

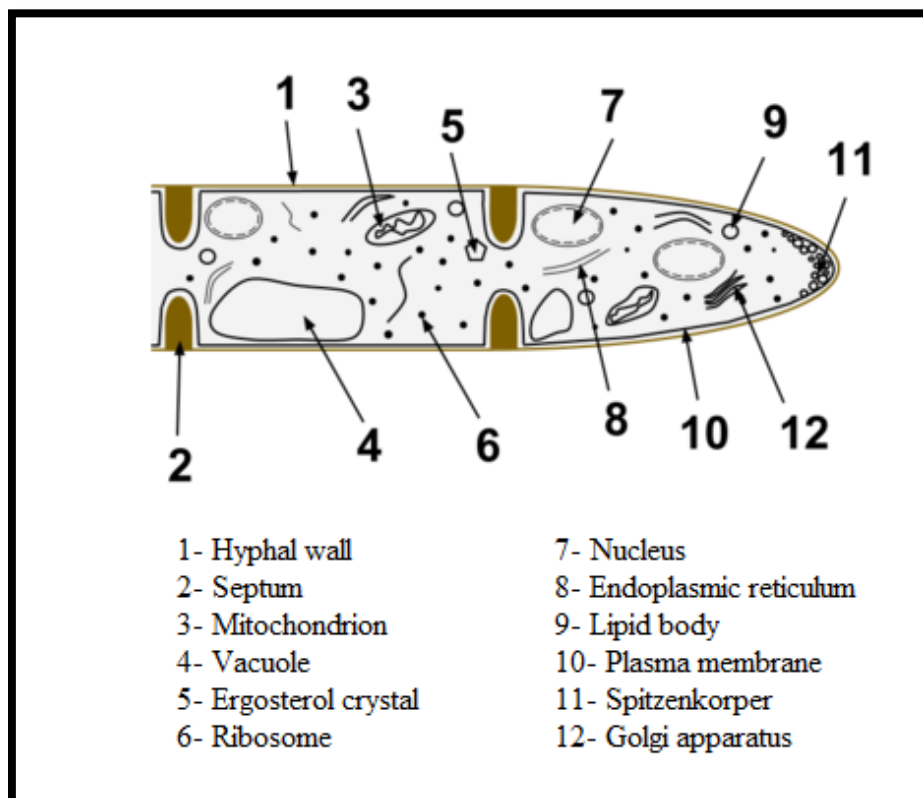
Fungal physiology : refers to all the processes that act by the fungal cell , nutrition, metabolism, growth, reproduction, and death .

The physiology of fungal cells impacts significantly on the environment, industrial processes, and human health. In relation to ecological aspects, the biogeochemical cycling of carbon in nature would not be possible without the participation of fungi acting as primary decomposers of organic material. The more understand their life and physiology, the better we can utilize them in agriculture , industry and medicine , and at the same time the greater will be our control over their harmful actives as pathogens of plants, animals and man , and as destroyers of timber , textiles food and feed.

Ultra structure of fungi

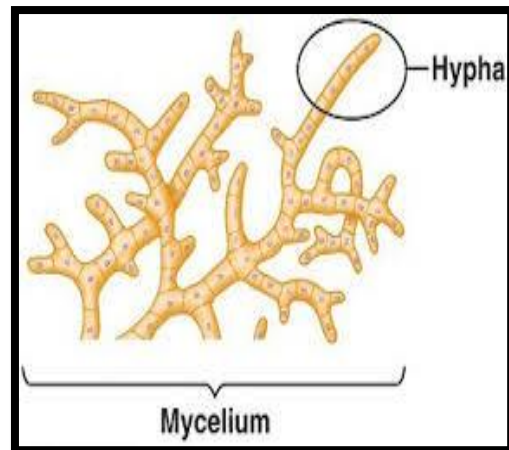
1-Filamentous Fungi

Most fungi grow as hyphae, which are cylindrical, threadlike structures 2–10 μm in diameter and up to several centimeters in length.

