

## LAB: Angiosperm Reproduction: Flowers and the Life cycle

You will need a compound scope and a dissecting scope for this lab

This lab requires you to go through sets of slides and living specimens. Use the resources, Lab book and handouts to:

- Identify flower parts: sterile and fertile. Look at the incredible variety, and ID different types of flowers (see below)
  - For each of the flower types, understand how these structures enhance sexual reproduction, and think about the role of pollinators.
- Identify stages in the life cycle. Be able to identify the stages, and tie the slides to the diagram in your lab manual, and to the actual flower (eg. Where does it all take place.)
- Identify the stages in early embryos of a eudicot and a monocot

### Clade **Plantae**

Division/Phylum **Anthophyta** "The Flowering Plants. Plants with sporophytes of diverse vegetative structure, all of which bear flowers and produce seeds enclosed in fruits at maturity. The gametophytes are *greatly reduced*.

Go through the differences in your book:

**Monocots:** Flower parts in threes, leaf venation usually parallel and with one cotyledon.

**Eudicots:** Flower parts in fours or fives, leaf venation netlike and with two cotyledons.

I. **Flowers.** Identify and distinguish the following (use your dissecting scope for this – you can dismember the flowers!)

- Monocot – flower parts in threes
- Eudicot – flower parts in fours or fives.
- Perfect – both stamens (male) and pistils (female)
- Imperfect – either stamens or pistils
- Complete (has all 4 parts?)/incomplete (have one or more parts missing?)
- Monoecious/dioecious
- Hypogynous (superior ovary) – flower parts attached below the ovary
- Epigynous (inferior ovary) - flower parts attached above ovary
- Perigynous (semi-inferior ovary)
- Anther/Filament/stamen (Male)
  - Stamens are microsporophylls. Each stamen has a filament and an anther
- Stigma/Style/Ovary/Ovule (Carpel) (Female)
  - Pistil is one or more fused carpels which are megasporophylls. Each pistil is divided into an ovary at the base (usually swollen), and a slender style, and an enlarged tip – the stigma. Using a razor blade, cut across the ovary and note one or more internal cavities containing a number of tiny white structures – the ovules
- Peduncle - or stalk on which the flower or inflorescence is borne.
- Receptacle - upper part of the peduncle to which the flower is attached.
- Inflorescence - several flowers on one peduncle.
- Pedicel - stalk of floret in inflorescence.
- Composite (special kind of inflorescence)

- Petals - arranged in a layer internal to the sepals and are often large and brightly colored in animal pollinated flowers. In some flowers, particularly in wind pollinated ones, these are small or missing altogether.
- Corolla – all the petals together
- Sepals-outermost parts of a flower which may be small and green or brown, or large and brightly colored - "petalous".
- Calyx - all the sepals together
- Perianth - sepals and petals combined.
- Fused parts?
- Symmetry? Regular: radially symmetrical. Irregular: bilaterally symmetrical

## II. Lily Life-Cycle

- Identify all stages and structures. Link them to the diagrams and to then actual structures. Draw it!
  - What does the male gametophyte look like? How many cells?
  - What does the female gametophyte look like? How many cells?
  - What does double fertilization do? Be able to draw it!
1. Examine a slide of a cross section of a Lily anther and note the **pollen sacs** or **microsporangia**. (In later stages of development, the two pollen sacs on each side of the anther fuse into one large chamber). Within the pollen sacs there are **microspores** (n) which will become pollen grains in later stages of development.
  2. In a mature anther study a **pollen grain** (microspore containing a male gametophyte) under high power and note the larger **tube cell** with a nucleus and a smaller cell in the tube cell, the **generative cell** which will give rise to two sperm cells. (These cells make up the entire male gametophyte).
  3. Obtain some living pollen and place it on a slide with a sugar solution and pals together. a cover slip. The pollen should begin to germinate and produce a **pollen tube** within a few minutes. Place pollen on a second slide with plain water and a cover slip. Do the pollen tubes emerge?
  4. Examine a prepared slide of cross sections through a young ovary of *Lilium*. Note the ovary wall of three fused carpels (megasporophylls) each bearing two **ovules** (megaspore and integuments). In at least one ovule on the slide you should be able to identify **integuments**, **megasporangium** of many small cells with a large vacuolated **megaspore mother cell** in the center and a **micropyle** (all 2n).
  5. Examine a prepared slide of a cross section through a mature *Lilium* ovary. Look through the sections until you find an ovule containing a mature **female gametophyte**, now called the **embryo sac** which is an oval vacuolated structure containing 8 nuclei (getting a section with all eight is hard, but try several!). Three of these will be at the micropylar end, the central of which is the **egg**. The two in the center are the **polar nuclei**, and the three at the opposite end are the **antipodals**.

After pollination, the pollen tube comes in contact with the embryo sac and the two sperm cells are released. One fertilizes the egg, and one fuses with the polar nuclei. Now the seed and the fruit develop...