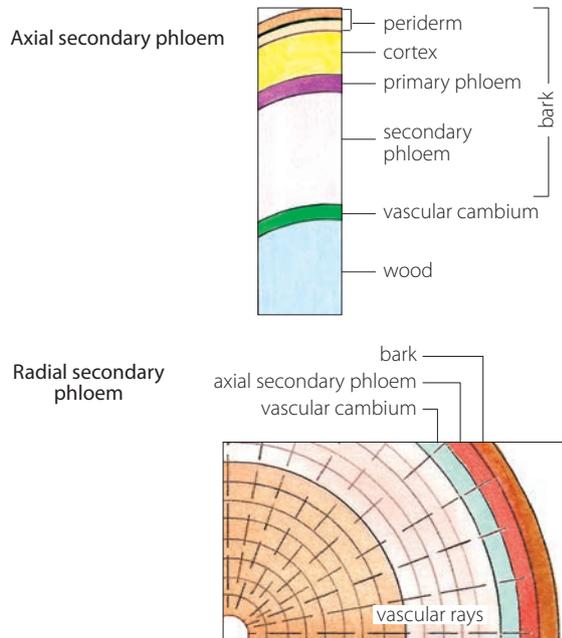
It is composed of an axial and a radial cell system. The axial system is made up of conducting cells (sieve tube elements in angiosperms and sieve cells in gymnosperms), companion cells (in angiosperms), associated parenchyma cells and phloem fibres.

**secondary phloem** page 264 (cont.)

The radial system consists of phloem rays, composed of storage parenchyma, that are continuous with rays of the secondary xylem to make up vascular rays.

see **phloem, primary phloem**

### Secondary phloem



**secondary tissue** Tissue derived from one of two secondary meristems (cork cambium or vascular cambium).

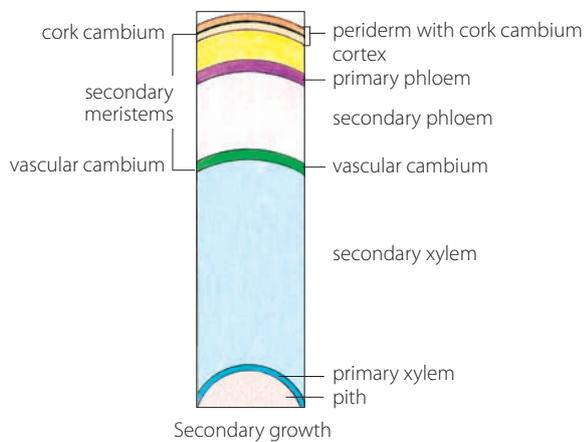
Cork cambium produces parenchymatous tissue and cork cells.

Vascular cambium produces secondary xylem and secondary phloem.

see **periderm**

cf. **primary tissue**

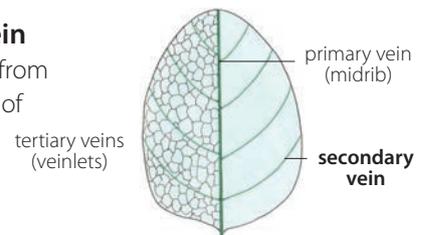
### Secondary tissue



### secondary vein

A vein arising from the main vein of a leaf.

A lateral vein.



### secondary xylem

Found in secondary growth, tissue in a vascular bundle that conducts water and mineral salts from the roots to other plant parts.

It is derived from vascular cambium, a lateral meristem, present in vascular tissue along the roots and stems of some flowering plants (woody eudicots) and gymnosperms.

The cells are thickened with deposits of lignin that provides support.

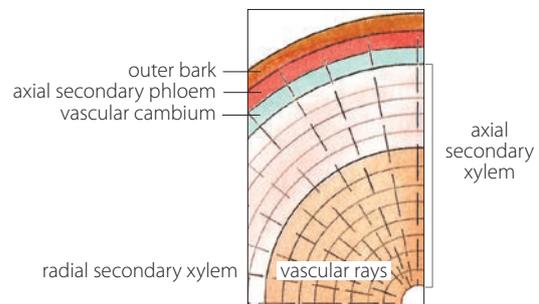
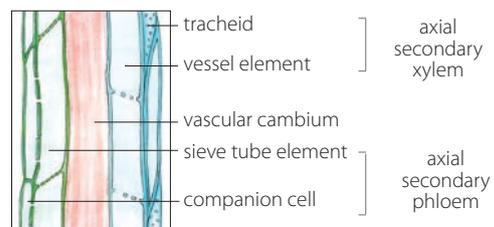
It is composed of an axial and a radial cell system. The axial system conducts water and is composed of fibres, tracheids, sclerenchyma and parenchyma, and vessel elements that are shorter and wider than those of primary xylem. It differentiates into sapwood and heartwood.

The radial system consists of xylem rays, composed of storage parenchyma, that are continuous with the rays of secondary phloem to make up vascular rays.

see **vascular bundle**

cf. **primary xylem**

### Secondary xylem



**secretion** The process of manufacturing a substance inside a cell and releasing it from the interior of the cell to its exterior.

The substance released.

**secretory** Of or relating to secretion.

Producing a secretion, as glands, nectaries, laticifers and ducts.

**-sect** A suffix meaning cut.

**sectile** Of orchids, describes pollen when it is organised into discrete subunits called massulae.

**section, sectio** Of taxonomic classification, the subdivisions of a large genus, below subgenus and above series.

**secund** Arranged along one side only, as leaves or flowers along a stem.



**sedge** Common name for a plant in the Cyperaceae family. Tufted or rhizomatous or sometimes stoloniferous or rarely tuber-producing, perennial grass-like herbs with solid, usually triangular stems that lack nodes. Flowers are inconspicuous, generally lack a perianth and are wind-pollinated. Fruit is an achene.

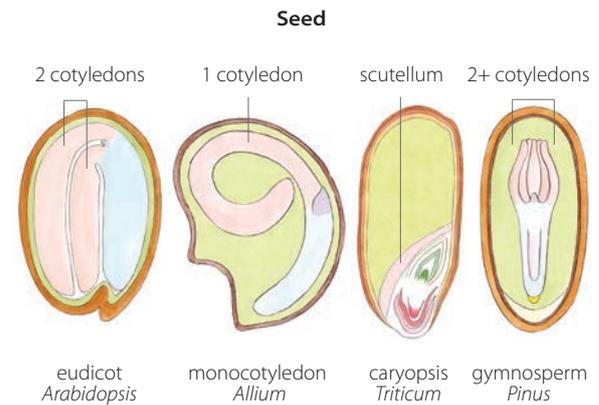


**seed** The propagation unit of seed plants (Spermatophyta) that include gymnosperms (conifers and related groups) and angiosperms. A ripened ovule that is capable of germinating and developing into another plant. It consists of a diploid embryo, food storage or nutritive tissue and a protective seed coat of one or more layers.

In angiosperms seeds are enclosed in the fruit (the ripened ovary).

In gymnosperms, seeds are borne naked on the surface of scales that form cones.

see **albuminous ~, cotyledon, endospermic ~, exalbuminous ~, non-endospermic ~**



**seed coat**

The outer covering of a seed that develops primarily from the integument(s) of the ovule after fertilisation.

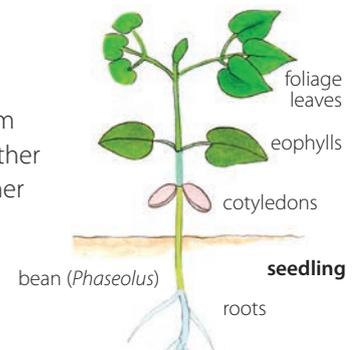
It may have a mechanical layer that protects the embryo within or it may be variously embedded in a protective fruit wall (pericarp).

see **bitegmic, unitegmic**

**seed leaf** A cotyledon.

**seed plants** Spermatophyta, the seed-producing angiosperms and gymnosperms.

**seedling** The next growth phase after germination. A plant resulting from seed germination rather than a cutting or other form of vegetative propagation. Of trees, the stage before a sapling.



**segment** A natural division or part, as a leaf that has three lobes or segments.



**segregate** In taxonomy, to separate or split off a part of a taxon.

**self-compatible** Of a plant capable of producing viable seeds from its own pollen.  
= **self-fertile**

**self-fertile** Of a plant capable of producing viable seeds from its own pollen.  
= **self-compatible**

**self-fertilisation** Fertilisation of an ovum of by a sperm cell from the pollen of the same flower or from another flower on the same plant.  
= **selfing**

**self-incompatible** Of plants that are unable to self-fertilise and produce viable seeds.  
= **self-sterile**

**self-pollination** The pollination of a flower by pollen from the same flower or from another flower on the same plant.  
= **autogamy, selfing**  
*cf.* **obligate outcrosser**

**self-sterile** Of plants that are unable to self-fertilise and produce viable seeds.  
= **self-incompatible**

**selfing** Fertilisation of an ovum by a sperm cell from the pollen of the same flower or from another flower on the same plant.  
= **autogamy, self-fertilisation**  
*cf.* **obligate outcrosser**

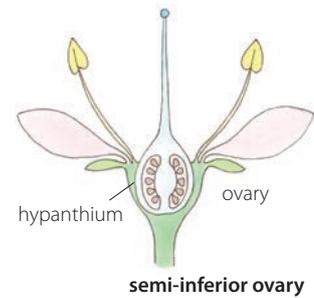
**semelparous** Of a plant that reproduces once in its lifetime then dies.  
An annual is semelparous, as rice (*Oryza sativa*). Some semelparous plants are long-lived, as century plant (*Agave americana*), the talipot palm (*Corypha*) and some species of bamboo.  
= **monocarpic**  
*cf.* **hapaxanthic, iteroparous, pleoanthic, polycarpic**

**semi-** A prefix meaning half or partly.

**semi-craspedodromous**  
Of leaves with secondary veins forking just within the margin, one branch terminating at the margin, the other joining the vein above.  
*see* **craspedodromous**



**semi-inferior ovary**  
An ovary having the lower half embedded in the hypanthium and the upper part free.  
= **half-inferior ovary**  
*cf.* **inferior ovary, superior ovary**



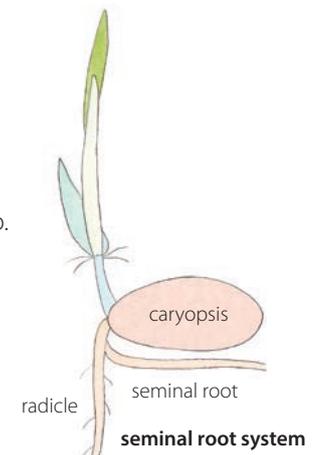
**semi-parasite** Another term for hemiparasite.

**semicarpous**  
Of a gynoecium with adjacent carpels partly fused and their styles and stigmas free.  
*cf.* **synovarious**



**seminal** Relating to a seed.

**seminal root system**  
Temporary roots, including the radicle, found in grasses (Poaceae). They arise from nodes on the root primordia in the embryo. Together they form the first or primary roots. These sustain the seedling until they are replaced by the adventitious roots that arise from the crown.



**senescence** Changes in the life cycle of a plant that lead to death of cells, tissues and eventually the whole organism.

**senescent** Becoming old and losing the power of cell division and growth.

**sens. abbr., sensu** In the sense of.

**sens. lat., s.l., abbr., sensu lato** Used to refer to a taxon in a broad sense, as a taxon that may have smaller groups within it.

**sens. str., s.str. abbr., sensu stricto** Used to refer to a taxon in a narrow sense, as a reference to the type specimen.

**sensu**, *abbr.* **sens.** In the sense of.

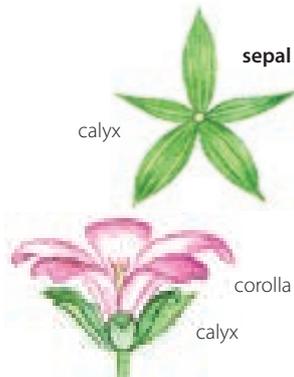
**sensu lato**, *abbr.* **sens. lat., s.l.** Used to refer to a taxon in a broad sense, as a taxon that may have smaller groups within it.

**sensu stricto**, *abbr.* **sens. str., s.str.** Used to refer to a taxon in a narrow sense, as a reference to the type specimen.

**sepal** One of the segments of the calyx of a flower. Typically green and leaf-like, but petaloid in most monocotyledons.

**sepaline** Relating to, attached to or resembling a sepal.

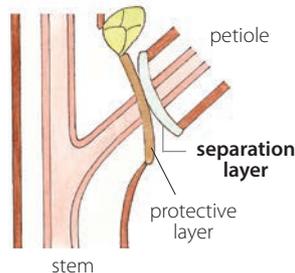
**sepaloid** Having the form of a sepal.



**sepalody** The abnormal development of floral parts into sepals or sepaloid organs.

### separation layer

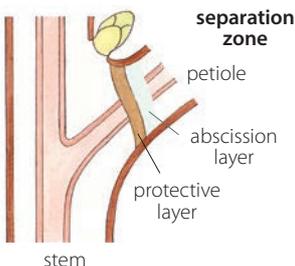
A layer of cells that disintegrates to facilitate the fall of a plant part, as a leaf or fruit. It forms in the abscission zone of some plants.  
= **abscission layer**



### separation zone

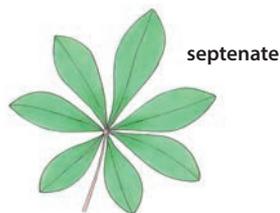
The zone, as at the base of a leaf, in which shedding occurs. It includes the protection layer and the abscission layer.

= **abscission zone**



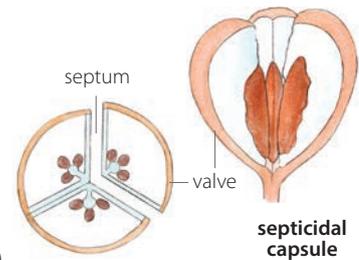
### septenate

Having seven parts, as a palmate leaf with seven leaflets attached to the tip of the petiole.



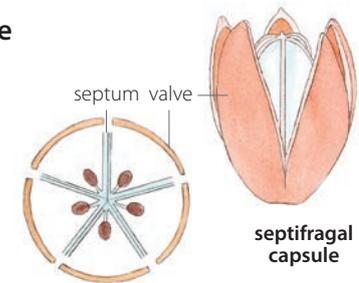
### septicidal capsule

A capsule that splits lengthwise through the fused sides (septa) of the carpels, as holywood (*Guaicum sanctum*).



### septifragal capsule

A capsule that splits so that the valves breakaway from the septa, as Argentine cedar (*Cedrela angustifolia*).  
= **valvular capsule**

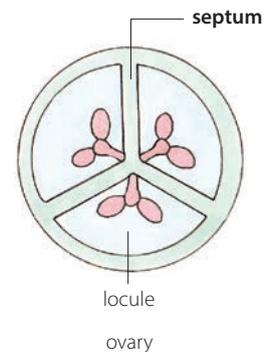


### septum, pl. septa

A partition or wall separating two cavities. In an ovary or fruit, it is usually formed by the fusion of adjacent carpel walls.

= **dissepiment**

**septate** Divided by one or more partitions, as an ovary divided into locules by internal walls (septa).



**ser.** An abbreviation for series.

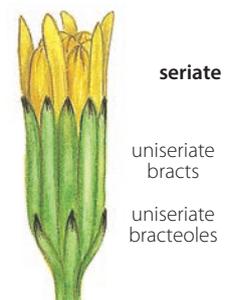
**ser., series** In taxonomic classification, one of the subdivisions of a large genus. The lowest rank below subgenus and section.

**sere** One of the stages in the species structure of a plant community as it evolved over time.

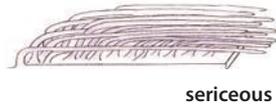
see **ecological succession**

**seral** Of or relating to a sere.

**seriate** Arranged in one or more rows or whorls. Usually written with a prefix, as uniseriate (in one row or whorl), biseriate (in two rows or whorls), multiseriate (in many rows or whorls).  
*cf.* **cyclic**



**sericeous** Silky with fine, slender, soft, smooth and glossy appressed hairs, as the young leaf of *Neolitsea sericea*.  
cf. **velutinous**



sericeous

**series, abbr. ser.** In taxonomic classification, one of the subdivisions of a large genus. The lowest rank below subgenus and section.

**serotiny** Of seeds remaining in the fruit after maturity and the fruit staying on the plant, often for many years, until exposure to certain conditions, like fire, as the follicles of some banksias (*Banksia*).  
**serotinous** Relating to serotiny.

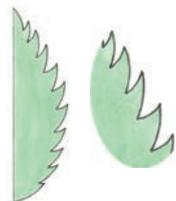


banksia (*Banksia*)

serotiny

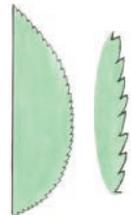
follicle

**serrate** Of a margin that is dentate but toothed like a saw with the teeth pointing forwards, as the margins of some leaves.



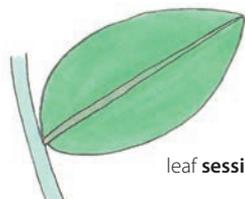
serrate

**serrulate** Minutely serrate. Of a margin that is minutely toothed, like a saw with the teeth pointing forwards, as the margins of some leaves.



serrulate

**sessile** Without a stalk and attached directly at the base, as a leaf without a petiole, a flower without a pedicel or a stigma without a style.



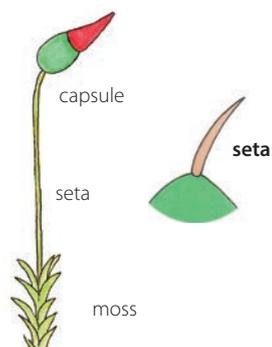
leaf sessile

**seta, pl. setae** A bristle or stiff hair. Of mosses and liverworts, the stalk supporting the capsule.

**setiferous, setaceous** Bearing bristles.

**setiform** Bristle-like, bristle-shaped.

**setose** Bristly.



capsule

seta

seta

moss

**setulose** Having small bristles or setae.

**sexine** The outer, sculptured layer of the exine that lies above the nexine in the wall of a pollen grain.  
see **pollen wall**

**sexual phase** The production of gametes for reproduction.

The haploid phase in the life cycle of a plant represented by the male and female sex cells (gametes).

= **gametophyte generation**

see also **alternation of generations**

**sexual reproduction** The fusion of the male sperm cell with the female egg cell, at fertilisation, to produce the beginnings of a new individual (a zygote).

cf. **asexual reproduction**

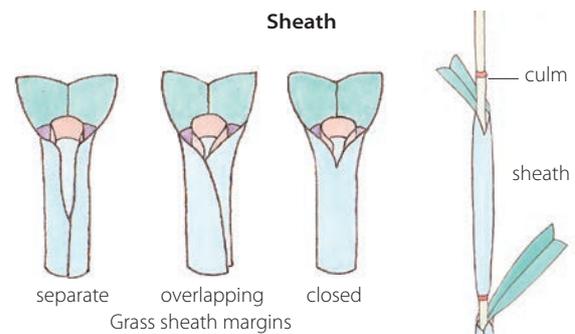
**sheath** A tubular or rolled structure that surrounds, at least partly, another organ.

In grasses (Poaceae), the tubular or rolled part of the leaf that encloses the culm. Sheath margins may be separate, overlapping or closed to form a tube.

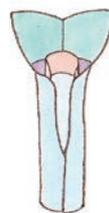
see **leaf sheath**

**sheathing** Enclosing or closely enveloping, as the tubular or rolled part of the leaf that encloses the culm in grasses.

see also **vaginate**



Sheath



separate

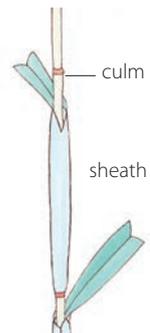


overlapping



closed

Grass sheath margins



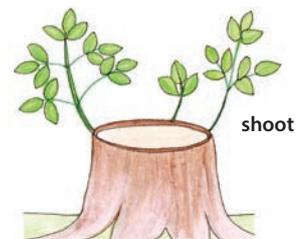
culm

sheath

**shoot** New growth, usually on the aerial part of a plant, as leaf or flower buds or new stems.

To sprout.

Of a seed, to germinate.



shoot

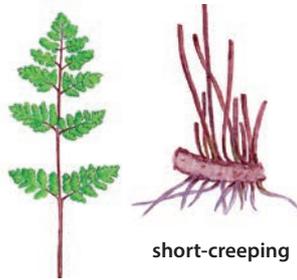
**shoot system** One of two plant organ systems, the other being the root system.

The above-ground parts of the plant that include the vegetative parts, (the leaves and stems) and reproductive parts (the flowers and fruit).

**short-creeping**

Of ferns, having a rhizome that elongates slowly so that the fronds are clustered, as most lip ferns (*Cheilanthes*).

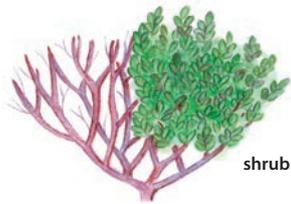
cf. **long-creeping**



short-creeping

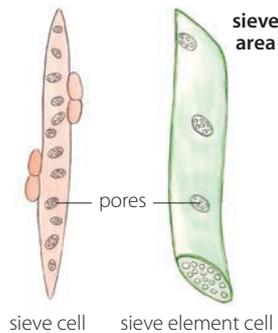
**shrub** A low woody perennial plant with several stems and no distinct trunk.

= **bush**



shrub

**sieve area** A region of a sieve cell wall in gymnosperms or a sieve element cell wall in angiosperms, with clusters of pores through which adjacent cells are interconnected for the transport of nutrients.

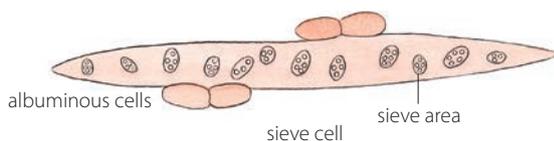


sieve cell sieve element cell

**sieve cell** An elongated food-conducting cell, associated with albuminous cells, in the phloem of gymnosperms and lower vascular plants. They are arranged in longitudinal rows and are connected to each other by surface pores (sieve areas) through which nutrients flow. Vertical rows of sieve cells perform the same function as sieve tubes in angiosperms.

cf. **sieve tube element**

**Sieve cell**



albuminous cells sieve cell sieve area

**sieve element** The main conducting component of phloem, so called because the walls have pores (sieve areas).

There are two types of sieve elements: less specialised sieve cells, typically associated with

albuminous cells, in lower vascular plants and gymnosperms and more specialised sieve tube elements, typically associated with companion cells, in angiosperms.

= **sieve member**

**sieve member** Another term for sieve element.

**sieve plate**

The perforated end wall of a sieve tube element in angiosperm phloem through which cytoplasm moves from one cell to another.

Absent in the phloem of gymnosperms and lower vascular plants.

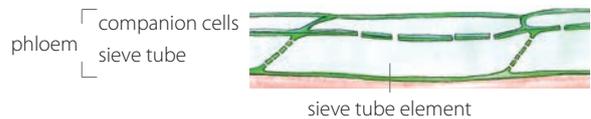
cf. **perforation plate**



sieve plate

**sieve tube** A longitudinal conducting tube in the phloem of angiosperms consisting of a vertical series of elongated sieve tube elements connected end to end by porous walls (sieve plates). Its function is to translocate products of photosynthesis throughout the plant.

**Sieve tube**



phloem companion cells sieve tube

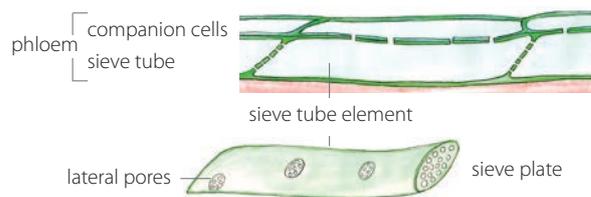
sieve tube element

**sieve tube element** One of the elongated conducting cells, typically associated with a companion cell, in the phloem of angiosperms. They are arranged in longitudinal rows to form a long sieve tube and are connected to each other by surface pores on the lateral surfaces and sieve plates on the adjoining ends of the cell walls.

= **sieve tube member**

see **sieve element**

**Sieve tube element**



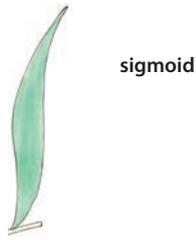
phloem companion cells sieve tube

sieve tube element

lateral pores sieve plate

**sieve tube member** Another term for sieve tube element.

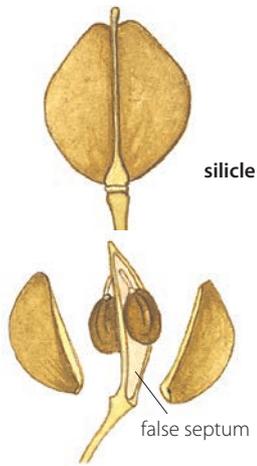
**sigmoid, sigmoidal**  
Shaped like the letter S, as the leaflets of some palms (Arecaceae).



**silica, silica dioxide** A colourless to white chemical compound. In plants it is found in some hairs, in cell walls and in specialised silica cells in grasses.  
**siliceous** Relating to or containing silica.

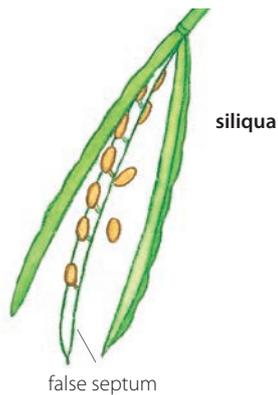
**silicle, silicule, silicula**

A stout dry fruit not more than twice as long as wide that splits into halves lengthwise usually leaving a persistent partition (false septum). Derived from a syncarpous two-carpelled superior ovary, as shepherd's purse (*Microlepidium pilosulum*).  
see also **replum**  
cf. **siliqua**



**siliqua, silique,**  
pl. **siliquae**

A dry fruit that splits into halves lengthwise usually leaving a persistent partition (false septum), as bittercress (*Rorippa*). It is two or three times longer than it is broad. It is derived from a syncarpous two-carpelled superior ovary.  
see also **replum**  
cf. **silicle**



**silk** The mass of long filiform styles at the top of female inflorescence (ear) of corn.  
see **tassel**

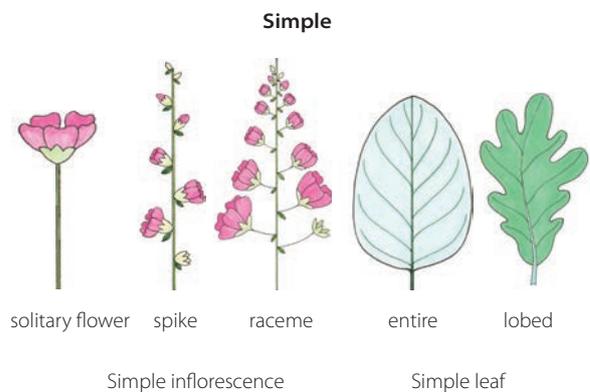


**silky** With fine soft hairs, as the bracts and seeds of quaking aspen (*Populus tremuloides*).

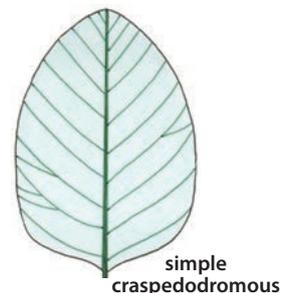


**silt** A loose sedimentary soil composed of very fine particles ranging in size from 0.002 to 0.5 mm in diameter. Intermediate in size between sand and clay.

**simple** Undivided, unbranched, as a simple inflorescence.  
Of a leaf, with the margin entire, lobed or toothed, but not divided into leaflets.  
cf. **compound**



**simple craspedodromous**  
Of leaves with all of the secondary veins and their branches terminating at the margin.  
= **marginal venation**  
see **craspedodromous**



**simple fertilisation** Two haploid sperm cells are produced by gymnosperms. When the nuclei of the two sperm cells meet the egg cell, one nucleus dies and the other unites with the egg nucleus to form a diploid zygote.  
cf. **double fertilisation**

**simple fruit** A fruit that develops from a single flower with one carpel.  
It may be dry and dehiscent as a follicle, dry and indehiscent as an achene, or fleshy and indehiscent as a drupe.

cf. **accessory fruit, aggregate fruit, compound fruit, composite fruit, schizocarp**

**Simple fruit**



follicle

achene

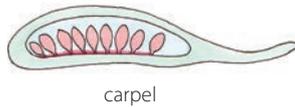
drupe

**simple gynoecium**

A pistil with only one carpel, as a pea (*Pisum*).

cf. **compound gynoecium**

**simple gynoecium**



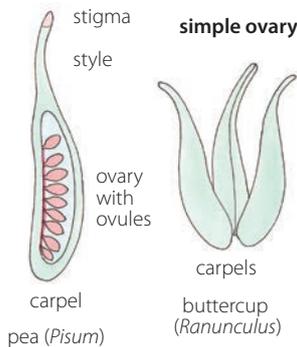
carpel

**simple ovary**

The ovary of a single free carpel.

