Fungi Basic Characteristics

Fungi are a kingdom of organisms that are described as eukaryotic heterotrophs. The basic functional units of most fungi are hyphae, which are filamentous thread-like structures that grow from the tips and typically contain multiple nuclei. A collection of hyphae together is referred to as a mycelium. Fungi have cell walls made of chitin, a polysaccharide, and have internal "cross-walls" called septa that are the dividers separating hyphae into individual cells. Fungi are known to be saprophytic, meaning they feed primarily off dead organic matter. Some of them, however, can be pathogenic and feed on living organisms. In order to digest dead organic matter, they use digestive enzymes that are excreted through the cell wall. Once the material is broken down, the cell absorbs the nutrients. Fungi can reproduce sexually if conditions are unfavorable or asexually if conditions are favorable. Sexual reproduction happens between two type-compatible fungi (often denoted as + or -). The hyphae fuse into an interconnected network and eventually undergo karyogamy (fusion of nuclei). The organism is briefly dikaryotic before fusion of nuclei, but becomes diploid after fusion. Meiosis then occurs followed by sporulation and the release of haploid spores. Asexual reproduction in most fungi is via mitotic division into spores, which are dispersed and eventually form new hyphae upon landing. Yeast reproduces asexually through budding. Both methods of asexual reproduction result in genetically identical spores and daughter organisms, while sexual reproduction results in genetic diversification.



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Characteristics

Hyphae
High-five with Hyphae
While in their vegetative state, fungi exist as filamentous structures called hyphae.

Mycelium
Mouse-lion
Many hyphae amassed together make up a mycelium.

Septa
Scepter
Septa are internal "cross-walls" that serve as dividers, which separate hyphae into distinct cells.

Chitin
Chicken
Chitin is the polysaccharide that septa (cross walls in fungi) are composed of. It can be compared to cellulose that makes up the cell wall of plants. It is also the polysaccharide that makes up the exoskeleton of insects.

Saprophytic
Sap
Most fungi are saprophytic, meaning they feed off dead organic matter. However, some fungi can be pathogenic and feed on living organisms.

Digestive Enzymes
Enzyme Fish
Digestive enzymes are excreted from fungi, which break down their food source. They then absorb these digested nutrients.

Sexual Reproduction
Sex-signs High-fiving
Fungi reproduce sexually in unfavorable conditions. Two compatible hyphae can fuse together into an interconnected network, resulting in a dikaryotic organism. The nuclei will then fuse in karyogamy and result in a temporary diploid phase, after which meiosis occurs. Haploid spores may be released thereafter, from which new fungal organisms grow.

Haploid Spores
Hat-plaid Spores
The spores released by fungi are always haploid. They can be released through mitosis during asexual reproduction, or can be released following sexual reproduction. The spore will be dispersed and form hyphae upon landing in a favorable region.

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Yeast Budding

East Butt-ing fun-guy

Asexual reproduction in yeast occurs via budding (cell fission), where a new cell pinches off from the parent cell.

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