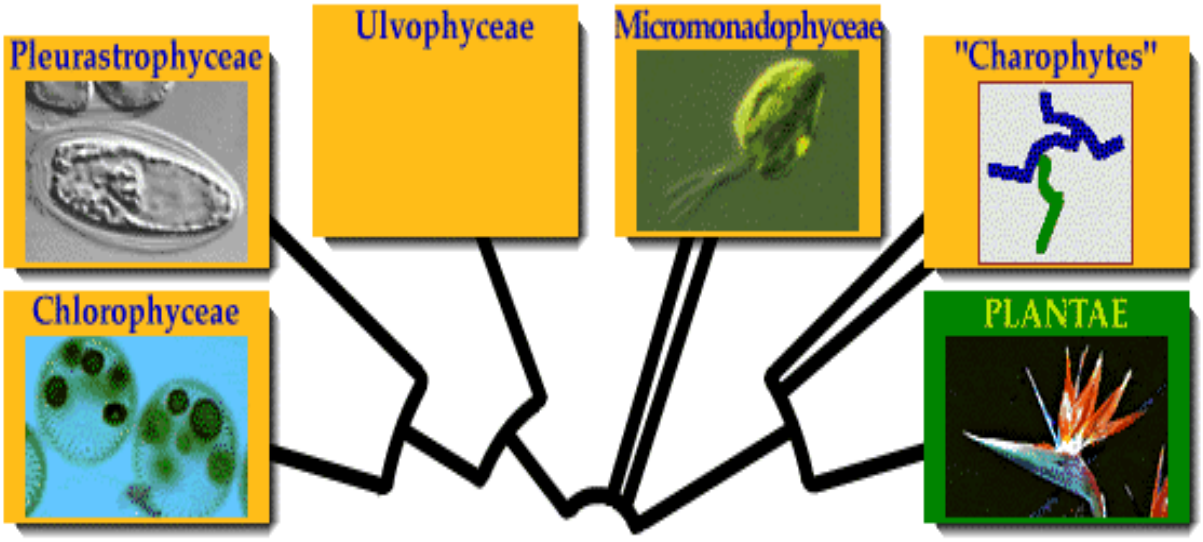
BIO 182
K. Viridiplantae, Chlorophyta and Plantae divisions.
Chlorophyta:

Observe, draw, and label the following specimens (as time permits). Answer the questions.

Part II Chlorophytes: Aquatic Green Algae. On the road to land plants. All have sexual reproductive stages. Observe (100-400x)and draw representatives of:

1. ***Chlamydomonas*** **– unicellular, considered to be a primitive state for the Chlorophyta. The specimens are haploid +/- states that undergo fertilization o diploid zygotes if placed together.**
2. ***Gonium*** **– a primitive colonial transition towards multicellularity. How many cells are grouped together?**
3. ***Eudorina*** **– also a simple colonial algae. How many cells are grouped together?**
4. ***Volvox*** **– most complex of colonial green algae specimens we have. Draw.**
5. ***Ulva*** **– this is a marine green algae with some multicellular (specialized) structure. Place one piece on a slide and cover slip. Observe and draw at 100 x. How are the cells arranged? Do they appear specialized or not?**
6. ***Chara*** **– Freshwater genus of green algae, with close genetic relations to land plants. Draw a small sample of a specimen under both the dissecting scope and compound microscope. Try and examine the cell structure. Is it specialized or not?**



From: http://www.ucmp.berkeley.edu/greenalgae/charophyta/charophyta.html

Additional observations of non-green algal representatives:

Euglena – Photosynthetic flagellated protists. Asexual reproduction only. Observe and draw at 100 x.

Physarum – a slime mold – Protist group without a definite clade. Observe under dissecting scope.