A flower may have one simple ovary, as peas (*Pisum*), or more than one simple ovary, as buttercups (*Ranunculus*).

cf. **compound ovary**



stigma  
style

**simple ovary**

ovary with ovules

carpels

carpel  
pea (*Pisum*)

buttercup  
(*Ranunculus*)

**simple tissue** Tissue composed of one kind of cell, as ground tissue (parenchyma, collenchyma or sclerenchyma).

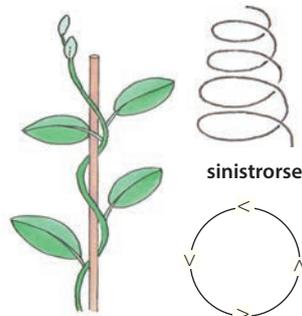
cf. **complex tissue**

**sinistrorse** Twining from the base in a spiral from right to left, as seen from the side.

Twining in an anti-clockwise direction, as seen from above.

see also **twiner**

cf. **dextrorse**

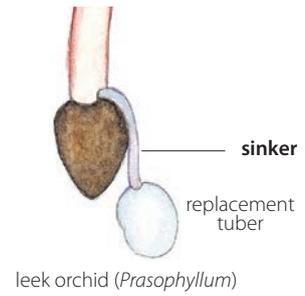


**sinistrorse**

**sinker** A root that grows downward from a bulb or corm that bears a replacement bulb or corm.

Of orchids, the short root that bears the replacement tuber.

= **dropper**



**sinker**

replacement tuber

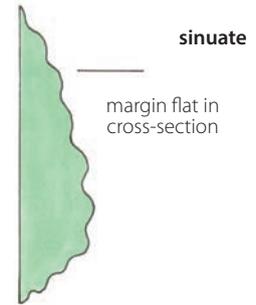
leek orchid (*Prasophyllum*)

**sinuate, sinuose, sinuous**

With margins more or less flat in cross-section and curving strongly inward and outward like the movement of a snake, as the margins of some leaves.

see also **repand**

cf. **sinuolate, undulate,**



**sinuate**

margin flat in cross-section

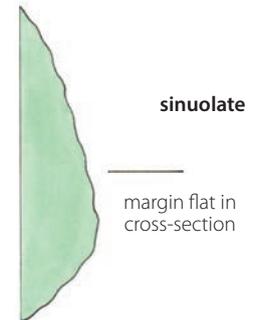
**sinuolate**

With margins more or less flat in cross-section and curving slightly inward and outward like the movement of a snake, as the margins of some leaves.

Slightly sinuate.

= **repand**

cf. **sinuate**



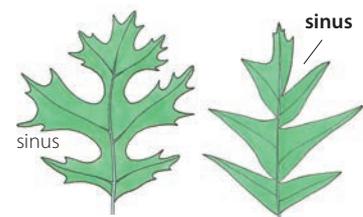
**sinuolate**

margin flat in cross-section

**sinus** The gap between two lobes or segment.

It may be rounded to angular.

cf. **lobe**



**sinus**

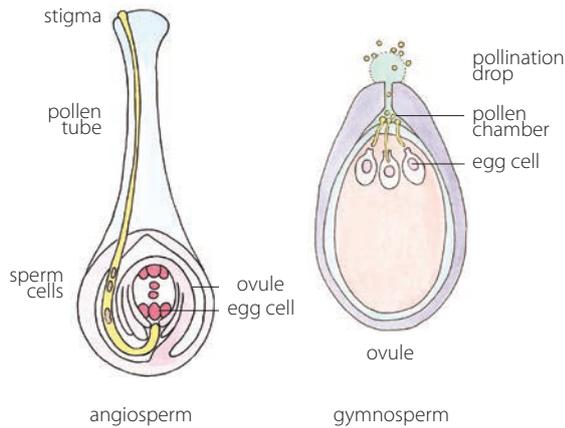
sinus

**siphonogamy** Process in which a non-motile male sperm is carried to the egg cell by a pollen tube, in all angiosperms from the stigma and in most gymnosperms from the pollen chamber.

**siphonogamy** page 272 (cont.)

see **pollination drop.**

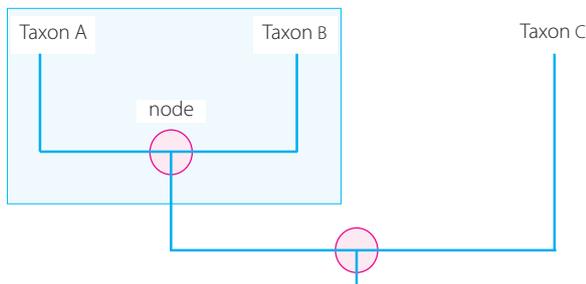
**Siphonogamy**



**siphonostele** Stele having a central pith. Surrounded by a cylinder of vascular tissue. Common in ferns.

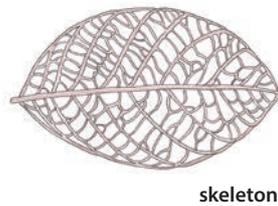
**sister clade, sister group, sister taxa** In a phylogenetic tree, two descendants that split from the same node. *see also* **speciation event**

**Sister taxa**

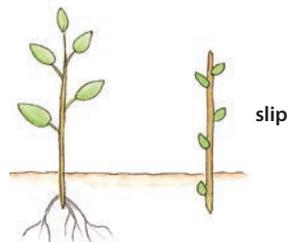


**skeleton** Framework, as veins are the framework of a leaf.

**skeletonised** To reduce to a skeleton, as occurs when some insects attack a leaf.



**slip** Part of a stem, leaf or root that is cut off and grows roots and shoots to produce a new plant. = **cutting** *see also* **grafting**

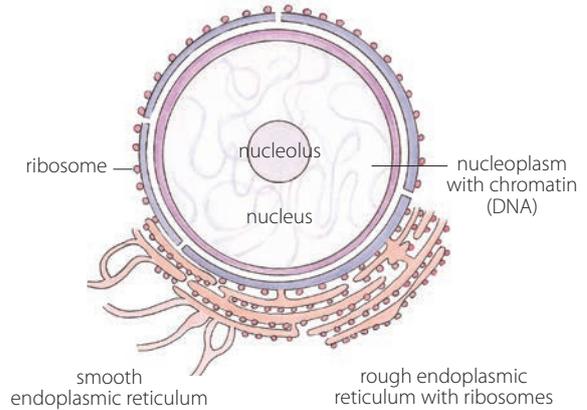


**smooth** Free from roughness or hairs, glabrous.

**smooth endoplasmic reticulum**

Endoplasmic reticulum that is 'smooth' because it lacks ribosomes. It is involved in the synthesis of lipids. *cf.* **rough endoplasmic reticulum**

**Smooth endoplasmic reticulum**



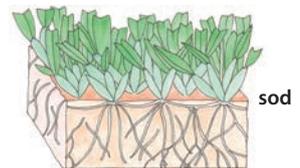
**sobel, sobole** A thin rhizome or a runner forming plants at short distances.

**soboliferous** Clump-forming. Bearing or producing soboles, as some grasses.



**sobole**

**sod** A section of grass-covered surface soil held together by matted roots. Turf.



**sod**

**softwood** The wood of gymnosperms, though the wood is not always soft. Softwood trees include pines, redwoods and larches. *cf.* **hardwood**

**solute** A substance dissolved in another substance (a solvent) to create a solution, as salt (the solute) dissolved in water (the solvent).

**solution** A homogeneous mixture having one substance dissolved in another, as salt (the solute) is dissolved in water (the solvent), or carbon dioxide gas (the solute) dissolved in water (the solvent). The substances may be solids, liquids or gases.

**solvent** A substance in which another substance (solute) is dissolved to form a solution, as water (the solvent) in which salt (the solute) is dissolved.

**somatic cell** All the cells in a plant that are not reproductive cells, usually with two sets of chromosomes (2n).

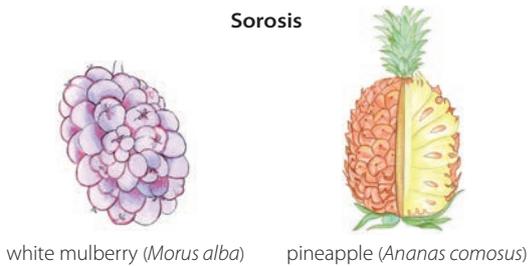
cf. **reproductive cell**

**sorosis, pl. soroses**

Fruitlets on a common axis that are usually coalesced and derived from the unisexual flowers of a female inflorescence, as pineapple (*Ananas comosus*) and the fruit from the catkin of the white mulberry (*Morus alba*).

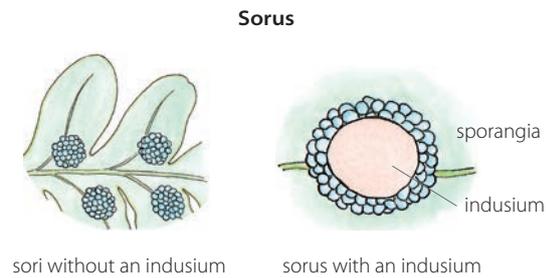
The fruit of the white mulberry consists of the succulent calyxes of the inflorescence, with each calyx containing an achene.

see **composite fruit**



**sorus, pl. sori** A cluster of sporangia variously arranged on the undersurface of a fern frond. It may or may not be covered by an indusium or false indusium.

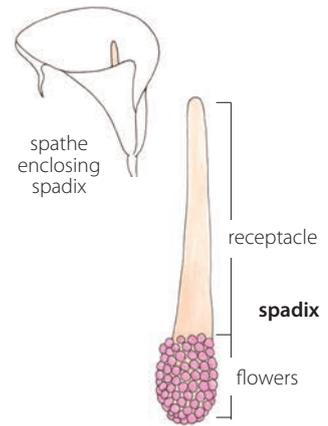
**soriferous** Bearing sori.



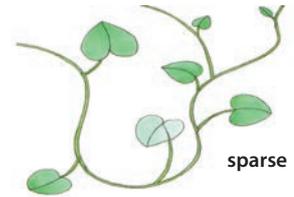
**sp., pl. spp.** An abbreviation for species.

**spadix, pl. spadices**

A spike of minute flowers arranged on a fleshy receptacle and typically enclosed in a sheath-like spathe. Flowers are unisexual and commonly at the base of the elongated receptacle, as the arum lily genus (*Arum*). A racemose inflorescence.



**sparse** Thinly scattered, not dense, as leaves on a stem.



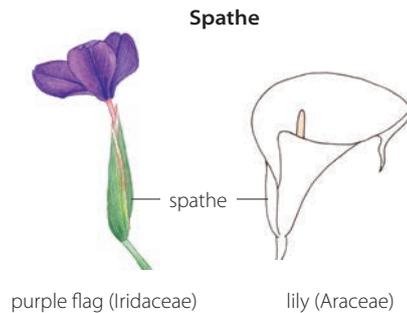
**spathe** A large bract sheathing an inflorescence: one of the bracts that subtend the inflorescence of palms (Arecaceae).

Two or more bracts enclosing the flowers of the iris family (Iridaceae).

The large bract enclosing the flower spike (spadix) of the arum family (Araceae).

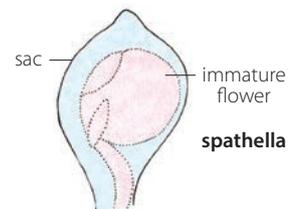
see **spadix**

**spathaceous, spatheate** Like or with a spathe.



**spathella**

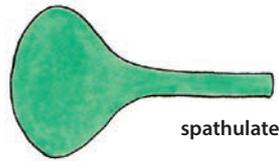
A membranous sac enclosing the immature flower in the riverweed family (Podostemaceae).



**spatheole** A small or secondary spathe.

**spathulate, spatulate**

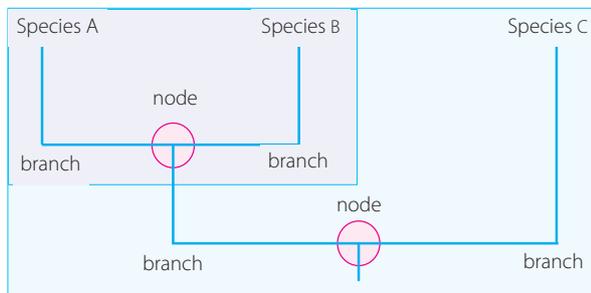
Spatula-shaped.  
With a broad, rounded apex and narrowed at the base.



**speciation** The evolutionary formation of a new species by the splitting of a single line of descent into two or more genetically independent lineages.

**speciation event** A lineage splitting event that produces two or more new species.  
The branching point that occurs at a node in a cladogram represents a speciation event.

**Speciation event**

**species, abbr. sp., pl. species, abbr. spp.**

The basic unit of taxonomic classification that is a group of individuals, with common biological characteristics, that are capable of interbreeding and producing fertile offspring.

A taxonomic species has two names, the first is the genus name, the second the species name (specific epithet), as *Geranium robertianum*.

A phylogenetic species is the smallest set of individuals that share a common evolutionary ancestor.

see **taxonomic hierarchy**

**species complex** A group of closely related species, in which the limits between them are unclear, that have been assigned to a single species.

**specific epithet** Of a scientific name, the word denoting species that follows the name of the genus, as *Geranium robertianum*.

see **binomial nomenclature**

**specimen** A plant, or part of a plant, collected and preserved for scientific study, that is usually lodged in a herbarium.

**sperm cell, spermatogenous cell**

In ferns, mosses, liverworts and hornworts, a male gamete (sex cell) that unites with the female gamete (egg cell) to form a zygote.

In angiosperms, one of two male microgametes, derived from the generative cell in the pollen grain; one unites with the female egg cell to form a zygote and the other unites with the central cell to form the seed's endosperm.

In gymnosperms, one gamete unites with the egg cell and the second cell disintegrates.

see **microgametogenesis, pollen tube**

see also **double fertilisation, generative cell, spore**  
cf. **egg cell, megagamete, ovum**

**-sperma, -spermous** A suffix meaning seed.

**Spermatophyta, spermatophytes**

The seed plants that comprise the flowering plants (angiosperms) and a group of non-flowering plants (gymnosperms) that includes conifers and cycads.

see **euphylophytes**

= **phanerogam**

cf. **cryptogam**

**spermatozoid, pl. spermatozoa**

A motile male gamete, that moves by means of whip-like hairs (flagellae).

In bryophytes and ferns it is produced in the antheridia.

Also found in some gymnosperms, where it is formed in the pollen tube prior to fertilisation.

= **antherozoid**

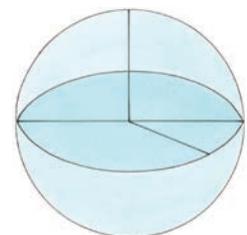
cf. **oosphere**

**spermoderm** Seed coat.

**sphere** A perfectly round object but three-dimensional as a ball.  
A three-dimensional surface with every point on the surface equidistant from the centre.

cf. **globose**

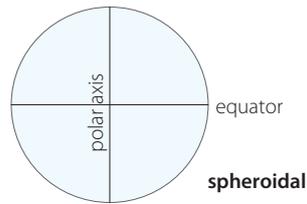
**spherical** Relating to a sphere.



**sphere**

**spheroidal**

Of an object with the polar axis and the equatorial diameter more or less equal.  
= **isodiametric**

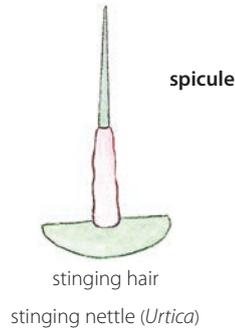


**spicule** A spikelet.

One of the minute silica stinging hairs on the leaves and stems of stinging nettles (*Urtica*).

**spiculate** Covered with small spicules.

**spicular** Resembling a spicule. Bearing spicules.



**spike**

A racemose inflorescence in which the floral axis bears single sessile flowers.

The axis continues to grow indefinitely with the youngest flower on the stem near the growing point at the apex and the oldest at the base.

A spike can be simple or compound.

Of grasses (Poaceae) and some sedges (Cyperaceae), the arrangement of sessile spikelets (rather than flowers) on the axis of the inflorescence.

An indeterminate or indefinite inflorescence.

see **acropetal, centripetal**

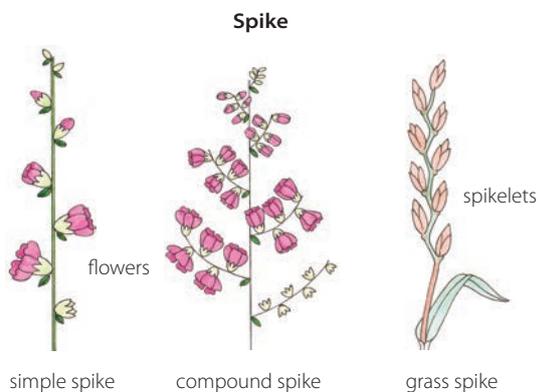
see also **cymose inflorescence**

cf. **digitate inflorescence, panicle, raceme**

**spicate** Spike-like.

Of an inflorescence, arranged in a spike or spikes.

**spiciform** Having the appearance, but not necessarily the structure, of a spike.



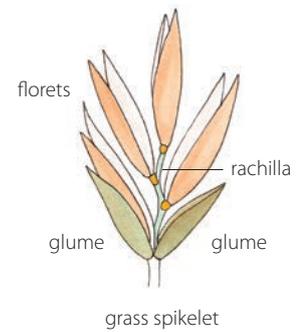
**spikelet** A little spike.

A secondary spike in a compound spike.

In grasses (Poaceae), the basic unit of the inflorescence, typically composed of two bracts (glumes) at the base of an axis (rachilla), with one or more florets arranged alternately in two ranks.

= **locusta**

**Spikelet**



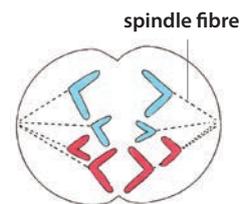
**spike moss**

The spike moss family (Selaginellaceae) comprises one genus (*Selaginella*) of mossy or fern-like vascular plants with single-veined leaves. Spores are of two kinds (heterosporous).

see **fern allies**



**spindle fibre** Any of the filaments responsible for pulling apart the chromosomes during nuclear division in meiosis and mitosis.



**spine** A sharp hard outgrowth on a plant derived from a modified plant organ, like the petiole or stipule of a leaf, as those on barberry (*Berberis vulgaris*).

The modified leaf of a cactus.

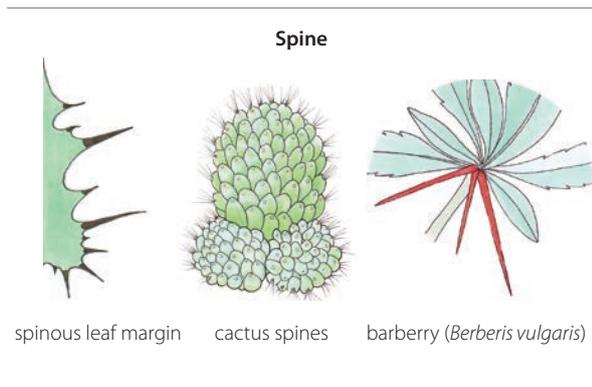
**spine** page 276 (cont.)

cf. **thorn**

**spinescent** Ending in a spine, modified to form a spine, tending to be spiny, as the margins of some leaves.

**spiniform** Shaped like a spine.

**spinose, spinous** Bearing spines.



**spinule** A small spine.

**spinulose** Bearing small spines.

**spiracle** One of the mucilaginous threads released from hairs on the surface of the testa of some seed when they become wet, as gilia (*Giliastrum*).

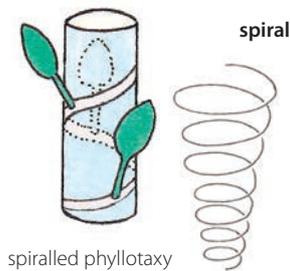
**spiral** A coil.

cf. **verticil**, **whorled**

**spiralled** The shape of or following the path of a coil, as leaves arranged around an axis.

see **phyllotaxy**

cf. **verticillate**, **whorled**



**splitter** A taxonomist who uses subtle differences to subdivide species, resulting in a larger number of taxa.

**spongy** Porous in texture, compressible and absorbent.

= **spongy**

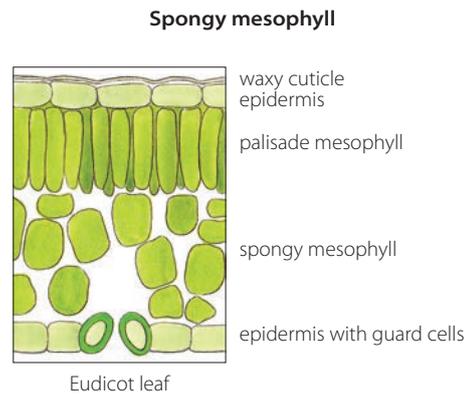
**spongy** Porous in texture, compressible and absorbent.

= **spongy**

**spongy mesophyll** The layer of photosynthetic parenchyma cells internal to the lower epidermis of a eudicot leaf.

The irregularly shaped cells are separated by air spaces that allow for exchange of gases.

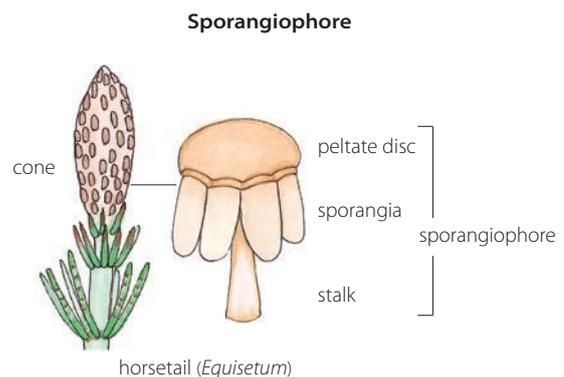
Spongy mesophyll cells communicate with guard cells, causing them to open or close the stomata depending on the concentration of gases in the air spaces.



**spongy parenchyma** Another term for spongy mesophyll.

**sporadic** Occurring at intervals that have no apparent pattern.

**sporangiophore** The organ bearing sporangia on the cone of horsetails (*Equisetum*).



**sporangium, pl. sporangia** A structure in which spores are formed.

Seed plants (angiosperms and gymnosperms) have two kinds of sporangia: the male microsporangium and the female megasporangium.

In angiosperms, the microsporangia are the pollen sacs in the anther and in gymnosperms the microsporangia are the pollen sacs borne on the lower surface of the cone scales.

In angiosperms and gymnosperms, the megasporangium is the nucellus in the ovule.

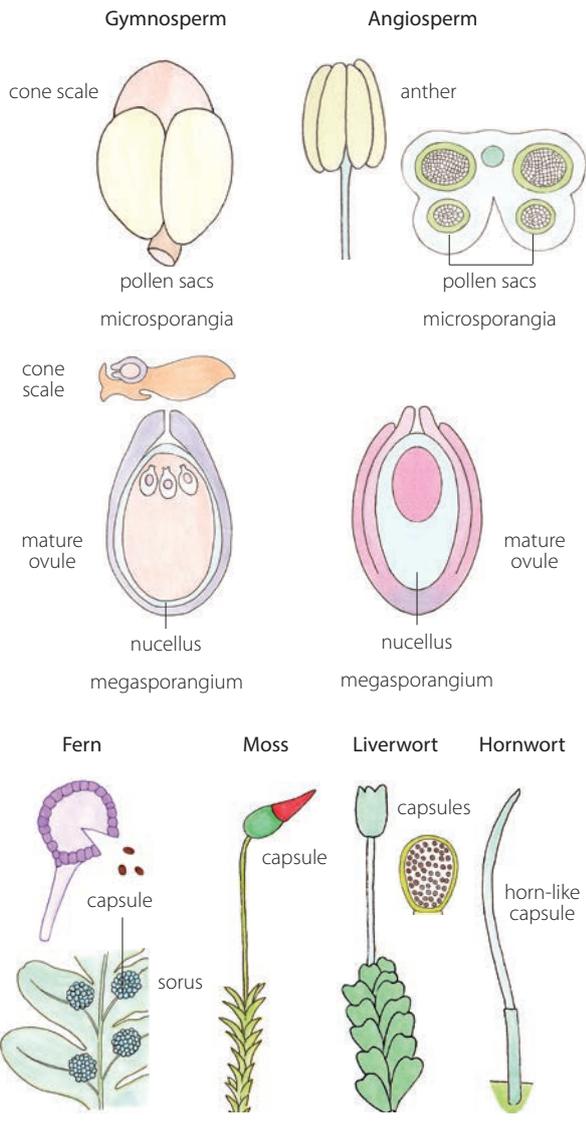
In angiosperms, the ovule is enclosed in the ovary. In gymnosperms, the ovule is exposed on a cone scale.

In ferns, the sporangia are capsules clustered in sori on the underside of the fronds.

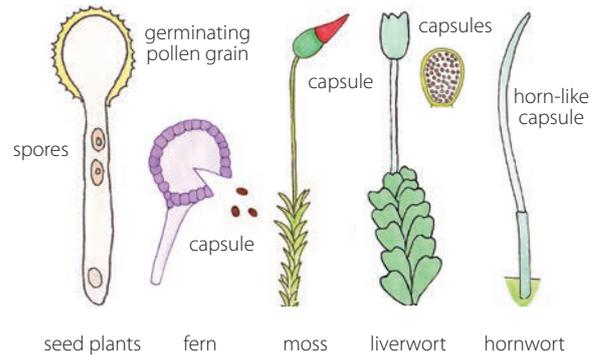
In bryophytes (mosses, liverworts and hornworts), the sporangium structure is a capsule.

see **heterospory**, **homospory**

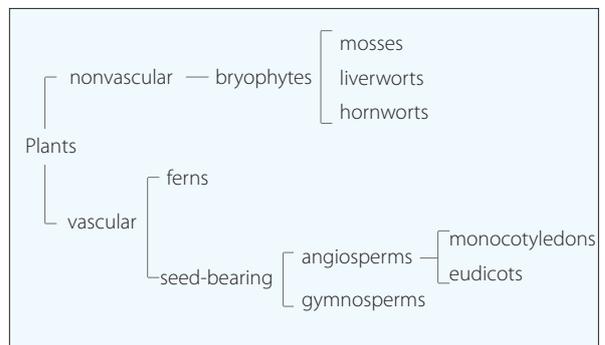
## Sporangium



## Spore



## Spore-bearing plants



**spore** A reproductive cell capable of developing into a new individual, either directly or after fusion with another spore.

In seed plants (angiosperms and gymnosperms), one of the two haploid cells in the pollen grain; one (the male gamete) unites with the female egg cell (the female gamete) to form a zygote.

= **sperm cell**

In nonvascular plants, like mosses, liverworts and hornworts, and seedless vascular plants, like ferns, clubmosses and whisk ferns, the haploid reproductive cell produced in the capsule (sporangium) that germinates to form the male and/or female haploid gametophyte. Gametophytes produce male and female gametes.

see **megaspore, microspore**

see also **alternation of generations, heterosporous, homosporous**

cf. **gamete**

**spore mother cell** A diploid cell in spore-bearing plants that gives rise, by meiosis, to four haploid spores.

= **sporocyte**

see also **megaspore mother cell, microspore mother cell, spore, sporogenesis**

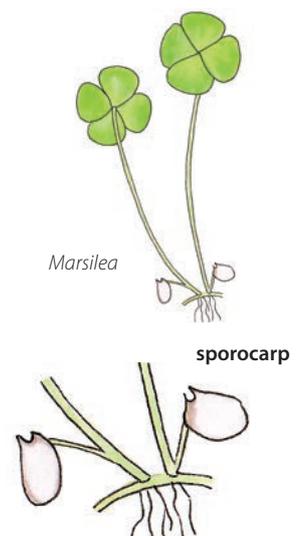
**sporiferous** Bearing spores.

