

CATEGORIES IN CLASSIFICATION OF FUNGI

KINGDOM FUNGI

PHYLUM BASIDIOMYCOTA

CLASS BASIDIOMYCETOMYCETOMYCOTA

ORDER AGARICOMYCOTA

FAMILY AGARICACEAE

GENUS *AGARICUS*

.SPECIES: *AGARICUS CAMPESTRIS* L



According to **Alexopolus 1996** can classified fungi into 3 phyla depended upon the characteristics of fungi (**Somatic Phase** , **Sexual And Asexual Spores**)

1- Kingdom: Protista or Protozoa

Phylum: **Myxomycota**

Phylum: **Plasmodiophoromycota**

2- Kingdom: Straminipila (Cromista)

Phylum **Hyphochytriomycota**

Phylum **Labyrinthulomycota**

Phylum: **Oomycota**

3- Kingdom: True Fungi (Fungi)

Phylum: **Chytridiomycota**

Phylum: **Zygomycota**

Phylum: **Ascomycota**

Phylum: **Basidiomycota**

Kingdom: **Protista** or **Protozoa** (Phylum: **Myxomycota**) The Latin name **Myxomycota** comes from the Ancient Greek words **μύξα** (*myxa*), which means "mucus", and **μύκης** (*myces*), which means "fungus"..

Members of this division are commonly referred to as **slime molds**. Although presently classified as Protozoans, in the Kingdom Protista, slime molds were once thought to be fungi (kingdom Mycetae which includes lower and higher fungi) **because they produce spores that are borne in sporangia**

a characteristic common to some taxa of fungi. However, the **assimilative stage** in slime molds is morphologically similar to that of an amoeba. This assimilative stage has been designated a myxamoeba. The myxamoeba, as is the case of the **amoeba**, is a **uninucleate, haploid cell** which is **not** enclosed in a **rigid cell wall**, and ingests its food by means of **phagocytosis**. **In fungi**, the assimilative stages are mycelium and yeast, both of which are **surrounded by a rigid cell wall** and obtain their food by means of **absorption**. These are some of the reasons **why mycologists no longer recognize slime molds as being fungi**.



1- lack cell wall

2- somatic phase is uninucleate flagellated swarm cell (1n) or an amoeba is called

myxoamoeba (1n) others multinucleate is called plasmodium a mass amoeboid protoplasm has many nuclei (multinucleate) , 2n cell wall less.

3-produce spores that are borne in sporangia,

4- Most of these individuals are saprophyte , and its nutrition phagotrophic .

5- life cycle:- spores are germinated to form myxamoebae(non flagellated) or swarm cells (flagellated cell). And fused swarm cells or myxamoebae sexually to produce zygote (2N) , zygote germinate forming plasmodium (2N) During favorable conditions, the plasmodium will migrate and feed for a period of time before being converted to numerous sporangia

