

Ainsworth Classification of Fungi

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Fungi

- Microbiologists use the term **fungus** [pl., **fungi**; Latin *fungus*, mushroom] to include eucaryotic, spore-bearing organisms with absorptive nutrition, no chlorophyll, and that reproduce sexually and asexually.
- Scientists who study fungi are **mycologists**, and the scientific discipline dealing with fungi is called **mycology**.
- The study of toxins and their effects is called **mycotoxicology**, and the diseases caused by fungi in animals are known as **mycoses** [s., **mycosis**].
- Fungi are primarily terrestrial organisms, although a few are freshwater or marine.
- Many are pathogenic and infect plants and animals.
- Fungi also form beneficial relationships with other organisms.
- For example, about three-fourths of all vascular plants form associations (called mycorrhizae) between their roots and fungi.
- Fungi also are found in the upper portions of many plants.
- These endophytic fungi affect plant reproduction and palatability to herbivores.
- Lichens are associations of fungi and either algae or cyanobacteria.

Classification

- Ainsworth G. C. (1966, 71, 73) proposed a more natural system of classification of fungi.
- This classification is based on morphology, especially of reproductive structure.
- He includes fungi along with slime molds under the kingdom Mycota.
- **Based on the presence or absence of Plasmodium and pseudoplasmodium; the kingdom Mycota is further divided into two divisions:**
- Myxomycota i.e., slime molds and Eumycota or true fungi.
- Divisions are subsequently divided into subdivision, class, subclass, order, family and then to genus.
- According to his classification, division ends in mycota, subdivision in mycotina, class in mycetes, subclass in mycetidae order in ales and family in aceae.

Geoffrey Clough Ainsworth (1905-1998)

He published this classification as a paper in a journal in 1966. Then modified and published in "Ainsworth and Bisby's Dictionary of the Fungi" (1971) and "The Fungi. An Advanced Treatise" (1973)

Kingdom Fungi

Myxomycota

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1. Acrasiomycetes
 2. HydroMyxomycetes
 3. Myxomycetes
 4. Plasmodiophoromycetes

