CLASSIFICATION OF FUNGI (Hawksworth et. al., 1995)

Hawksworth et. al., in the 8th edition of ***Dictionary of the fungi***, recognized the merit of the molecular phylogeny in classifying organisms and recast the classification of fungi as shown below:

Kingdom PROTOZOA

Phylum Acrasiomycota

Phylum Dictyosteliomycota

Phylum Myxomycota→ **i) Class** Myxomycetes

ii) Class Protosteliomycetes

Phylum Plasmodiophoromycota

Kingdom STRAMINOPILA (CHROMISTA)

Phylum Hyphochytriomycota

Phylum Labyrinthulomycota

Phylum Oomycota

Kingdom FUNGI

Phylum Ascomycota (no classes)

Phylum Basidiomycota→ **i) Class** Basidiomycetes

ii) Class Teliomycetes

iii)Class Ustomycetes

Phylum Chytridiomycota→ **Class** Chytridiomycetes

Phylum Zygomycota→ **i) Class** Trichomycetes

ii) Class Zygomycetes

Kingdom Protozoa :- Now, the slime molds are placed under the kingdom Protozoa, a new kingdom under the domain Eukarya. The kingdom Protozoa includes predominantly unicellular, plasmodial or colonial organisms that are wall less during their somatic phase. These are phagotrophic on bacteria, yeasts, spores etc. in dung or decaying plant materials. Ciliary hairs are never rigid or tubular. Chloroplasts when present lack starch or phycobilisomes. The multicellular species show minimal cell differentiation.

Phylum 1 : Acrasiomycota : 1. The somatic phase comprises small, unicellular, independent, haploid, amoeboid cells.

2. These are typically cylindrical, with a clear demarcation of an inner granular endoplasm and outer, non granular ectoplasm.

3. There is a single lobed pseudopodium in the anterior region and several small filose pseudopodia on the posterior.

4. The amoebae are phagotrophic and feed on bacteria, yeast and spores and multiply by fission.

5. The individual amoebae encyst under unfavourable circumstances, which on germination give rise to amoebae. Under favourable circumstances, the amoebae aggregate to form a sorocarp, which looks like a microscopic tree, with stem and branches. It is surrounded by membranous sheath. The stem comprises somatic cells while the cells in the branches are spores. Both give rise to amoebae on germination.

6. Flagellated cells are absent, and sexual reproduction is not reported.

Example: *Acrasis rosea*

Phylum 2 Dictyosteliomycota : 1. The somatic phase consists of small, independent, uninucleate, haploid amoeboid cells that feed on bacteria by phagocytosis and multiply by binary fission.

2.As soon as the population of the amoebae attains a critical number, they organize themselves into a slug or bullet shaped colony, called grex. This is pseudoplasmodium. The individual cells in a colony are not fusedin the grex. The grex moves and after a definite period develops into a sorocarp. It consists of a stalk, bearing apically a mass of spores, which are not surrounded by peridium.

3. The spores are disseminated by wind and have cellulosic wall. Example: *Dictyostelium discoideum*

Phylum 3 Myxomycota : 1. The somatic phase is represented by a plasmodium, which is a giant multinucleate amoeboid mass of cytoplasm, lacking cell wall and definite form, moves by pseudopodia, divides synchronously by mitosis.

2. Under unfavourable condition the plasmodium forms sporocarp which is similar to the fungal sporangium.The spores at the time of germination undergoes meiosisand form four haploid nuclei, three of which disintegrate and one survive which produces a uninucleate haploid amoeboid cell**.** Such haploid amoebae develops whiplash type of flagella on availability off water, which are called myxamoebae.

3. The two myxamoebae come in contact and form zygote which grow into a diploid multinucleate plasmodium.

4. Under certain condition, plasmodium forms sclerotium, which on germination gives rise to a plasmodium. Example: *Physarum polycephalum*.

Phylum 4 Plasmodiophoromycota : 1. The thallus is a plasmodium, which develops only in plant cells as obligate parasites. The plasmodium may be haploid or diploid, is holocarpic and develops into thin walled sporangia, aggregated in sori, or into resting spores. The plasmodium is designated as zoosporogenous or cystogenous, depending on wheather it produces zoospores or cysts.

2. Zoospores are uninucleate, anteriorly biflagellate, heterokont and both flagella are of whiplash type.

3. The nuclear division is called cruciform or promitosis type. During division, an intranuclear spindle is formed and the chromosomes lie in a circle.

4. The resting spores or cysts are thick walled, dormant, resistant and aggregates to form sori called cystosori. The resting spore on germination gives rise to zoospores.

5. Sexual reproduction has been reported only in few cases, where it occurs by planogametic copulation. Example : *Plasmodiophora, Spongospora* etc.

Phylum 5 Hyphochytriomycota :1. These are characterized by their anteriorly uniflagellate swarmers – zoospores and gametes. The flagellum is of the tinsel type.

2.The thallus is microscopic, eucarpic, monocentric or polycentric, having cellulosic cell wall.

3. The zoosporangia are inoperculate, and the zoospores are released through discharge tubes.

4. Sexual reproduction is not reported. Resting spores have been found in few genera. Example: *Rhizidiomyces, Latrostium*.

Phylum 6 Labyrinthulomycota : 1.The most important feature of phylum is the formation of a wall less, ectoplasmic network, in which the spindle shaped or spherical thalli live and move by gliding.

2. The cytopolsamic network is formed by special invaginated cell surface organelles, called **bothrasome**.

3.The cell wall comprises scales produced by golgi bodies. The cell wall scales are made up of L-galactose and sulphated galactan.

4. Zoospores are biflagellate, with an anterior tinsel type of flagellum and posterior whiplash type of flagellum.

5. In sexual reproduction only biflagellate zoospores are formed which possess and eye spot, a rare feature not found in other algal group.The eye spot helps in positive phototactive movement. Example:*Labyrinthula*

Phylum 6 Oomycota : 1. Diploid nature of the somatic phase

2. Production of laterally biflagellate zoospores.

3. Presence of protoplasmic or nucleus associated microtubules in the zoospores.

4. Cell wall is made up of glucan cellulose.

5. Thick walled oospore is formed as a result of sexual reproduction.

6. The lysine biosynthetic pathway is different from true fungi because lysine is synthesized by diaminopimilic acid pathway in contrast to alpha aminoadipic acid pathway in true fungi. Example: *Achlya, Saprolegnia* etc.