**sporocarp** A fruiting body that produces and releases spores in some heterosporous aquatic ferns like water clover (*Marsilea*).

Found only in the aquatic fern families Azollaceae, Marsileaceae and Salviniaceae.

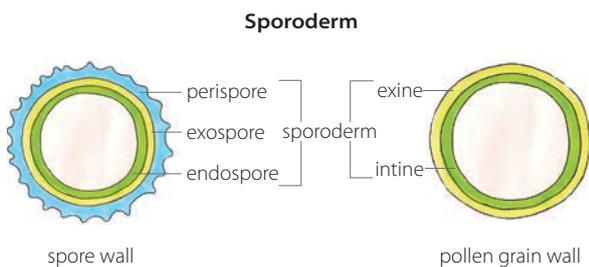
The sporocarp includes one or more female megasporangia and/or several to many male microsporangia.

see **conceptacle, megasporocarp, microsporocarp**

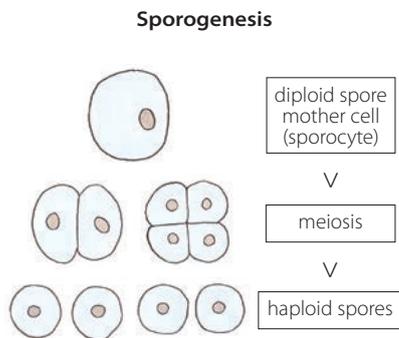


**sporocyte** A diploid cell in spore-bearing plants that produces four haploid spores by meiosis.  
 = **spore mother cell**  
*see also* **spore, sporogenesis**

**sporoderm** The wall of a spore or pollen grain that encloses the cytoplasm.  
 A spore wall consists of perispore, exospore and endospore.  
 A pollen grain wall usually consists of exine and intine.  
*see also* **pollen wall**



**sporogenesis** In plants, the process of forming haploid spores, by meiosis, from a diploid spore mother cell.



**sporogenous** Producing or reproducing by means of spores.  
 Of tissue, spore producing, as that in an immature pollen sac.

**sporophore** Of the adder's tongue family (Ophioglossaceae), the fertile spore-bearing part of a frond that shares a common stalk with the vegetative leaf-like part of the frond.  
*cf.* **trophophore**



**sporophyll** *see* page 279

**sporophyte** *see* page 280

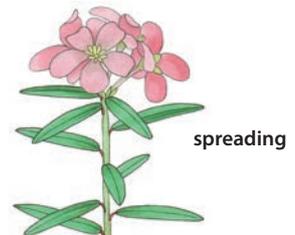
**sporophyte generation** The usually diploid phase of a plant's life cycle that arises from the zygote.  
*see* **alternation of generations, sporophyte**  
*cf.* **gametophyte generation**

**sporophytic apomixis** Of flowering plants (angiosperms), the production of an embryo directly from cells of the nucellus or integuments in the ovule.  
 A form of agamospermy.  
 = **adventitious embryony**  
*cf.* **gametophytic apomixis**

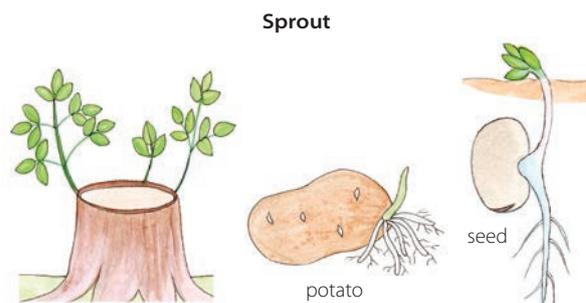
**sporopollenin** The main component of the tough outer wall (exine) of plant spores and pollen grains.  
*see* **perispore, sporoderm**

**sport** An individual or part of a plant, such as a shoot leaf or flower, that differs from the normal state of the rest of the species.  
 It is usually transient or it may be propagated vegetatively to form a new cultivar.

**spreading** More or less at right angles.  
 Extending horizontally, as branches on a tree or leaves on a stem.



**sprout** The shoot of a plant.  
 To send out new growth, as new growth on a cut down tree or eyes on a potato.  
 To shoot up suddenly.  
 Of a seed, to germinate.



**sporophyll** A modified leaf that bears spore-producing structures.

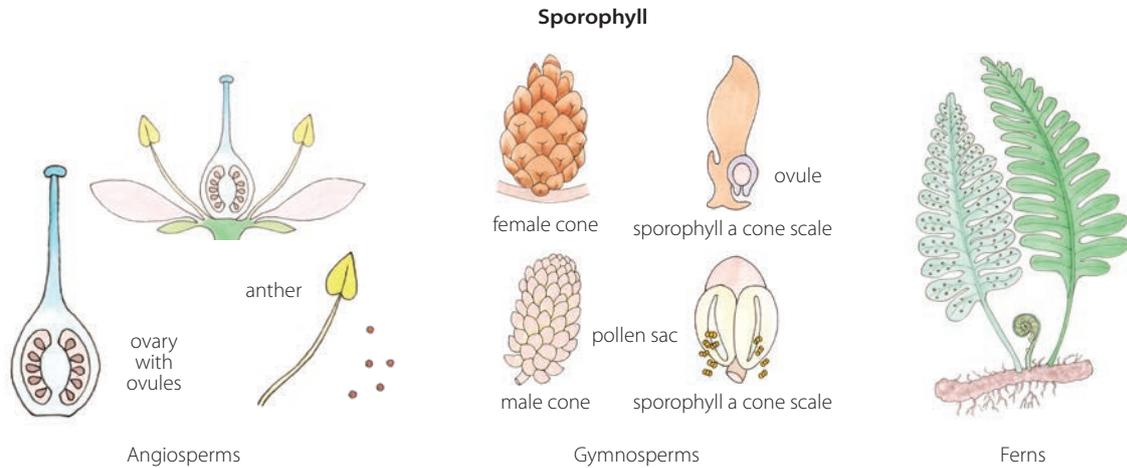
In angiosperms, ovules and the anthers are modified leaves that bear the spore-producing structure.

In gymnosperms, sporophylls are the cone scales that bear naked ovules or seeds on the female cone and pollen sacs on the male cone, as the genus of pines (*Pinus*).

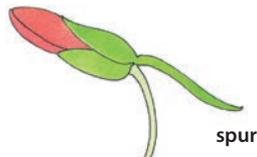
In ferns, sporophylls are the fertile fronds that bear spore-producing sporangia in sori on the lower surface.

see **megasporophyll**, **microsporophyll**, **sporangium**

cf. **trophophyll**

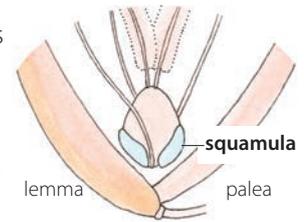


**spur** A slender tubular projection, especially of the calyx or corolla, that typically contains nectar, as the calyx of nasturtium (*Tropaeolum*).

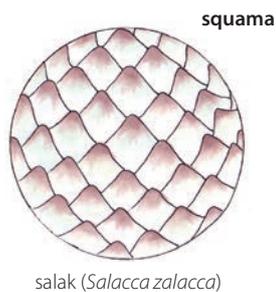


**spurred** Having a spur.  
= **calcarate**

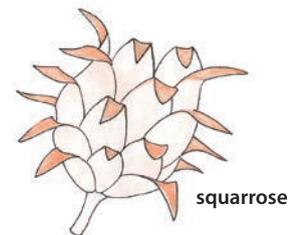
**squamula** One of usually two minute scales at the base of the pistil in a grass floret. It swells to push the bracts (lemma and palea) apart during flowering.  
= **lodicule**



**squama**, *pl.* **squamae**  
Any kind of scale.  
**squamate**, **squamose**, **squamous** Covered with scales. Consisting of scales. Scale-like.  
**squamiform** Shaped like a scale.



**squarrose**, **squarrous**  
With a rough surface due to the reflexed tips of appendages like scales and bracts, as the involucre bracts of some daisies (Asteraceae).



**squarrouse** Minutely or slightly squarrose.

**squamella**, *pl.* **squamellae**, **squamula**,

*pl.* **squamulae**, **squamule**

A little scale.

Of grasses, a lodicule.

**squamellate**, **squamulose** Covered with little scales.

**stalk** A stem-like support.

**stamen** The male reproductive organ of a flower. Usually a bilobed, pollen-bearing anther on a stalk-like filament.

**stamen** page 281 (cont.)

see also **androecium**

cf. **pistil**, **carpel**

**staminal** Attached to or relating to the stamens.

**staminoid** Resembling a stamen.

**sporophyte** All plants have a life cycle alternating between a haploid gametophyte generation and a diploid sporophyte generation.

A sporophyte produces either spores or seeds.

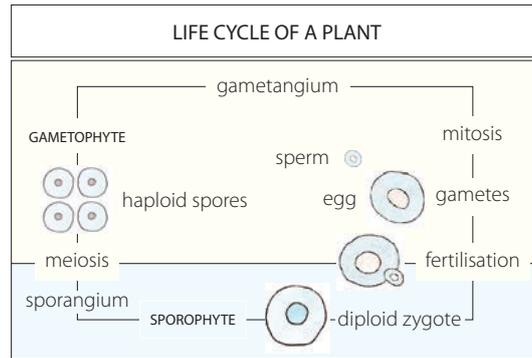
In nonvascular plants, the tiny sporophyte grows on the larger gametophyte plant. It produces spores.

In vascular plants, the sporophyte generation is the larger familiar green plant. The gametophyte is microscopic and lives on or in the sporophyte. It produces seeds.

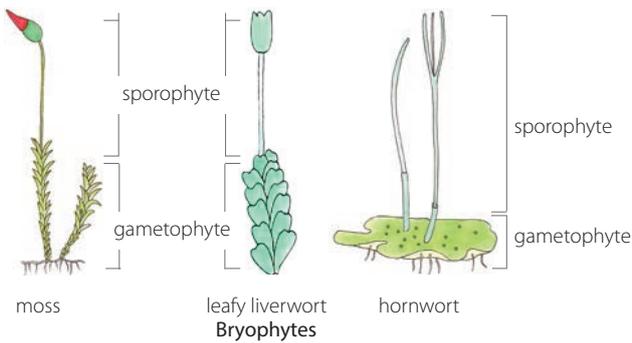
see **alternation of generations**

cf. **gametophyte**

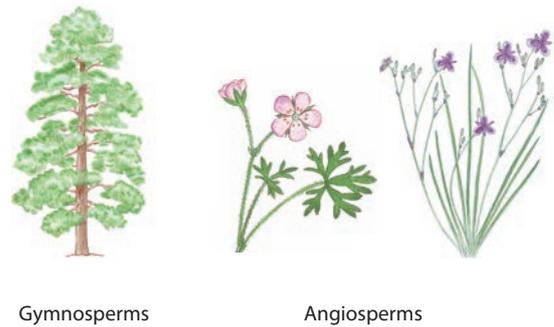
**Sporophyte**



Sporophyte of nonvascular plants that produce spores



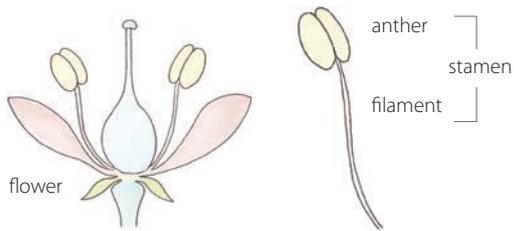
Sporophyte of vascular plants that produce seeds



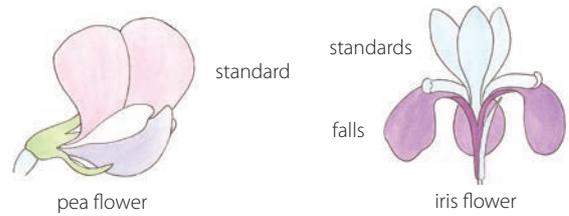
Sporophyte of vascular plants that produce spores



## Stamen

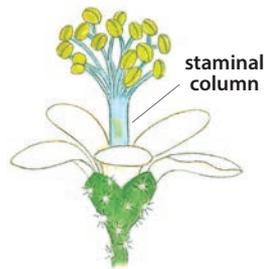


## Standard

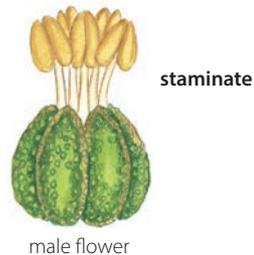


### staminal column

A tube formed by the fusion of the stamen filaments for much of their length. Characteristic of, but not confined to, the mallow family (Malvaceae).



**staminate** Having stamens and no carpels, as the unisexual male flower of seaberry saltbush (*Rhagodia candolleana*).  
*cf.* **pistillate**



**staminate cone** The male, pollen-producing cone of gymnosperms.  
= **microstrobilus**  
*cf.* **ovulate cone**

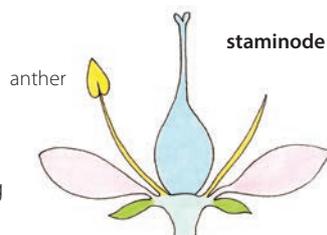
**staminode, staminodium**  
*pl.* **staminodia**

A stamen that lacks an anther.

A sterile stamen.

**staminodal** Relating to staminodes.

*cf.* **ovulode**



**staminody** The abnormal development of floral parts into stamens or staminoid organs.

### standard

The large upper petal (banner or vexillum) of a pea flower (Faboidae).

One of the three inner more or less erect petals of an iris (*Iris*) flower as distinct from the three falls.

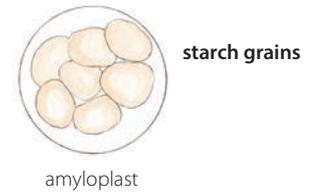
*see* **banner, vexillum**

**starch** A complex carbohydrate produced by most green plants as a form of energy storage. Found in seeds, fruits, tubers, roots etc.

= **amylum**

### starch grain

A granule inside an amyloplast in which starch is stored.



**stat. nov. abbr., status novus** A taxon that has been given a new rank in the taxonomic hierarchy, such as a subspecies that is raised to the rank of species or a species lowered to the rank of subspecies.

**state** An identifying characteristic or quality, as having either a superior or inferior ovary.

**status** In nomenclature, the standing of a taxon with regard to publication, legitimacy or correctness.

Rank of a taxon in the taxonomic hierarchy, that is, whether it is a species, genus etc.

**status novus, abbr. stat. nov.** A taxon that has been given a new rank in the taxonomic hierarchy, such as a subspecies that is raised to the rank of species or a species lowered to the rank of subspecies.

**stele** The central core of stems and roots comprising the vascular tissue and other tissues like pith.

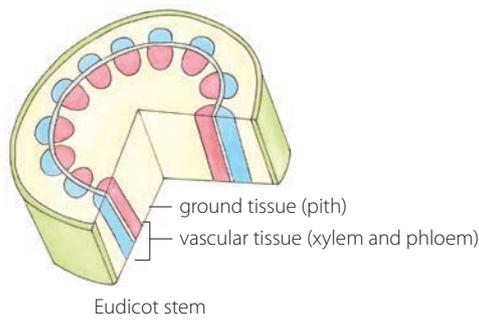
The Theory of Steles describes the many different types of steles, including protosteles, siphonosteles, eusteles and atactosteles.

Different types of stele may be found in different regions of the same plant.

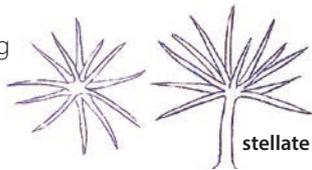
**stele** page 282 (cont.)

= **vascular cylinder**

### Stele



**stellate** Shaped like a star with points radiating from a common centre, as a sessile or stalked stellate hair.



**stem** The main axis of a plant, typically above ground and bearing leaves and buds, but sometimes underground, as rhizomes. Develops from the plumule of the seed.

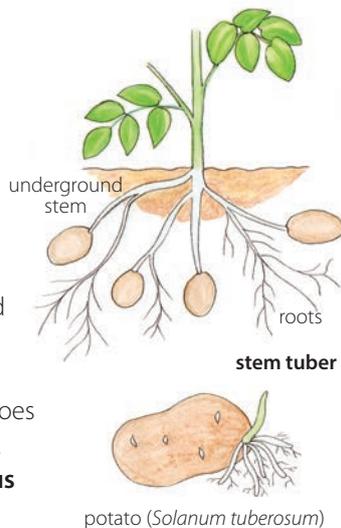
**stem tissue** *see* **tissue**

### stem tuber

A thickening of an underground stem that functions as a storage organ. Stem tubers do not produce new tubers or offsets but have growing points called eyes from which the plant reproduces vegetatively, as potatoes (*Solanum tuberosum*).

*cf.* **tuberoid, tuberous**

**root**



**stenospermocarpy** The development of fruit that is seedless from fruit that is pollinated and fertilised normally but the embryonic seed is aborted, as seedless grapes.

*cf.* **parthenocarpy**

**stenothermal** Able to tolerate growing in only a narrow range of temperature.

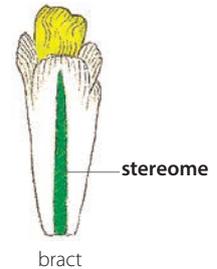
**stephano-** A prefix meaning situated on the equator.

**stephanoaperturate** Of a pollen grain with apertures situated at the equator.

**steppe** Treeless temperate semi-arid plains of low grasses that extend across southeastern Europe and Siberia.

*see* **biome, prairie**

**stereome** A strip of strengthening tissue in the bracts (phyllaries) of some daisies (Asteraceae), as lemon beauty heads (*Calocephalus citreus*).



### stereomorphic

Of a flower with basic radial symmetry that is three-dimensional, as the daffodil genus (*Narcissus*).



### sterigma,

*pl.* **sterigmata**

Of some conifers, the persistent, peg-like leaf base that remains on the twig after leaves fall.

*see* **brachyblast**



**sterile** Unable to reproduce sexually.

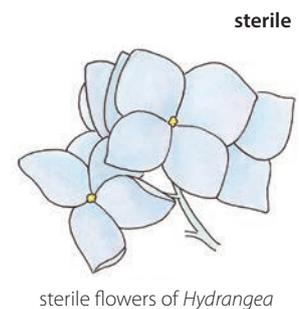
Of flowers lacking functional stamens and pistils, as the sterile flower of hydrangea (*Hydrangea*).

Not producing viable seeds or fruit.

Of shoots, branches, bracts etc. not producing flowers.

= **infertile**

*cf.* **fertile**



### sterile bract

A bract that does not bear a flower.

*cf.* **fertile bract**

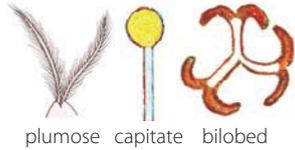
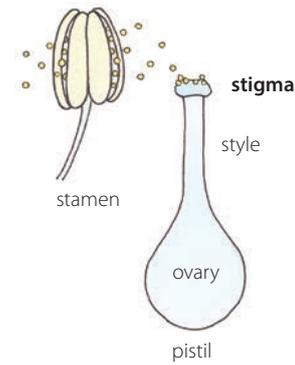


**stigma**, *pl. stigmata*, **stigmas**

The pollen-receptive part of the pistil, commonly at the tip of the style, where pollen germinates.

It is variously shaped, including: capitate, clavate, crestate, decurrent, discoid, fimbriate, indusiate, lobed and plumose.

**stigmatic** Of or relating to the stigma.

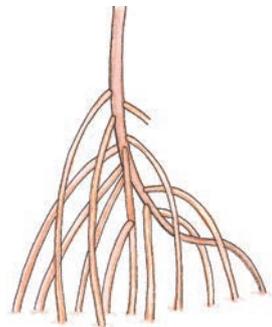


**stilt roots** Adventitious roots that grow out from the lower trunk of a tree and into the soil to provide support.

Found in some mangroves as (*Rhizophora*) and the banyan (*Ficus benghalensis*).

= **prop roots**

*cf.* **buttress root**



stilt roots

**stipe** A small stalk that supports some other structure.

Of flowers, the gynophore that bears the pistil above the other floral parts.

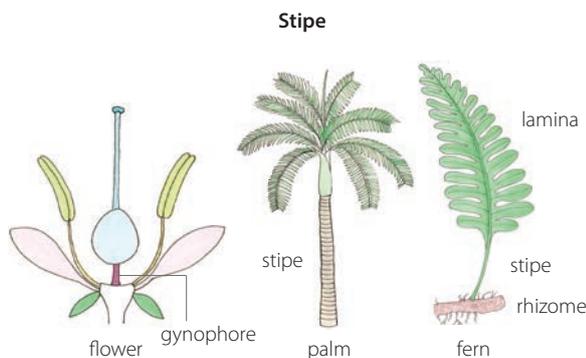
Of ferns, the petiole connecting the lamina of the frond to the rhizome.

The 'trunk' of a palm.

Of orchids, a strap or stalk, formed from columnar tissue, that connects the pollinia to the viscidium.

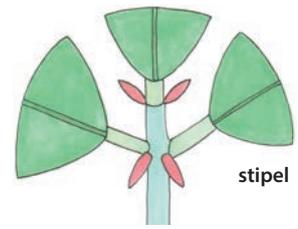
*see also* **caudicle, hamulus, tegula**

**stipitate** Having a stipe.



**stipel** A small secondary stipule often found at the base of a leaflet or petiolule in a compound leaf.

**stipellate** With stipels.  
*cf.* **exstipellate**



**stipule** *see* page 284

**stock** In grafting, a plant grown from seed that has strong roots, vigour and a suitable habit, onto which a bud or scion from another plant is implanted, as tomato cultivars that are grafted onto a stronger species of the tomato genus (*Lycopersicum*).

A plant that provides slips or cuttings.

That part below the graft that gives rise to the lower main stem and root system of the new plant

**stolon** A horizontal stem that grows at ground level (usually above or slightly below) and produces roots and shoots at the nodes or at the tip.

= **runner**

*cf.* **rhizome**

**stoloniferous** Bearing or producing stolons.

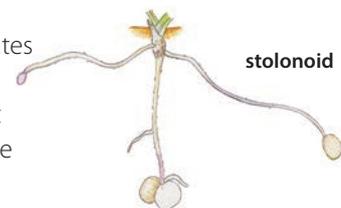
**stoloniform** Resembling a stolon.

**stolonoid** Spreading like a stolon.

Stolon



**stolonoid** Of orchids, a roots that grow sideways and terminates in reproductive daughter orchids that form colonies, as some greenhood orchids (*Pterostylis*).



**stipule** An appendage at the base of the leaf-stalk (petiole), typically in pairs.

Free or variously united to each other or to the petiole.

Shape and texture is variable, as lobed, spiny, membranous or tendril-like.

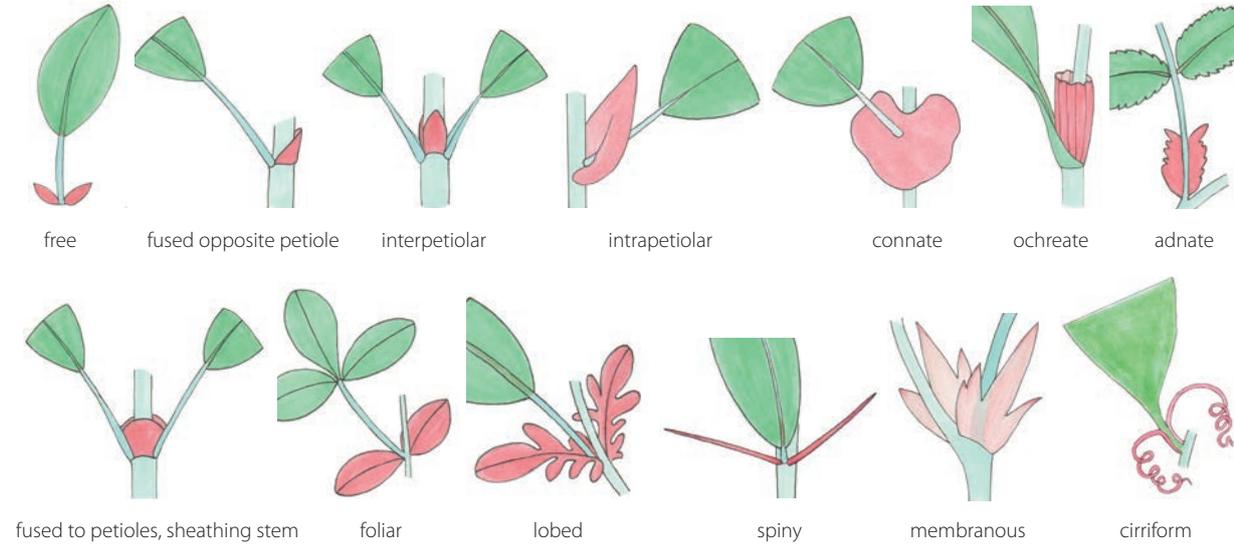
**stipular** Borne on or relating to stipules.

**stipulate** With stipules.

*cf.* **exstipulate**

**stipuloid** Resembling stipules.

### Stipule

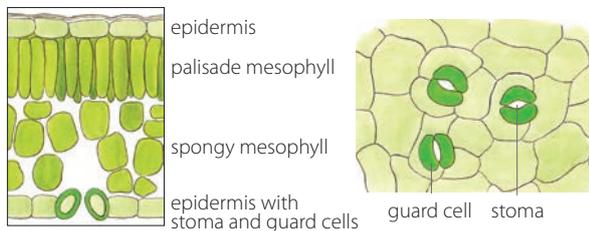


**stoma, pl. stomata** A pore on the surface of a leaf that is surrounded by specialised guard cells.

Guard cells regulate the opening and closing of a stoma and thus control the exchanges of gases and water vapour between the leaf and the atmosphere.

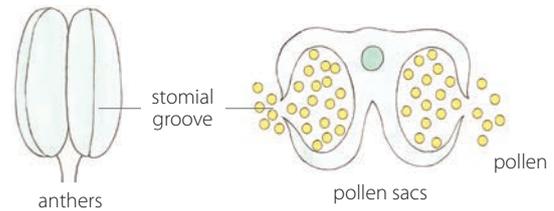
Monocotyledons have stomata on both the upper and lower surfaces of their leaves and eudicots mostly have stomata only on the lower surface.

### Stoma



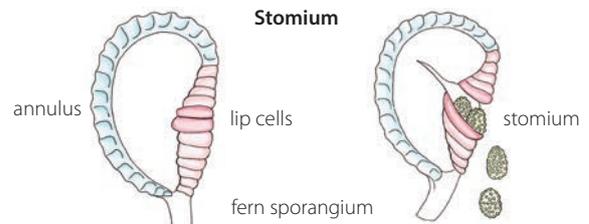
**stomial groove** In flowering plants, the region of dehiscence in a pollen sac through which spores are released from an anther.

### Stomial groove



**stomium, pl. stomia** The region of dehiscence of a sporangium or pollen sac.

In ferns, the opening in the lip cells of the annulus surrounding the sporangium through which spores are released.



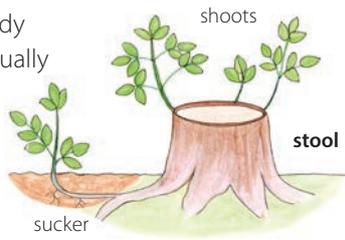
**stone** The hard endocarp and the enclosed seed in a cherry, plum or other fruit.

*see also* **pericarp**

**stool** A stump, woody base or root that annually produces shoots or suckers.

see also **layering**

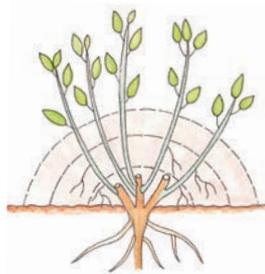
**stooling** To produce shoots or suckers from a stool.



**stool layering** A form of propagation whereby a plant is cut back to near ground level and covered with layers of soil as new shoots develop.

Rooted shoots are later separated and grown as new plants.

= **mound layering**



stool layering

**storey** One of the layers in a forest.

The canopy is more or less continuous and is made up of the crowns of trees.

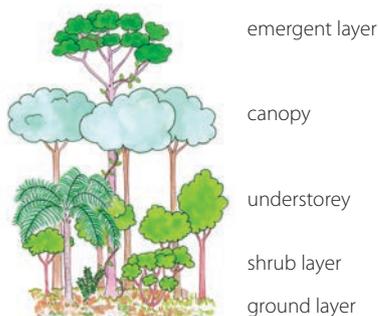
The emergent layer consists of scattered taller trees that extend above the canopy.