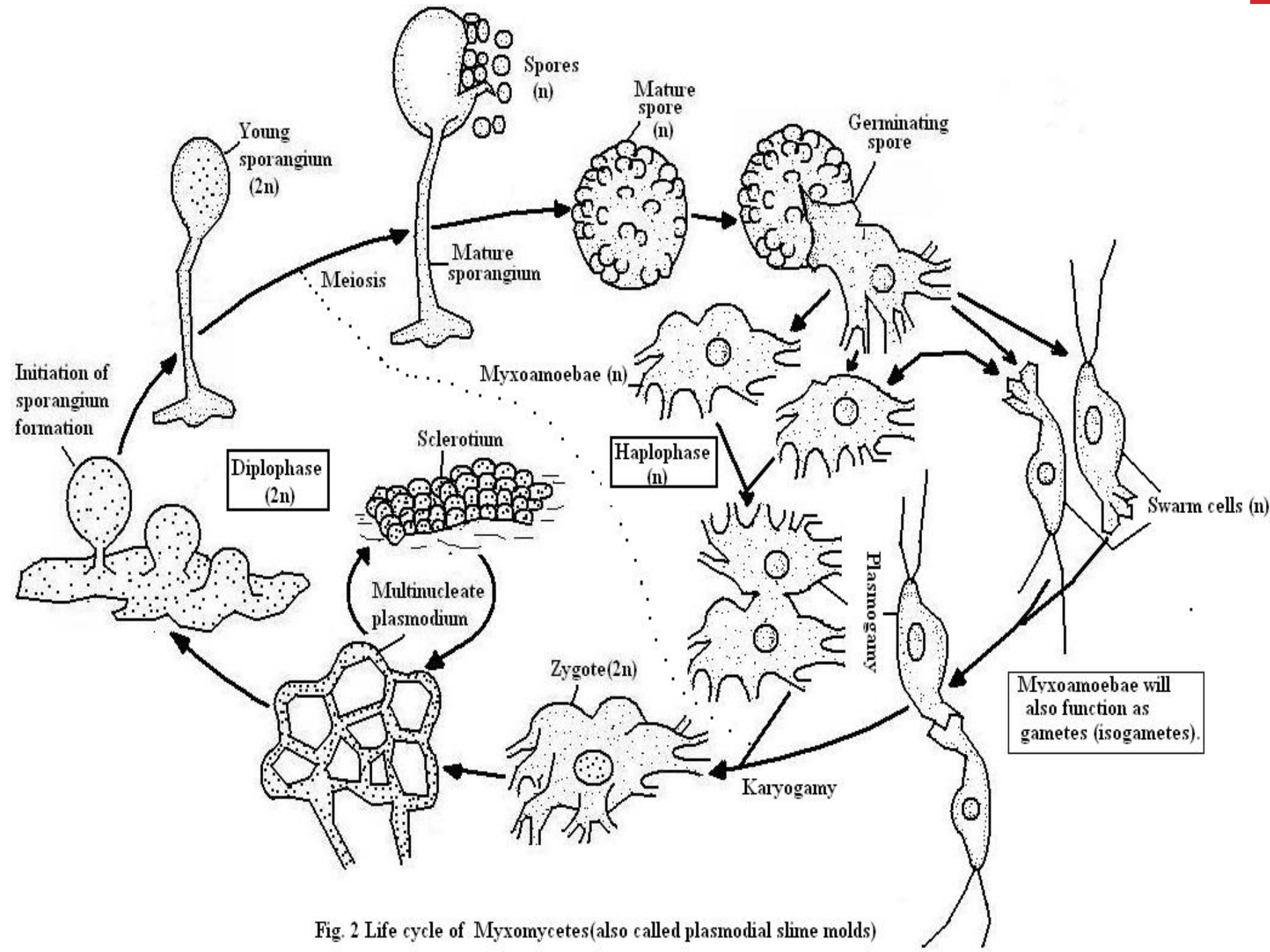
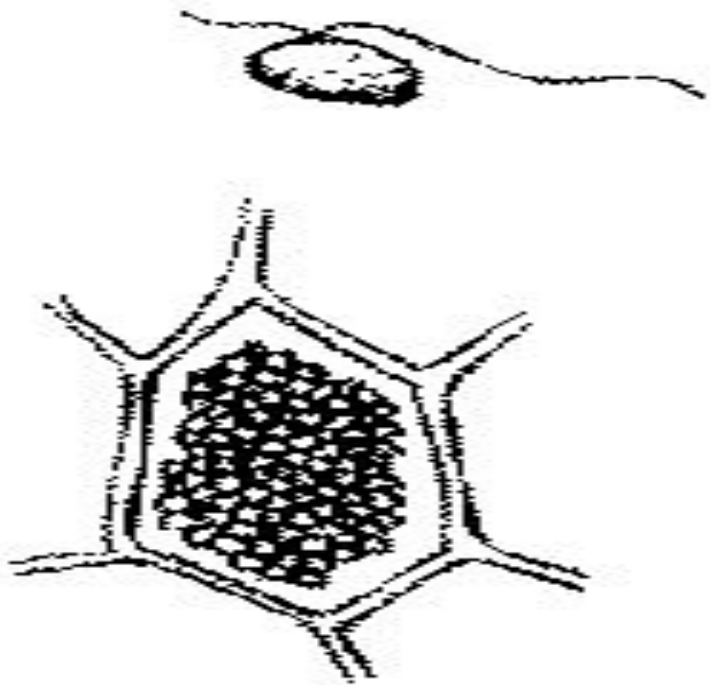


Fig. 2 Life cycle of Myxomycetes (also called plasmodial slime molds)

Phylum : **Plasmodiophoromycota**

are a group of obligate parasites commonly referred to as endoparasitic slime molds. Has the same characteristic of phylum myxomycota , All members are **obligate parasites** of algae, fungi, or plants, causing cell enlargement, especially of the roots. They are distinguished by the production of motile cells (zoospores) with two unequal anterior whiplash (flagella).



The best-known examples attack higher plants, causing economically significant diseases such as club-root of brassica (*Plasmodiophora brassicae*), powdery scab of potato (*Spongospora subterranea*):



Figure 3.