Eumycota

5 Subdivisions

1. Mastigomycotina (3)
2. Zygomycotina (2)
3. Ascomycotina (6)
4. Basidiomycotina (3)
5. Deuteromycotina (3)

Kingdom: Mycota

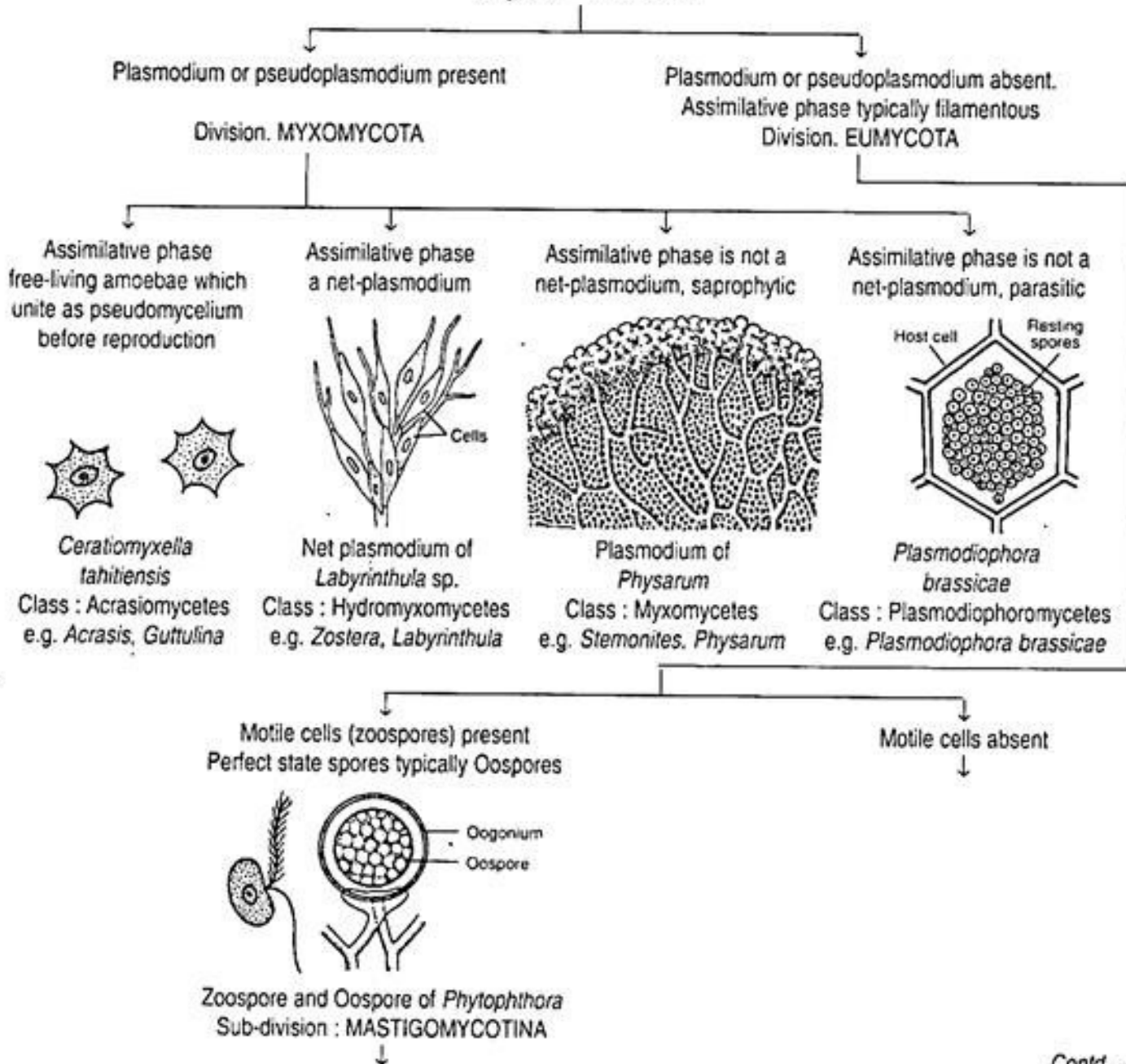
Important features

- Free-living, parasitic or mutualistic symbionts, devoid of chlorophyll.
- Cell wall composition is very variable, majority contain chitin and glucan.
- Reserve food materials are oil, mannitol and glycogen.
- Except some unicellular members, majority are filamentous.

Division: Myxomycota

- Wall-less organisms possess either a Plasmodium (a mass of naked multinucleate protoplasm having amoeboid movement) or a pseudoplasmodium (an aggregation of separate amoeboid cells).
 - Both are of slimy consistency, hence slime molds.
1. Class. Acrasiomycetes (cellular slime molds): Amoeboid cells aggregating into a pseudoplasmodium *Example: Dictyostelium*
 2. Class. Hydromyxomycetes (net slime molds): Amoeboid cells spindle-shaped to oval interconnected by slime filaments forming a net commonly known as 'net plasmodium' or 'filo-plasmodium'.
Example: Labyrinthula
 3. Class. Myxomycetes (true slime molds): Free-living plasmodium bearing haploid or diploid nuclei *Example: Physarum*
Plasmodium non-parasitic, fructification present.
 4. Class. Plasmodiophoromycetes (endo- parasitic slime molds): Plasmodium parasitic, fructification lacking *Example: Plasmodiophora*

Kingdom — MYCOTA



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Division Eumycota (True fungi, all with walls)

- Subdivision Mastigomycotina (motile cells – zoospores present, perfect state spore-oospore). *Example: Albugo, Pythium, Saprolegnia*
- 1. Class. Chitridiomycetes (unicellular, zoospore with single whiplash flagellum).
- 2. Class. Hyphochytridiomycetes (uni-cellular, zoospore with single tinsel flagellum).
- 3. Class. Oomycetes (aseptate mycelium, zoospores with two flagella).

...Eumycota

Subdivision. Zygomycotina (mycelium aseptate, perfect state spore-zygospore).

1. Class. Zygomycetes (mycelium immersed in the host tissue).
 2. Class. Trichomyces (mycelium not immersed in the host tissue).
- Example: Rhizopus

Subdivision. Ascomycotina (yeasts or septate mycelium, perfect state spore-ascospores formed in ascus, usually within ascocarp).

