

Cellular eukaryotic,
prokaryotic and
archaea. within these,



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Cellular life on earth can be divided in three different domains - the eukaryotic, prokaryotic and archaea. Within these, further sub distinctions can be made, resulting in a branched and complex annotation of life. Fungi belong to the eukaryotic domain, in which they constitute their own kingdom, besides the plant and animal kingdoms. As other eukaryotic cells, fungi cells accommodate organelles and a true nucleus, all contained within a membrane, while they differ by having a cell wall consisting of chitin, as well as lacking chlorophyll. The general scheme of a fungi is relatively simple.

Composing of a main body, a mycelium, made up by a branched network of tubes, hyphae. Through hyphae, nutrients are absorbed, in which organic carbon, from either living or dead biological organisms, function as the main energy source. Reproduction of fungi can occur in two separate, yet connected, ways. Either reproduction takes place asexually, mainly through the means of the release of small identical copies of parent fungi as spores, or reproduction occurs sexually. Sexual reproduction varies between different phyla and therefore a generic description does not make sense.

Instead a detailed description is integrated within the description of each phylum. The fungi kingdom can be subdivided in 5 different phyla, these are named Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota and Deuteromycota. Phylum Chytridiomycota contains all fungi, which at some point in their life cycles exists as flagellated swimming cells and these fungi are therefore, primarily, found in aquatic environments. These fungi reproduce asexually when a zoospore, who are uniflagellate asexual spores, lands on a suitable substrate, after which a cell wall forms around it, thus, creating a fungi body. Long threads, rhizoids, attach to the substrate and <https://assignbuster.com/cellular-eukaryotic-prokaryotic-and-archaea-within-these/>

through these nutrient is absorbed. After a period of feeding, the fungi body is converted into a sporangium, a structure which contains and subsequently releases zoospores. Sexual reproduction occurs by fusing zoospores, thus creating a diploid zygote, which then hardens and creates a meiosporangium. Later fusing of nuclei create meiospores, which can then swim away to find a suitable substrate and form a new fungi body.

Fungi of this phyla are mostly harmless, saprotrophic fungi, although a few pathogens such as *Batrachomyces dendrobatidis*, which causes chytridiomycosis in amphibious animals have been found. Phylum Zygomycota clusters more than 1100 different species, mostly saprotrophic soil fungi, who exploits nutrients by decomposing waste products, such as rotten fruit. Their name, refers to their reproductive sexual mechanism, as it forms a structure called zygosporangium, arising from the conjugation between two compatible hyphae. After conjugation, a cell wall is formed behind the fusing hyphae, which at this point are called gametangia. Next to this, the wall separating the two hyphae is broken down, leading to fusion of both hyphae's cell components into one organism, except their nuclei, which are still separate entities. Following this, their nuclei fuse and the walls around the zygosporangium grows even harder and thicker than before, this creates the zygospore, responsible for the naming of the phylum. After a long resting period, meiosis occurs, and the fused nuclei are divided into two separate recombinant nuclei.

These are then later integrated and released as meiospores. Asexual reproduction occurs by the release of mitospores. Most Zygomycota are harmless to humans, although a few are pathological causing a disease called <https://assignbuster.com/cellular-eukaryotic-prokaryotic-and-archaea-within-these/>

mucormycose, which arises when spores are inhaled from dusty environments. Fungi in the third phyla, phylum Ascomycota, are the most abundant phylum as more than 65,000 species belong here.

Their trademark is their structural component, the ascus, which is a sac-like unit, harboring eight ascospores, in which sexual and asexual reproduction occurs. The formation of this component arises when a spore lands on a suitable substrate, which forms a haploid mycelium. From this, asexual structures can be produced, or sexual structures, gametangia, can be formed. The female sexual structure is called ascogonium, while the male sexual structure is an antheridium. Fusing of these leads to plasmogamy (one organism, with two nuclei) and forms an ascogonium hypha.

Karyogamy (fusing of nuclei) takes place at the tip of this hyphae, creating a diploid ascus, which undergoes meiosis and thus produces 4 haploid nuclei. Followed by a round of mitosis eight ascospores are formed, which can then be released and the cycle repeats. Due to the sheer amount of species, phylum Ascomycota, exert both a positive and negative effect on the human condition. Beneficial species such as *Penicillium notatum* and *Saccharomyces cerevisiae* contribute to our health and our ability to produce beverages, while malignant effects are seen by species of the *Aspergillus* genus who can cause a respiratory disease, decay food, synthesize carcinogenic toxins in nuts etc. The *Aspergillus* genus will be investigated extensively later in this paper. The fourth phyla, Basidiomycota, are next to Ascomycota the most abundant phyla with more than 30,000 species.

000 separate species and because of this abundance, their diversity is large and plentiful. This phylum encompasses the largest and most complex fungi, in which most species share a common structural component called the basidium. The basidium is a club-shaped structure, in which meiosis takes place and where basidiospores are synthesized, often located on fruiting bodies such as mushrooms.

Basidiomycota reproduce asexually by producing spores or by a mechanism called budding, in which an extension of a cell is separated into its own cell. Sexual reproduction happens when haploid hyphae meet and fuse, often followed by the transfer of a nucleus from each parent hyphae to the other, which reproduces mitotically, thus, creating a dikaryotic mycelium. From a dikaryotic mycelium a fruiting body arises, by hyphae, which communicate and create different components. Some create the stalk, others the gills of the fruiting body.

The tips of the hyphae which constitute the gills is the basidium and when these swell, nuclei are fused and a bit later 4 basidiospores are formed, which will then be ready to be released. Basidiomycota play an important role in ecosystems, as they achieve nutrients by breaking down decomposing organic material, unfortunately they also break down wood, which has negative economic consequences. The last phylum, phylum Glomeromycota, is a fairly new addition to the additional four phyla. These fungi live in close association with the roots of trees. Their relationship is symbiotic in which the roots contribute with carbohydrates and carbon, while the fungi supply essential vitamins and minerals which the plant can utilize. Glomeromycota do not reproduce sexually and cannot sustain life without support from a plant.

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roots. The remaining fungi that do not fit in any of these phyla, belong to a sixth informal phylum called phylum Deuteromycota. These fungi all reproduce solely asexually as individuals closer to other phyla but not close enough to be considered a valid part of these.