Figure 2.



Figure 1.



KINGDOM STRAMENOPILA (CHROMISTA)

INCLUDES DIATOMS, CHRYSOPHYTES, BROWN ALGAE AND PHYLA OF FUNGAL-LIKE ORGANISMS:

PHYLUM 1 HYPHOCHYTRIOMYCOTA

PHYLUM 2 LABYRINTHULOMYCOTA

PHYLUM 3 OOMYCOTA

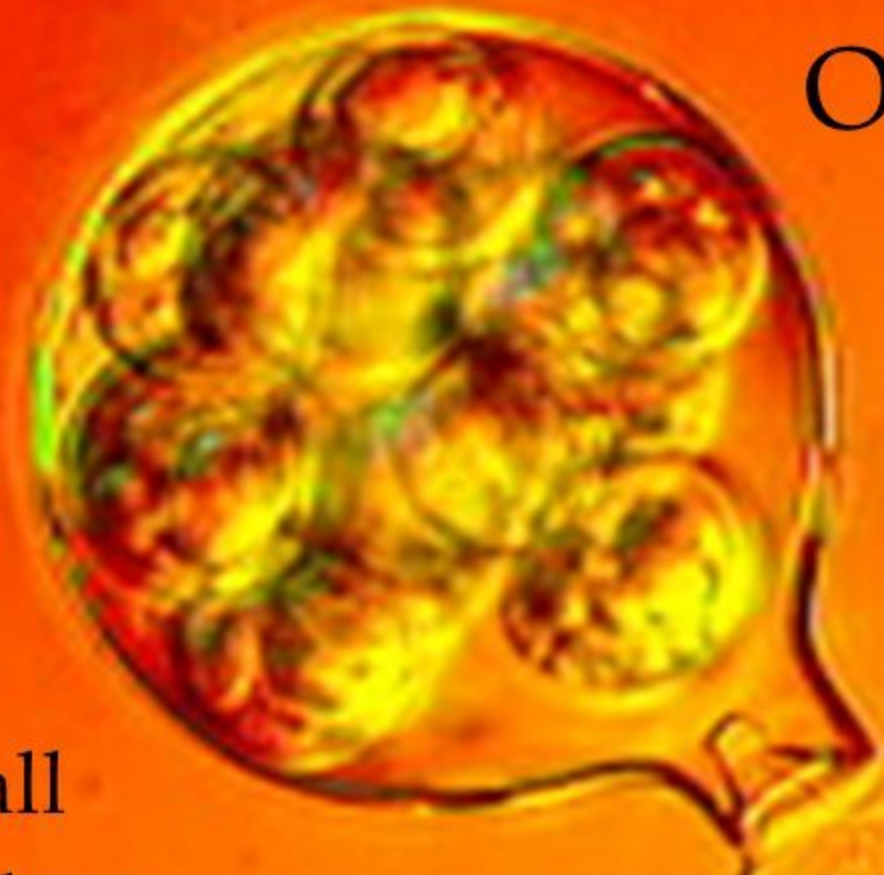
ITS NAME WAS INTRODUCED BY D. J. PATTERSON IN 1989 BASED ON TINSEL-TYPE FLAGELLUM. TINSEL FLAGELLUM WITH TWO ROWS OF TUBULAR TRIPARTITE HAIRS , PULLS ZOOSPORE THROUGH WATER AND PRESENCE OF FILAMENTOUS THALLUS IN SOME STRAMENOPILES AND FUNGI IS EVIDENCE OF CONVERGENT EVOLUTION

The individuals of 3 phyla are shared with true fungi in many physiological and morphological characteristics like have cell wall , and **somatic phase** consist from branched filaments hyphae and their nutrition is **Absorption** but different from true fungi in forming zoospores and the chemical components of cell wall is **cellulose** .

On the other hand these individuals also different from protistae (**slime molds**) in forming branched hyphae , have cell wall while somatic phase in slime mold (myxoamoeba uninucleate or plasmodium multinucleate) , cell wall less and its nutrition is phagotrophic in slime molds while absorptive nutrition in **stramenopila** .

Oomycetes

- Cell wall
 - cellulose
- Body structure
 - branching filaments
 - few cell walls



Phylum Oomycota (water molds)

Oomycota means "Egg Fungi" and refers to the large round oogonia, or structures containing the female gametes. It has economic importance because it includes water molds (grow on injured tissue but also will grow on the skin and gills of fish) and downy mildews (parasitic terrestrial plants acts as a pathogen).

