# Seeds, Flowers and Fruits Lab

## Gymnosperms

The word "gymnosperm" means "naked seed", and refers to the fact that seeds are situated naked on the surface of cone scales instead of being surrounded by protective tissue like fruit. The gymnosperms include cycads, *Ginkgo*, conifers, and gnetophytes. Gymnosperms have been successful primarily because of the evolution of seeds. Before gymnosperms, no plants had seeds. A seed is simply a tough-walled structure containing the young sporophyte, or embryo, surrounded by the female gametophyte tissue, which serves as the nutritive source for the embryo. With seeds, the embryo can remain protected in a dormant state until conditions are suitable for growth.

The largest and most familiar group of gymnosperms is the conifers. Conifers bear conspicuous cones (**strobili**), and have needle or scale leaves. They are most common in temperate latitudes, and include common plants like pine, spruce, fir, juniper, cypress, and redwoods.

EXERCISES

1. Examine a slide of *Pinus* pollen. Pollen grains are the male gametophytes, surrounded by a thick coat with wings (the Mickey Mouse ears) for wind dispersal. Sketch and label.
2. Examine a slide with a longitudinal section of *Pinus* male strobilus. Note the **sporangia**. Sketch and label.
3. Examine a slide with a longitudinal *Pinus* female strobilus. Note the **ovules** (the female sporangium, or **nucellus**, surrounded by a coat called the **integument**). In the nucellus, meiosis will produce haploid cells called megaspores. One megaspore will divide many times to form the female gametophyte tissue. Within this tissue, you may be able to see the archegonia with their egg cells inside. Sketch and label

After pollination, the pollen tube formed by the male gametophyte slowly digests its way through the diploid nucellus for about a year, and finally sperm is delivered to the egg in the archegonium. Several archegonia may contain fertilized eggs, but only one zygote will mature as a seed. The zygote will divide to form the embryo. Remember that all of this happens within the female gametophyte, within the ovule, on top of the cone scale. When the integuments harden around the ovule the seed is formed.

# ANGIOSPERMS
## Reproductive Structures

Angiosperms, commonly known as flowering plants, are the dominant and most recently evolved plants in the world today. They exceed all other plants in their usefulness to people. Angiosperms are the greatest providers of food to the nations of the world. All of the so-called hardwoods that are used extensively as lumber and fuel are angiosperms. Many important sources of textiles, drugs, and ornamentals belong to this vast array of diverse plants.

An important unifying feature that is common to all flowering plants is that their ovules are enclosed within the carpel. The approximately 250,000 species of angiosperms are divided into two classes: the Dicots (200,000 species) and the Monocots (50,000 species). The Dicots alone constitute more than half of the known species of plants on the Earth.

Distinguishing characteristics of the Monocots and Dicots include:

| Structures | Dicots | Monocots |
|---|---|---|
| Embryonic Cotyledons | 2 | 1 |
| Leaf veination | Net or branching | Parallel |
| Stem vascular tissues | Bundled in a ring pattern | Scattered throughout the ground tissue |
| Vascular cambian in stems | May have | Never |
| Root type | Tap Root | Usually Fibrous |
| Flower petal/parts | 2's, 4's, 5's or many | 3's or multiples of 3's |

Familiar examples of Dicots include roses, sunflowers, peas, dandelions, oaks, maples, and apple trees. Some examples of monocots are corn, wheat, or other grasses, and such ornamentals as tulips, lilies, irises, and orchids.

EXERCISES:

1. Examine the plants or flowers in the lab and determine if they are Monocots or Dicots. If some characteristics are conflicting, rely mainly on the flower parts.
2. Dissect several flower specimens, using the dissecting microscope if necessary. Find the anthers, filaments, stigma, style, ovary, petals, and sepals.
3. Examine some pollen grains – placed on a slide – from the anthers of your flowers. Make separate slides and see if you can distinguish flower species by pollen shapes. Use the light microscope for this under scanning and low power.

**Angiosperm Life Cycle**

The angiosperm life cycle is very similar to that of the gymnosperms. The main differences in the angiosperms are: (1) the development of a flower that aids in protection of the female gametophyte inside the ovule, and which aids in the attraction of specific pollinators; and (2) the development of a female gametophyte that is much reduced compared to the female gametophyte in gymnosperms.

