

Final Biology Review

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2.3 Protists

Protists - eukaryotes that cannot be classified as animals, plants, or fungi.

- Both uni/multicellular
- Both hetero/autotroph
- Diverse in living ways
- Usually live in moist environments

Animal-Like Protists

Also called **protozoans**

Sarcodine

- Move and feed by forming pseudopods
- **Pseudopods** form when the cytoplasm flows towards something and the rest of the body flows along side
- Functions of pseudopods:
 - Move away from **bright light**
 - Trap food, **form food vacuole**

Endocytosis - cellular process in which substances are brought into the cell.

Exocytosis - cellular process in which contents of a cell vacuole are released to the exterior through the fusion of the vacuole and the cell membrane.

Flagellate

- Move with flagella
- **Flagella** - a whiplike structure made of protein
- Some flagellates live inside other organisms, forming a **symbiosis**, e.g.:
 - **Mutualistic**: Termites and Termite Flagellates
 - **Parasitic**: Giardia and the Hiker's Disease

Ciliates

- Move with cilia
- **Cilia** - Hairlike projections moving in wavelike motions
- They have **contractile vacuoles**, which store water and expels excess water
- They also have **2 nuclei** (woah! Wtf)

- **Macronucleus**: controls everyday tasks
- **Micronucleus**: regulates reproduction
- Ciliates reproduce **asexually** (binary fission) and **sexually** (conjugation)

Sporozoans

- **Parasitic protozoans**
- Move in various ways, e.g., flagella, slime...
- E.g, **Plasmodium** (protist that causes Malaria)

Plant-Like Protists

Also known as algae

Important food source and oxygen producer for the Earth's inhabitants

- Autotrophic
- Both uni/multicellular
- Use pigments to capture sun's energy
- Pigment - chemicals that produce color
- Plant-like protists are based off size and color.;

Euglenoids

- Green, unicellular, lives in freshwater
- Both auto/multicellular
- Eyespot: a part of the Euglenoid's body that contains the pigment to sense light and to help the euglenoid recognize the direction of light

Dinoflagellates

- Colorful, unicellular, aquatic inhabitants
- Covered by stiff plates and many glow in the dark
- 2 flagella, held in grooves between plates

Diatoms

- Transparent, unicellular, aquatic inhabitants
- Glass cell wall
- Source of food for heterotroph
- Diatomaceous remains can be used to produce:

- Polishing agent
- Pesticide

Red Algae

- Red, multicellular (almost all), marine inhabitants
- Red pigments are especially good at absorbing the sunlight (smol) that reach deep ocean
- Substances extracted from red algae can be used for:
 - Ice cream
 - Hair conditioner
 - Cell culturing

Brown Algae

- Brown (many pigments), multicellular, marine inhabitants
- Known as haleophyta or seaweed
- Has plant-like structures like holdfasts, stalks, blades, bladders, etc.

Fungi-Like Protists

...fungi

- Heterotrophic
- Have cell wall made of cellulose
- Use spores to reproduce

Slime Molds

- uni/multicellular
- Feed on bacteria / other microorganisms
- Reproduces both sexually and asexually
- When the environment is harsh, they produce spores, which are tiny cells that are able to grow into new organism

Water Mold

- Water / moist places
- Grow into tiny threads
- Attack food crops and animals

Downy Mildew

Kid named finger:

2.4 Fungi:

- Eukaryotic
- Heterotrophic
 - Absorbs food
- Have cell walls
 - Have chitin which is same material as exoskeleton of insects
- Use spores to reproduce
- Live in warm and moist place
 - Such as damp tree barks, moist foods, lawn coated with dew, damp forest floors, and even wet bathroom tiles
- Cell structure:
 - Unicellular
 - Yeast
 - Multicellular
 - Some have loosely arranged hyphae
 - Some have tightly arranged hyphae
 - Hyphae:
 - Branching, threadlike tubes that makes up the bodies of multicellular fungi
 - Septate hyphae:
 - With septum that allows important organelles to pass through
 - Aseptate hyphae (Coenocytic):
 - A continuous thread of cytoplasm that contains many nuclei
 - Substances move quickly and freely through hyphae
 - Cap and stalk:
 - Tightly packed hyphae
 - Has a rigid structure
 - Basically a mushroom
 - Underground hyphae:
 - Loosely arranged
 - Threadlike maze

- Gill:

- Contains the structure to reproduce

- Obtaining food:

- Grows hyphae into food source
- Digestive chemicals ooze from the hyphae into the food
- Chemicals break down the food into small substances
- Hyphae absorb the chemical
- Feed on dead organisms
- Parasite on other organisms

- Reproduction:

- Most fungi reproduce both asexually and sexually
- Usually makes spores:
 - Light-weight
 - Have protective covering
 - Can be carried by air or water
- Asexual reproduction happens when there is adequate moisture and food
 - Making spores by one fruiting body
 - Basidiomycete
 - Budding
 - Yeast
- Sexual reproduction happens when the condition becomes unfavorable
 - Making spores by fruiting body of two fungi
 - Grow together
 - Exchange genetic material
 - New reproductive structure grows out
 - Makes spores
 - Fruiting body:
 - Reproductive structure that fungi produce spores
 - Appearance of fruiting body is one way to classify

