GHSGT Review: Biology (Day 7)

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OBJECTIVE: Describes the similarities and differences of spore-producing (seed-less) plants.

MOSSES

Bryophytes need a lot of water to survive because they lack vascular tissue and must transport materials by osmosis and diffusion. This requires a lot of water. Almost all bryophytes are small plants and they grow close to the ground. Gravity can restrict the processes of osmosis and diffusion.

Bryophytes do not have true stems, leaves, and roots. What you think are their "roots" are actually **rhizoids**. They anchor the plant to the ground, but they do not absorb water like real roots do. The part of the bryophyte that is above the ground gets its water from the air through its leaves. Bryophyte leaves are usually only two cells thick.

The life cycle of the bryophytes exhibit alternation of generation. This means that they alternate between gametes and spores. The gametophyte produces gametes (sex cells) by mitosis. During fertilization, the gametes fuse. The resulting zygote grows into a sporophyte, which produces spores by meiosis. When the spores germinate, they develop into the new gametophyte generation. In all bryophytes, the gametophyte generation is the dominant generation. The plant you are used to seeing is the gametophyte because the plant spends the majority of its life in this generation.

There are three classes in phylum bryophyta: mosses, liverworts, and hornworts

FERNS

Ferns are seedless plants that contain vascular tissue. Other seedless plant groups include whisk ferns, horsetails, and club mosses. Ferns have underground rhizomes (underground stem) that produce roots. Each fern frond has a stem (called a stipe)and many leaf blades make up the frond. Fern fronds spread out over a large area and so ferns are able to survive in dim sunlight.

The life cycle of the fern has the sporophyte generation as the dominant generation of the fern. The fern fronds produce spores, which are released and grow into the gametophyte. The gametophyte then produces eggs and sperm to produce the sporophyte.

OBJECTIVE: Describes the similarities and differences of seed-producing plants.

GYMNOSPERMS

Gymnosperms are one of two groups of vascular plants. Gymnosperms produce their seeds in cones and generally keep their leaves throughout the year (evergreen). There are four groups of gymnosperms alive today – Cycads, Gnetales, Ginkgoes (1 species), and Conifers.

Conifers means "cone-bearer". Pines, spruce, fir, and other conifers are characterized by their stiff cones and needle-like leaves. Conifers can thrive in harsh conditions because they have special adaptations. Their needles are covered in a hard waxy cuticle and have little exposed surface area. This means that they do not lose much moisture. They shed their needles throughout the year instead of once a year. They send their roots out into a wide area of soil instead of deep into the soil. This allows them to survive in areas where the soil is not very deep.

Cycads live mostly in the tropics and look like palms, but are not related to them. The order Gnetales includes trees and woody vines. The Ginkgo tree is the last species of a once widespread group of plants.

ANGIOSPERMS

Angiosperms are flowering plants. They produce seeds enclosed in fruits. (Gymnosperm seeds are uncovered in their cones.) Angiosperms are deciduous plants. That means that they lose their leaves every fall. Angiosperms

produce seeds with a cotyledon (seed leaf) inside. A cotyledon provides food for the plant embryo in the seed when it begins to grow.

Angiosperms can be divided into one of two groups. This group is based on characteristics of their seeds: monocot and dicot. Monocots are plants with only one cotyledon. Monocots also have vascular tissue that is scattered in separate bundles throughout the stem. The leaves have parallel veins and the root system is fibrous with string-like branches.

Dicots have two cotyledons. Dicots have vascular tissue arranged in a circle around the outside of the stem. The leaves have net-like veins. The root is a large central taproot.

REPRODUCTION

Vascular plant life is different from non-vascular plant life. **Nonvascular plants spend the majority of their life in the gametophyte phase. In vascular plants, the sporophyte generation is the dominant generation.** The sporophyte is physically larger and shows more complex development.

The reproductive cycle of a conifer involves separate male and female cones that are grown on the same tree. The male pollen cones produce the pollen grains. The female seed cones contain egg cells. Both pollen and eggs are gametophytes. When the egg cells mature, the female cells produce a sticky sap that traps the pollen grain. The pollen grain produces sperm, which fertilize the eggs. A conifer embryo develops, enclosed in the seed.

Reproduction in angiosperms is different. All angiosperms produce flowers. Some flowers have both male and female parts and some have just one sex. The flower attracts insects for pollination and thus fertilization to make a seed. After fertilization, the flower petals die and the remaining flower structures form a fruit. The fruit protects the seed and helps to disperse them in various ways. Then, an animal eats the fruit and leaves the seed in its feces elsewhere.

SEXUAL REPRODUCTION

In plants that produce them, the flower functions in sexual reproduction. Flowers consist of modified leaves. The essential flower parts are the ones that produce gametes and carry out sexual reproduction. These include male parts called stamens and female parts call pistils.

Most flowers have three, four, or five stamens. The thin stem-like portion of a stamen is called the filament. Pollen is produced at the tip of the filament, generally in an oblong structure called the anther. Most flowers have a single pistil. The pistil contains three parts. The swollen base of the pistil is called the ovary. Within the ovary, one or more ovules produce the egg cells. The slender middle part of the pistil is called the style. At the tip of the style is the stigma. The stigma produces a sticky substance to which pollen grains become attached.

During pollination, pollen grains stick to the top of the stigma. From there, the pollen grain grows a pollen tube down through the style to the ovary where it fertilizes the egg.

In cross-pollination, the pollen from one flower sticks to insects, which in turn deposit, it on other flowers. In self-pollination, the pollen is transferred to the stigma of the same flower. In the anther and the ovary, cell division takes place, which reduces the number of chromosomes in half.

Animals, wind, and water all transport pollen from flower to flower. The nonessential flower parts are modified to aid the specific type of pollination a plant undergoes. In flowers that are pollinated by animals, the stem and receptacle hold the flower out where its colors and scent are most obvious. Some flowers produce nectar, a sweet liquid.

Fruits are formed when the egg is fertilized and the ovary begins to swell and ripen. It changes color and becomes fleshy or dry. Animals eat the fruit and pass the seed out to new places through their waste.

ASEXUAL REPRODUCTION

Many plants can produce new plants without the aid of fertilization.. Asexual reproduction is common in strawberries, potatoes, irises, spider plants, and grasses. Remember that any plant produced asexually has the same genes as its parent plant.

Asexual reproduction can be accomplished naturally through vegetative propagation. This means that the plant sends out runners or long modified stems (rhizomes) and grows new plants from these parts.

Artificial propagation involves things like cuttings and graftings. With cuttings, pieces of stem are cut from the parent plant and kept in soil or water until roots grow. Then the plant is placed in soil to grow. Grafting is a method used to propagate fruit trees, roses, and grapes. Sections of one plant's stem are cut and attached to another plant's stem that is already rooted in the soil.

GENERAL INFORMATION ON PLANTS

Examples:	All multicellular plants - Mosses, liverworts, hornworts, ferns, gymnosperms (pine cone plants), angiosperms (flower-bearing plants)
Characteristics:	eukaryotes, mainly multicellular, can't move, autotrophic
Structures:	cellulose cell walls
Functions:	based on cell and tissue chemistry
Systems:	all present and functioning
Growth:	based on hormone action
Reproduction:	asexual, sexual by spores, seeds, flowers, and cones