The understorey receives less light and consists of shorter trees, shrubs and saplings.

The ground layer that is usually herbaceous but may also include prostrate woody plants.

Not all layers are represented in all forests.

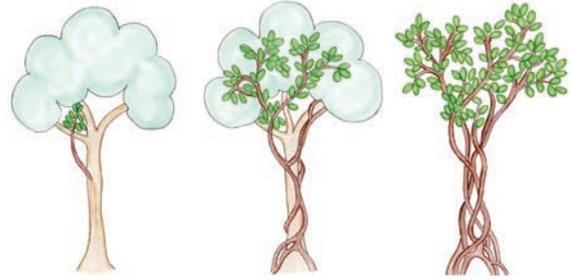
Storey



**stramineous** Like straw. Straw-coloured, pale yellow.

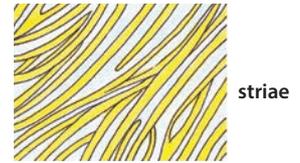
**strangler** A plant that germinates in the canopy of a tree and sends aerial roots down into the ground. The host tree is starved of light and nutrients and eventually dies but the strangler continues to thrive independently, as strangler figs (*Ficus*).

Strangler



**stria, pl. striae** A fine groove or thread-like line.

**striate** Marked with striae.



striae

**striga, pl. strigae**

A sharp-pointed, rigid appressed bristle or hair.

**strigose** Covered with strigae.



strigae

**strigulose** Minutely or finely strigose.

**strobile, strobilus, pl. strobili** Of gymnosperms, the unisexual cone-like reproductive structure, typically with a central axis having spirally arranged scales.

The reproductive structure of some fern allies, as horsetails (*Equisetum*) and clubmosses (*Lycopodium*), with compressed modified spore-bearing leaves (sporophylls) at the tips of branches.

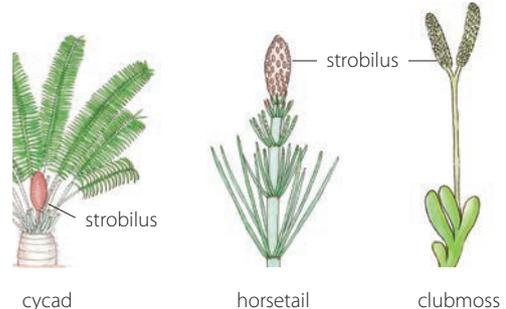
Strobili are often called cones.

**strobiliferous** Bearing a strobile or strobiles.

**strobiliform, strobiloid** Resembling a strobilus.

see **megastrobilus, microstrobilus**

Strobilus



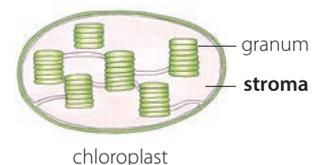
cycad

horsetail

clubmoss

**stroma, pl. stromata**

The matrix of a chloroplast in which the grana are embedded.



granum

stroma

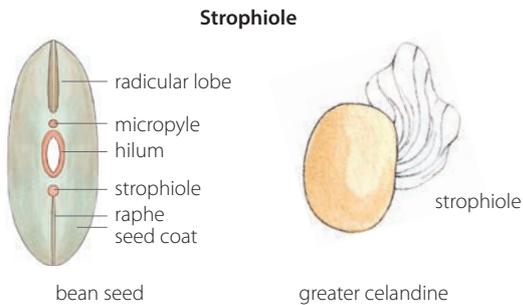
chloroplast

**strophiole** Various used as a synonym of caruncle and aril. Specifically, an outgrowth on the testa of a seed in the region of the raphe, as greater celandine (*Chelidonium majus*).

One of the sites through which water is absorbed during seed germination, as beans (Fabaceae).

= **lens**

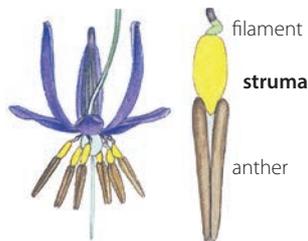
**strophiolate** Bearing or related to a strophiole.



**struma, pl. strumae**

A cushion-like swelling of or on an organ.

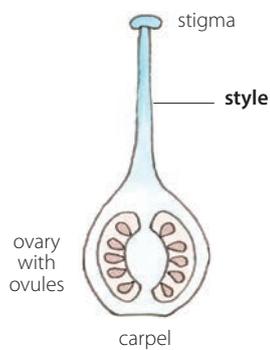
**strumose** Having a struma or strumae, as the filament of flax lilies (*Dianella*).



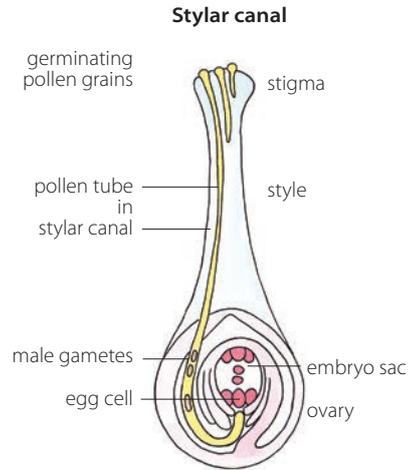
**style** The usually elongated part of a carpel that connects the stigma with the ovary. In orchids (Orchidaceae) it is an indiscernible part of the column.

**stylar** Of or relating to the style of a flower.

**stylete** Having a style.



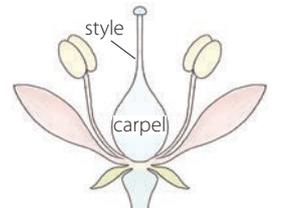
**stylar canal** Of flowering plants, the conducting tissue of the style through which the pollen tubes grow from the stigma to the ovary.



**stylocarpellous**

Of a carpel with a style and without a supporting stalk (stipe).

cf. **astylocarpellous**, **stylocarpepodic**

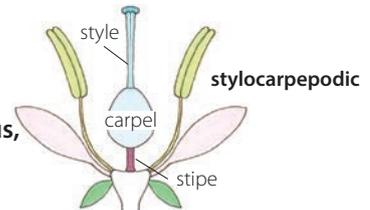


**stylocarpellous**

**stylocarpepodic**

Of a carpel with a style and a stipe.

cf. **astylocarpellous**, **stylocarpellous**

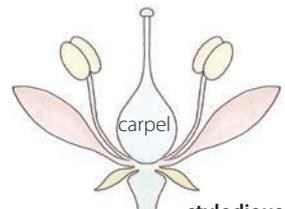


**stylocarpepodic**

**styloidious**

Of a flower having a single free carpel in the gynoecium.

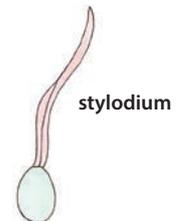
= **monocarpellary**, **monocarpous**, **unicarpellate**



**styloidious**

**styloidium, stylodia**

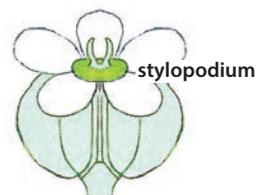
An elongated stigma that resembles a style, as the shrubs in the family Coriariaceae.



**styloidium**

**stylopodium**

The expanded nectar-secreting disc at the base of each of the two styles in the carrot family (Apiaceae).



**suaveolent** Fragrant, sweet-smelling.

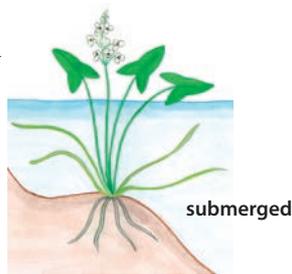
**sub-** Under or less than.  
Somewhat or almost, as suberect.  
Under or inferior to, as subfamily that is a rank below family in taxonomic classification.

**suberin** A waxy substance in the cell walls of some plant tissue, especially cork, that prevents water loss.

**suberose, suberous** Relating to, resembling or consisting of cork, corky.

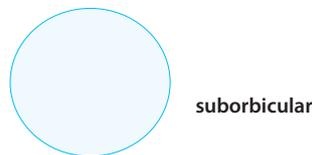
**suberisation** The deposition of suberin in the cell walls of some plants.

**submerged** Beneath the water, as the leaves of some aquatic plants.  
= **submersed**  
cf. **emergent, immersed**

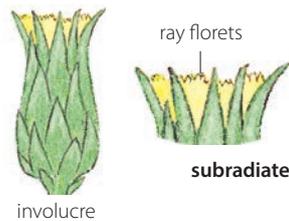


**submersed** Beneath the water, as the leaves of some aquatic plants.  
= **submerged**  
cf. **emergent, immersed**

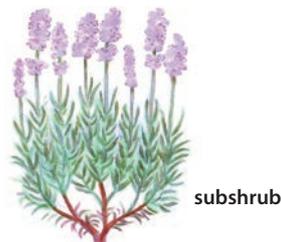
**suborbicular**  
A two-dimensional shape, with an almost circular outline.



**subradiate**  
Of daisies (Asteraceae), a heterogamous capitulum with the outer ray florets not exceeding the involucre.



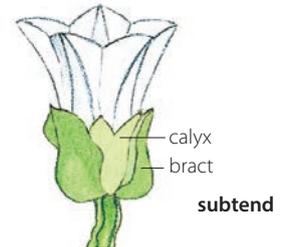
**subshrub** A small shrub with a woody base and herbaceous new growth, as lavender (*Lavandula*) and thyme (*Thymus*).  
= **suffrutex, undershrub**



**subsp., pl. subspp.** An abbreviation for subspecies.

**subspecies, abbr. subsp., pl. subspecies, abbr. subspp.** In taxonomic classification the rank below species and above variety, such as *Geranium robertianum* spp. *purpureum*.  
see **taxonomic hierarchy**

**subtend** To be inserted directly below a different organ or structure, as the bracts that subtend the calyx of the bindweed *Calystegia*.



**subulate** Narrowly triangular and tapering gradually to a fine point.  
= **awl-shaped**



**succession** In ecology, the process of change in species structure as a community establishes over time.

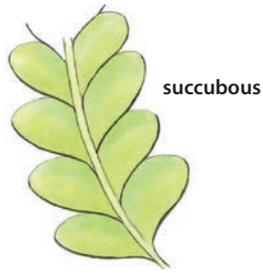
Primary succession occurs on previously uncolonised areas like lava flows.

Secondary succession occurs on disrupted or disturbed areas.

= **ecological succession**  
see also **climax community**



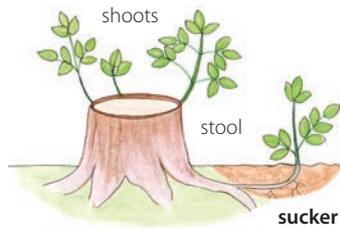
**succubous** Of leafy liverworts, having leaves attached to the stem obliquely so that the upper margin of each leaf is overlapped by the base of the leaf above it. The new leaf begins above the older one.  
*cf. incubous*



**succulent** A plant characterised by fleshy water-storing tissues that allows it to survive arid conditions, as the pigface family (*Aizoaceae*). A common term for a member of the cactus family (*Cactaceae*). Having juicy fleshy tissue, as a peach.



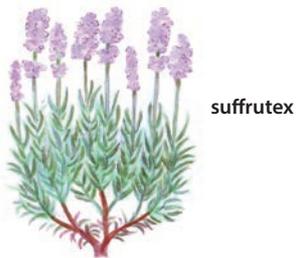
**sucker** A shoot that arises from an underground root or stem that gives rise to a new plant.



= **surculus**  
**suckering** Having or producing suckers.

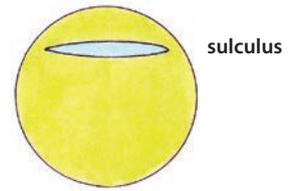
**suffrutescent** Woody only at the base of the stem.  
 = **suffruticose**  
*see suffrutex*

**suffrutex** A small shrub with a woody base and herbaceous new growth, as lavender (*Lavandula*) and thyme (*Thymus*).  
 = **subshrub**,  
**undershrub**

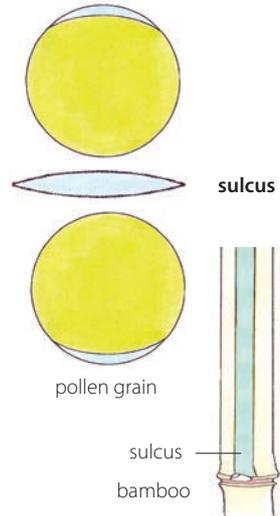


**suffruticose** Woody only at the base of the stem.  
 = **suffrutescent**  
*see suffrutex*

**sulculus, pl. sulculi** An elongated latitudinal aperture on a pollen grain that is not situated at a pole.  
**sulculate** Having a sulculus.  
*cf. sulcus*



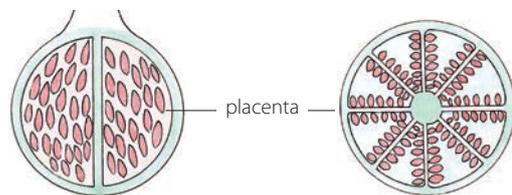
**sulcus, pl. sulci** A groove or furrow. The indentation along the side of the culm in the bamboo genus *Phyllostachys*. An elongated latitudinal aperture situated at the distal or proximal pole of a pollen grain.  
**sulcate** Having a sulcus.  
*cf. colporus, colpus, pore, sulculus*



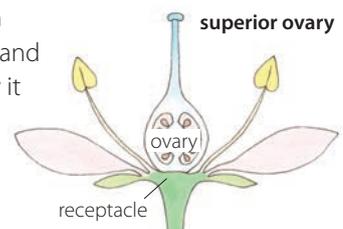
**super-** A prefix meaning above, as superorder that is a rank above order and below class in taxonomic classification.

**superficial placentation** Having carpels fused but the internal walls (septa) lacking, creating a unilocular ovary, with ovules attached to septa-like placentas that project from the wall of the ovary, as water lilies (*Nymphaea*).  
 = **lamellar placentation**  
*see placentation*

**Superficial placentation**



**superior ovary** An ovary with the petals and sepals inserted below it on the receptacle.  
*cf. inferior ovary, semi-inferior ovary*

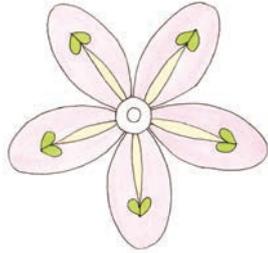


**superposition**

The placement of one part above another on the same radius, as stamens borne above the petals of a flower.

**superposed** Situated vertically on or above another part.

= **ante-position**  
cf. **alternation**



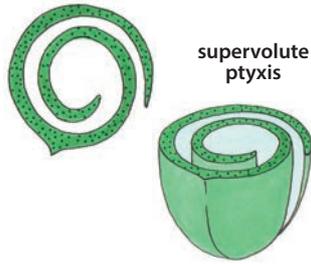
superposition

**supervolute**

Having one margin rolled within the other.

**supervolute ptyxis**

Of a single leaf in bud with one margin rolled within the other.



supervolute ptyxis

**suppress** To keep something from developing.

To inhibit the growth or development of, as many eucalypts (*Eucalyptus*) suppress the growth of some species beneath their canopy.

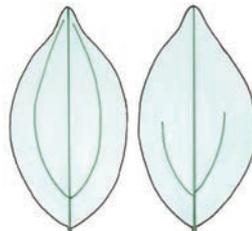
**supra-** A prefix meaning above or over.  
cf. **infra-**

**supra-axillary** Borne above the axil, as some flowers and fruit.

**suprabasal** Above the base.

Of veins originating at some distance above the base of the leaf.

Of acrodromous leaf venation with the veins curving upwards from a single point above the base of the leaf.

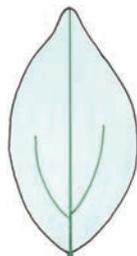


suprabasal

**suprabasal-imperfect**

Having veins originating at some distance above the base of the leaf and lateral veins that extend for less than two-thirds of the leaf surface.

see **acrodromous**

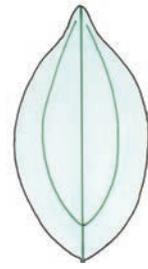


suprabasal-imperfect

**suprabasal-perfect**

Having veins originating at some distance above the base of the leaf and lateral veins that extend for at least two-thirds of the leaf surface.

see **acrodromous**



suprabasal-perfect

**suprafoliar**

Of an inflorescence that stands above the crown of leaves, as some palms (Arecaceae).

cf. **infrafoliar**, **interfoliar**



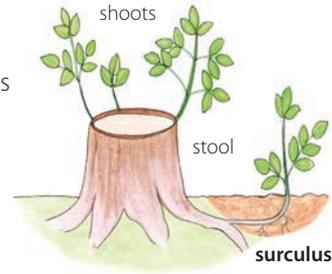
suprafoliar

**surculus, pl. surculi**

A shoot that arises from an underground root or stem that gives rise to a new plant.

= **sucker**

**surculose** Having or producing suckers.

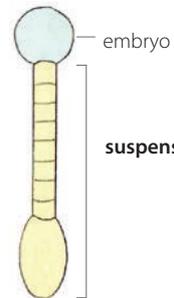


surculus

**suspensor** Of eudicot embryogenesis, a stalk-like region that develops from cell division of the zygote. It connects the nourishing endosperm to the embryo. The suspensor degenerates when the endosperm is absorbed by the embryo.

see **embryogenesis**

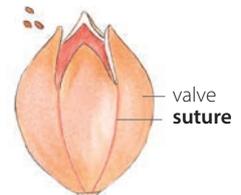
see **embryogenesis**



embryo

suspensor

**suture** The line of junction between two fused parts, as the fused valves of a capsule.



valve suture

**swamp** A permanently saturated freshwater or saltwater wetland usually fringed by trees. They form around lakes or river outlets along coastlines.

cf. **bog**, **mangrove**, **marsh**

**switch plant** A plant, such as broom, with leaves soon falling or absent, and photosynthesis occurring in the stems.



switch plant

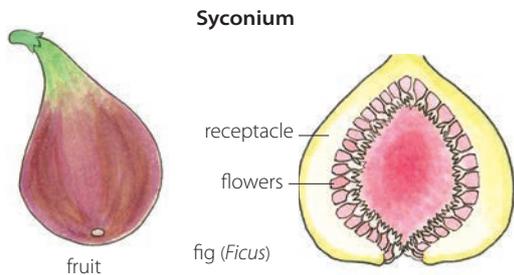
**sword fern**

Sword ferns (*Nephrolepis*) are one of about twenty genera of mostly terrestrial ferns in the wood fern family (Dryopteridaceae). They have simple or divided tufted fronds and long-creeping to erect scaly rhizomes. see **fern**



sword fern (*Nephrolepis*)

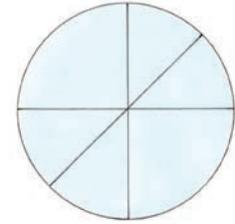
**syconium, pl. syconia** The fruit derived from a fleshy, hollow, inverted receptacle, bearing an inflorescence of numerous sessile flowers that develop into fruitlets. Characteristic of the fig genus (*Ficus*). see **composite fruit, hypanthodium**



**symbiont, symbiote** An organism living in symbiosis with another of a different species, as the coexistence of algae and fungi in lichens.

**symbiosis** A close and mutually beneficial relationship between organisms of different species, as mycorrhiza associated with some trees. The mycorrhizal fungus extracts nutrients from the soil for the tree and the fungus receives sugars from plant photosynthesis. see **amensalism, commensalism, mutualism, parasitism**  
**symbiotic** Of or relating to symbiosis.

**symmetry** The quality of being divisible into equal halves, either facing each other or around an axis.

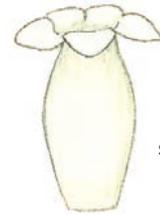


symmetry

**symmetric, symmetrical** With any plane through the centre producing like halves. cf. **asymmetric**

**sympatric** Of distribution, occurring in the same geographic area and having more or less overlapping ranges. cf. **allopatric, parapatric**

**sympetalous** Of a flower with petals fused, at least at the base. = **gamopetalous** cf. **apopetalous**



sympetalous

**symplast** All of the protoplasm of all the cells in a plant that is interconnected by plasmodesmata in the cell walls. It can be considered as one continuous mass. The symplast together with the apoplast make up the whole plant. cf. **apoplast**

**symplastic pathway** Diffusion of water and solutes through the cellulose cell wall then across the cell membrane through the cytoplasm, and from cell to cell by way of the plasmodesma. One of the pathways of movement of water and solutes radially from the root epidermis through the cortex and endodermis to the vascular cylinder where it will be transported vertically in the xylem. see also **apoplastic pathway, Casparian strip, symplast**

**symplesiomorph, symplesiomorphy**

In cladistics, an ancestral or primitive character shared by two or more taxa. A shared plesiomorphy, as hair that is an ancestral character for all primates. **symplesiomorphic** Of or relating to a symplesiomorph.

**sympodium** A pattern of growth in which the apex of the main stem ceases to grow due to the abortion of the apical bud or the development of a flower or another structure, as a tendril.

Growth continues below the apex from a succession of axillary branches with a similar growth pattern.

A rhizome that grows horizontally for a while then turns upward to form a new shoot.

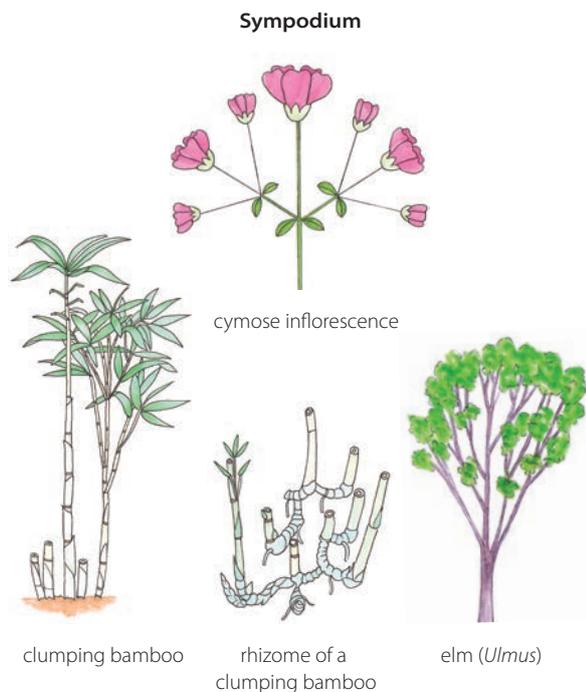
The growth pattern of a non-invasive clumping bamboo.

see **leptomorph**

cf. **amphipodium, pachymorph, sympodium**

**sympodial** Lacking a persistent terminal growing point and having growth occur in successive lateral branches, as elms (*Ulmus*).

Of determinate or definite growth, as a cymose inflorescence.



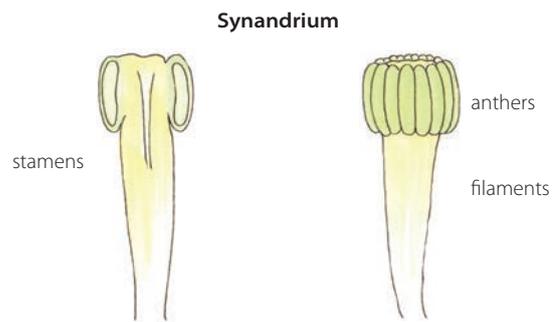
**syn-** A prefix meaning with or together.

**synandrium** The structure formed by stamens that are partially or completely fused along both their filaments and anthers, as the Aroideae genus *Taccarum*.

cf. **syngenesious**

**synandry** Fusion of the stamens into a tube-like structure.

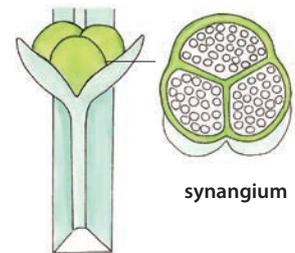
**synandrous** Of stamens partially or completely fused along both their filaments and anthers.



**syngonium,**

pl. **syngonia**

A structure formed by the fusion of two or more sporangia, as in which ferns (*Psilotum*) and the staghorn fern genus (*Platynerium*).



**synanthesis** Having the anthers and stigmas of a flower mature at the same time.

cf. **synanthous**

**synanthous** Having flowers and leaves appear at the same time.

cf. **hysteranthous, precocious, synanthesis**

**synanthy** Abnormal fusion of two or more flowers.

**synapomorph, synapomorphy** In cladistics, a character, derived from a common ancestor, that is shared between two or more taxa.

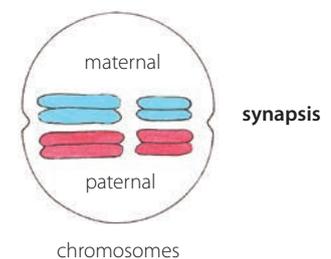
An apomorphy that is found in two or more species.

**synapomorphic** Of or relating to a synapomorph.

**synapsis**

The time early, in meiosis, when homologous chromosomes that are usually separate lie side by side in pairs.

see **bivalent, univalent**

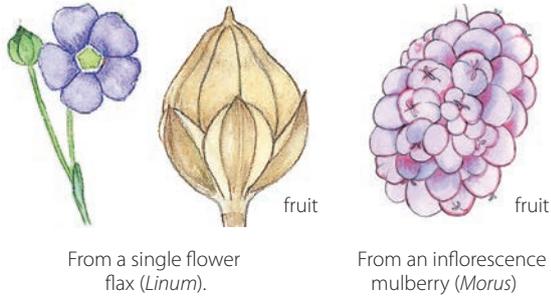


**syncarp** A fruit formed from two or more fused carpels of a single flower, as flax (*Linum*), or the fused carpels of all the flowers of an inflorescence, as mulberry (*Morus*).

see **multiple fruit, syncarpous**

cf. **aggregate fruit, apocarp**

**Syncarp**



**syncarpous**

Of a flower having a compound gynoecium of two or more carpels with the ovaries styles and stigmas fused together to form one unit.

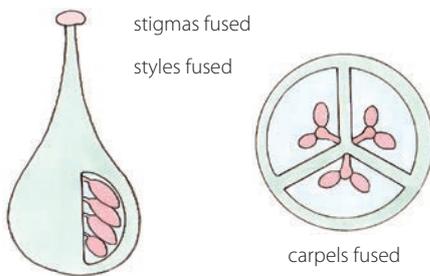
Of a fruit formed from the fused carpels of a single flower or of an inflorescence.

see **syncarp**

cf. **apocarpous, paracarpous, polygynous, semicarpous, synovarious**

**syncarpy** The condition of being syncarpous.

**Syncarpous**

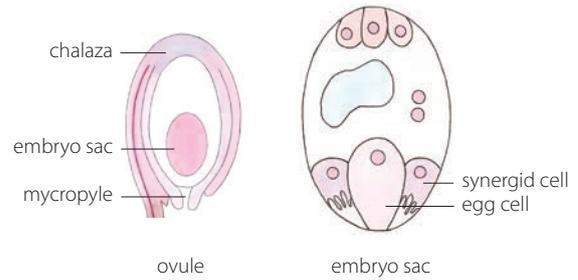


**syndrome** A set of conditions that form an identifiable pattern, as a system of pollen transfer.

see **pollination syndrome**

**synergid** One of two cells on either side of the egg cell at the micropylar end of an embryo sac.

**Synergid**



**synflorescence**

A compound inflorescence, composed of a terminal inflorescence and one or more lateral inflorescences.

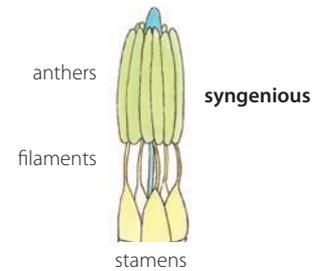
see also **coflorescence, paraclade**



**syngenesious**

Of stamens with anthers united in a tube and filaments free, as the daisy family (*Asteraceae*).

cf. **synandrous**



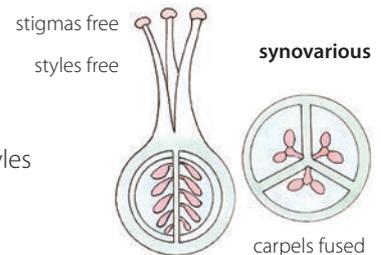
**synonym** In nomenclature, one or more names for the same taxon.

A name that has been superseded and is no longer valid.

**synovarious**

Of a gynoecium with ovaries of adjacent carpels fused and their styles and stigmas free.

cf. **semicarpous**

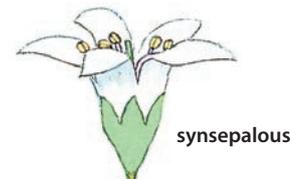


**synsepalous**

With sepals fused, at least at the base.