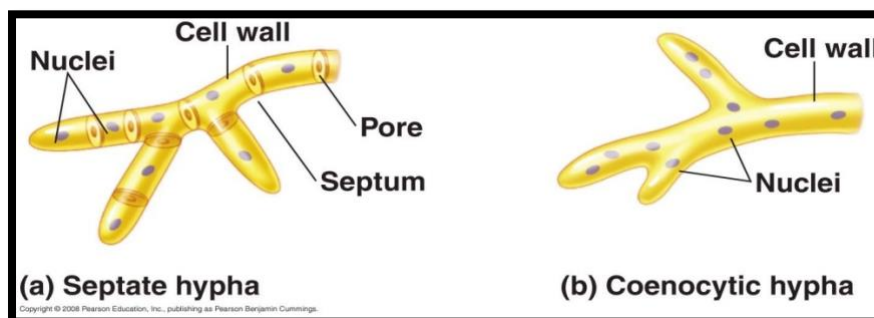


Hyphae

Hyphae grow at their tips. New hyphae are typically formed by emergence of new tips along existing hyphae by a process called branching, multiplies by branching, creating a fine network called a Mycelium .

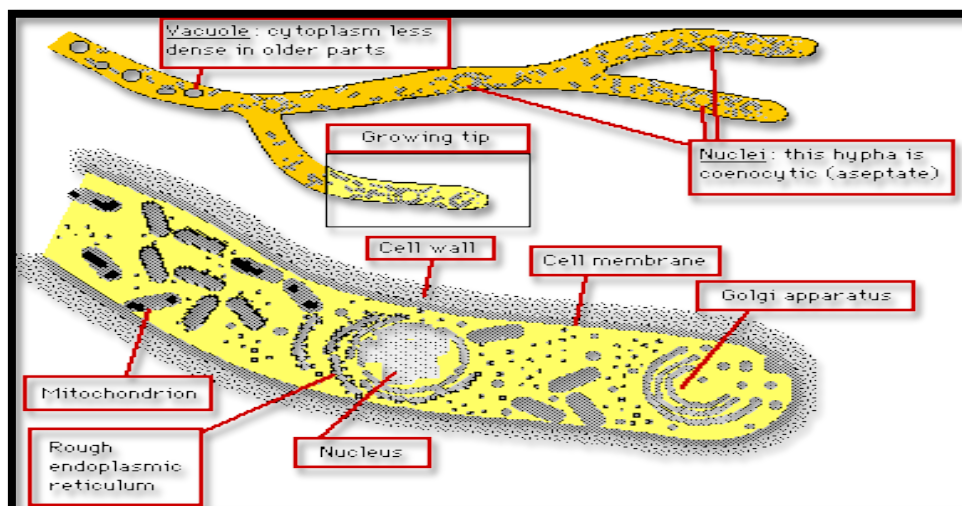


hyphae are divided into compartments separated by cross walls (internal cell walls, called septa, that are formed at right angles to the cell wall giving the hypha its shape), with each compartment containing one or more nuclei. Hypha in some Fungi are undivided or no septa called **Coenocytic**.



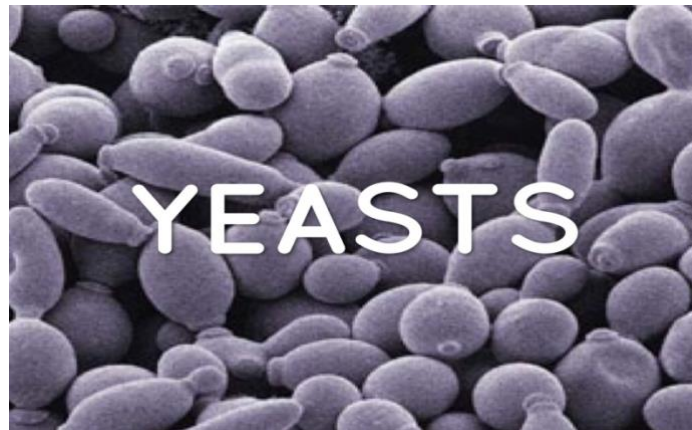
Septa have pores that allow cytoplasm, organelles, and sometimes nuclei to pass through; an example is the dolipore septum in the fungi of the phylum Basidiomycota.

Coenocytic hyphae are essentially multinucleate supercells.