- Classification:

- Club fungi: mushroom
- Sac fungi: morel, yeast, etc.
- Zygote fungi: some mold
- Chytrids: produce gametes that swim using flagella
- Imperfect fungi: aspergillus
- Tight associations with plant roots

- Interactions:

- Decomposers and recycler
- Provide food for people
- Help fight diseases or cause disease
- Form the beneficial relationship with other organisms

- Environmental recycling:
 - Process of fungi breaking down dead organisms will return important nutrients to the soil
- Food and fungi
 - Help to make food
 - Yeast
 - Make bread
 - Make wine
 - Food source:
 - Morel
 - Mushroom
- Disease fighting fungi:
 - Making antibiotics
 - Alexander Fleming discovered Penicillin that kills bacteria
 - Penicillin is produced by the important fungi Penicillium
 - Diseases:
 - Dutch elm disease
 - Corn smut
 - Wheat rust
 - Athlete's foot
 - Ringworm
- Fungi-plant relationship association (mycorrhizal association)
 - Mutualism relationship:
 - Hyphae of fungi spread out underground
 - Absorb water and nutrients for the plants
 - Plants provide food for the fungi
- Lichens:
 - Fungus + algae/autotrophic bacteria
 - Mutualism
 - Fungi absorb the food from algae/bacteria
 - algae/bacteria obtain inorganic nutrients from fungi

3.1 Plant.

DID YOU KNOW THAT CHLOROPHYTA IS A PLANT.

Plants are autotrophic, multicellular, and have cell walls.

Chlorophyll - a green pigment found in chloroplasts, an organelle that conducts photosynthesis

Plant cell wall is constructed with cellulose, a type of glucose.



Types of plants include:

- Small plants
- Ferns
- Gymnosperm
- Angiosperm (flowering)

Features of Plant Survival:

Obtain Water / Nutrients

- Drain resource from surrounding
- Adaptation: Roots cover large amount of surface area, going deep underground

Retain Water

- Transpiration: loss of water vapor from leaves // stems of plants
- Cuticle: waxy, water-proof water covers both sides

Support bodies

- Vascular System - system of tube like structures inside a plant through which water, minerals and foods move
- The central vacuole strengthens // supports large bodies of the plants
- Cell wall gives support

Transport materials

- Water // Mineral goes upward in the plant
- Food goes downward in the plant
- For small plants, resources are transferred directly cell to cell
- For larger plants, resources are transferred from vascular tissue to tissue

Reproduction

- Sperm joins the egg cell
- Sperm swims to the egg cell
- Sperm are often taken to egg cell in other ways

FLOWER TIME

Flower: The reproductive structure of an angiosperm

- Sepal: the leaf-like structure that protects flowers
- Petal: leaf-like structure of a flower
- Stamen: male reproductive organ with two parts: Anther and filament
- Pistil: female reproductive organ with three parts: stigma, style, ovary

3.2 Classifying Plants

- Plant kingdom:

- Nonvascular plants:
 - Mosses
 - Liverworts
 - Hornworts
- Vascular plants:
 - Vascular plants without seed:
 - Fern
 - Club mosses
 - Horsetails
 - Vascular plants with seed:
 - Gymnosperm
 - Angiosperm
- Nonvascular plants:
 - Plants that lacks vascular tissue for transporting materials
 - Materials are passed from cell to cell
 - Characteristics:
 - Low-growing
 - Thin cell walls
 - Do not have roots, lead and stem
 - Obtain water directly from surroundings by rhizoid
 - Rhizoid: root-like structure
 - Most like in damp, shady places
 - Mosses:
 - Most diverse group of nonvascular plants
 - More than 10,800 species

- Liverworts:
 - More than 8000 species of liverwort
 - Shape looks like human liver
 - Grows on rocks or soil along sides of a stream
- Hornwort:
 - Fewer than 100 species
 - Live in moist soil, often mixed in with grass plants
- Vascular seedless plant:
 - Ferns and other seedless plants once dominated ancient forests
 - Range in size from centimeters to meters
 - Characteristics:
 - Have vascular tissues
 - Produce spores
 - Have stems, leaves, and roots
 - Vascular tissue:
 - Functions:
 - Provides effective way of transporting material throughout the plant
 - Strengthens the plant's bodies
 - Two types of vascular tissues:
 - Phloem: vascular tissue that transport foods up and down
 - Xylem: vascular tissues that transports water up and down
 - Ferns:
 - More than 12,000 species
 - Ranges in sizes
 - Thrive in shaded areas with moist soil
 - Some remains green year round, others turn brown
 - Structure of ferns:
 - *Underground:*
 - Stem (for most ferns)
 - Root
 - Anchor fern to the ground
 - Absorb nutrients and water, transport to stem and leaves through vascular tissue
 - *Above-ground:*
 - Leaves:
 - Young leaves are called fiddleheads
 - Mature leaves are called fronds
 - Upper surface is coated with a cuticle
 - Spores develop in spore cases on underside
- Club mosses:
 - Not moss