They are filamentous which must absorb their food from the surrounding water or soil, or may invade the body of another organism to feed. As such, oomycetes play an important role in the decomposition and recycling of decaying matter. Other parasitic species have caused much human suffering through destruction of **crops and fish**.



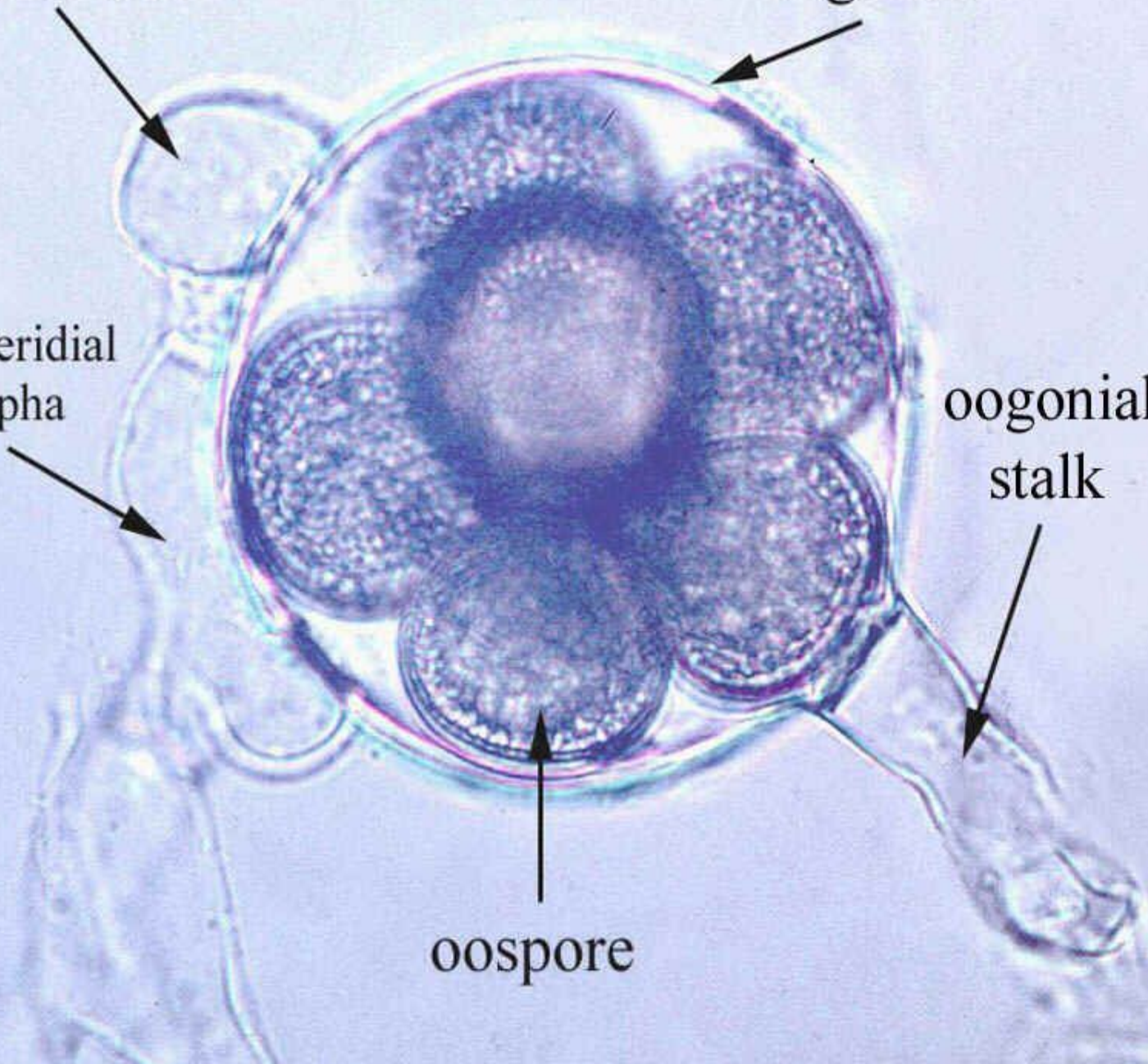
antheridium

oogonium

antheridial
hypha

oogonial
stalk

oospore



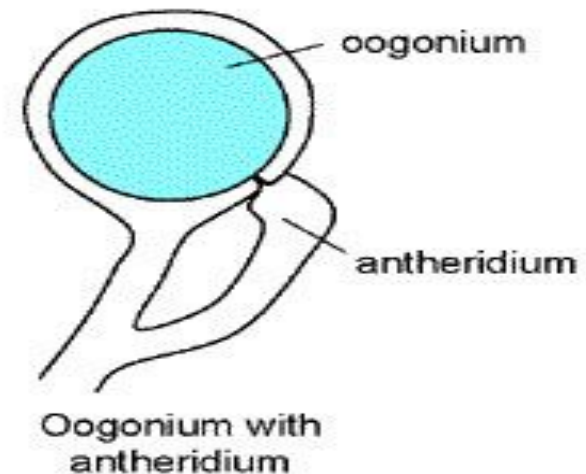
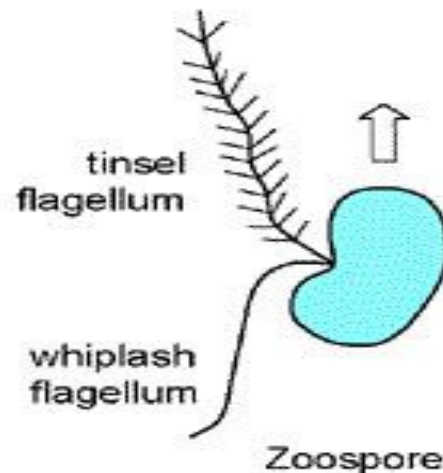
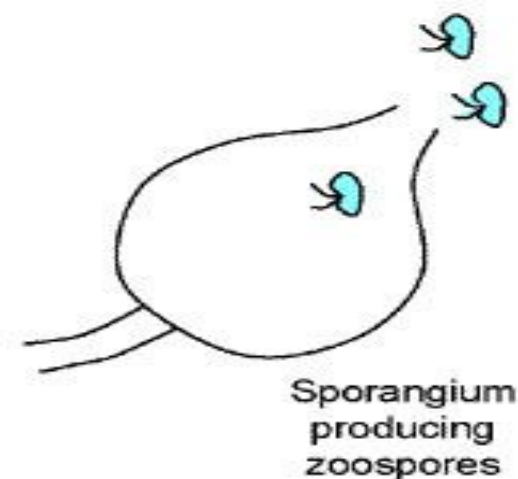
Characteristic of oomycota

1-have cell walls composed of **cellulose** and **glycan** , a diploid dominant lifecycle (**2n**).

2- **Somatic Phase** : The mycelium is **coenocytic** and produce septa only to **separate** the reproductive structures from the **assimilative portion** of the thallus.

3- Asexual reproduction is by **zoospores** that are produced in **zoosporangia**. The zoospores produced are **biflagellated** with one flagellum of the whiplash type and the other of the tinsel type.

4-Sexual reproduction is **heterogamous** and occurs by direct injection of the male nuclei (=sperms) from the **antheridium** into the eggs contained in the **oogonium** .

