Appendix A: Classification Used in Class, With Example Genera

It is your responsibility to learn all the names in **bold**. You are not required to know the names in *italics*.

Phylum Chytridiomycota: water molds, chytrids

Allomyces, *Synchytrium*

Phylum Zygomycota: bread molds

Phycomyces, *Rhizopus*

Phylum Basidiomycota: club fungi

Agaricus, *Boletus*, *Coprinus*, *Lycoperdon*, *Polyporus*

Phylum Ascomycota: sac or cup fungi

Aspergillus, *Erisyphe*, *Penicillium*, *Peziza*, *Saccharomyces*, *Sordaria*, *Taphrina*

Lichens (not a Phylum)

Physcia, *Umbilicaria*

Phylum Myxomycota: plasmodial slime molds

Arcyria, *Dictydium*, *Stemonitis*, *Physarum*

Phylum Euglenophyta: euglenas

Euglena

Phylum Dinophyta: dinoflagellates

Ceratium, *Noctiluca*, *Peridinium*

Phylum Rhodophyta: red algae

Corallina, *Polysiphonia*, *Porphyra*

Phylum Oomycota: water molds

Saprolegnia

Phylum Bacillariophyta: diatoms

Melosira

Phylum Phaeophyta: brown algae

Isomorphic group: *Ectocarpus*, *Zonaria*
Kelps: *Laminaria*, *Macrocystis*
Rockweeds: *Fucus*

Phylum Chlorophyta: green algae

Chara, *Cladophora*, *Closterium*, *Hydrodictyon*, *Monostroma*, *Oedogonium*, *Pediastrum*, *Scenedesmus*, *Spirogyra*, *Ulva*, *Volvox*

Phylum Hepatophyta: liverworts

Marchantia, *Porella*

Phylum Anthocerophyta: hornworts

Anthoceros

Phylum Bryophyta: mosses

Mnium, *Polytrichum*

Phylum Lycophyta: lycopods

Class **Lycopodiopsida**: club mosses
Lycopodium
Class **Selaginellopsida**: spike mosses
Selaginella
Class **Isoetopsida**: quillworts
Isoetes

Phylum Psilotophyta: whisk ferns

Psilotum

Phylum Sphenophyta: horsetails

Equisetum

Phylum Pterophyta: ferns

Azolla, *Cyrtomium*, *Marsilea*, *Osmunda*, *Polypodium*, *Salvinia*

Phylum Cycadophyta: cycads

Cycas, *Zamia*

Phylum Ginkgophyta: ginkgo

Ginkgo

Phylum Coniferophyta: conifers

Abies, *Cedrus*, *Juniperus*, *Metasequoia*, *Picea*, *Pinus*, *Sequoia*, *Sequoiadendron*, *Taxodium*

Phylum Gnetophyta

Ephedra

Phylum Anthophyta: flowering plants

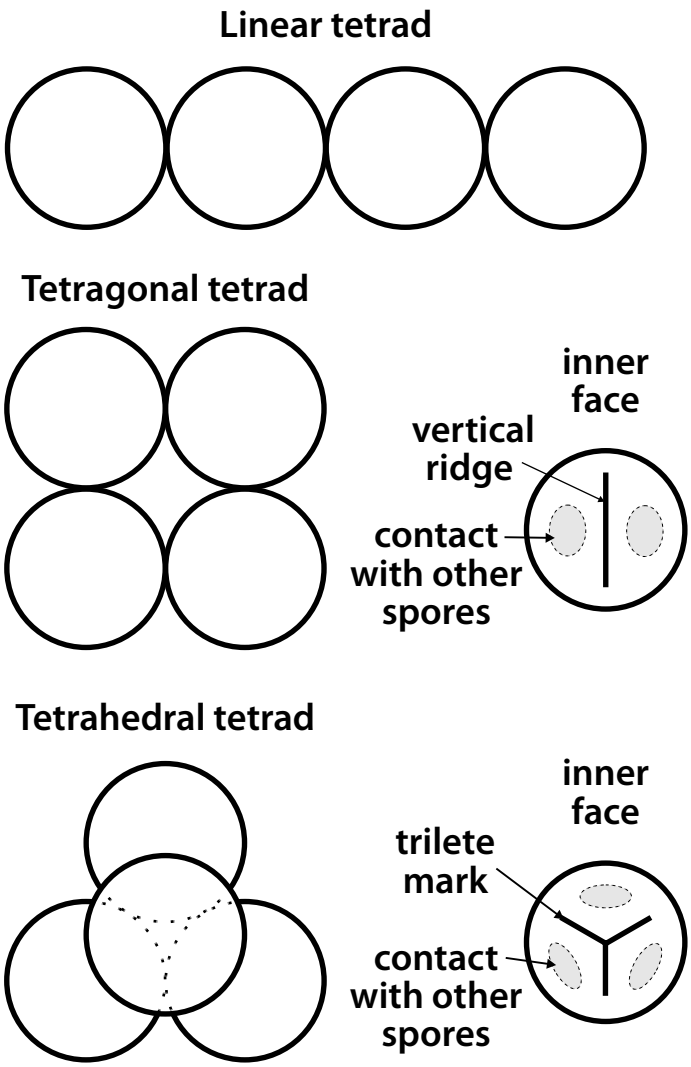
Class **Magnoliopsida**: dicots
Phaseolus
Class **Liliopsida**: monocots
Lilium, *Triticum*

