TwoOldGuys™ Study Guides
BI114 Biological Concepts for Teachers
Chapter 2. Diversity of Life
2.6. Vascular Plants

Based on Indiana's Academic Standards, Science, as adopted by the Indiana State Board of Education, Nov 2000.
Numbers refer to the age-appropriate grade-level for the content.

Review

We developed a tentative definition of life, and applied it to all known life-forms consistent with the cognitive development of the 8th grade mind. To outline the known living things, we expanded the 20-Questions classification scheme to include several ranks of taxa which are recognized as artificial: Kingdom, Phylum, Class, Order, Family, and Genus; plus one real taxon: the species.

The artificial taxa are defined by enumeration. We have already covered most animals and plants. This section will complete our definitions by enumeration for the major taxa with which your students may be familiar, and some you hope they never heard of.

Plants, part 2
Vascular Plants

grade 5: to 8:

The vascular plants include the Ferns and Fern Allies, plus the Conifers and Flowering Plants. All vascular plants have stems with vascular tissue, consisting of xylem for transporting water and minerals

up the stem, and phloem for transporting sap from the leaves to the rest of the plant.

Ferns & fern allies (Phyla Pteridophyta, Equisetophyta, Lycopodophyta, Psilophyta)

The Ferns and fern allies do not produce seeds. The plant body consists of 'true' leaves with vascular tissue in veins, stems with vascular tissue in bundles, and rhizomes rather than 'true' roots. A true root contains vascular tissue. A rhizome is technically an underground stem.

Ferns, phylum: Pteriodophyta

Ferns have true (delicate) leaves, with sporangia on lower leaf surface. The living ferns are mostly herbaceous, but in Central America there are groves of tree ferns. The tree ferns were the dominant trees during the Carboniferous (350 – 270 Myr BP).

Horsetails, phylum: Equisetophyta

Horsetails have tiny (almost microscopic) microphyllous leaves. A microphyllous leaf does not contain vascular tissue. The sporangia are in fleshy cones located either at the tip of the main stem or at the tips of upright branches. All living examples (of which there are few) are herbaceous, although during the carboniferous some were massive trees.

Club mosses, phylum: Lycopodiophyta

For microphyllous leaves, the leaves of the club mosses are "large." The plants resemble miniature pine trees and are sold for terrariums as 'ground pine.' The sporangia are in fleshy cones located at the tips of horizontal branches. Again the few living examples are herbaceous,

while during the Carboniferous they ranged from herbaceous to massive trees which were not the dominant trees.

Whisk ferns, phylum: Psilophyta

In the whisk ferns, the microphyllous "leaves" are scale-like, and the sporangia are located on the stems immediately above a pair of microphyllous bracts. All known examples, living and fossil, are herbaceous. The pioneers and Native Americans used the whisk ferns as scouring pads (similar to Brillo™). These plants are known only from the Quaternary (present) and the Silurian (440 – 400 Myr BP) and Devonian (400 – 350 Myr BP). They seem to have been more common in the Silurian to Devonian than they are now.

Plants, Part 3
Non-Vascular Plants

grade 5: to 8:

The non-vascular plants do not have any vascular tissue, and do not produce seeds.

Mosses & liverworts (Phyla Bryophyta, Hepatophyta)

Bryophyta, mosses

Most people are familiar with the mosses, which grow to about 15 cm (6 inches).

Hepatophyta, liverworts

The liverworts are known only to those people who are interested in them.

Sphagnum, peat moss

Sphagnum is a Bryophyte listed separately here because there is a hypothesis that these plants evolved separately from the vascular plants, then gave rise to the mosses and liverworts. *Sphagnum* grows only in acid bogs as floating mat, never rises more than 18 cm (7 inches) above the water surface.

Chara, an algae

Chara is classified either as Charophyta (the charophytes) or as Chlorophyta (the green algae) depending on which 'expert' you read. The plants grow in fresh water, attached to the bottom of ponds and small lakes. Wave action may break them loose, allowing them to float as mats which cannot break the water surface without dehydrating to death. There are some striking similarities to *Sphagnum,* suggesting the possibility that the *Sphagnum* evolved from the *Chara*.