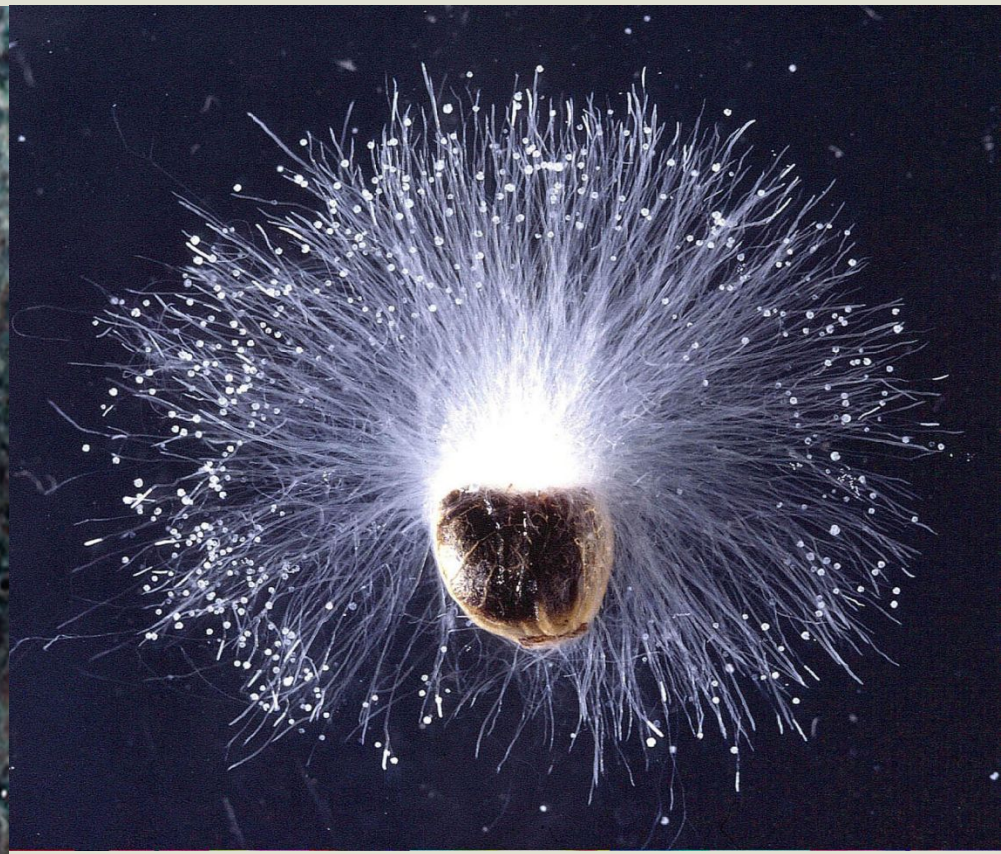


Class: Oomycetes

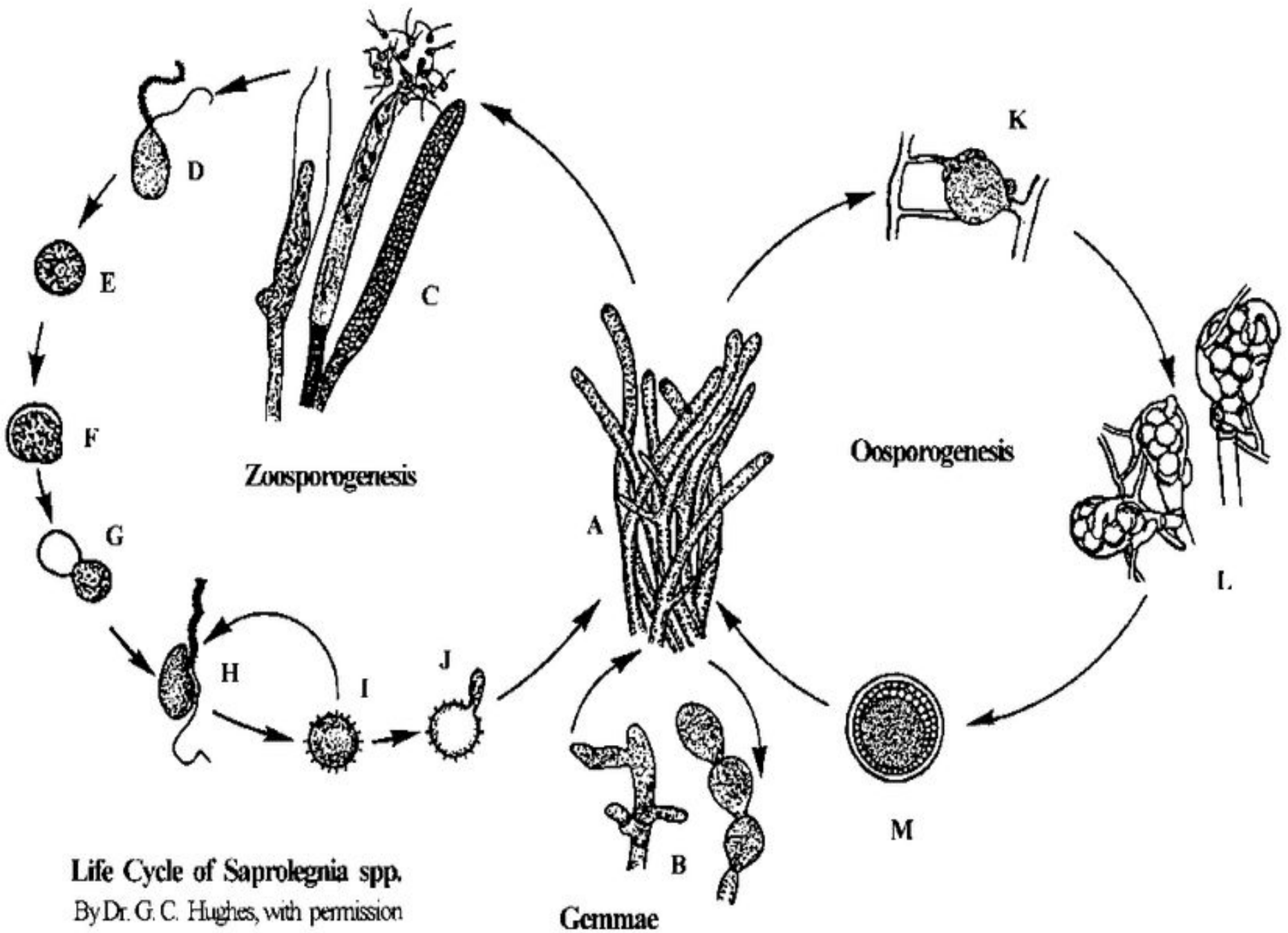
The characteristics of the class Oomycetes is the same as those of the division. We will examine two representatives in the Oomycota:

