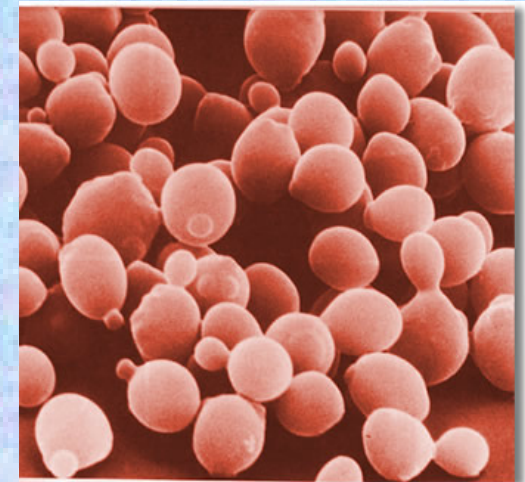




Kingdom Fungi

The Rotten World We Live In



Fungi Characteristics

- General Information
 - Eukaryotic
 - Some are unicellular (yeast). Most are multicellular.
 - Heterotrophic
 - Secretes digestive enzymes onto food source to liquefy it.
 - Absorbs nutrients
 - Does not contain chlorophyll

Fungi Characteristics

- Asexual and Sexual reproduction
 - Most produce spores that are reproductive cells which form new individuals.
- Habitat
 - Varied; most prefer moist, warm and dark places.
- Examples:
 - Mushrooms, mold, yeast, mildew, puffballs

Fungi Characteristics

- Filamentous bodies
 - Many different cell and tissue types
 - Woven together to form body of fungi
- Cell walls contain chitin
 - Tough polysaccharide found in the body of insects
- Exhibit nuclear mitosis that is slightly different than most eukaryotes
 - Nuclear envelope remains intact

Mushroom Life Cycle

- Structures
 - Spores land on ground (A)
 - Develop into a threadlike filament called hyphae (B)
 - Hyphae composed of cells which have cell walls made of chitin.
 - Cytoplasm and nuclei can move from cell to cell.
 - As fungus grows, the hyphae forms a tangled mass called a mycelium (C).

Mushroom Life Cycle

- The mycelium may produce a reproductive structure (mushroom, puffball, bracket fungi) that will grow above the ground surface. (D)
- The reproductive structures will then release spores from its gills and the process starts over. (E)
- See diagram included

4. Hyphae connect with a tree root to form a relationship that benefits both partners, the fungus and tree. The fungus provides phosphorus, minerals and water, the tree provides carbohydrates for the fungus' growth and in some cases reproduce.

FRUITBODY

1.

spores are carried away from the underside of the fruitbody by the wind. If they land in a favourable site, they germinate to produce an underground branched web called a mycelium.

2.

