24.1C: Fungi Reproduction

Fungi can reproduce asexually by fragmentation, budding, or producing spores, or sexually with homothallic or heterothallic mycelia.

Learning Objectives

• Describe the mechanisms of sexual and asexual reproduction in fungi

Key Points

• New colonies of fungi can grow from the fragmentation of hyphae.
• During budding, a bulge forms on the side of the cell; the bud ultimately detaches after the nucleus divides mitotically.
• Asexual spores are genetically identical to the parent and may be released either outside or within a special reproductive sac called a sporangium.
• Adverse environmental conditions often cause sexual reproduction in fungi.
• Mycelium can either be homothallic or heterothallic when reproducing sexually.
• Fungal sexual reproduction includes the following three stages: plasmogamy, karyogamy, and gametangia.

Key Terms

• homothallic: male and female reproductive structures are present in the same plant or fungal mycelium
• gametangium: an organ or cell in which gametes are produced that is found in many multicellular protists, algae,
fungi, and the gametophytes of plants

- **spore**: a reproductive particle, usually a single cell, released by a fungus, alga, or plant that may germinate into another
- **sporangium**: a case, capsule, or container in which spores are produced by an organism
- **karyogamy**: the fusion of two nuclei within a cell
- **plasmogamy**: stage of sexual reproduction joining the cytoplasm of two parent mycelia without the fusion of nuclei

### Reproduction

Fungi reproduce sexually and/or asexually. Perfect fungi reproduce both sexually and asexually, while imperfect fungi reproduce only asexually (by mitosis).

In both sexual and asexual reproduction, fungi produce spores that disperse from the parent organism by either floating on the wind or hitching a ride on an animal. Fungal spores are smaller and lighter than plant seeds. The giant puffball mushroom bursts open and releases trillions of spores. The huge number of spores released increases the likelihood of landing in an environment that will support growth.

![Figure](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/24%3A_Fungi/24.01%3A_Reproduction/fg-24.01.01.png)

Figure 24.1: The release of fungal spores: The (a) giant puffball mushroom releases (b) a cloud of spores when it reaches maturity.

### Asexual Reproduction

Fungi reproduce asexually by fragmentation, budding, or producing spores. Fragments of hyphae can grow new colonies. Mycelial fragmentation occurs when a fungal mycelium separates into pieces with each component growing into a separate mycelium. Somatic cells in yeast form buds. During budding (a type of cytokinesis), a bulge forms on the side of the cell, the nucleus divides mitotically, and the bud ultimately detaches itself from the mother cell.

The most common mode of asexual reproduction is through the formation of asexual spores, which are produced by one parent only (through mitosis) and are genetically identical to that parent. Spores allow fungi to expand their distribution and colonize new environments. They may be released from the parent thallus, either outside or within a special reproductive sac called a sporangium.
Types of fungal reproduction: Fungi may utilize both asexual and sexual stages of reproduction; sexual reproduction often occurs in response to adverse environmental conditions.

There are many types of asexual spores. Conidiospores are unicellular or multicellular spores that are released directly from the tip or side of the hypha. Other asexual spores originate in the fragmentation of a hypha to form single cells that are released as spores; some of these have a thick wall surrounding the fragment. Yet others bud off the vegetative parent cell. Sporangiospores are produced in a sporangium.

Sexual Reproduction

Sexual reproduction introduces genetic variation into a population of fungi. In fungi, sexual reproduction often occurs in response to adverse environmental conditions. Two mating types are produced. When both mating types are present in the same mycelium, it is called homothallic, or self-fertile. Heterothallic mycelia require two different, but compatible, mycelia to reproduce sexually.
Although there are many variations in fungal sexual reproduction, all include the following three stages. First, during plasmogamy (literally, “marriage or union of cytoplasm”), two haploid cells fuse, leading to a dikaryotic stage where two haploid nuclei coexist in a single cell. During karyogamy (“nuclear marriage”), the haploid nuclei fuse to form a diploid zygote nucleus. Finally, meiosis takes place in the gametangia (singular, gametangium) organs, in which gametes of different mating types are generated. At this stage, spores are disseminated into the environment.