21-1 The Kingdom Fungi

Fungi are **eukaryotic** heterotrophs that have cell **walls**. Their cell walls contain **chitin**, a complex carbohydrate. Fungi depend on other organisms for food. They digest food **outside** of their bodies and then absorb it. Some fungi absorb nutrients from **organic** matter in the soil. Other fungi are **parasites**, absorbing nutrients from their hosts.
Except for yeast, all fungi are multicellular.

Fungi are made up of thin filaments called hyphae. Each hypha is only one cell thick.

In some fungi, cross walls (septa) divide hyphae into cells with 1 or 2 nuclei. In the cross walls, there are openings through which the cytoplasm and nuclei can move.

Some hyphae lack cross walls and contain many nuclei (multinucleated). (Acellular slime mold-like) "Plasmodium"
The bodies of multicellular fungi are composed of many hyphae tangled together into a thick mass called a **mycelium**. The mycelium permits a large **surface area** to come in contact with the food source through which it grows. A **mushroom** is the **fructifying body** of a fungus. A fruiting body is a **reproductive** structure growing from the mycelium in the soil beneath it.
Asexual reproduction occurs when hyphae break off and begin to grow (fragmentation). In some fungi, spores are produced in structures called sporangia at tips of specialized hyphae called sporangiophores. Sexual reproduction involves two mating types: “+” and “−”. Hyphae of opposite mating types meet and fuse, bringing their nuclei together in one cell. The nuclei form a diploid zygote nucleus. The zygote enters meiosis and produces haploid spores capable of growing into new organisms.
Many fungi produce dry spores that scatter easily in the wind. If these spores are to germinate, they must land in an environment with the proper combination of temperature, moisture, and food so they can grow. Other fungi are specialized to lure animals, which disperse spores over long distances.
Fungi are classified according to their structure and method of reproduction. The four main groups of fungi are:

1. Common molds (Zygomycota)
2. Sac fungi (Ascomycota)
3. Club fungi (Basidiomycota)
4. Imperfect fungi (Deuteromycota)

Outdated by DNA sequence
Familiar molds that grow on meat, cheese, and bread are called **Zygomycetes**. Zygomycetes have life cycles that include a **zygospore**. A zygospore is a resting spore that contains a zygote formed during the **sexual** phase of the mold's life cycle.
Black bread mold, *Rhizopus stolonifer*, is a zygomycete with two types of hyphae:

- **Rhizoids** are rootlike hyphae that penetrate the bread's surface.
- **Stelons** are stemlike hyphae that run along the surface of the bread. 

The sporangium reproduces asexually by releasing haploid spores produced by mitosis.
Black bread molds reproduce both sexually and asexually. **Hyphae** from different mating types fuse and produce gamete-forming structures called **gametangia**. Haploid (N) gametes produced in the gametangia fuse with gametes of the opposite mating type to form diploid (2N) **zygotes**, which develop into thick-walled **zygospores**.
In favorable conditions, the zygospore ___________ germinates, undergoes ___________ meiosis, and releases new haploid ___________ spores.