- Few species left
- Grow in moist woodland and near stream
- Also ground pine or princess pine
- Horsetail:
 - 30 species
 - Stems are jointed and contain silica
 - Long, coarse, needlelike branch
 - Can be used to scrub pots and pans (scouring brushes)

Characteristics	Moss	Fern
Sizes	Small and low	Can be tall
Environment	Moist	Moist
Body parts	Leaf-like, stem-like, root-like	Fronds, stems, roots
Vascular tissue present	No	Yes

- Seed plants:
 - Outnumber seedless plants by more than ten to one
 - Two important characteristics:
 - Have vascular tissue
 - Use pollen and seeds to reproduce
 - Also have roots, stems, and leaves
 - Mostly live on land
 - Pollen and seeds:
 - Pollen: tiny structure that contains the cells that will later become sperm cells
 - Seeds: structure containing a young plant inside a protective covering
 - Gymnosperm:
 - Seed plant that contains naked seed
 - Characteristics:
 - Naked seed
 - Needle-like or scale-like leaves
 - Deep-growing root system
 - Mostly trees, a few shrubs and vines
 - 36 million years ago, the oldest seed plants came
 - 4 groups of gymnosperms exist today
 - Cycad:
 - Mainly in tropical/subtropical area
 - Like palm trees with cones (palm tree is angiosperm)

- Can have large cones
- Conifers:
 - Largest, most diverse group
 - Mostly evergreen
 - Keep leaves (needle) year round
 - Pines, redwood, cedars, hemlock, juniper
- Ginkgo:
 - Only one species (*Ginkgo biloba*) exists
 - Tall, with scale-like leaves
 - Tolerate air pollution
- Gnetophyta:
 - In hot deserts and tropical rainforests
 - Can be trees, shrubs, or vines
- Angiosperm:
 - Flowering plant
 - Plant that produces seeds enclosed in a fruit
 - Characteristics:
 - Produce flowers
 - Produce seeds that are enclosed in fruits
 - Live almost everywhere
 - Cotyledon: or seed leaf, provides food for the embryo
 - Two types of angiosperms
 - Monocots:
 - Angiosperms that have only one cotyledon
 - Leaf veins are usually parallel
 - Stem vascular bundles are in a complex arrangement
 - Floral parts are usually in multiples of three
 - Fibrous root system
 - E.g. corn, wheat, rice, lilies, tulips
 - Dicots:
 - Angiosperms that have two cotyledon
 - Leaf veins usually branched
 - Stem vascular bundles are arranged in a ring
 - Floral parts are usually in multiples of four or five
 - Taproot usually present
 - E.g. roses, violets, dandelions, oak tree, maple trees

Seed leaves	Leaf veins	Stems	Flowers	Roots
One cotyledon	Veins usually parallel	Vascular bundles in complex	Floral parts usually in multiples of	Fibrous root system

		arrangement	three	
Two cotyledon	Veins usually branched	Vascular bundles arranged in ring	Floral parts usually in multiples of four or five	Taproot usually present

3.3 Plant Structures

Did someone say plants (no)

Roots

A plant structure that:

- Anchors plants in the ground
- Absorbs water and minerals from the soil
- Stores food (e.g., carrot and beets)

Types of roots:

- Fibrous root: several main roots are visible
 - (lawn grass, corn, even matthew)
- Taproot: one long, thin, main root
 - (carrots, dandelions, potatoes, cacti)

Root Structure:

- Root cap
 - Dead root cells that protect the root
- Dividing cell
 - Form new root cells
- Root hair
 - Increases the contact surface area with the soil
 - Absorption // anchoring the plant
- Vascular Tissue (see [vascular tissue](#))

Stems

A plant structure that:

- Transport materials between the leaves and roots
- Provide support for plant

- Hold up leaves towards the sun
- Store food for some plants

Types of stems:

- Woody stem: hard and rigid
 - (maple trees)
- Herbaceous stem: no wood, is soft
 - (daisies, ivy, asparagus)

	Phloem	Xylem	Bark	Heartwood	Hardness
Herbaceous	Yes	Yes	No	No	Soft
Woody	Yes	Yes	Yes	Yes	Hard

Stem structures:

- Outer Bark (protection)
- Inner Bark (contains phloem)
- Cambium (where cells divide to form new xylem and phloem)
- Sapwood (contains active xylem, which transports water and nutrients)
- Heartwood (contains old xylem, gives support, cannot carry nutrients and water)
- Pith (center, stores food and water)

Annual Rings

- A pair of light and dark rings represent one year's growth
- The width of annual rings can provide important clues about its past environments
- Made of xylems

Leaves

A plant structure to capture the sun's energy and carry out photosynthesis

Photosynthesis carries out in chloroplasts



Leaf Structure:

- Cuticle (see [cuticle](#))
- Upper leaf cell (cells trap sunlight)
- Lower leaf cell (store CO₂ and O₂)
- Stomata (small pore in the underside)
- Vein (contains xylem and phloem)

Water Loss:

- Prevent Transpiration with stomata and cuticles!