SPORES

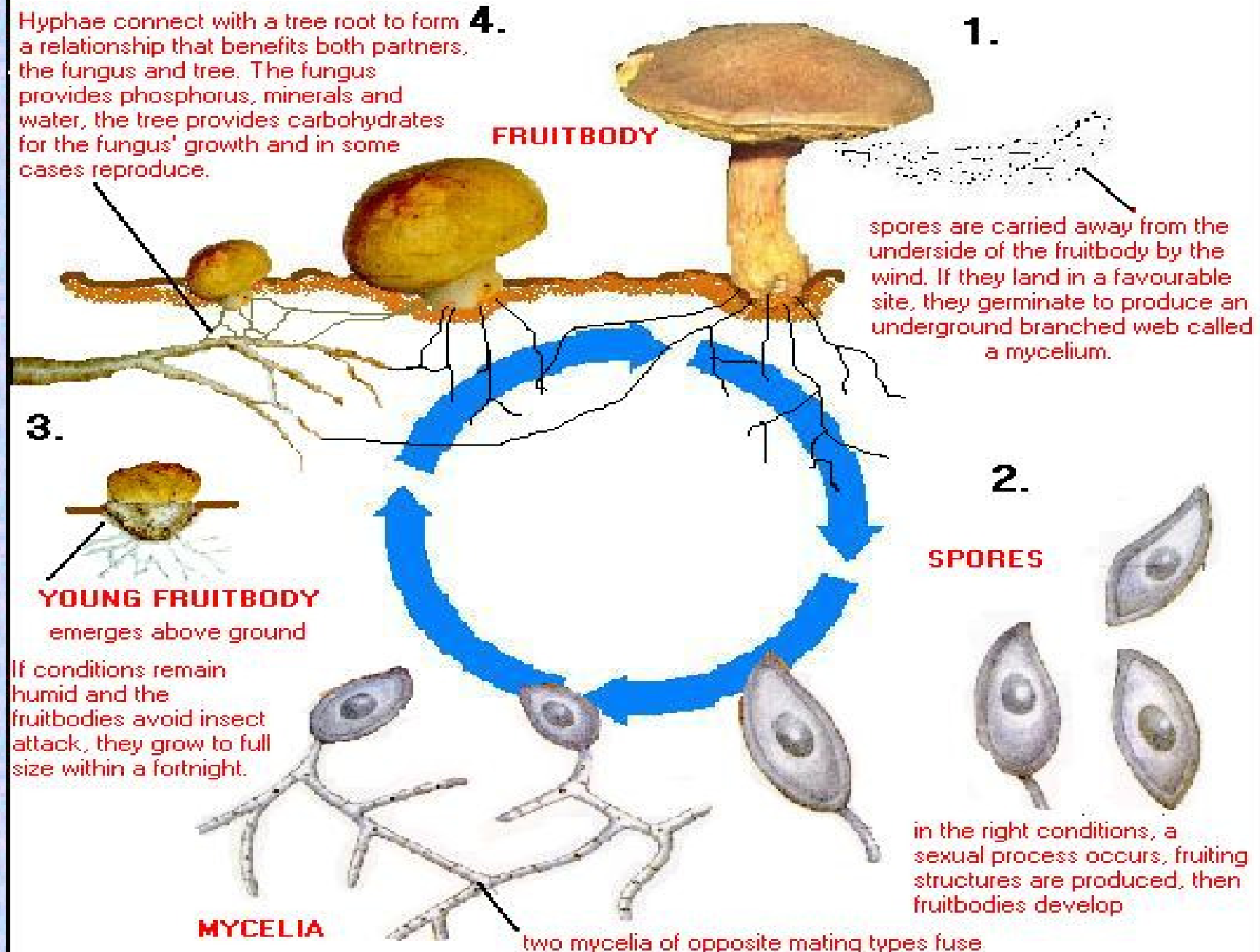
3.

YOUNG FRUITBODY
emerges above ground

If conditions remain humid and the fruitbodies avoid insect attack, they grow to full size within a fortnight.

MYCELIA

two mycelia of opposite mating types fuse

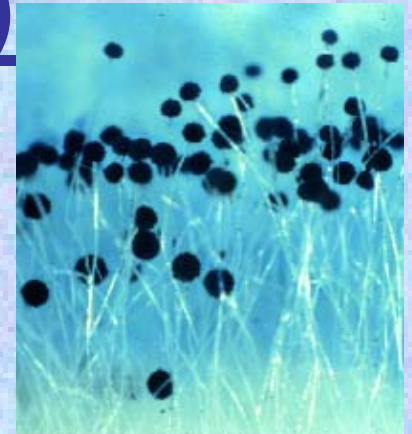


Classification

- Fungi are classified by:
 - The appearance of the body that produces the spores.
 - The appearance of the fruiting body.
- **All fungi that have cell walls of chitin are called “true fungi”.**
- **There are 5 Phyla in this Kingdom (3 are true fungi)**

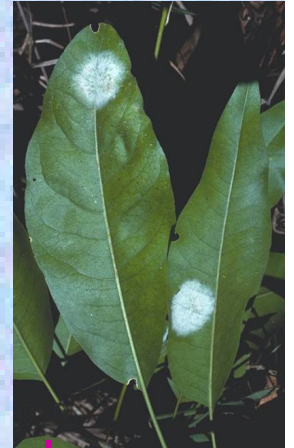
1. Phylum Zygomycota (Sporangia Fungi)

- Common saprophyte in the soil.
 - Example: *Rhizopus* (Bread mold)
 - Common mold on moist, stale bread
 - Hyphae form a white, cottony mycelium.
 - Some hyphae penetrate bread and form rhizoids which anchor the fungus and make enzymes that digest the bread.
 - Others form sporangiophores which are upright stalks that produce spore cases at their tips.
 - Spore cases are known as sporangia and these are where spores are produced.



Rhizopus -black bread mold

2. Phylum Ascomycota (Sac Fungi = Ascus)



- They are the largest group of fungi.
- Grow in soil, on rotted wood, marine and fresh water, and dung.
- Examples: powdery mildews on fruit, yeast, chestnut blight, morels, truffles
- Many Ascomycetes produce asexual spores called **conidia**.
- Some reproduce sexually by forming specialized structures that contain male and female nuclei.
- Yeasts are the only unicellular Ascomycete. They do NOT have hyphae or fruiting bodies. They reproduce asexually by budding.