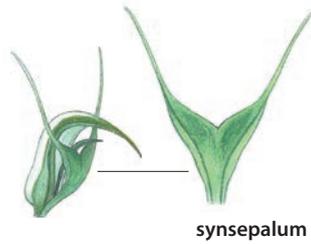
= **gamosepalous**

cf. **aposepalous**



### synsepalum

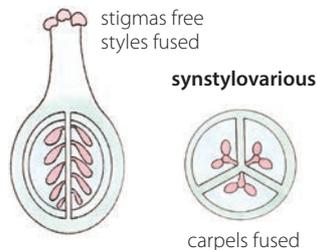
A structure formed by the fusion of two or more sepals, as the two fused lateral sepals of greenhood orchids (*Pterostylis*).



### synstylovarious

Of a gynoecium with ovaries and styles of adjacent carpels fused and their stigmas free.

cf. **semicarpous**

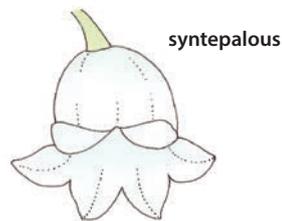


### syntepalous

With tepals fused, at least at the base, as the flowers of lily of the valley (*Convallaria majalis*).

= **gamotepalous**

cf. **apopetalous**



### syntype

Any of two or more specimens used in the original description of a taxon when a holotype was not designated.

### system

A group of organs that work together to carry out a particular task.

Plants have two systems with related organs.

The shoot system includes stems, leaves and flowers, and the root system includes all roots and underground structures, such as tubers.

Cells are organised into tissues, tissues are organised into organs and organs function together in systems.

### systematics

The branch of botany that deals with the identification, classification, naming (nomenclature) and evolutionary relationships (phylogenetics) of plants.

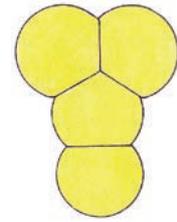
see **phylogenetic systematics, taxonomy**

### T-shaped tetrad

A uniplanar tetrad arranged with two members of the tetrad perpendicular to the other two so that they cohere in the shape of the letter T.

see **uniplanar, viscin thread**

see also **pollen tetrad**



T-shaped pollen tetrad

**taiga** The most northerly biome of the temperate zone that forms a nearly continuous belt across North America and Eurasia.

It is characterised by coniferous forests, long harsh winters and short summers.

see **boreal**

**tannin** A brownish bitter-tasting substance made of tannic acids, present in wood-bark, leaves, roots and fruit of some plants.

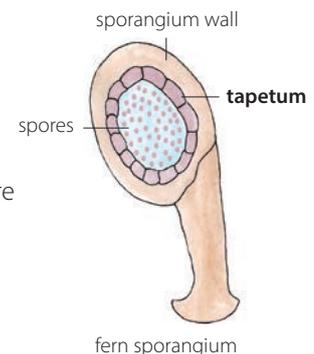
### tapetum, pl. tapeta

Of angiosperms and gymnosperms, the innermost wall of an immature pollen sac (microsporangium) that nourishes the microspore mother cells.

see **microsporangial wall**

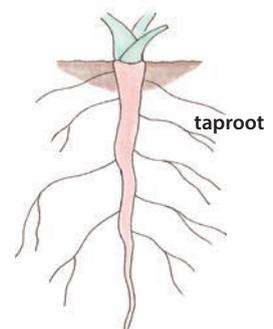
Of ferns, the nutritive layer surrounding the developing spores in the sporangium.

**tapetal** Of or relating to a tapetum.



**taproot** In eudicots and gymnosperms, an enlarged primary root together with the lateral roots that emerge from it. It develops from the radicle.

see **conical taproot, fusiform ~, napiform ~**  
cf. **fibrous roots**



**tartareous** Having a rough crumbling surface.  
Crumbling spontaneously.

**tassel** The male inflorescence at the tip of a corn plant.  
*see* **silk**



**tawny** Brownish-yellow, the colour of tanned leather.

**taxon, pl. taxa** In traditional taxonomy, a general term for an entity with its members having characteristics in common, as a family, genus, species or variety.  
In phylogenetics, the members of a named entity with a common evolutionary history of descent, rather than shared characteristics, that may or may not be currently alive.

**taxonomic hierarchy** *see* page 295

**taxonomy** The branch of botany that deals with the identification, description, classification and naming (nomenclature) of plants by comparing selected characters associated with their structure, function or other attributes.

*see* **phylogenetics, systematics**

**taxonomic** Of or relating to taxonomy.  
Of the description, classification and naming of organisms.

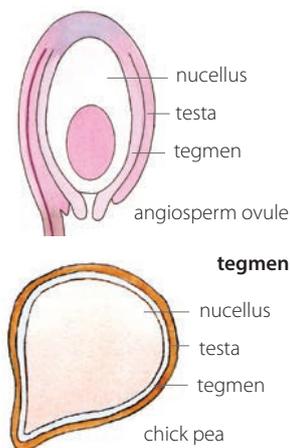
**tectum** A layer of the wall of a pollen grain that forms a roof over the columellae and other elements.  
*see* **pollen wall**

**tegmen, pl. tegmina**

Of the angiosperm ovule, the inner of two integuments surrounding the nucellus.  
Of the bitegmic seed coat of angiosperms, the derivatives of the inner integument of the ovule form the tegmen.

*cf.* **testa**

*see* **tegmic seed, testal seed**



**tegmic seed** Of angiosperms, one having the mechanical layer in the exotegmen, the mesotegmen or the endotegmen.

*cf.* **testal seed**

*see* **endotegmic seed, exotegmic seed, mesotegmic seed**

**tegula** Of orchids, a stipe formed mostly from the epidermis of the rostellum.

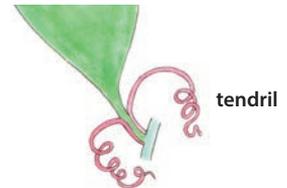
*cf.* **hamulus**

**temperate** The biome that lies mainly between latitudes 30° and 60° in both hemispheres. Generally receives plentiful rainfall and has four seasons that are neither extremely hot nor extremely cold.

It includes deciduous and evergreen forests and savannas.

*see* **biome**

**tendril** A slender coiling structure modified from a plant part (as a petiole, shoot or stem) that twines around a support.



**tension wood** Structurally abnormal wood formed as support in response to stress.

Found on the upper side of a lean, the side under tension, of stems in angiosperms.

*see also* **reaction wood, compression wood**

**tenui-** A prefix meaning thin.

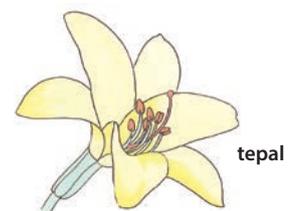
**tenuinucellate** Of an ovule with one or few layers of cells in the nucellus.

Having a thin nucellus.

*cf.* **crassinucellate**

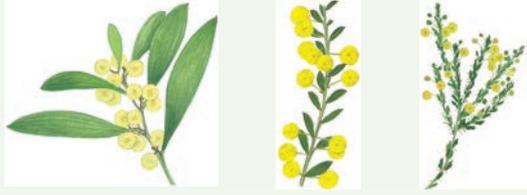
**tepal** A segment of the perianth of a flower when the petals and sepals are similar in appearance, as the day lily (*Hemerocallis*).

*cf.* **petal, sepal**



**taxonomic hierarchy** A series of terms classifying plants in levels or ranks from the highest and most complex to the lowest and least complex, as kingdom, division, class, order, family, genus and species.  
 see **PhyloCode**

**Taxonomic hierarchy of plants**

<b>Taxonomic hierarchy of plants</b>  Kingdom Subkingdom Infrakingdom Superdivision Division Subdivision Class Subclass Superorder Order Suborder Family Subfamily Genus Subgenus Species Subspecies Variety Form	<b>KINGDOM</b> Plantae		algae      bryophytes      ferns      gymnosperms      angiosperms
	<b>DIVISION</b> Tracheophyta (vascular plants)		bryophytes      ferns      fern allies      gymnosperms      angiosperms
	<b>CLASS</b> Magnoliopsida (flowering plants) eudicots		Geraniaceae      Fabaceae      Vitaceae      Ranunculaceae
	<b>FAMILY</b> Fabaceae		Cullen      Acacia      Lotus      Gompholobium      Phaseolus
	<b>GENUS</b> Acacia		<i>Acacia melanoxylon</i> <i>Acacia acinacea</i> <i>Acacia paradoxa</i>
	<b>SPECIES</b> <i>Acacia acinacea</i>		<i>Acacia acinacea</i>

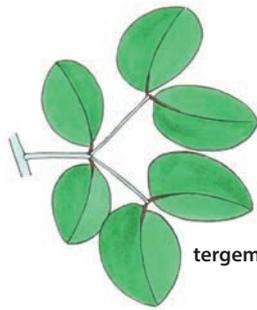
**terete** Cylindrical or slightly tapering, with a circular transverse section.



terete

**tergminate**

Of a compound leaf having a pair of leaflets at the base then forking, with a pair of leaflets on each branch, as the powderpuff plant (*Calliandra tergemina*).  
see **geminate**



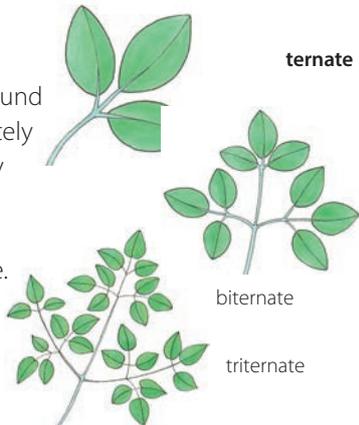
tergminate

**terminal** At the apex. Borne at the tip of a stem, as leaves, an inflorescence or other structure.  
cf. **axillary, basal, cauline, intercalary inflorescence**



terminal

**ternate** Arranged in groups of three. A trifoliolate compound leaf, it can be pinnately ternate or palmately ternate. Leaflets can be petiolulate or sessile.  
see **trifoliolate**



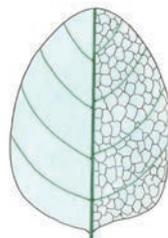
ternate

biternate

triternate

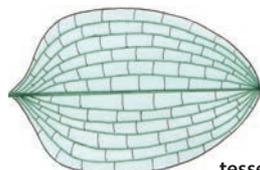
**terrestrial** Of or relating to land, as opposed to an aquatic habitat.  
cf. **amphibious, aquatic**

**tertiary vein** A small vein. The ultimate visible division of a vein on a leaf.  
= **veinlet, venule**



tertiary veins

**tessellate, tessellated** With markings in small squares, chequered, as the tessellated venation of a leaf.



tessellate

**testa, pl. testae, testas** A term generally used as a synonym of seed coat.

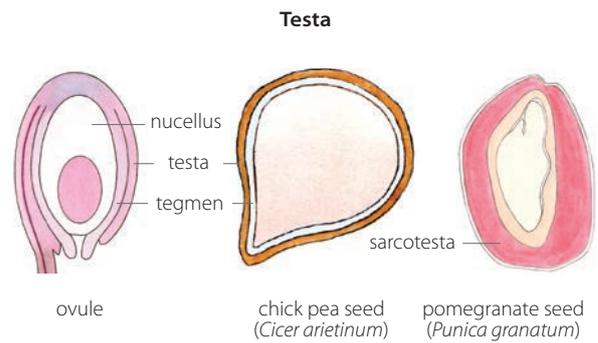
Of the angiosperm ovule, the outer of two integuments surrounding the nucellus.

Of the bitegmic seed coat of angiosperms, the derivatives of the outer integument of the ovule form the testa.

If whole or part of the outer integument is fleshy it is then called a sarcotesta, as pomegranate (*Punica granatum*).

cf. **tegmen**

see **tegmic seed, testal seed**



**testal seed** Of angiosperms, one having the mechanical layer in the exotesta, the mesotesta or the endotesta.

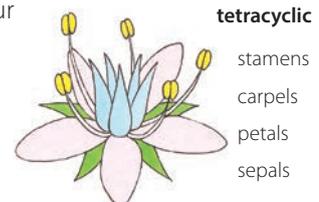
cf. **tegmic seed**

see **endotestal seed, exotestal seed, mesotestal seed**

**tetra-** A prefix meaning four.

**tetracyclic** Having four whorls, as a flower with sepals, petals, stamens and carpels.

see also **cyclic**



tetracyclic

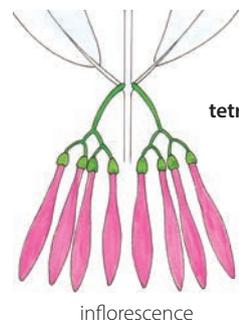
stamens

carpels

petals

sepals

**tetrad** A group of four. Four flowers grouped together in an inflorescence, as those of some mistletoes. A unit of four variously cohering pollen grains or spores.  
see also **diad, monad, pollen dispersal, pollen tetrad, polyad, triad**



tetrad

inflorescence

**tetrad mark** A single groove (monolete) or three-rayed, Y-shaped groove (trilete) on the face of a spore.

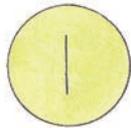
Also sometimes, one branch of a trilete laesura. It marks the way in which the four spores of a tetrad were in contact with each other after meiosis. It is the area of weakness in the wall through which a spore germinates.

= **laesura**

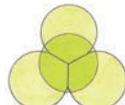
**Tetrad mark**



pollen tetrad linear



pollen grain laesura monolete



pollen tetrad tetrahedral

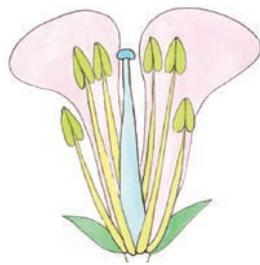


pollen grain laesura trilete

**tetradynamous, tetradidynamous**

Having six stamens, four long and two short, as the flowers of some members of the mustard family (Brassicaceae).

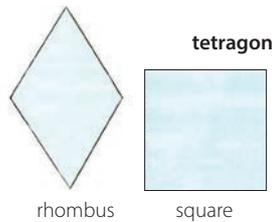
cf. **didynamous, tridynamous**



tetradynamous

**tetragon** A flat shape with four sides and four angles, as a square or rhombus.

**tetragonal** Of or in the form of a tetragon.



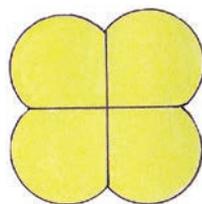
rhombus

square

**tetragonal tetrad**

A uniplanar tetrad arranged with all four cohering members in contact at the centre and the orientation of the walls forming a cross.

see also **pollen tetrad**  
see **uniplanar, viscin thread**

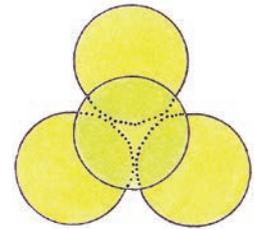


tetragonal pollen tetrad

**tetrahedral tetrad**

A multiplanar tetrad with the four cohering members arranged in a pyramid, with each member of the tetrad in contact with the other three.

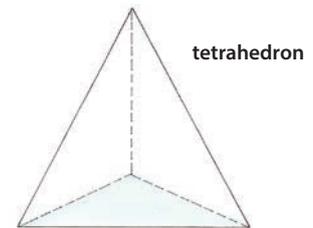
see **pollen tetrad**



tetrahedral pollen tetrad

**tetrahedron** A solid figure enclosed by four triangles, as some pyramids.

**tetrahedral** Of a solid figure having four triangular faces.



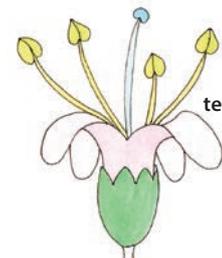
tetrahedron

**tetramerous** Having flower parts, such as petals, sepals and stamens, in whorls of four or multiples of four. 4-merous.

see **-merous**

**tetrandrous** Having four stamens, as the flowers of bedstraw (*Galium*).

cf. **diandrous, monandrous, pentandrous, polyandrous, triandrous**



tetrandrous

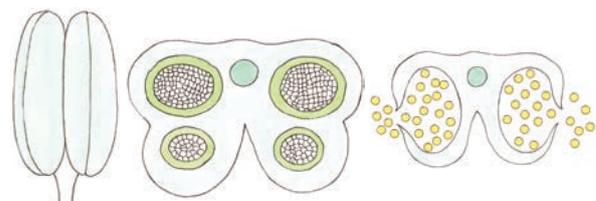
**tetraploid** Having four complete sets (4x) of chromosomes in each somatic cell.

see **ploidy**

**tetrasporangiate** Of an anther with four pollen sacs, two in each anther lobe (theca). The pairs of pollen sacs coalesce before dehiscence.

cf. **monosporangiate, unisporangiate**

**Tetrasporangiate**



two-lobed anther

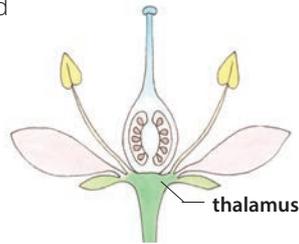
four pollen sacs

pollens sacs coalesce

**texture** The feel, appearance or consistency of a surface or substance, as of a leaf or soil.

**thalamus** An expanded area at the apex of a stem bearing the organs of a single flower (sepals, petals, stamens and carpels).

= **receptacle, torus**  
cf. **hypanthium**



**thallus, pl. thalli** A flattened, usually photosynthetic vegetative body with no vascular system, root-like rhizoids and no differentiation into a stem or leaf-like structures.

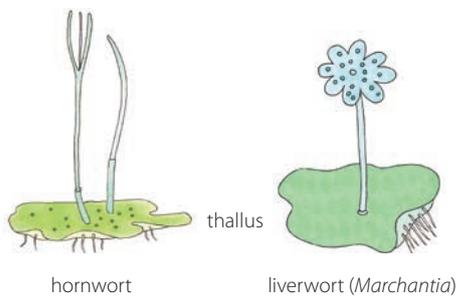
Of bryophytes, in hornworts and liverworts, the gametophyte phase of the life cycle that supports the dependent sporophyte phase.

Moss gametophytes lack a thallus and have an upright stem-like structure with leaf-like blades and root-like rhizoids.

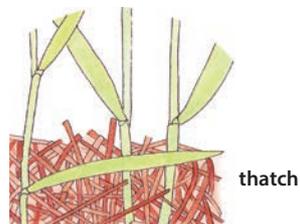
**thalloid, thallose** Relating to, resembling or consisting of a thallus.

see **bryophyte, prothallus**

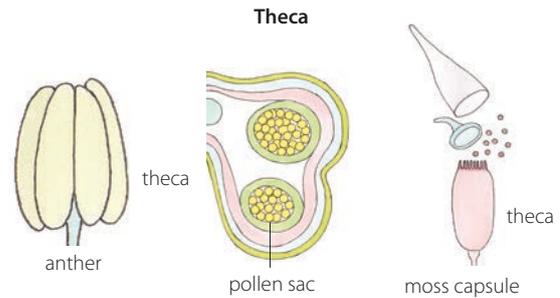
**Thallus**



**thatch** An intertwined layer of dead roots, stems and blades that builds up on the soil surface at the base of living grass plants.



**theca, pl. thecae** One half of an anther that contains two pollen sacs. The urn-shaped, spore-bearing part of a moss capsule.



**therophyte** A plant that completes its life cycle in one season (an annual) and survives as seeds.

**thicket** A dense growth of shrubs, bushes or small trees; a coppice.

**thievery** The removal of pollen by an insect that, because of its shape, cannot contact the stigma and pollinate the flower.

cf. **robbery**

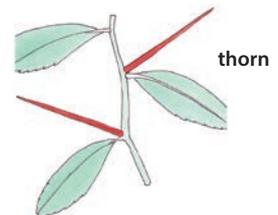
**thigmotropism** Growth of a plant towards or away from touch, as a tendril that curves in the direction of support and coils around it.

see **tropism**

**thigmotropic** Of or relating to thigmotropism.

**thorn** A sharp hard outgrowth on a plant derived from woody tissue, as hawthorn (*Crataegus*).

cf. **prickle, spine**



**threatened** According to the IUCN, a conservation status covering species that are at risk of becoming extinct.

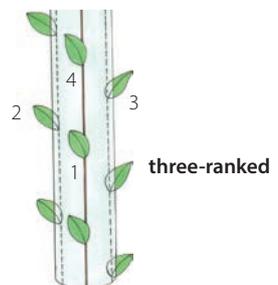
Three subdivisions are commonly recognised: critically endangered, endangered and vulnerable.

**three-ranked**

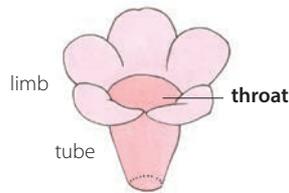
Of leaves arranged in three vertical rows, with any fourth leaf above the one below it.

= **tristichous**

see also **orthostichy**



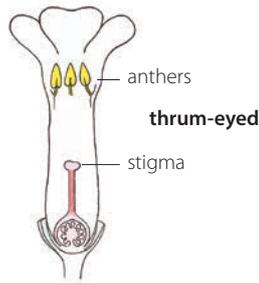
**throat** The opening of the tubular part of a calyx, corolla or perianth where it joins the limb.  
cf. **palate**



**throwback** The reappearance of a character of a distant ancestor after several generations.  
An atavism.

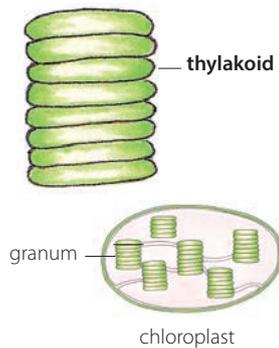
**thrum, thrum-eyed**

Presentation of the anthers above the level of the stigma so that floral visitors contact the anthers first, as the cowslip (*Primula vulgaris*).  
see **herkogamy**  
cf. **pin**



**thylakoid**

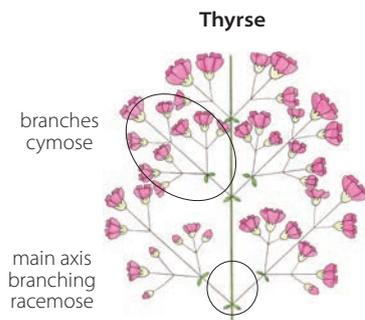
A disc-shaped membranous sac in a chloroplast that functions as the site of photosynthesis. Chlorophyll is situated in the thylakoid membranes.  
A stack of thylakoids is a granum.



**thyrses, thyrsus** A mixed inflorescence, with the main axis racemose (indeterminate) and the lateral branches cymose (determinate), as lilac (*Syringa*).  
see also **determinate, indeterminate**  
cf. **panicle**

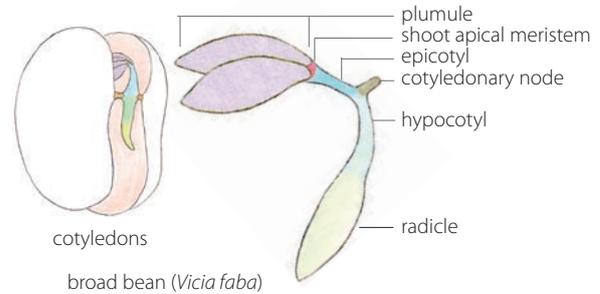
**thyrsiform** With the appearance, but not necessarily the structure, of a thyrses.

**thyrsoid** Like a thyrses.

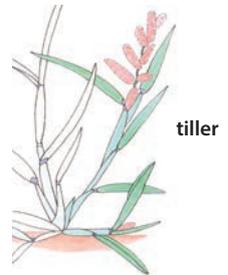


**tigellum** The plumule, epicotyl, hypocotyl and radicle that together form the embryo axis. It is attached to the cotyledon(s) at the cotyledonary node.  
It represents the axis of the future plant.  
= **embryo axis**

**Tigellum**

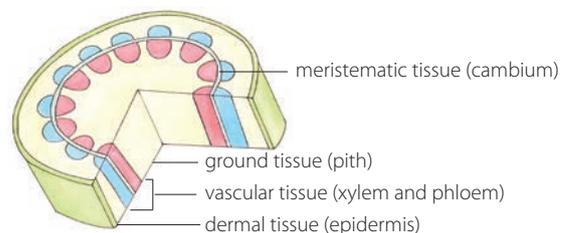


**tiller** A shoot that arises at or near the base of the stem of a grass or sedge. Tillers are separated from the parent plant for vegetative propagation or can produce an inflorescence and seeds.



**tissue** A group of cells, with a similar structure, that act together to perform a specific function. A level of organisation between cells and organs. Plants have four tissue types: meristematic tissue for differentiating into new tissues, vascular tissue for transport, dermal tissue for protection and ground tissue that makes up the remainder of the plant.  
see **complex ~, primary ~, secondary ~, simple ~**

**Stem tissues**



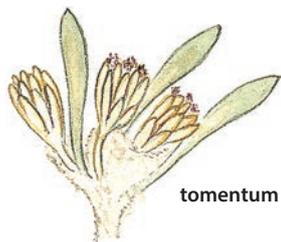
**tissue system** Plants have three tissue systems: the dermal tissue system (epidermis and periderm), the vascular tissue system (xylem and phloem) and the ground tissue system (parenchyma, collenchyma and sclerenchyma). Each tissue originates from a particular meristem.  
**tissue system** page 300 (cont.)

Tissue system		
Tissue System	Tissue	Meristem Origin
dermal	epidermis periderm	protoderm cork cambium
ground	parenchyma collenchyma sclerenchyma	ground meristem
vascular	primary xylem primary phloem secondary xylem secondary phloem	procambium vascular cambium

**tomentulose** Slightly or minutely tomentose.

**tomentum** A covering of dense matted short soft cottony or woolly hairs, as on cudweed (*Gnaphalium*).

**tomentose** With a tomentum.

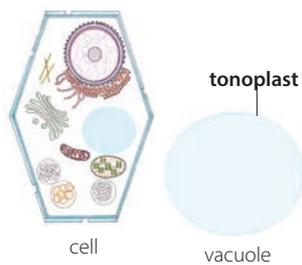


**tonoplast**

The membrane surrounding a plant cell vacuole that maintains water pressure through osmosis.

see **cell sap**

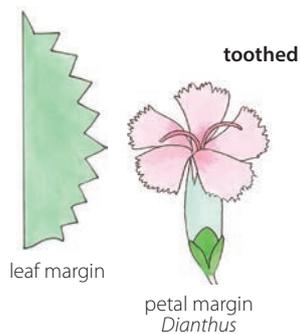
see also **turgour**



**toothed** Having teeth. With shallow tooth-like projections that are like an equilateral triangle, at right angles to the margin.

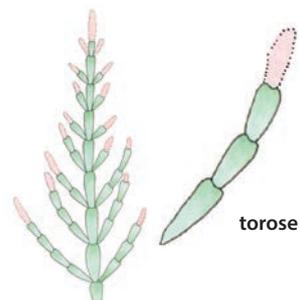
= **dentate**

cf. **crenate**, **edentate**, **serrate**

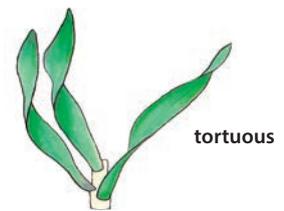


**torose, torous**

Cylindrical with alternate swellings and contractions but less markedly so than moniliform, as the stems of glassworts (*Salicornia* and *Sarcocornia*).



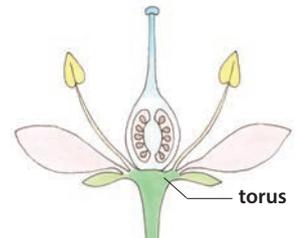
**tortuous** Twisted in different directions, as some leaves.



**torulose** Minutely torose, somewhat torose.

**torus** An expanded area at the apex of a stem bearing the organs of a single flower (sepals, petals, stamens and carpels).

= **receptacle**, **thalamus**  
cf. **hypanthium**



**toxin** A poisonous substance produced within living cells or organisms.

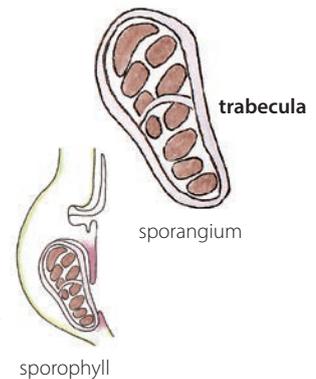
**trabecula,**

pl. **trabeculae**

A transverse partition dividing or partly dividing a cavity, as in the sporangium of a quillwort (*Isoetes*).