Example: *Saccharomyces*, *Penicillium*, *Peziza*

1. Class. Hemiascomycetes (no asco-carp, asci naked).
2. Class. Loculoascomycetes (fruit body an ascostroma, asci bitunicate i.e., 2-walled).
3. Class. Plectomyces (fruit body cleistothecium, asci unitunicate i.e., 1-walled).
4. Class. Laboulbeniomyces (fruit body perithecium, asci unitunicate, exoparasite of arthropods).
5. Class. Pyrenomycetes (fruit body perithecium, asci unitunicate, not parasitic on arthropods).
6. Class. Discomycetes (fruit body apothecium, asci unitunicate).

...Eumycota

Subdivision. Basidiomycotina (yeast or septate mycelium, perfect state spore – basidiospore formed on a basidium).

Example: *Agaricus*, *Puccinia*

- 1. Class. Teliomycetes. Basidiocarp lacking, teliospores grouped in sori or scattered within the host tissue, parasitic on vascular plant.
- 2. Class. Hymenomycetes. Basidio- carp present. Hymenium is com-pletely or partly exposed at matu-rity. Basidiospore ballistospores.
- 3. Class. Casteromycetes. Basidiocarp present. Hymenium enclosed in basidiocarp. Basidiospore not ballistospores.

...Eumycota

Subdivision. Deuteromycotina or Fungi imperfecti. Yeast or septate mycelium. Perfect state unknown.

Example: *Fusarium*, *Cercospora*

1. Class. Blastomycetes. Budding (Yeast or Yeast like) cells with or without pseudomycelium. True mycelium lacking or not well-developed.
2. Class. Hyphomycetes. Mycelia sterile or bearing asexual spore directly or on conidiophore, in various aggregation.
3. Class. Coelomycetes. Mycelial; asexual spore formed in pycnidium or acervulus.

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Motile cells absent

Sub-division : MASTIGOMYCOTINA

Zoospore unilagellate
(whiplash type)



Synchytrium

Class : Chitridiomyceles
e.g. *Opidium*, *Synchytrium*

Zoospore unilagellate
(tinsel type)



Rhizidiomyces

Class : Hyphochytridiomyceles
e.g. *Rhizidiomyces*, *Rhizidiomycopsis*

Zoospore bilagellate
(one whiplash and other tinsel type)



Phytophthora

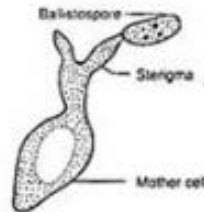
Class : Oomycetes
e.g. *Pythium*, *Phytophthora*

Perfect state absent

Sub-division : DEUTEROMYCOTINA

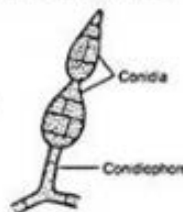
Perfect state present

True mycelium lacking or not well developed



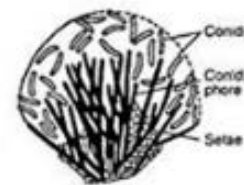
Sporobolomyces roseus
Class : Blastomycetes
e.g. *Sporobolomyces*, *Bullera*

True mycelium may be sterile or bearing spores directly or on sporophores



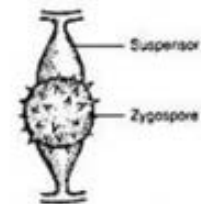
Alternaria
Class : Hyphomycetes
e.g. *Botrytis*, *Rhizoctonia*

True mycelium aggregated to form pycnidium or acervulus produces spores inside



Acervulus of *Colletotrichum*
Class : Coelomycetes
e.g. *Colletotrichum*, *Pestalotia*

Perfect state spore-Zygospor



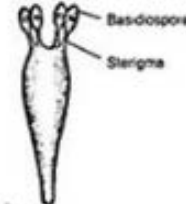
Single zygospor of *Mucor*
Subdivision :
ZYGOMYCOTINA

Perfect state spore-Ascospore



An ascus of *Ascoberolus*
Subdivision :
ASCOMYCOTINA

Perfect state spore-Basidiospor



Single basidium of *Agaricus*
Subdivision :
BASIDIOMYCOTINA

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