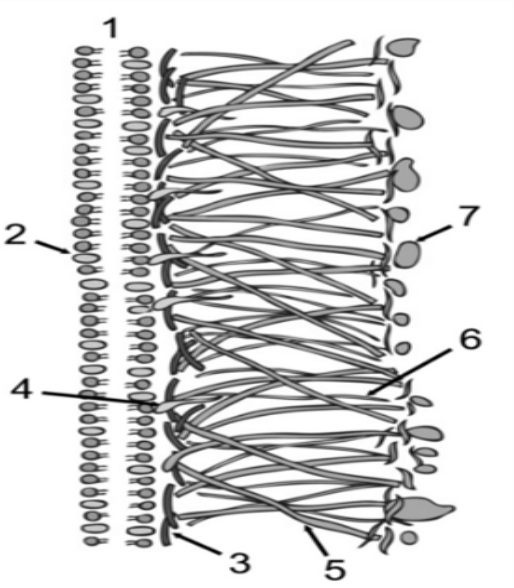
THE FUNGAL CELL WALL

Both the structure and composition of the fungal cell wall have unique characteristics. The **polysaccharide β(1,4) N-acetil-glucoseamine**, generally known as **chitin**, is a unique cell wall component of the fungi, but the amount of chitin of cell walls of different groups may differ strikingly. In some groups (e.g. in some zygomycetes) the chitin is partially deacetylized by an enzyme (chitin deacetylase) and so the cell wall will contain **chitosan** (deacetylized chitin). The chitin is synthesized by the membrane attached chitin synthase enzyme. Its zymogen is transported into the cell membrane by the vesicles called chitosomes.

The fungal cell walls contain polysaccharides mainly β(1,3) and β(1,6) glucans synthesized by the transmembrane glucan synthase enzymes.

Most proteins of the cell wall are present in glycolised form. A majority of the glycoproteins are mannans or mannoproteins, the proteins being connected by mannose. Some proteins are anchored in the cell membrane and play crucial roles in cell wall integrity.



Schematic diagram of fungal cell membrane and cell wall architecture

1: cell membrane; 2: ergosterol; 3: chitin; 4: anchor proteins; 5: β(1,3) glucan; 6: β(1,6) glucan; 7: mannoproteins.

The Oomycetes have also cell walls and some species have a small amount of chitin in their walls, but the vast majority has no chitin at all. On the other hand, their cell walls contain cellulose, a β(1,4) glucan, which is never present in true fungi.

The major wall components can be categorized into two major types:
(i) the **structural (fibrillar) polymers** that consist predominantly of straight-chain molecules, providing structural rigidity, and
(ii) the **matrix components** that cross-link the fibrils and that coat and embed the structural polymers.

The major components of fungal walls in different groups

Taxonomic group	*Structural (fibrillar) components*	*Matrix components*
Chytridiomycota	Chitin Glucan	Glucan ?
Zygomycota	Chitin Chitosan	Polyglucuronic acid Mannoproteins
Ascomycota	Chitin β-(1→3), β-(1→6)-glucan	Mannoproteins α(1→3)-glucan
Basidiomycota	Chitin β-(1→3), β-(1→6)-glucan	Mannoproteins α(1→3)-glucan
Oomycota (not true fungi)	β-(1→3), β-(1→6)-glucan Cellulose	Glucan

In addition to the main structural components of the wall, some yeasts can have a discrete polysaccharide capsule, and both hyphae and yeasts can be surrounded by a more or less diffuse layer of polysaccharide or glycoprotein, easily removed by washing or mild chemical treatment. These extracellular matrix materials can have important roles in the interactions of fungi with other organisms.