A transverse line or ridge, as on some seeds.

**trabeculate** Of or having a trabecula.



**trace element** Nutrients essential to plant growth and health that are only needed in very small quantities, including iron, manganese, boron, zinc, molybdenum, chlorine and copper.

= **micronutrient**

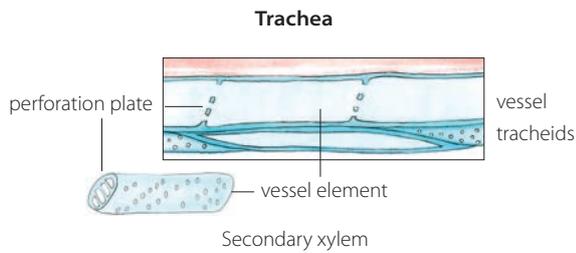
cf. **macronutrient**

**trachea** In the secondary xylem of angiosperms, a column of dead cells (vessel elements) with the joining ends perforated or totally degraded to form a tube.

The woody cell walls are pitted so that water and minerals can flow sideways as well as upwards from one cell to another.

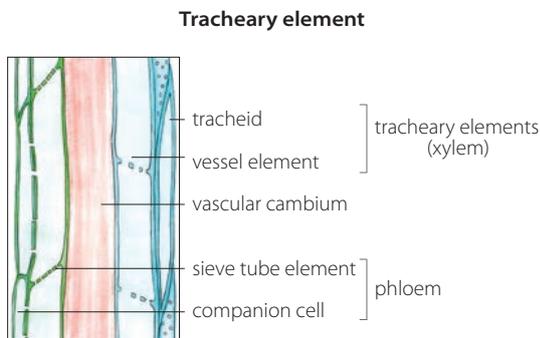
Gymnosperms generally do not have vessels.

= **vessel**



**tracheary element** Either of two types of specialised elongated cells in xylem, tracheids and vessels, for transporting water and solutes up the plant.

Tracheids are found in gymnosperms, ferns and angiosperms, and vessels are found only in angiosperms.



**tracheophytes** Vascular plants that have xylem and phloem for conducting water and nutrients. includes flowering plants (angiosperms), conifers and other gymnosperms, ferns, clubmosses and horsetails.

cf. **nonvascular plants**

**trailing** Of stems, hanging loosely or spreading over the ground, as trailing beach morning glory (*Ipomoea pes-caprae*).



**trait** A genetically determined characteristic or condition.

**transcription** The copying of one kind of nucleic acid, DNA, to form another kind, mRNA (messenger ribose nucleic acid), that is the code used for making proteins.

see also **translation**

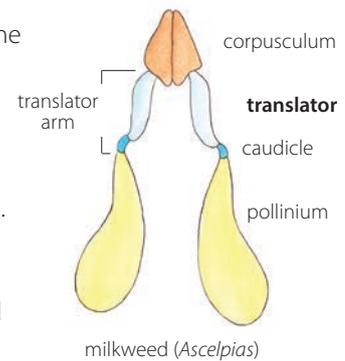
**translation** The conversion of the code in mRNA (messenger RNA) into the of amino acids that make up a protein.

see **transcription**

**translator** One of the thread-like arms that attaches a pollinium to the corpusculum in the milkweed family (Apocynaceae).

= **retinaculum**

Equivalent to the caudicle in the orchid family (Orchidaceae).



**translocation** The movement of soluble nutrients from one part of a plant to another, as sap containing nutrients in phloem tubes.

In genetics, the attachment of a broken part of a chromosome to a different chromosome or to a different part of the same one.

**translucent** Allowing light to pass through but not transparent.

**transparent** Sheer. Of a substance, clear and transmitting light so that it can be seen through.

So fine in texture that it can be seen through.

cf. **translucent**

**transpiration** The movement of water into, through and out of a plant.

Water enters through the roots, is transported upwards through the xylem and evaporates mainly from the stomata on the leaves.

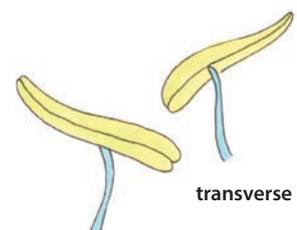
see also **evaporation**

**transverse** Situated or extending across something at right angles to the axis.

Of anthers borne at right angles to the tip of the filament.

see **anther attachment**

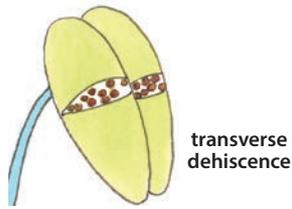
cf. **explanate**



**transverse dehiscence**

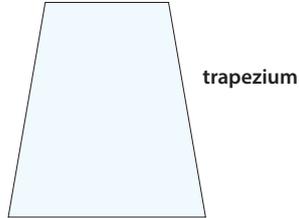
Of anthers, opening across the anther lobe to release pollen.

see also **anther dehiscence**

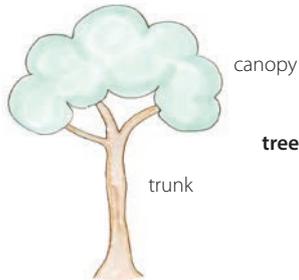


**trapezium** A four-sided figure with two sides parallel of unequal length.

**trapeziform** Shaped like a trapezium.



**tree** A tall perennial woody plant with a single main stem (trunk) from which branches extend to form a characteristic canopy or crown of leaves.



**tree fern** Tree ferns primarily belong to the tree fern family (Dicksoniaceae) and the scaly tree fern family (Cyatheaaceae).

Some species, as *Cyathea*, have trunk-like stems composed of rhizomes that grow vertically. The tip of the stem produces a cluster of large divided fronds.

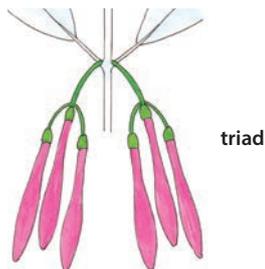
see **fern**



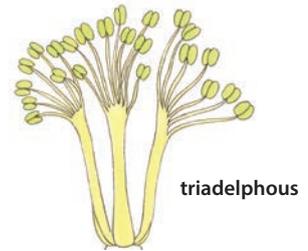
**treeline** The altitude above which trees are unable to grow. It varies according to latitude and other effects like exposure and soil.

**tri-** A prefix meaning three.

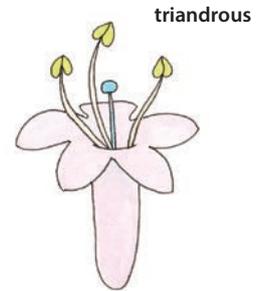
**triad** A group of three, as three flowers grouped together in an inflorescence, as those of some mistletoes.  
cf. **diad, monad, polyad, tetrad**



**triadelphous** Of stamens united by their filaments into three bundles, as some members of the gourd family (Curcubitaceae).  
see **adelphous**

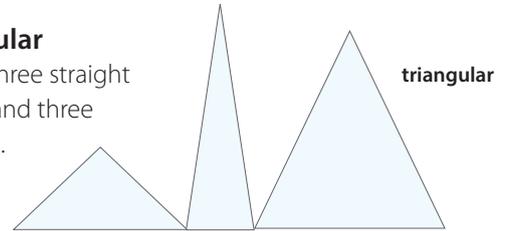


**triandrous** Having three stamens, as the flowers of the iris family (Iridaceae).  
cf. **diandrous, monandrous, pentandrous, polyandrous, tetrandrous**



**triangular**

With three straight sides and three angles.



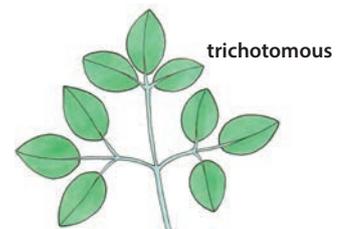
**tribe, tribus** In taxonomic classification, a subdivision of a large family or, if present, subfamily. Names of tribes end in *-eae*.

**trichome** An outgrowth from the epidermis, as a prickle, glochid or various types of hairs. They may be glandular or non-glandular, unicellular or multicellular, branched or unbranched.  
cf. **spine, thorn**

**trichomosulcate** Of a pollen grain with a three-armed sulcus.



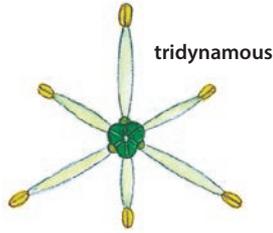
**trichotomous** Branching once or regularly into three parts.  
cf. **dichotomous**



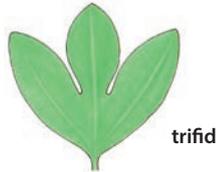
**tricyclic** Having three whorls, as a flower with a whorl or tepals, a whorl of stamens and a whorl of carpels.  
see also **cyclic**

**tridentate** Three-toothed, as the leaflet tips of three-toothed cinquefoil (*Sibbaldiopsis tridentata*).

**tridynamous** Having six stamens, three long and three short, as the pale grass lily (*Caesia parviflora* var. *parviflora*).  
cf. **didynamous**,  
**tetradynamous**



**trifid** Split by deep clefts into three lobes, as a trifid leaf.



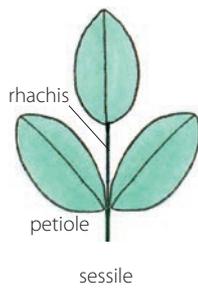
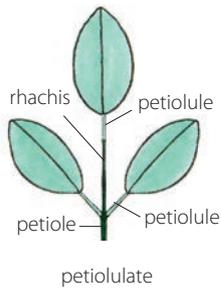
**trifoliolate** With three leaves.  
see **foliate**  
cf. **bifoliolate**, **unifoliolate**



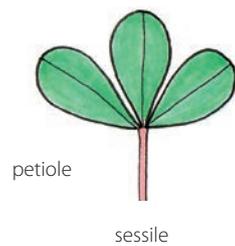
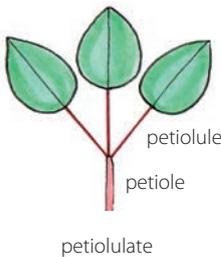
**trifoliolate** Of a compound leaf with three leaflets.  
It can be pinnate or palmate and leaflets can be petiolulate or sessile.  
see also **ternate**  
cf. **trifoliate**

**Trifoliolate**

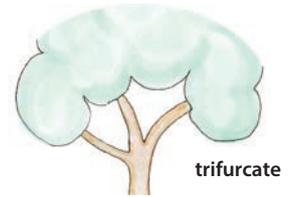
**Pinnate**



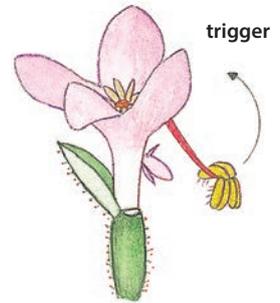
**Palmate**



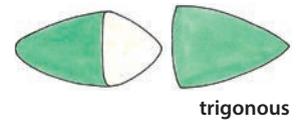
**trifurcate** Divided into three more or less equal branches or prongs.  
Forked.  
see **furcate**



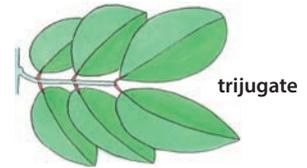
**trigger** A pollinating mechanism in trigger plants (Stylidiaceae). The sensitive column arches back on one side of the flower and springs forward to deposit pollen on, or to collect pollen from, an insect visitor.



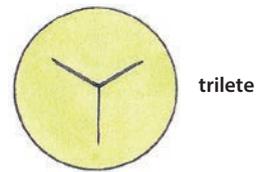
**trigonus** Triangular in cross-section with angles obtuse.



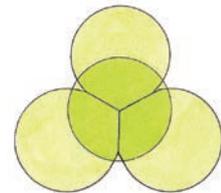
**trijugate** Of a pinnate leaf having three pairs of leaflets.  
see **jugate**



**trilete** Of a spore with a three-branched, Y-shaped laesura that is a result of the way the four spores of the multiplanar tetrad were in contact with each other after meiosis.  
It is the area of weakness in the wall through which the spore germinates.  
cf. **alete**, **trilete**



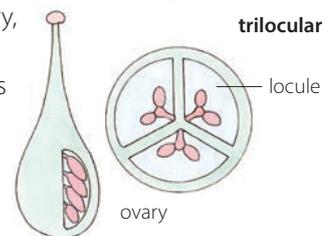
Y-shaped laesura



**trilobate, trilobed**  
Having three lobes, as some leaves.

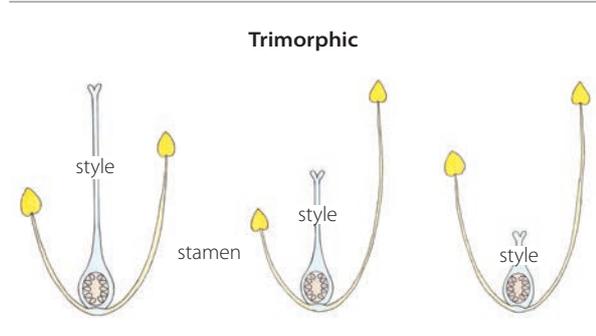


**trilocular** Of an ovary, anther or fruit, having three locules or cavities for ovules, pollen or seeds.  
cf. **plurilocular**,  
**unilocular**



**trimerous** Having flower parts, such as petals, sepals and stamens, in whorls of three or multiples of three. 3-merous.  
*see -merous*

**trimorphic** Having three distinct forms, as daffodils (*Narcissus*) that can have three different style lengths and different stamen lengths.  
*cf. dimorphic, monomorphic, polymorphic*



**trioecious** Of a species having plants with male flowers, plants with female flowers and plants with bisexual flowers.  
*see androgynomonoecious*  
*cf. diclinous, dioecious, monoecious*

**tripartite** Divided almost to the base into three lobes, as a tripartite leaf.



**tripinnate** Of a pinnate leaf with the primary divisions (pinnae) themselves divided into leaflets (pinnules) and the pinnules again divided into pinnules. A three times pinnately divided compound leaf.



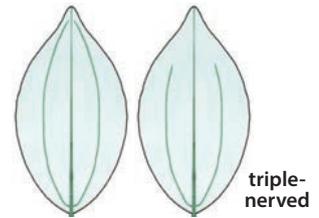
**tripinnatifid** Thrice pinnatifid.

**tripinnatipartite** Thrice pinnatipartite. Of a pinnately lobed leaf with the primary lobes twice pinnatipartite.

**tripinnatisect** Thrice pinnatisect. Of a pinnately lobed leaf with the primary lobes twice pinnatisect.



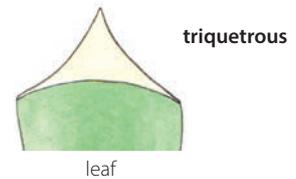
**triple-nerved, triple-ribbed, triplinerved** Having two prominent lateral veins emerge from the midrib a little above its base.



**triploid** Having three or more complete sets (3x) of chromosomes in each somatic cell.  
*see ploidy*

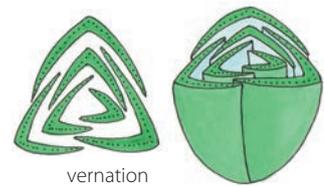
**tripterous** Of fruit or seed, having three wing-like expansions.

**triquetrous** Triangular in cross-section with angles acute, as some leaves.



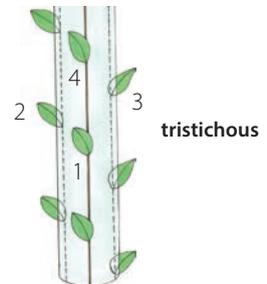
*cf. trigonous*

**triquetrous venation** Of young leaves in the unopened leaf bud having the bud triangular in section and leaves equitant at each angle.

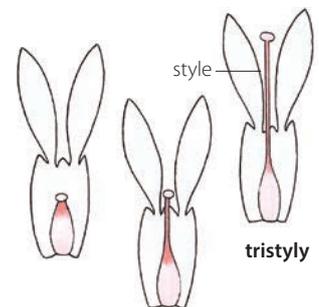


**tristichous**

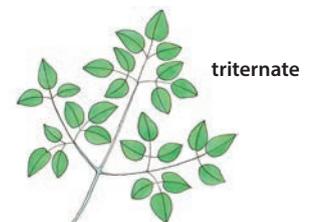
Arranged on a stem in three vertical rows, as some leaves, with any fourth leaf above the one below it.  
 = **three-ranked**  
*see orthostichy*



**tristyly** Having styles of three different lengths in flowers on the same plant, as purple loosestrife (*Lythrum salicaria*).  
*cf. distily, heterostyly*  
**tristylous** Exhibiting tristily.



**triternate** Consisting of three parts, with each part divided into three and each of these three again divided into three, as a triternate leaf.

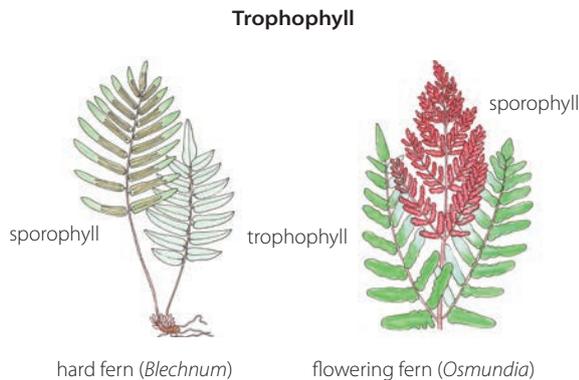


**trophic** Of or relating to the nutrition of an organism in a food chain.  
 see **autotrophic, chemoautotrophic, dystrophic, ectotrophic, endotrophic, eutrophic, heteromycotrophic, heterotrophic, holomycotroph, hypereutrophic, mesotrophic, mycotrophic, oligotrophic, photoautotrophic**

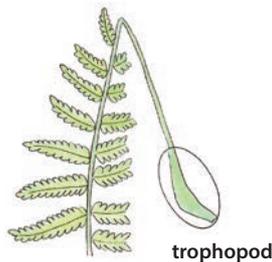
**trophophore** Of the adder's tongue family (Ophioglossaceae), the sterile photosynthetic vegetative leaf-like part of a frond that shares a common stalk with the fertile spore-bearing part of the frond.  
 cf. **sporophore**



**trophophyll** Of ferns, a vegetative frond that is usually similar in appearance to the fertile fronds (sporophylls) that bear sori, as hard ferns (*Blechnum*), but often different, as flowering ferns (*Osmundia*).  
 cf. **sporophyll**



**trophopod**, pl. **trophopodia** The enlarged and modified persistent base of a frond filled with starch storage tissue, as the lady fern (*Athyrium filix-femina*).



**tropic response** Growth of a plant in a direction towards or away from a stimulus, such as light, gravity or moisture.  
 = **tropism**  
 see also **apogeotropism, geotropism, gravitropism, heliotropism, hydrotropism, orthotropism, phototropism, thigmotropism**  
 cf. **nastism**

**tropical rainforest** Luxuriant forest characterised by high annual rainfall, extensive growth and poor soils.

Tropical rainforest is found near the equator, has no distinct seasons and four layers of growth (the emergent layer, the canopy layer, the understorey layer and the forest floor).

see **biome**  
 see also **storey**

**tropics** The region between the Tropic of Cancer at latitude 23½° north of the equator and the Tropic of Capricorn at latitude 23½° south of the equator. Characterised by relatively constant temperatures, a wet and a dry season in the monsoon regions and tropical savanna, and a year-long wet season in tropical rainforest regions.  
 Also called the torrid zone.

**tropic, tropical** Of or occurring in the tropics.  
 see **biome**

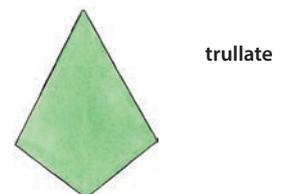
**tropism** Growth of a plant in a direction towards or away from a stimulus, such as light, gravity or moisture.

= **tropic response**  
 see also **apogeotropism, geotropism, gravitropism, heliotropism, hydrotropism, orthotropism, phototropism, thigmotropism**  
 cf. **nastism**

**trophophyte** A plant adapted to grow in a climate with alternating rainy and dry seasons, as yams (*Dioscorea alata*).  
 cf. **mesophyte, xerophyte**

**true fruit** Fruit derived only from the the tissue of the ovary, as a drupe.  
 cf. **false fruit**

**trullate** Shaped like a bricklayer's trowel.  
 cf. **obtrullate**



**truncate** Appearing cut off at the base or the apex. Terminating suddenly rather than gradually.  
 = **abrupt**



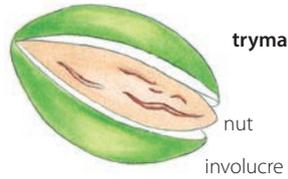
**trunk** The main stem of a tree, usually thick and upright, that bears branches at some distance above the ground.

cf. **crown, bole**



**tryma** A nut surrounded by a fused involucre that dehisces at maturity, as the pecan (*Carya*).

see **accessory fruit**  
cf. **pseudodrupe**



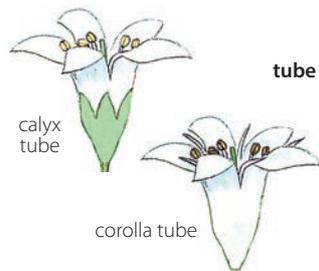
**tryphine** A sticky material coating the pollen grains of the mustard family (*Brassicaceae*).

see **pollen kit**

**tube** Of a flower, the fused, usually more or less cylindrical portion of a calyx or corolla.

cf. **limb**

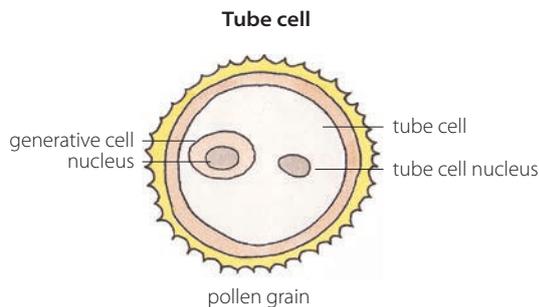
**tubular** Cylindrical and hollow.



**tube cell** One of the two cells, lacking a cell wall, in a pollen grain.

After pollen germination, it develops into the pollen tube.

see also **generative cell**



**tuber** The part of an underground root or stem, rarely an aerial stem, as Madeira vine (*Anredera cordifolia*), that is swollen with food reserves and survives from season to season.

see **root tuber, stem tuber, tuberoid**

**tuberous** Bearing tubers or tuberoids.

**tubercle** A small rounded wart-like protuberance.

A nodular growth on the roots of legumes.

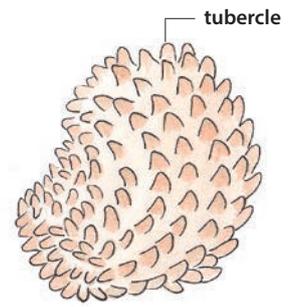
see **nitrogen fixation**

**tubercular** Like a tubercle.

Having tubercles, as the seeds of some chickweeds (*Stellaria*).

**tuberculate,**

**tuberculose** Covered with small blunt warty projections.



chickweed seed tuberculate

**tuberoid** A fleshy storage organ on a root, usually on plants that die back over winter.

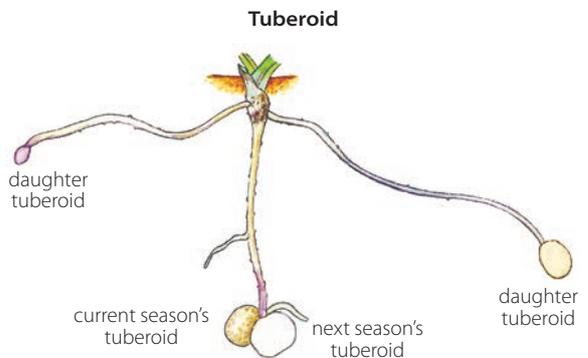
It has an apical bud and can form roots at the base to produce a new plant.

Daughter tuberoids, that develop on the ends of additional roots, can produce a colony of new plants.

Often only two tuberoids are present, with one being a replacement for the previous season's tuberoid.

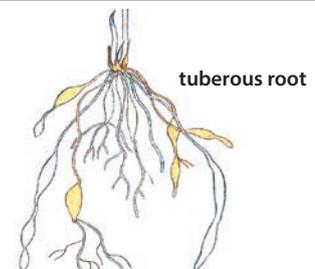
Common in terrestrial orchids.

see also **dropper, tuber, tuberous root**

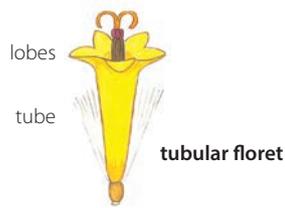


**tuberous root** Roots with swollen parts that function as a storage organ and allows the plant to survive during dormancy.

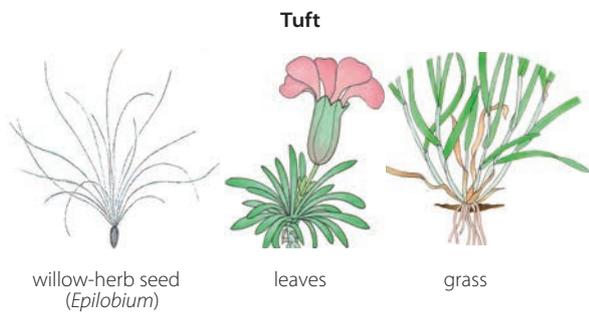
see **root tuber**



**tubular floret** A small tubular flower usually with lobes.  
 = **disc floret**  
*cf.* **ligulate floret, ray floret**



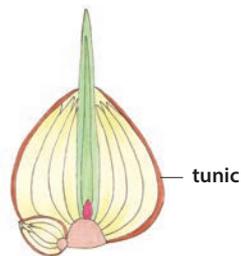
**tuft** A dense bunch or cluster, as of leaves or hairs, that are attached to or close together at the base. Of grasses (Poaceae), tillers joined together at the base by very short stems or apparently stemless.  
*cf.* **mat grass**  
 A small clump of trees or bushes.  
**tufted** In a dense bunch, cluster or clump.  
 = **caespitose**



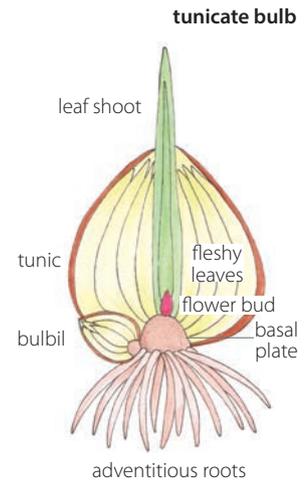
**tumid** Swollen and distended, especially due to high fluid content.  
 = **turgid**  
**tumescent** Becoming tumid or nearly tumid.  
**tumidity** The state of being tumid.

**tundra** A vast mostly flat treeless arctic biome in Europe, Asia and America, with a patchy low vegetation of mosses, lichens, herbs and small shrubs. Surface soil freezes and thaws seasonally and subsoil remains permanently frozen.  
*see* **biome, permafrost**

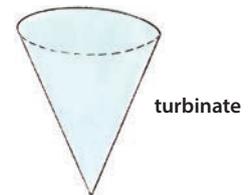
**tunic** The outer dry papery covering of bulbs and corms.  
**tunicate** Having or covered with a tunic, as the fleshy cylinder-like leaves of an onion bulb.



