

BIOLOGICAL DIVERSITY
CHAPTER 31: FUNGI (lecture)
11/30

Fungi

- mycelium: represents an individual organism (core of the organism)
 - each mycelium is composed of hyphae: filaments of the mycelium
 - hyphae grow, reproduce, and feed
 - heterotrophic organisms
 - osmotrophs (release enzymes into environment, breaking down organic matter, and taking in organic matter)
 - absorbing products of digestion
 - products can be transported throughout the entire mycelium
 - septum
 - break in hyphae
 - pores in septum
 - chitin: makes up most of the structure of hyphae
 - hyphae are below ground
- reproduction
 - fruiting bodies
 - made of hyphae
 - mushrooms (contain spores)
 - sporangia (contain spores)
 - does not reproduce every year, only when conditions are ideal
 - sporangia mature then burst with spores

Groups of Fungi

- Ph. Chytridiomycota
 - most ancestral
 - characterized by mobile (flagellated) zoospores (egg, sperm/gametes)
 - closely associated with water in order for zoospores to move around
 - “water-borne pathogens”
 - infect plants, algae, animals
 - global declines in amphibians
 - Batrachochytrium dendrobatidis (poison dart frogs)
 - Chytrid
 - fungus responsible for wiping out frogs
 - **all fungi use alteration of generations (like plants)*****
 - have a haploid (n) side and diploid side (2n)
 - gametophyte and sporophyte
 - figure 31.9 in textbook
- Ph. Zygomycota
 - bread/food molds
 - found in some soils
 - decompose organic matter
 - form of sporangia characterize this group
 - zygosporangium:
 - not so much male and female, but positive and negative hyphae
 - positive and negative hyphae come together (fertilization)

- dikaryon stage: (before union of gametes)
 - $n + n$
 - haploid to dikaryon to diploid and back to haploid*
- Ph. Glomeromycota
 - “myco” means fungal related
 - plant symbionts
 - arbuscular mycorrhizae
 - fungus grows into the individual root cells
 - part of the hyphal network is outside of the root
 - mutualism (+, +)
 - fungi produce nitrogen and phosphorus that benefits the plant
 - plant produces carbon (in form of carbohydrates) used for the fungus
- Ph. Ascomycota
 - (cup or sac fungi)
 - 75% of all fungi is Ascomycota (large and diverse)
 - includes Cordyceps (zombie killer fungi)
 - truffles
 - yeast
 - pathogens
 - characterized by the fruiting bodies lined with asci (hold in spores)
 - mildews, blights
 - grains
 - ergot fungus: pathogen on wheat that also makes people sick
 - causes insanity, hallucinations, gangrene, permanent brain damage, death
 - fairly certain ergot is behind Salem Witch Trials
 - when people became crazy, thought they were a witch, but had ergot poisoning
 - morels: fruiting body like a mushroom
 - lined with spore-producing structures
 - spores do not travel far
 - truffles: fruiting body (underground)
 - attached to underground mycelium (actual organism)
 - both the fruiting body and mycelium are underground
 - associated with certain tree species
 - symbiotic relationship
 - mycorrhizae
 - (+,+) mutualism
 - nitrogen for carbon
 - sold as truffle oil for food
 - multicellular fruiting body from multicellular mycelium
 - yeast: only true unicellular fungus
 - food
 - commensal organism
 - (+,0) where yeast benefits and organism it is living on has no effects
 - reproduce asexually (budding)
 - Saccharomyces cerevisiae: bread and alcohol varieties
 - tamed yeast selected for over very long periods of time
 - Candida spp.
 - wild yeast

- “thrush”
 - commensal
 - lichens: mutualistic relationship btw Ascomycota and green algae or cyanobacteria
 - looks like crust
 - photosynthetic organisms
 - production of carbohydrates
 - energy
 - the surface has green algae and cyanobacteria
 - layer of hyphae in the middle
 - chitin-based layer
 - signifies great air quality in the area
 - different colors for different lichens and their symbiotic relationships
- Ph. Basidiomycota
 - mushrooms, toad stools
 - basidium/basidiocarp
 - fruiting body of mycelium (underground)
 - smut: fungal infection
 - delicacy in some countries
 - rust: agriculture pests
 - puff balls
 - jelly fungus
 - osmotrophs
 - hyphae are part of jelly mass
 - moves through forest
 - mushrooms have toxins
 - vomitoxin
 - aflatoxin
 - reduce competition
 - avoid competition
 - hyphae release toxin in soil around them
 - fairy rings: infections of the lawn that started with a single spore
 - germinates
 - hyphal network grows
 - leaks nitrogen and acts like fertilizer for the grass
 - mushroom reproduction
 - mycelium underground
 - mushroom growing
 - modified hyphae for reproduction
 - hyphae grows, forages, and reproduces*
 - folds underneath the cap are called gills
 - reproduction occurs here
 - sporangia line the gills
 - basidiospores
 - individual spores are sphere shaped
 - Glomeromycota
 - Glomeromycota
 - grow into root cells
 - mostly Basidiomycota Ectomycorrhizae
 - grow around cells
 - Mycorrhizae