

## Definitions:

What is mycology? Mycology is the study of fungi and their multiple functions in nature.

What are fungi: Fungi are eukaryotic organisms that do not contain chlorophyll, but have cell walls, filamentous structures, and produce spores. These organisms grow as saprophytes and decompose dead organic matter also as pathogens of plants, animals and humans, and in food spoilage and as producers of secondary metabolites

There are between 100,000 to 200,000 species depending on how they are classified. About 300 species are presently known to be pathogenic for human.

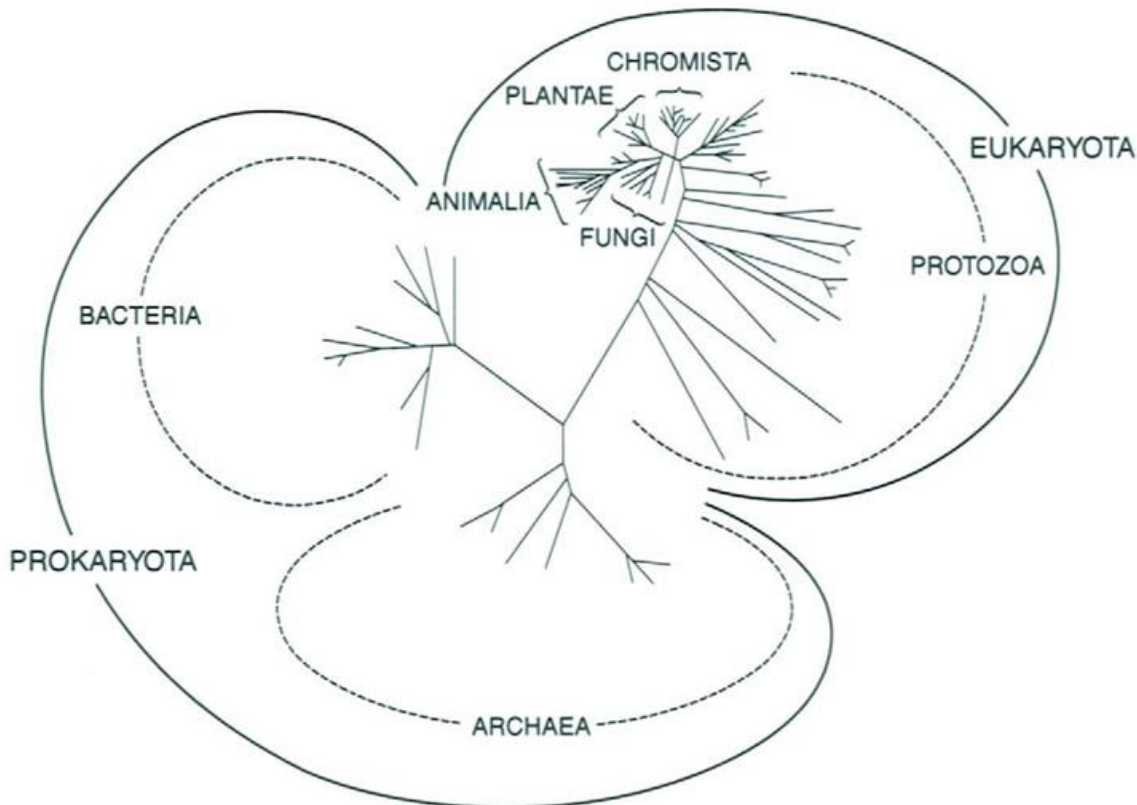
Mycology (from Greek term μύκης (mykes, mukos) "fungus" and logy "science")

According to Wittaker 1969; There are five kingdoms of living things, and the fungi are in the Kingdom Mycetae.

Kingdom	Characteristic	Example
<b>Monera</b>	Prokaryocyte	Bacteria Actinomycetes
<b>protista</b>	Eukaryocyte	protozoa
<b>Mycetae</b>	Eukaryocyte	fungi
<b>Plantae</b>	Eukaryocyte	Plants Moss
<b>Animalae</b>	Eukaryocyte	Arthropods Human Mammals Birds

The taxonomy of the Kingdom Fungi is evolving and is controversial. Formerly based on gross and light microscopic morphology, studies of ultra-structure, biochemistry and molecular biology provide new evidence on which to base taxonomic positions

According to Carlile *et al.*, 2001; fungi are recognized as one of five Eucaryotic kingdoms including Animalae, Plantae, Chromista(straminopila) and Protozoa.