The Non-Vascular Plants
BIO 182

The Non-Vascular Plants include three divisions (phyla) of interesting tiny, green plants – mosses, liverworts, and hornworts. They are most common in warm, tropical regions, but occur in many other places, including Arizona. The typical habitat of a non-vascular plant is damp, at least during the spring. Some grow on steep banks, others on tree trunks, cracks in sidewalks, or rotting logs. Both liverworts and mosses are easy to find locally in the early spring when soil is moist. They dry up quickly with the onset of hot, dry weather.

Non-Vascular Plants are often referred to as the "amphibians" of the plant world since they are transitional between aquatic organisms (algae) and terrestrial organisms. To make the move from water to dry land, these plants evolved certain adaptations to prevent desiccation. Even so, they are much more dependent upon water than the more advanced vascular plants.

Important characteristics of the Non-Vascular Plants include:

1. They lack true vascular tissue, and are thus restricted to seasonally moist habitats, and are restricted in size as well.
2. Sexual reproduction includes a well-established alternation of generations, with a dominant gametophyte and dependent (parasitic) sporophyte.
3. Sporangia, antheridia, and archegonia are surrounded by a jacket of cells to prevent drying out.
4. The zygote is retained within the archegonium and develops there into an embryo and then a young sporophyte. Thus, the young sporophyte is protected by the gametophyte during the critical stages of development.

EXERCISES

1. Examine the mature gametophyte of a liverwort. Sketch and label. Are any sporophytes visible?
2. Examine a prepared slide showing mature *Marchantia* archegonia (located underneath the "palm trees") and antheridia (located under the disk-topped structures). Sketch and label. What are the differences between these structures? Also, examine a prepared slide showing the developing *Marchantia* sporophyte. Locate the "foot" embedded in the gametophytic tissue. What might be the function of this "foot"? Can you see the spores produced inside the sporangium? By what process were these spores produced? Sketch and label.

Ferns and Other Lower Vascular Plants
BIO 182

The lower vascular plants represent some of the more primitive land plants. They are better equipped for terrestrial existence than the Bryophytes, but not as well-suited as the gymnosperms and angiosperms. Many of these older vascular plants are now extinct. Those that persist are generally restricted to certain habitats, unlike the widespread higher vascular plants.

Distinguishing characteristics that apply to the living members of the lower vascular plants are:

A. Sexual life cycle consisting of an alternation of an inconspicuous, sometimes subterranean, gametophyte with a conspicuous sporophyte.
B. Asexual reproduction by means of a perennial rhizome (a horizontal underground stem from which new vertical shoots arise). There are exceptions to this.
C. A sporophyte characterized by vascular tissue, herbaceous growth habit, rhizome, and no primary root system (with secondary, or adventitious, roots arising from the rhizome).
D. Sporangia located on modified leaves called sporophylls (the ferns are exceptions to this).

E. Primitive, single-veined leaves called microphylls (again, ferns are an exception to this).

Ferns

Ferns are much more common today than any of the other seedless vascular plants, especially in tropical areas. Why have ferns been better able to cope than psilophytes, lycophytes, and arthrophytes? Probably the answer lies in the more modern architecture of their leaves. Distinguishing characteristics of the ferns include:

1. A sexual life cycle consisting of an alternation of a small, photosynthetic gametophyte (incompletely adapted to life on land) with a larger, conspicuous, and photosynthetic sporophyte (much better adapted to life on land).
2. Asexual reproduction in most species by means of a perennial rhizome from which new leaves and roots arise. In most ferns, the rhizome is underground, but in some tree fern species, it may grow straight up to as much as 60-80 feet.
3. Large, multi-veined, complex leaves (megaphylls) much better adapted to light capture and to supplying the necessary ingredients for photosynthesis to occur.

EXERCISES

1. Examine the prepared slide labeled "Fern Life Cycle", and observe the following:
    a. Leaf cross section, showing sori and sporangia.
    b. Young gametophyte, showing the antheridia, archegonia, and rhizoids.
    c. Young seedling sporophyte, shown growing through the notch of the gametophyte.

    Sketch and label all three parts of the slide.