Yeasts

Yeasts are unicellular (mostly ascomycete, basidiomycete, or members of the deuteromycete group) fungi that divide asexually by budding or fission and whose individual cell size can vary widely from 2–3 μm to 20–50 μm in length and 1–10 μm in width. *Saccharomyces cerevisiae*, commonly referred to as brewer's or baker's yeast, is generally ellipsoid in shape with a large diameter of 5–10 μm and a small diameter of around 5 μm . There is great diversity in cell shapes and modes of cellular reproduction in the yeasts.



typical yeast cell

Fungal Cell Structure :

Cell Wall:

The fungal cell wall is an essential structure with great plasticity that is vital to maintaining cellular integrity and viability. The cell wall plays an important role in different biological functions such as controlling cellular permeability and protecting the cell from osmotic and mechanical stress. In addition to these important functions, the cell wall mediates interactions with the external environment through adhesions and a large number of receptors. The cell wall is a specific and complex cellular organelle composed of glucans, chitin, chitosan, and glycosylated proteins. Proteins are generally associated with polysaccharides resulting in glycoproteins. Together, these components contribute to the cell wall rigidity.

Cell Wall Structure

The cell wall is structured in different layers where the innermost layer is a more conserved structure on which the remaining layers are deposited and can vary between different species of fungi. The composition and organization of fungal cell walls are the following:

❖ Glucans

Glucan is the most important structural polysaccharide of the fungal cell wall and represents 50–60% of the dry weight of this structure.

❖ Chitin

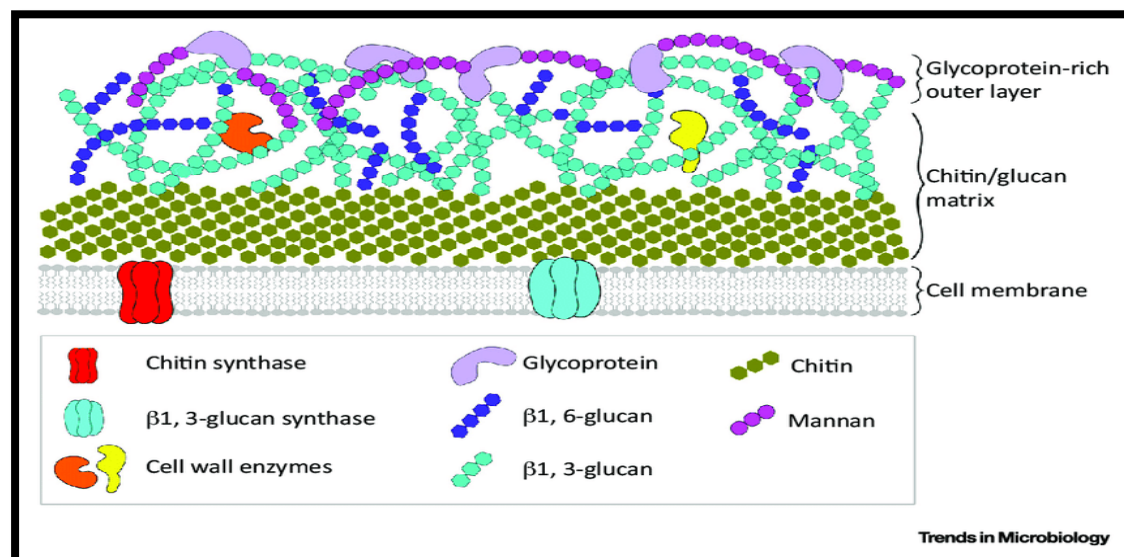
The chitin content of the fungal wall varies according to the morphological phase of the fungus. It represents 1–2% of the dry weight of yeast cell wall while in filamentous fungi, it can reach up to 10–20%.

❖ Glycoproteins

Proteins compose 30–50% of the dry weight of fungal wall in yeast and 20–30% of the dry weight of the wall of the filamentous fungi.

❖ Melanin

Melanin is a pigment of high molecular weight that is negatively charged, hydrophobic and insoluble in aqueous solutions and protects fungi against stressors facilitating survival in the host.



Fungal Wall Structure

Functions of The Fungal Wall

- Protects the underlying protoplasm;
- determines and Maintains the shape of the fungal cell .
- acts as an Interface between the fungus and its environment;
- acts as a Binding Site for some enzymes .
- Contains pigments for protection.
- possesses Antigenic properties - which allow interactions with other organisms.