two orders (**Saprolegniales**) and (**Peronosporales**).

Saprolegnials include the largest family saprolegniaceae :
ex: *Saprolegnia parasatica* and *Achlya* spp.



Saprolegnia is the main genus of water molds responsible for significant fungal infections of freshwater fish and eggs. It like most water moulds, is both a **saprotroph** and **necrotroph** (facultative parasites). Typically feeding on waste from fish or other dead cells, *Saprolegnia* has a complex life cycle which includes both sexual and asexual reproduction. Sexual reproduction involves the production of antheridium and oogonium gametangia, which unite for fertilization. The asexual spore of *Saprolegnia* release motile, primary zoospores. Primary zoospores are active only for a few minutes before they encyst, germinate, and release a secondary zoospore. Secondary zoospores are more motile for a longer



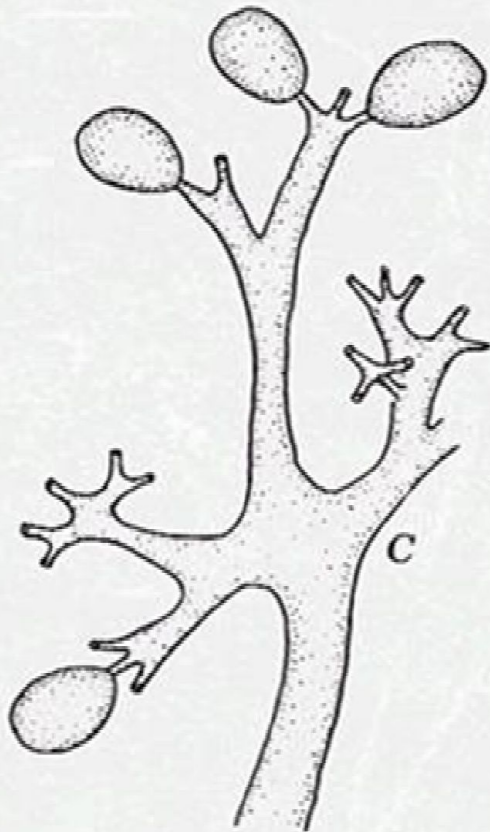
Life Cycle of Saprolegnia spp.
 By Dr. G. C. Hughes, with permission

Peronosporaceae (Downy mildew disease family) :- refers to any of several types of oomycete(Downy mildew disease family) :- refers to any of several types of oomycete microbes that are obligate parasites(Downy mildew disease family) :- refers to any of several types of oomycete microbes that are obligate parasites of plants. Downy mildews exclusively belong to Peronosporaceae .

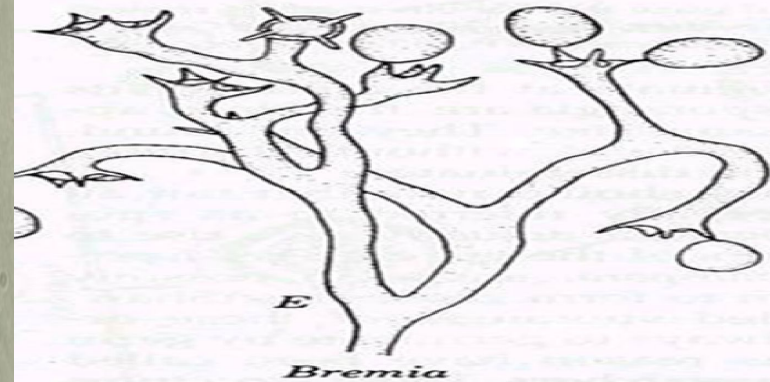
including species of *Basidiophora*,

1- *Plasmopara* sp. Sporangiophore branched is irregular with short and straight sterigma

2- *Bremia* sp. The ends of sporangiophore is branched many branches like palm and bear 4 sterigma on each of it one sporangium