**A phylogenetic tree showing the relationships between the two Prokaryote and five Eukaryote kingdoms (Carlile *et al.*, 2001)**

### **Characteristics of fungi:**

1. Nutrition: Heterotrophic (lacking photosynthesis), feeding by absorption rather than Ingestion except slime molds .
2. Vegetative state: On or in the substratum, typically as a non-motile mycelium of hyphae showing internal protoplasmic streaming. Motile reproductive states may occur.
3. Cell wall: Typically present, usually based on  $\beta$ -glucans and chitin, rarely on glucans and cellulose (Oomycota).

4. Nuclear status: Eukaryotic, uni- or multinucleate, the thallus being homo- or heterokaryotic, haploid, dikaryotic or diploid, the latter usually of short duration (but exceptions are known from several taxonomic groups).
5. Life cycle: Simple or, more usually, complex.
6. Reproduction: The following reproductive events may occur: sexual (i.e. nuclear fusion and meiosis) and/or Parasexual (i.e. involving nuclear fusion followed by gradual de-diploidization) and/or asexual (i.e. purely mitotic nuclear division).
7. Propagules: These are typically microscopically small spores produced in high numbers. Motile spores are confined to certain groups.
8. Sporocarps: Microscopic or macroscopic and showing characteristic shapes but only limited tissue differentiation.
9. Habitat: Ubiquitous in terrestrial and freshwater habitats, less so in the marine environment.
10. Ecology: Important ecological roles as saprotrophs, mutualistic symbionts, parasites, or hyperparasites.
11. Distribution: Cosmopolitan , fungi are among the most diverse organisms on earth and are considered only second to the insects in species diversity.

### **Importance of Fungi:**

- 1- Fungi are the agents responsible for much of the disintegration of organic matter and such they affect us directly by destroying food, fabrics, leather and other consumer goods manufactured from materials subject to fungal attack.
- 2- They are the basis of a number of industrial processes involving fermentation, such as making of bread example: *Saccharomyces cerevisiae*, wines, beers, and the fermentation of cacao, bean and the preparation of certain cheeses.
- 3- Production of many organic acids of some drugs such as Ergotamine and cortisone and some vitamin preparations, and are responsible for manufacture of a number of antibiotics, notably Penicillin and Cephalosporin .
- 4- Some of them are good for human consumer such as *Agaricus bisporus* - edible mushroom, and single cell proteins.

5-Many fungi are particularly important in the decomposition of plant debris because of their ability to utilize cellulose such as *Xylaria*

6- Use it as important research tools in cytologists, Geneticists, and biochemists such as *Neurospora*.

7- They cause majority of known plant disease such as *Botrytis*, and many diseases of animals and humans such as *Fusarium*.

### History of mycology:

Mycology is a relatively new science that became systematic after the development of the microscope in the 16th century.

\*Fungal spores were first observed by **Giambattista della Porta in 1588**,

\*The seminal work in the development of mycology is considered to be the publication of **Pier Antonio Micheli's 1729** work **Nova plantarum genera**. Micheli not only observed spores but also showed that, under the proper conditions, they could be induced into growing into the same species of fungi from which they originated.

\*Extending the use of the binomial system of nomenclature introduced by **Carl Linnaeus** in *Species plantarum* .

\***Hendrik Persoon (1761–1836)** established the first classification of mushrooms with such skill so as to be considered a founder of modern mycology.

\***Elias Magnus Fries (1794–1878)** further elaborated the classification of fungi, using spore color and various microscopic characteristics, methods still used by taxonomists today.

\***Anton de Bary(1861)** established modern mycology ; he studied slime molds, rusts and late blight of potato diseases.

\***Berfield(1875)** studied smut disease and he used copper sulphate to control plant diseases caused by fungi.

\* **Robert Koch (1843-1910)** the first one who discovered artificial medium to isolate and growth fungi.

The 20th century has seen a modernization of mycology.