3. Phylum Basidiomycota (Club Fungi= Basidium)

- Examples: mushrooms, bracket fungi, puffballs, plant rusts and smuts
 - Basidiomycetes produce basidiospores.
 - When basidiospores germinate, they produce primary mycelium.
 - This mycelium has hyphae that have 1 nucleus in each cell.
 - When 2 different strains come together, their hyphae fuse and produce secondary mycelium, which may produce a fruiting body.
 - Each cell now has 2 nuclei.



3. Phylum Basidiomycota

- A mushroom is the fruiting body of a basidiomycete.
- Bracket fungi are basidiomycetes that are usually woody.
- They grow on trees that are old or injured.
- They have a plate like fruiting body.
- Rusts and smuts are basidiomycetes that cause many plant diseases.

4. Phylum Deuteromycota (imperfect Fungi)

- Are classified by the shape of their conidia (asexual spores) and how they are produced.
- Called imperfect fungi
- They do NOT have a sexual phase.
- Examples: species of *Penicillium* mold makes penicillin, an antibiotic



5. Phylum Oomycota (Protist like Fungi)

- Examples: water molds
- Commonly form a white fuzz on aquarium fish or on organic matter sitting in water.
- Sometimes found on land under very humid conditions.
 - On land, they have caused some serious diseases among crop plants.
 - Examples: Potato blight
- Absorb food through very thin cell walls made of cellulose.
- Only phylum of fungi that produces motile spores.



Importance of Fungi

1. Saprophytes

- They decompose dead organic matter and return nutrients to the soil.
- Secrete digestive enzymes onto the food, and then absorb the digested nutrients.
- Examples: mold, mildew, mushrooms, etc.

Importance of Fungi

2. Food source

— Some edible forms

- Truffles = pigs dig for them; very expensive delicacy.
- Morels = in PA (sponge mushrooms)
- Shiitake = Japanese, expensive delicacy.
- Whitecaps (common in stores)



Importance of Fungi

- Most are inedible—very poisonous.
 - Death angel—grows in lawns and woods-a small bite can lead to death.
 - Some are hallucinogens, used in religious ceremonies.



Importance Of Fungi

3. Food and Beverage Production

- Yeast—*Saccharomyces cerevisiae* (baker's yeast)
 - Anaerobic respiration produces ethyl alcohol, which is needed for alcoholic beverage production.
 - Carbon dioxide produced during anaerobic respiration causes dough to rise.
- Molds
 - Used to flavor cheeses (from a species of *Penicillium*).
 - Examples: bleu cheese and Roquefort cheese.

Importance Of Fungi

4. Used to Produce Medicines

- *Penicillium* = antibiotic that kills many bacteria called penicillin
- Cyclosporine = used for organ transplants to prevent rejection.
- Cephalosporine , Neosporin = antibiotic ointments

Importance Of Fungi

5. Allergies

- People react to the presence of spores in the air.



Importance Of Fungi

6. Many Parasitic Forms

- Grow and feed on plants and animals.
- Plant fungi that cause death
 - Dutch Elm Disease
 - Chestnut Blight
 - Coffee tree wilt
 - Smuts and Rusts on wheat, oats, barley and corn
 - Fruit mildew (apple)

Importance Of Fungi

— Animal fungus

- Dermatophytes (means skin plants) = fungus infections of the skin.
- Examples: Ringworm, Athlete's foot, Jock itch, fingernail and toenail fungus
- Affect the nonliving tissues of the body.
- Can be transmitted by contact (contagious) through clothing, floor, animals, etc.



Importance Of Fungi

— Thrush

- yeast infection of the tongue (babies)
- causes white patches on tongue and mouth



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Importance Of Fungi

7. Symbiotic Relationships

- Symbiosis = 2 different organisms living together.
- Examples: lichens
 - fungus and algae growing together
 - grow almost anywhere (soil, rock, tree, warm, cold, wet, dry)
 - sensitive to sulfur dioxide = indicator of air pollution
 - Fungus absorbs nutrients and water that the algae needs to photosynthesize.
 - The algae produce food that the fungus uses. (mutualistic relationship)

Importance Of Fungi

– Mycorrhizae

- Mutualistic relationship between a fungi and tree roots
 - Hyphae of fungi provide tree with phosphorus and minerals while the tree supplies carbohydrates (food) for the fungi
 - Hyphae will appear as a tangled mass around the tree roots.