**tunicate bulb** A true bulb that consists of a compressed stem with nodes (basal plate) bearing cylinder-like leaves arranged in concentric circles, that surround the leaf shoot and flower bud for the following season. The fleshy leaves are covered by an outer sheath (tunic) of dry membranous scale leaves.  
*see also imbricate bulb*

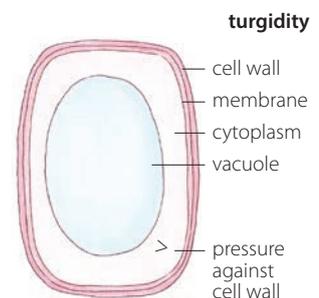


**turbinate** Cone-shaped with the narrow end at the base. Shaped like a top.

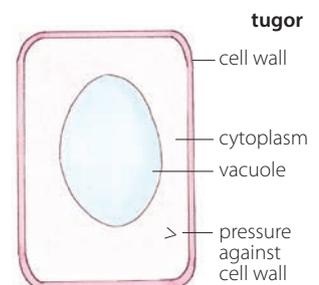


**turf** A layer of earth covered with grass. Sod.

**turgidity** The state of being turgid.  
*see* **turgor**  
**turgid** Of a plant cell having high turgor pressure. It occurs when the vacuole increases its water content and swells causing outward pressure against the cell wall.  
*cf.* **flaccid, tumid**

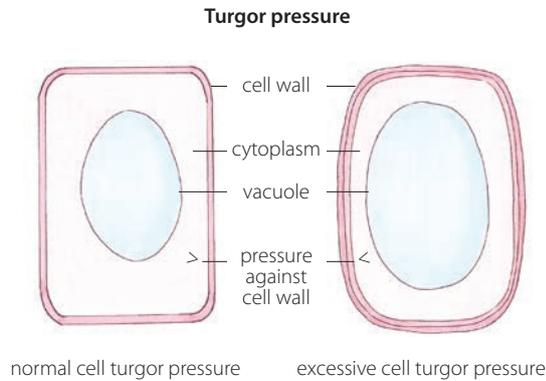


**turgor, turgour** Of a plant cell, the normal state of rigidity caused by pressure of the contents of a cell against the hard cellulose cell wall.



**turgor pressure** The pressure on the cell wall caused by the degree of swelling of the vacuole. Pressure from excessive water in the vacuole causes the cell walls to become distended.

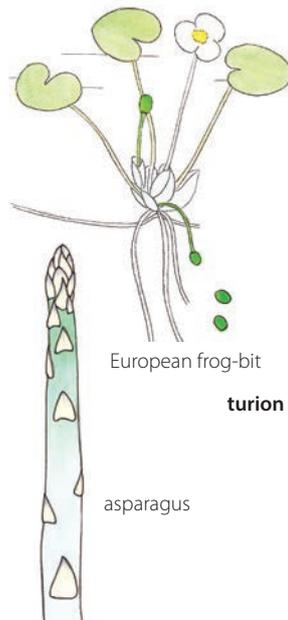
cf. **flaccidity, plasmolysis**



**turion** In some aquatic species, an overwintering perennating bud that separates from the parent plant and either sinks to the bottom, shooting when conditions are favourable, or disperses and colonises a new habitat, as European frog-bit (*Hydrocharis morsus-ranae*).

A scaly shoot that develops from an underground bud, as asparagus (*Asparagus officinalis*).

cf. **gemma**



**turpentine** A resinous exudate from the turpentine tree (*Pistacia terebinthus*) and some conifers.

see **oleoresin**

**tussock** A plant growing in a dense tuft, usually separately from similar tufts, as serrated tussock (*Nassella trichotoma*).

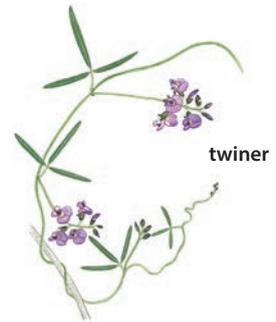
see also **hummock grass**



**twig** The lowest order of branching in a woody plant, usually of the current season's growth and concentrated in the outer extremities.

**twiner** A plant that winds itself spirally around a support as it grows, as honeysuckle (*Lonicera caprifolium*) and twining glycine (*Glycine clandestina*).

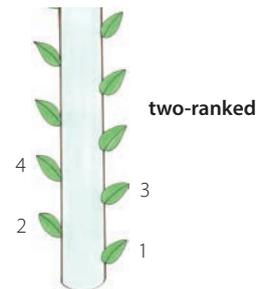
cf. **climber**



**two-ranked** Of leaves arranged alternately on opposite sides of the stem, in two vertical rows, with any third leaf above the one below it.

= **distichous**

see also **orthostichy**



**type** A preserved specimen, or sometimes an illustration, that serves as the reference point when naming or describing a new species, genus or family.

= **type specimen**

see **holotype, isolectotype, isosyntype, isotype, lectotype, neotype, nomenclatural type, paratype, syntype**

**type specimen** A preserved specimen, or sometimes an illustration, that serves as the reference point when naming or describing a new species, genus or family.

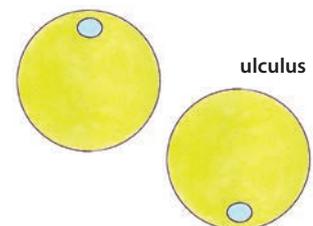
= **type**

**ulculus, pl. ulculi**

A more or less circular aperture not situated at a pole on a pollen grain.

cf. **ulcus**

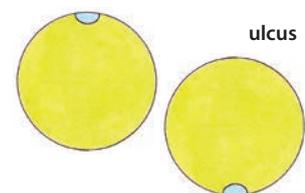
**ulculate** Of a pollen grain with an ulculus.



**ulcus, pl. ulci** A more or less circular aperture situated at either pole of a pollen grain.

cf. **ulculus**

**ulcerate** Of a pollen grain with an ulcus.



**umbel** A flat-topped to almost spherical racemose inflorescence, with the flower stalks (pedicels) arising from the same point at the top of the main stem.

Typical inflorescence of the carrot family (Apiaceae).

An umbel may be simple or compound.

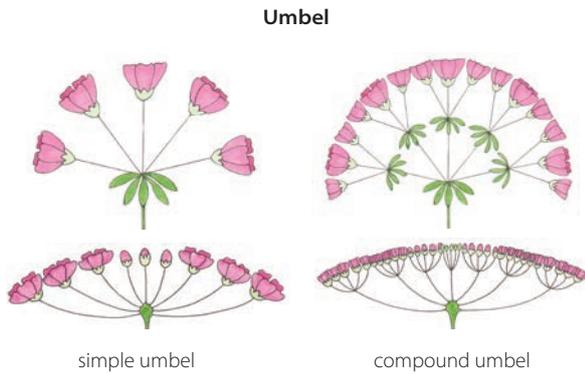
An indeterminate or indefinite inflorescence.

cf. **corymb**

**umbellate** Bearing umbels.

**umbelliferous** Bearing or producing an umbel or umbels.

**umbelliform** Having the shape, but not necessarily the structure, of an umbel.



**umbellaster**

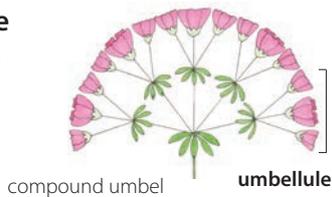
The unique umbel-like inflorescence of some eucalypts.



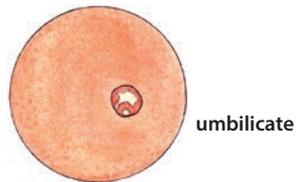
**umbellet, umbellule**

A secondary umbel in a compound umbel.

A small or partial umbel.

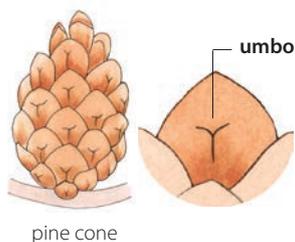


**umbilicate** Having a central depression resembling a navel, as on a navel orange.



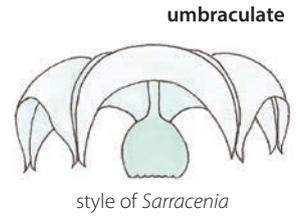
**umbo** A projection arising from a surface. The raised part of the apophysis on the scale of a pine cone.

**umbonate** Bearing or like an umbo.



**umbraculate, umbraculiferous**

Having the shape of an open umbrella, as the elaborate style of the pitcher plant genus *Sarracenia*.



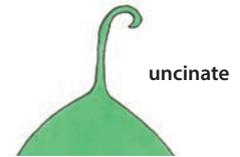
**un-** A prefix meaning negation or reversal.

**unarmed** Lacking thorns, spines or prickles.

= **inermous**

see **armature**

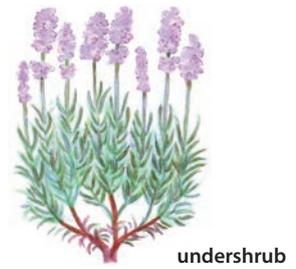
**uncinate** With a hook at the apex, as some leaves.



**unctuous** Smooth and greasy in texture or appearance, as camphor, the oil extracted from the camphor laurel (*Cinnamomum camphora*).

**undershrub** A small shrub with a woody base and herbaceous new growth, as lavender (*Lavandula*) and thyme (*Thymus*).

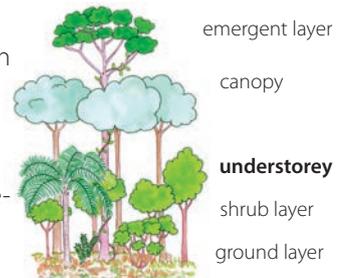
= **subshrub, suffrutex**



**understorey, understory**

The layer of vegetation between the shrub layer and the canopy in a forest.

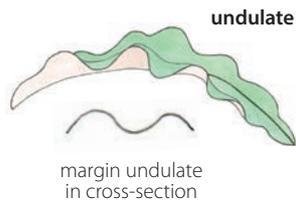
It is made up of shade-tolerant trees and the saplings of canopy and emergent species.



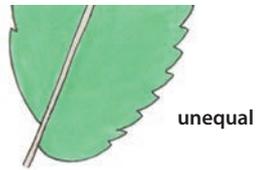
**undescribed** A taxon, such as a new species, that has not yet been formally described and named.

**undifferentiated** With no distinctive characteristics, as the unspecialised cells of a meristem or the sepals and petals of some lilies.

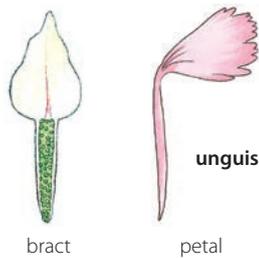
**undulate** Wavy.  
With margins curving up and down in cross-section, as the margins of some leaves. Not flat.  
*cf. sinuate*



**unequal** Asymmetrical, as a leaf or leaflet larger on one side of the midrib than on the other.  
*see also oblique*

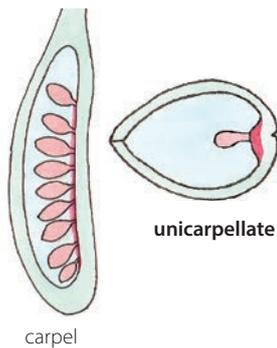


**unguis** A claw.  
**unguiculate** Narrowed at the base into a claw, as some petals and bracts.

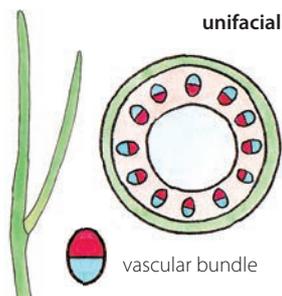


**uni-** A prefix meaning having only one.

**unicarpellate, unicarpellous**  
Of a flower having a carpel with one locule, as peas.  
= **monocarpellary, monocarpellate, monocarpous, stylodious**  
*cf. apocarpous, syncarpous*



**unifacial** Having one usually cylindrical surface, as the leaf of an onion (*Allium cepa*) with no distinct upper and lower surfaces.  
= **centric**  
*cf. bifacial, equifacial*



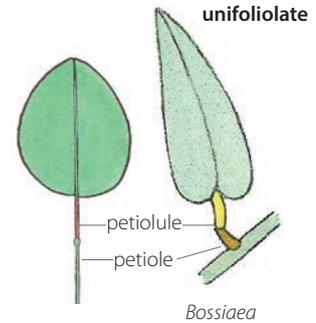
**uniflorescence**  
One of the inflorescence units in a confluence, including any pedicels and bracts when present, as the paired flowers of grevilleas (*Grevillea*) and banksias (*Banksia*).



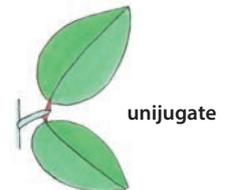
**unifoliate** With one leaf, as the orchid pink fairies (*Caladenia latifolia*).  
*see foliate*  
*cf. bifoliate, trifoliate*



**unifoliolate** Of a compound leaf having a single leaflet, with the leaflet on a petiolule attached to the top of the petiole, as some bossiaea (*Bossiaea*) or lemons (*Citrus*).  
*cf. unifoliate*  
= **monofoliolate**

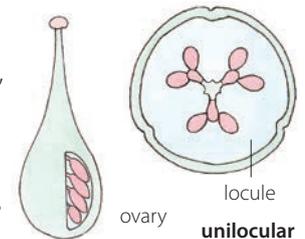


**unijugate** Paired.  
Of a pinnate leaf having one pair of leaflets.  
*see jugate*

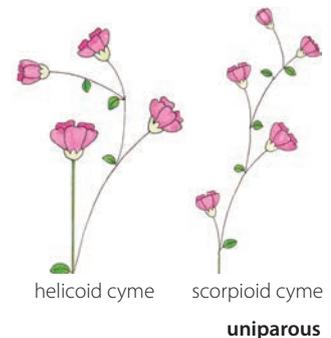


**unilateral** Arranged on one side only.  
*cf. bilateral*

**unilocular** Of an ovary, anther or fruit, having a single locule or cavity for ovules, pollen or seeds.  
*cf. bilocular, plurilocular*



**uniparous** Of a cymose inflorescence forming a single stem at each branching point, as a helicoid or scorpioid cyme.  
*cf. biparous, multiparous*



**uniplanar** Lying on an imaginary two-dimensional flat or level surface, as pollen grains in tetrads that are tetragonal, T-shaped, rhomboidal or linear.  
*see plane, pollen tetrad*  
*cf. multiplanar*

**uniseriate** Arranged in one row or whorl.  
= **monoseriate**  
*see also seriate*

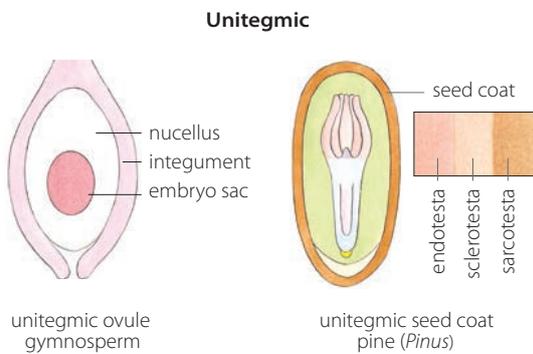
**unisexual** Of a flower with either stamens or a pistil or pistils fertile, but not both.  
Of an inflorescence or plant with fertile flowers of one sex only.  
*cf.* **bisexual, neuter**

**unisporangiate**  
Of an anther with only one pollen sac, as the dwarf mistletoes (*Arceuthobium*).  
= **monosporangiate**  
*cf.* **bisporangiate, tetrasporangiate**



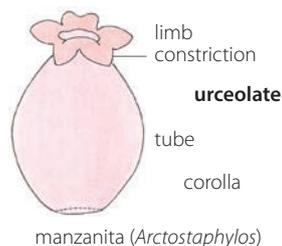
**united** Of parts fused or joined together.  
*cf.* **adherent, coherent**

**unitegmic**  
Of an ovule, with one integument surrounding the nucellus, as gymnosperms.  
Of a seed coat, having a single integument comprising three layers: an outer fleshy sarcotesta, a middle stony sclerotesta and an innermost parenchymatous endotesta that generally collapses to form a membranous layer, as gymnosperms.  
*cf.* **ategmic, bitegmic**

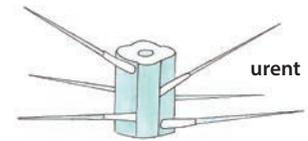


**univalent** In meiosis, of a chromosome that is not paired with its homologous chromosome during synapsis.

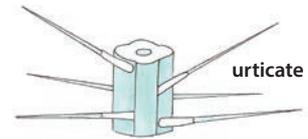
**urceolate** Urn-shaped. of a globose to sub-cylindrical corolla with a constriction at or below the short limb, as manzanita (*Arctostaphylos*).



**urent** Stinging.  
Causing irritation when touched, as hairs of the stinging nettle (*Urtica dioica*).



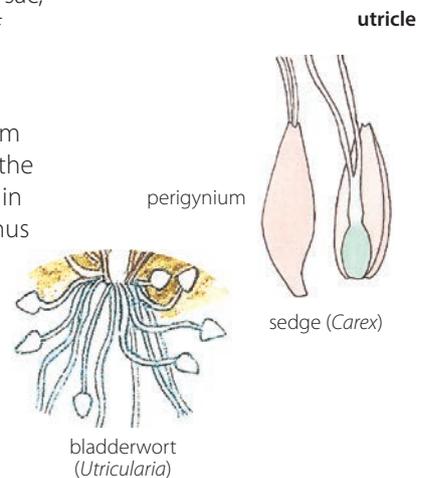
**urticate** Causing a stinging sensation, as hairs of the stinging nettle (*Urtica dioica*).



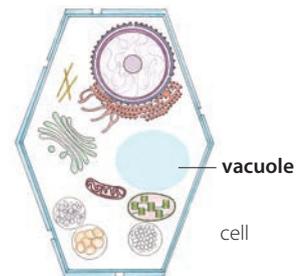
**utricle** A bladder-like structure.  
A membranous indehiscent single-seeded fruit, as bluebush (*Maireana*).



A bladder-like sac, as the traps of bladderworts (*Utricularia*).  
The perigynium that encloses the female flower in the sedge genus *Carex*.



**vacuole** A fluid-filled membranous sac in the cytoplasm of a plant cell. Its functions include digestion, storage of wastes and toxins, and maintenance of water pressure.  
*see* **tonoplast, cell sap**



**vaginate** Enclosed in a sheath, as the leaf base that surrounds the stem of most grasses.  
*see also* **sheathing**



**valid name** A name published in accordance with the International Code of Nomenclature.

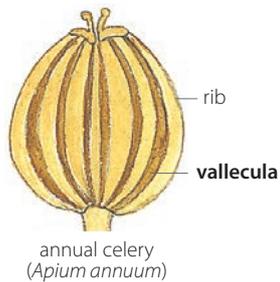
**validly published** Published in accordance with the International Code of Nomenclature.  
= **effectively published**

**vallecula, pl. valleculae**

A groove or furrow.  
A furrow between the ribs on the fruit of the carrot family (Apiaceae).

**valleculate** Having valleculae.

**vallecular** Relating to valleculae.



**valvate** With similar parts touching at the edges but not overlapping.

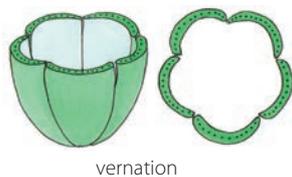
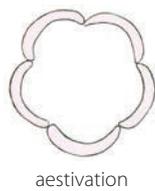
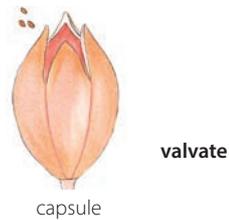
Relating to valves.  
Opening by valves, as some capsules.

**valvate aestivation**

The arrangement of petals, tepals or sepals in a bud with the margins meeting but not overlapping.

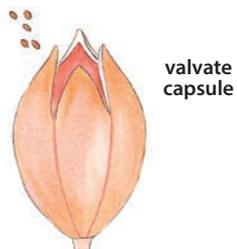
**valvate vernation**

The arrangement of young leaves in an unopened leaf bud with the margins meeting but not overlapping.



**valvate capsule**

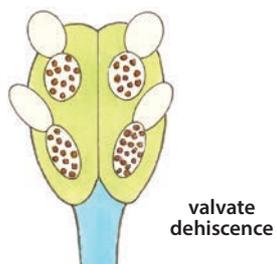
A capsule that splits at the tip along the margins of the valves, as some of the carnation family (Caryophyllaceae).



**valvate dehiscence, valvular dehiscence**

Of anthers, with flap-like valves that open upwards to release pollen, as the laurel family (Lauraceae).

see also **anther dehiscence**



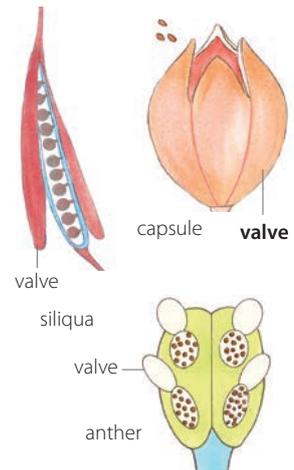
**valve** A segment of a dry fruit, as a capsule or siliqua, or an anther, that splits open at maturity.

It may remain attached or fall off.

Derived from the fruit wall.

**valvular** Of or relating to a valve.

see **valvate**

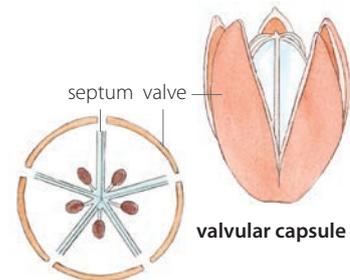


**valvular capsule**

A capsule that splits so that the valves breakaway from the septa, as Argentine cedar

(*Cedrela angustifolia*).

= **septifragal capsule**



**VAM** Vesicular arbuscular mycorrhiza.

**vaporisation** The change of a substance from a liquid state to a gaseous state.

There are two types of vaporisation, evaporation and boiling.

cf. **condensation**

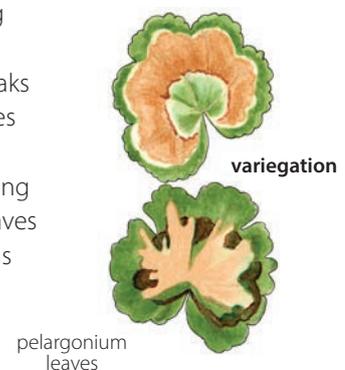
**var.** An abbreviation for variety.

**variation** The naturally occurring genetic and/or morphological differences among individuals of the same species.

**variegation** Having differently coloured patches, spots or streaks in plant parts, as leaves and petals.

**variegated** Exhibiting variegation, as the leaves of some pelargoniums (*Pelargonium*).

cf. **concolorous, discolorous**



**variety, varietas, abbr. var.** In taxonomic classification, a subdivision of species below subspecies and above forma, as *Geranium sanguineum* var. *strictum*.  
see **taxonomic hierarchy**

**vascular** Having a system of vessels (xylem and phloem), for conducting water and nutrients. It includes flowering plants (angiosperms), conifers and other gymnosperms, ferns, clubmosses and horsetails.  
see also **cryptogams, nonvascular plants**

**vascular bundle** A strand of vascular tissue (xylem and phloem) and associated tissues (as cambium in secondary growth) that provides support and supplies nutrients to plant parts. It originates in the procambium of the apical meristem.

In monocotyledon stems the bundles appear scattered in cross-section and in eudicot stems they are arranged in a ring inside the epidermis.

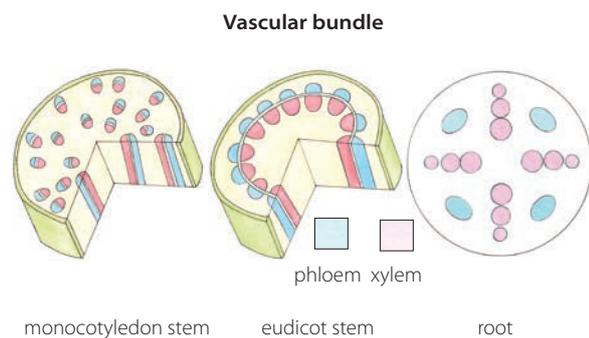
Open vascular bundles in secondary growth have a layer of cambium, as eudicots. Closed vascular bundles lack a cambium layer and secondary growth, as monocotyledons.

Xylem and phloem are usually bundled together (conjoint vascular bundles) but are typically arranged separately (radial vascular bundles) in the roots of monocots and eudicots.

In the stem and root the vascular bundles are continuous throughout the length of the axis.

= **vascular strand**

see also **stele**



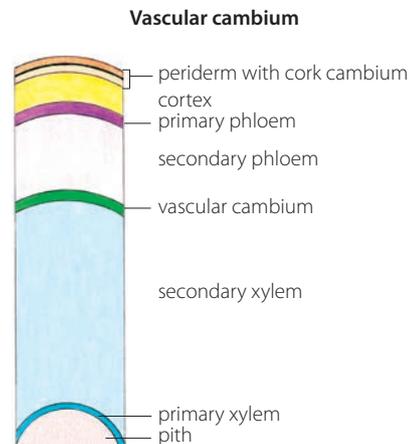
**vascular cambium** A layer of meristematic cells, between the xylem and phloem in the vascular tissue of eudicots and gymnosperms, that produces secondary xylem (wood) and secondary phloem (inner bark).  
In primary growth it is derived from procambium,

as well as the parenchyma between the vascular bundles.

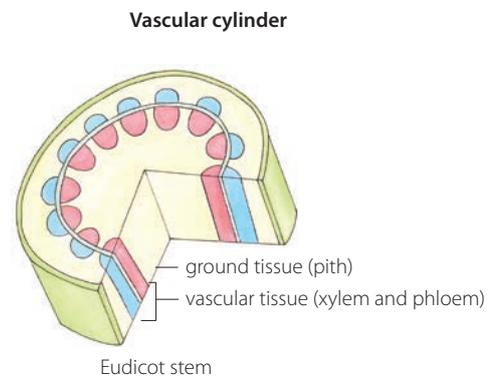
It is found in secondary growth and eventually forms a continuous ring.

see **vascular bundle**

see also **cambium, fusiform initials, interfascicular cambium, lateral meristem, ray initials**



**vascular cylinder** The central core of eudicot and gymnosperm stems and roots comprising the vascular tissue and other tissues like pith.  
= **stele**



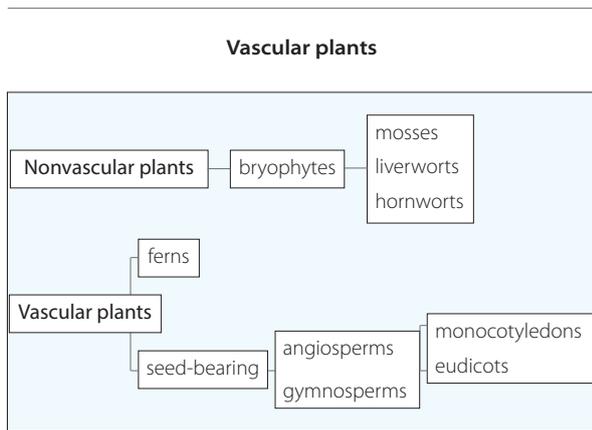
**vascular plants** Plants with a specialised conducting system (xylem and phloem) for transporting water and nutrients.

The three kinds of vascular plants are: flowering plants (angiosperms), conifers and other gymnosperms, and seedless plants like ferns, clubmosses and horsetails.

**vascular plants** page 314 (cont.)

= **tracheophyte**

cf. **nonvascular plants**

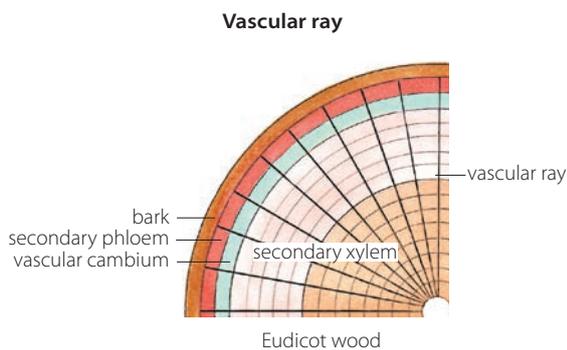


**vascular ray** Of secondary growth in eudicots and gymnosperms, one of the bands of mostly parenchyma tissue produced by the vascular cambium that extends through the secondary xylem (growth rings) and the secondary phloem in woody plants.

Vascular rays store nutrients and transport them radially. Vascular bundles transport nutrients vertically.

see **medullary ray**

see also **ray initials**

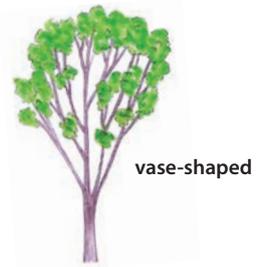


**vascular strand** A vascular bundle.

**vascular system** Specialised tissues, xylem and phloem and associated tissues, that provide support and conduct water and nutrients throughout a plant.

**vascular tissue** Tissue arranged in long strands (vascular bundles) that provide support and transport water and nutrients throughout a plant.  
see **complex tissue, primary tissue**

**vase-shaped** Of a tree having a tall central trunk with a canopy of spreading branches that is widest at the top, as American elm (*Ulmus americana*).