Appendix B: Spores, Tetrads

What is a macrospore?

You may have seen demos in the lab or older textbooks that use the terms "macrospore" and "macrosporangium". These terms are equivalent to megaspore and megasporangium. The Greek prefix *mega-* means "large", and *macro-* means "long", while *micro-* means both "small" and "short". So both *mega-* and *macro-* are opposites of *micro-*. In the past, both terms were used, but *mega-* is really what we mean, and almost all modern references use it instead of *macro-*.

Guide to Tetrads



Appendix C: Woody Stems of Seed Plants

Primary Growth—Plant stems initially grow from the tip, the apical meristem; this is called primary growth. In seed plants, the vascular tissue is arranged in a eustele, a cylinder of vascular bundles, with xylem characteristically toward the center and phloem toward the outside.

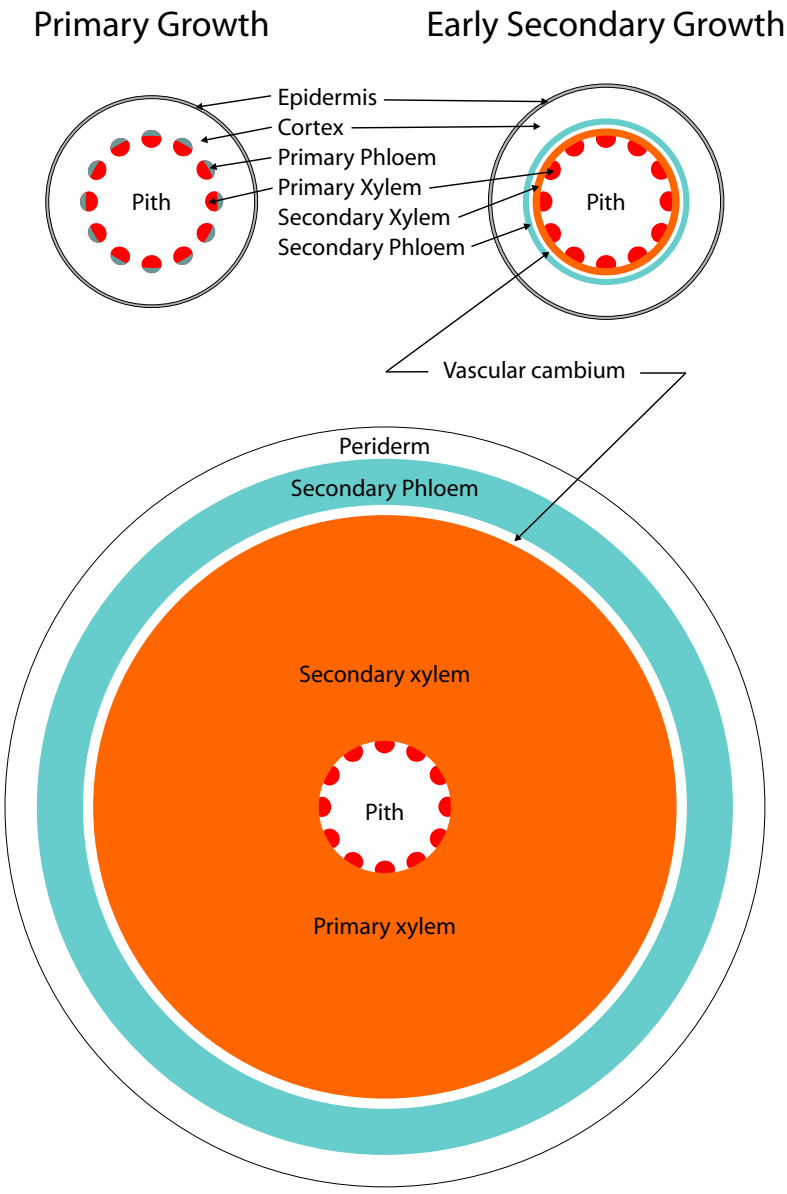
Vascular cambium—In many, but not all, seed plants, a second meristem becomes active in the primary stem: the vascular cambium. It is a sheet of cells that forms between the primary xylem and primary phloem, and in the areas of parenchyma cells between the vascular bundles. If you could make all the other tissues disappear, it would look like a hollow cylinder. It produces new cells both to the inside and to the outside.

