

Plant Anatomy Lab 12 – Cones and Flowers

In this lab, you will be observing reproductive structures of typical gymnosperms and angiosperms. Keep in mind that there is an incredible diversity among plants (especially angiosperms) with regard to these structures, so it is difficult to think of a “typical” cone or flower. One could spend an entire course surveying these reproductive structures, not to mention studying them anatomically.

Pine reproductive structures

Observe the sample megasporangiate cones on the front table and identify the various structures shown in the handout or the atlas. These structures include ovuliferous scales, bracts, and ovules (if still present).

Obtain a prepared slide of a microsporangiate strobulus. Note how it is formed from a simple (not compound) shoot axis. Identify the microsporophylls, microsporangia, and pollen (microspores). From the pollen grains, you should be able to see the wings (air sacs) and perhaps the generative cell and tube cell nuclei.

Obtain a prepared slide of a megasporangiate strobulus - there are slides from early and late stages of development. Identify the bracts, ovuliferous scales, and ovules (immature seeds). Notice how the cone represents a compound shoot axis because the ovuliferous scales arose from an axillary bud.

Angiosperm reproductive structures

Observe the model of a simple single-carpel, single-ovule flower on the front table and identify the various structures.

Obtain a flower or two from the *Arbutus unedo* tree. Using a dissecting microscope, carefully dissect the flower and identify the structures as shown for the model on the front table. Carefully slice the carpel open longitudinally. Note that the ovary contains not a single ovule, like the model on the front table, but many ovules. Obtain some pollen from the anthers (slice one open on a microscope slide) and observe under the microscope. These pollen grains are probably dispersed as a tetrad unit as pictured in Figure 19.14 of the Mauseth text (available up front).

Observe the prepared slide sequence of *Lilium* anthers showing the development of the pollen grains representing the male gametophyte. Refer to the handout of images from the atlas describing the sequence of anther development. You should observe at least the following slides (steps in development):

- anthers with sporogenous tissue,

- anthers showing meiotic division phases (labeled prophase, first division, or second division),
- anthers with pollen tetrads.

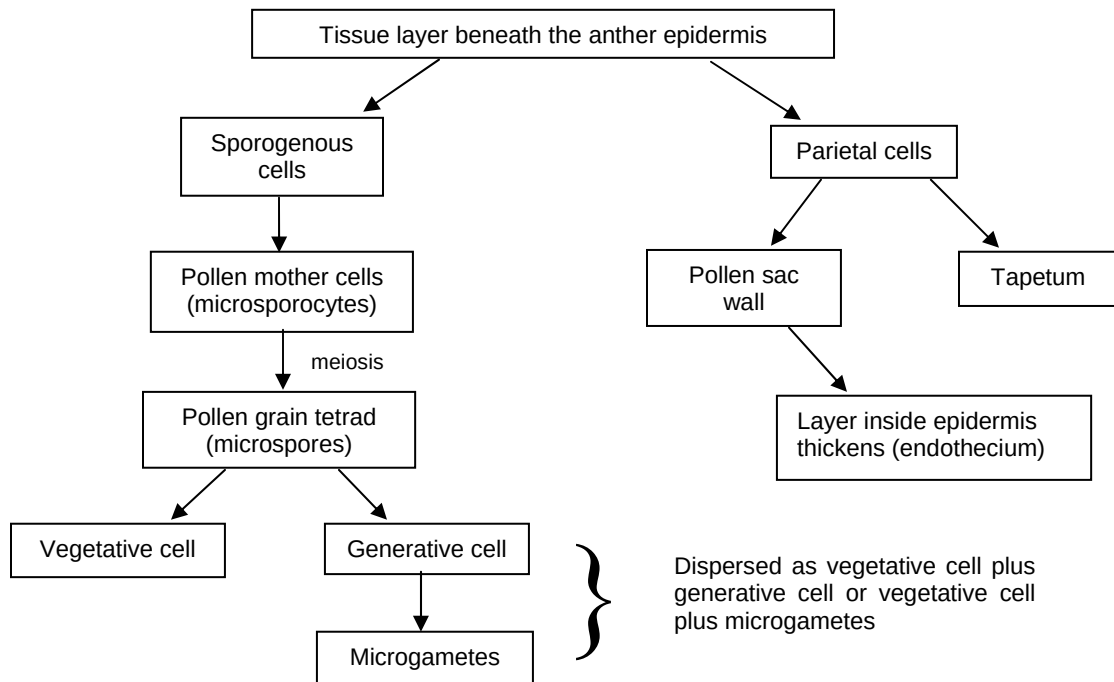
You should also have located the inner and outer pollen sac walls and the tapetum tissue that feeds the megaspore mother cells.

Observe the prepared slides of *Lilium* during various stages of the megagametophyte development, referring to your handout of atlas images and to the attached page describing the sequence of carpel development. Note that each ovary has more than one ovule developing. Megagametophyte development is not perfectly synchronized for each ovule on the slide, and the sections are not always cut exactly through the center of each ovule, so all the ovules in the slide will not be at the exact same stage. But for each slide, at least some of the ovules will be at the stage for which the slide is labeled. You should be able to find representatives of each of the eight stages shown in the figure handout (numbered 1-8):

- megaspore (uninucleate) (1)
- first division
- 2-nucleate stage (2)
- second division
- first 4-nucleate stage (3)
- migration of nuclei (4)
- third division (5)
- second 4-nucleate stage (6)
- fourth division (7)
- 8-nucleate stage (8)

Note that the atlas handout refers to the “normal” type of embryo sac development corresponding to the *Polygonum* type in the Figure 265 handout. The *Lilium* type in the atlas handout corresponds to the *Fritillaria* type in the Figure 265 handout.

Anther development sequence



Carpel development sequence