**Vavilovian mimicry** A form of imitation where a weed comes to share one or more characteristics with a domesticated plant, especially of a food crop, as the grass *Lolium remotum* is a nearly obligate weed of flax (*Linum usitatissimum*).

cf. **Bakerian mimicry, Dodsonian mimicry, Pouyannian mimicry**

**vector** A DNA molecule that carries and inserts a foreign gene into another cell.

see also **genetic engineering**

**vegetation** The general form or appearance of the plant life of a particular community.

cf. **flora**

**vegetative** Relating to the non-floral parts of a plant, as stems, leaves and roots.

**vegetative apomixis** Vegetative buds or bulbils produced in the place of flowers.

May be the only means of propagation for the plant, as tree onion (*Allium cepa* var. *proliferum*).



**vegetative bud** A leaf bud, a bud composed of embryonic leaves.

see also **ptyxis, vernation**

cf. **reproductive bud**

**vegetative phase** The phase after germination in which plant shoots increase in size and photosynthetic capacity.

The diploid generation of a plant that begins with the zygote and includes its roots, stems and leaves, and in angiosperms the flowers and fruit, and in gymnosperms the cone.

The gamete-bearing phase in the life cycle of a plant.

= **sporophyte**

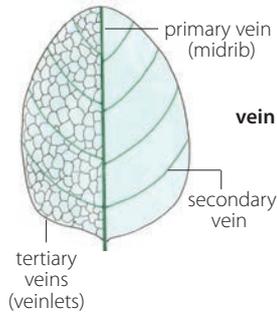
see **reproductive phase, senescence**

see also **alternation of generations**

**vegetative reproduction** A form of asexual reproduction where a new plant grows from parts of a parent plant and is identical to it (a clone). It is either natural, as from stems (stolons and rhizomes), roots (tubers) and bulbils, or artificial, as from cuttings, grafting or layering.

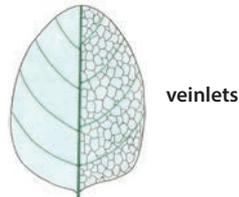
see also **apomixis**

**vein** A vascular bundle in a leaf or other plant part that circulates water, minerals and other substances. It typically divides or branches and provides support and strength.  
= **nerve**



**veinlet, venule**

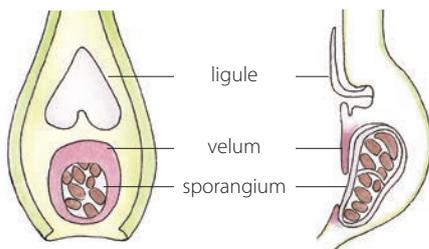
A small vein. The ultimate visible division of a vein on a leaf.  
= **tertiary vein**



**velamen** A water-retaining outer layer on the aerial roots of some epiphytes, especially orchids.

**velum, pl. vela** The membranous flap covering the sporangium in quillworts (*Isoetes*).

**Velum**

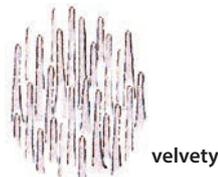


basal part of a sporophyll

**velutinous** Velvety. Covered with silky, short, fine, erect hairs of an even length.  
cf. **sericeous**



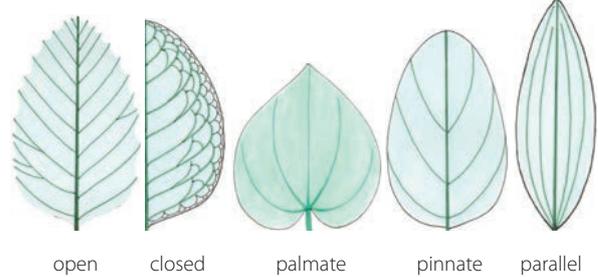
**velvety** Covered with silky, short, fine, erect hairs of an even length.  
= **velutinous**  
cf. **sericeous**



**venation** The arrangement of veins on a leaf. It can be open, with free-ending veins and margins from toothed to lobed or compound (mostly eudicots), or closed, with veins fused into loops and margins entire with smooth edges (mostly monocotyledons).

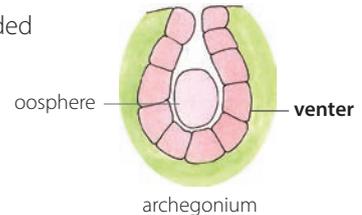
Venation can be pinnate, palmate or parallel. Venation can be net-like (reticulate), branching (dendritic) and with veins of clearly different diameters (hierarchical), as midrib, vein and veinlets.  
= **nerivation**

**Venation**

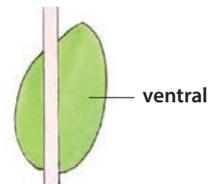


**venose** Having numerous or conspicuous veins.

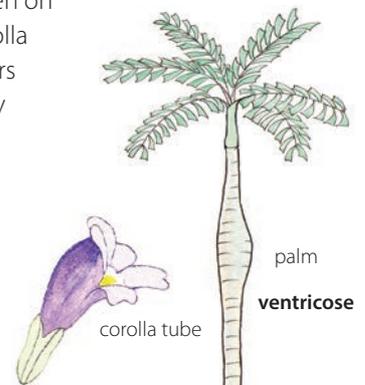
**venter** The expanded basal part of an archegonium in which the oosphere is formed.



**ventral** The front. The inner side facing towards the axis, as a leaf on a stem.  
cf. **dorsal**

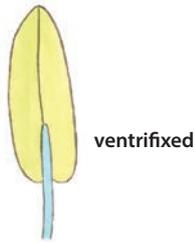


**ventricose** Swollen on one side as the corolla tube of some flowers in the figwort family (Scrophulariaceae) and the mint family (Lamiaceae). Swelling out in the middle, as the stem of the palm *Iriartea ventricosa*.  
cf. **gibbous**



**ventriculose** Slightly ventricose.

**ventrifixed** Attached on or by the front, as a stamen filament attached to the connective somewhere along the front of an anther.  
*cf.* **dorsifixed, medifixed**  
*see* **anther attachment**

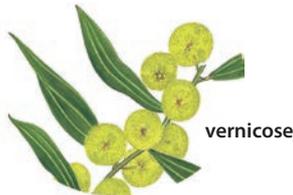


**vernacular name** The common name for a plant as opposed to the scientific name, as apple (common name) and *Malus domestica* (scientific name).

**vernal** Of or appearing in spring.  
*cf.* **aestival, autumnal, hibernal**

**vernation** *see* page 317

**vernice** Having a shiny surface as though varnished, as the phyllodes of the varnish wattle (*Acacia verniciflua*).



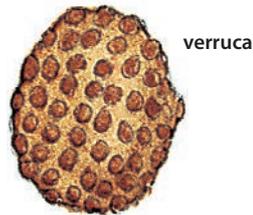
**verruca, pl. verrucae**

A wart-like projection.

**verrucate, verrucose, verrucous** Warty.

Bearing small wart-like projections, as the seeds of some species of skullcap (*Scutellaria*).

**verruciform** Wart-like.



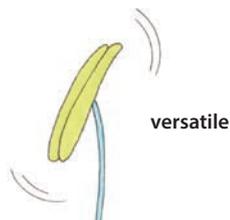
skullcap seed verrucose

**verrucula, pl. verruculae** A small wart.

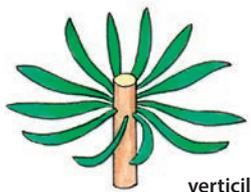
**verruculate, verruculose** With small warts.

Slightly verrucose, finely verrucose.

**versatile** Of anthers, swinging freely about the point of attachment to the filament.  
*see* **anther attachment**



**verticil** A circular arrangement of parts around an axis, as leaves or petals around a stem.  
 = **whorl**  
*see* **verticillaster**  
*cf.* **spiral**

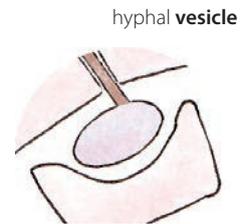


**verticillate** Arranged in one or more verticils.  
 = **whorled**

**verticillaster** A cymose inflorescence at a node on a stem, resembling a whorl but composed of two opposite, usually sessile, axillary cymes, as the genus *Salvia*.  
*see* **fascicled cyme, glomerule**



**vesicle** A small bladder-like sac containing fluid. Of a mycorrhiza, a hyphal swelling that acts as a lipid-filled storage structure. It is found inside or outside cells.



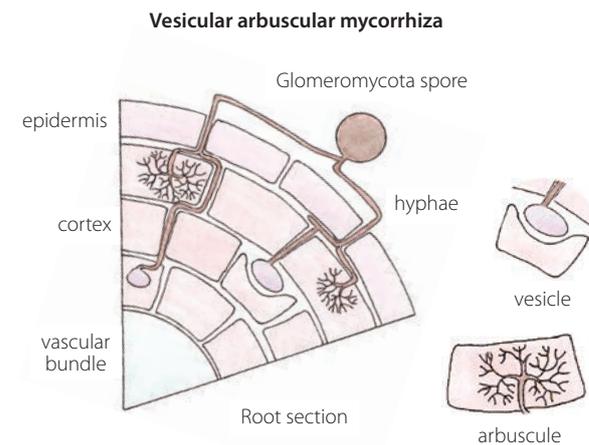
**vesicular** Of or relating to vesicles.

**vesicular arbuscular mycorrhiza**

A mutually beneficial symbiosis formed between Glomeromycota fungi and the roots of many vascular plants. Vesicles are present as well as hyphae that penetrate the cells of the root cortex and form branching structures called arbuscules.

One of the endomycorrhizas.

*see* **mycorrhiza**



**vespertine**

Relating to, occurring or active at dusk, as flowers that open or emit fragrance at this time.

*cf.* **crepuscular, diurnal, matutinal, nocturnal**

**vernation** The arrangement of young leaves in the unopened leaf bud.  
 Typically, they may be flat or slightly convex, rolled or folded.  
 = **prefoliation**  
*see also* **ptyxis**  
*cf.* **aestivation**

**Vernation**

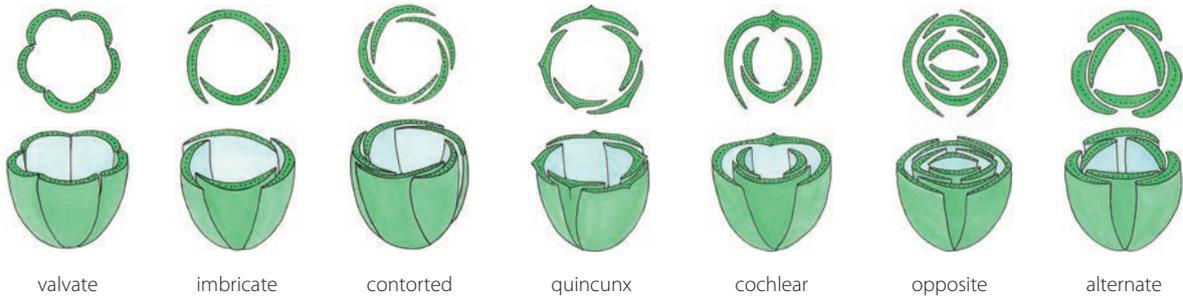
**Vernation**  
 Arrangement of young leaves  
 in the unopened leaf bud.  
  
 Vernation equitant.  
 Ptyxis conduplicate.



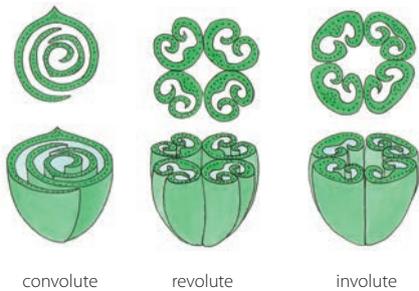
**Ptyxis**  
 Arrangement of a young leaf  
 in the unopened leaf bud.  
  
 Ptyxis conduplicate.



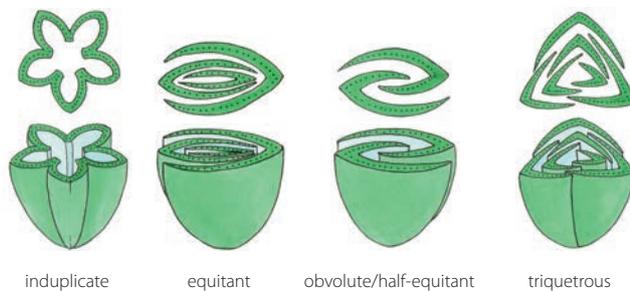
**Leaves flat or slightly convex**



**Leaves rolled**



**Leaves folded**



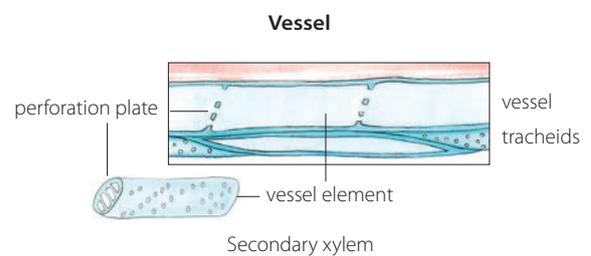
**vessel**

In the secondary xylem of angiosperms, the main water-conducting structure composed of a column of dead cells (vessel elements), with the joining ends perforated or totally degraded to form a tube. The woody cell walls are pitted so that water and minerals can also flow sideways from one cell to another.

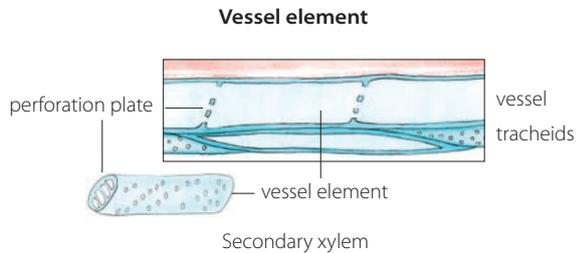
Gymnosperms generally do not have vessels.

= **trachea**

*see* **perforation plate**

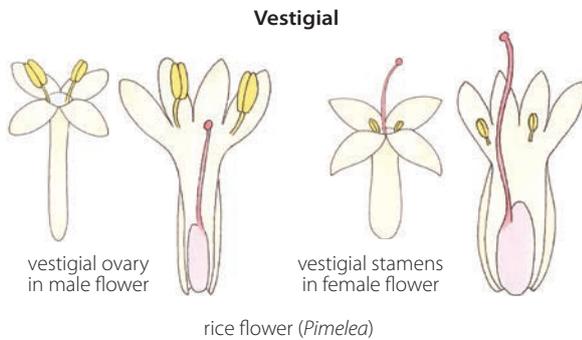


**vessel element** A water-conducting cell with lignified walls in the xylem of some angiosperms. The end walls between two cells are perforated or totally degraded to form a perforation plate. A column of dead vessel elements that forms a tube is a vessel.  
= **vessel member**

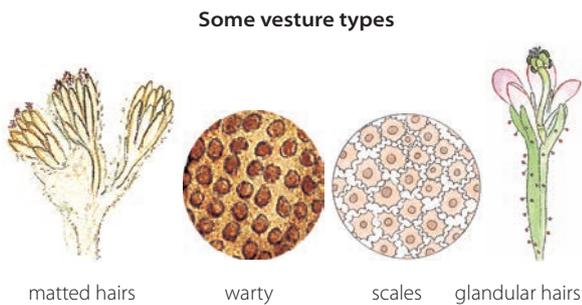


**vessel member** Another term for vessel element.

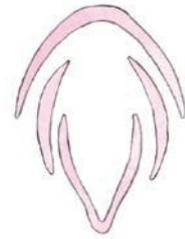
**vestigial** A mere trace in one organism of that which is fully developed in another organism, as the unisexual flowers of rice flowers (*Pimelea*) that have vestigial organs of the opposite sex. Part of an organism that is reduced from the fully developed ancestral condition and is no longer functional.  
*cf.* **abortive, rudimentary**



**vesture, vestiture** A covering on or arising from the surface of a plant or plant part, as hairs, scales, thorns and tubercles.  
*see also* **indumentum**

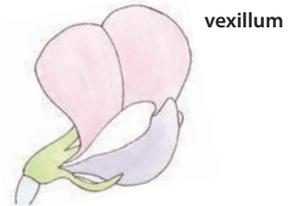


**vexillary aestivation** Having five petals with the largest (the standard or vexillum) overlapping the two lateral petals (the wings) which in turn overlap two petals (the keel). Typical of peas (Fabaceae).  
= **papilionaceous aestivation**



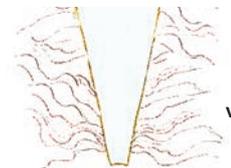
vexillary aestivation

**vexillum** The large upper petal of a pea flower (Fabaceae).  
= **banner, standard**  
**vexillary** Of or pertaining to the vexillum.



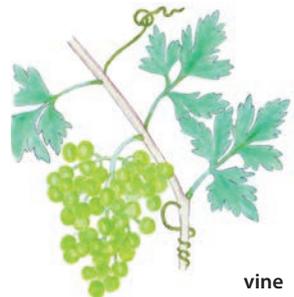
vexillum

**villose, villous** Shaggy, with dense long and soft hairs.  
*cf.* **pilose**



villous

**vine** A thin-stemmed climber or scrambler, as a grapevine (*Vitis vinifera*), that uses tendrils, hooks or twining shoots for support, usually on another plant. It may be herbaceous or woody, annual or perennial.  
*cf.* **bine, strangler**



vine

**virescence** The appearance of green pigmentation in plant tissues that are not ordinarily green.

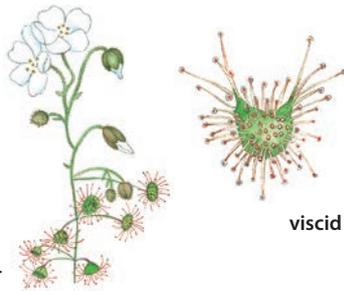
**virgate** Elongated straight and slender, as the stems of pretty heath (*Epacris virgata*).



virgate

**viscid, viscous**

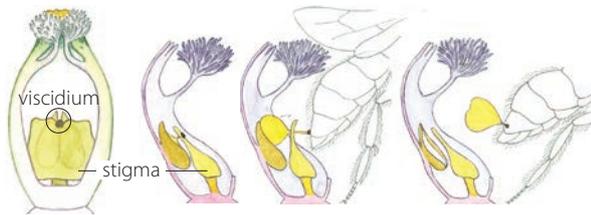
Covered with a sticky substance. Thick and sticky in consistency, as the secretion from the glands on the leaves of sundews (*Drosera*).



**viscidium** *pl. viscidia* Present in some orchids, a sticky pad formed by the rostellum that is removed, together with the pollinia, when it attaches to a pollinator.

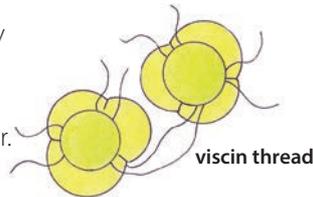
= **retinaculum**

**Viscidium**



Removal of the pollinia by a pollinator. sun orchid (*Thelymitra*)

**viscin thread** A sticky thread arising from the surface of pollen grains that links them together.

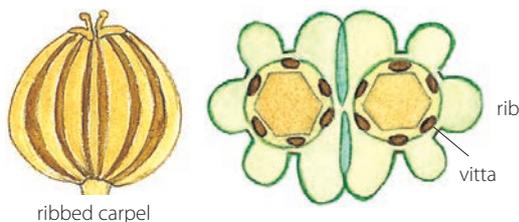


**vitreous** Transparent like glass. *cf. hyaline*

**vitta, pl. vittae** Longitudinal ducts, that secrete aromatic oils, situated under or between the ribs on the carpels of the carrot family (Apiaceae).

**vittate** Bearing oil tubes (vittae). Striped longitudinally.

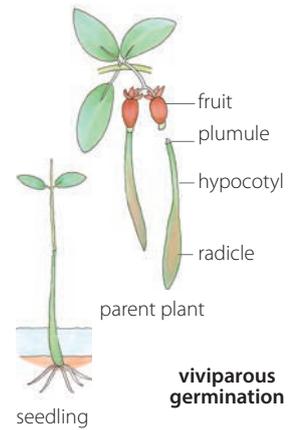
**Vivipary**



**viviparous germination**

Producing seeds that germinate before becoming detached from the parent plant, as the red mangrove (*Rhizophora mangle*). Having a single seed that germinates within the fruit before it is shed.

*cf. epigeal germination, hypogeal germination*

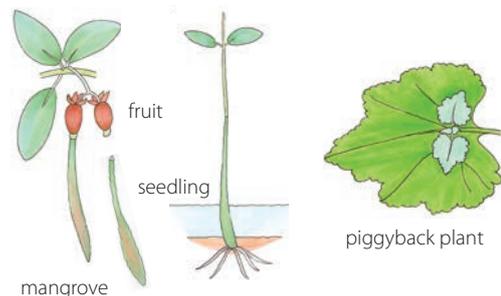


**vivipary** The germination of seed before it is shed from the parent plant, as red mangrove (*Rhizophora mangle*).

The asexual production of buds that start to grow while still attached to the parent plant, into plantlets, as on the leaves of the piggyback plant (*Tolmiea menziesii*) and on the fronds of some ferns.

**viviparous** Reproducing by vivipary.

**Vivipary**

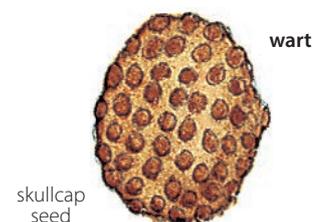


**volute** Rolled up. *see involute, revolute*

**voucher specimen** A specimen of a plant preserved and stored in a herbarium for reference and study.

**vulnerable** According to IUCN, a conservation status covering species that are considered to be facing a high risk of extinction in the medium term.

**wart** A hard or firm outgrowth. **warty** Having warts or as though covered with warts, as the seeds of some species of skullcap (*Scutellaria*).



**wax** An oily water-resistant substance that is solid at room temperature, as beeswax.  
**waxy** Resembling wax in texture or appearance.

**weather** The condition of the atmosphere, including temperature, precipitation, humidity and wind, at a particular place over a short period of time.  
*cf.* **climate**

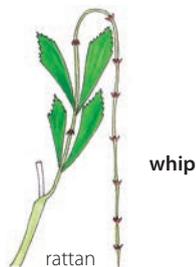
**weed** Any plant, usually one that grows profusely, where it is not wanted, as many thistles.

**weeping** Drooping gracefully downward, as the branches and leaves of weeping willow (*Salix babylonica*).



**wetland** A coastal or inland area with water covering the soil, or at or near the surface of the soil, for all or part of the year. A saline or freshwater transition zone between aquatic and terrestrial ecosystems, as a marsh, swamp or bog, or on the edges of lakes and streams and in river estuaries.

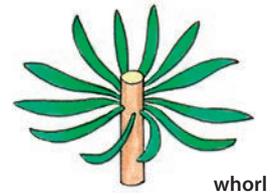
**whip** A general term for cirrus and flagellum. Of palms (*Arecaceae*), the barbed climbing organ of rattans.



**whisk fern** The whisk fern family (*Psilotaceae*) comprises one genus (*Psilotum*) of epiphytic or terrestrial vascular plants that reproduce by spores rather than seeds. Stems are undivided or branched dichotomously with small or scale-like leaves. Spores are of only one kind (homosporous).  
*see* **fern allies**



**whorl** A circular arrangement of parts around an axis, as leaves or petals around a stem.  
 = **verticil**  
*cf.* **spiral**  
**whorled** Arranged in one or more whorls.  
 = **verticillate**

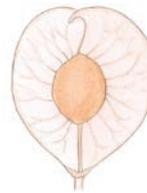


**widespread** Distributed over a large area or occurring in many different places.

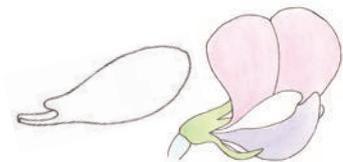
**wild** Growing in a natural state, not cultivated.

**wing** A thin, often membranous extension, as that on the seeds of elms (*Ulmus*). One of two clawed lateral petals of a pea flower (*Faboideae*).  
 = **ala**

Wing



winged seed of elm (*Ulmus*)

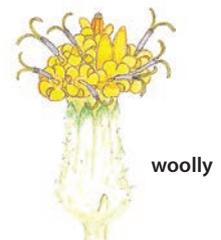


lateral petal of pea flower

**wood** The secondary xylem that accumulates as a cylinder beneath the bark in the stems, branches and roots of woody plants. A dense strengthening and nutrient conducting tissue composed of cellulose and lignin.  
*see* **heartwood, sapwood**  
*see also* **woodland**

**woodland** A plant community with large trees widely spaced so that their crowns form an open canopy that limits shade and moisture. The understorey includes grasses, shrubs and herbs.

**woolly** Densely covered with long tangled fine soft curly or wavy hair, as the white-woolly bracts of blanket leaf (*Bedfordia arborescens*).  
 = **lanate**



**xanthophyll** A yellow pigment in the chromoplasts of plant cells that protects them from excessive solar radiation during photosynthesis.  
*see* **carotenoid**

**xenogamy** Pollination between flowers on different plants of the same species.  
*see* **allogamy, geitonogamy**  
*cf.* **autogamy**

**xeric** Of, relating to or adapted to an environment that receives only a small amount of water, as the Gobi Desert and the Sahara Desert.  
*cf.* **hydric, mesic**

**xero-** A prefix meaning dry.

**xerochasy** Hygroscopic movement caused by the loss of water in plant parts that are mostly dead, resulting in the opening of follicles, pods and some capsules.  
*cf.* **hydrochasy**  
**xerochastic** Of or related to xerochasy.

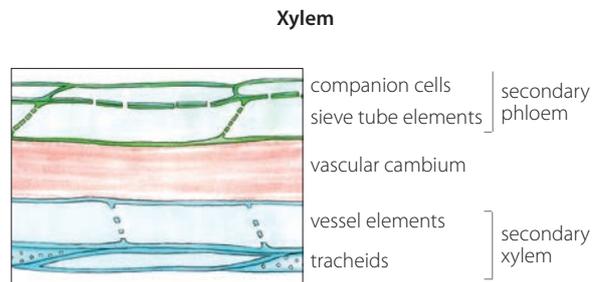
**xeromorph** A plant that has the morphological characteristics of a xerophyte but may not be able to resist drought.

**xerophyte** A plant adapted to withstand extremely dry conditions, as occurring in deserts and on sand dunes. Adaptations include surviving drought as seeds and growing only during short rainy periods. Succulents can store large amounts of water and deep-rooted plants can tap water occurring at great depths.  
*cf.* **mesophyte, tropophyte, xeromorph**

**xerosere** An ecological succession that starts on dry, bare land.

**xylem** Tissue in a vascular bundle that provides support and conducts water and dissolved nutrients from the roots to other parts of a plant. There are two types of xylem. Primary xylem is associated with vertical primary growth and forms from procambium. Secondary xylem is associated with lateral secondary growth and is formed from vascular cambium. Both types consist of less specialised tracheids and more specialised vessel elements that form tubes.

Secondary xylem occurs in woody plants and differentiates into sapwood and heartwood.  
*see* **metaxylem, protoxylem, vascular bundle xylar** Relating to xylem.



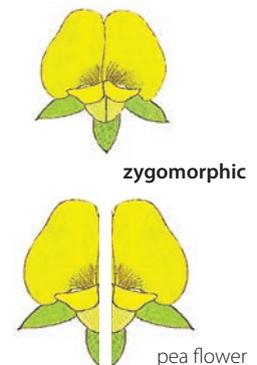
**zona-** A prefix meaning ring-like.

**zoni-, zono-** A prefix meaning located equatorially.

**zoochory** Dispersal of pollen, spores, seeds or fruit by animals.  
**zoochorous** Of or relating to zoochory.

**zoophily** Dispersal of pollen and pollination by animals.  
**zoophilous** Pollinated by animals.

**zygomorphic** Divisible through the centre, on one plane only, into exactly similar halves, as flowers in the pea family (Fabaceae). Bilaterally symmetrical.  
= **monosymmetric**  
*cf.* **actinomorphic**



**zygote** The diploid cell that results, at fertilisation, from the fusion of the nuclei of the haploid male gamete (sperm cell) and the haploid female gamete (egg cell). Once a zygote begins to undergo cellular division it becomes an embryo.

**Zygomycota** A phylum of fungi known as pin mould fungi, the 'pin' being the thick-walled resting spore. Arbuscular mycorrhizas, the most prevalent type of mycorrhiza, develop between plant roots and species of Zygomycota.  
*see* **fungus, mycorrhiza**