Beginning of secondary growth—The cells produced to the inside mature into secondary xylem. This pushes the vascular cambium outward, as it makes room for the xylem it just created. Toward the outside, the vascular cambium produces secondary phloem, which exerts even more pressure on the tissues outside of it, the primary phloem, cortex, and epidermis. The primary phloem is quickly crushed, and its function is taken over by the secondary phloem. In some plants, the cortex and epidermis grow to keep up with secondary growth, but more often they eventually wear or flake off of the outer surface of the plant, being replaced by a protective layer called periderm. Secondary growth causes an increase in the diameter of a stem, but does not affect its length.

Mature woody stem—At maturity, the center of the stem will still contain the pith and original primary xylem. Outside that will be a region of secondary xylem; this is "wood". The vascular cambium separates the wood from the "bark", which consists of active secondary phloem ("inner bark") and one or more layers of protective periderm separated by layers of older, inactive secondary phloem ("outer bark"). The vascular cambium ordinarily grows throughout the life of the plant. In plants of seasonal environments, the vascular cambium is active only part of the year, producing growth rings in the wood. In temperate climates, the vascular cambium is inactive in winter, so that one growth ring is formed each year. These are called annual rings, and can be used to determine the age of a tree. In tropical seasonal climates, the vascular cambium is inactive during the dry season. If there is only a single dry season per year, these growth rings are annual, too, but in areas such as

Some plants with stems that* appear *woody, such as tree ferns, palms, and Joshua trees, don't produce the structures described here.

the Sonoran Desert that can receive rain in both the winter and the summer, a plant could form two, one, or even no growth rings in a year, depending on rainfall.



Appendix D: Geological Time Scale

Era	Period	Million years ago	Major land plant groups
Paleozoic	Cambrian	570	
	Ordovician	500	
	Silurian	435	bryophytes, earliest vascular plants
	Devonian	395	Lycophyta, Pterophyta, progymnosperms
	Carboniferous	345	Lycophyta, early seed plants
	Permian	280	early conifers, cycads, extinct seed plants
Mesozoic	Triassic	225	Coniferophyta, Cycadophyta
	Jurassic	195	Coniferophyta
	Cretaceous	141	Coniferophyta, early flowering plants
Cenozoic	Tertiary	65	Anthophyta
	Quaternary	2.5	Anthophyta

Colophon

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Color micrographs were taken on either a Leitz photomicroscope or Olympus dissecting scope, both provided through the generosity of Rancho Santa Ana Botanic Garden in Claremont, California, or a Zeiss photomicroscope at California State Polytechnic University, Pomona. Slides were made with Fujichrome Sensia or Kodachrome and digitized with a Nikon CoolScan kindly provided by Dr. Glenn Kageyama, a Nikon scanner provided by Rancho Santa Ana Botanic Garden, or a Hewlett-Packard PhotoScan S20. Images were enhanced and resampled with Corel Photopaint.

Other color photographs were taken with a Sony Mavica MVC-FD7 or a Nikon Coolpix 4500 digital camera, and enhanced and resampled with Corel Photopaint or Adobe Photoshop.

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