EXERCISES:

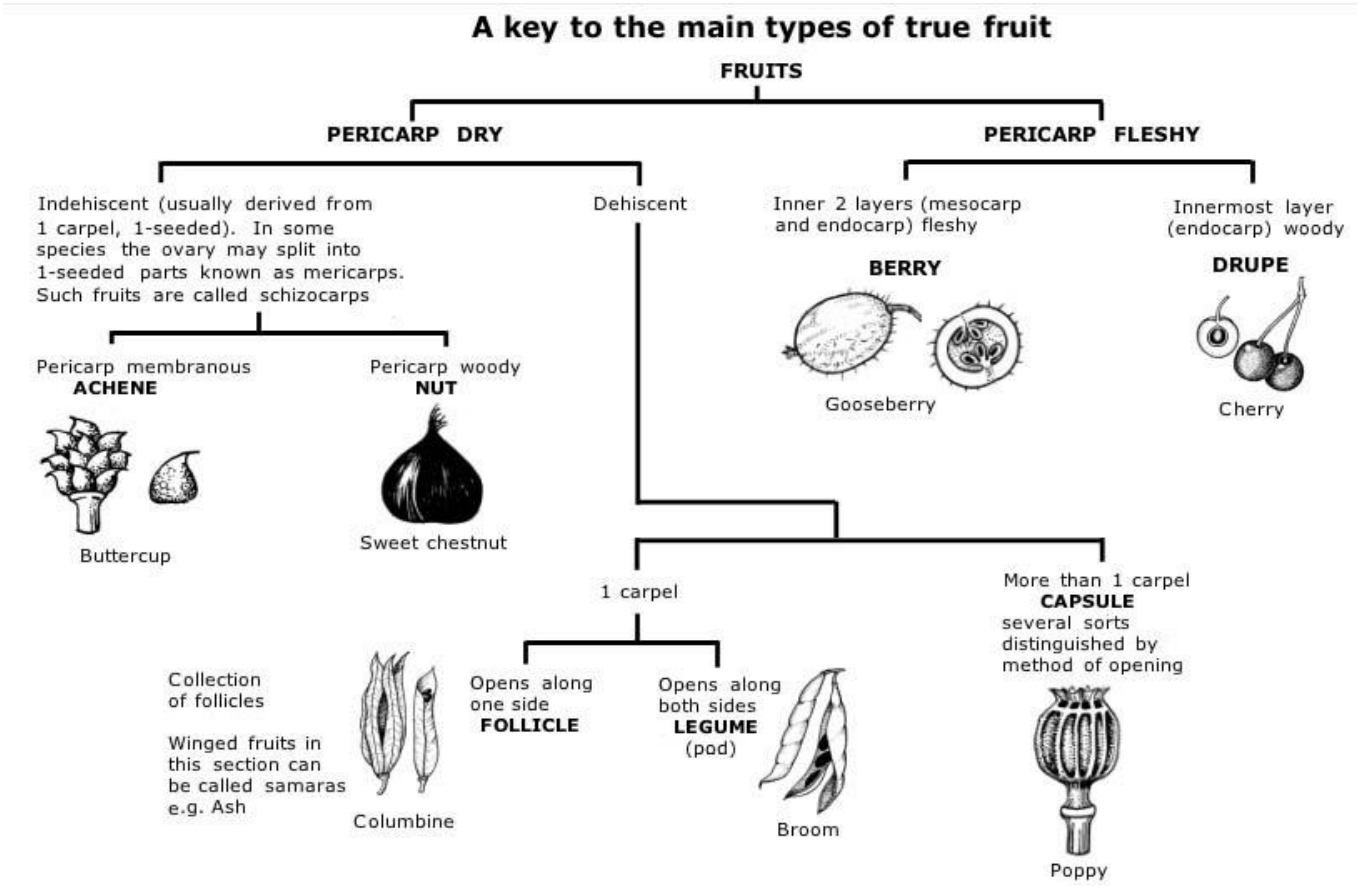
1. Examine a prepared slide of *Lilium* (lily) anthers. Locate the developing pollen grains. They could be haploid or diploid, depending on their stage of development. What generation does a mature pollen grain represent? Sketch and label the anthers.
2. Examine a prepared slide of Mixed Pollen Grains. The pollen grains are shed from the anthers and transferred by various means to the stigma of the same or different flower. Following pollination, a pollen tube is formed that is chemotropically oriented to grow down through the style to the ovules. During the growth of the pollen tube, one of the nuclei divides mitotically to produce two sperm cells. Sketch and label some pollen grains.

**Examine several fruits and draw and classify them in terms of type of fruits**

**Fruits are the mature ovary tissues (carpels) of a plant.**
Fruits – mature ovaries (carpals)
Pericarp – ovary wall
Carpel (ovary) wall composed of three layers: exocarp, mesocarp, and endocarp

Fruit types

1. Fleshy – true berries (tomatoes, blueberries)
2. drupes (single seed enclosed in a hard pit
3. aggregate fruits – composites of many ovaries of a single flower – blackberries, strawberries – ovaries not fused + covered in continous pericarp (ie. Tomatoes)
4. dry fruits – pericarp is dry at maturity (ex. peas, maples)
5. multiple fruits – multiple flowers fuse around a single stem (pineapple)

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