

19-1 The Fungi

I. Characteristics of Fungi

A. Fungi are *eukaryotic heterotrophs*

1. Many are saprophytes (def'n): *organisms that obtain food from decaying organic matter* others are parasites (def'n): *live on or in a host organism and harm them*

B. Fungi characteristics:

1. Nutrition (Getting food):

a) Fungi do not ingest their food

b) Fungi release digestive enzymes into their environment, which break down organic material, so nutrients diffuse into fungus

2. Body structure:

- a) Made up of filaments called hyphae
- b) Hyphae tangle together to form a thick mass called a mycelium
- c) Hyphae cell walls usually made of chitin
- d) Mycelium is well-suited to absorbing food because ... *it permits a larger surface area to come in contact with the food source*

3. Reproduction

a) Most fungi reproduce BOTH ways

b) Asexual reproduction occurs by

i) The production of spores

ii) Fragmentation of the hyphae

c) Sexual reproduction involves two different mating types: + (plus) and – (minus)

C. Fungi Classification:

1. According to their methods of reproduction and their basic structure

2. There are five phyla:

a) Oomycota

b) Zygomycota

c) Ascomycota

d) Basidiomycota

e) Deuteromycota

3. *-mycota* means mushroom in Greek

II. Oomycota - Protistlike Fungi

A. Commonly called water molds, but are able to grow on land in damp conditions

B. Oddities:

1. Cell walls made of cellulose

2. Produce motile spores that swim through water to find new food sources

3. When found, they develop into hyphae that grow into/on the food source

III. Zygomycota - Common Molds

A. Members are terrestrial

B. Name comes from formation of a thick-walled zygote called a zygospore

C. Examples: the molds that grow on meat, cheese, and bread

D. Have different kinds of hyphae:

1. Rhizoids: rootlike, these penetrate the surface of bread and they:

a) Anchor the fungus

b) Release digestive enzymes

c) Absorb digested material

2. Stolons: run along the surface of the bread

3. Sporangioophores: push up into the air and form sporangia at the tips

a) 40,000 spores per sporangium

b) When developed it opens, scattering spores

E. Sexual reproduction

1. Occurs when two hyphae from different mating types come together
2. They form gametangia containing haploid gametes
3. Gamete fusion forms a diploid nucleus that grows a thick wall
4. These zygospores can remain dormant for months

IV. Ascomycota - Sac Fungi

A. The largest phylum

B. Some, like the morel, are large enough to be visible; others, like yeasts, are microscopic

C. Asexual reproduction:

1. Spores formed at tips of hyphae called conidiophores

2. These spores are very fine: called conidia after the Greek word for dust

D. Sexual reproduction:

1. Mating types' gametangia grow together
2. Nuclei fuse and develop into a structure called an ascus
3. Meiosis makes 4 haploid cells that all go through a round (or 2) of mitosis to result in 8 or 16 cells in each ascus, called ascospores

E. Fruiting Bodies

1. (def'n): The part of the fungus you can see *above the ground* that contains the *spore*-producing structures

F. Yeasts

1. Unicellular

2. Reproduce by mitosis and by budding

(def'n): formation of a smaller cell from a larger one

3. Can reproduce sexually: the dry powder contains ascospores

4. In moist environment, they become *active*

V. Basidiomycota - Club Fungi

A. Contains most of the organisms we call *mushrooms*

B. Name comes from spore-producing structure called a *basidium*

C. In mushrooms, basidia are found in the *cap*

D. Life cycle:

1. *Basidiospore* germinates to produce haploid (1n) primary mycelia
2. When these find the opposite mating type, they fuse
3. They make a secondary mycelia, whose cells all contain two UNFUSED nuclei -- one from each "parent"
4. These secondary mycelia can grow in the soil for years

5. Can get enormous: hundreds of metres across!

6. When conditions are right (combination of moisture and nutrients) a spore-producing fruiting body (mushroom) pushes up above the ground

7. Cytoplasm from thousands of hyphae stream into the mushroom and enlarge it

8. Fully-developed mushrooms can appear overnight

9. When the cap opens, it exposes hundreds of tiny gills on its underside

10. Each gill is lined with basidia

11. Now, the 2 nuclei fuse to form a true (2N) zygote cell

12. Undergo meiosis to produce basidiospores within a few hours

13. A single mushroom can produce one billion spores!

E. Other members:

1. Bracket fungus; puffballs, toadstools, and plant parasites called rusts

VI. Deuteromycota - Imperfect Fungi

A. Members grouped together because their sexual reproduction has never been seen

B. Examples:

1. Penicillium mold: grows on fruit; source of antibiotic penicillin

2. Fungi responsible for ringworm, athlete's foot, and other skin infections