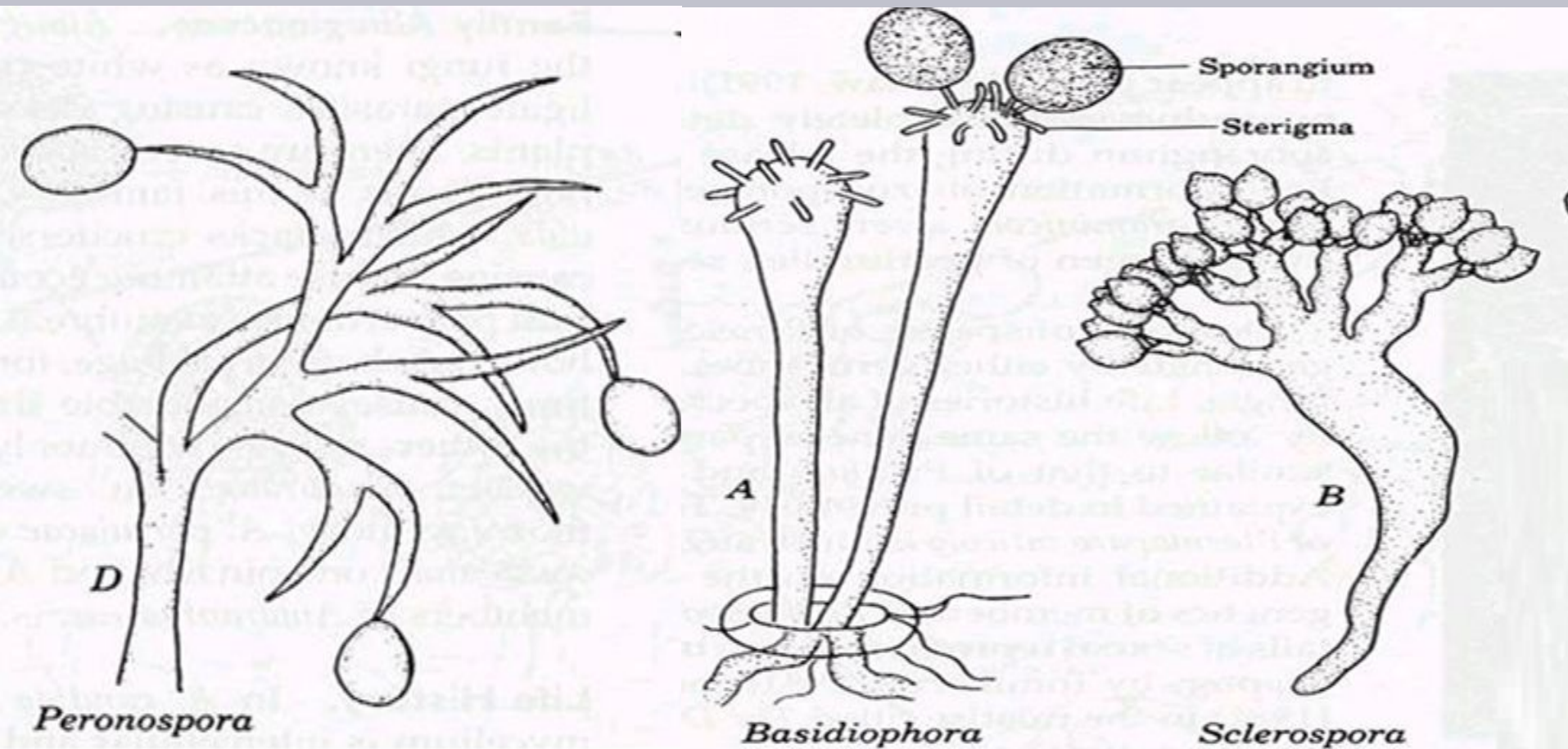
Plasmopara



3- *Peronospora* sp. Sporangiphore is branched dichasium dichasium and its branches long, curved terminal

4- *Basidiophora* sp . spongophore is Simple and swollen at the top and carries on its surface sporangia based on sterigma

5-*Sclerospora* sp. Sporangiphore is thick dendritic shaped branching many branches at the tip and bearing sporangia





Water molds Vs. fungi

1-water molds have cellulose for their cell walls , while fungi have chitin 2-water molds have diploid nuclei , whereas fungi have haploid nuclei.

3- self-motile spores of oomycetes usually have two flagella , while fungal spores have only one .

4- they both have different metabolic pathways for synthesizing lysine (an essential amino acid).

5- number of certain enzymes differ.





